SONY

HD CAMCORDER

HDW-700A

HDCAM

OPERATION MANUAL English

1st Edition

Serial No. 10001 and Higher

WARNING

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

To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

For the customers in U.S.A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of theFCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

For the customers in the USA and Canada

RECYCLING NICKEL-CADMIUM BATTERIES

Ni-Cd

NICKEL-CADMIUM BATTERY.
BATTERY MUST BE RECYCLED OR DISPOSED OF PROPERLY.

Nickel-Cadmium batteries are recyclable. You can help preserve our environment by returning your unwanted batteries to your nearest Sony Service Centre or Factory Service Centre for collection, recycling or proper disposal.
Note: In some areas the disposal of nickel - cadmium batteries in household or business trash may be prohibited.

For the Sony Service Centre nearest you call 1-800-222-SONY (United States only)
For the Sony Service Centre nearest you call 416-499-SONY (Canada only)

Caution: Do not handle damaged or leaking nickel-cadmium batteries.

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1-1 Features

The HDW –700A HD Camcorder combines a HD color video camera, of which effective picture elements is 1920(H) x 1080(V) and which uses 2/3 inch FIT[1] CCD[2] imagers with 2,000,000 picture elements, with an HDCAM portable videocassette recorder. Its excellent portability and dust- and water-proof construction make it ideal as a camcorder for ENG[3] and EFP[4] in the same way as the earlier DVW-700, which is the Digital BETACAM model. The introduction of a new method of processing HD digital signals improves the image quality even further and simplifies setup (initialization) operations.

1-1-1 Camera Features

The features of the HDW-700A camera are described below.

- 2/3 inch FIT CCDs with 2,000,000 picture elements provide a compact and lightweight unit with excellent image quality.
- Existing 2/3 inch lenses can be used.
- Digital signal processing has improved picture quality, stability, and reliability.
- A setup menu enables you to control features such as status displays, messages, and markers; to select various types of settings; to toggle switches; and to operate a setup card.
- Blur-free shooting is ensured by a built-in, high-performance electronic shutter that provides a variety of modes, such as ECS[5] mode which reduces flickering on the monitor screen and S-EVS[6] mode which improves vertical resolution.
- Selectable video gain ensures a noise-free image.
- A simple switch operation enables automatic adjustment of the black set, black balance, and white balance. Memory functions make it easy to replicate the white balance setting appropriate for the lighting conditions.

1) FIT: Frame Interline Transfer
2) CCD: Charge-Coupled Device
3) ENG: Electronic News Gathering
4) EFP: Electronic Field Production
5) ECS: Extended Clear Scan
6) S-EVS: Super Enhanced Vertical definition System

- Character display functions on the viewfinder indicate switch settings, automatic black and white balance adjustment, status indications, and warnings.
- The warning system uses various types of warning indicators and sounds to inform you of VTR faults, end of tape, low battery, etc.
- The camcorder is equipped with a dual-wheel filter disk for adjusting the filter setting to shooting and lighting conditions.
- Override function which makes fine adjustment of the reference value for brightness of automatic iris control is provided.
- A built-in circuit produces a color bar signal for easy adjustment of the color monitor.
- The remote control unit controls camera functions and VTR functions.
- Setup data specified by the camera operator, including the various marker settings, can be stored in the camcorder itself or on a setup card as an operator file, and then can be recalled.
- Setup data specified by video engineers, including the various detail settings, can be stored in the camcorder itself and on a setup card as a reference file, and then can be recalled. It is possible to shorten time for setting with duplicating the stored reference file to the other cameras through the setup card,
- Setup data specified by video engineers, including the video settings, can be stored as a scene file. It is possible to recall the setup data appropriate for the scene.
- Correction value to use a lens extender and for each lens can be stored as a lens file, and then can be recalled. It is possible to shorten time for adjustment when replacing the lens.
- A high-performance viewfinder is adjustable forward, backward, and sideways, and has a full range of auxiliary equipment.

1-1-2 VTR Features

The VTR features of this camcorder are described below.

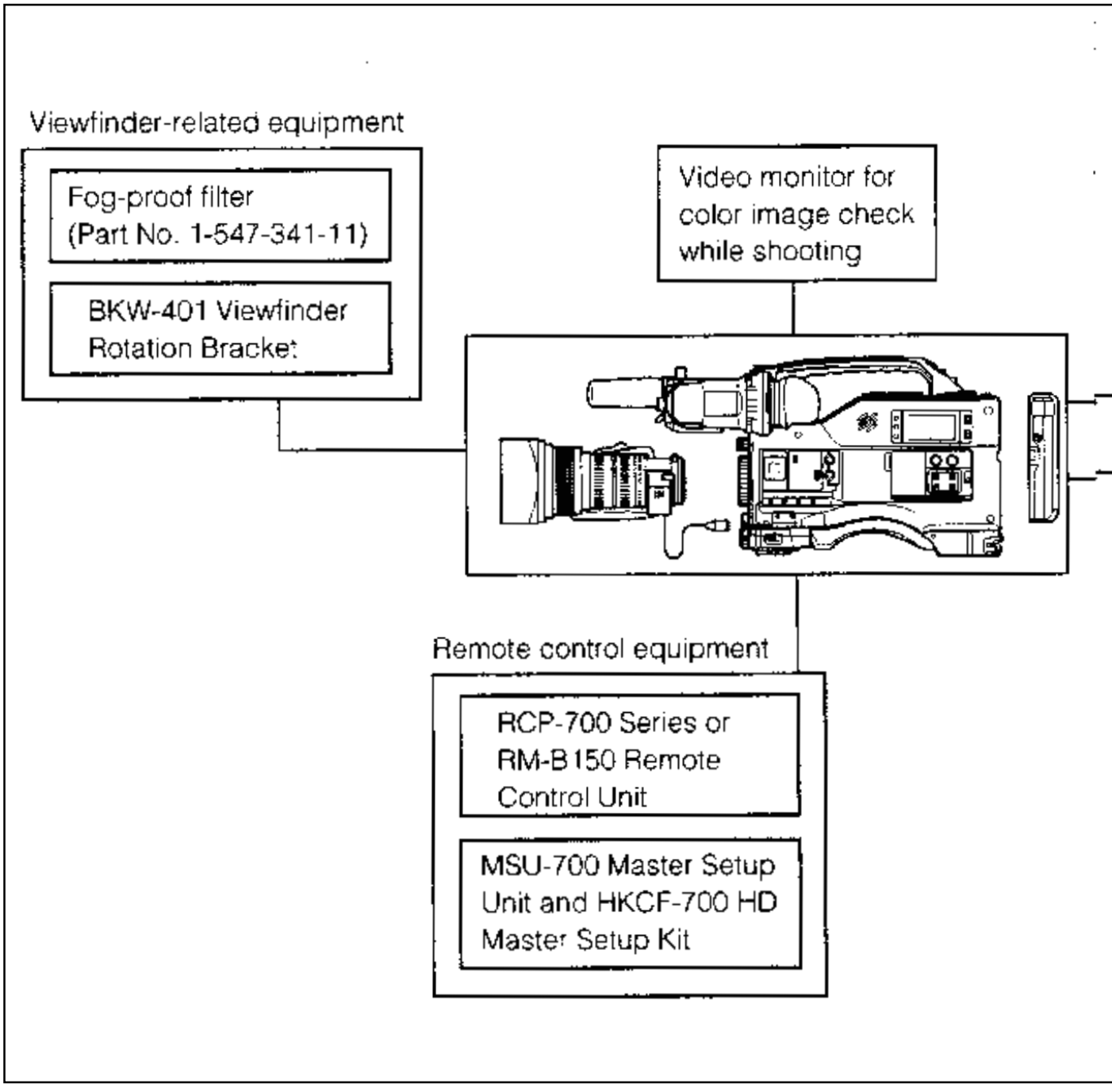
- Use of the HDCAM format allows high performance HD digital recording and playback while preserving the same ease of use as conventional camcorder equipment.
- The same cassette size (S size) as Digital BETACAM can be used to achieve a long recording time of approximately 40 minutes.
- The recording review function, which automatically rewinds and plays back the last approximately 3 seconds of recording on the tape, enables you to quickly confirm recorded contents.
- No playback adaptor is needed to see the color playback image on the monitor screen.
- The 3 times normal speed search function provides quick positioning of the tape.
- LTC[1)] and VITC[2)] recording and LTC playback can be performed.
- The built-in time code generator can be synchronized with an external generator.
- A lithium battery is the back-up power supply for the built-in time code generator enabling the time code to be held for approximately 5 years without charging the camcorder power supply.
- Optional long-life battery packs are available.
- Pressing the VTR START button on the camcorder or the VTR button on the lens ensures recording continuity from the very next frame.
- Two analog audio input channels can be recorded as 16-bit digital signals.

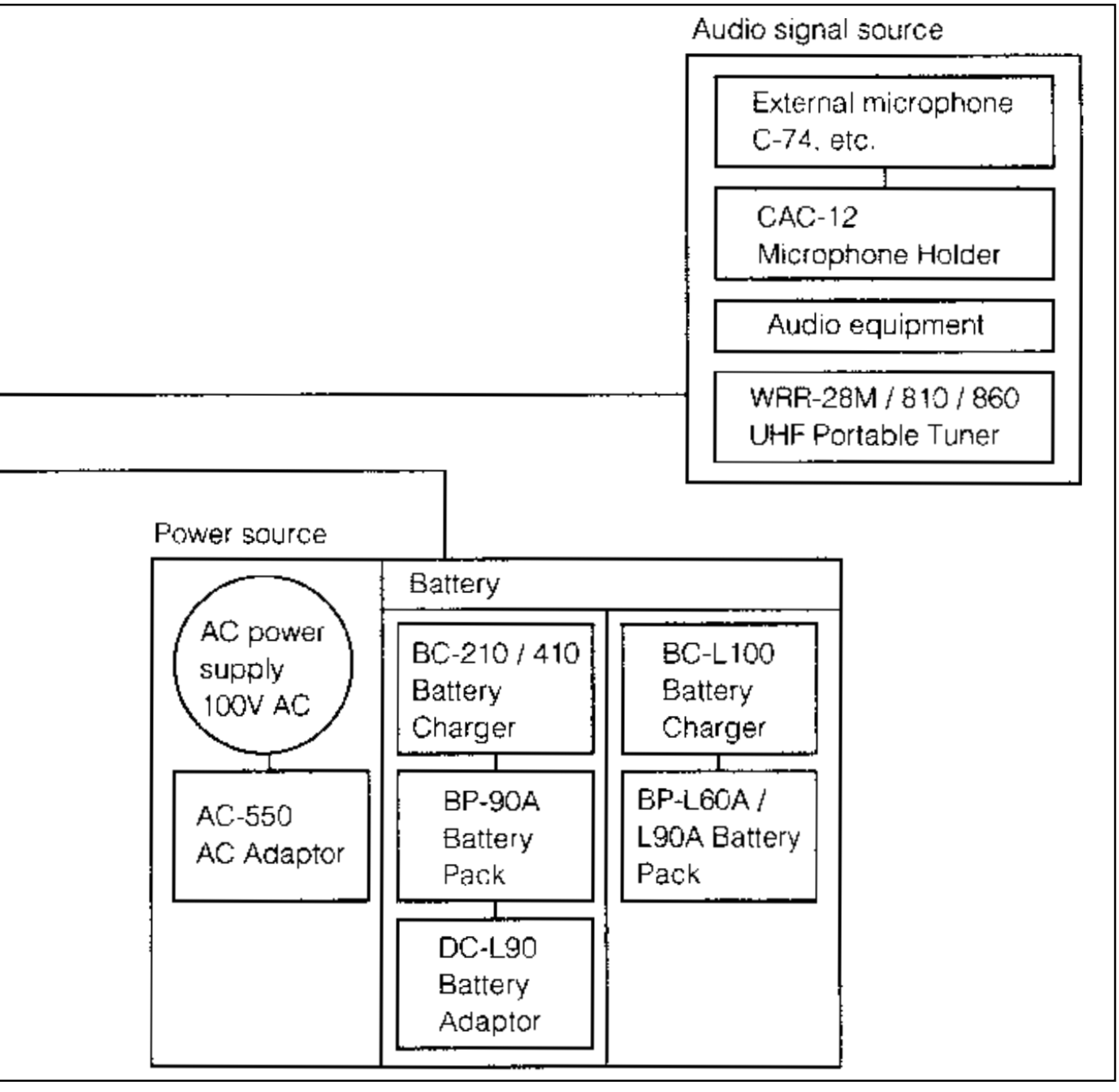
1) LTC: Longitudinal Time Code
2) VITC: Vertical Interval Time Code

1-2 Example of System Configuration

The diagram below shows a typical configuration of the camcorder for ENG and EFP.

For more information about the fittings, connections, or use of additional equipment and accessories, see Chapter 5 as well as the operation manuals for the connected equipment.




Audio signal source
External microphone
C-74, etc.
CAC-12
Microphone Holder
Audio equipment
WRR-28M / 810 / 860
UHF Portable Tuner
Power source
AC power
supply
100V AC
AC-550
AC Adaptor
Battery
BC-210 / 410
Battery
Charger
BP-90A
Battery
Pack
DC-L90
Battery
Adaptor
BC-L100
Battery
Charger
BP-L60A /
L90A Battery
Pack

1-3 Precautions

1

Use and Storage

Do not subject the camcorder to severe shocks
The internal mechanism may be damaged or the body warped.

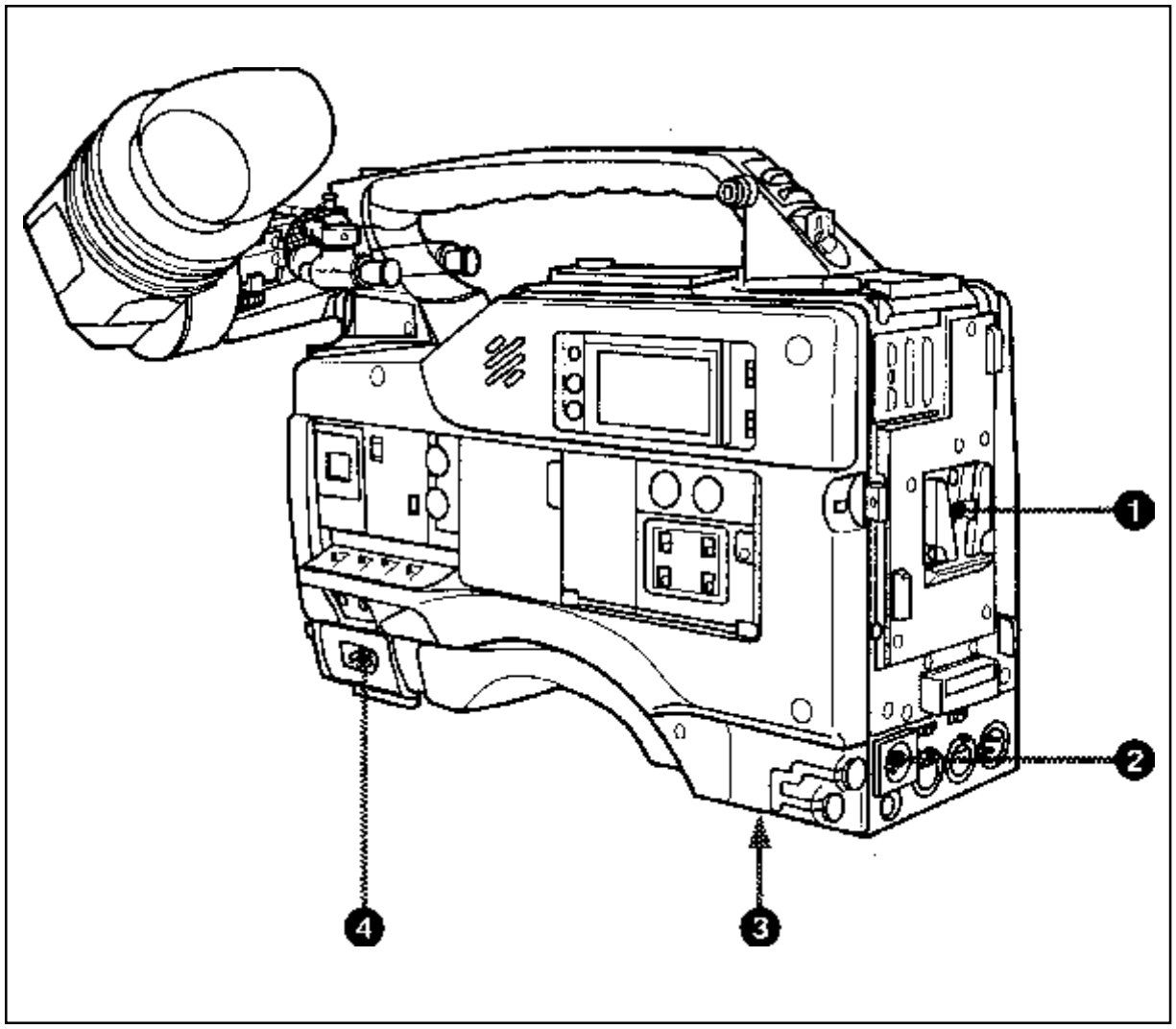
After use
Always turn off the power.

Before storing the camcorder for a long period
Remove the battery pack.

Use and storage locations
Store in a level, ventilated place. Avoid using or storing the camcorder in the following places.

- Places subject to temperature extremes
- Very damp places
- Places subject to severe vibration
- Near strong magnetic fields
- In direct sunlight or close to heaters for extended periods

2-1 Power Supply



Power Supply

❶Battery attachment

Attach a BP-L60A/L90A battery pack. A DC-L90 Battery Adaptor for loading a BP-90A Battery Pack also can be attached.

❷DC IN (external power input) connector (XLR type, 4-pin, male)

To operate the HDW-700A using an AC power supply, connect an AC-550 AC Adaptor with the DC output cable supplied with the adaptor. To use an external battery, connect its DC output cable to the DC IN connector.

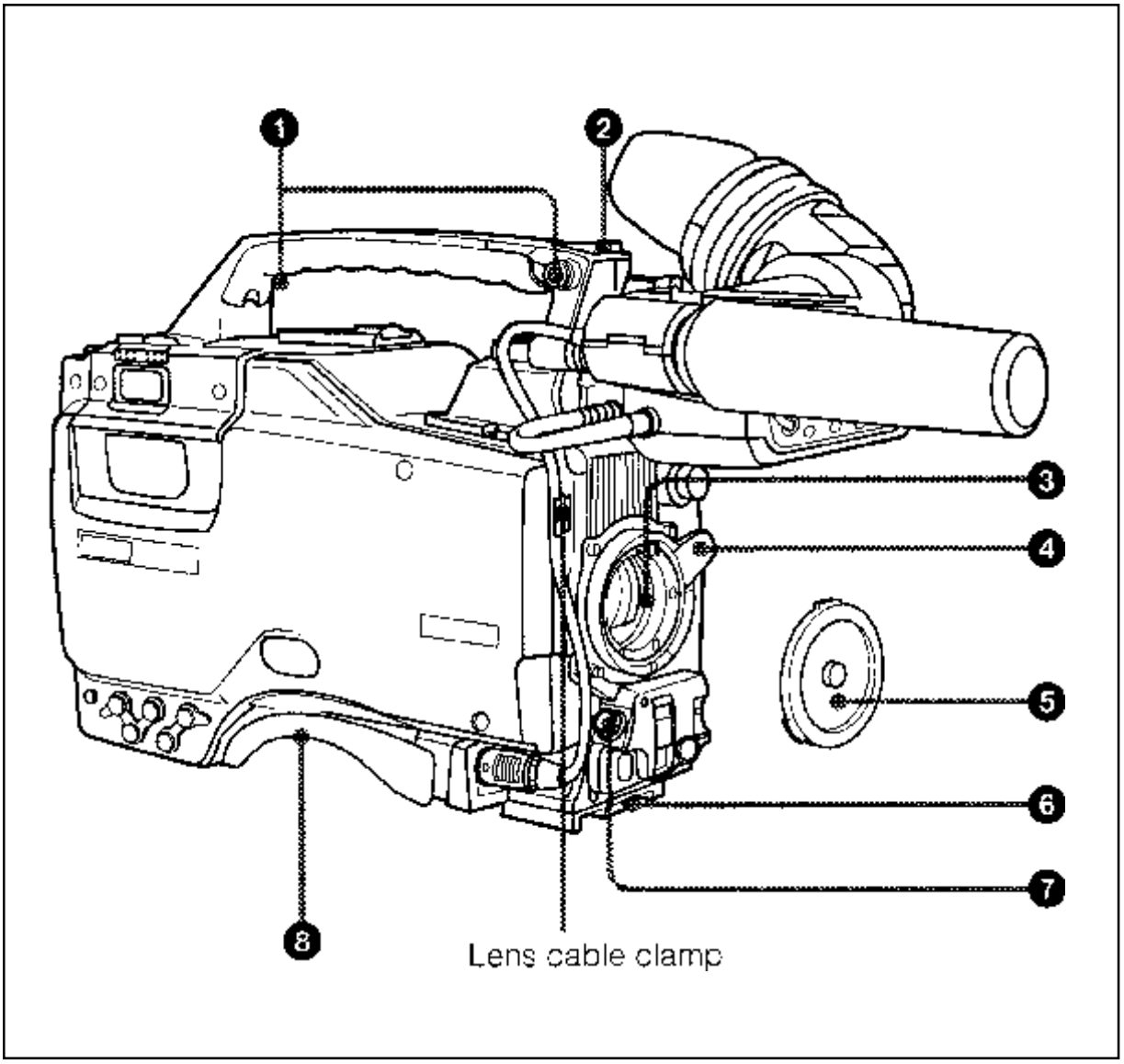
❸ BREAKER button

If excessive current flows within the unit, the breaker is tripped automatically to shut off the power supply and protect the equipment. After performing internal checks or adjustments, use a pointed object such as a pen to press down lightly on this button. If there is no problem, the power will again be supplied.

❹ POWER switch

This switch turns the main power supply on and off.

2-2 Accessory Attachments



Accessory attachments

❶ Shoulder strap posts
Attach the supplied shoulder strap to these posts.

❷ Light Shoe
Attach an optional accessory such as a video light to this shoe.

❸ Lens mount (special bayonet mount)
Use this for mounting the lens.

❹ Lens locking lever

After inserting the lens in the lens mount, rotate the lens mount ring with this lever to lock the lens in position.

❺ Lens mount cap

Remove this cap by pushing up on the lens locking lever. For protection from dust, always insert this cap when no lens is mounted.

❻ Tripod mount

When using the unit on a tripod, attach the supplied tripod adaptor.

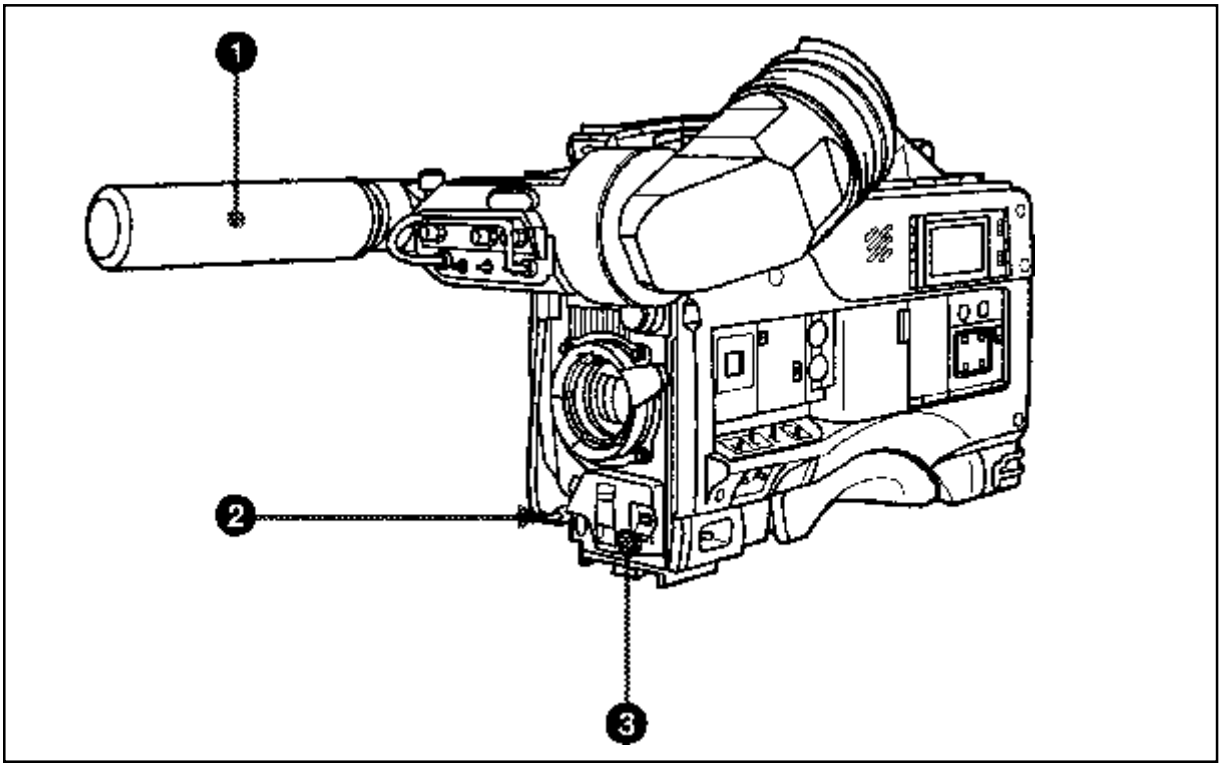
❼ LENS connector (12-pin)

Fit the lens cable to this connector. Contact your Sony representative for more information about the lens you are using.

❽ Shoulder pad

You can move the shoulder pad forwards or backwards by loosening the two screws. Do this to ensure the best balance when shooting with the camcorder on your shoulder.

2-3 Audio Functions



Audio functions (1)

❶ Microphone

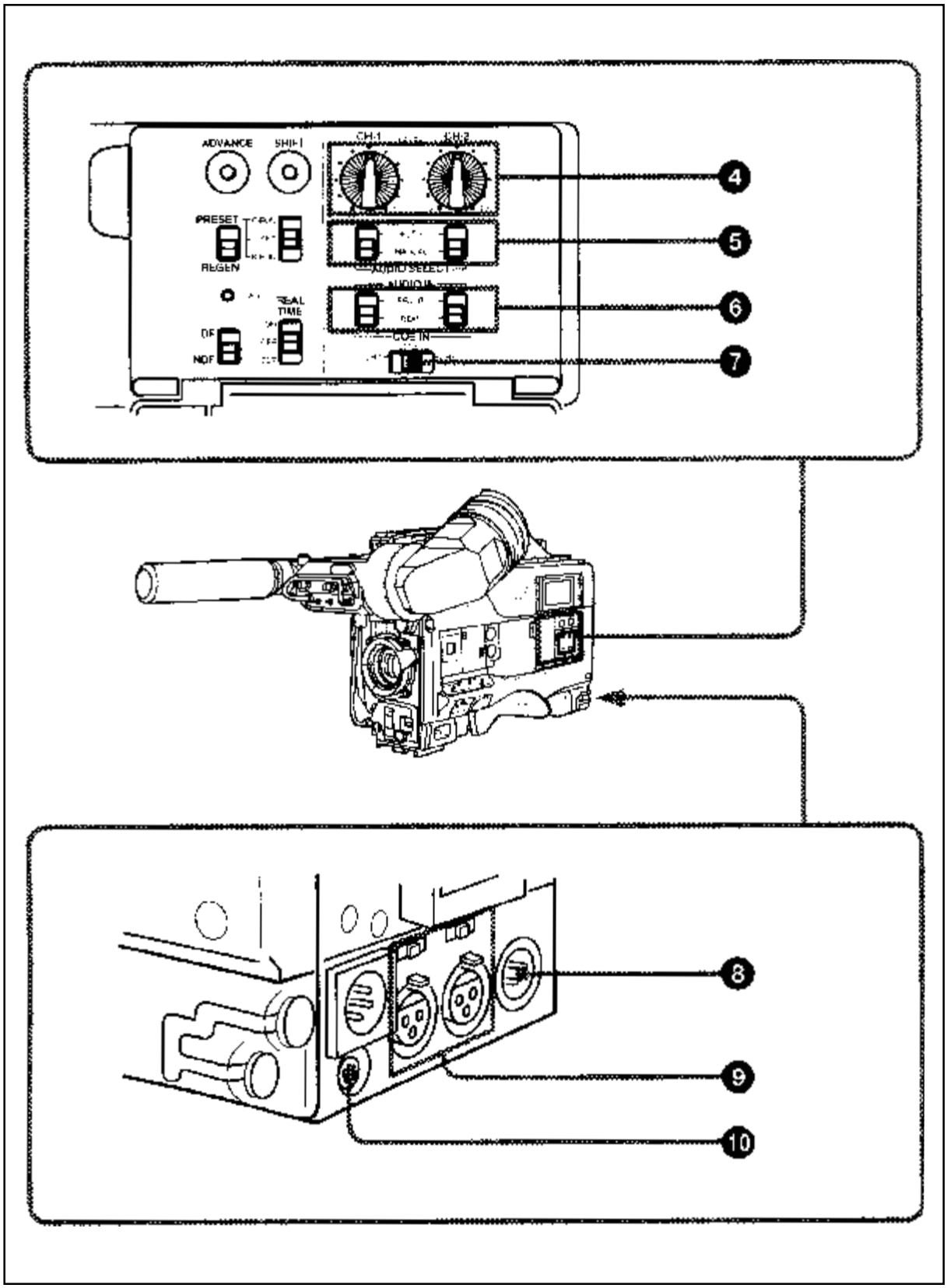
This is a super-cardioid directional microphone with an external power supply (+48 V) system. You can use it as an interview microphone by connecting it to an extension cable (not supplied).

❷ MIC IN (microphone input) connector (XLR type, 3-pin, female)

The supplied microphone connects to this connector. You can connect a microphone other than the supplied one as long as it corresponds to an external power supply system. The connector supplies power (+48 V) to the microphone.

❸ MIC/MENU knob

This knob adjusts the audio level of the front microphone. To adjust the front microphone level, set the VF DISP switch to ON, then push the MENU switch to CANCEL. The audio level indication will appear on the viewfinder screen. Note that you can do this only when the AUDIO SELECT CH-1 / CH-2 switches are set to MANUAL and the AUDIO IN switches are set to FRONT.



Audio functions (2)

❹ AUDIO LEVEL CH-1 / CH-2 (audio channel 1 and channel 2 recording level) controls

These controls adjust the audio levels of channels 1 and 2 when audio input is from the AUDIO IN CH-1 / CH-2 connectors and the AUDIO SELECT CH-1 / CH-2 switches are set to MANUAL.

❺ AUDIO SELECT CH-1 / CH-2 (audio channel –1 and channel – 2 adjustment method select) switches

These switches select the audio level adjustment method for each of audio channels 1 and 2.

AUTO: Use automatic adjustment.

MANUAL: Adjust the audio level manually.

❻ AUDIO IN (audio input) switches

These switches select the audio input signals to be recorded for audio channels 1 and 2.

FRONT: The input signal source is the microphone connected to the MIC IN connector.

REAR: The input signal source is the audio equipment connected to the AUDIO IN CH-1 / CH-2 connectors.

❼ CUE IN (cue track input) switch

This switch selects the input signal to be recorded on the cue track.

CH-1: CH-1 input signal

MIX: Mixed input signals of CH-1 and CH-2

CH-2: CH-2 input signal

❽ AUDIO OUT (audio output) connector (XLR type, 3-pin, male)

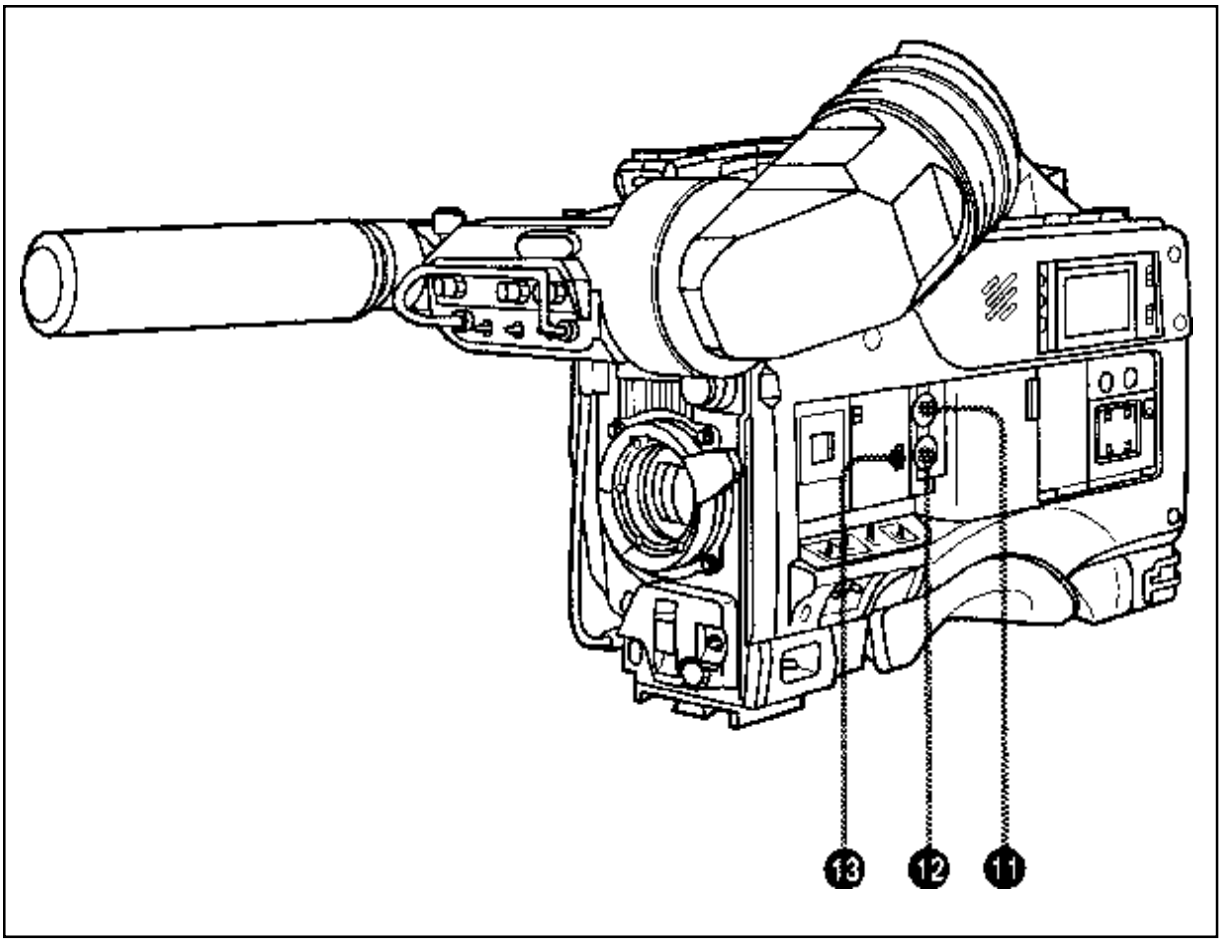
The connector outputs the audio signal selected by the MONITOR switch.

❾ AUDIO IN CH-1 / CH-2 (audio channel 1 and channel 2 input) connectors (XLR type, 3-pin, female) and LINE/MIC/+48 V ON (line input/microphone input/external power supply +48 V on) switches

These are audio input connectors for channels 1 and 2 to which you can connect audio equipment or a microphone.
The LINE / MIC / +48V ON switches select the audio source of the audio input signals connected to each of these connectors.
LINE: Line input audio equipment
MIC: Microphone with an internal power supply
+48 V ON: Microphone with an external power supply system

❿ DC OUT (DC power output) connector

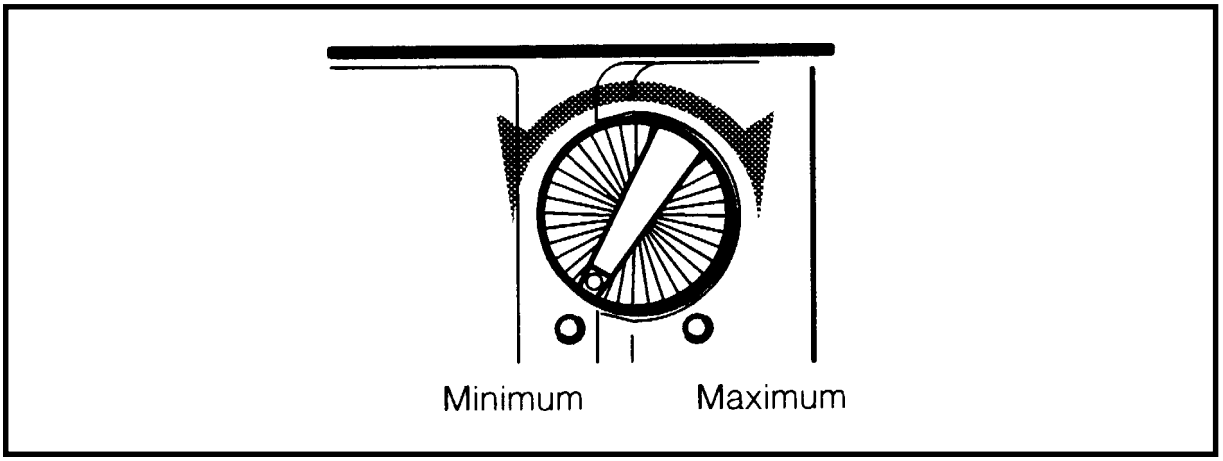
This connector supplies power for a WRR-28M / 860 UHF Portable Tuner (not supplied). Do not connect any equipment other than the UHF portable tuner.



Audio functions (3)

⓫ ALARM volume control

This control adjusts the speaker or earphone alarm volume. At the minimum position, no sound can be heard.



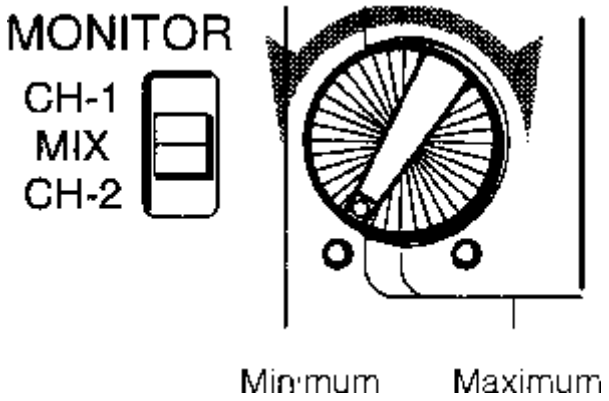
ALARM volume control

The internal volume control can be adjusted so that the alarm is audible even if the ALARM volume control is at the minimum position.

For more information, refer to the Maintenance Manual.

⓬ MONITOR volume control

This control adjusts the speaker or earphone volume for sounds other than the alarm sound. At the minimum position, no sound can be heard.

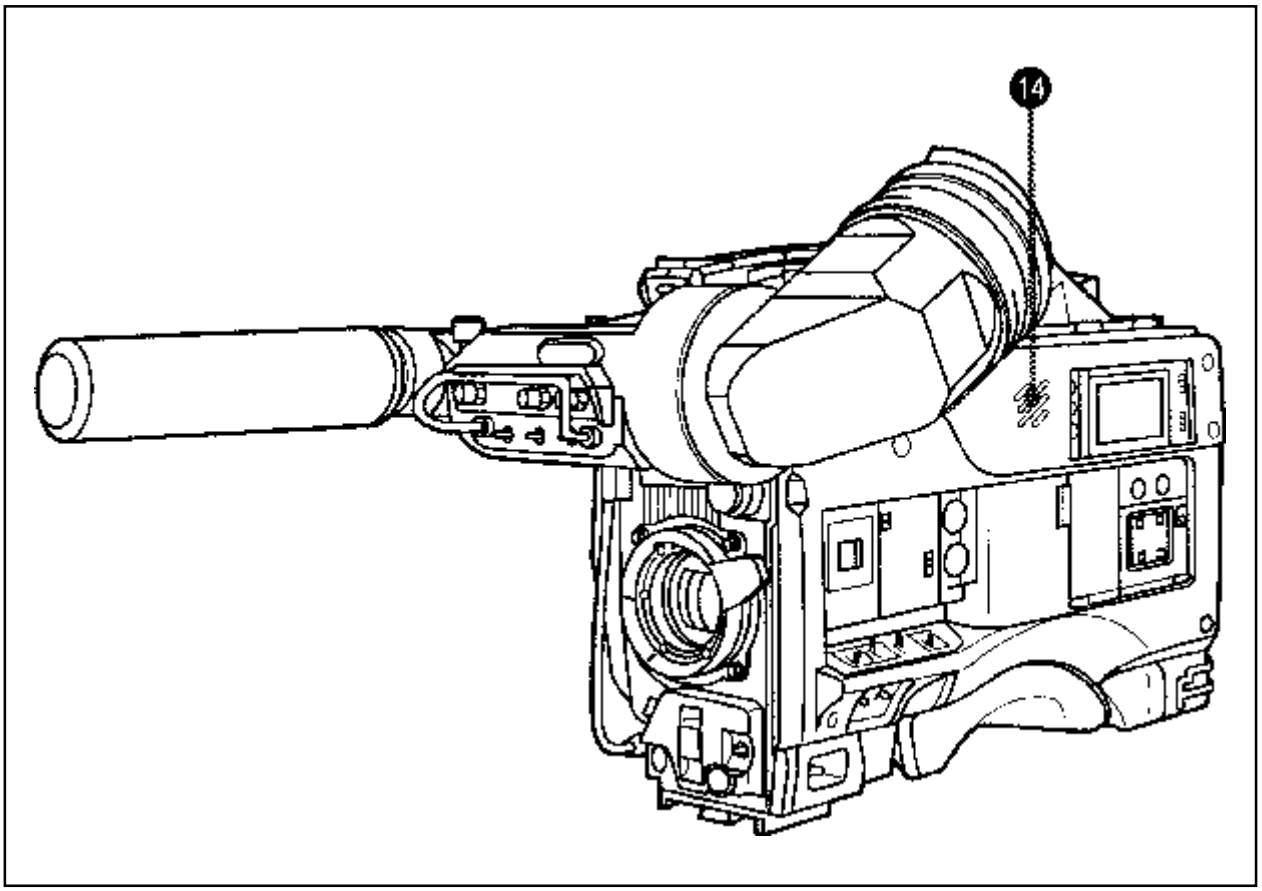


MONITOR volume control

⓭ MONITOR (audio channel select) switch

This switch selects the audio channel to be output from the speaker or earphone.

CH-1: Channel 1 audio
MIX: Mixed sound of channels 1 and 2
CH-2: Channel 2 audio



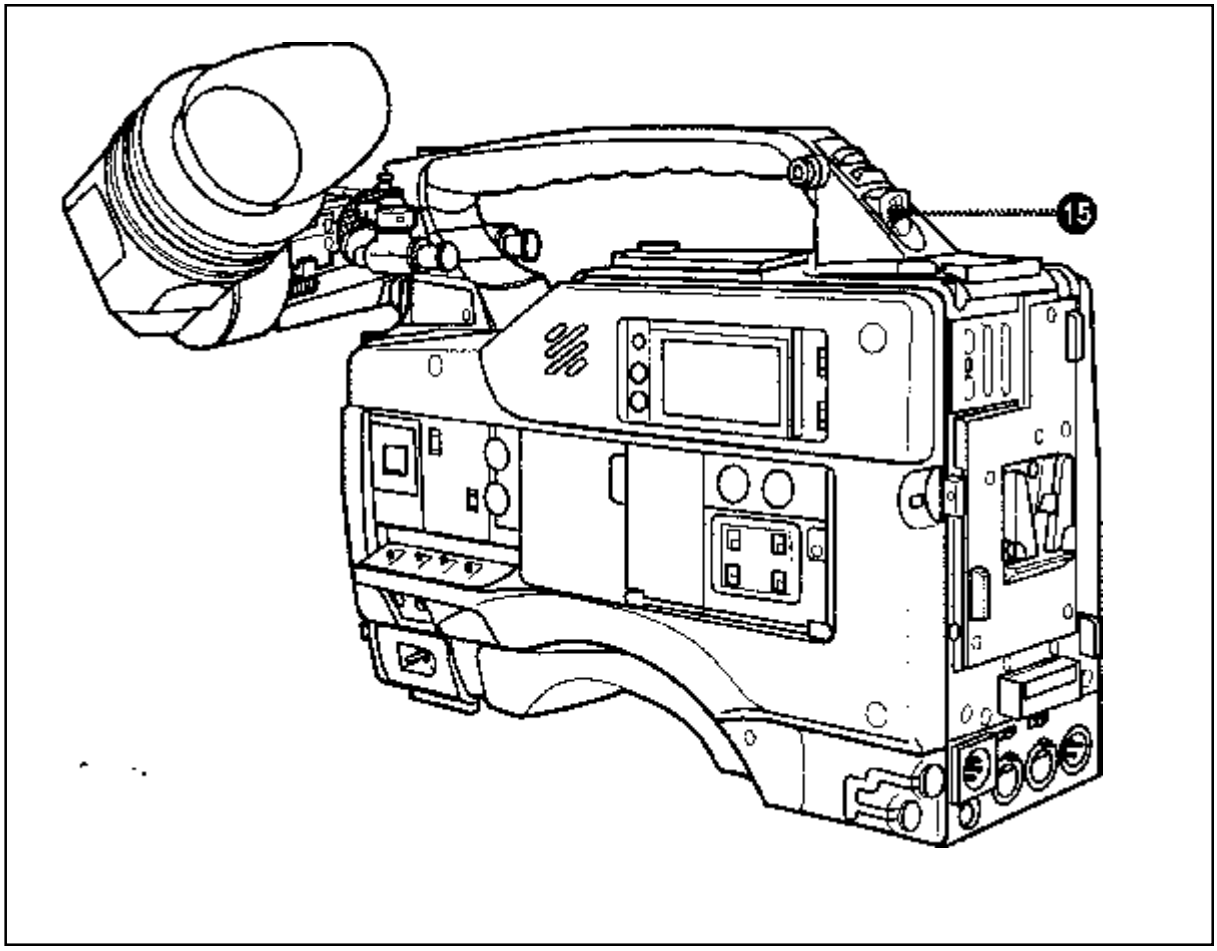
Audio functions (4)

⓮ Built-in speaker

During recording, the speaker can be used for monitoring the E-E[1)] sound, and during playback for monitoring playback sound. The speaker also sounds alarms to reinforce visual warnings.
If an earphone is plugged into the EARPHONE jack, the speaker sound is automatically cut off.

See Section 6-3 "Operation Warnings" (page 6-12) for information about alarms.

1) E-E sound (Electric-to-Electric sound)
The term E-E sound refers to an audio signal that has passed through the amplifier, but has not been recorded on the tape. In other words, you can directly monitor the recording input signal, as opposed to the simultaneous playback (output) signal.

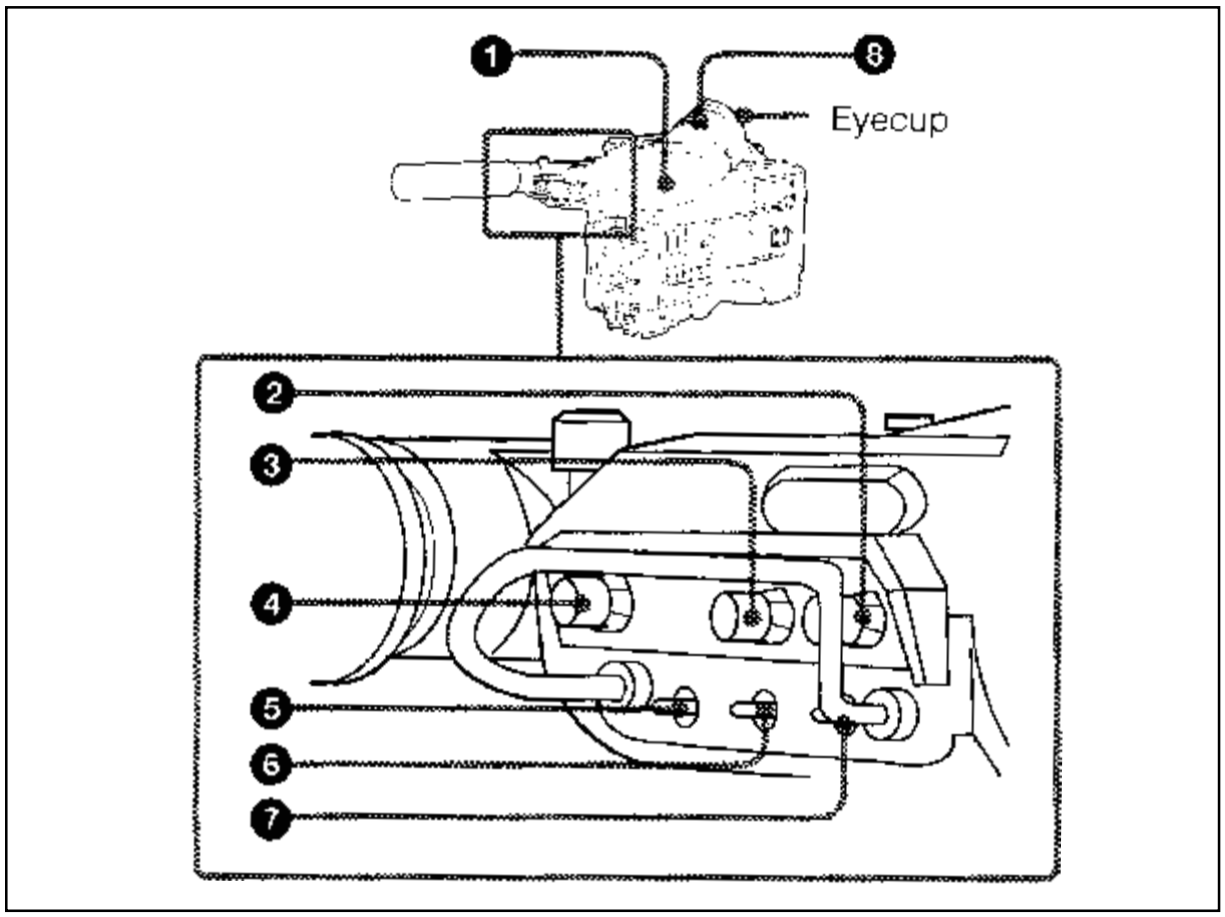


Audio functions (5)

⓯ EARPHONE jack

You can monitor the E-E sound during recording and playback sound during playback. Plugging an earphone into the jack automatically cuts off the built-in speaker, and you hear the alarms about the camcorder's operation and status through the earphone.

2-4 Shooting and Recording/ Playback Functions



Shooting and recording/playback functions (1)

❶ Viewfinder

The viewfinder lets you view the camera image in black and white while shooting the picture and also see the playback picture from the VTR. It also displays various warnings and messages related to the settings or operating conditions of the camcorder, a zebra pattern[1)], safety zone marker[2)], and center marker[3)].

1) Zebra pattern
The zebra pattern aids in manual iris adjustment by indicating areas of the picture where the video level is approximately 70% and 100% and above.
2) Safety zone marker
The safety zone marker is a rectangle indicating the effective picture area.
For more information, see Section 4-7-3 "Setting the Marker Display" (page 4-42)
3) Center marker
The center marker indicates the center of the picture with a crosshair.

❷ BRIGHT (brightness) control

This control adjusts the picture brightness on the viewfinder screen. It has no effect on the camera output signal.

❸ CONTRAST control

This control adjusts the picture contrast on the viewfinder screen. It has no effect on the camera output signal.

❹ PEAKING control

This control adjusts the sharpness of the picture on the viewfinder screen to make focusing easier. It has no effect on the camera output signal.

❺ DISPLAY / ASPECT (display/aspect control) switch

Use this switch to turn the markers on or off and to change the VF scan mode.

DISPLAY: When MARKER in the OPERATION menu is set to ON, pushing this switch to DISPLAY toggles the markers on the viewfinder screen on and off.

ASPECT: Pushing this switch to ASPECT toggles the viewfinder screens aspect ratio between 16:9 and 4:3.

❻ ZEBRA (zebra pattern) switch

This switch controls the zebra pattern on the viewfinder screen.

ON: The zebra pattern is displayed and stays.

OFF: No zebra pattern is displayed.

MOMENT: The zebra pattern is displayed and stays for 5 to 6 seconds.

The zebra pattern is factory set to indicate picture areas where the video level is approximately 70%. The setup menu can be used to specify that areas where the video level is 100% and above are to be displayed at the same time.

For information about how the zebra pattern is to be displayed to indicate areas of 100% or more, see Section 4-7-6 "Setting the Viewfinder" (page 4-47).

❼ TALLY switch

This switch controls the TALLY indicator (❶ on page 2-36), setting its brightness (HIGH or LOW) or turning it off.

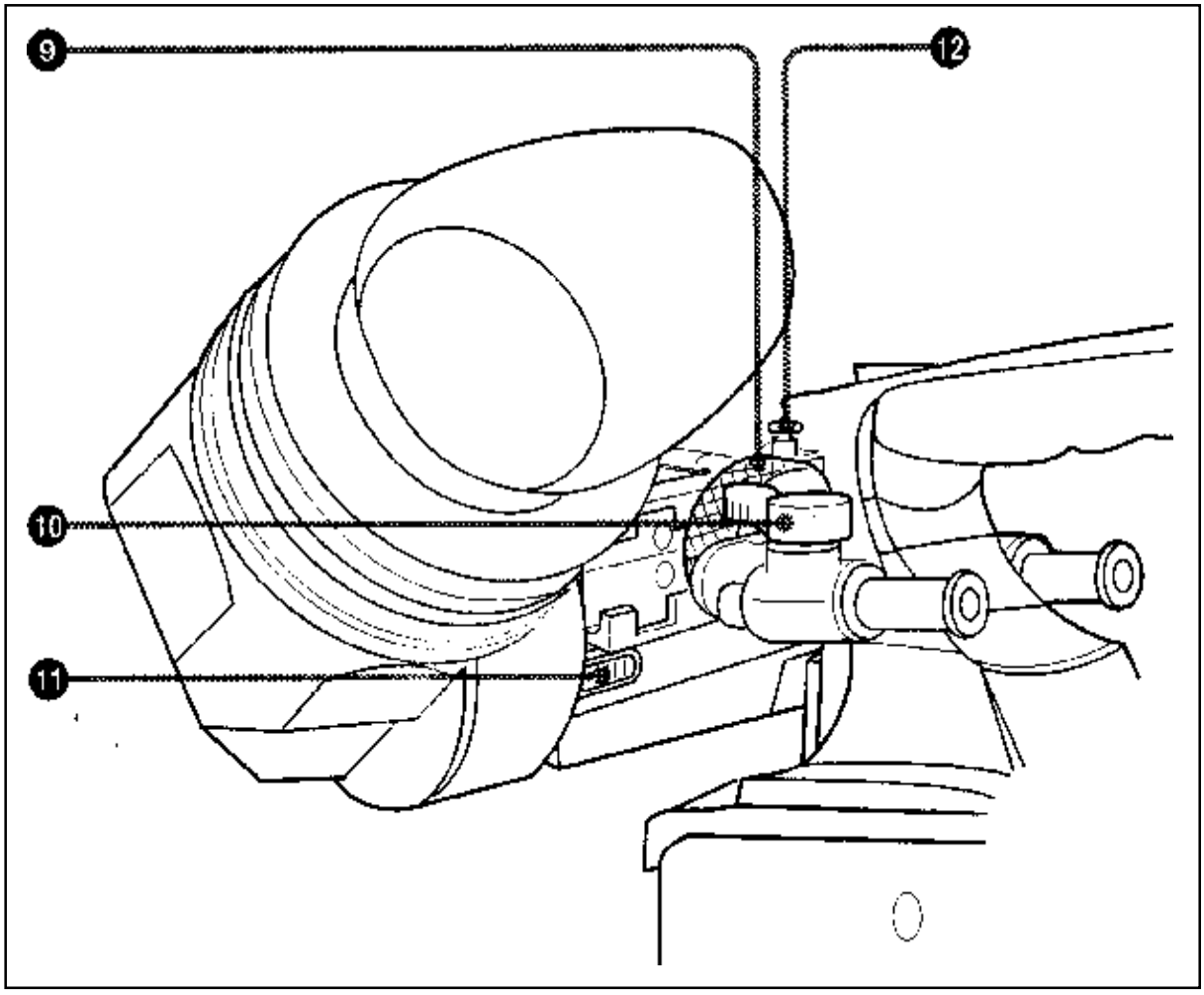
HIGH: The TALLY indicator gets brighter.

OFF: The TALLY indicator does not operate.

LOW: The TALLY indicator gets dimmer.

❽ Diopter adjustment ring

Use this ring to adjust the viewfinder image for your vision.



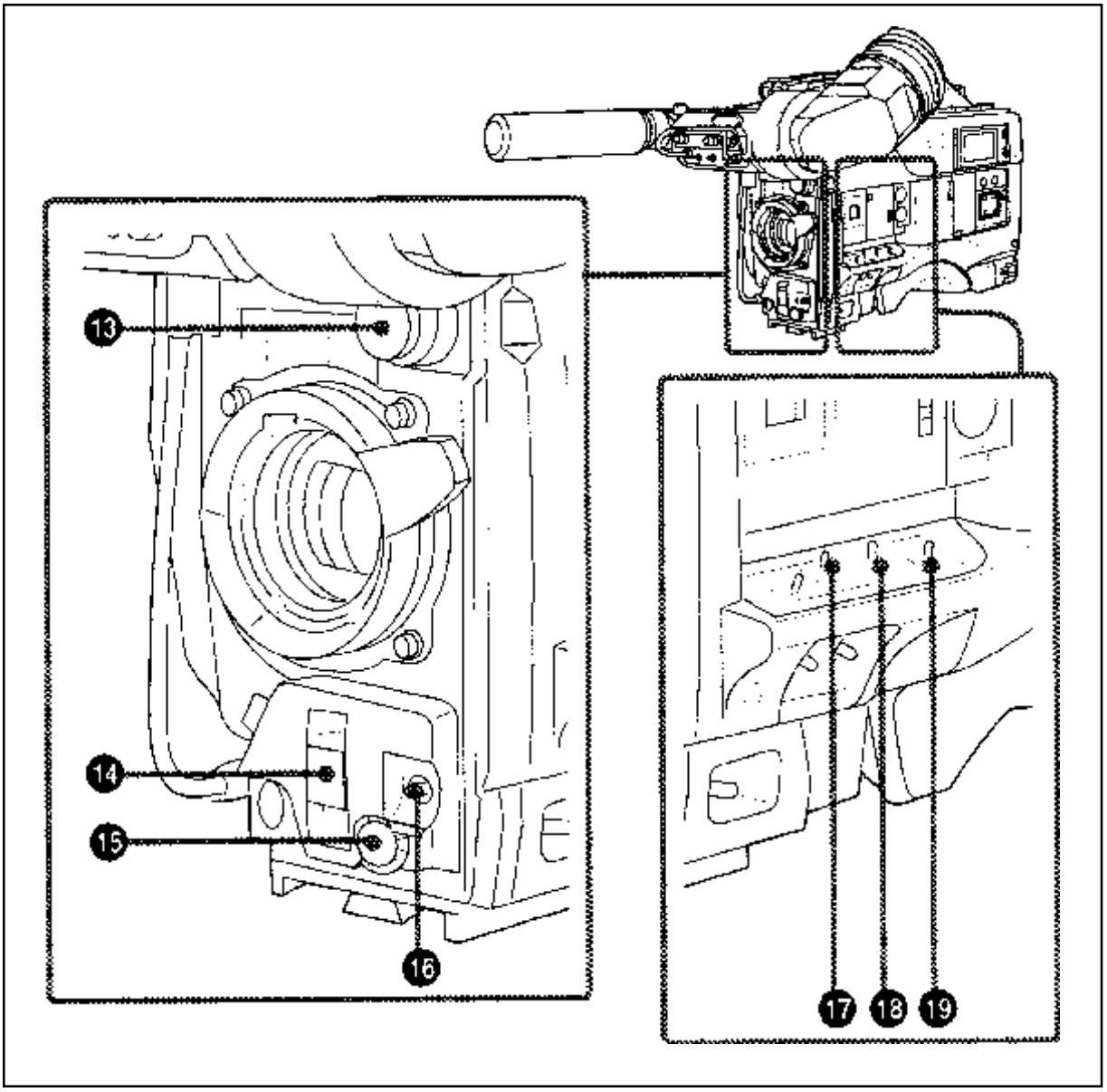
Shooting and recording/playback functions (2)

❾ Viewfinder left-right positioning ring
Use this ring to move the viewfinder sideways.

❿ Viewfinder front-rear positioning lever
Use this lever to move the viewfinder forward or backward.

⓫ Cameraman tally indicator
This indicator lights while the camcorder is operating.
Slide the window open when you shoot, keeping your eye away from the viewfinder. This indicator flashes when the battery level is running low or the tape is nearing its end.

⓬ Viewfinder stopper
Pull up this stopper to detach the viewfinder from the camera.



Shooting and recording/playback functions (3)

⓭ FILTER selector

This selector is a dual knob that selects the most appropriate filter to match the light source illuminating the subject. The outer knob selects the color temperature of the CC (Color Conversion) filter, and the inner knob selects the type of ND (Neutral Density) filter. When this selector is adjusted, the new setting will be indicated on the viewfinder screen for about 3 seconds. The white balance is stored in memory for each CC filter.

The relationships between the selector settings and filter selections as well as examples of filters for different shooting conditions are given below.

FILTER selector (outer) setting and CC filter selection

FILTER selector (outer) setting	CC filter selection
A	Cross filter[a)]
B	3200K
C	4300K
D	6300K

a) A type of special effect filter. Generates a cross-hair light ray on a highlighted portion.

FILTER selector (inner) setting and ND filter selection

FILTER selector (inner) setting	ND filter selection
1	Clear
2	1/4 ND
3	1/16 ND
4	1/64 ND

Examples of shooting conditions and appropriate filters

Shooting condition	CC filter	ND filter
Sunrise and sunset; inside studio	B(3200 K)	1 (clear)
Clear skies	C (4300 K) or D (6300 K)	2 (1/4 ND) or 3(1/16 ND)
Cloudy or raining	D (6300 K)	1 (clear) or 2 (1/4 ND)
Very bright conditions such as snow, at high altitudes, or at the seashore	C (4300 K) or D (6300 K)	3 (1/16 ND) or 4 (1/64 ND)

⓮ SHUTTER selector

Set this selector to ON to use the electronic shutter. Set it to SEL to switch the shutter speed or mode setting within the range that has been previously set from the setup menu.
When this selector is adjusted, the new setting will be indicated on the setting change / adjustment progress message display area for about 3 seconds.
For more information about the shutter speed and mode settings, see Section 4-2 "Setting the Electronic Shutter" (page 4-9).

⓯ MIC/MENU knob

When the DISP switch is set to ON or when the lens is using the automatic iris operation with the DISP switch set to OFF, pressing and turning the MIC/MENU knob sets the iris override (± 1 iris in 1/4 iris steps). The iris override setting returns to 0 when you turn off the camcorder, then on again.

⓰ AUTO W/B BAL (automatic white / black balance adjustment) switch

This switch activates the white balance and black balance automatic adjustment functions.

WHT: Automatic adjustment of the white balance. If the WHITE BAL switch is set to A or B, the white balance setting is stored in the corresponding memory. The memory can store the white balance setting for each CC filter.

BLK: Automatic adjustment of the black set and black balance.

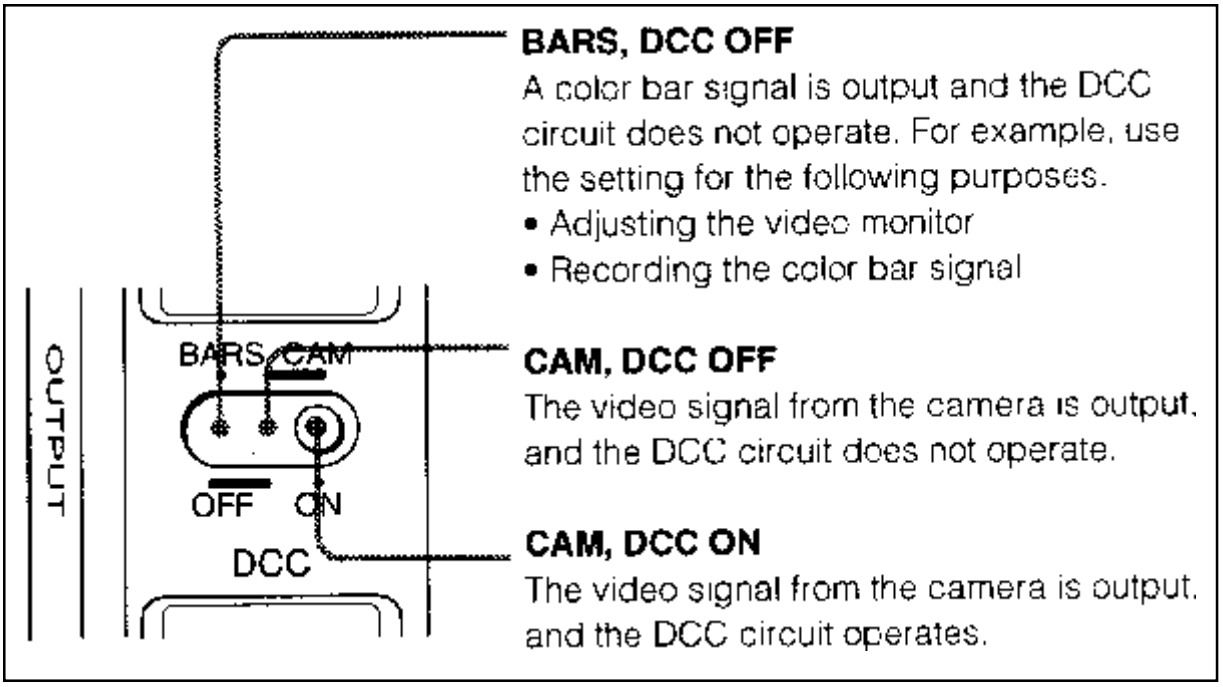
⓱ GAIN selector

This selector switches the gain of the video amplifier to match the lighting conditions during shooting. The gains corresponding to the L, M, and H, settings are selected from the setup menu before use. The factory settings are L = 0 dB, M = 6 dB, and H = 12 dB.
When this selector is adjusted, the new setting will be indicated on the setting change/ adjustment progress message display area of the viewfinder screen for about 3 seconds.
For information about setting the gain values, see Section 4-7-5 "Setting the GAIN Selector Values" (page 4-45).

⓲ OUTPUT / DCC (output signal / dynamic contrast control) selector

This selector switches the video signal that is output to the VTR, viewfinder, and video monitor, between the color bar signal and the camera output. It also switches DCC[1)] on and off when output from the camera is selected.

1) DCC (Dynamic Contrast Control)
Also called automatic knee. Against a very bright background with the iris opening adjusted to the subject, objects in the background will be lost in the glare. The DCC function will suppress the high intensity and restore much of the lost detail and is particularly effective in the following cases.
- Shooting a subject against a bright sky
- Shooting a subject indoors, against a background through a window
- Any high contrast scenes



OUTPUT/DCC selector

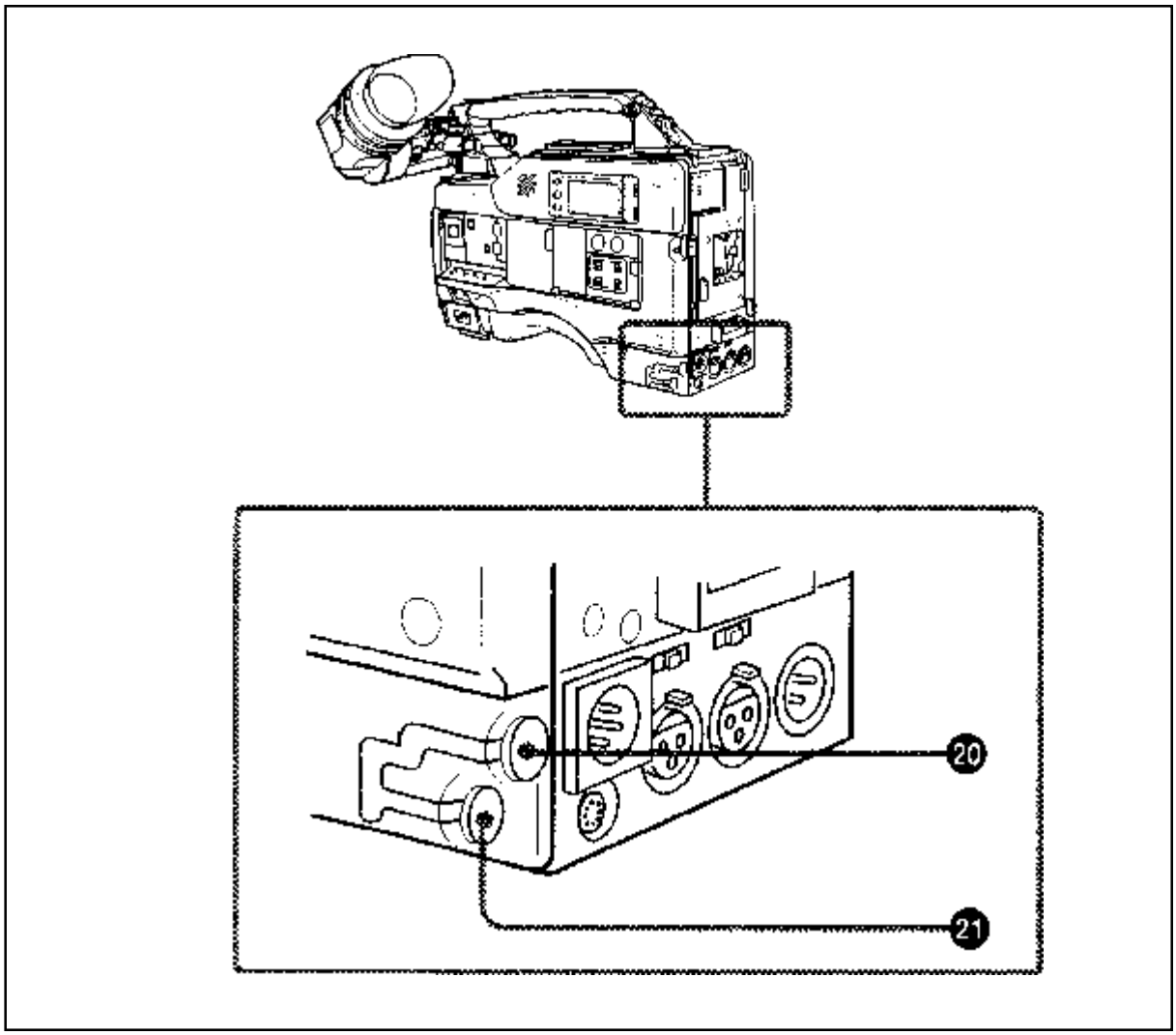
⑲ WHITE BAL (white balance memory) switch

This switch determines the source of the white balance settings.

PRST (preset): Adjusts the color temperature corresponding to the position of the FILTER selector (outer knob). Use the PRST setting when you have no time to adjust the white balance.

A or B: When the AUTO W / B BAL switch is pushed to WHT, the white balance is automatically adjusted according to the current position of the FILTER selector (outer knob), and the adjusted value is stored in either memory A or memory B. (There are two memories for each CC filter, so a total of eight adjustments can be stored). When the FILTER selector (outer knob) is at the same position as it was when this WHITE BAL switch was adjusted, the stored value is called from memory, and the camcorder automatically adjusts itself to that value.

When this switch is adjusted, the new setting will be indicated on the setting change / adjustment progress message display area of the viewfinder screen for about 3 seconds.



Shooting and recording/playback functions (4)

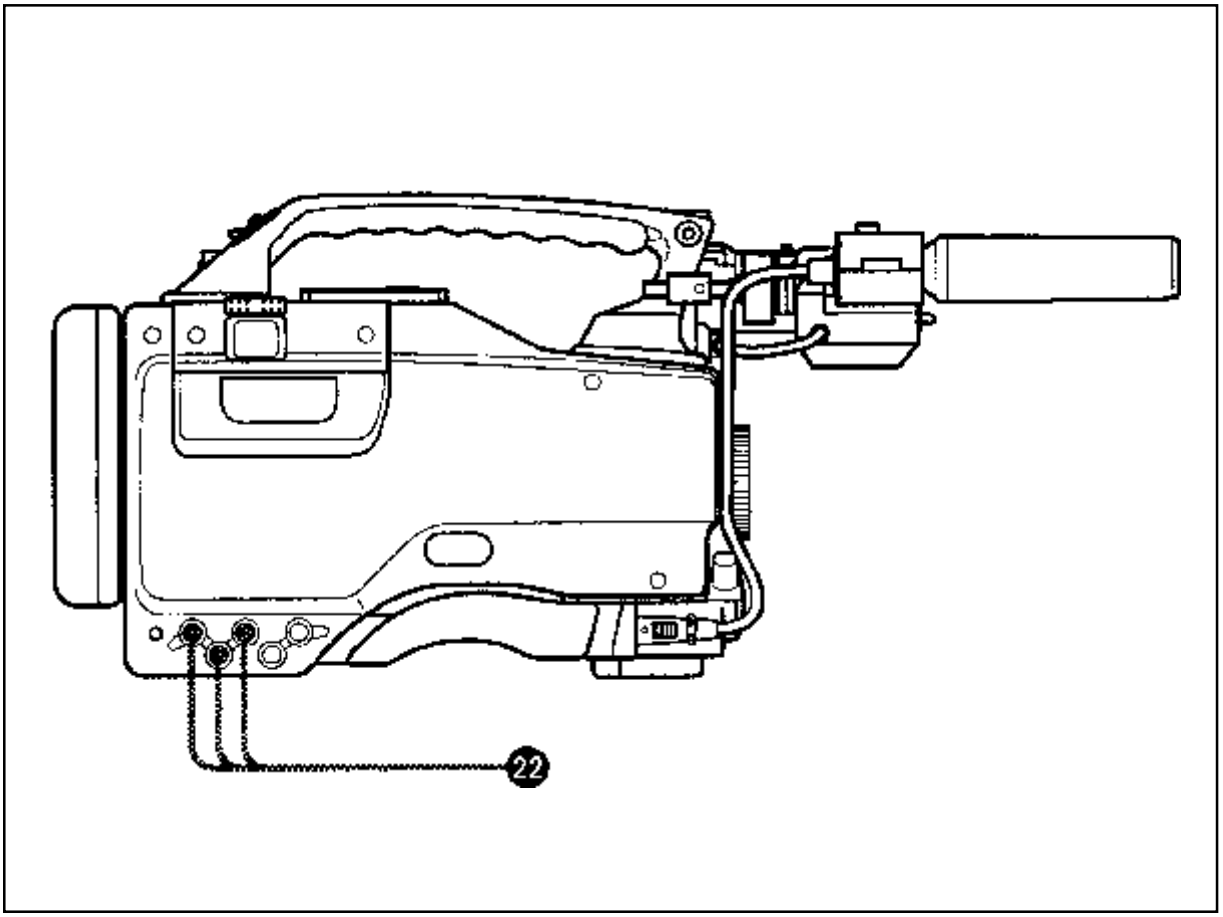
⓴ GENLOCK IN (genlock input) connector (BNC type)

This connector inputs an HD reference signal when the camera is to be genlocked or when the time code is to be synchronized with external equipment. Use the MAINTENANCE menu to adjust the genlock H-phase (phase of Horizontal sync signal).

For details, refer to the Maintenance Manual.

㉑ REMOTE (remote control) connector (8-pin)

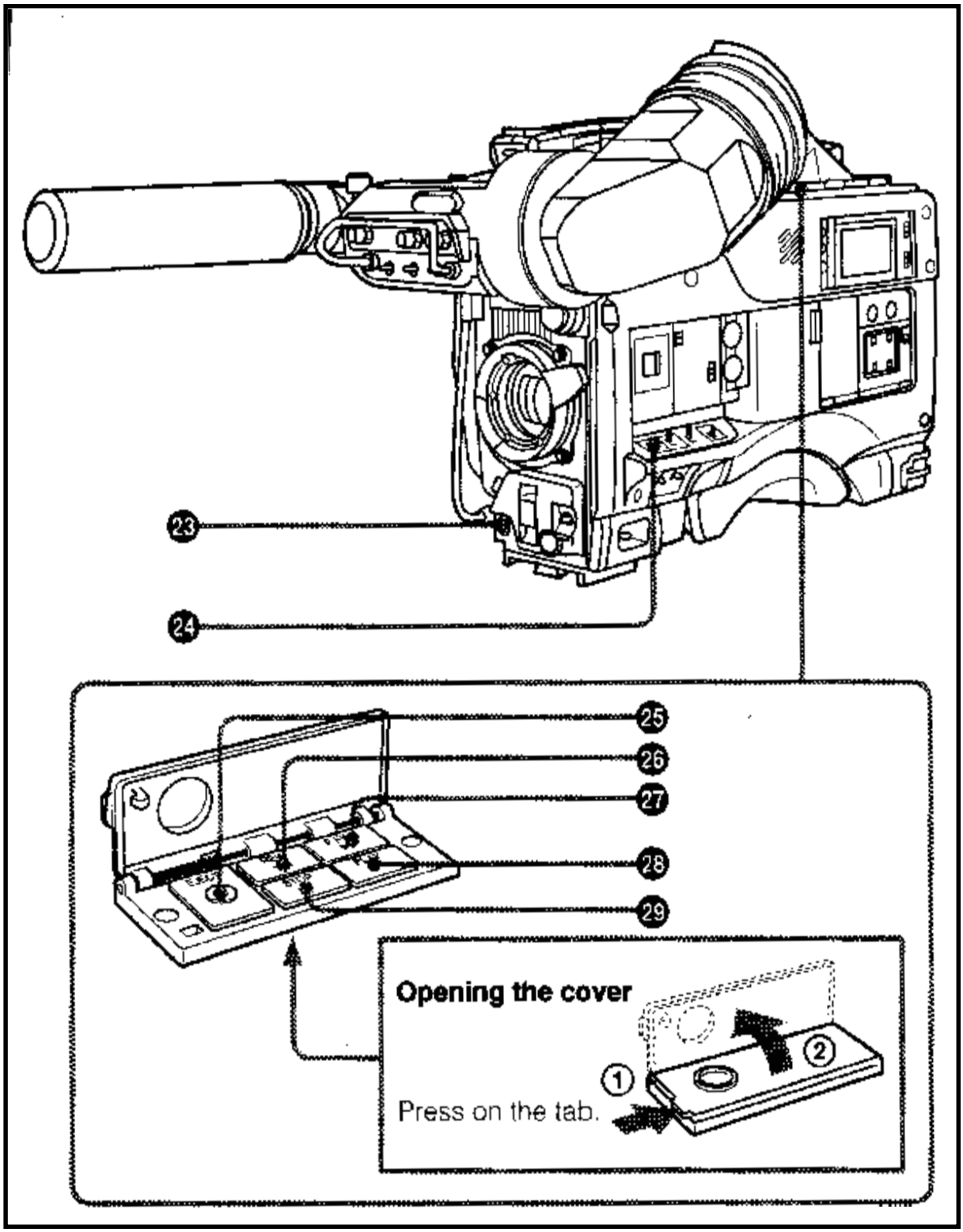
Connect the RCP-700 Series or RM-B150 Remote Control Unit (not supplied) with which VTR control is possible. You can also connect and use the MSU-700 Master Setup Unit (not supplied).



Shooting and recording/playback functions (5)

㉒ MONITOR OUT connector (BNC type)

This connector outputs the HD video signal (75-ohm terminated, Y / P_B / P_R). To include the text on the viewfinder screen with the output signal, push the VF DISP switch to MENU while pushing the MENU switch to CANCEL. Text output is cancelled when you turn the camcorder off, then on again.



Shooting and recording/playback functions (6)

㉓ VTR START button

Press this button to start recording. Press it again to stop recording. The effect is exactly the same as that of the VTR button on the lens.

㉔ VTR SAVE / STBY (VTR power saving / standby) switch

This switch controls the VTR power mode during pauses in recording (REC PAUSE).

SAVE: Power saving mode. When you press the VTR START button, there is a short delay before recording starts, but power consumption is less than in standby mode, and battery life is extended. When the switch is set to SAVE, the VTR SAVE indicator in the viewfinder lights.

STBY: Standby mode. Recording starts as soon as you press the VTR START button.

㉕ EJECT (cassette eject) button

Press this button to eject or load a cassette.

㉖ REW (rewind) button and indicator

Press this button to rewind the tape. The indicator lights during rewinding.

㉗ FWD (fast forward) button and indicator

Press this button to fast forward the tape. The indicator lights during fast forward.

㉖ PLAY (playback) button and indicator

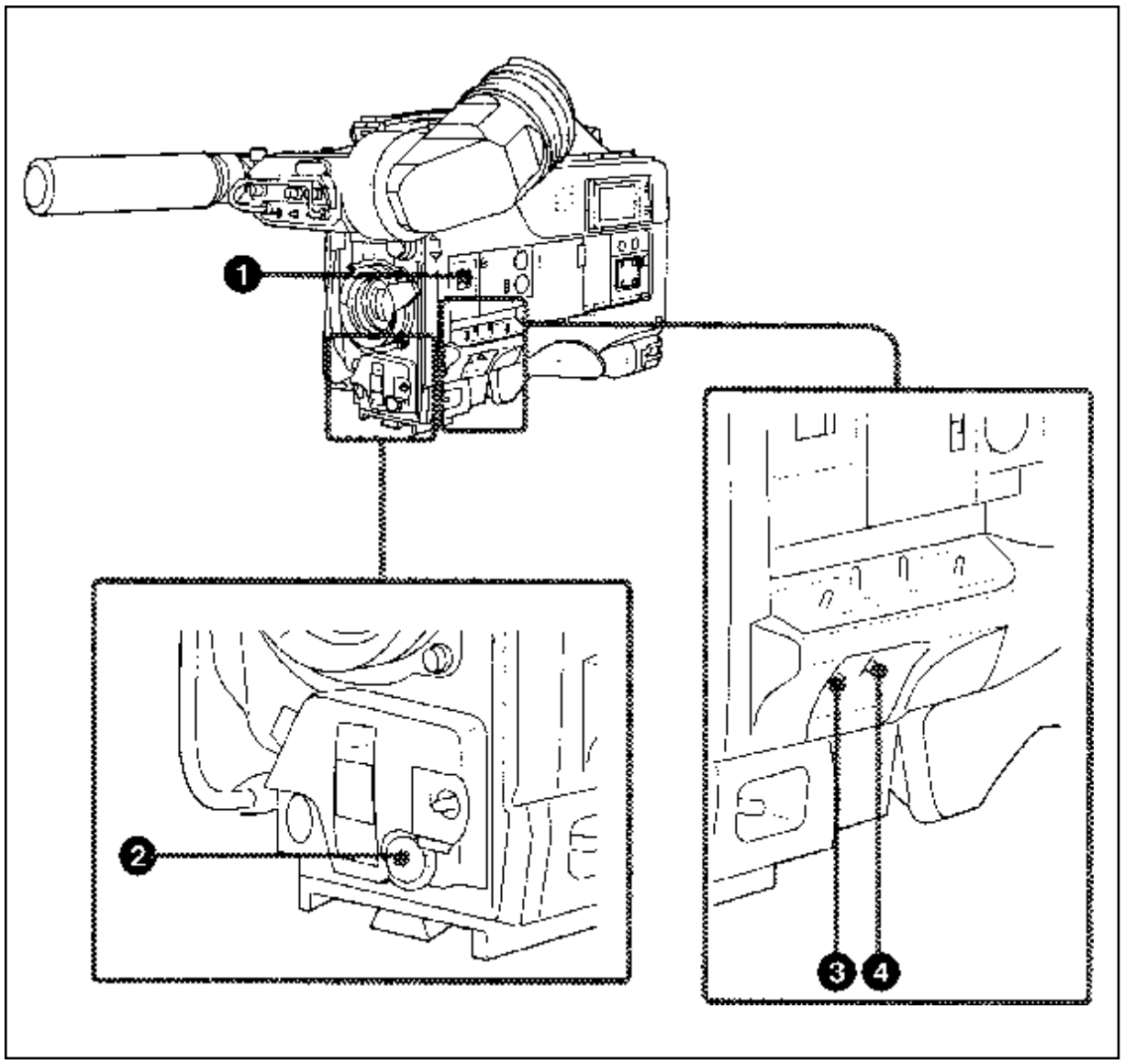
Press this button to view the recorded picture in the viewfinder or on the color video monitor. The indicator lights during playback.

The 3 times normal speed search function is provided to make it far quicker to find a desired location of the tape. Press the REW button or F FWD button during playback to view the 3 times normal speed search picture.

㉗ STOP button

Press this button to stop the tape.

2-5 Setup Menu Operating Section



Setup menu operating section

❶ Setup card compartment

Lift the OPEN lever to open the cover and insert the supplied Setup Card into the slot with the "SONY" logo facing you (a Setup Card was already inserted at the factory).

❷ MIC/MENU knob

Use this knob to change the page selection or a setting within the setup menu.

❸ MENU switch

Push this switch to CANCEL to erase the menu settings and return to page selection mode or the TOP menu. Push the switch up to display the '!' LED page of the operation menu.

For details on settings of this page, see Section 4-7-2 "Selecting the Items for Which the '!' LED is to light" (page 4-40).

❹ VF DISP switch

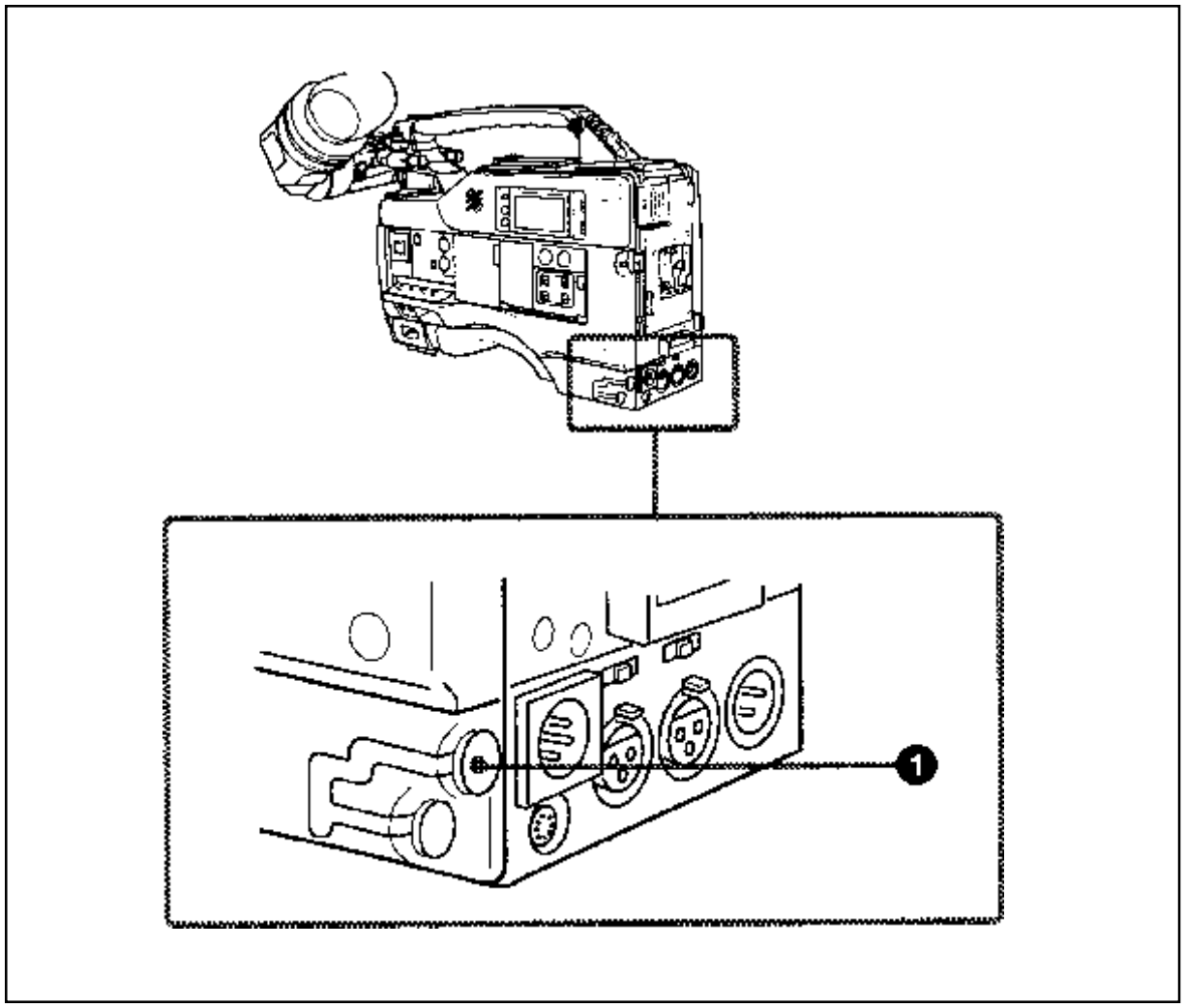
Use this switch to change the display on the viewfinder screen.

ON: A message or character indicating the camcorder's settings or operation status is displayed on the viewfinder screen.

OFF: The display on the viewfinder screen disappears.

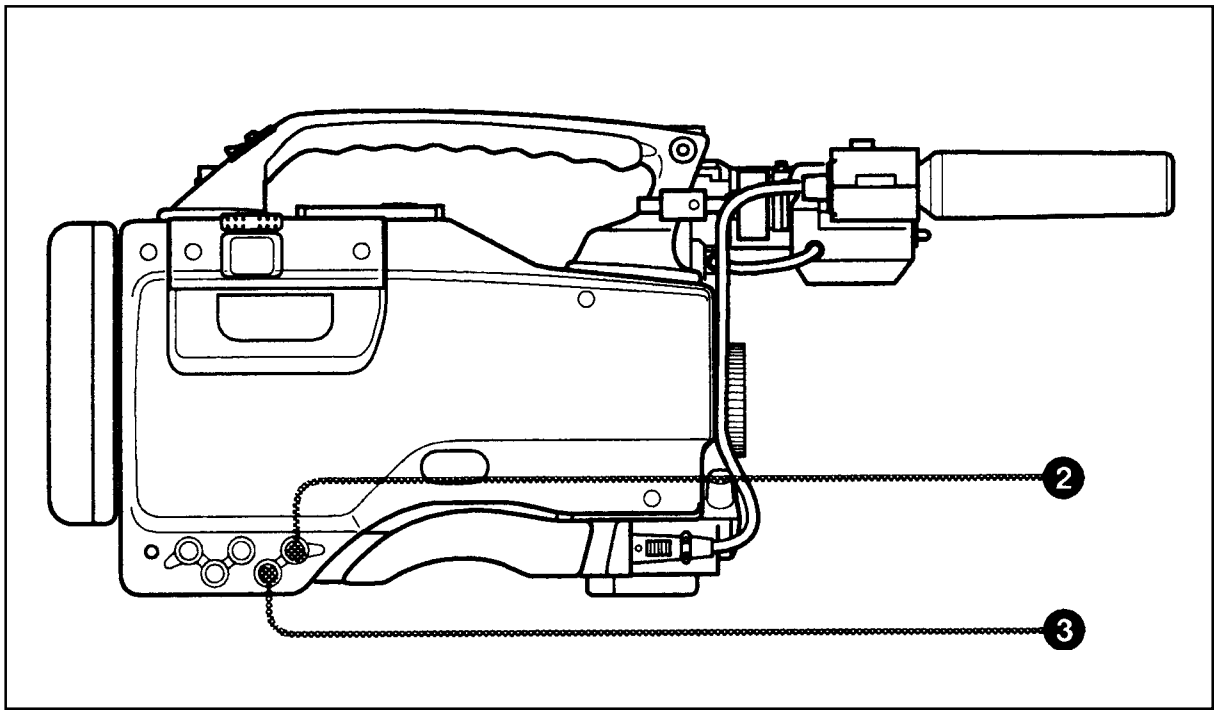
MENU: The setup menu is displayed on the viewfinder screen.

2-6 Time Code System



Time code functions (1)

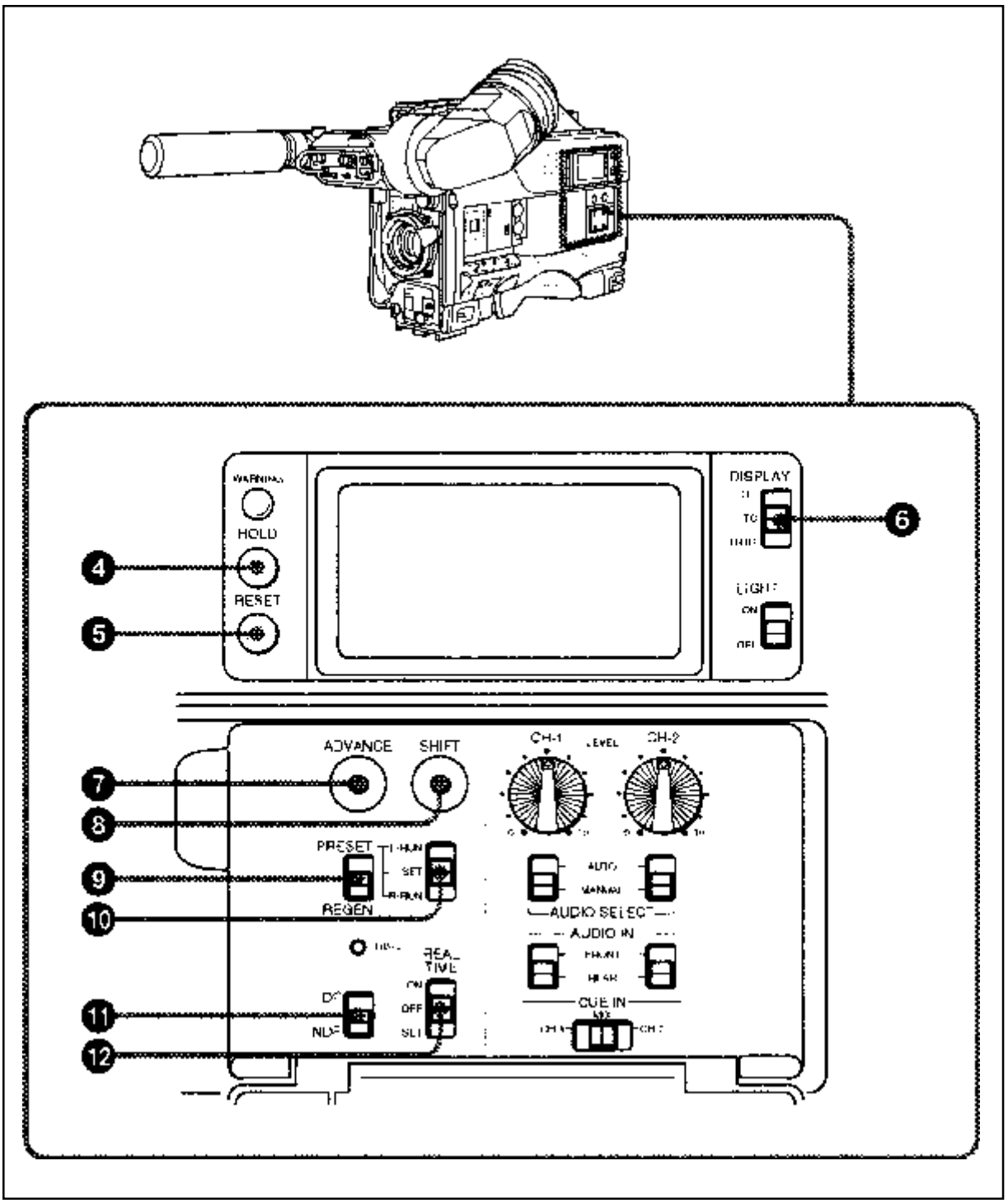
❶ GENLOCK IN (genlock input) connector (BNC type)
This connector inputs an HD reference signal when the camera is to be genlocked or when the time code is to be synchronized with external equipment.



Time code functions (2)

❸ TC IN (time code output) connector (BNC type)
To synchronize the time code with an external time code, connect the reference time code input here.

❸ TC OUT (time code output) connector (BNC type)
To synchronize the time code of an external VTR with that of the camcorder, connect this connector to the time code input lock connector of the external VTR.



Time code functions (3)

❹ HOLD (display hold) button

Pressing this button instantly freezes the time data displayed in the counter display section. (The time code generator continues normal operation.) Pressing this button again releases the hold. One use of this feature is to determine the exact time of a particular shot.

See Section 2-8 "Warnings and Indications on the Display Panel" (page 2-38) for more information about the counter display.

❺ RESET (counter reset) button

This button resets the time data displayed on the counter display section to "00:00:00:00" and the user bit data to "000000000".

❻ DISPLAY switch

Depending on the settings of the F-RUN / SET/ R-RUN switch and the REAL TIME switch, this switch selects data to display in the counter display section as follows:

CTL: Control signal
U-BIT: User bits
TC: Time Code

For more information see "Time code displays" (page 2-40).

❼ ADVANCE button

For setting the time code, user bits, or real time, each press of this button increments the flashing digit selected by the SHIFT button.

❽ SHIFT button

For setting the time code, user bits, or real time, this button selects the digit to be changed. The selected digit flashes.

❾ PRESET / REGEN (preset / regeneration) switch

This switch selects whether to set a new time code or to match the existing time code that had been recorded.

PRESET: Starts recording time code values on the tape from the newly set value.

REGEN: Reads the existing time code on the tape and sets the time code starting value accordingly. Thus, even when there is an indefinite break in recording, this setting ensures that time codes on the tape will be continuous. Regardless of the setting of the F-RUN/SET/R-RUN switch, the camcorder operates in R-RUN mode.

❿ F-RUN/SET/R-RUN (free run/set/recording run) switch

This switch selects the operating mode for the internal time code generator.

F-RUN: The time code generator keeps running, regardless of the operation state of the VTR. Use this position when matching the time code to real time or for synchronizing the time code with an external time code.

SET: Set the switch to this position to set the time code or user bits.

R-RUN: The time code generator runs only while recording. This produces a tape with consecutive time code value, even when shot intermittently.

For more information, see Section 4-4-1 "Setting the User Bits" (page 4-17) and Section 4-4-2 "Setting the Time Code" (page 4-19).

⓫ DF / NDF (drop frame / non-drop frame) switch

This switch selects whether the time code advances in drop frame mode or non-drop frame mode.

DF: Drop frame mode[1)]

NDF: Non-drop frame mode[2)]

⓬ REAL TIME switch

The switch selects whether or not real time is to be recorded as VITC user bit data. It is also used for setting the real time.

ON: Real time is recorded as VITC user bit data.

OFF: Real time is not recorded as VITC user bit data.

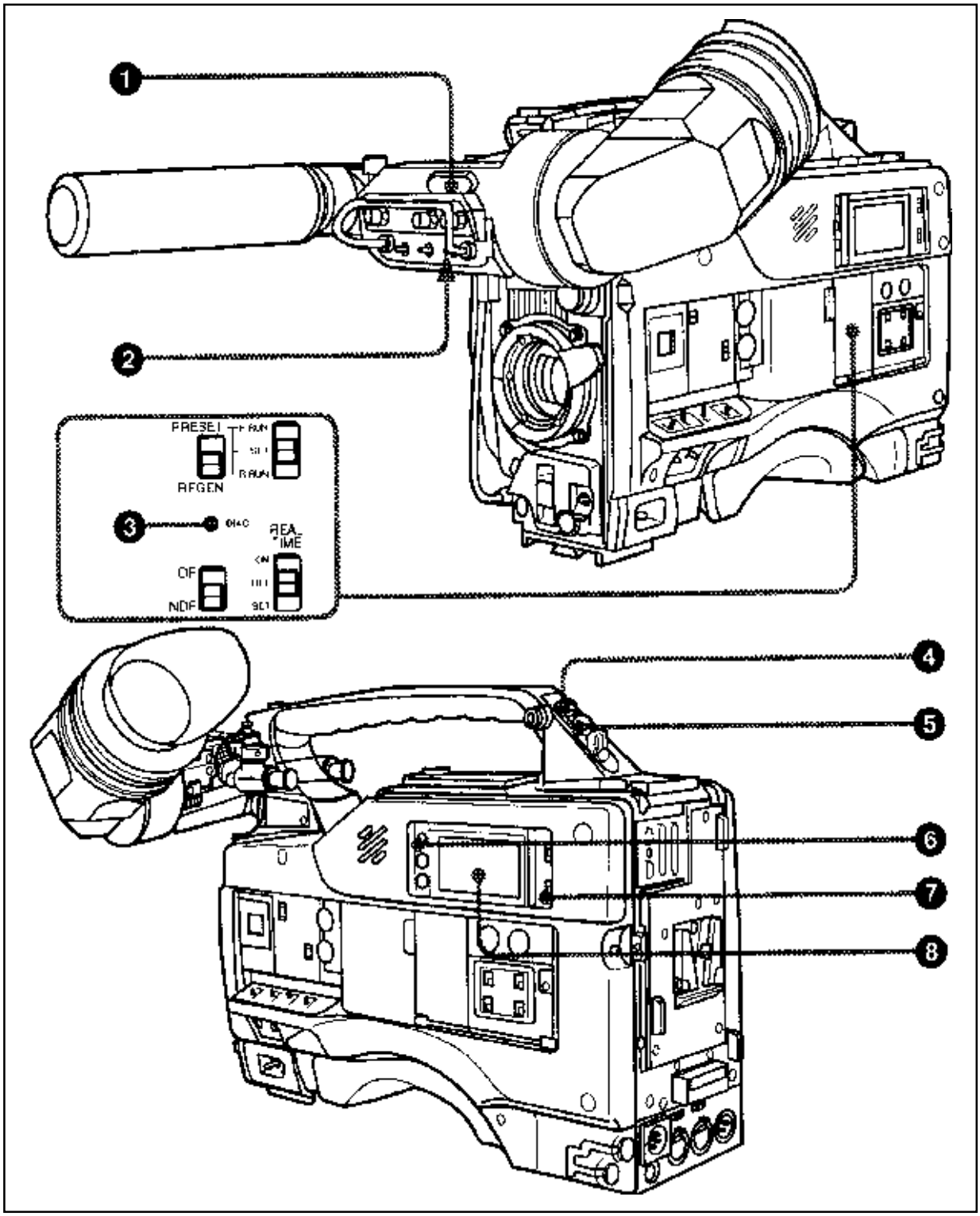
SET: Sets the real time.

1) Drop frame mode
To eliminate the discrepancy between the actual time and the time code value generated by the time code generator when the field frequency is 59.94 Hz, drop frame mode drops two frames (frame 00 and 01) from the time code value at the beginning of each minute except every tenth minute.

2) Non-drop frame mode
Non-drop frame mode does not perform the processing of drop frame mode. As a result, when the field frequency is 59.94 Hz, there will be a discrepancy between the actual time and the time code value of about 86 seconds per one day of recording.

2-7 Warnings and Indications

The camcorder supplies you visual information and warnings by means of its indicators without you having to use the speaker, earphone or viewfinder.



Warning and indication functions

❶ TALLY indicator

Setting the TALLY switch to HIGH or LOW activates this indicator. The indicator lights during recording on the VTR. It also provides the same information as the REC indicator in the viewfinder; it lights up during recording and flashes to indicate a problem. The brightness of this indicator when it is lit can be controlled by the TALLY switch.

❷ TALLY switch

This switch controls the TALLY indicator, setting its brightness (HIGH or LOW) or turning it off.
HIGH: The TALLY indicator gets brighter.
OFF: The TALLY indicator does not operate.
LOW: The TALLY indicator gets dimmer.

❸ DIAG (self-diagnostics) button

Pressing this button when the VTR is stopped switches the camcorder to self-diagnostics mode. In self-diagnostics mode, it is possible to carry out a display panel test, a VTR test, or a camera test and display the test result.
To exit from self-diagnostics mode, press this button once more.
Refer to the Maintenance Manual for more information.

❹ BACK TALLY indicator

This indicator functions exactly the same way as the front tally indicator when the BACK TALLY switch is set to ON.

❺ BACK TALLY switch

This switch enables (ON) or disables (OFF) the operation of the BACK TALLY indicator.
ON: Enables the BACK TALLY indicator operation.
OFF: Disables the BACK TALLY indicator operation.

❻ WARNING indicator

This indicator lights up or flashes when there is a fault in the VTR.
See Section 6-3 "Operation Warnings" (page 6-12) for more information about the relationships between the operation of the indicator and the meanings of the indications.

❼ LIGHT switch

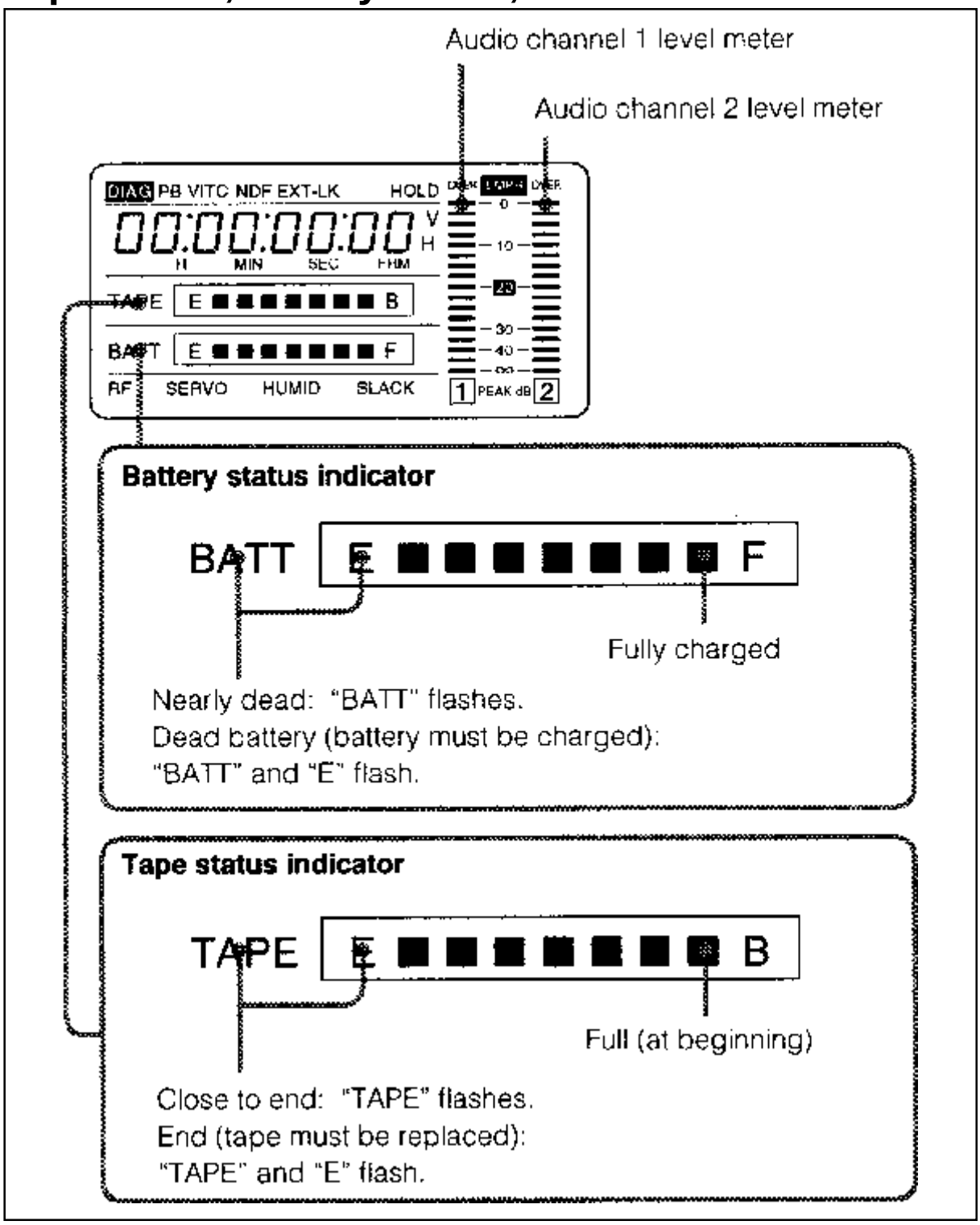
This switch controls the display panel light.
ON: Turns the panel light on.
OFF: Turns the panel light off.

❽ Display panel

VTR error messages, battery status, tape status, audio level, time data, and so forth are displayed on this panel.
For more information, see Section 2-8 "Warnings and Indications on the Display Panel" (page 2-38).

2-8 Warnings and Indications on the Display Panel

Tape status, battery status, and level indicators



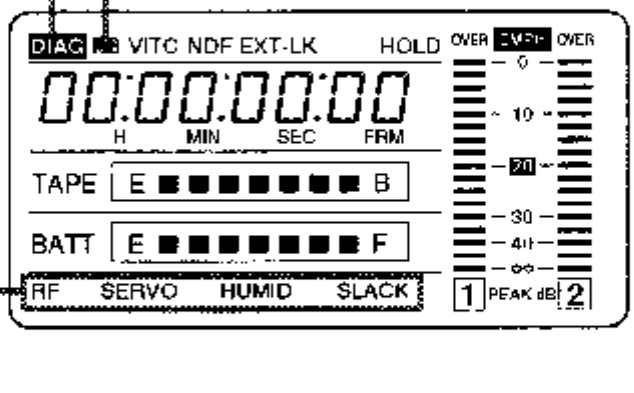
Tape status, battery status, and level indicators

VTR operation status and status indicators

Lights in the self-diagnostic mode (testing display panel, camera, and VTR).

For more information, refer to the Maintenance Manual.

Lights during playback.



Warning indicators

RF: Lights if the recording heads are clogged.

SERVO: Lights if the servo motor fails.

HUMID: Lights if condensation is on the drum.

SLACK: Lights if the tape is not winding properly.

For more information, see Section 6-3 "Operation Warnings" (page 6-12).

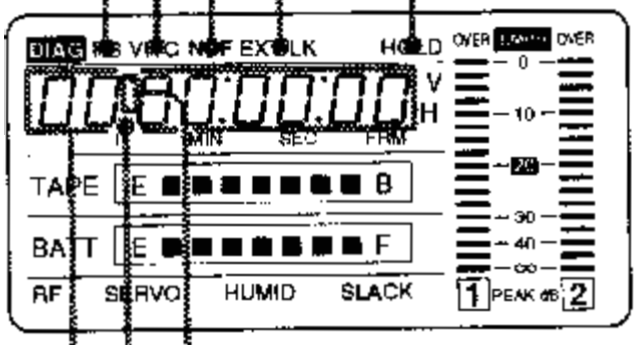
VTR operation and status indicators

Note

If the tape in the VTR becomes slackened, an error code appears automatically on the display section of the display panel.

For more information refer to the Maintenance Manual.

Time code displays



Lights in playback mode.

Lights when VITC is selected for the time code.

Lights in non-drop frame mode.

Lights when the camcorder is synchronized with an external time code.

Lights when the time code generator is on hold.

Lights when the time code, CTL, or real time is displayed.

Lights when the HOLD button is pressed.

Time counter display: Shows the time code, CTL, user bits, and real time.

The table on the next page lists the details of the displayed items and switch settings.

Time code displays

Relationships between the REAL TIME, F-RUN/SET/R-RUN, and DISPLAY switch settings and the time counter displays

The time counter display is determined first by the REAL TIME switch setting, then by the F-RUN / SET / R-RUN switch setting, and finally by the DISPLAY switch setting.

Switch settings related to time code and displayed information

REAL TIME switch position	F-RUN/SET/R-RUN switch position	DISPLAY switch position	Displayed information
ON or OFF	SET	TC or CTL	Time code
		U-BIT	User bits
	F-RUN or R-RUN	CTL	CTL
		TC	Time code
		U-BIT	User bits
SET	Any position	Any position	Real time

3-1 About Cassettes

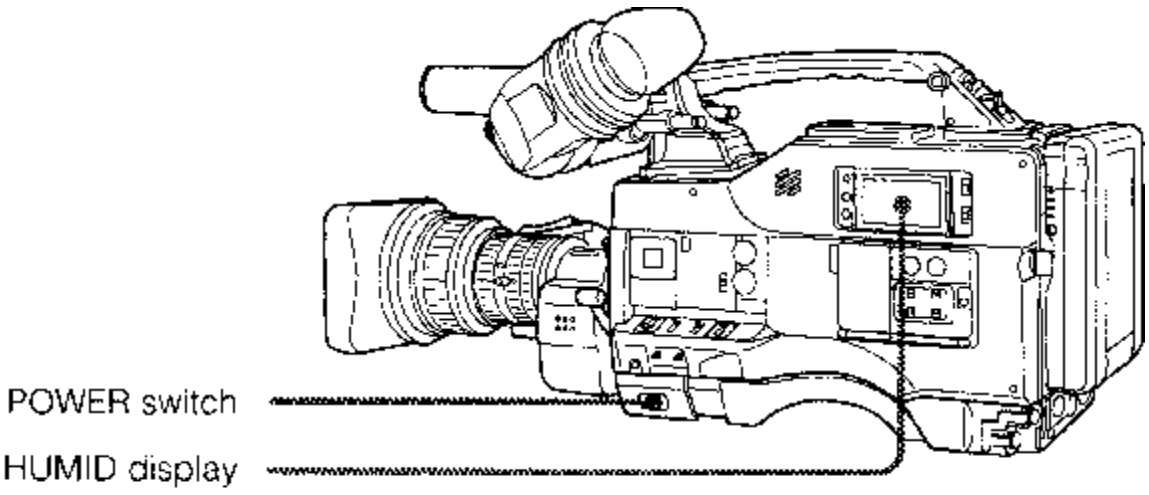
This section describes the procedure for loading and unloading a cassette.

See "Specifications VTR Section" (page A-3) for information about the cassettes you can use in the camcorder.

3-1-1 Loading and Unloading a Cassette

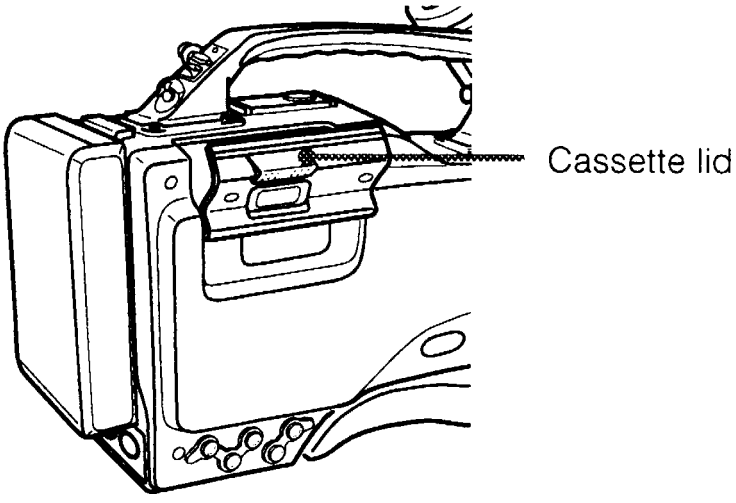
Loading a Cassette

1 Turn on the POWER switch.



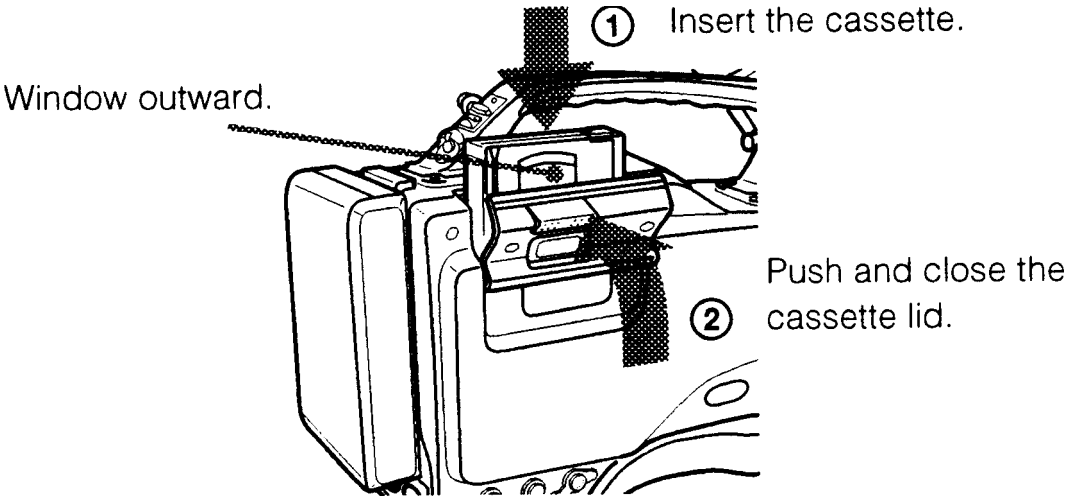
If the interior of the VTR section is damp, the HUMID indicator will light. If this happens, wait until the indicator goes off before going on to step **2**.

2 Press the EJECT button.
The cassette lid will open



(Continued)

3 Check that there is no slack in the tape. Then slide in the cassette until it clicks into position and close the cassette lid completely by pressing near the engraved “PUSH”.

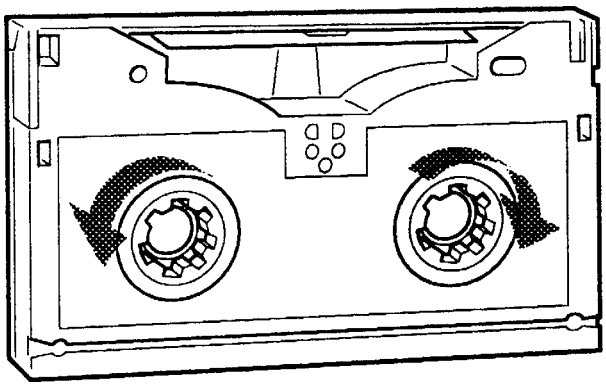


Note

To insert the tape correctly, make sure the tape in the cassette is facing up towards you before you try to close the cassette lid.

Checking the tape for slack

Pressing in the reels lightly, turn them gently with your finger in the directions shown below. If the reels will not move, there is no slack.



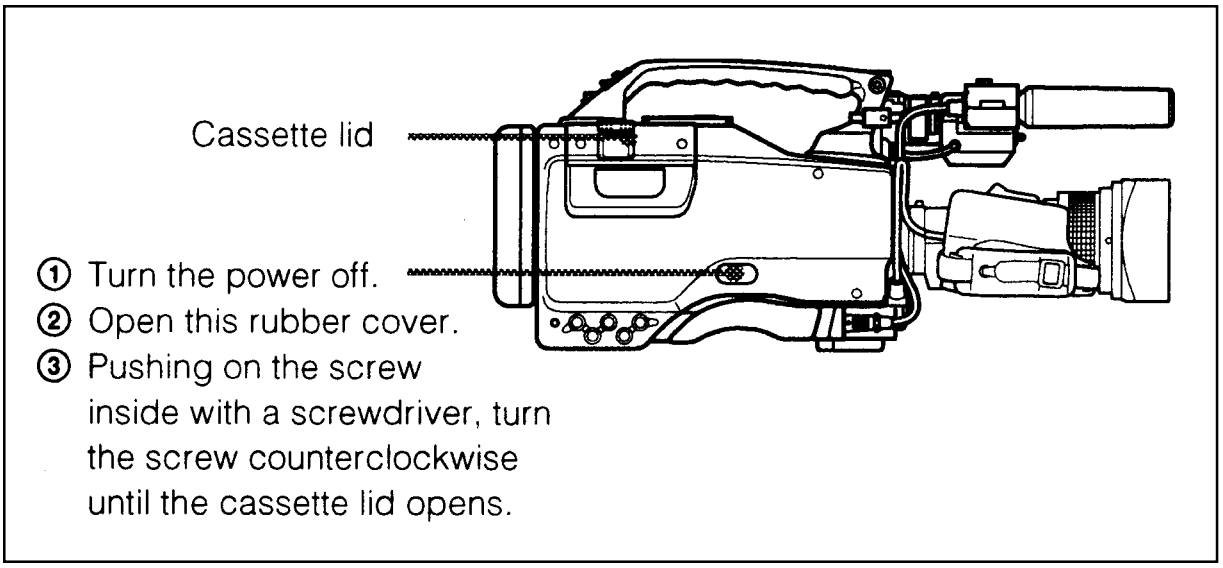
Checking the tape for slack

Unloading a cassette

With the power supply on, press the EJECT button to open the cassette lid. Then take out the cassette. If you are not going to insert another cassette, close the cassette lid.
It is possible to take out the cassette and close the cassette lid unless the battery voltage drops below about 10.5 V. Do not repeat this unloading operation.

Unloading a cassette manually

If the battery voltage drops below about 10.5 V, take out the cassette manually as illustrated below.

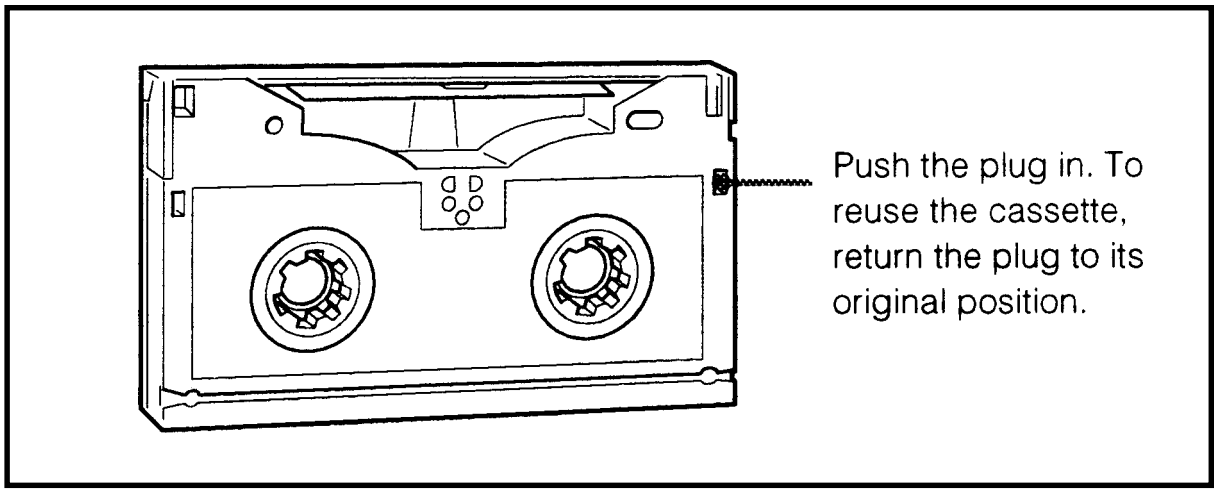


Unloading a cassette manually

You need not return the screw to its original position after taking out the cassette. Although the cassette lid is not locked, turning on the power makes the cassette lid operable again.

3-1-2 Preventing Accidental Erasure

The following procedure prevents cassettes from being recorded inadvertently.



Preventing accidental erasure

3-2 Recording

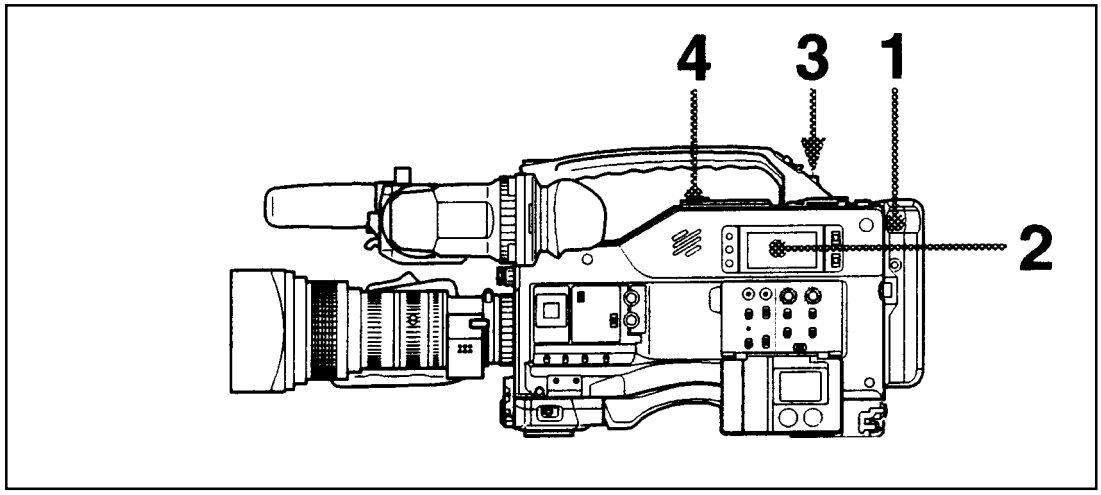
3-2-1 Basic Procedure

This section describes the basic procedure for shooting and recording. Before a shooting session, ensure that the camcorder is functioning properly.

For more information, see Section 6-1 "Testing the Camcorder Before Shooting" (page 6-1).

Turning on the camcorder and loading a cassette

Follow the procedure below.



Basic procedure for shooting : from power supply to cassette loading

1 Attach a fully charged battery pack.

2 Set the Power switch to ON. Check that the HUMID indicator does not appear and that the BATT indicator shows at least five segments.

- If HUMID indicator appears, wait until it disappears
- If the BATT indicator does not show at least five segments, replace the battery pack with a fully charged one.

(Continued)

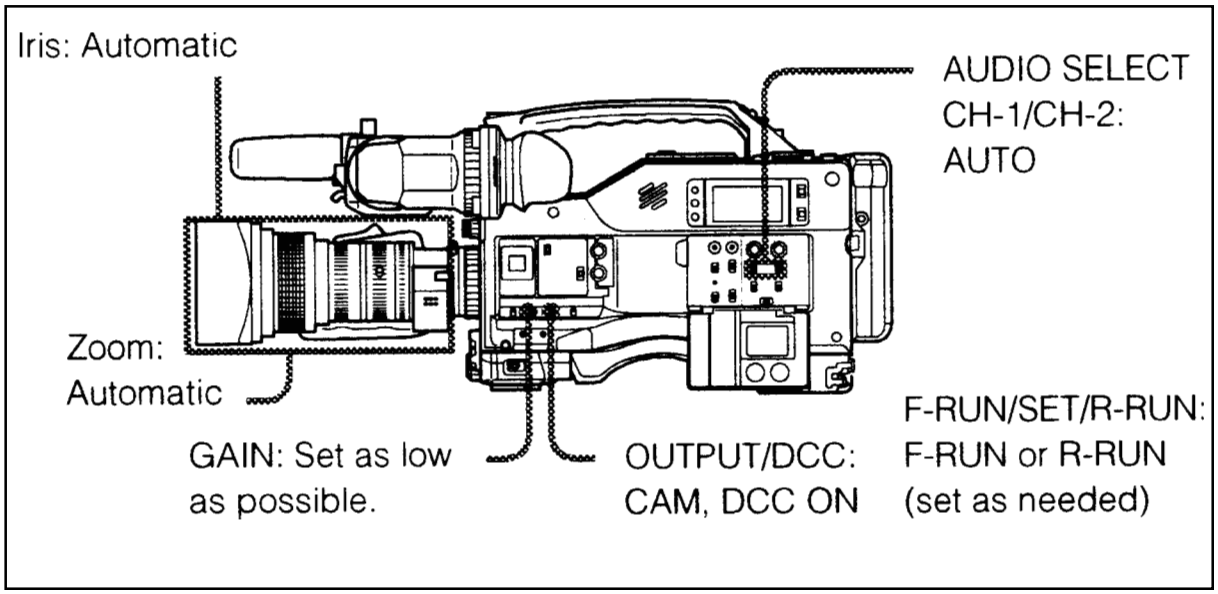
3 Check that there are no obstructions near the cassette lid. Then press the EJECT button to open the cassette lid.

4 After checking the points below, load the cassette and close the cassette lid.

- The cassette is not write-protected.
- There is no slack in the tape.

Basic procedure for shooting: from adjusting the black balance and white balance to stopping recording

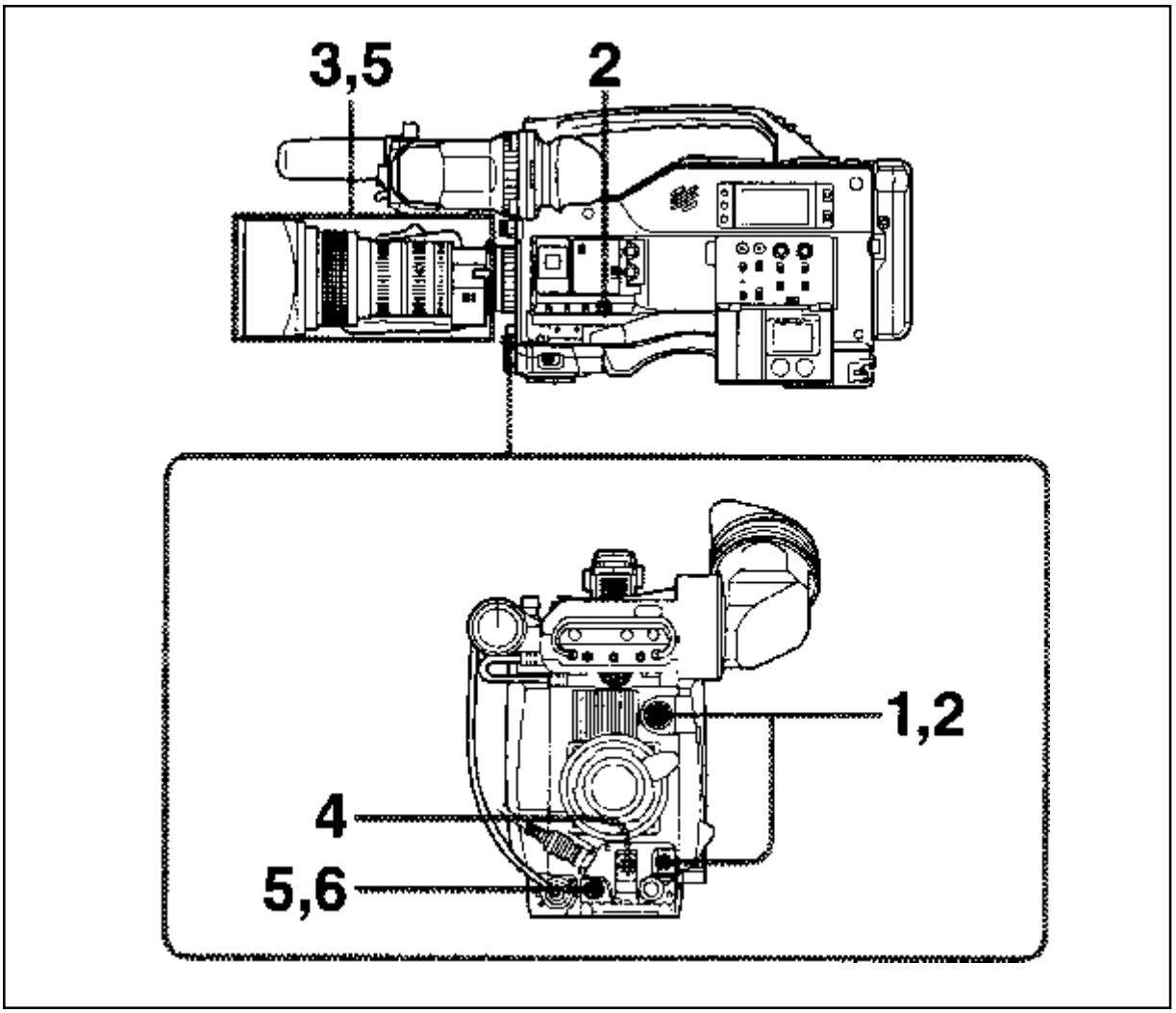
After turning on the power and loading a cassette, set the switches and selectors as shown below and begin operation.



Switch and selector settingsbefore shooting

Shooting

Follow the procedure below.



Basic procedure for shooting: from adjusting the black balance and white balance to stopping recording

1 Push the AUTO W / B BAL switch to BLK to adjust the black balance.

2 Select the CC filter and ND filter to match the lighting conditions, and adjust the white balance.

(Continued)

When the black balance and white balance settings are already in memory:
Set the WHITE BAL switch to A or B.

When the white balance setting is not in memory and you do not have enough time to adjust the white balance:
Set the WHITE BAL switch to the PRST position. The white balance is automatically set to 3200 K when the FILTER selector is set to B, to 4300 K when the FILTER selector is set to C, and to 6300 K when the FILTER selector is set to D.
For more information, see Section 4-1-3 "Adjusting the White Balance" (page 4-5).

3

3 Aim the camera at the subject and adjust the focus and zoom.

4 If necessary, set the electronic shutter for an appropriate mode and speed.
For more information, see Section 4-2 "Setting the Electronic Shutter" (page 4-9).

5 To start recording, press the VTR START button or the VTR button on the lens.

During recording, the REC indicator in the viewfinder goes on. Perform zooming and focus control, if necessary.

6 To stop recording, press the VTR START button or the VTR button on the lens again.

The REC indicator goes off.

Cassette control buttons

During recording, the cassette control buttons (EJECT, REW, FFWD, PLAY, STOP) have no effect.

3-2-2 Continuous Recording

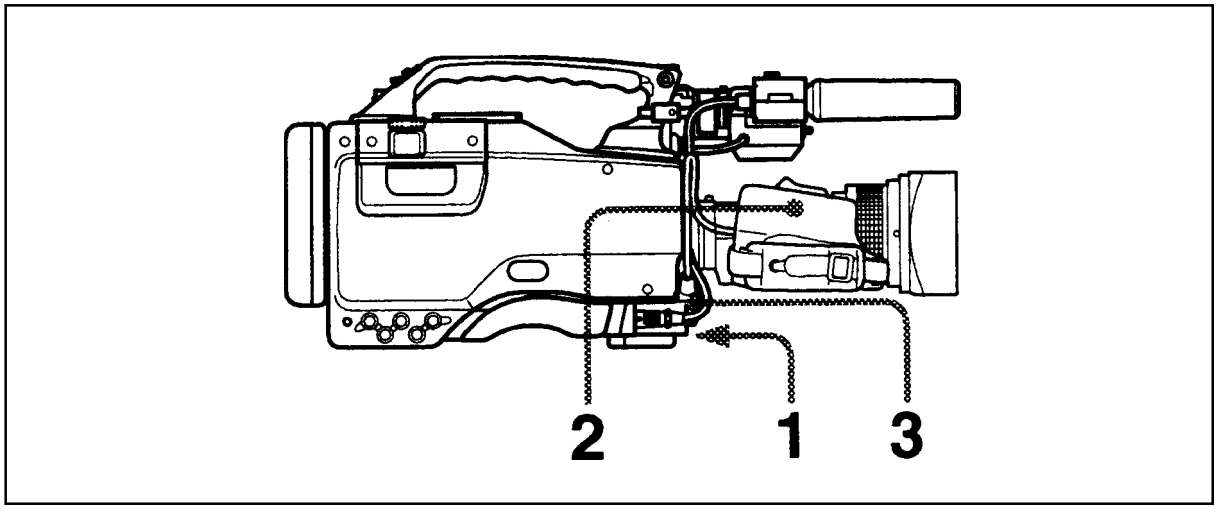
If the camcorder is in the recording pause mode, simply pressing the VTR START button on the camcorder or the VTR button on the lens continues recording at exactly the next frame.
In other cases, you first need to position the tape at an appropriate point.

When the camcorder is in the recording pause mode

Pressing the VTR START button on the camcorder or the VTR button on the lens positions the tape at the appropriate point automatically.
However, the time taken before recording starts depends on the setting of the VTR SAVE/STBY switch.

- If the VTR SAVE/STBY switch is in the SAVE position, it takes about 4 seconds before recording starts.
- If the VTR SAVE/STBY switch is in the STBY position, recording starts immediately. However, just after the switch position is changed from SAVE to STBY, it takes about 4 seconds before recording starts.

If you turn off the power during a recording pause



Continuous recording after turning off the power during a recording pause

1 Turn on the power again.

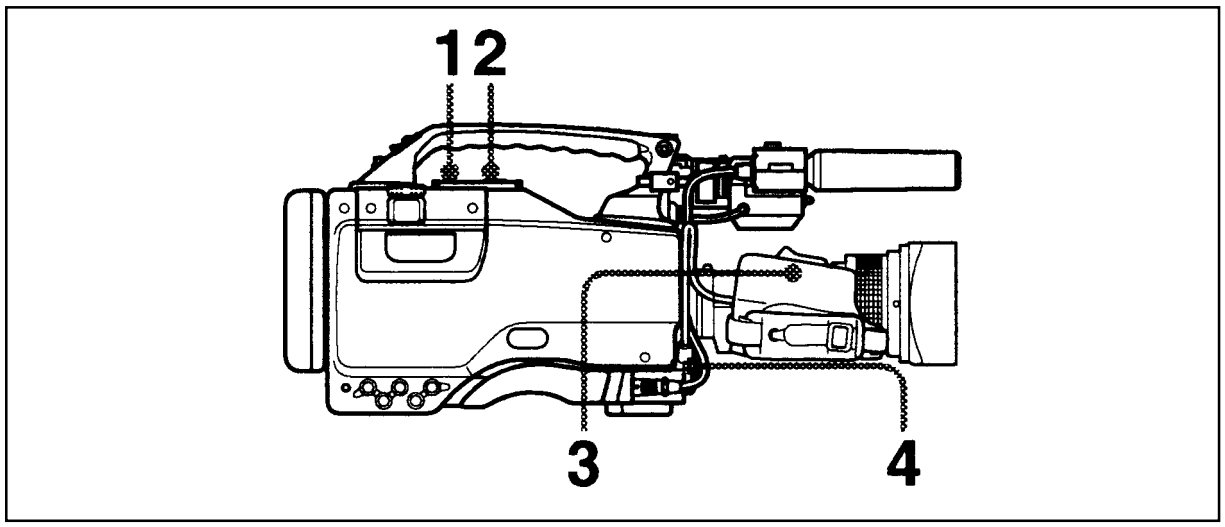
2 Press the RET button on the lens.

The camcorder positions the tape at the appropriate point. Note, however , that this function works only for continuously recorded material or consecutively joined segments totaling at least 4 seconds in length.

3 Press the VTR START button on the camcorder or the VTR button on the lens start recording.

Continuous recording in other cases

After rewinding or fast forward, after removing the cassette, or on a tape that has been partially recorded, you can obtain a continuous recording by following the procedure below.



Continuous recording after rewinding or fast forward, after removing the cassette, or on a tape that has been partly recorded

1 Looking in the viewfinder, press the PLAY button to start playback.

2 Press the STOP button at the desired point to begin recording. To continue from the end of recording already on the tape, press the STOP button immediately after the end of the previous recording (within 0.5 seconds).

3 Press the RET button.

The tape will rewind and will be positioned at the desired point to continue recording.

4 Press the VTR START button on the camcorder or the VTR button on the lens to start recording.

3-3 Checking the Recording – Playback

By pressing the PLAY button, you can review any length of recording in the viewfinder in black and white. There are two other ways to review the recording.

- **Recording review:** You can view the last 3 seconds of the recording in the viewfinder in black and white.
- **Color playback:** You can see the recording in color on a color video monitor without the need for any external adaptor.

You may also view the picture by pressing the REW button or FFWD button during playback.

See Section 2-3 "Auto Functions" (page 2-5) for information about the switches and controls used to select the audio output signal and to adjust the audio level.

3-3-1 Checking the Last Three Seconds of the Recording – Recording Review

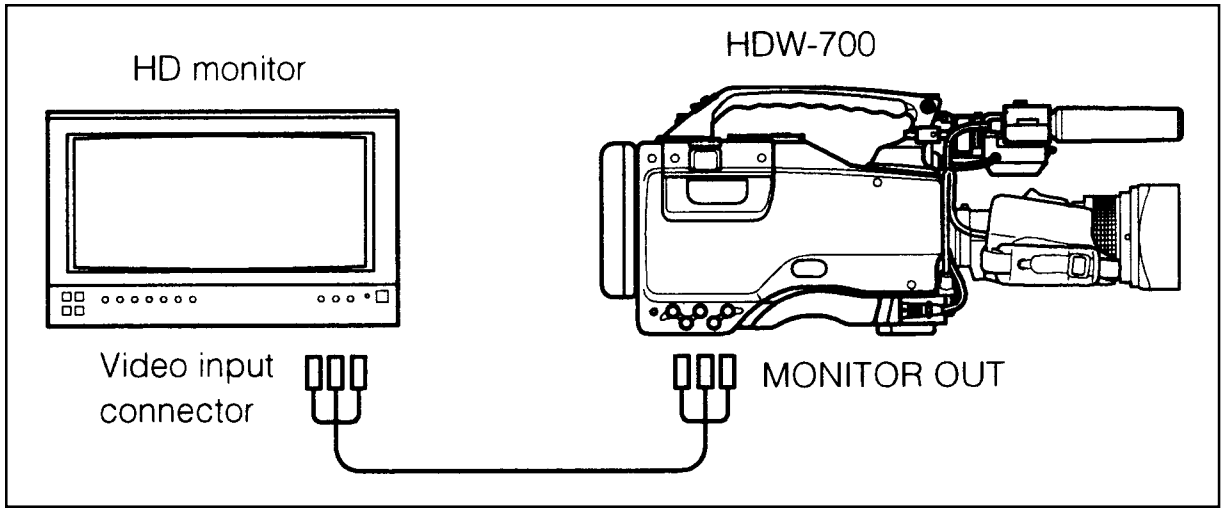
If you press the RET button on the lens while recording is paused, the last three seconds of the tape is automatically rewound, and that segment is played back on the viewfinder screen. Use this function to check whether recording went smoothly. If you hold the RET button down longer, at most 10 seconds of the tape is rewound and played back. After playback, the camcorder is ready to start recording again.

Note

The recording review functions only works if the recording you have made is at least 3 seconds long.

3-3-2 Checking the Recording on the Color Video Monitor – Playback in Color

Connect a color video monitor to the MONITOR OUT connector of the camcorder and press the PLAY button.



Color playback

4-1 Adjusting the Black Balance and the White Balance and Correcting the White Spots

To always obtain excellent image quality when using this camcorder, conditions may require that both the black balance and the white balance be adjusted.

Black balance adjustment

The black balance will require adjustment in the following cases.

- When the camcorder is first used
- When the camcorder has not been used for a long time
- When the camcorder is used under conditions in which the surrounding temperature has changed greatly
- When the GAIN selector values have been changed by using the setup menu

It is not usually necessary to adjust the black balance when using the camcorder after it has been briefly off.

Automatic correction of white spots in the image

In rare cases, white spots may appear in the image due to pixel abnormalities in the CCD. If this happens, you can activate a function that automatically detects the position of the white spots and corrects them.

White balance adjustment

Always readjust the white balance when the lighting conditions change.

Viewfinder screen displays

When the black balance, white balance adjustment or white spots correction is started, messages that report on the progress and results are displayed on the viewfinder screen.

Note

Black balance and white balance adjustment values that are automatically set by the camcorder and the various settings are stored in the camcorder memory and retained even when the power is turned off.

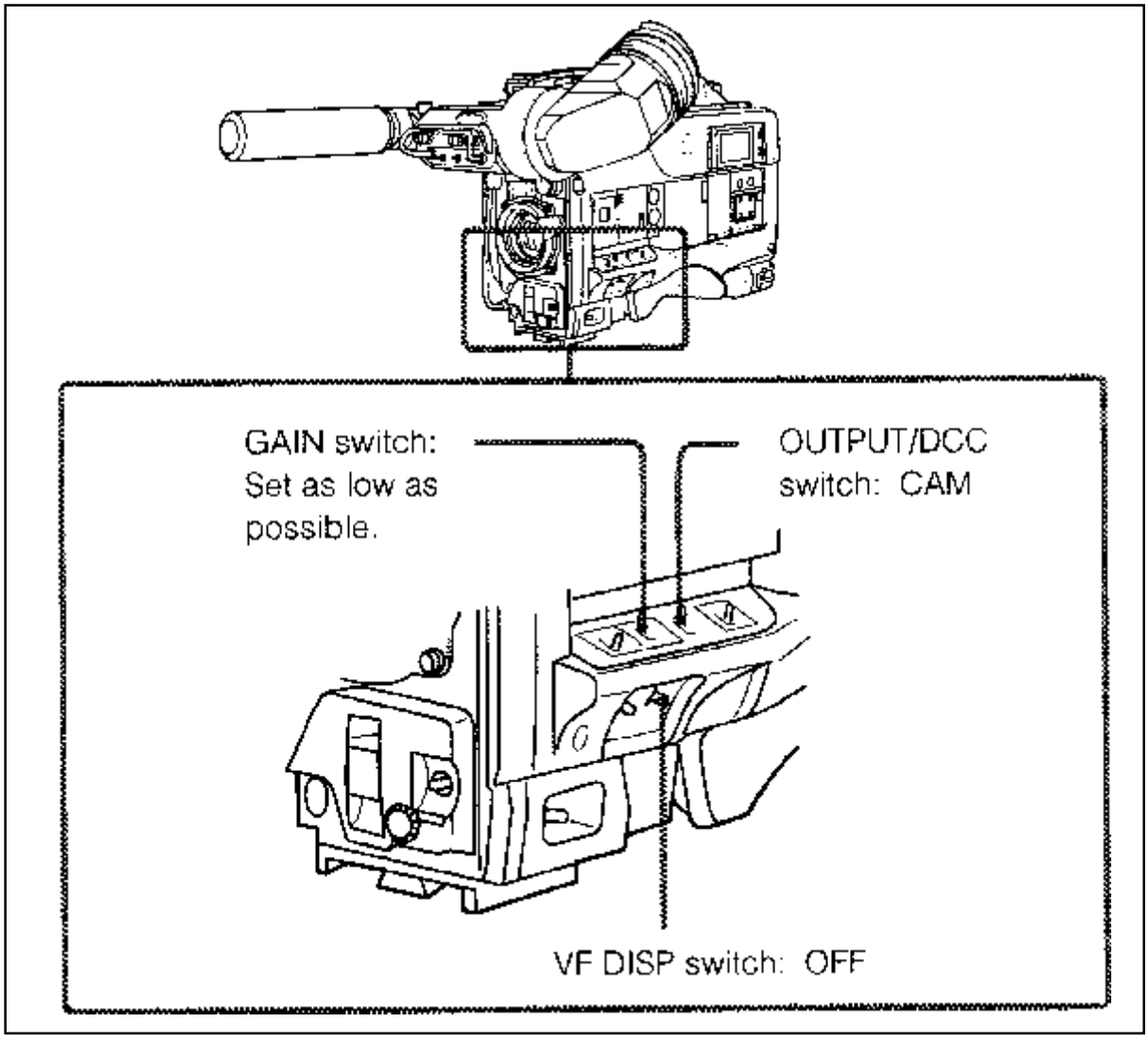
4-1-1 Adjusting the Black Balance

In automatic black balance mode, adjustments are performed in the following order: clamp level, black set, and black balance. Manual black balance adjustment can be selected from the setup menu.

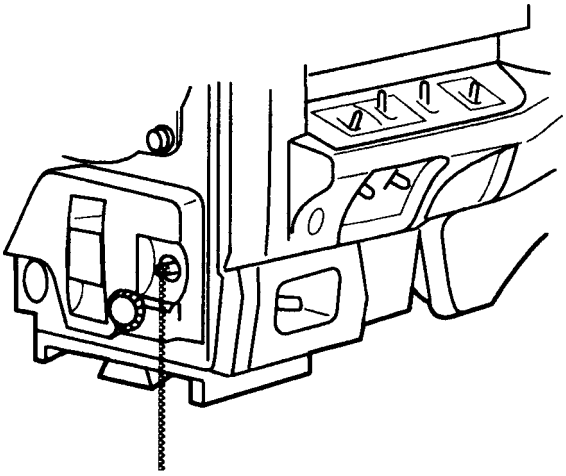
4

Follow the procedure below to adjust the black balance.

1 Set switches as shown in the figure below.



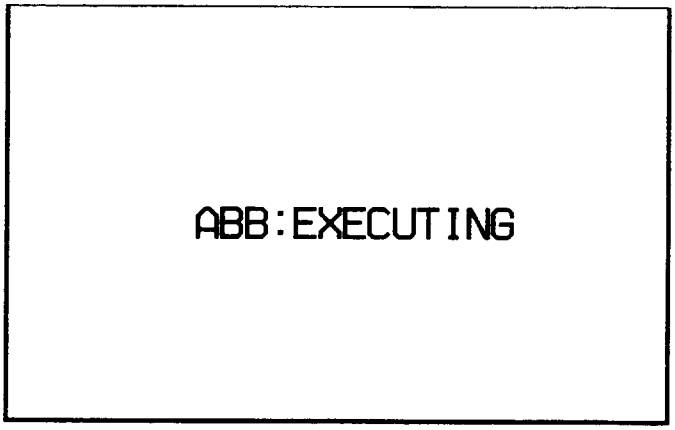
2 Push the AUTO W/B BAL switch to BLK and release the switch.



AUTO W/B BAL switch

The switch returns to the center position, and the adjustment is completed.

During adjustment, the following message is displayed on the viewfinder screen.



The black balance adjustment ends in a few seconds with the message "ABB:OK" and the adjustment setting is automatically stored in memory.

Notes

- During the black balance adjustment, the iris is automatically closed.
- During the black balance adjustment, the gain selection circuit is automatically activated so you may see flickering on the viewfinder screen, but this is not a fault.

If automatic black balance adjustment cannot be made

If the black balance adjustment cannot be completed normally, the error message "ABB:NG" will appear for about 3 seconds on the viewfinder screen. If this error message is displayed, retry the black balance adjustment. If the error message occurs again, an internal check is necessary.

Refer to the Maintenance Manual for information about this internal check.

Black balance memory

Values stored in memory are retained even when the camcorder power is turned off.

4-1-2 Automatic Correction of White Spots in the Image

White spots that are visible and have a gain of 0 dB can be automatically corrected by the camcorder.

To initiate this function, hold the AUTO W / B BAL switch in the BLK position until automatic black balance adjustment starts and ends. After the automatic black balance adjustment is completed, the camcorder begins the automatic detection and correction of white spots.

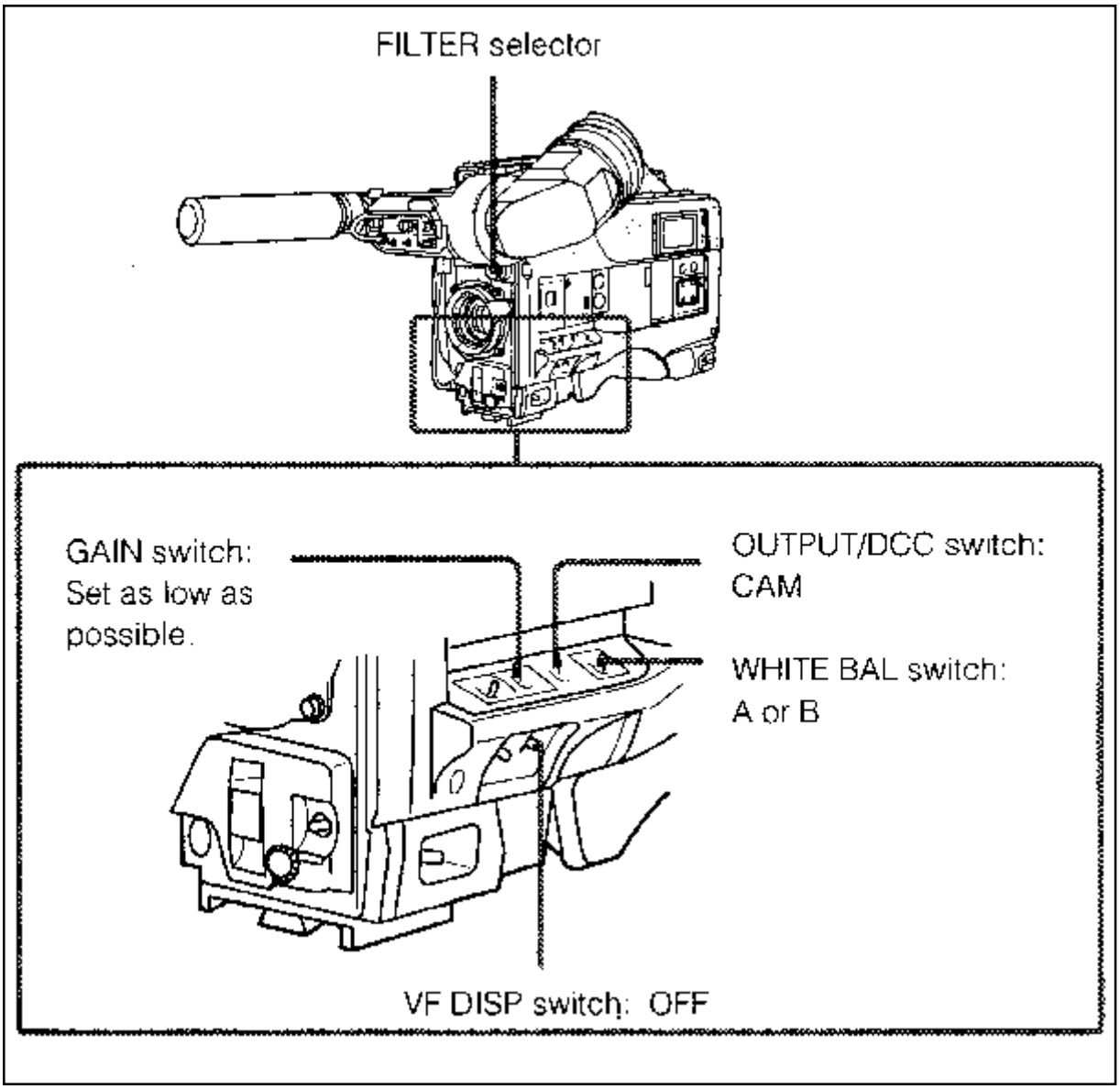
Notes

- Automatic white spot correction takes place only when there are significant white spots (i.e., spots that are visible to the eye and have a gain of 0 dB).
- If you perform the automatic white spots correction several times and spots still persist, consult your Sony service representative.

4-1-3 Adjusting the White Balance

Follow the procedure below to automatically adjust the white balance.

1 Adjust the switches as shown in the figure below.



If the setting on the GAIN selector or WHITE BAL switch is changed, a message reporting the set position appears for about 3 seconds in the setting change and adjustment progress message display area of the viewfinder screen.

(Continued)

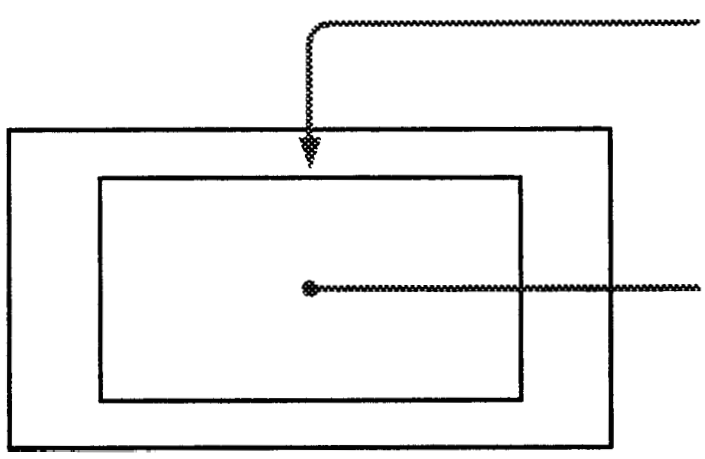
2 Adjust the FILTER selector to suit the lighting conditions.

ND filter		CC filter	
1	Clear	A	Cross filter
2	1/4 ND	B	3200K
3	1/16 ND	C	4300K
4	1/64 ND	D	6300K

If the setting of the FILTER selector is changed, a message reporting the setting appears for about 3 seconds in the setting change and adjustment progress message display area of the viewfinder screen.

3 Place a white test card under the same lighting conditions as the subject to be shot and zoom up to it. Alternately, any white object such as a cloth or wall could be used.

The absolute minimum white area is as follows:



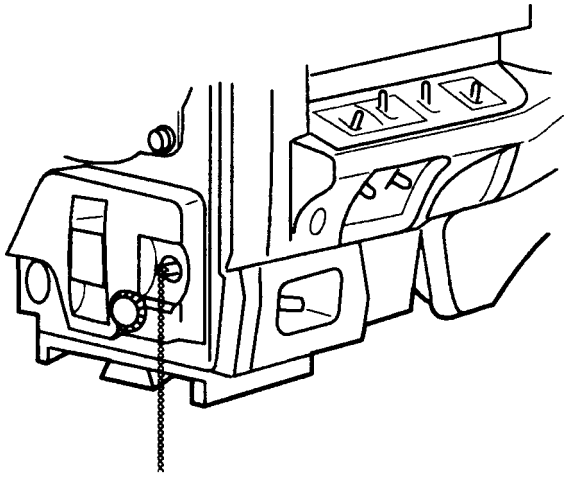
Note

Make sure there are not bright spots in the rectangle.

4 Adjust the lens iris.

If the lens is manually adjusted, adjust it as appropriate.
If the lens has automatic iris, set the automatic / manual switch on the lens to automatic.

5 Push the AUTO W / B BAL switch to WHT and release the switch.



AUTO W/B BAL switch

The switch returns to the center position, and the adjustment is completed.

During adjustment, the message “AWB:EXECUTING”: is displayed in the lower left portion of the viewfinder screen.

The white balance adjustment ends in a second with the message “AWB:OK AWB MEM:A”, and the adjustment setting is automatically stored in the memory (A or B) that was selected in step **1**.

Note

If the camera has a zoom lens with an automatic iris, the iris may hunt[1)] during the adjustment. To prevent this, adjust the iris gain knob (marked with IG, IS, or S) on the lens.

For more information, refer to the lens operation manual.

If the automatic white balance adjustment cannot be made

If the white balance adjustment cannot be completed normally, the error message "AWB:NG" will appear for about 3 seconds on the viewfinder screen.

If this message is displayed, retry the white balance adjustment. If the error message occurs again, an internal check is necessary.

Refer to the Maintenance Manual for information about this internal check.

If you have no time to adjust the white balance

Set the WHITE BAL switch to PRST. The white level is reset to the value saved in the reference file (factory setting: 3200K). The white balance is automatically set according to the FILTER selector (outer knob) position.

White balance memory

Values stored in memory are retained even when the camcorder power is turned off.

1) Hunting
Repeated brightening and darkening of an image, resulting from repeated response to automatic iris control.

4-2 Setting the Electronic Shutter

This section describes the shutter modes that can be used with the electronic shutter of the camcorder, and describes the procedure for selecting the shutter speed and mode.

4-2-1 Shutter Modes

The shutter modes that can be used with the electronic shutter and the shutter speeds that can be selected are listed below.

Selectable shutter modes and speeds

Mode	Shutter speed	Application
Standard	1/100, 1/125, 1/250, 1/500 1/1000, 1/2000 sec	For shooting fast-moving subjects with little blurring
ECS (Extended Clear Scan)	30 to 7000 Hz	For obtaining images with no horizontal bands of noise when shooting subjects such as monitor screens.
S-EVS (Enhanced Vertical definition System)	1/60 sec. (automatic setting) 0 to 100%	Improved vertical resolution. However, the sensitivity and dynamic range are reduced.

Notes

- Whatever the operating mode of the electronic shutter, the iris opens wider as the shutter speed increases, thus reducing the depth of field.
- Under artificial light, particularly fluorescent or mercury lamps, the light intensity may appear to be constant, but the strengths of each of the R, G, and B colors are actually changing in synchronization with the frequency of the power supply (“flicker”). Using an electronic shutter under such lighting could make the flicker even worse. Color flicker is particularly likely to happen when the power supply is 60 Hz. However, if the power supply is 50 Hz, setting the shutter speed to 1/100 can reduce this flicker.

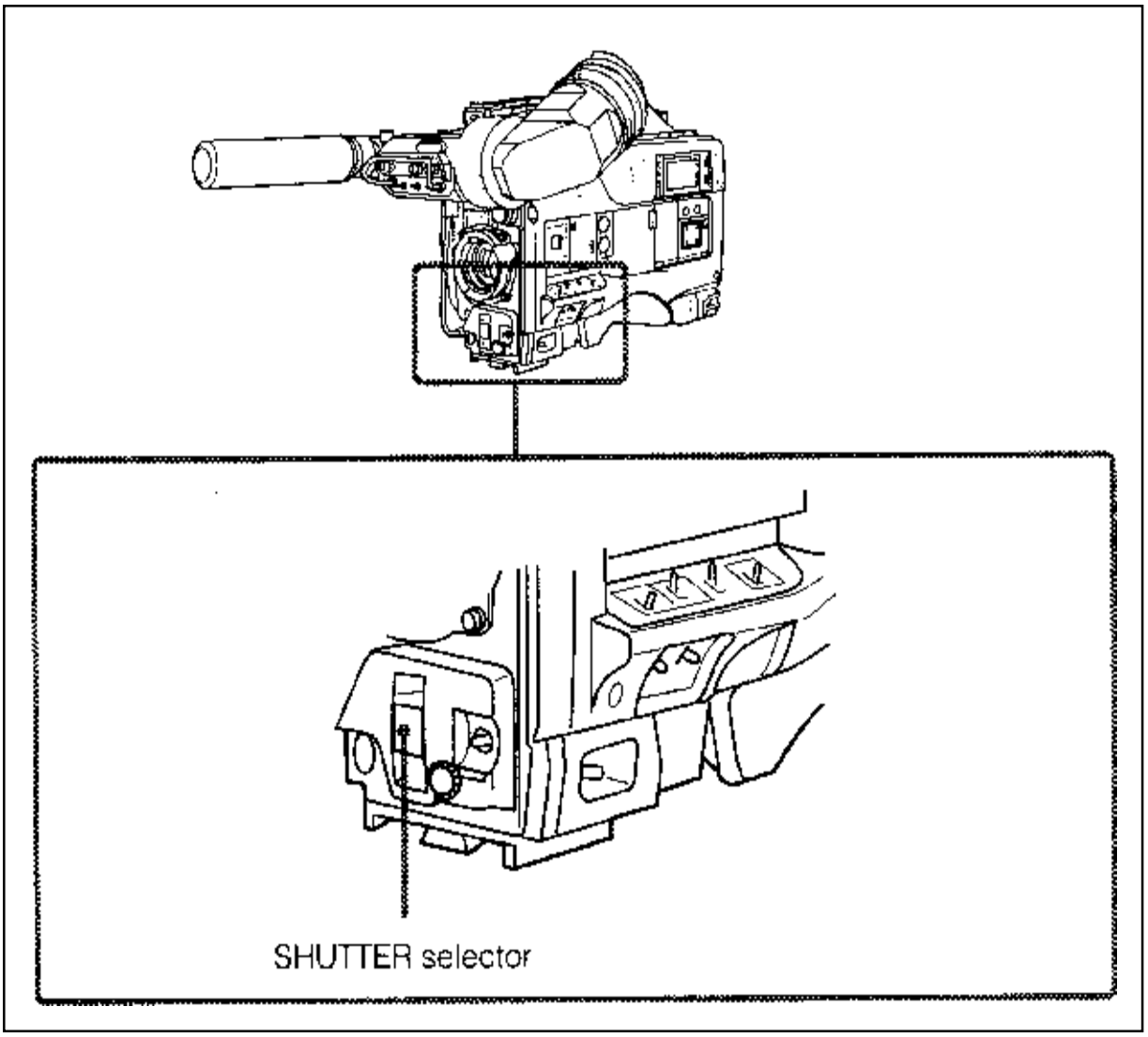
4-2-2 Selecting the Shutter Mode and Speed

Use the SHUTTER selector to select a shutter mode or a standard-mode shutter speed.

Setting the shutter mode and standard-mode shutter speed

1 Follow the procedure described in “Selecting the Display Items” (page 4-43) to set SHUTT to ON from the VF DISPLAY page of the OPERATION menu.

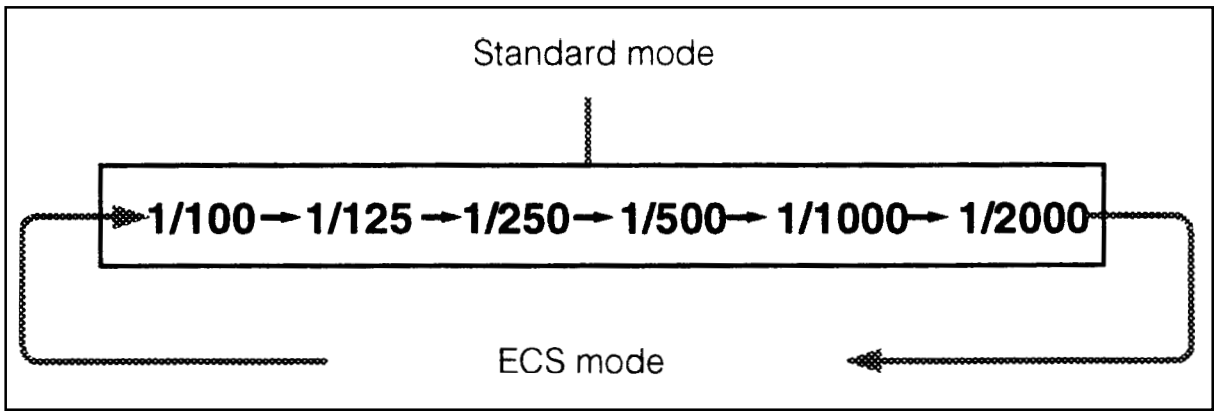
2 Push the SHUTTER selector from ON to SEL.



The current shutter setting appears for about 3 seconds in the setting change and adjustment progress message display area of the viewfinder screen. (e.g., :SS: 1/250)

3 Before the message from step **2** disappears, push the SHUTTER selector to SEL again and repeat until the desired mode or speed appears.
Pushing the SHUTTER selector to SEL repeatedly allows you to cycle through all of the pre-selected settings of mode and speed.

(Continued)



4

When ECS mode is selected
You can change the speed by rotating the MIC / MENU knob on the front of the camcorder.

Once the shutter speed is selected, it is retained even when the camcorder power is turned off.

When S-EVS mode is selected
You can change the speed with the PAINT menu.

For more information, see Section 4-8 "Paint Menu" (page 4-54).

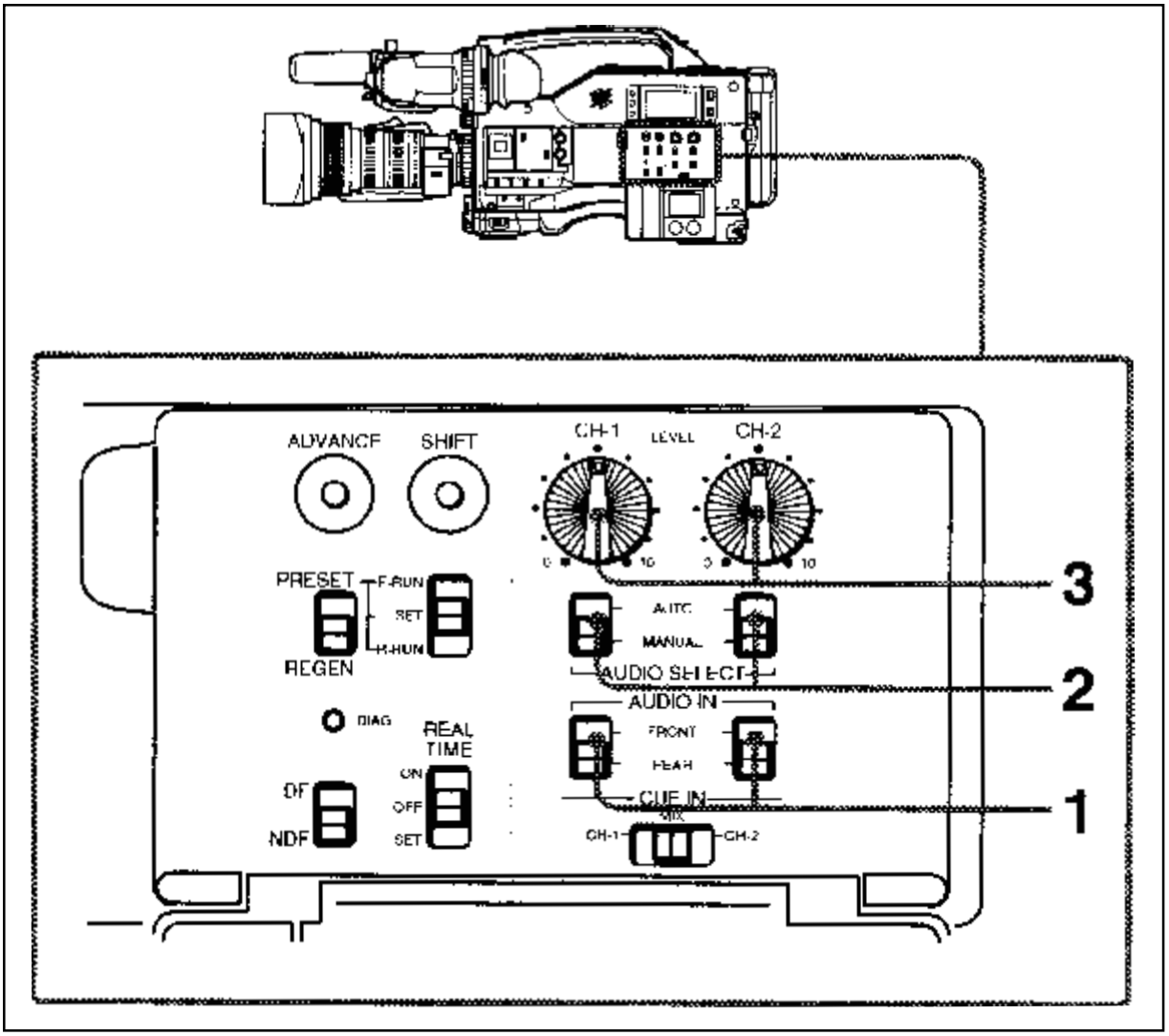
4-3 Adjusting the Audio Level

If you set the AUDIO SELECT CH-1 / CH-2 switches to AUTO, input levels for the corresponding channels are adjusted automatically.

Follow the procedure below to manually adjust the input levels for both audio channels.

Manually adjusting the audio levels of AUDIO IN CH-1 / CH-2

Follow the procedure described below to adjust the audio levels of the audio input from the AUDIO IN CH-1 / CH-2 connectors, which is entered to channels 1 and 2.

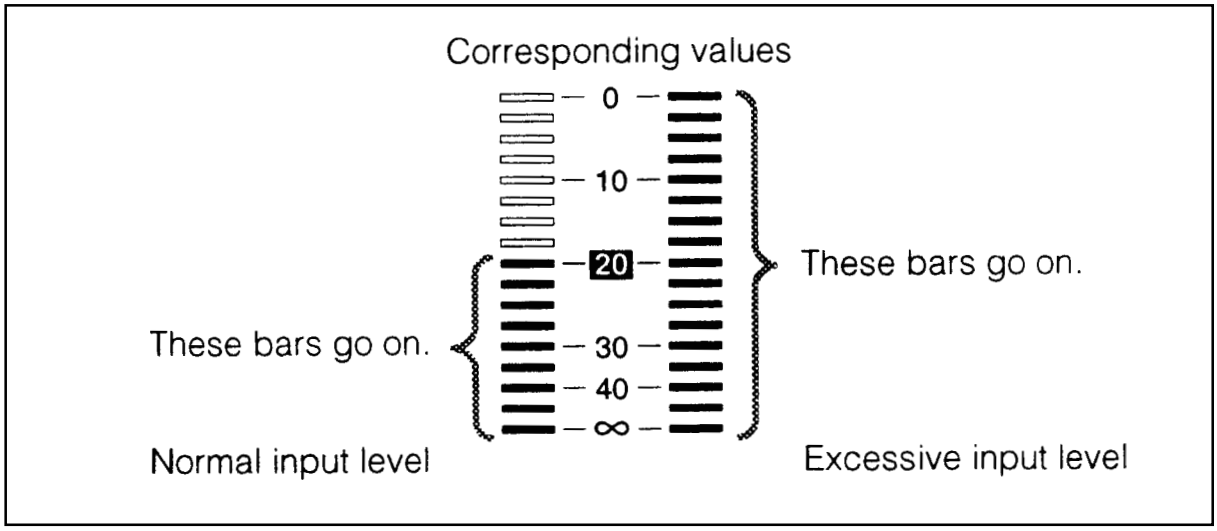


Manual adjustment of the audio levels of AUDIO IN CH-1 / CH-2

1 Set the AUDIO IN switch to REAR.

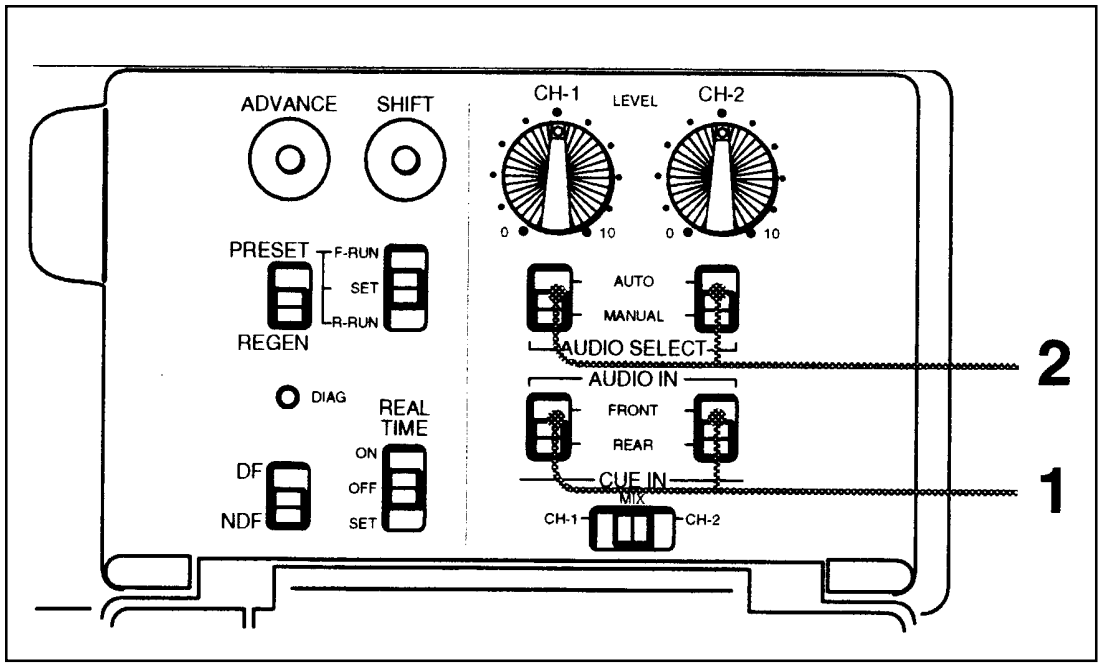
2 Set the AUDIO SELECT CH-1 / CH-2 switches to MANUAL.

3 Adjust the AUDIO LEVEL CH-1 / CH-2 controls so that at the maximum sound level, the level meter indicates -20 dB. The second bar from the top may turn on occasionally, but do not allow the top bar to go on. If it goes on, the audio level is too high.



Manually adjusting the audio level of the front microphone

You can adjust the audio level input from the front microphone for channels 1 and 2 by using the MIC / MENU knob on the front of the camcorder.



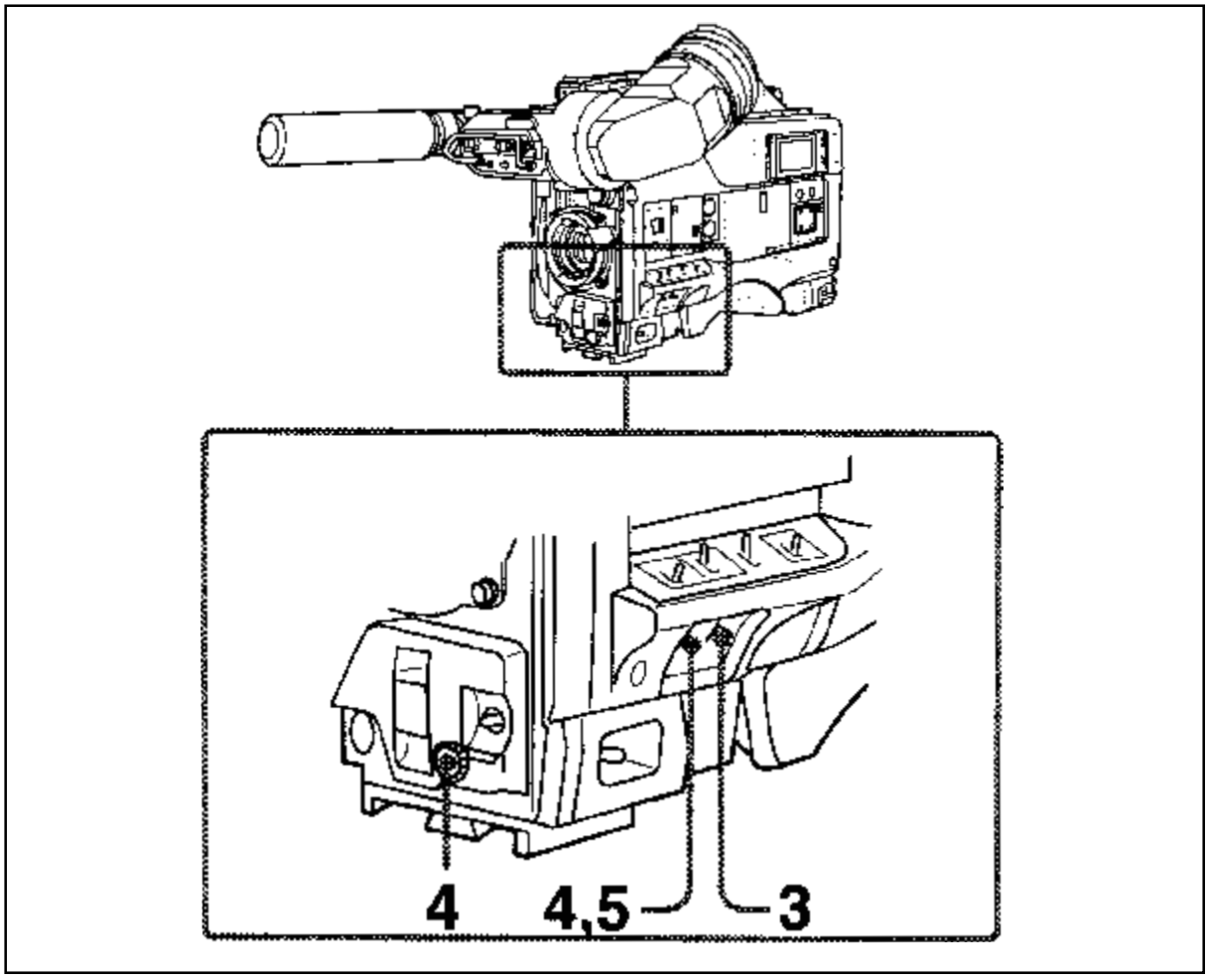
Microphone audio level manual adjustment (1)

1 Set the AUDIO IN switches as follows:

- **When using the front microphone input for both channels 1 and 2:** Set both AUDIO IN switches to FRONT.
- **When using the front microphone input for either channel 1 or 2:** Set the AUDIO IN switch for the desired channel to FRONT.

2 Set the AUDIO SELECT switch(es) for the desired channel(s) to MANUAL.

(Continued)



Microphone audio level manual adjustment (2)

3 Set the VF DISP switch to ON.

4 Push the MENU switch to CANCEL to display the current audio level (e.g., “AUDIO LEVEL:70”), then rotate the MENU knob to adjust the audio level so that at the maximum sound level, the level meter indicates -20 dB.

- The MENU knob can be adjusted from 0 to 100 in 101 steps.
- The second bar from the top may turn on occasionally, but do not allow the top bar to go on. If it goes on, the audio level is too high.

5 Push the MENU switch to CANCEL.

Note

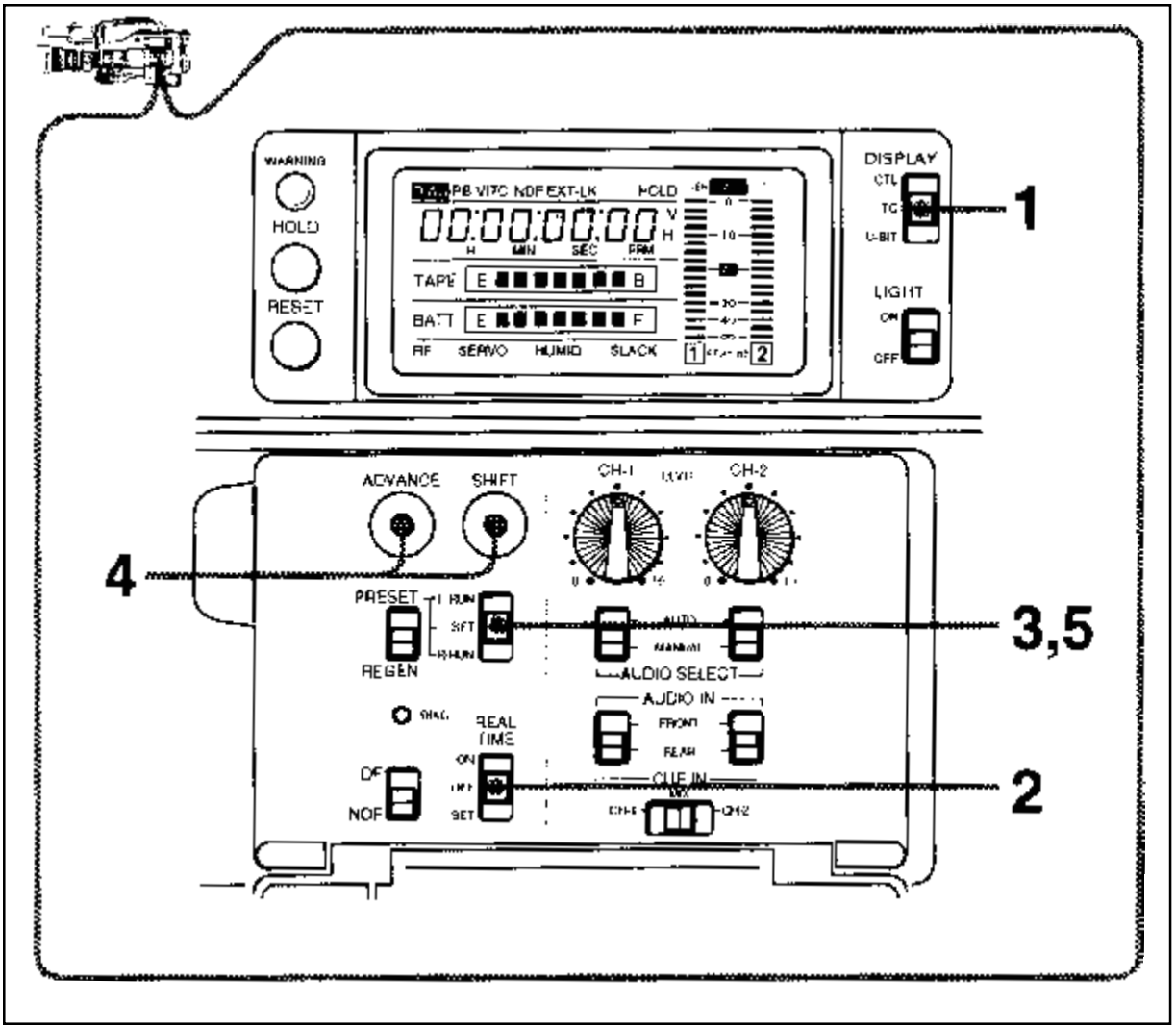
The AUDIO SELECT CH-1 and CH-2 switches on the left side of the camcorder do not function when the AUDIO IN switch is set to FRONT.

4-4 Setting the Time Data

4-4-1 Setting the User Bits

By setting the user bits (up to 8 hexadecimal digits), you can record user information such as the date, time, or scene number on the time code track.

Follow the procedure below to set the user bits.



Setting the User bits

1 Set the DISPLAY switch to U-BIT.

2 Set the REAL TIME switch to OFF.

3 Set the F-RUN/SET/R-RUN switch to SET.

(Continued)

4 Set the user bits by using the SHIFT and ADVANCE buttons.

SHIFT: Selects a digit to set. Each time you press the button, the flashing digit moves one column to the right.

ADVANCE: Increments the value of the flashing digit.

Hexadecimal digits A to F are displayed as follows:

Hexadecimal	A	B	C	D	E	F
Display	A	b	C	d	E	F

Resetting a modified numeric value

To reset a numeric value that was modified, press the RESET button.

5 Set the F-RUN/SET/R-RUN switch to F-RUN or R-RUN, corresponding to the desired time code run mode.

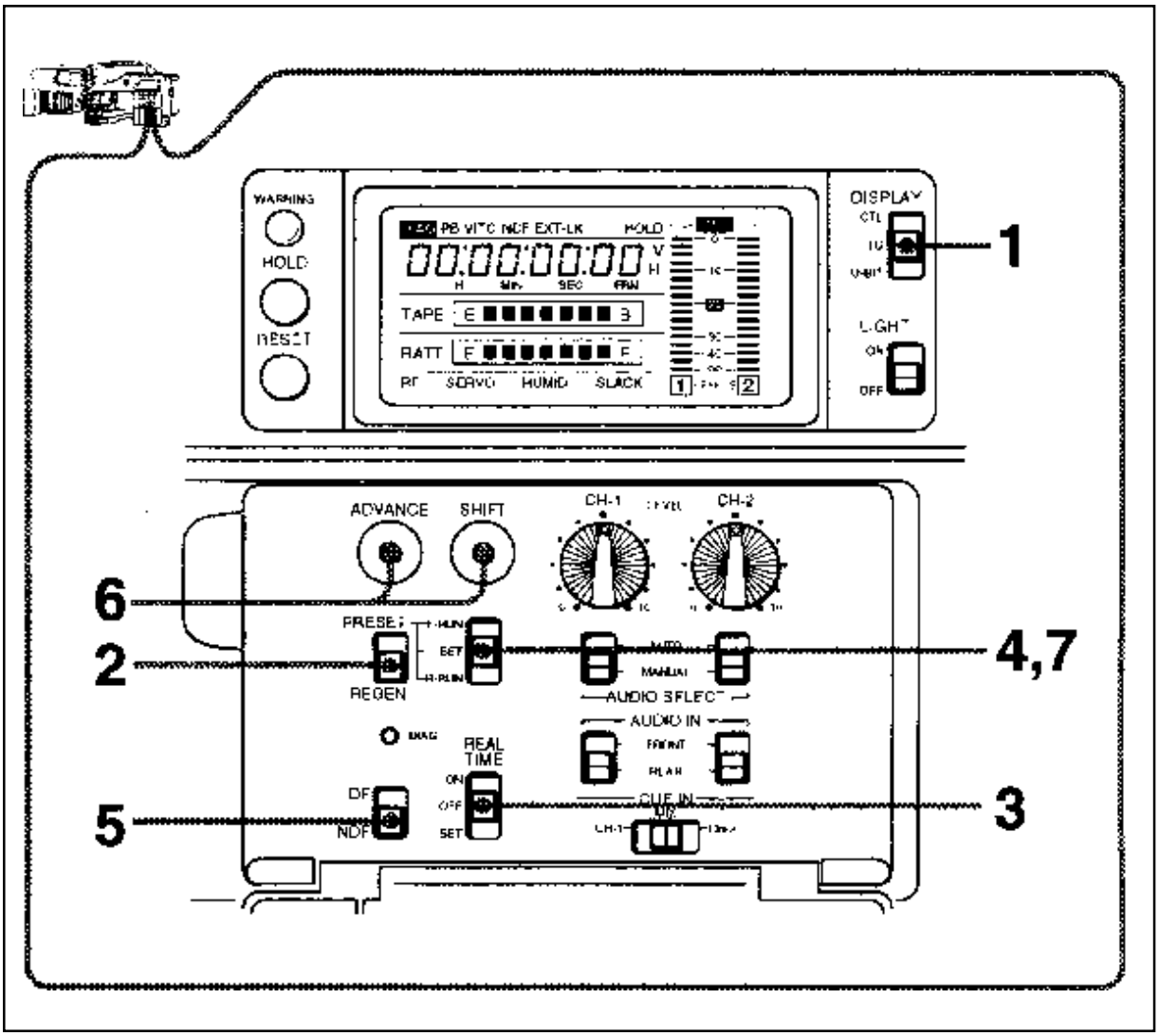
The specified user bits will be recorded for both LTC and VITC.

Storing the user bits in memory

The user bits settings (other than real time) are automatically retained in memory even when the power is turned off.

4-4-2 Setting the Time Code

The time code setting range is from 00:00:00:00 to 23:59:59:29 (hour: minute: second: frame).
Follow the procedure below to set the time code.



Setting the time code

1 Set the DISPLAY switch to TC.

2 Set the PRESET / REGEN switch to PRESET.

3 Set the REAL TIME switch to ON or OFF.

(Continued)

4 Set the F-RUN / SET / R-RUN switch to SET.

5 Set the DF / NDF switch as necessary.

DF: Drop frame mode
NDF: Non-drop frame mode

6 Using the SHIFT and ADVANCE buttons, set the time code.

SHIFT: Selects a digit to set. Each time you press the button, the flashing digit moves one column to the right.
ADVANCE: Increments the value of the flashing digit.

Resetting a modified numeric value
To reset a numeric value that was modified, press the RESET button.

7 Set the F-RUN / SET / R-RUN switch to F-RUN or R-RUN.

F-RUN: Free run. The time code generator keeps running, regardless of the operating state of the VTR.
R-RUN: Recording run. The time code generator runs only while recording.

Make the time code continuous
When the F-RUN / SET / R-RUN switch is set to R-RUN, recording a number of scenes on the tape normally produces continuous time codes. If, however, you take the cassette out at some point, the time code will no longer be continuous.
To make the time code continuous, follow the procedure below.

1 Set the PRESET / REGEN switch to REGEN.

2 Use the tape transport buttons to play back.

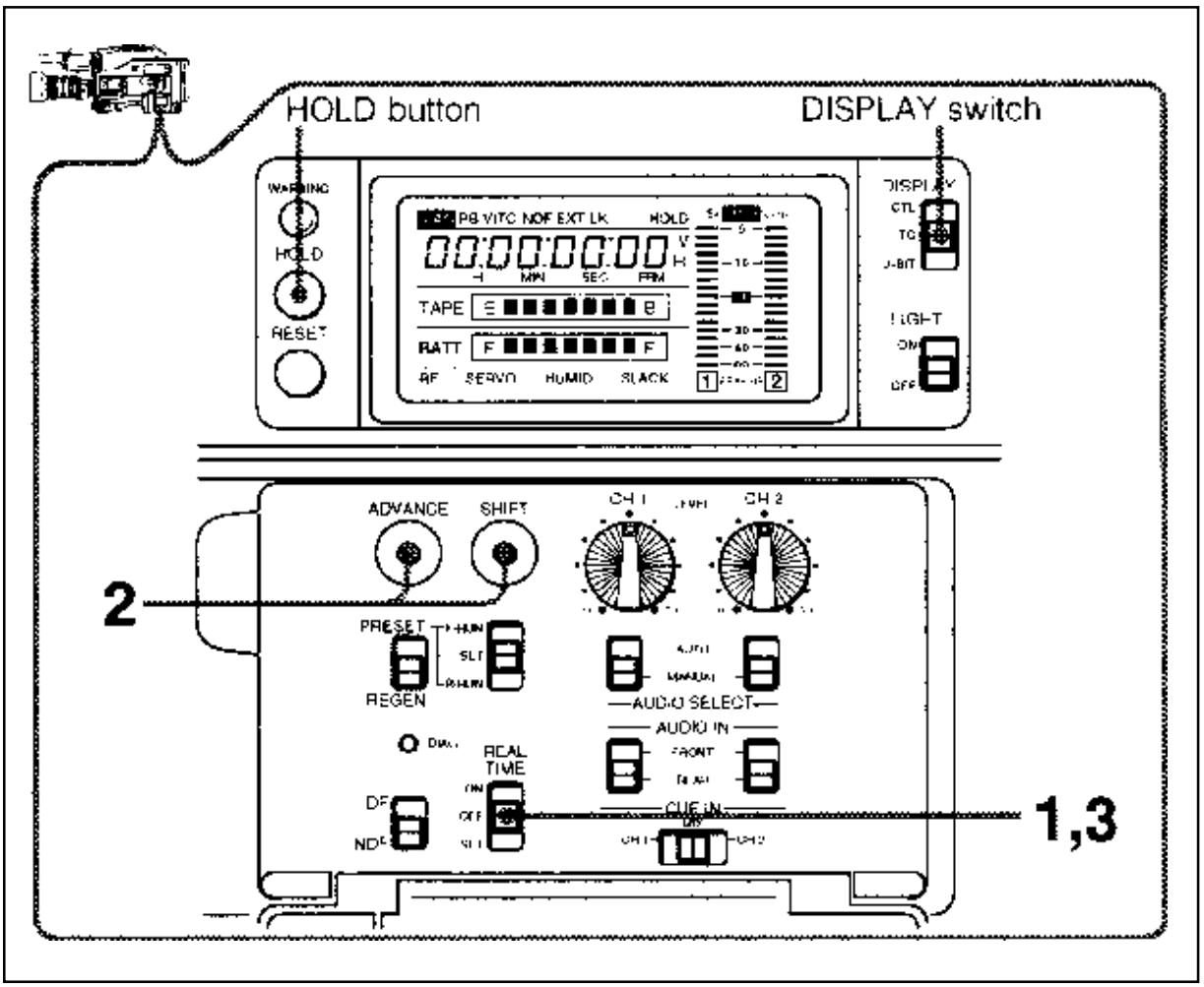
3 Watching the playback, find the point of the previous recording on the tape from which you wish to continue recording, and press the STOP button.

4 Press the RET button on the lens.

This reads the previous recording and synchronizes the internal time code generator, thus allowing the new time code recorded to follow on consecutively.

4-4-3 Entering the Real Time in the VITC

Follow the procedure below to enter the real time in the VITC.



Entering the real time in the VITC

1 Set the REAL TIME switch to SET.

2 Use the ADVANCE and SHIFT buttons to set the real time.

3 Set the REAL TIME switch to ON.

The real time is recorded in the VITC, and the user bits that were set are recorded in the LTC.

By flipping the internal switch, you can enter the user bits in the VITC and the real time in the LTC.

Refer to the Maintenance Manual for more information.

Displaying the user bits recorded in the VITC

Set the DISPLAY switch to U-BIT and then press and hold down the HOLD button. The user bits that are recorded in the VITC are displayed while the HOLD button is pressed.

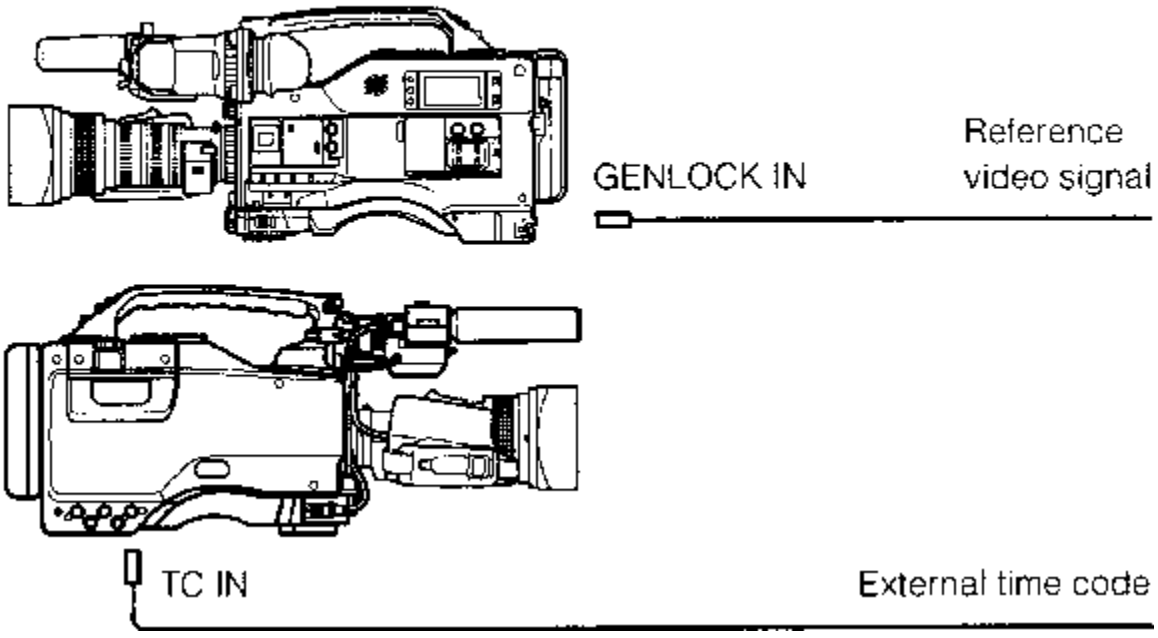
4-4-4 Synchronizing the Time Code

You can synchronize the internal time code generator of this camcorder with an external generator for the regeneration of an external time code. You can also synchronize the time code generators of external VTRs with the internal generator of this camcorder.

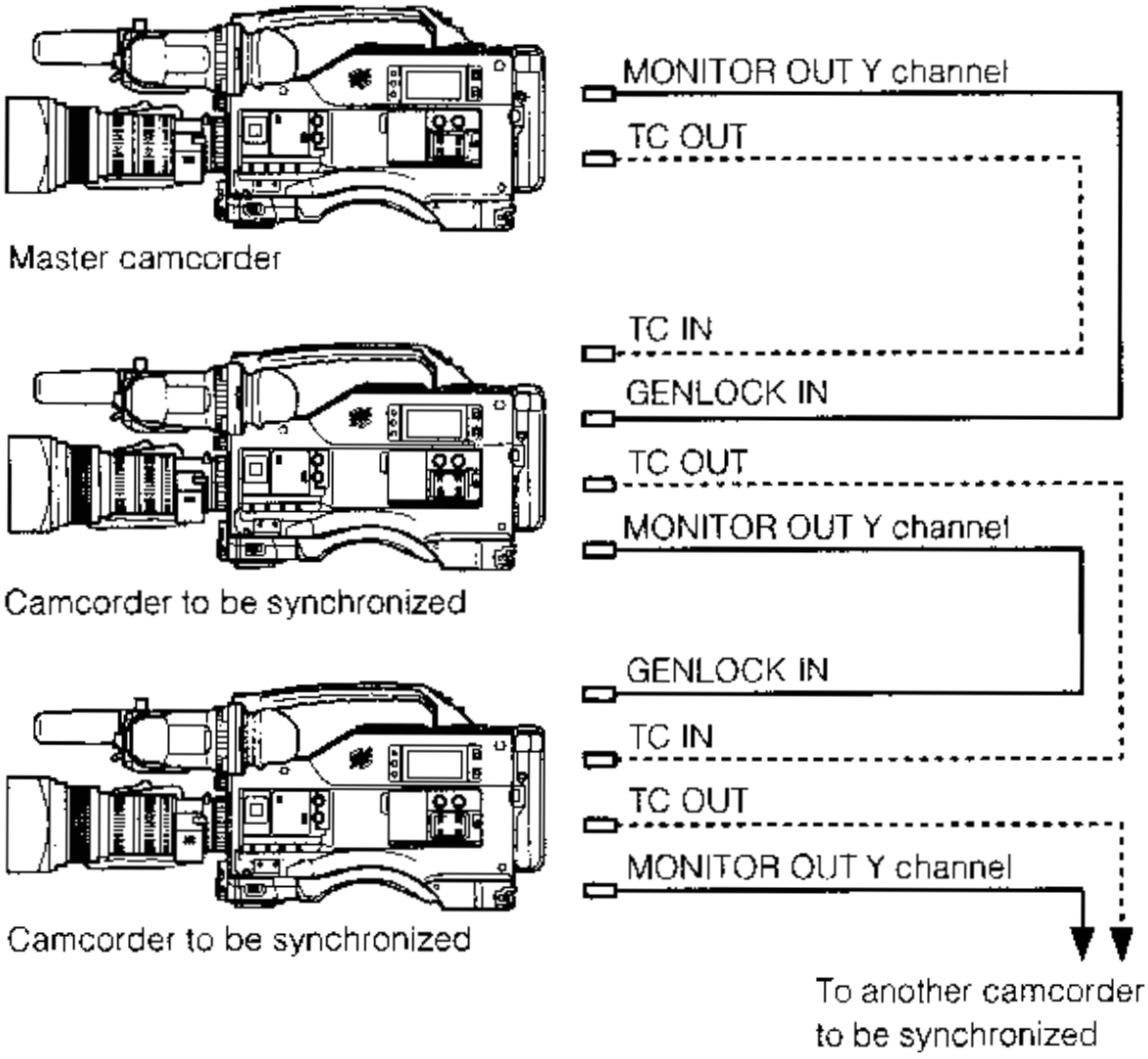
Connections for time code synchronization

Connect both the reference video signal and the external time code as illustrated below.

Example 1: Synchronizing with an external time code

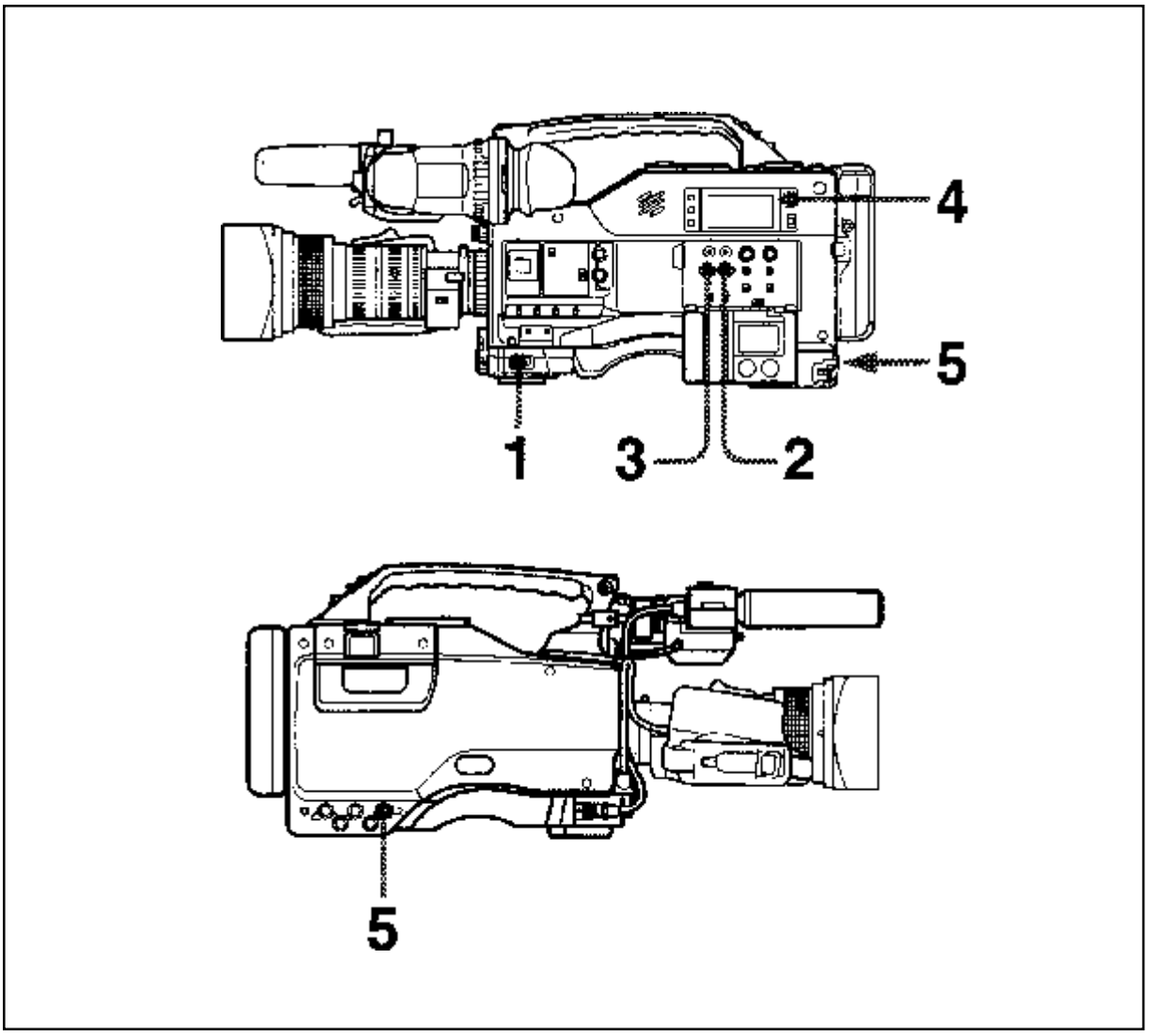


Example 2: Interconnecting a number of camcorders for time code synchronization



Procedure for time code synchronization

Follow the procedure below to synchronize the time code.



Synchronizing the time code

1 Turn the POWER switch to ON.

2 Set the F-RUN / SET / R-RUN switch to F-RUN.

3 Set the PRESET / REGEN switch to PRESET.

(Continued)

4 Set the DISPLAY switch to TC.

5 Supply the time code to the TC IN connector and reference video signals that comply with the SMPTE time code standard and are in the proper phase relationship to the GENLOCK IN connector.

This operation synchronizes the internal time code generator with the external time code. After about 10 seconds, you can disconnect the external time code without losing the synchronization. However, the synchronization will be disrupted if you connect or disconnect the time code during recording.

Note

- When you finish the above procedure, the time code is immediately synchronized with the external time code and the counter display will show the value of the external time code. However, wait for a few seconds until the sync generator stabilizes before recording.

- If the frequency of the reference video signal is not the same as the set frequency of the camcorder, the camera cannot be correctly genlocked.

User bit settings during time code synchronization

When the time code is synchronized, only the time data is synchronized with the external time code value. Therefore, the user bits can have their own settings for each camcorder. You can also synchronize the user bits with external user bit data.

Refer to the Maintenance Manual for more information.

Releasing the time code synchronization

First disconnect the external time code, then set the F-RUN/SET/R-RUN switch to R-RUN

Changing the power supply from the battery pack to an external power supply during time code synchronization

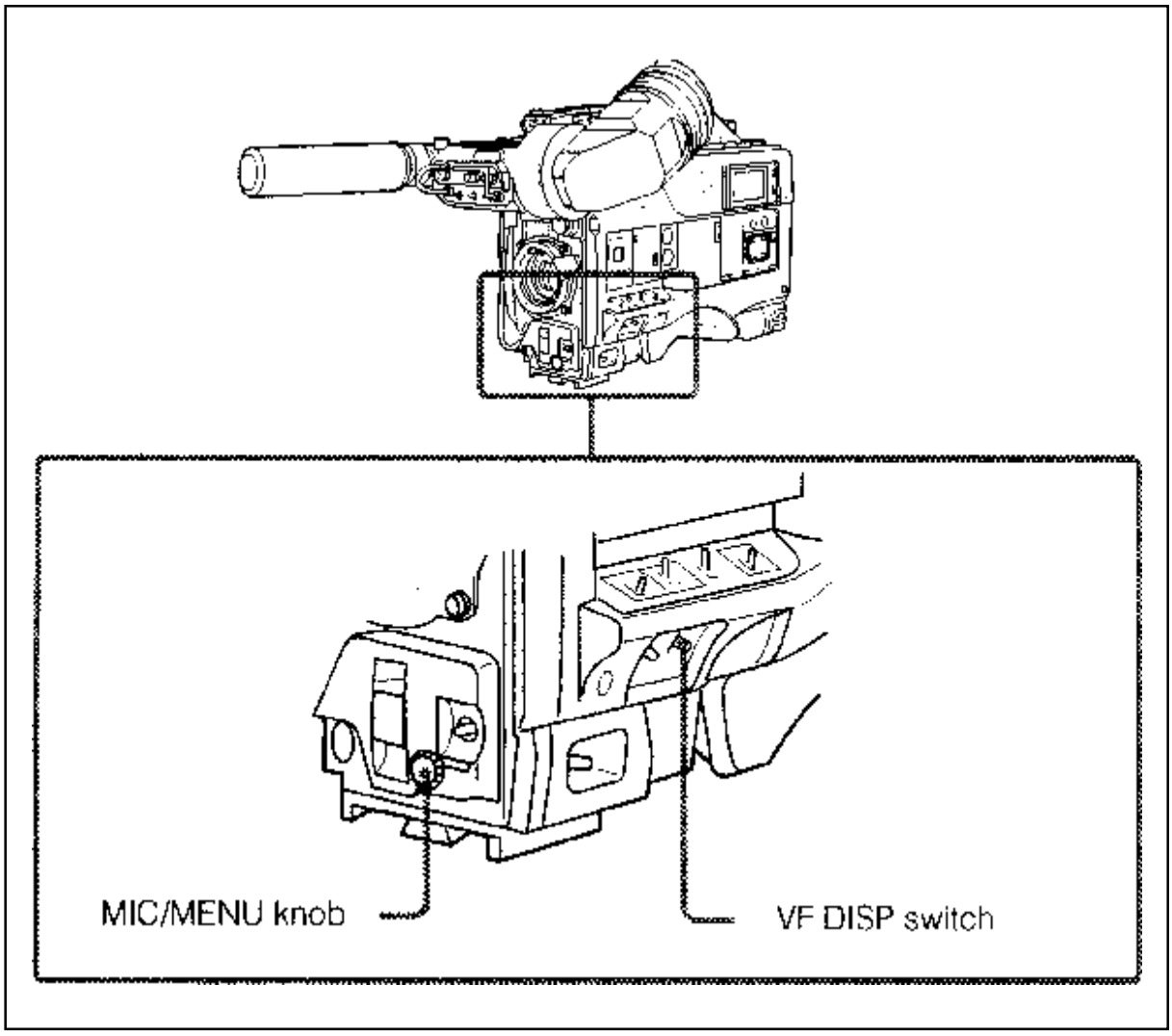
To maintain a continuous power supply, connect the external power supply to the DC IN connector before removing the battery pack. You may lose time code synchronization if you remove the battery pack first.

Camera synchronization during time code synchronization

During time code synchronization, the camera is genlocked to the reference video signal input from the GENLOCK IN connector.

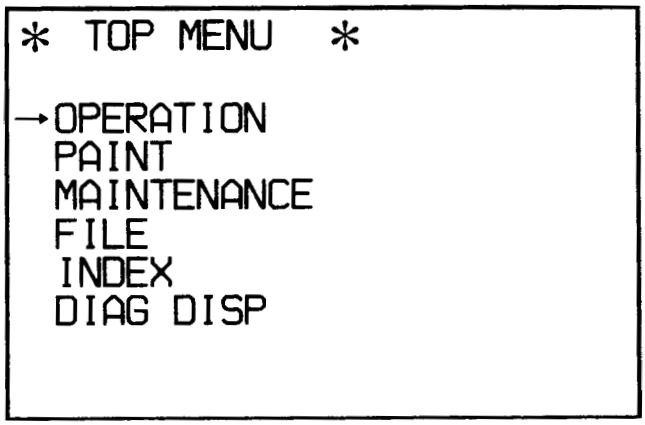
4-5 Setup Menu Display on the Viewfinder Screen

If the VF DISP switch is set to MENU, the OPERATION menu is displayed on the viewfinder screen. The menu is displayed as individual pages.



TOP menu

The TOP menu screen shows the overall structure of the menu items. To display the TOP menu screen, set the VF DISP switch to MENU while pressing the MIC / MENU knob.



Note

The contents of the TOP menu will differ according to IF circuit board switch settings inside the HDW-700A camcorder.
Refer to the Maintenance Manual for more information.

The TOP menu has the following submenus.

OPERATION menu: This menu contains items for changing settings according to conditions related to the subject when a normal cameraman is operating the camcorder. This menu is normally displayed when the VF DISP switch is changed to MENU.

PAINT menu: This menu contains items for making detailed image adjustments while using a waveform monitor to monitor the waveforms output by the camera. Usually, the support of a video engineer is required to use this menu. Although you can also use an external remote control panel or master setup unit to set the items on this menu, this menu is effective when using the camcorder by itself outdoors. This menu is almost identical to the PAINT menu of the MSU-700 Master Setup Unit (not supplied).

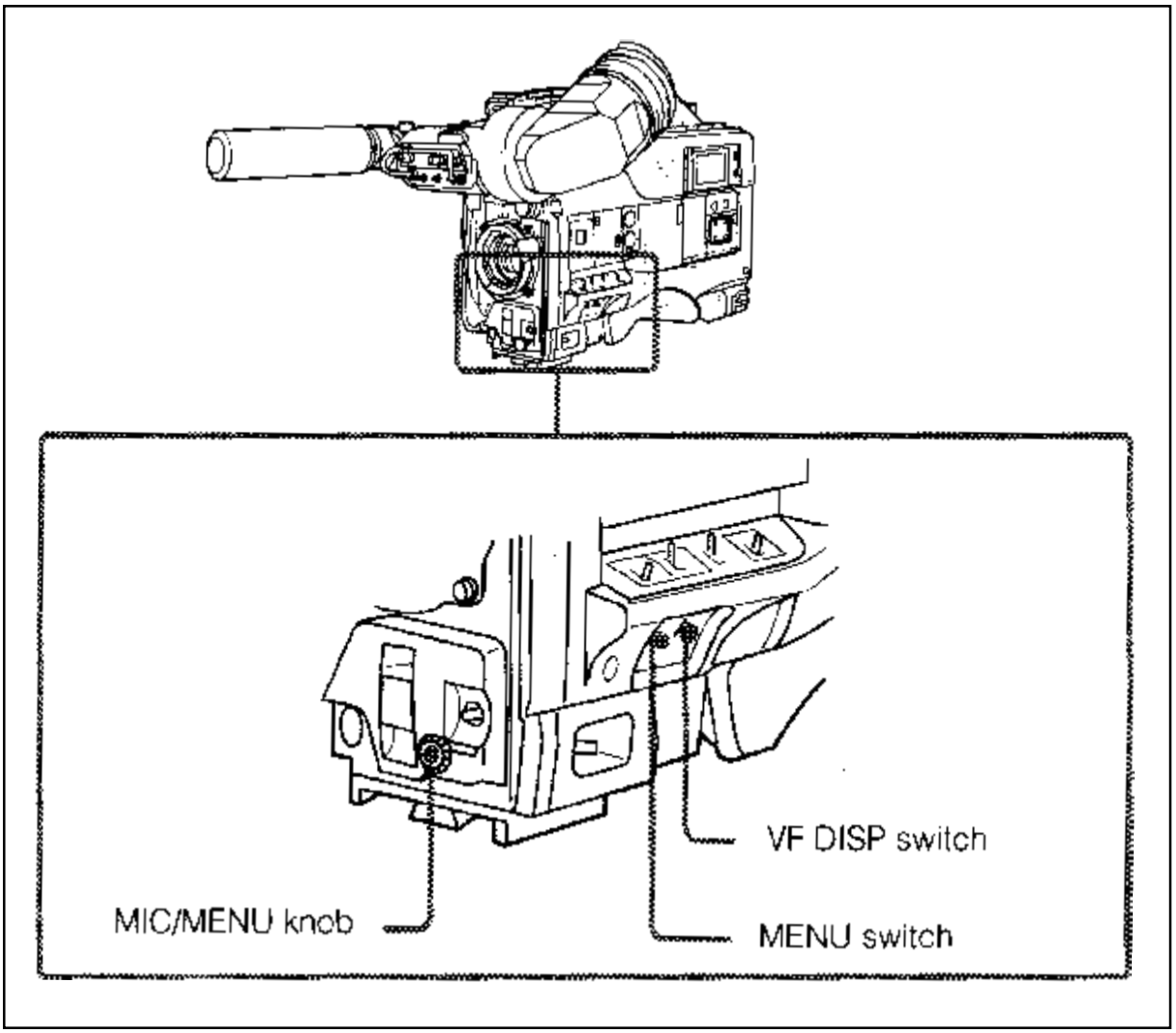
MAINTENANCE menu: This menu contains items for performing camera maintenance operations such as changing the system or infrequently used paint items. This menu is almost identical to the MAINTENANCE menu of the MSU-700 Master Setup Unit (not supplied).

FILE menu: This menu is used for performing file operations such as writing the reference file.

INDEX menu: This menu is used for searching for an item you want to set when you do not know the page that contains it.

DIAG DISP menu: This menu enables you to confirm the VTR status or a failed circuit board.

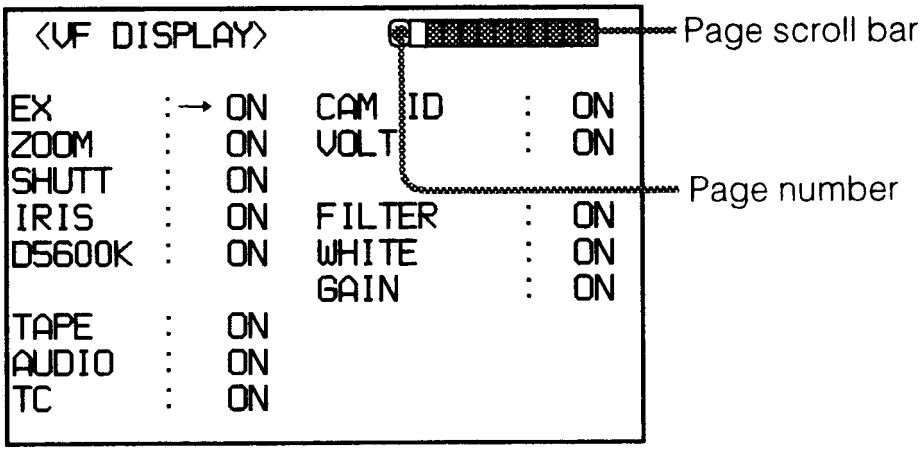
4-5-1 Basic Use of the Setup Menu



1 Turn the VF DISP switch from OFF to MENU.

The OPERATION menu will be displayed.

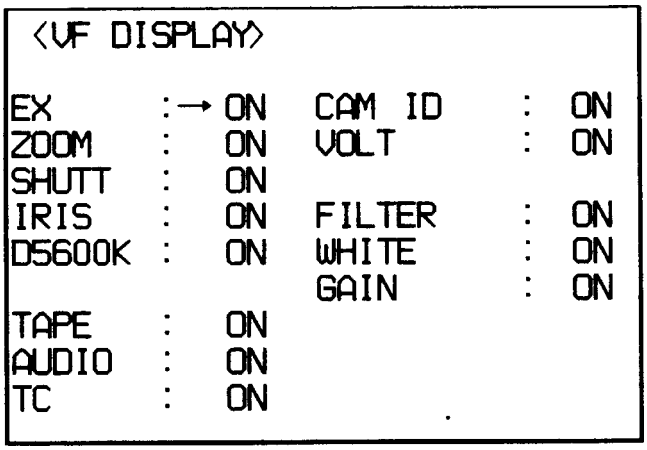
(Continued)



2 Turn the MIC / MENU knob until the desired page appears.

3 Push the MIC / MENU knob.

The arrow (→) points to the currently selected item.



4 Turn the MIC / MENU knob to move the arrow (→) to the item you want to set.

5 Push the MIC / MENU knob.

The arrow (→) changes to a flashing question mark (?).

6 Turn the MIC / MENU knob to change the setting.

If you turn the knob quickly, the numeric value changes rapidly. If you turn it slowly, you can make minute adjustments.

Canceling a modified value
If you push the MENU switch to CANCEL before pushing the MIC / MENU knob, the setting will return it to its original value.
Interrupting setting operations
If you turn the VF DISP switch to OFF, the menu screen display will disappear. When you turn the VF DISP switch to MENU again, the values that were displayed when you interrupted the setting operations will reappear so you can continue making settings.

7 Push the MIC / MENU knob.

The question mark (?) changes to an arrow (→) to confirm the setting.

8 To continue changing the settings of items on the same page, repeat steps **4** to **7**.

9 To move to another page, push the MENU switch to CANCEL to return to the upper right portion of the screen where the page scroll bar is displayed, and turn the MIC / MENU knob.

The screen shown in step **1** reappears.

To end menu operations
Turn the VF DISP switch to OFF.

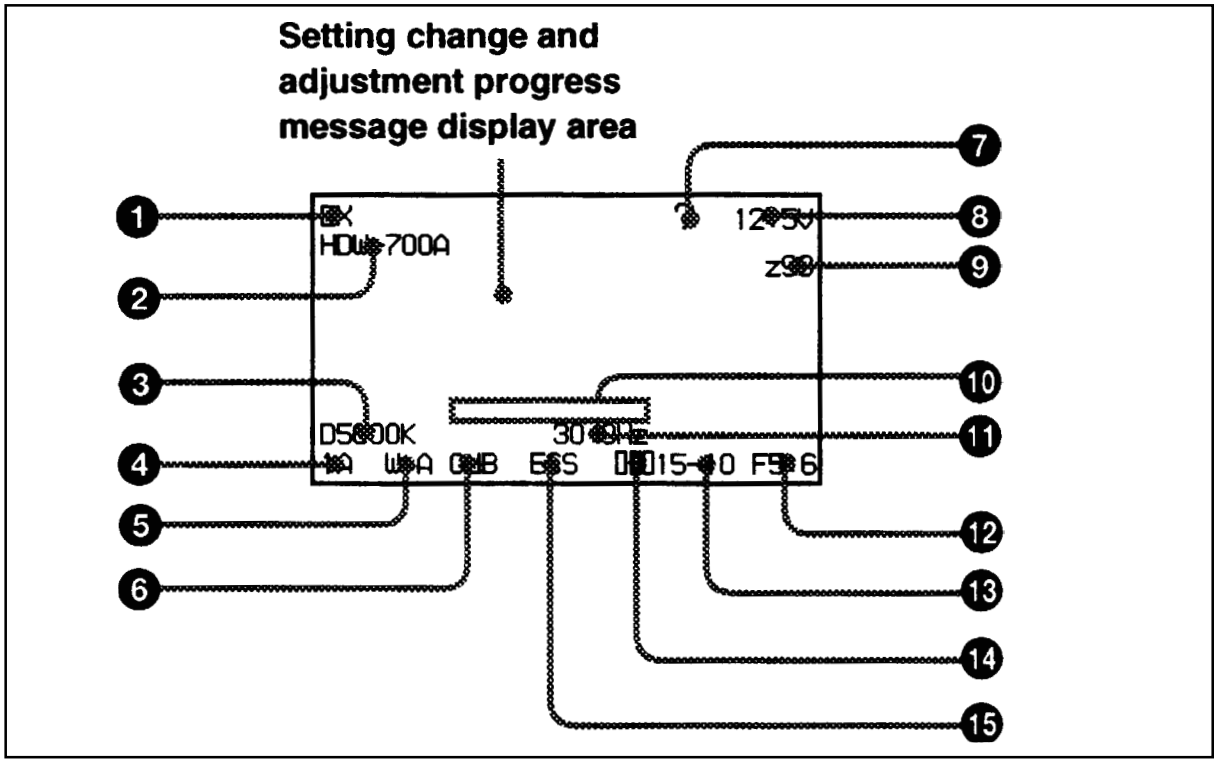
4-6 Status Display on the Viewfinder Screen

The viewfinder screen displays not only the video picture but also characters and messages indicating the camcorder settings and operating status, a center marker, a safety zone marker, etc.
When the VF DISP switch is set to ON, the items for which an "ON" setting was made in the VF DISPLAY page of the OPERATION menu or with related switches are displayed at the top and bottom of the screen.
The messages that give details of the settings and adjustment progress and results can also be made to appear for about 3 seconds while settings are being changed, during adjustment, and after adjustment.

For information about marker display, see Section 4-7-4 "Setting the Marker Display" (page 4-42).For information about the display item selection, see Section 4-7-4 "Selecting the Display Items" (page 4-43).

4-6-1 Layout of the Status Display on the Viewfinder Screen

All items that can be displayed on the viewfinder screen are shown below.



❶ Extender

EX is displayed when a lens extender is used.

❷ Camera ID

The ID that was set by using the menu is displayed.

For information about the camera ID setting, refer to the Maintenance Manual.

❸ D5600K mode

This indicator is displayed when D5600K mode is used.

❹ Filter

This indicator indicates the currently selected filter types. The digit (1 to 4) indicates the ND filter selection, and the letter (A, B, C, or D) indicates the CC filter selection.

❺ White balance memory

This indicator indicates the currently selected white balance automatic adjustment memory.

W:A: The WHITE BAL switch is set to A.

W:B: The WHITE BAL switch is set to B.

W:P: The WHITE BAL switch is set to PRST.

❻ Gain
This indicator indicates the gain (in dB) of the video amplifier, as set by the GAIN selector.

❼ Self-diagnostics
When a fault has been detected in the camcorder, this indicator appears as a flashing question mark (?).

❽ Power voltage
This indicator indicates the power voltage.

❾ Zoom position
This indicator indicates the length between wide angle and telephoto. The indicator ranges from z0 toz99.

❿ Time code
This indicator indicates the time code value.

⓫ ECS (Extended Clear Scan)
This indicator indicates ECS frequency.

⓬ Iris setting
This indicator indicates the f-stop (iris setting) of the lens.

⓭ Remaining tape

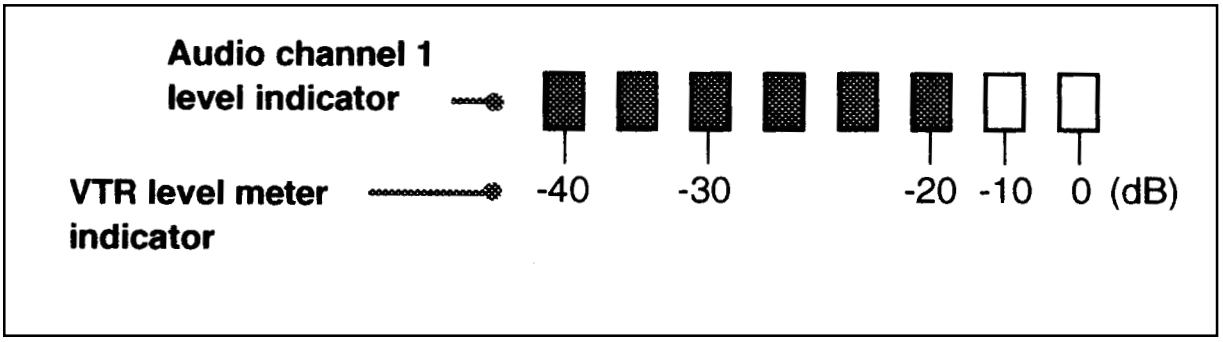
This indicator indicates the remaining tape recording time (in minutes) of the VTR.

Example of remaining tape indicator

Display	Tape time remaining
F-30	Full to 30 minutes
30 - 25	30 to 25 minutes
25 - 20	25 to 20 minutes
20 - 15	20 to 15 minutes
15 - 10	15 to 10 minutes
10 - 5	10 to 5 minutes
5 - 0	5 to 2 minutes
5 - 0 (flashing)	Less than 2 minutes

⓮ Audio level

This indicator indicates the level of audio channel 1. The peak indication of the VTR level meter is related as follows to the audio level when a sine wave is input.



⓯ Shutter speed, ECS, or S-EVS

This indicator indicates the shutter speed, ECS or S-EVS mode. However, if both shutter/ECS and S-EVS are OFF, nothing is displayed.

4-7 Setup Using the OPERATION Menu

To set up or adjust the camcorder, use the OPERATION menu.
The items that can be set up or adjusted by using the OPERATION menu are listed in the table below.

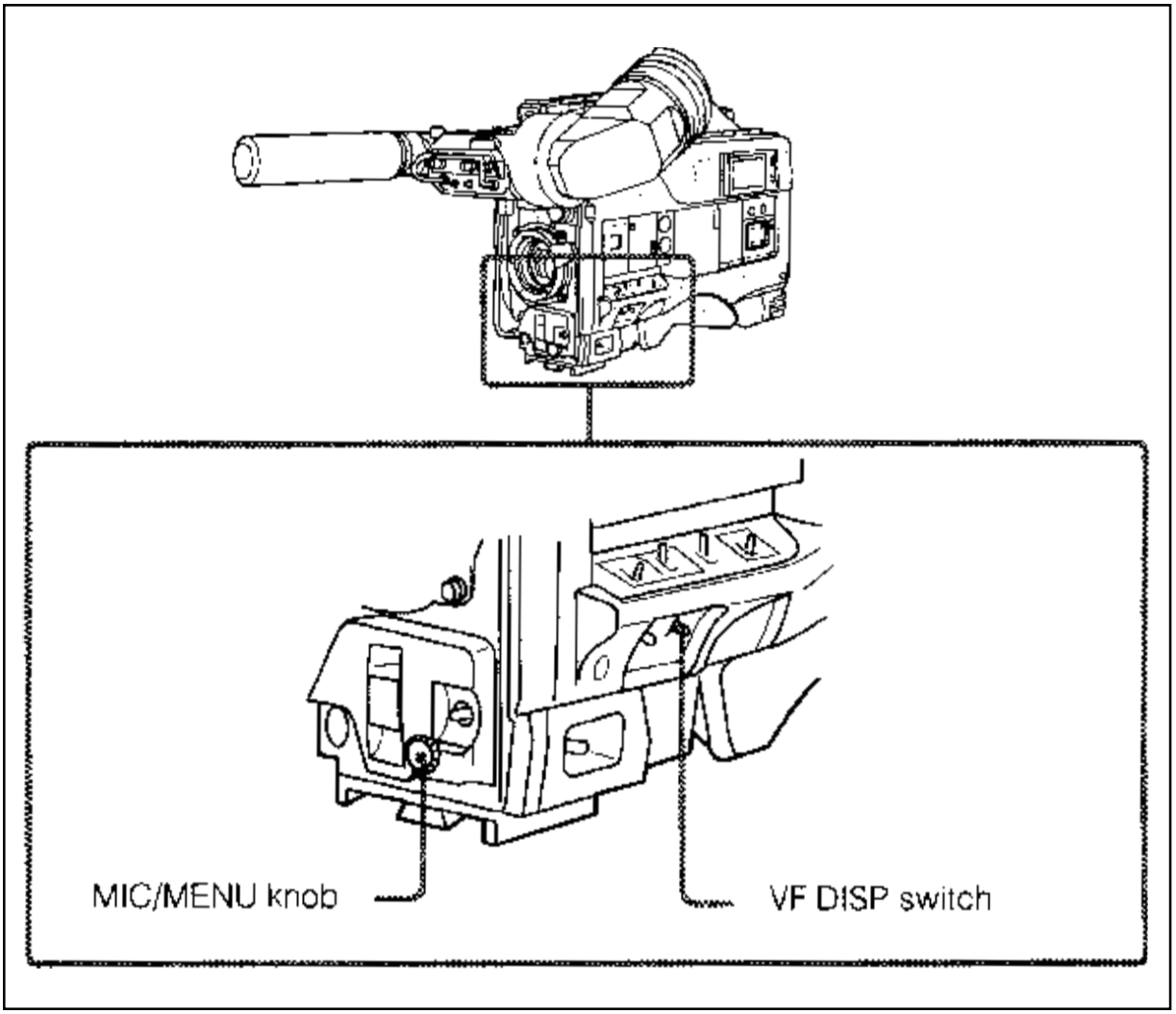
Items that can be set up or adjusted by using the OPERATION menu

Adjustment or setup item	Page	Page name	Reference
Page search	1	CONTENTS	Page 4-39
'!' LED setup	2	'!' LED	Page 4-40
Marker setup	3	MARKER	Page 4-42
Selection of viewfinder screen indicators	4	VF DISPLAY	Page 4-43
Gain selector setup	5	GAIN SW	Page 4-45
Viewfinder setup	6	VF SETUP	Page 4-47
Auto iris setup	7	AUTO IRIS	Page 4-48
Battery and D5600K setup and lens file selection	8	BATTERY / D56	Page 4-50
Operator file	9	OPERATOR FILE	Page 4-52

For information about other adjustments or setup operations, see Section 4-8 "Paint Menu" (page 4-54) or refer to the Maintenance Manual.

4-7-1 Finding a Page

To find a page within the OPERATION menu, use the CONTENTS page of the OPERATION menu. This enables you to directly display the page on which you want to make a setting, without turning the MIC / MENU knob to scroll through the pages.



1 Set the VF DISP switch to MENU.

The OPERATION menu is displayed on the viewfinder screen.

(Continued)

2 Turn the MIC/MENU knob until the CONTENTS page appears, and push the MIC / MENU knob.

3 Turn the MIC/MENU knob to move the arrow (→) until it points to the page you want to retrieve, and push the MIC/MENU knob.

The page you retrieved will appear.

4-7-2 Selecting the Items for Which the '!' LED is to Light

To select the items for which the '!' LED is to light up on the viewfinder screen, use the '!' LED page of the OPERATION menu.

Selecting the items for which the '!' LED is to light

Follow the procedure below to select these items.

1 Set the VF DISP switch to MENU.

2 Turn the MIC / MENU knob until the '!' LED page appears, and push the MIC / MENU knob.

The current setting of an item appears to the right of the item.

Viewing the setting without opening the OPERATION menu
You can view the setting by pushing the MENU switch upward.

GAIN: The '!' LED lights up when the gain is anything but 0 dB.
SHUTTER/ECS: The '!' LED lights up when the SHUTTER or ECS selector is anything but OFF.
S-EVS: The '!' LED lights up when S-EVS is ON.
D5600K: The '!' LED lights up when the D5600K is ON.

WHT PRESET: The '!' LED lights up when the WHITE BAL switch is to PRST.

FILTER: The '!' LED lights up when the FILTER selector is anything but 1B.

EXTENDER: The '!' LED lights up when the lens extender is in use (i.e., EX is ON).

FAN: The '!' LED lights up when FAN mode is anything but AT (NORM).

60 Hz: The '!' LED lights up when field frequency is 60 Hz.

3 Turn the MIC/MENU knob to move the arrow (→) to the item you want to set, and push the MIC/MENU knob.

The arrow (→) changes to a question mark (?).

4 Turn the MIC/MENU knob to change the desired setting, and push the MIC/MENU knob.

The question mark (?) changes back to the arrow (→) to confirm the setting.

5 To continue setting other items, repeat steps **3** and **4**.

6 To end menu operations, turn the VF DISP switch to ON.

The menu disappears from the viewfinder screen, and the display indicating the current status of the camcorder appears along the top and bottom of the viewfinder screen.

4-7-3 Setting the Marker Display

Use the MARKER page of the OPERATION menu to specify the display setting for the various markers and to turn the mask function which dims all areas except the markers on or off.

Setting the marker display

Follow the procedure below to select the items.

1 Set the VF DISP switch to MENU.

2 Turn the MIC/MENU knob until the MARKER page appears, and push the MIC/MENU knob.

MARKER: Set to OFF to turn off all markers. Set to **ON** to turn them all on. This item must be set to **ON** in order for the DISPLAY/ASPECT switch to function.

CENTER: To display the center marker, set to **ON**. If this item is set to **ON**, you can select the type of center marker (1 to 4)

SAFETY ZONE: To display the safety zone, set to **ON**. If this item is set to **ON**, you can set the safety zone range (80%, 90%, 92.5%, or 95%).

MKR MODE: Selects the operation mode (16:9, 4:3 or VISTA) for the following four items.

FRAME: To display the 4:3 or VISTA frame, set to **ON**.

MASK: To display 4:3 or VISTA mask, set to **ON**.

MASK LEVEL: Set the 4:3 or VISTA mask level (0 to 100%)

EFFECT: To display the effective pixel area, set to **ON**.

3 Turn the MIC/MENU knob to move the arrow (→) to the item you want to set, and push the MIC/MENU knob.

The arrow (→) changes to a question mark (?).

4 Turn the MIC/MENU knob to change the desired setting, and push the MIC/MENU knob.

The question mark (?) changes back to the arrow (→) to confirm the setting.

5 To end menu operations, turn the VF DISP switch to ON.

The menu disappears from the viewfinder screen, and the display indicating the current status of the camcorder appears along the top and bottom of the viewfinder screen.

4-7-4 Selecting the Display Items

To select the items to be displayed on the viewfinder screen from the VF DISPLAY page of the OPERATION menu, turn on or off the indication next to each item. The VF DISPLAY page can be used to turn on or off the following indicators.

- Extender indicator
- Zoom position indicator.
- Shutter speed, ECS or S-EVS indicator
- Iris opening indicator
- D5600K mode indicator
- Remaining tape indicator
- Audio level indicator
- Time code indicator
- Camera ID indicator
- Power voltage indicator
- Filter indicator
- White balance memory indicator
- Gain indicator

Selecting the display items

Follow the procedure below to select the items to be displayed on the viewfinder screen.

1 Set the VF DISP switch to MENU.

The OPERATION menu appears on the viewfinder screen.

2 Turn the MIC/MENU knob until the VF DISPLAY page appears, and push the MIC/MENU knob.
EX: Extender indicator
ZOOM: Zoom position indicator
SHUTT: Shutter speed, mode, and read mode indicator
IRIS: Iris opening indicator
D5600K: D5600K mode indicator
TAPE: Remaining tape indicator
AUDIO: Audio level indicator
TC: Time code indicator
CAM ID: Camera ID indicator
VOLT: Power voltage indicator
FILTER: Filter indicator
WHITE: White balance memory indicator
GAIN: Gain indicator

3 Turn the MIC/MENU knob to move the arrow (→) to the item you want to set, and push the MIC/MENU knob.

The arrow (→) changes to a question mark (?)

4 Turn the MIC/MENU knob to change the desired setting, and push the MIC/MENU knob.

The question mark (?) changes back to the arrow (→) to confirm the setting.

5 To continue setting other items, repeat steps **3** and **4**.

6 To end menu operations, turn the VF DISP switch to ON.

The menu disappears from the viewfinder screen, and the display indicating the current status of the camcorder appears along the top and bottom of the viewfinder screen.

4-7-5 Setting the GAIN Selector Values

Before using the camcorder, use the GAIN SW page of the OPERATION menu to set the gains corresponding to the L, M, and H positions of the GAIN selector, which switches the gain of the video amplifier.

Setting the GAIN selector values

Follow the procedure below to select the items.

1 Set the VF DISP switch to MENU.

2 Turn the MIC/MENU knob until the GAIN SW page appears, and push the MIC/MENU knob.

LOW: Set the gain value corresponding to the L position of the GAIN selector.

MIDDLE: Set the gain value corresponding to the M position of the GAIN selector.

HIGH: Set the gain value corresponding to the H position of the GAIN.

3 Turn the MIC/MENU knob to move the arrow (→) to the item you want to set, and push the MIC/MENU knob.

The arrow (→) changes to a question mark (?).

(Continued)

4 Turn the MIC/MENU knob to change the desired setting, and push the MIC/MENU knob.

The question mark (?) changes back to the arrow (→) to confirm the setting.

Any of -3, 0, 3, 6, 12, or 18 dB can be set for each of the L, M, and H positions, in any sequence.
To change the gain corresponding to another switch position, return to step 3.

5 To end menu operations, turn the VF DISP switch to **ON**.

The menu disappears from the viewfinder screen, and the display indicating the current status of the camcorder appears along the top and bottom of the viewfinder screen.

4-7-6 Setting the Viewfinder

Use the VF SETUP page of the OPERATION menu to select items related to the viewfinder.

1 Set the VF DISP switch to MENU.

2 Turn the MIC/MENU knob until the VF SETUP page appears, and push the MIC/MENU knob.

ZEBRA: Turn the zebra display on or off and select the zebra display level.

ZEBRA 1 (70%): Adjust the level of the zebra (70%) display

ZEBRA 2 (100%): Adjust the level of the zebra (100%) display

VF SCAN: Select the VF scan mode (16:9 or 4:3). This item has the same function as the DISPLAY/ASPECT switch.

3 Turn the MIC/MENU knob to move the arrow (→) to the item you want to set, and push the MIC/MENU knob.

The arrow (→) changes to a question mark (?).

4 Turn the MIC/MENU knob to change the desired setting, and push the MIC/MENU knob.

The question mark (?) changes back to the arrow (→) to confirm the setting.

5 To continue setting other items, repeat steps **3** and **4**.

6 To end menu operations, turn the VF DISP switch to **ON**.

The menu disappears from the viewfinder screen, and the display indicating the current status of the camcorder appears along the top and bottom of the viewfinder screen.

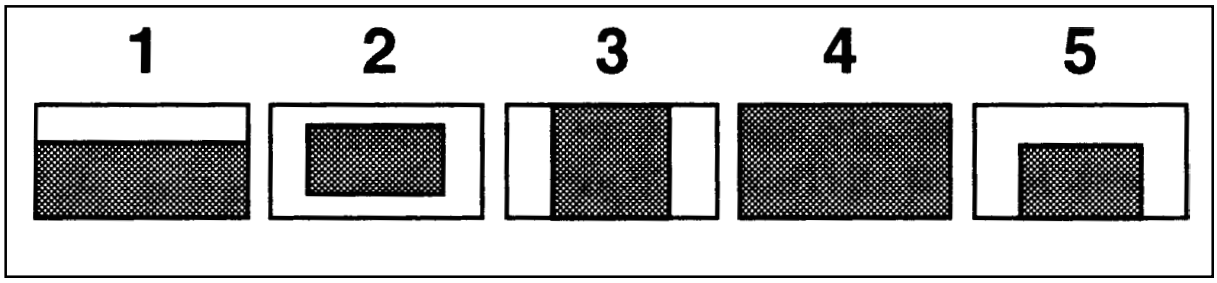
4-7-7 Setting the Automatic Iris

Use the AUTO IRIS page of the OPERATION menu to select items related to the automatic iris.

1 Set the VF DISP switch to MENU.

2 Turn the MIC/MENU knob until the AUTO IRIS page appears, and push the MIC/MENU knob.

WINDOW SEL: Select the automatic iris window. The shaded parts in the illustrations below indicate the area where light detection occurs.



OVERRIDE: Set the override to temporarily change the reference value for brightness of the automatic iris level (-99 (fully closed iris) to + 99 (fully open iris))

Note

The override returns to 0 when you turn the camcorder off, then on again.

3 Turn the MIC/MENU knob to move the arrow (→) to the item you want to set, and push the MIC/MENU knob.

The arrow (→) changes to a question mark (?)

4 Turn the MIC/MENU knob to change the desired setting, and push the MIC/MENU knob.

The question mark (?) changes back to the arrow (→) to confirm the setting.

5 To continue setting the other items, repeat steps **3** and **4**.

6 To end menu operations, turn the VF DISP switch to ON.

The menu disappears from the viewfinder screen, and the display indicating the current status of the camcorder appears along the top and bottom of the viewfinder screen.

4-7-8 Setting the Battery, D5600K Mode and Selecting the Lens File

Use the BATTERY / D56 page of the OPERATION menu:

- To select the type of battery that is currently being used. (When you change this setting, the alarm voltage automatically changes to the value set in the MAINTENANCE menu.)
- To turn on the gain amplifier (providing an electrical equivalent of 5600K).
  When colour temperature is high, signal to noise ratio of blue component becomes better as compared to the correction with the CC filter. And also when lighting is dark and colour temperature is high, it is possible to correct colour temperature with sensitivity higher than CC filter. When the setting is changed, it is necessary to perform automatic white balance adjustment.
- To select the lens file to be used.

For details on the lens file setting, refer to the maintenance manual.

1 Set the VF DISP switch to MENU.

2 Turn the MIC/MENU knob until the BATTERY / D56 page appears, and push the MIC/MENU knob.
BATT TYPE: Selects the battery
D5600K: Turns the D5600K gain amplifier on and off
LENS FILE: Selects the lens file

3 Turn the MIC/MENU knob to move the arrow (→) to the item you want to set, and push the MIC/MENU knob.

The arrow (→) changes to a question mark (?).

4 Turn the MIC/MENU knob to change the desired setting, and push the MIC/MENU knob.

The question mark (?) changes back to the arrow (→) to confirm the setting.

5 To continue setting other items, repeat steps **3** and **4**.

6 To end menu operations, turn the VF DISP switch to ON.

The menu disappears from the viewfinder screen, and the display indicating the current status of the camcorder appears along the top and bottom of the viewfinder screen.

4-7-9 Operator File

Use the OPERATOR FILE page of the OPERATION menu to save the setup data of various OPERATION menu pages such as the MARKER or OPERATOR FILE page to or read the data from a setup card.

1 Set the VF DISP switch to MENU.

2 Turn the MIC / MENU knob until the OPERATOR FILE page appears, and push the MIC / MENU knob.

READ (CARD→CAM): Read data from the setup card
WRITE (CAM→CARD): Write data to the setup card
PRESET: Return data to the present status that was set by using the file menu
PROTECT: Turn on or off the write-protection function for the setup card
CARD ID: Set a card ID consisting of up to 10 alphanumeric characters, symbols, and spaces
CAM CODE: Display the camera model code that is saved on the setup card
DATE: Display the date when the data was saved

3 Turn the MIC / MENU knob to move the arrow (→) to the item you want to set, and push the MIC / MENU knob.

The arrow (→) changes to a question mark (?).

4 Turn the MIC / MENU knob to change the desired setting, and push the MIC/MENU knob.

The question mark (?) changes back to the arrow (→) to confirm the setting.

5 To continue setting other items, repeat steps **3** and **4**.

6 To end menu operations, turn the VF DISP switch to ON.

The menu disappears from the viewfinder screen, and the display indicating the current status of the camcorder appears along the top and bottom of the viewfinder screen.

Recalling the preset values in the OPERATOR FILE page

To recall the preset values in the OPERATOR FILE page, follow the procedure below.

1 Push the WHITE BAL switch to PRST and turn off the camcorder.

2 Turn the power to the camcorder on again while pressing the AUTO W / B BAL switch to WHT.

4-8 Paint Menu

The PAINT menu contains various detail adjustment items such as white clipping. It also enables you to save up to five sets of detail-adjusted data customized to certain shooting scenes (SCENE FILE page).

For information about how to set items, see Section 4-5-1 "Basic Use of the Setup Menu" (page 4-31).

Selecting the PAINT menu

1 While pushing the MIC/MENU knob, change the VF DISP switch from OFF to MENU.

The TOP menu screen will appear.

2 Turn the MIC/MENU knob to move the arrow (→) until it points to PAINT.

3 Push the MIC/MENU knob.

The PAINT menu screen will appear.

PAINT menu items

Page	Item	Setting	Description
SW STATUS	FLARE	ON, OFF	Turns flare correction on or off
	GAMMA	ON, OFF	Turns gamma correction on or off
	BLACK GAMMA	ON, OFF	Turns black gamma correction on or off
	KNEE	ON, OFF	Turns knee correction on or off
	WHITE CLIP	ON, OFF	Turns white clipping on or off
	DETAIL	ON, OFF	Turns the detail signal on or off
	LEVEL DEPEND	ON, OFF	Turns the level depend function of the detail signal on or off
	MATRIX	ON, OFF	Turns matrix correction on or off

To reset an item in the PAINT menu to its standard (factory) setting
Rotate the MIC / MENU knob to move the arrow (→) to the item and hold down the MIC / MENU knob for three seconds to reset the selected item to its standard setting. This function operates for items that require a precise value to be entered. It does not function for the items that require a selection from a choice of settings.

(Continued)

Page	Item	Setting	Description
VIDEO LEVEL	WHITE R,G,B	-99~0~99	Adjusts the R,G, and B gain
	BLACK R,G,B,M	-99~0~99	Adjusts the R,G,B and master black level
	FLARE R,G,B	-99~0~99	Adjusts the R,G, and B flare level
	GAMMA R,G,B,M	-99~0~99	Adjusts the R,G,B and master gamma correction curve
	V MOD R,G,B,M	-99~0~99	Adjusts the V SAW correction of the R,G,B and master V modulation shading of the lens and prism system
	FLARE	ON, OFF	Turns flare correction circuit on or off
	V MOD	ON, OFF	Turns the V modulation correction function on or off
	TEST	VA SAW, PR SAW, OFF	Selects the test signal VA SAW: outputs the saw-tooth waveform test signal from within the VA circuit board PR SAW: outputs the saw-tooth waveform test signal from within the DPR circuit board OFF: Stops output of any test signal

Page	Item	Setting	Description
GAMMA	GAMMA R,G,B,M	-99~0~99	Sets the R,G,B and master gamma correction curve
	BLK GAM	-99~0~99 R,G,B,M	Adjusts the R,G,B and master black gamma
	COARSE	0.40, 0.45 0.50	Sets the master gamma correction curve in terms of individual steps
	GAMMA	ON, OFF	Turns the gamma correction function on or off
	BLACK GAMMA	ON, OFF	Turns the black gamma function on or off
	TEST	VA SAW, PR SAW, OFF	Selects the test signal VA SAW: outputs the saw-tooth waveform test signal from within the VA circuit board PR SAW: outputs the saw-tooth waveform test signal from within the DPR circuit board OFF: Stops output of any test signal

(Continued)

Page	Item	Setting	Description
KNEE	POINT	-99~0~99 R,G,B,M	Sets the R,G,B and master knee point when the automatic knee function is off
	SLOPE R,G,B,M	-99~0~99	Sets the R,G,B and master knee slope level when the automatic knee function is off
	WHT	-99~0~99 R,G,B,M	Sets the R,G,B and master of the white clipping level
	KNEE	ON, OFF	Turns the knee correction circuit on or off
	WHITE	ON, OFF CLIP	Turns the white clipping function on on or off
	TEST	VA SAW, PR SAW, OFF	Selects the test signal VA SAW: outputs the saw-tooth waveform test signal from within the VA circuit board PR SAW: outputs the saw-tooth waveform test signal from within the DPR circuit board OFF: Stops output of any test signal

Page	Item	Setting	Description
DETAIL 1	DETAIL	ON, OFF	Turns on or off a function that adds a detail signal for improving resolution
	LEVEL	-99~0~99	Sets the comprehensive level of the detail signal
	LIMITER	-99~0~99	Sets the level for clipping an excessive detail signal
	CRISPENING	-99~0~99	Sets the level for suppression of the noise component included in the detail signal
	H/V RATIO	-99~0~99	Sets the level of the V detail signal
	FREQUENCY	-99~0~99	Sets the frequency component of the detail signal to be boosted
	LEVEL DEP END	ON, OFF	Turns the level depend function on or off
		-99~0~99	Sets the level where detail diminishes in a dark space
DETAIL 2	DETAIL	ON, OFF	Turns on or off a function that adds a detail signal for improving resolution
	WHT LIMITER	-99~0~99	Sets the level for clipping an excessive detail signal in the positive direction
	BLK LIMITER	-99~0~99	Sets the level for clipping an excessive detail signal in the negative direction

(Continued)

Page	Item	Setting	Description
SKIN DETAIL	AUTO HUE		Sets the operational range of the skin-tone detail function automatically
	SKIN DETAIL	ON, OFF	Turns on or off the skin-tone detail function which adjusts the skin-tone detail for a specific hue
	PHASE	0~359º	Adjusts the center phase of the hue being processed by the skin-tone detail function
	WIDTH	0~90º	Adjusts the width of the hue being processed by the skin-tone detail function
	SATURATION	-99~0~99	Adjusts the lowest saturation level of the hue being processed by the skin-tone detail function
	LEVEL	-99~0~99	Adjusts the level of the hue being processed by the skin-tone detail function
	GATE	ON, OFF	Turns on or off the gate marker (zebra) in the viewfinder which indicates the operational range of the skin-tone detail function

Page	Item	Setting	Description
MATRIX	R-G, R-B	-99~0~99	Sets arbitrary R-G or R-B user-set matrix coefficients
	G-R, G-B	-99~0~99	Sets arbitrary G-R or G-B user-set matrix coefficients
	B-R, B-G	-99~0~99	Sets arbitrary B-R or B-G user-set matrix coefficients
	MATRIX	ON, OFF	Turns the linear matrix correction function on or off
	USER MTX[a)]	ON, OFF	Turns on or off the use of user-set matrix correction coefficients
	PRESET MTX[a)]	ON, OFF	Turns on or off the use of factory-set matrix correction coefficients
	PRE MTX SEL	SMPTE-240M REC-790 SMPTE-WIDE NTSC EBU	Selects the factory-set matrix correction coefficients
	TEST	VA SAW, PR SAW, OFF	Selects the test signal VA SAW: outputs the saw-tooth waveform test signal from within the VA circuit board PR SAW: outputs the saw-tooth waveform test signal from within the DPR circuit board OFF: Stops output of any test signal

a) When both USER MTX and PRESET MTX are turned on, the matrix coefficients are obtained by combining both sets of coefficients.

(Continued)

Page	Item	Setting	Description
SHUTTER	SHUTTER/ ECS	ON, OFF	Turns SHUTTER or ECS to ON or OFF
		1/100 to 1/2000, ECS	When SHUTTER/ECS is set to ON, selects the shutter speed or ECS
	ECS FREQ	30 to 7000 Hz	When ECS is selected, sets the ECS frequency
	S-EVS	ON, OFF	Turns S-EVS mode to ON or OFF
		0 to 100%	When S-EVS is set to ON,sets the S-EVS vertical resolution

Page	Item	Setting	Description
SCENE FILE	1		Saves and restores a scene file (detail-adjusted data customized to certain shooting scenes) Saving data 1. Move the arrow (→) until it points to FILE STORE and push the MIC/MENU knob. This causes FILE STORE to flash. 2. Select the number (1 to 5) of the file to be saved. (If data has already been saved, it will be replaced by the new data.) Restoring data Move the arrow (→) until it points to the number of the file to be restored, and push the MIC/MENU knob. • Each time you push the MIC/MENU knob, the data toggles between the current settings and the scene file settings. • When a scene file is restored, an asterisk (*) appears next to the number display.
	2		
	3		
	4		
	5		
	FILE STORE		
	STANDARD		Clears all current detail-adjusted settings and switch settings, and returns the settings to the reference file data.

4-9 Using the Setup Card

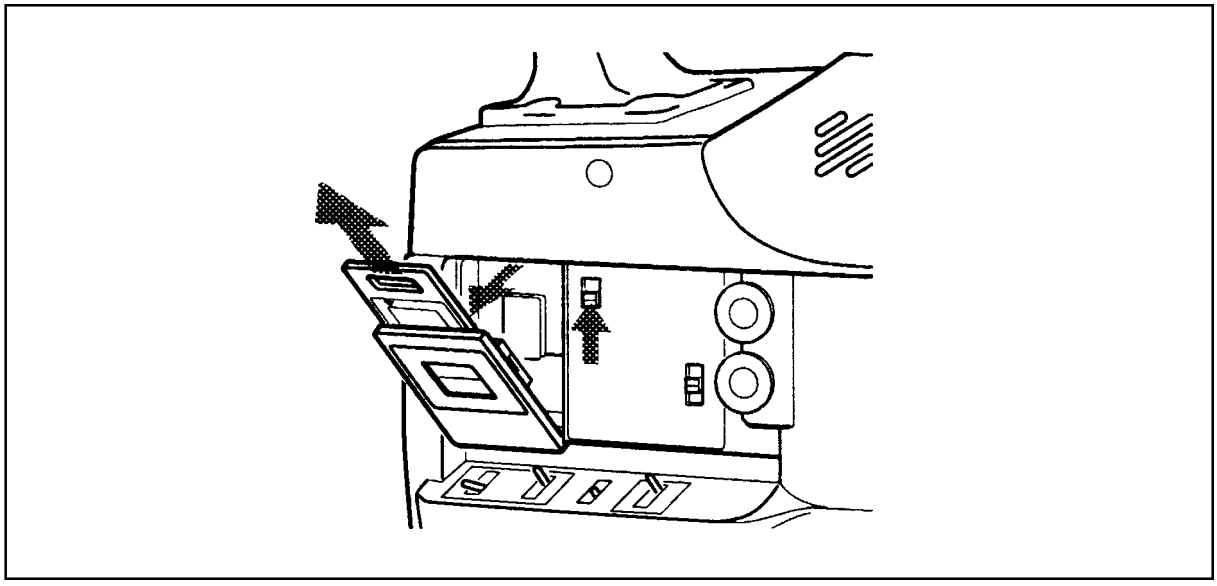
You can save the contents of the setup menu in the supplied setup card (which was inserted at the factory). This data enables rapid recreation of suitable setup conditions.

4-9-1 Handling the Setup Card

The setup card can be inserted or removed from the camcorder with the power turned on or off.

Removing the setup card

Push the tab on the right-hand side of the card insertion lid to open the lid.



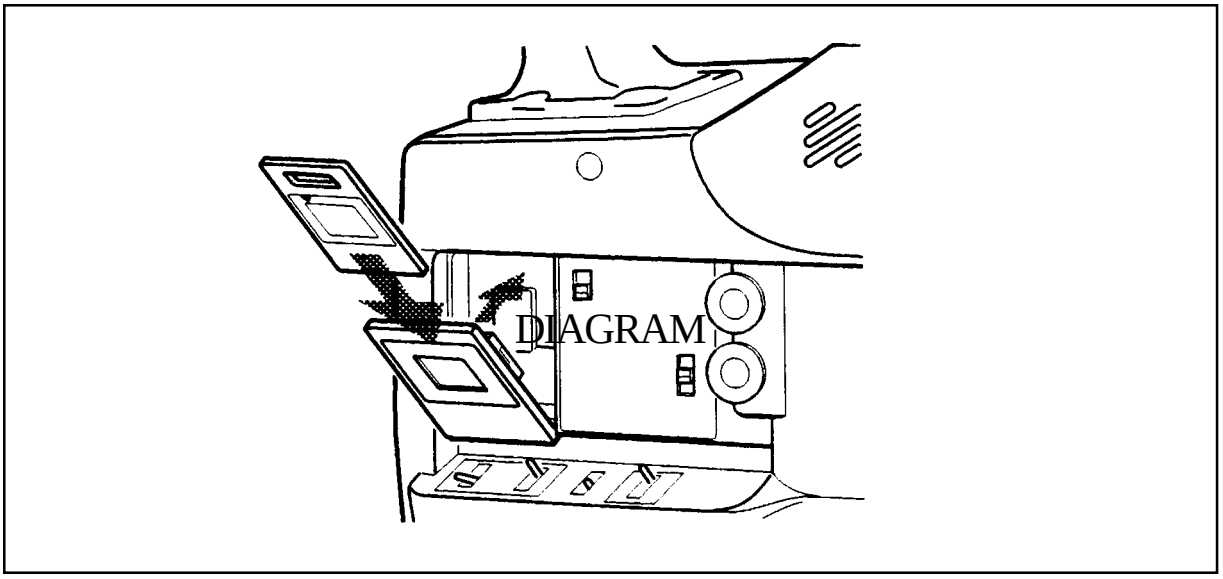
Removing the setup card

Note

Do not touch the pins on the card connector.

Inserting the setup card

Hold the setup card with the “SONY” logo facing you so you can read it, slide it into the insertion slot, and close the lid.



Inserting the setup card

Note

Make sure that you can read the “SONY” logo when you insert the card. If there is some resistance when you insert the card, the card might be turned around upside down. Do not force the card into the slot. Check that the card is correctly oriented, and then try inserting it again.

Notice for using and storing the setup card

The following points apply to the use and storage of a setup card.

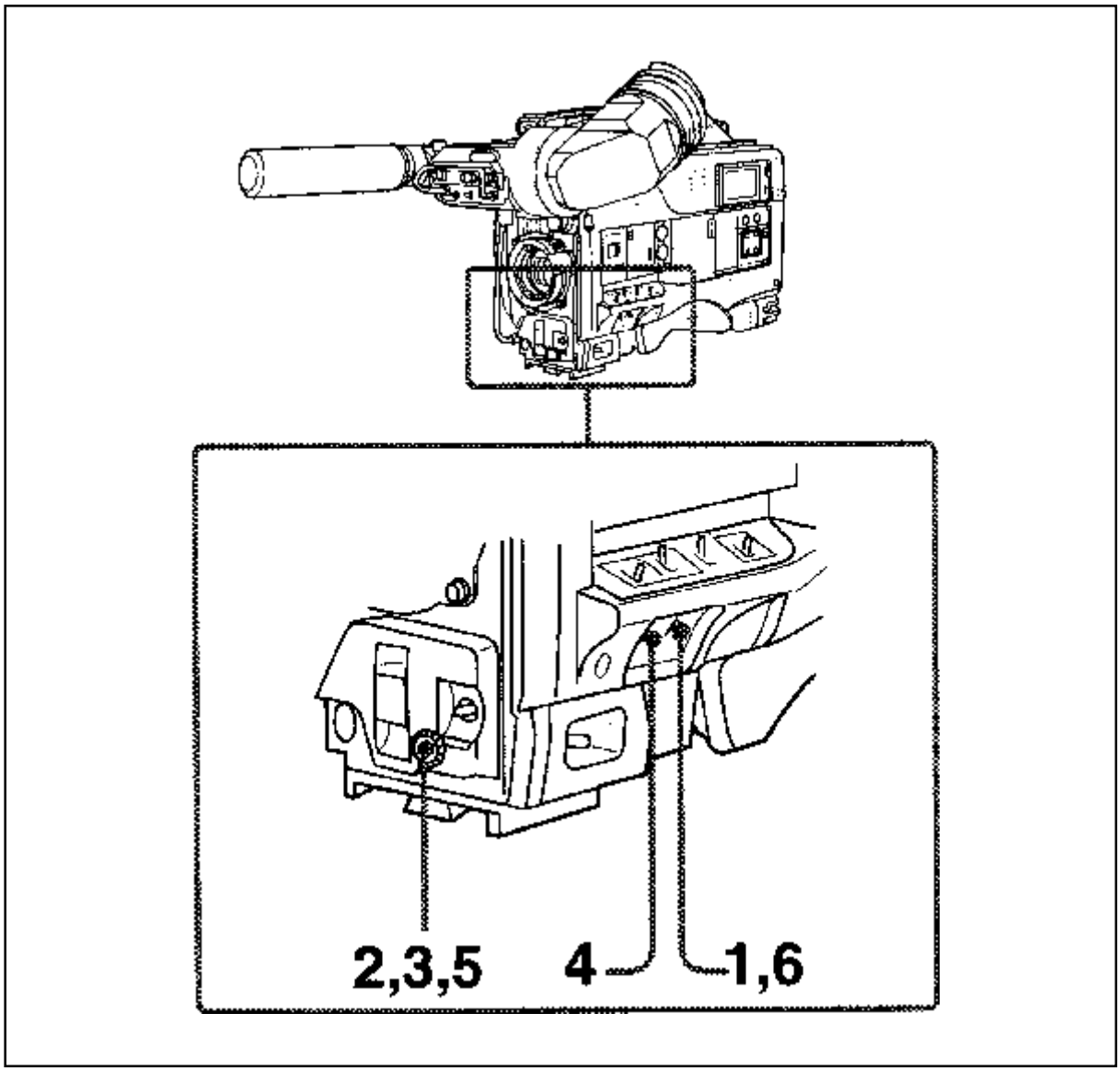
- Avoid high temperature and humidity.
- Make sure the card does not get dirty or wet.
- Avoid static electricity.
- Store the card by inserting it into the camcorder and closing the card insertion lid.

4-9-2 Using Data on the Setup Card

The operations of saving data to the setup card and reading the saved data from the setup card are done from the OPERATOR FILE page of the OPERATION menu.

Writing data to the setup card

Following the procedure below.

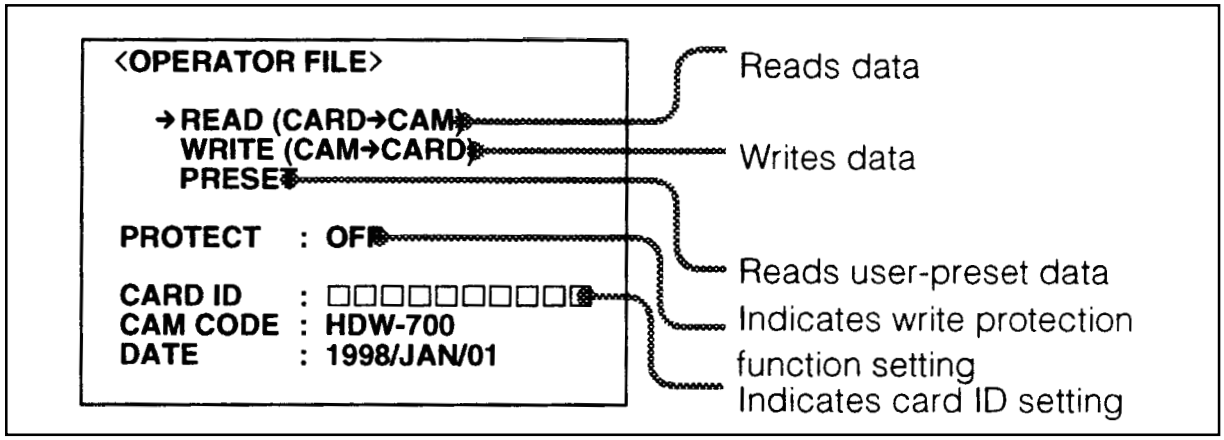


Writing data to the setup card

1 Set the VF DISP switch to MENU.

The page that was on the screen when the last menu operation ended appears on the viewfinder screen. (When this MENU is first used, the lowest page number of the previously selected will appear.)

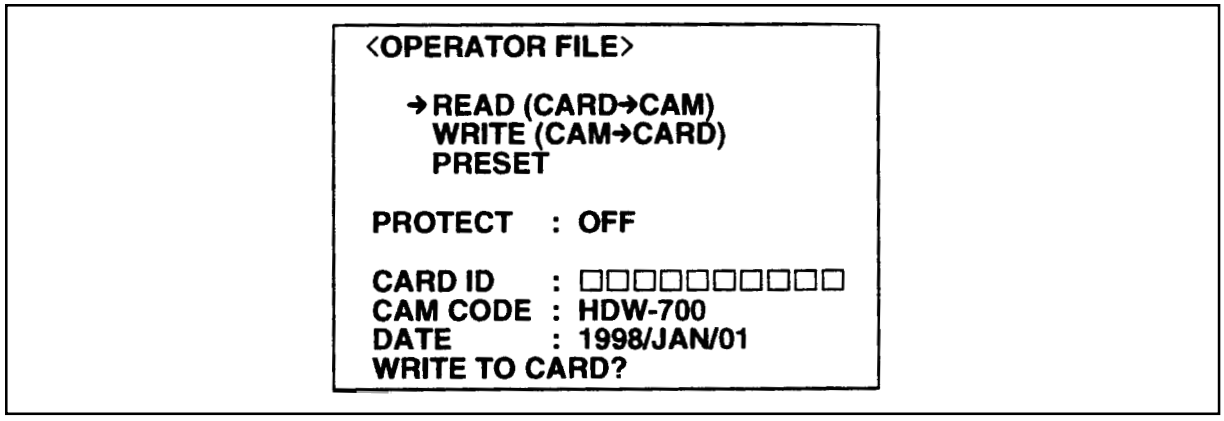
2 Turn the MIC / MENU knob until the OPERATOR FILE page appears, and then push the MIC / MENU knob.



OPERATOR FILE page

3 Move the arrow (→) until it points to WRITE (CAM→CARD) and push the MIC/MENU knob.

"WRITE TO CARD?" appears. If no card has been inserted, the message "NO CARD!" will appear. Insert a setup card.



(Continued)

4 • To end the writing of data, push the MENU switch to CANCEL.
• To continue the writing of data, go to step **5**.

5 Push the MIC / MENU knob.

The setting data stored in the camcorder is written to the card.

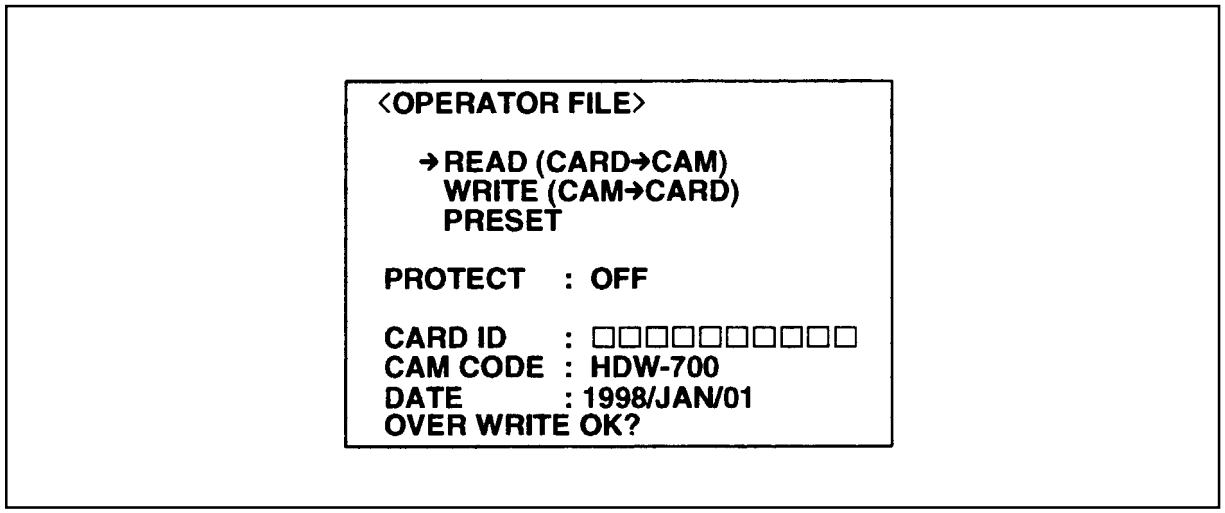
When the writing is completed, the message “CARD STORE OK” appears.

6 To end the menu operations, set the VF DISP switch to ON.

The setup menu disappears from the viewfinder screen and the displays indicating the current status of the camcorder appear along the top and bottom of the viewfinder.

Updating the data

If data is already saved on the setup card, a message asking whether or not that data is to be updated appears when the MIC/MENU knob is pushed in step **5** of the procedure in the previous section (page 4-68). The message is illustrated below.



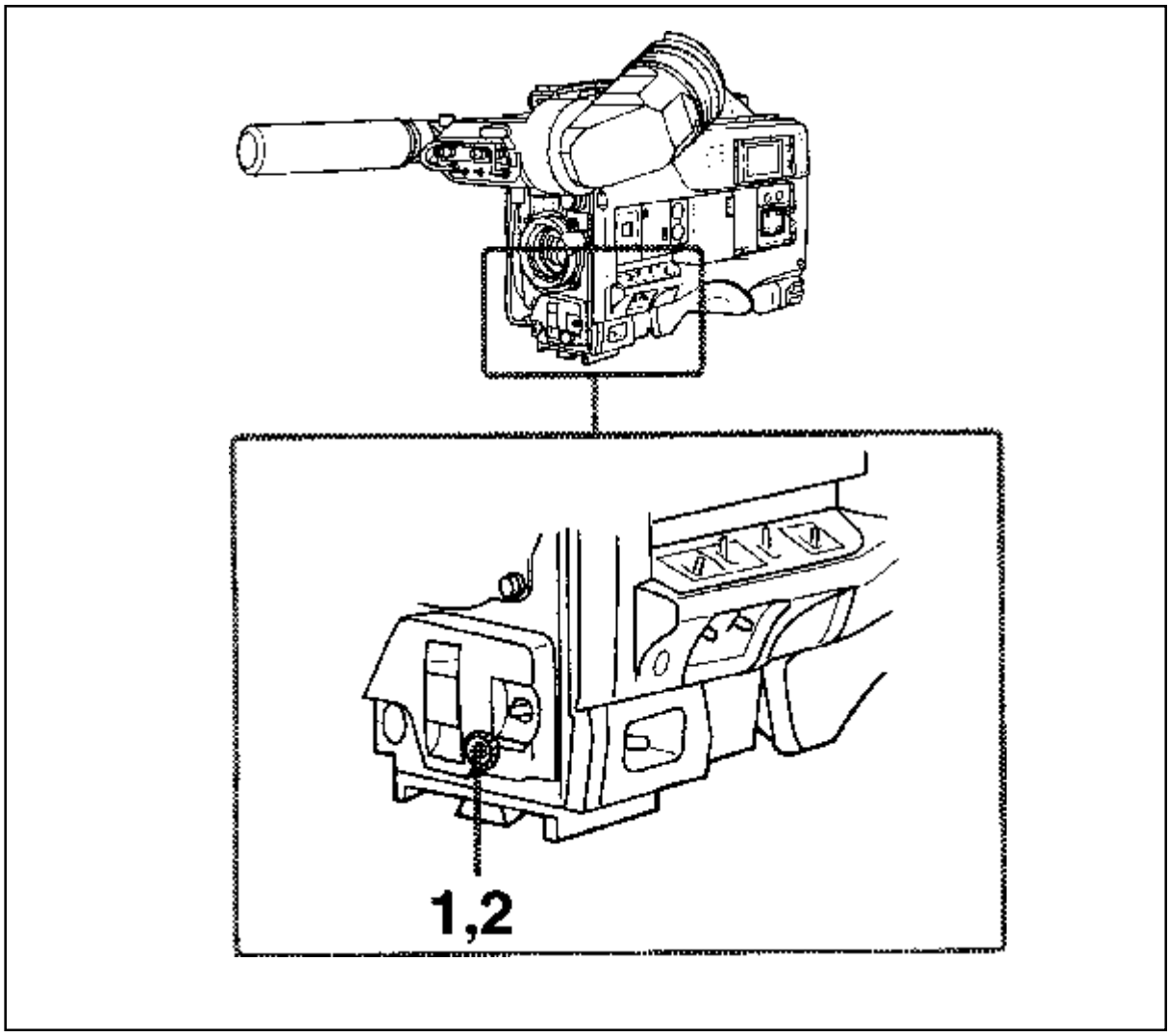
To update the data, push the MIC/MENU knob.

Protecting saved data

If you set the WRITE PROTECT setting to “ON” to protect data written to a setup card, then pushing the MIC / MENU knob in step **5** of the procedure in the previous section (page 4-68), “WRITE PROTECTED!” appears and the already saved data will not be overwritten.

Changing the write protection setting

Follow the procedure below.



1 Turn the MIC/MENU knob until the arrow (→) points to PROTECT on the OPERATOR FILE page of the OPERATION menu, and then push the MIC / MENU knob.

The arrow (→) changes to a question mark (?).

2

- To enable the write-protection function (the “ON” setting) turn the MIC/MENU knob until the setting changes to ON, and then push the MIC / MENU knob.
- To disable the write-protection function (the “OFF” setting), turn the MIC/MENU knob until the setting changes to OFF, and then push the MIC/MENU knob.

The question mark (?) changes back to the arrow (→) to confirm the setting.

4

If data cannot be written

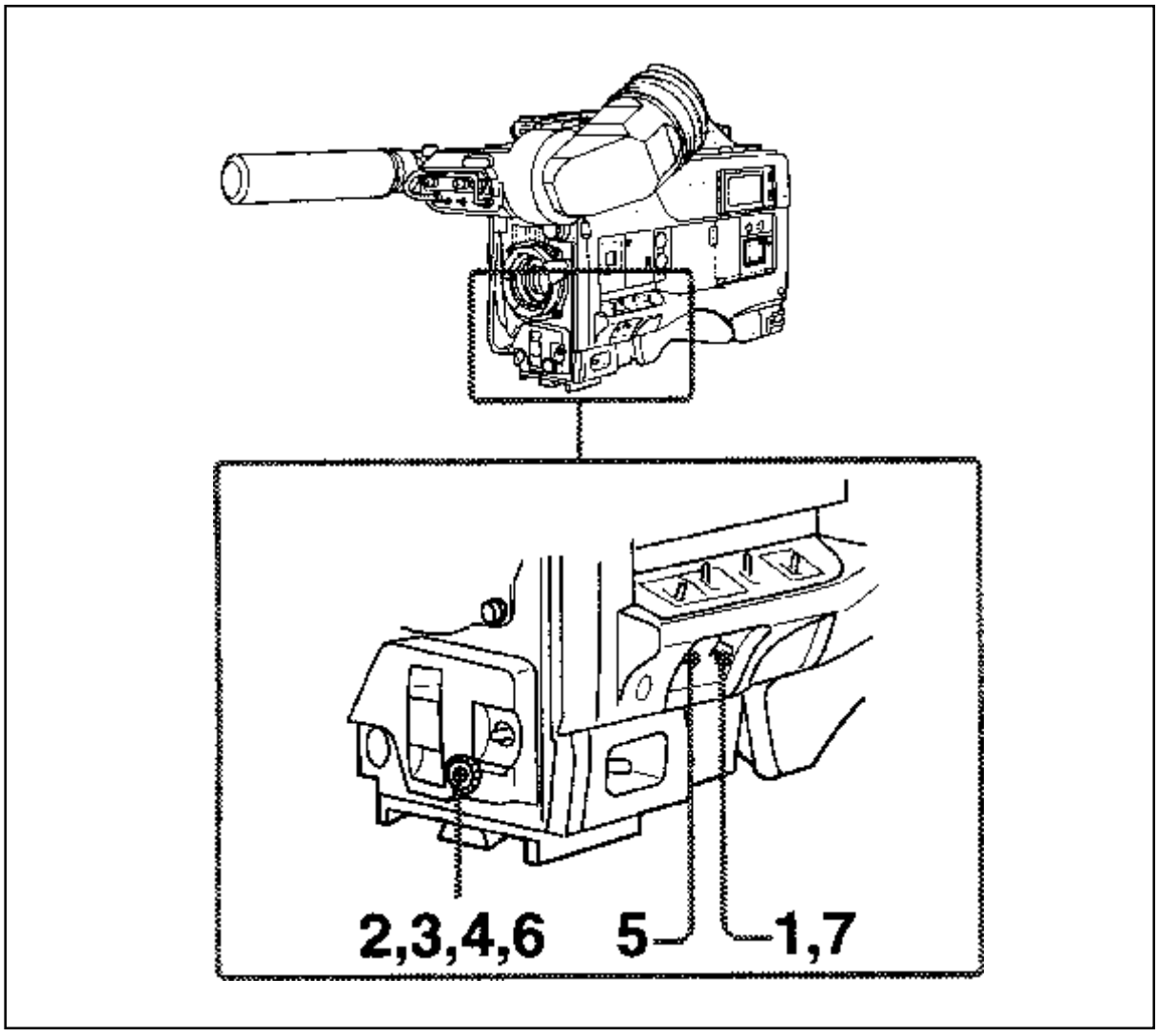
If one of the following error messages appears when you push the MIC/MENU knob in step **5** of the procedure in the previous section (page 4-68), then the data was not written.

Data write error messages

Error message	Reason	Action
NO CARD!	No setup card is inserted.	Insert or reinsert the card.
WRITE PROTECTED!	WRITE PROTECT is set to ON.	Set WRITE PROTECT to OFF.
CARD WRITE ERROR (flashing)	Circuit or card fault.	Check the circuitry, or replace the card with a verified card.

Reading saved data from a card

Follow the procedure below.

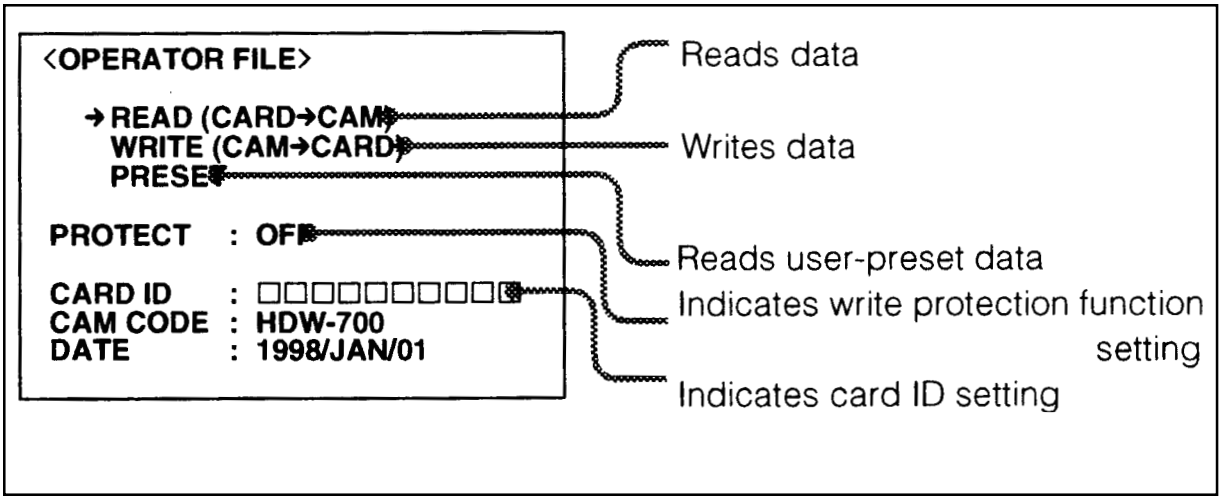


Reading saved data from a card

1 Set the VF DISP switch to MENU.

The page that was on the screen when the last menu operation ended appears on the viewfinder screen. (When this menu is first used, the lowest-numbered one of the currently selected pages appears.)

2 Turn the MIC / MENU knob until the OPERATOR FILE page appears, and then push the MIC / MENU knob.

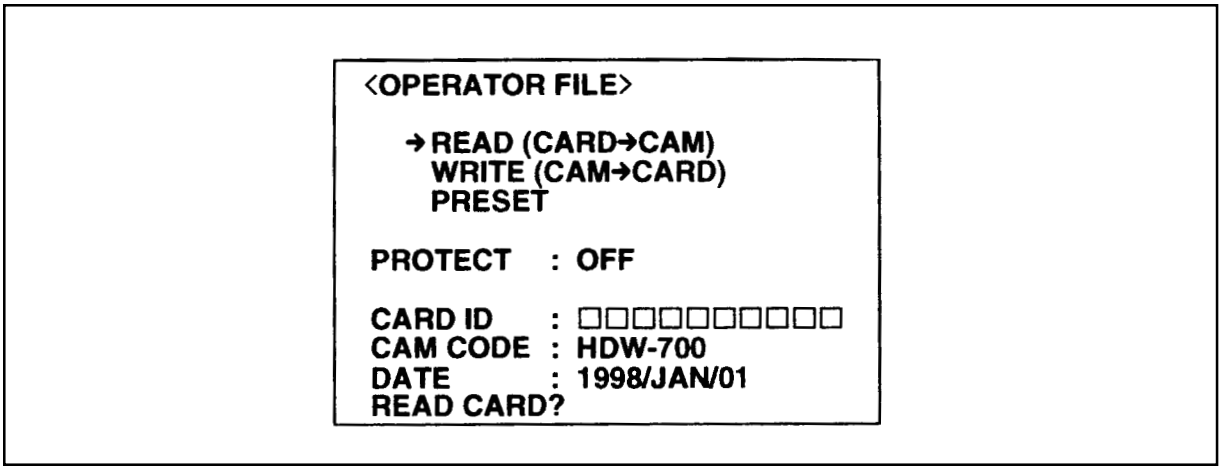


OPERATOR FILE page (factory settings)

3 Move the arrow (→) until it points to READ (CARD→CAM).

4 Push the MIC/MENU knob.

A message asking whether or not data is to be read from the card appears.



If no card is inserted, the message "NOCARD" appears. Insert a setup card.

(Continued)

5
- To end the reading of data, push the MENU switch to CANCEL.
- To continue the reading of data, go to step **6**.

Note

The data read from the card overwrites the data stored in the camcorder.

6 Push the MIC/MENU knob.

When the reading is completed, the message “CARD READ OK” appears.

7 To end the menu operations, set the VF DISP switch to ON.

The setup menu disappears from the viewfinder screen and the displays indicating the current status of the camcorder appear along the top and bottom of the viewfinder.

If data cannot be read

If one of the following error messages appears when you push the MIC/MENU knob in step **6,** then the data was not read.

Data read error messages

Error message	Reason	Action
NO CARD!	No setup card is inserted.	Insert or reinsert the card.
CARD READ ERROR (flashing)	Circuit or card fault.	Re-check, and consult a Sony representative.
CARD DATA NG! (flashing)	The card contains data that cannot be read with this camcorder.	Do not try to read data written with another camcorder.
NO DATA!	There is no data in the setup card.	Insert a card with data or save data to the card.
CHECKSUM ERROR	The data in the setup card is invalid.	Try saving the data to the card again.

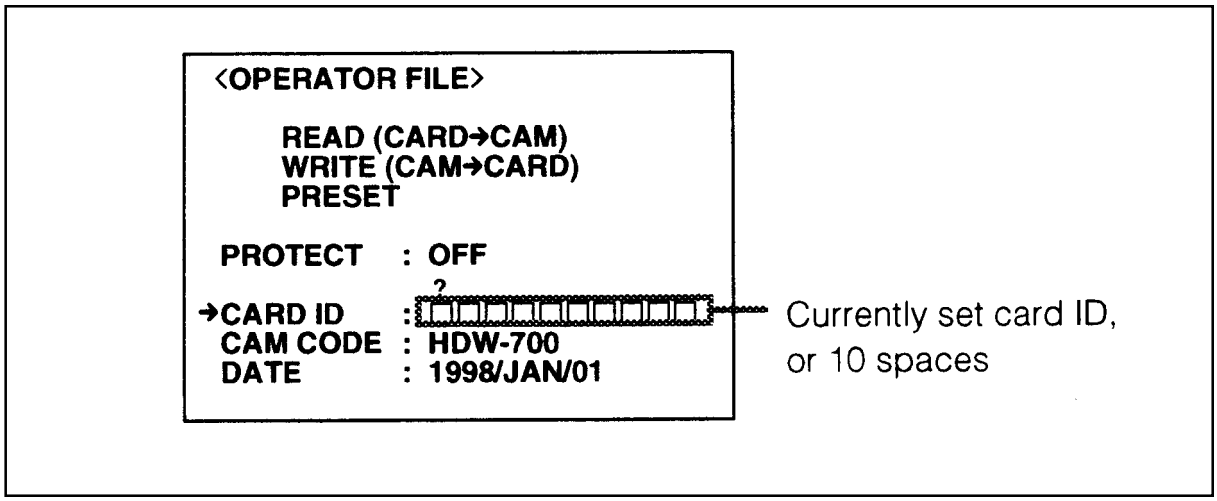
Setting the card ID

When data is written to a setup card, it is useful to set an ID for the card to identify it.

When data is saved to a card, a card ID is written to the card together with the data.

1 Turn the MIC/MENU knob until the arrow (→) points to CARD ID on the OPERATOR FILE page.

2 Push the MIC/MENU knob.
The arrow (↓) changes to a question mark (?).



3 Turn the MIC/MENU knob until the character you wish to set appears.

4 Push the MIC/MENU knob.

This confirms the entered character and moves the down arrow (↓) indicator to the next position.

5-1 Power Supply

You need to power on the camcorder to adjust the flange focal length and make other adjustments, which are described later.
First, prepare the power supply.
The following power supplies can be used with the camcorder.

- A BP-L60A/L90A lithium-ion battery pack
- A BP-90A Ni-Cd battery pack
- AC power using AC-550

You can also make combined use of internal and external batteries by mounting one of the above batteries as an internal battery and connecting an external battery that can be a BP-90A contained in a DC-210 Battery Adaptor and connected to the DC IN of the camcorder.

5-1-1 Using a BP-L60A/L90A Battery Pack

When a BP-L60A Battery Pack is used, the camcorder will operate continuously for about 80 minutes. When a BP-L90A Battery Pack is used, it will operate continuously for about 120 minutes. Before use, charge the battery pack with a BC-L100 Battery Charger. It takes about 2.5 hours to charge one BP-L60A and about 3.5 hours to charge one BP-L90A.

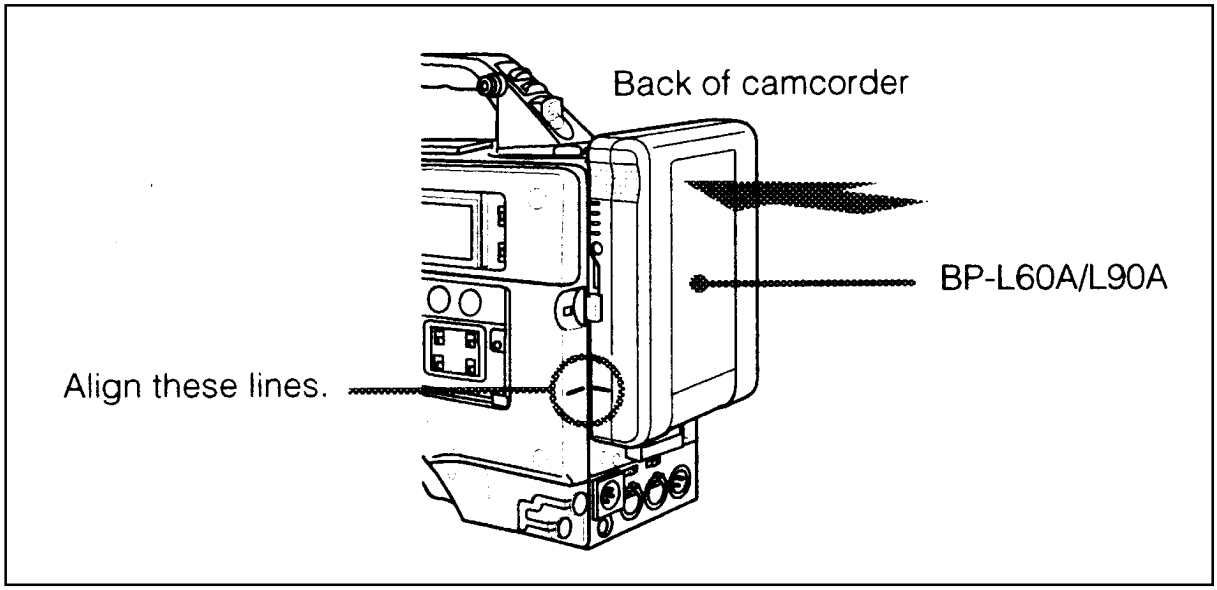
For more information, refer to the BC-L100 manual.

Note on using the battery pack

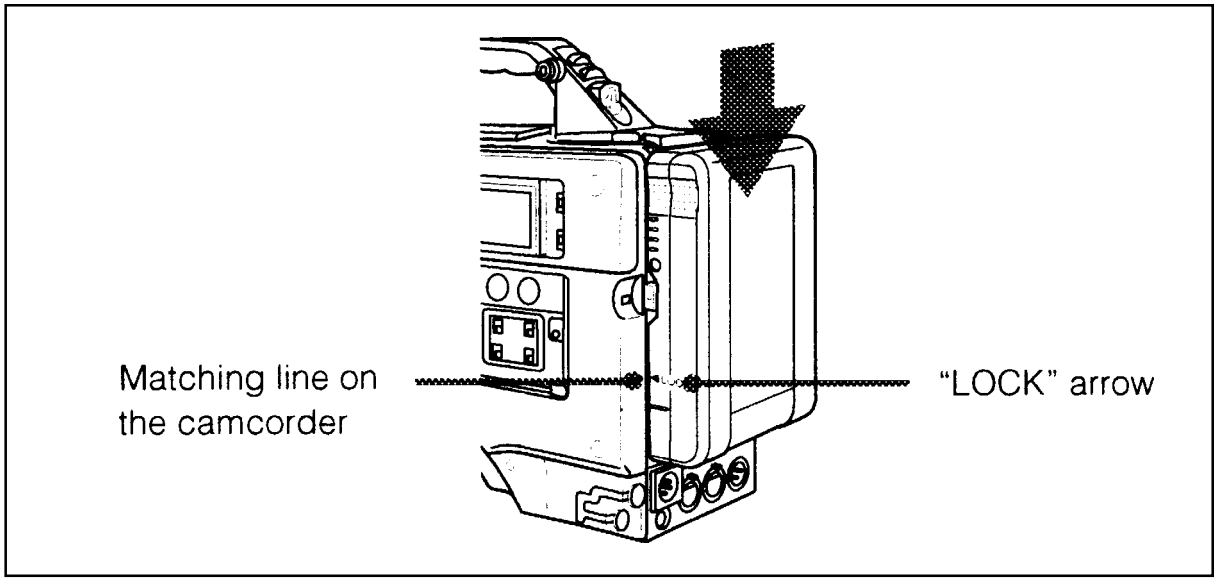
A warm battery pack may not be able to be fully recharged.

Attaching the battery pack

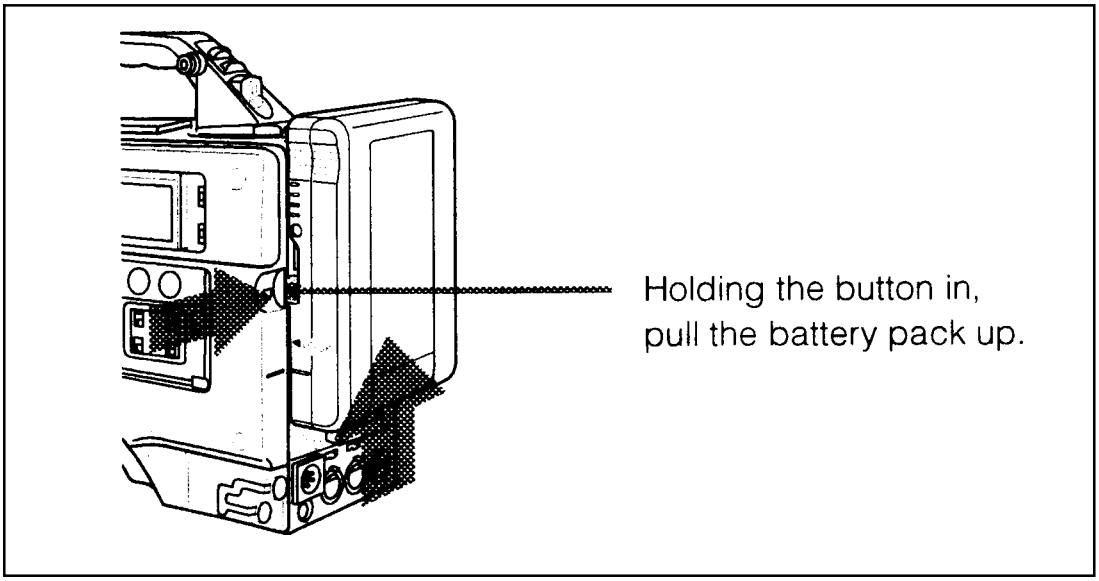
1 Press the battery pack against the back of the camcorder, aligning the side line of the battery pack with the line on the camcorder.



2 Slide the battery pack down until its "LOCK" arrow points at the matching line on the camcorder.



Detaching the battery pack



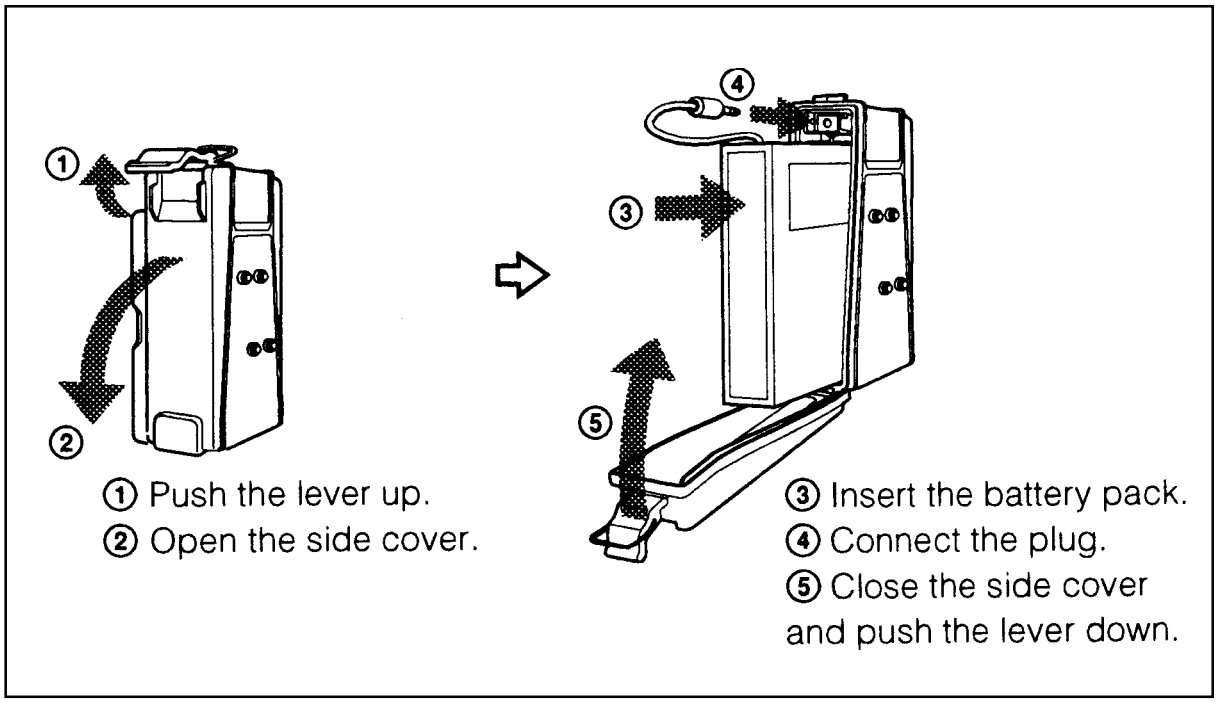
Detaching the battery pack

5-1-2 Using a BP-90A Battery Pack

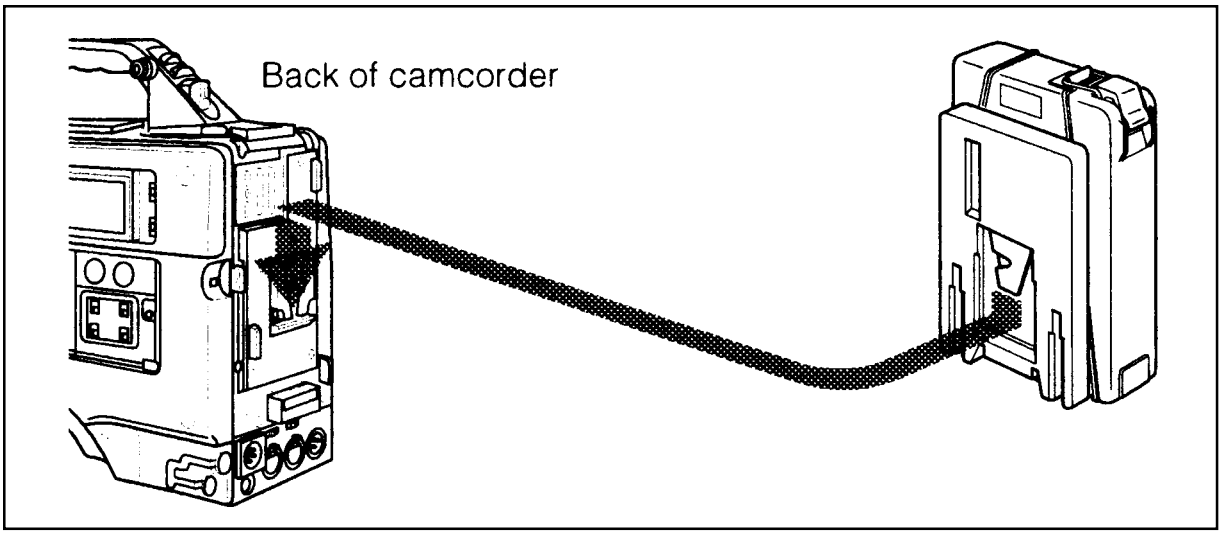
The BP-90A Battery Pack can be used. Use of this battery pack requires a DC-L90 Battery Adaptor (not supplied).
Before use, charge the battery pack with a BC-210/410 Battery Charger for about 2 hours.
For more information, refer to the BC-210/410 manual.

Attaching the battery pack

1 Fit a BP-90A Battery Pack in the DC-L90 Battery Adaptor.



2 Mount the DC-L90 Battery Adaptor on the back of the camcorder.



5-1-3 Avoiding Breaks in Operation Due to Dead Batteries

If you use both an internal battery pack and an external battery connected to the DC IN connector at the same time, you can avoid breaks in operation due to dead batteries.

When the external battery begins to fail and an internal battery pack is also used

Remove the DC output cable from the DC IN connector. The power source will switch to the internal battery pack.

When the external battery begins to fail and an internal battery pack is not used

First load the camcorder with a fully charged internal battery pack, then remove the DC output cable of the external battery from the DC IN connector. The power source will switch to the internal battery pack. To use an external battery again, connect a fully charged external battery to the DC IN connector before unloading the internal battery pack. The power source will switch to the external battery.

Continuous operation when operating with only an internal battery pack

First, connect a fully charged external battery to the DC IN connector, then charge the internal battery.

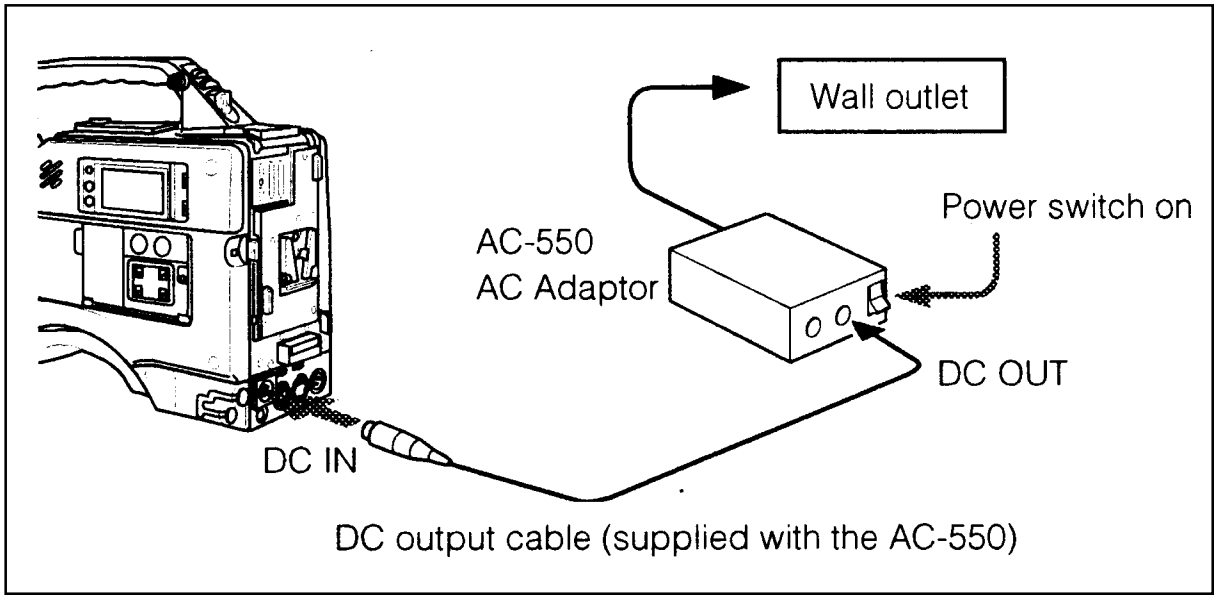
Notes

- When an internal battery pack is loaded and an external battery is connected to the DC IN connector, the external battery is always used as the power source.
- There may be some noise on the video signal at the instant the power sources are switched.

5

5-1-4 Using an AC Adaptor

Connect the camcorder to the AC power supply through the AC-550 AC Adaptor as shown in the following figure, and turn the POWER switch of the AC-550 on.



Connecting to an AC power source

Note

When using an AC adaptor, set BATT TYPE in the OPERATION menu to an item other than ANTON.

For more information about selecting the battery, see Section 4-7-8 "Setting the Battery, D5600K Mode and Selecting the Lens File" (page 4-50)

5-1-5 Using the Anton Bauer Ultralight System

You can equip the camcorder with a special battery mount that the Anton Bauer Corporation has developed for its Ultralight System.

Ultralight System: By installing this system on the camcorder, you can switch the video light on and off automatically as you start and stop VTR operation, using the VTR START button on the camcorder or the VTR button on the lens.

Contact your Sony representative for more information.

When the internal battery (Anton Bauer) begins to fail during use

Follow the procedure below to change the battery .

1 Set the battery to LITHIUM on the OPERATION menu.

For more information about selecting the battery, see Section 4-7-8 "Setting the Battery, D5600K Mode and Selecting the Lens File" (page 4-50)

2 Connect a fully charged external battery to the DC IN connector, and change the internal battery.

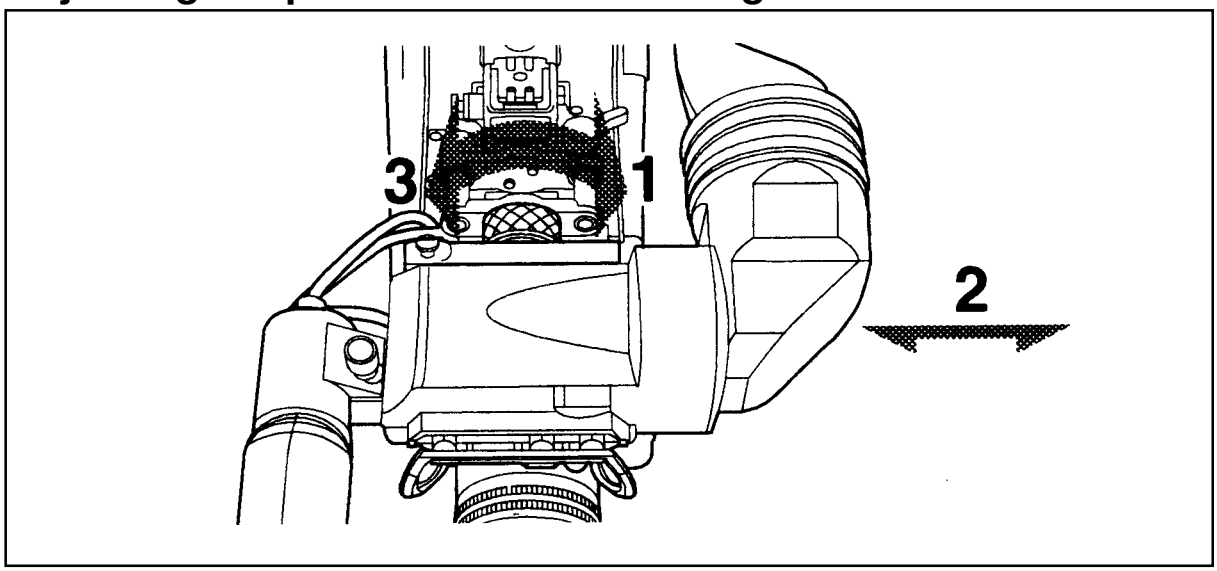
3 Remove the external battery connection, then return the battery setting to ANTON.

5-2 Adjusting the Viewfinder

For maximum viewing convenience, you can adjust the viewfinder position in the left-right and backward-forward directions.

5-2-1 Adjusting the Viewfinder Position

Adjusting the position to the left or right



Adjusting the position to the left or right

1 Loosen the viewfinder left-right positioning ring.

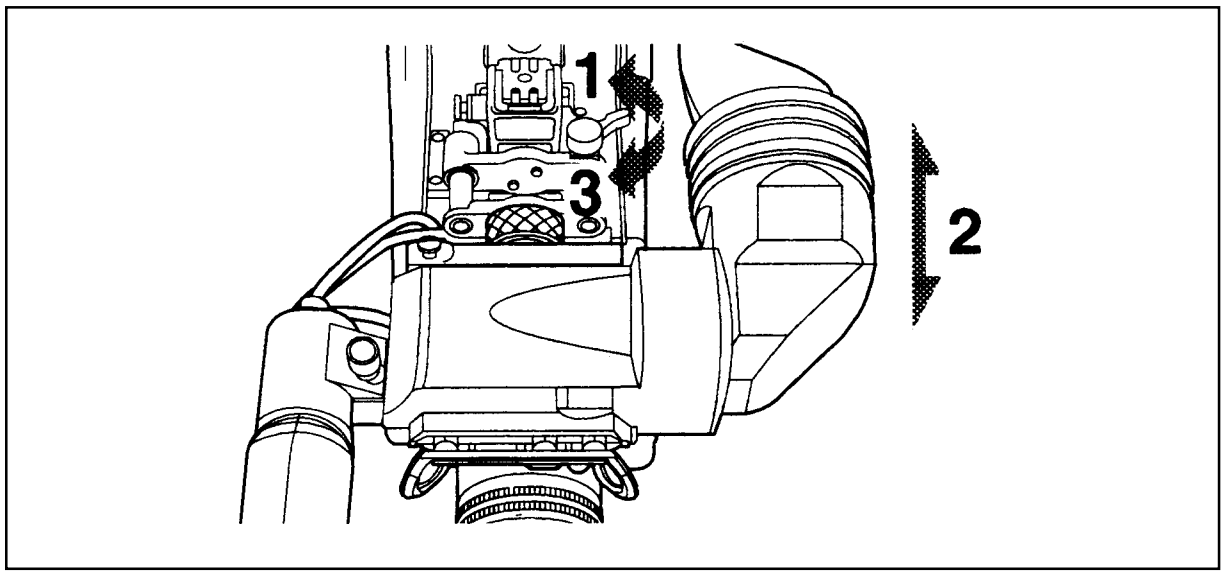
2 Slide the viewfinder to the most convenient position.

3 Tighten the viewfinder left-right positioning ring.

Storing the camcorder in the carrying case

Always store the camcorder with the viewfinder moved fully in the direction opposite to the barrel and the viewfinder left-right positioning ring tightened.

Adjusting the position backward or forward



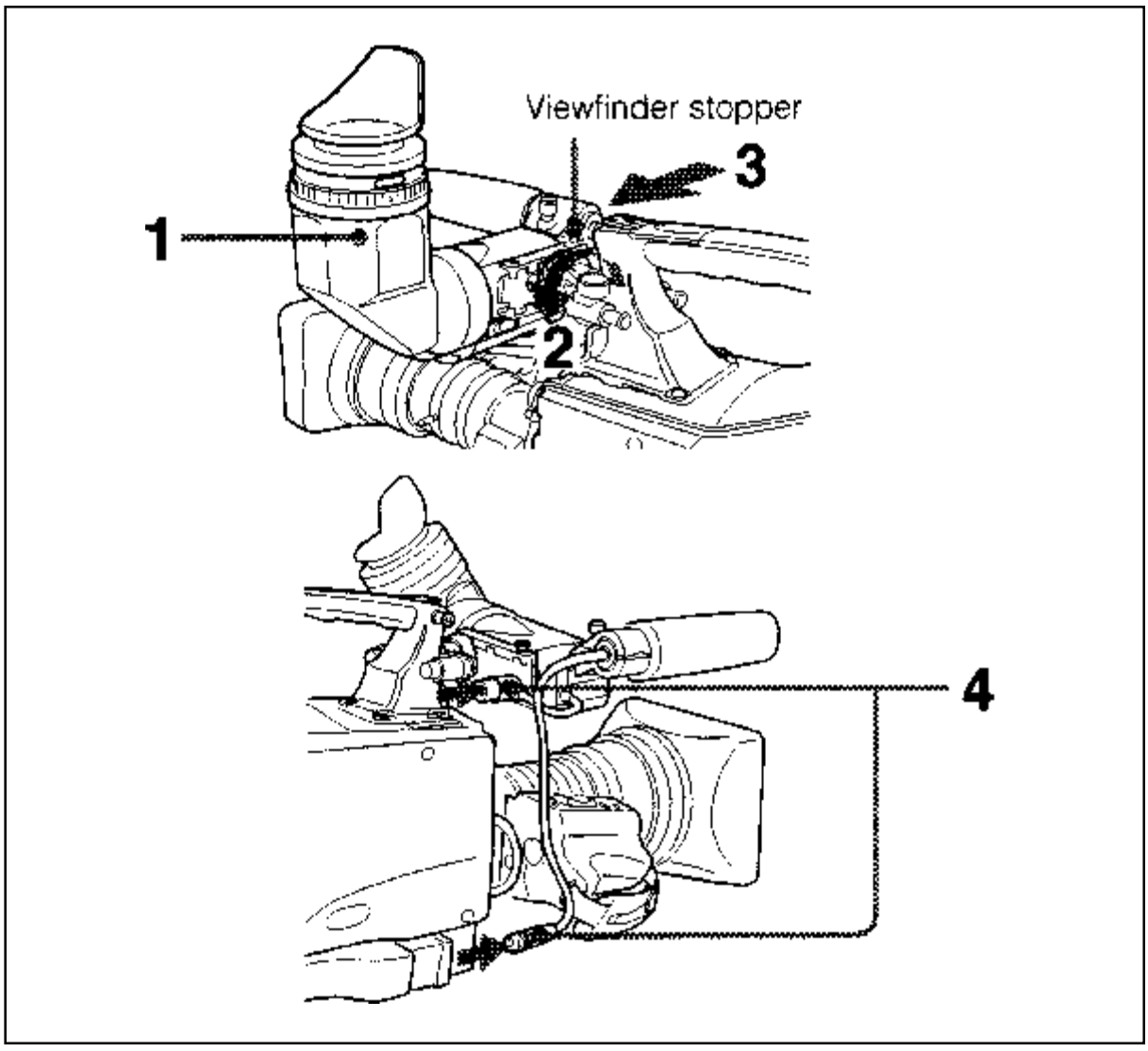
Adjusting the position backward or forward

1 Loosen the viewfinder front-rear positioning lever.

2 Slide the viewfinder longitudinally to the most convenient position.

3 Tighten the viewfinder front-rear positioning lever.

5-2-2 Detaching the Viewfinder



Detaching the Viewfinder

1 Point the viewfinder barrel up or down.

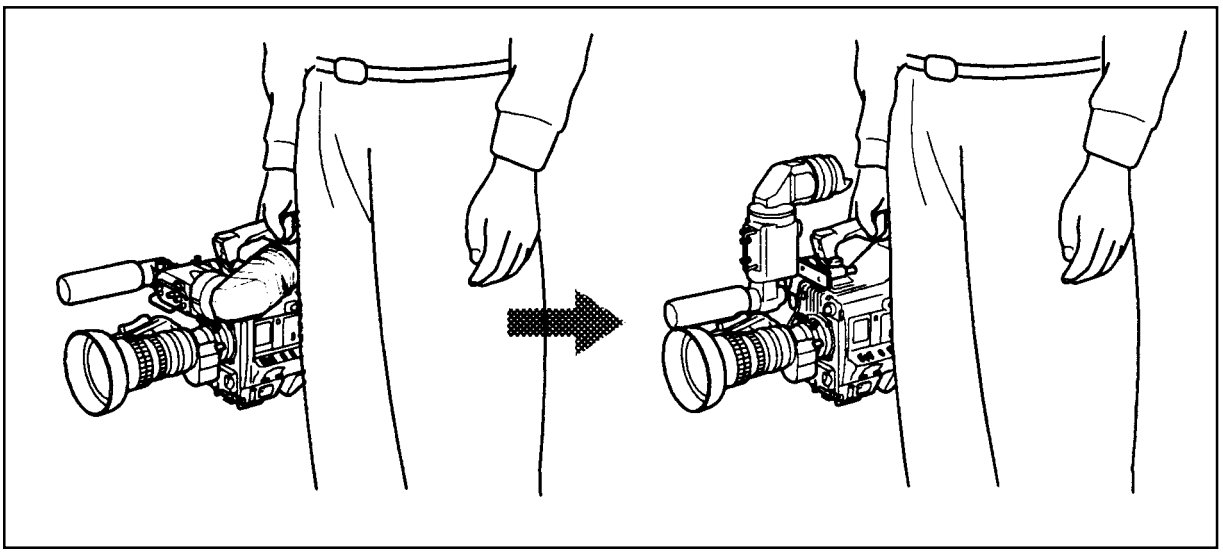
2 Loosen the viewfinder left-right positioning ring.

3 Holding the viewfinder stopper up, slide the viewfinder in the direction indicated by the arrow and detach it.

4 Remove the viewfinder cable and microphone cable from the clamps and disconnect them.

The viewfinder rotation bracket

By fitting a BKW-401 Viewfinder Rotation Bracket (not supplied), you can rotate the viewfinder out of the way so that your right leg does not hit the viewfinder while you are carrying the camcorder.
For more information, refer to the BKW-401 manual.

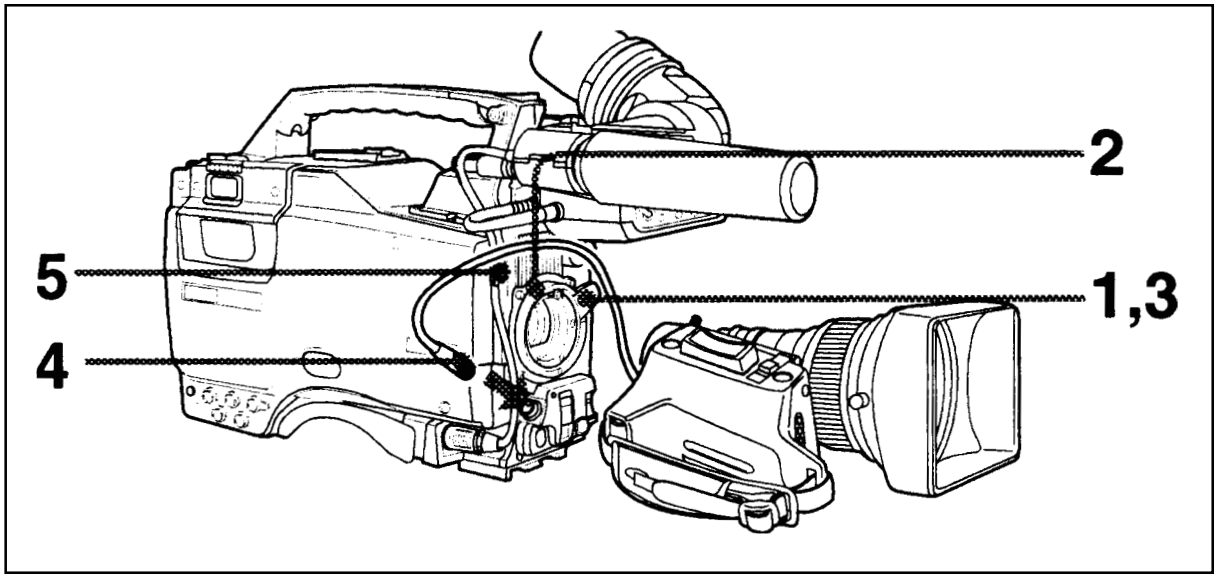


Using the BKW-401 Viewfinder Rotation Bracket

5-3 Mounting the Lens

Follow the procedure below to mount the lens.

For information about using the lens, refer to the lens manual.



Mounting the Lens

1 Push the lens locking lever up and remove the lens mount cap from the lens mount.

2 Align the center slot in the lens mount with the center pin on the lens, and insert the lens into the mount.

3 Holding the lens in place, push the lens locking lever down to mount the lens.

4 Connect the lens cable to the LENS connector.

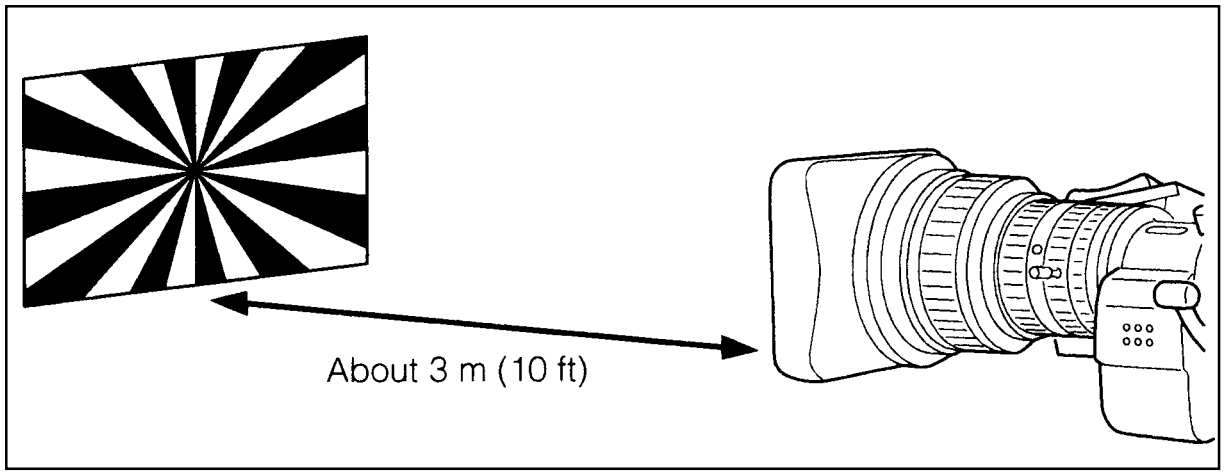
5 Secure the lens cable with the cable clamps.

5-4 Adjusting the Flange Focal Length

If the lens does not stay in focus properly as you zoom from telephoto to wide angle, adjust the flange focal length (the distance from the plane of the lens mounting flange to the imaging plane). Make this adjustment after mounting or changing the lens.

Adjusting the flange focal length

The position of the controls for adjusting the flange focal length vary somewhat from lens to lens. Check the identification of the various controls in the lens manual.



Adjusting the flange focal length

1 Set the iris to manual.

2 Open the iris. Place the flange focal length adjustment chart about 3 m (10 ft) away from the camera, lit well enough to provide a satisfactory video output level.

3 Loosen the fixing screws on the Ff ring (flange focal length adjustment ring).

4 Use manual or power zoom to set the lens to telephoto.

(Continued)

5 Point the camera at the chart by turning the focus ring and focus on it.

6 Set the zoom ring to wide angle.

7 Turn the Ff ring until the chart is in focus, being careful not to disturb the focus ring.

8 Repeat steps **4** to **7** until the chart stays in focus all the way from wide angle to telephoto.

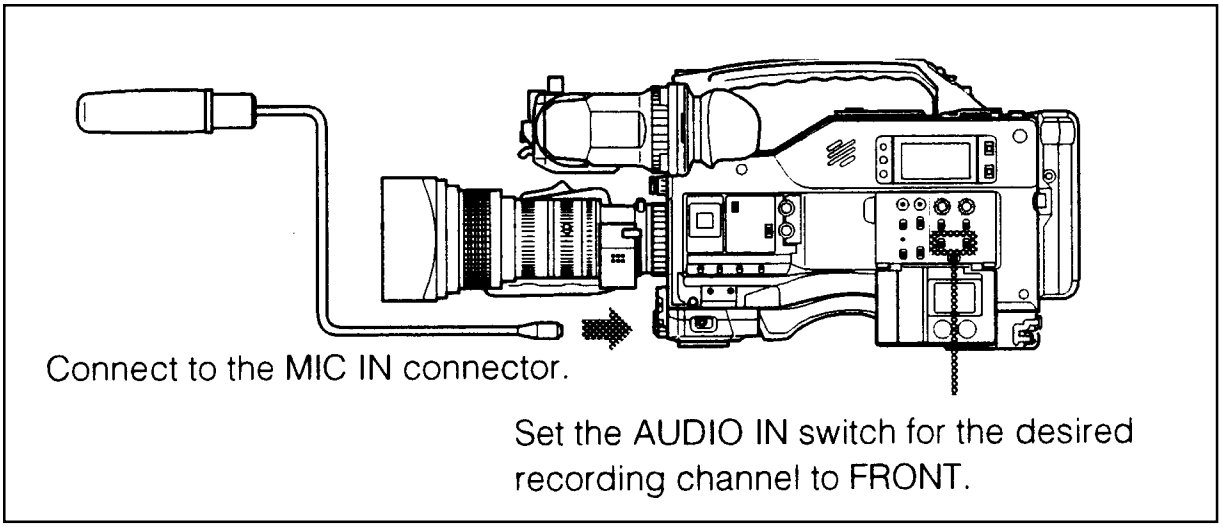
9 Tighten the Ff ring fixing screws.

5-5 Audio Input System

5-5-1 Using the Supplied Microphone

You can use the supplied microphone either detached from or attached to the camcorder.

Using the microphone detached from the camcorder



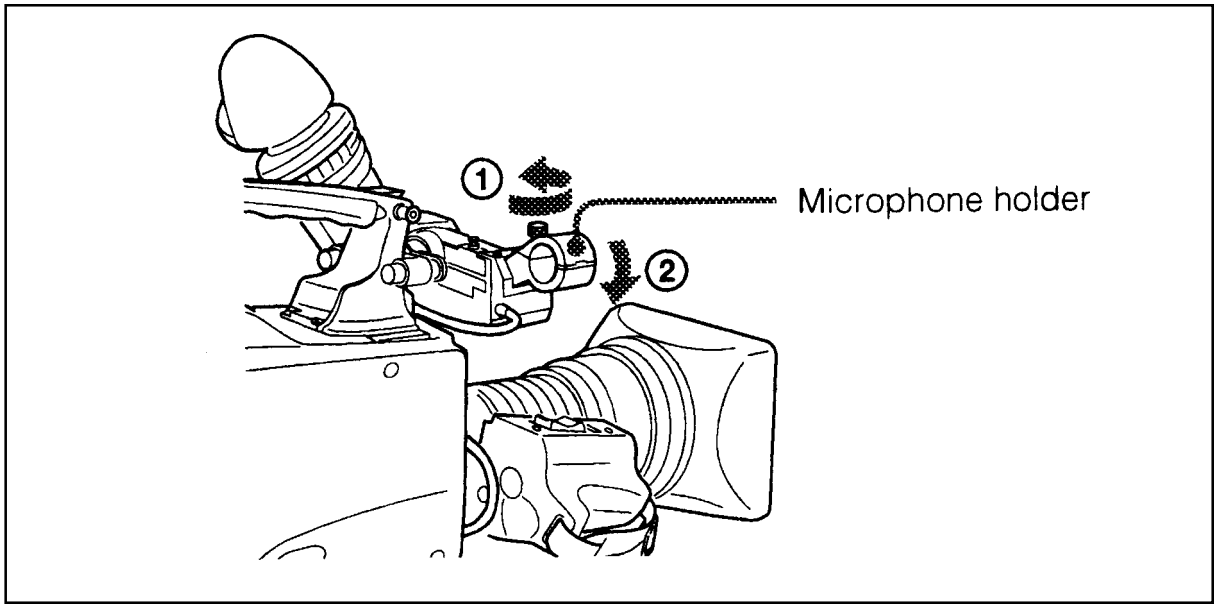
Using the supplied microphone detached from the camcorder

Note

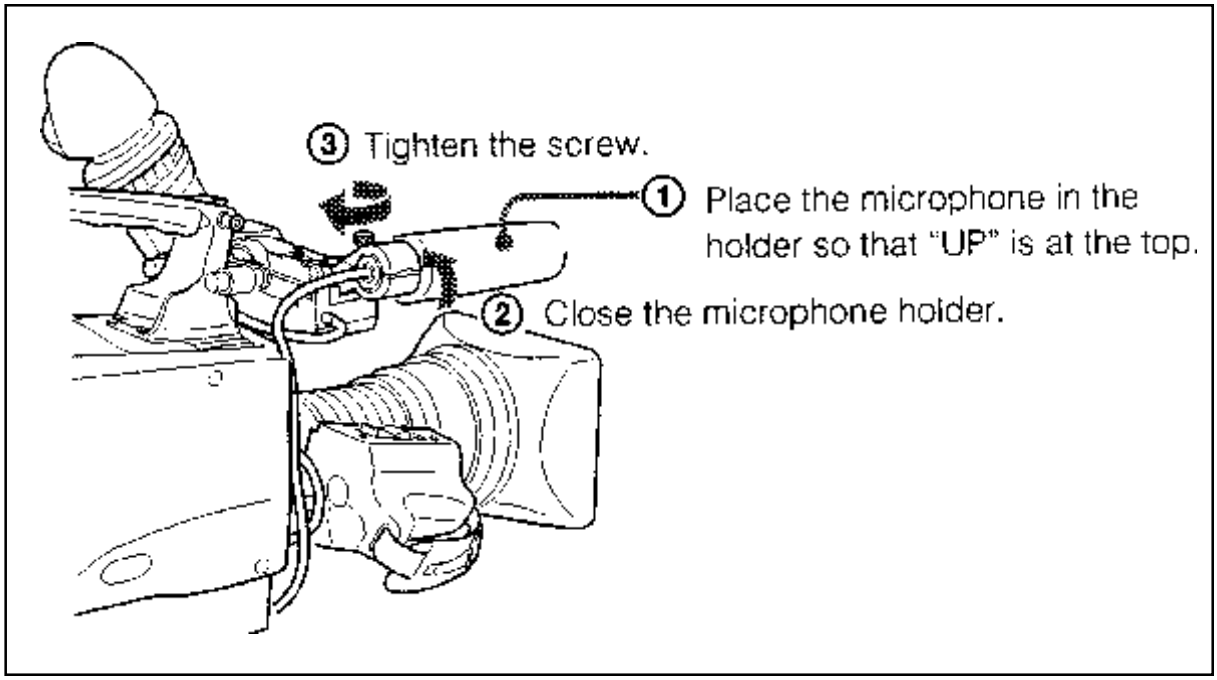
When using the supplied microphone with an extension cable, always use an external power supply type cable.

Using the microphone attached to the camcorder

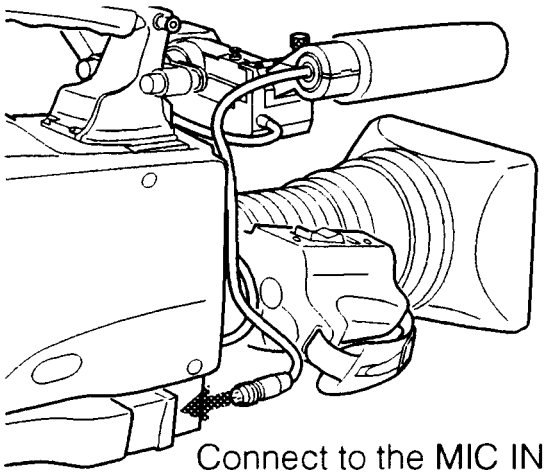
1 Loosen the screw and open the microphone holder.



2 Place the microphone in the microphone holder.



3 Plug the microphone cable into the MIC IN connector, and set the AUDIO IN switch for the desired recording channel to FRONT.

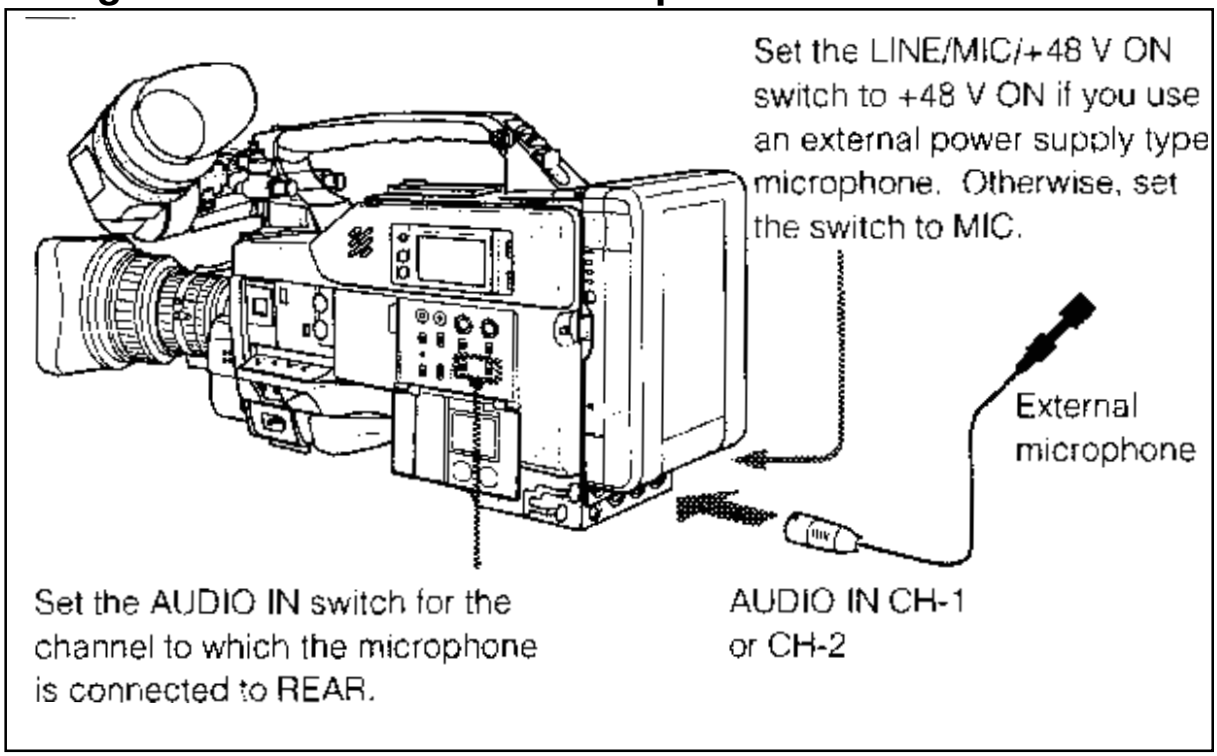


Connect to the MIC IN connector.

5-5-2 Using an External Microphone

You can connect up to two external microphones, using the AUDIO IN CH-1 and CH-2 connectors. When you use an external power supply type microphone, set the LINE/MIC/+48 V ON.
If a microphone you use is not the external power supply type, set the LINE/MIC/+48 V ON switch to MIC.

Using a detached external microphone



Using a detached external microphone

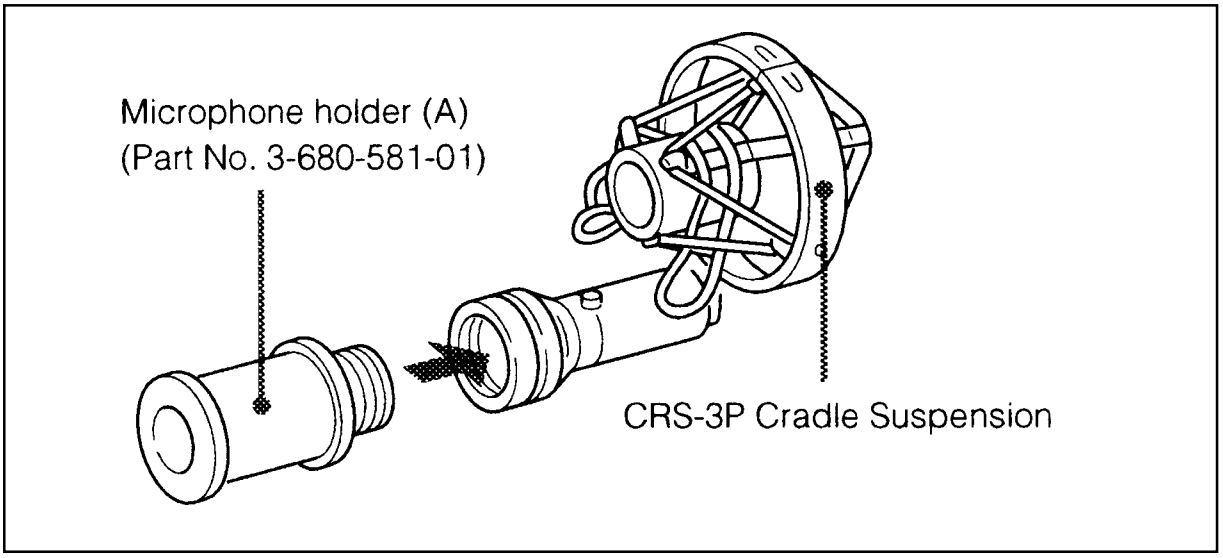
Using an external microphone attached to the camcorder

You can attach an external microphone to the camcorder by using the CAC-12 Microphone Holder (not supplied). Additionally, by using the CRS-3P Cradle Suspension (not supplied), you can reduce the mechanical vibration noise from the VTR, and can also attach a long microphone. Note, however, that use of the CRS-3P requires a microphone holder (A) (Part No. 3-680-581-01), which is not supplied with the CRS-3P.

The procedure for attaching an external microphone using a CAC-12 and CRS-3P is shown below.

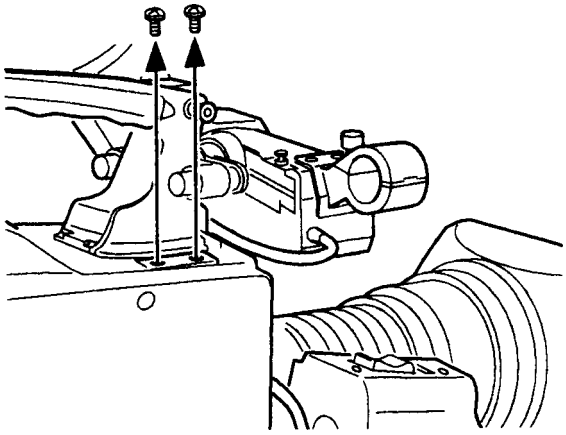
Refer to the microphone holder or cradle suspension manual for more information.

1 Assemble the CRS-3P Cradle Suspension and microphone holder (A) (Part No. 3-680-581-01).



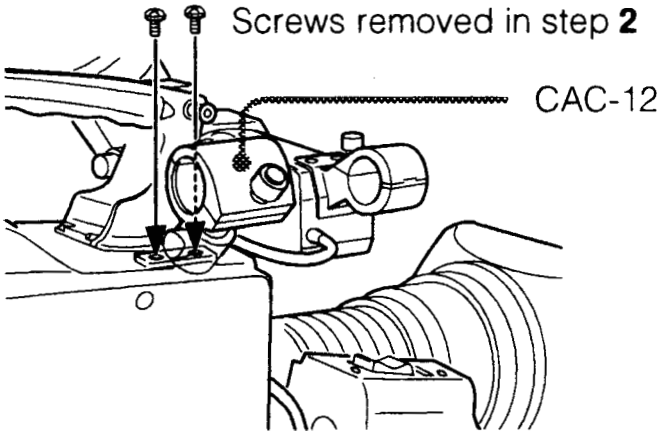
(Continued)

2 Remove the external microphone holder attachment screws.

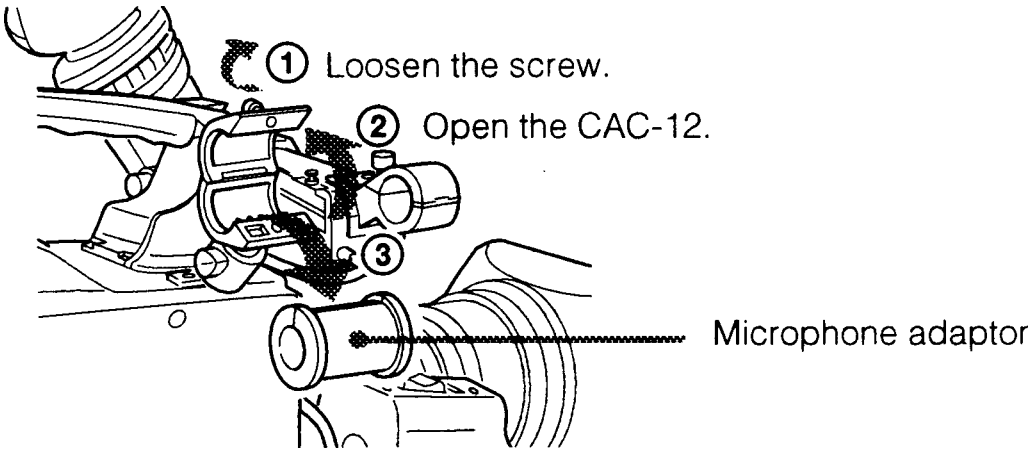


5

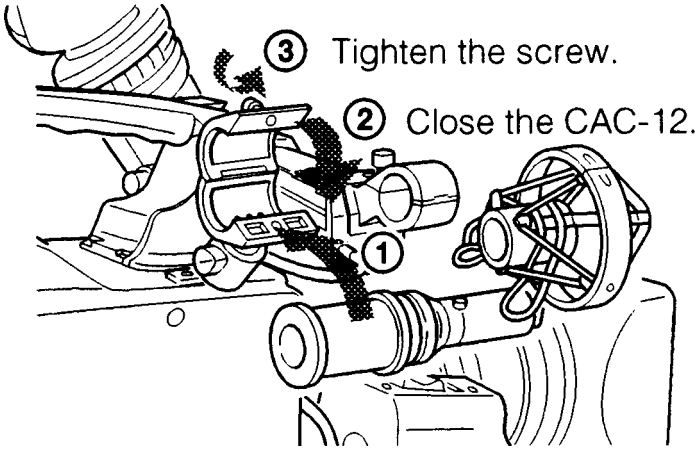
3 Attach the CAC-12 Microphone Holder.



4 Open the CAC-12 and remove the microphone adaptor.

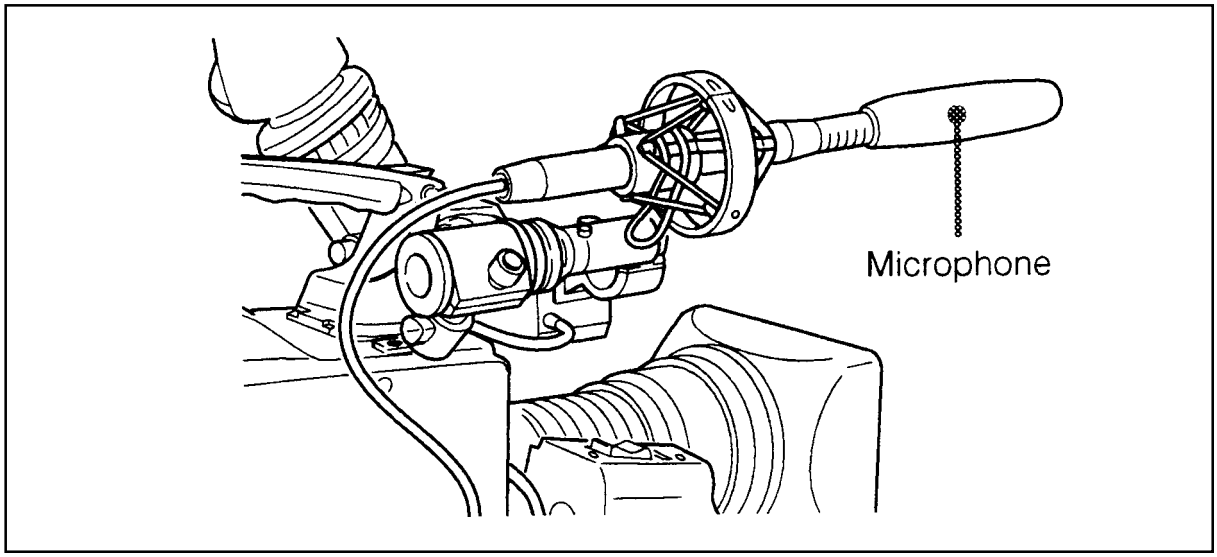


5 Mount the assembly from step **1** in the CAC-12.



(Continued)

6 Mount the microphone into the cradle suspension.



7 Connect the microphone cable to the AUDIO IN connector for channel 1 or 2. Set the corresponding AUDIO IN switch to REAR. Set the LINE/MIC/+48 V ON switch to +48 V ONor MIC in accordance with the type of the microphone power supply.

Note

When you connect a microphone to the AUDIO IN connector for channel 1 and 2, set the appropriate LINE/MIC/+48 V ON switch to MIC.

5-5-3 Attaching a UHF Portable Tuner (for a UHF Wireless Microphone System)

To use a Sony UHF wireless microphone system, fit the WRR-28M/810/860 UHF Portable Tuner. For each of these UHF portable tuners, use the following attachment procedure. (The WRR-28M is taken as an example below.)

Refer to the UHF portable tuner manual for more information.

Using a BP-L60A/L90A Battery Pack

1 (1) Attach the supplied tuner fitting to the back of the camcorder.

❶ Pass a screwdriver through the holes and tighten the screws.

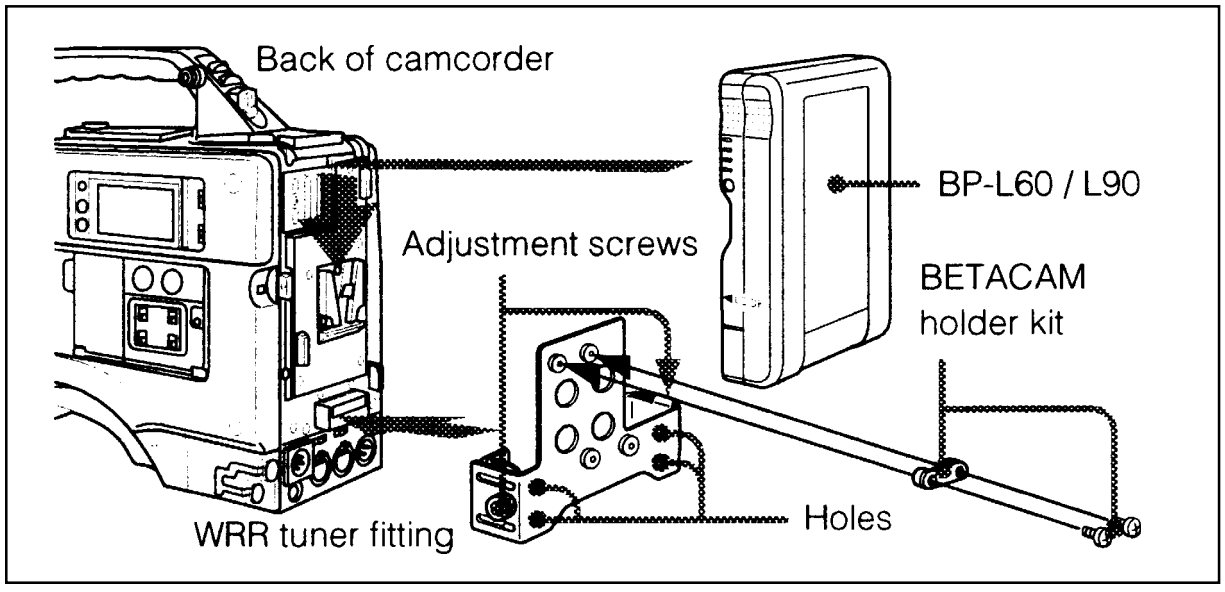
❷ Loosen the adjustment screws.

❸ Adjust the metal fitting position for a BP-L60A/L90A Battery Pack to be attached, and tighten the adjustment screws to fix its position.

❹ Attach the BETACAM holder kit supplied with the tuner.

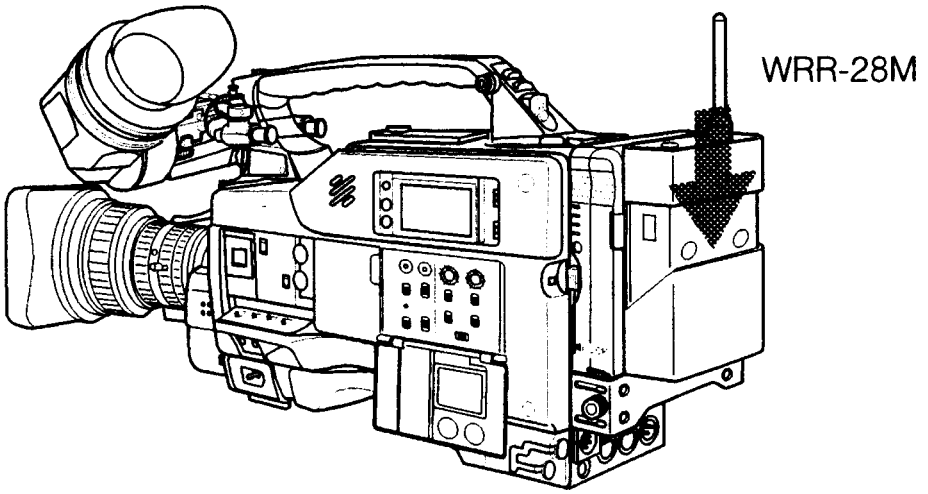
(2) Attach the battery pack.

For more information about attaching the BP-L60A/L90A Battery Pack, see Section 5-1-1 "Using a BP-L60A/L90A Battery Pack" (page 5-1).



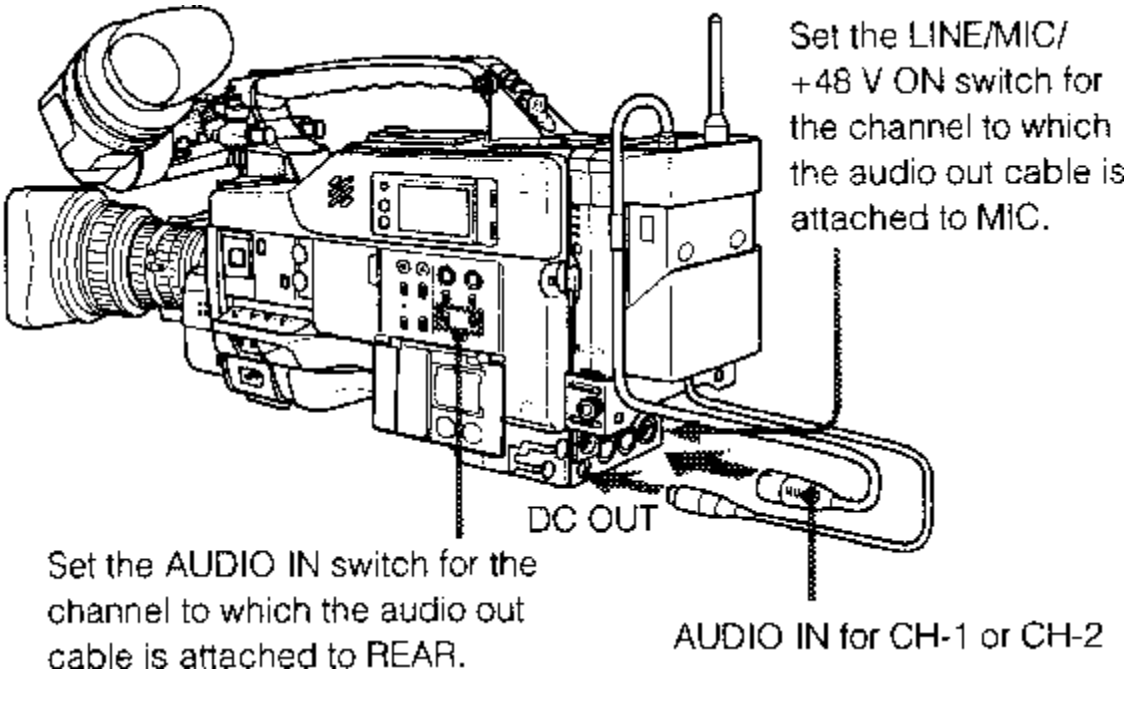
(Continued)

2 Mount the tuner on the WRR tuner fitting.



5

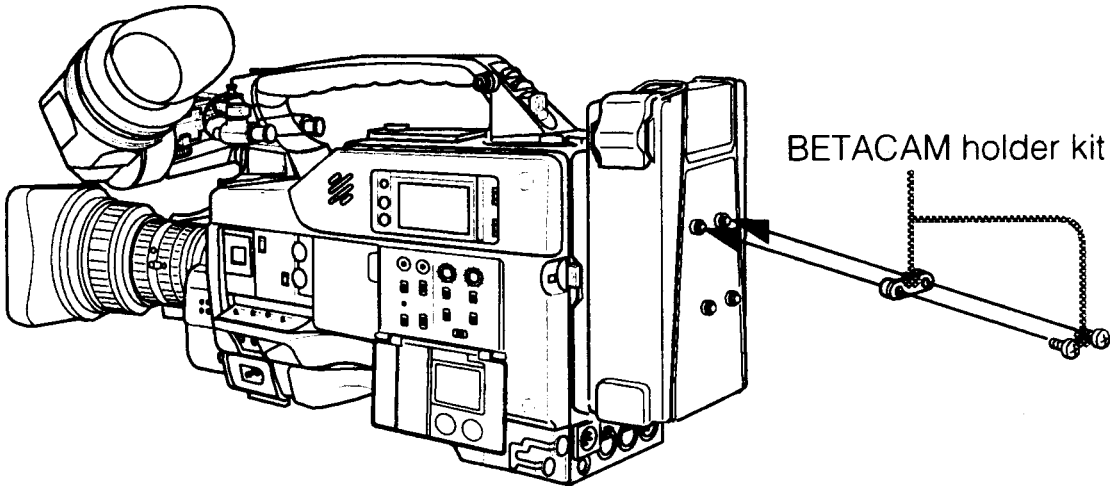
3 Connect the tuner power cord to the DC OUT connector of the camcorder, and the audio output cable to the AUDIO IN connector for channel 1 or channel 2.



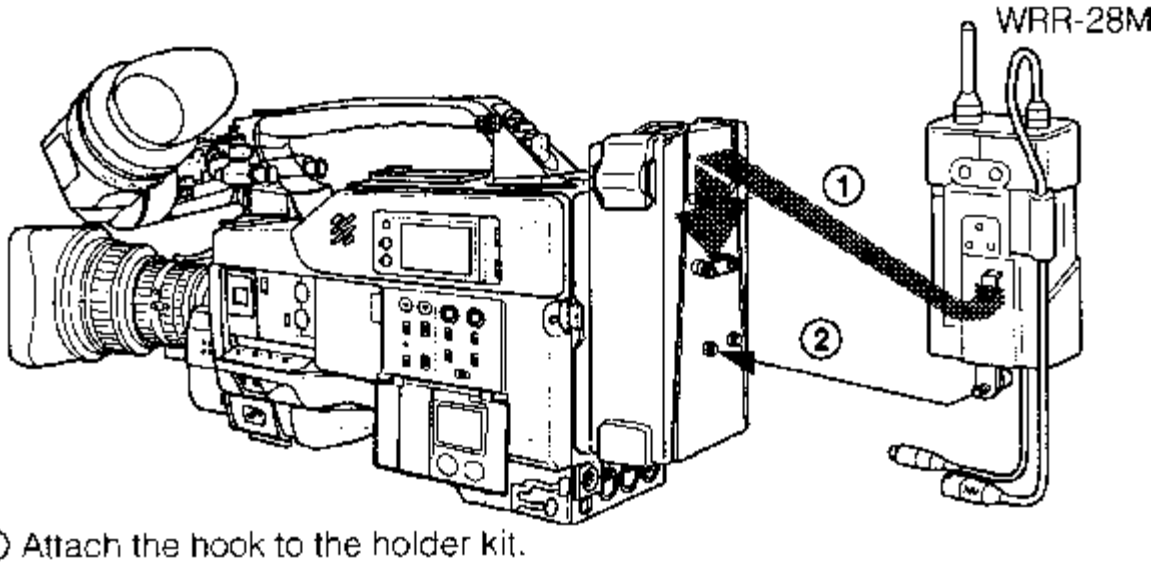
Using a BP-90A Battery Pack

Before attempting the following attachment, make sure that a BP-90A Battery Pack is contained in the DC-L90 Battery Adaptor.

1 Attach the BETACAM holder kit supplied with the tuner to the battery adaptor.

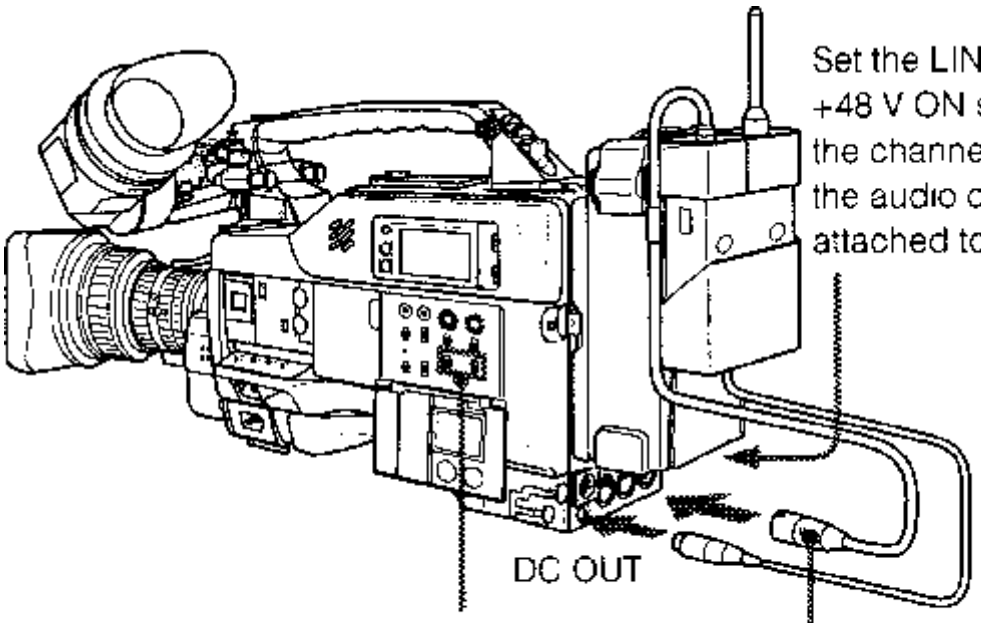


2 Mount the tuner on the battery adaptor.



(Continued)

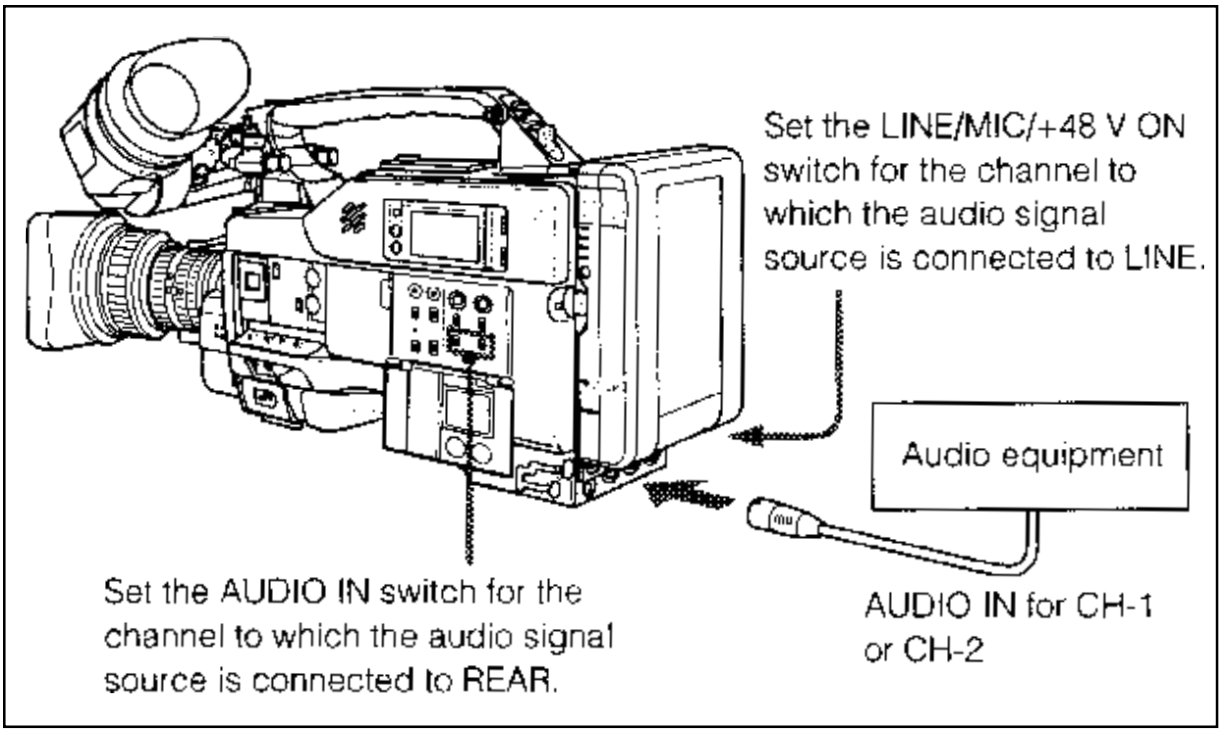
3 Connect the tuner power cord to the DC OUT connector of the camcorder, and the audio output cable to the AUDIO IN connector for channel 1 or channel 2.



5

5-5-4 Connecting Line Input Audio Equipment

Connect the audio output connector of the audio equipment that supplies the line input signal to the AUDIO IN CH-1 or CH-2 connector.

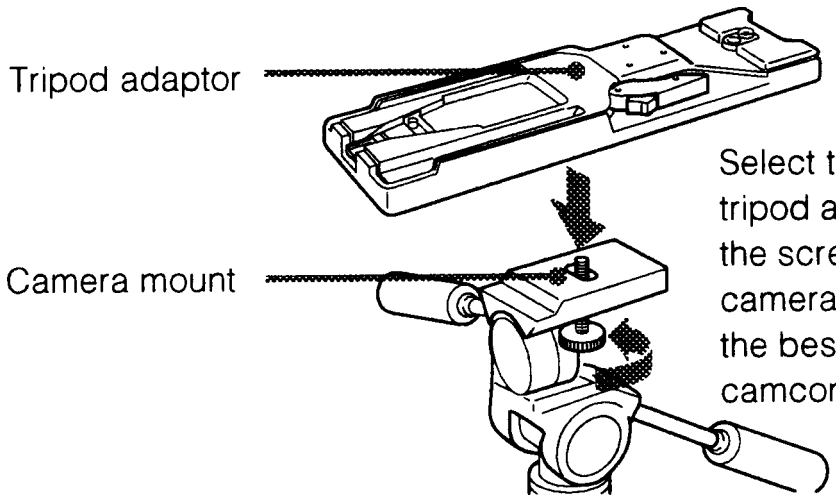


Line input connection

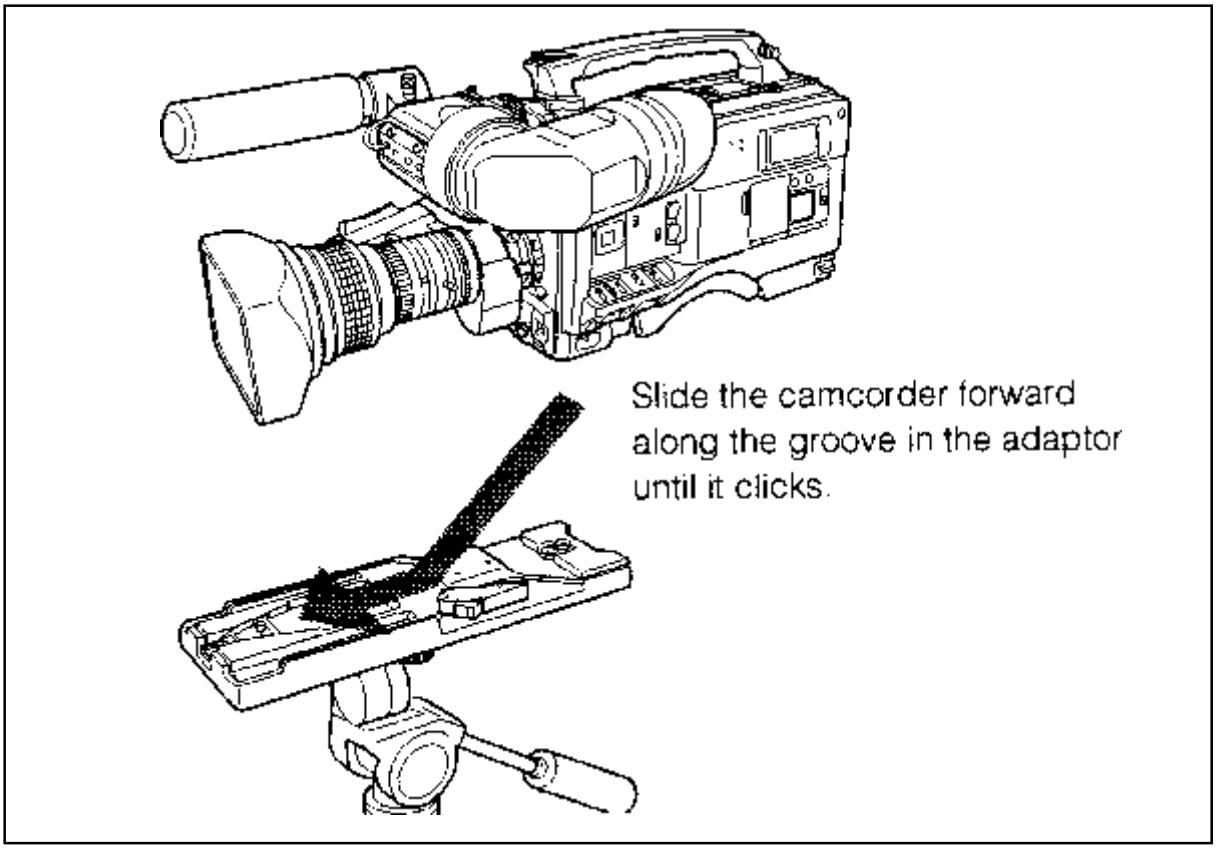
5-6 Tripod Mounting

You can easily mount and dismount the camcorder on a tripod by using the supplied tripod adaptor.

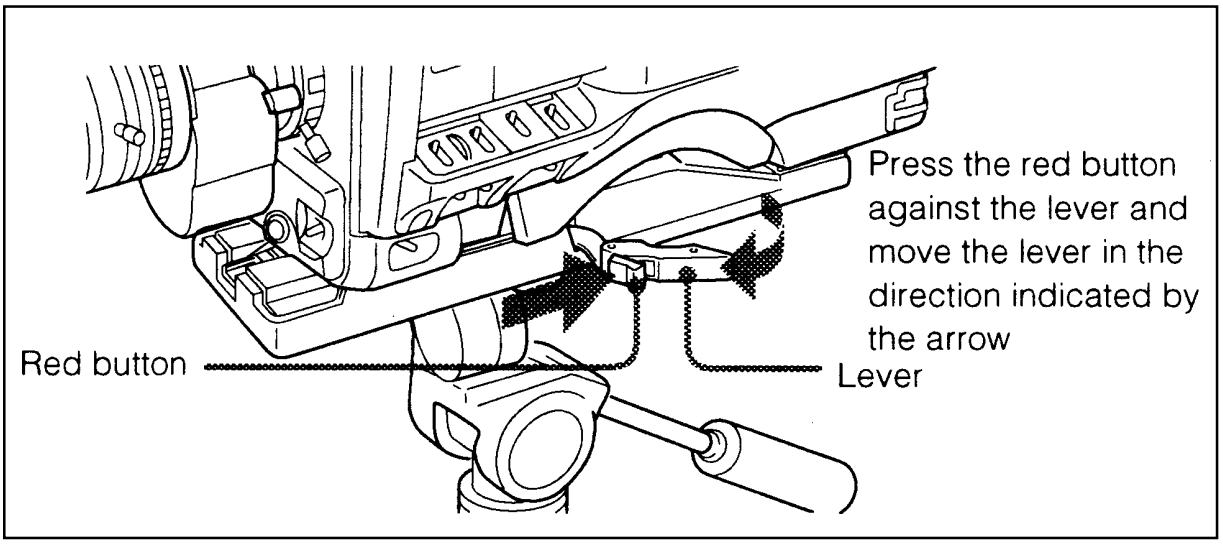
1 Attach the tripod adaptor to the tripod.



2 Mount the camcorder on the tripod adaptor.



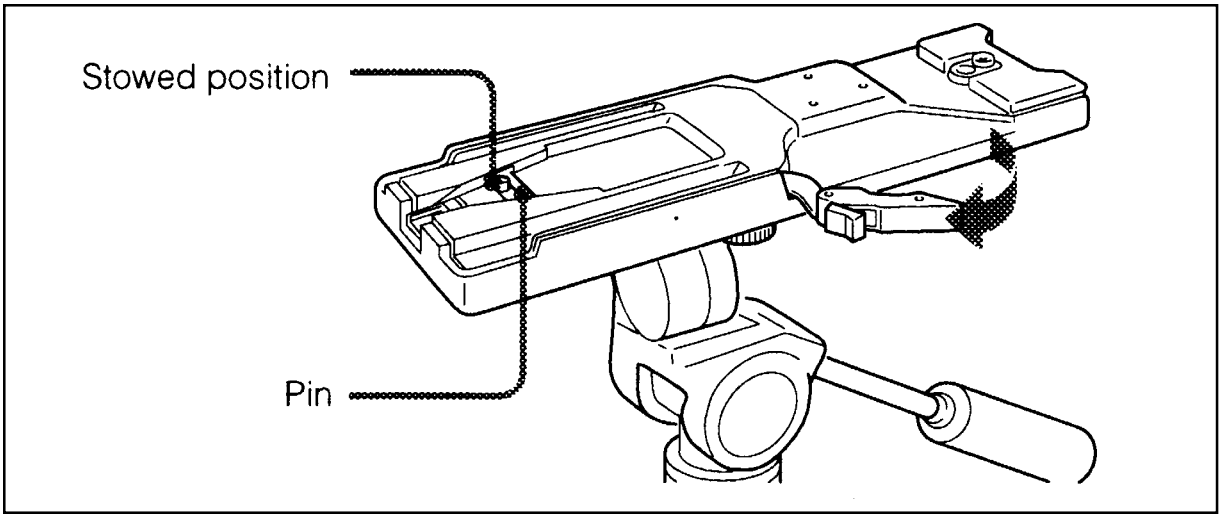
Removing the camcorder from the tripod adaptor



Removing the camcorder from the tripod adaptor

Note

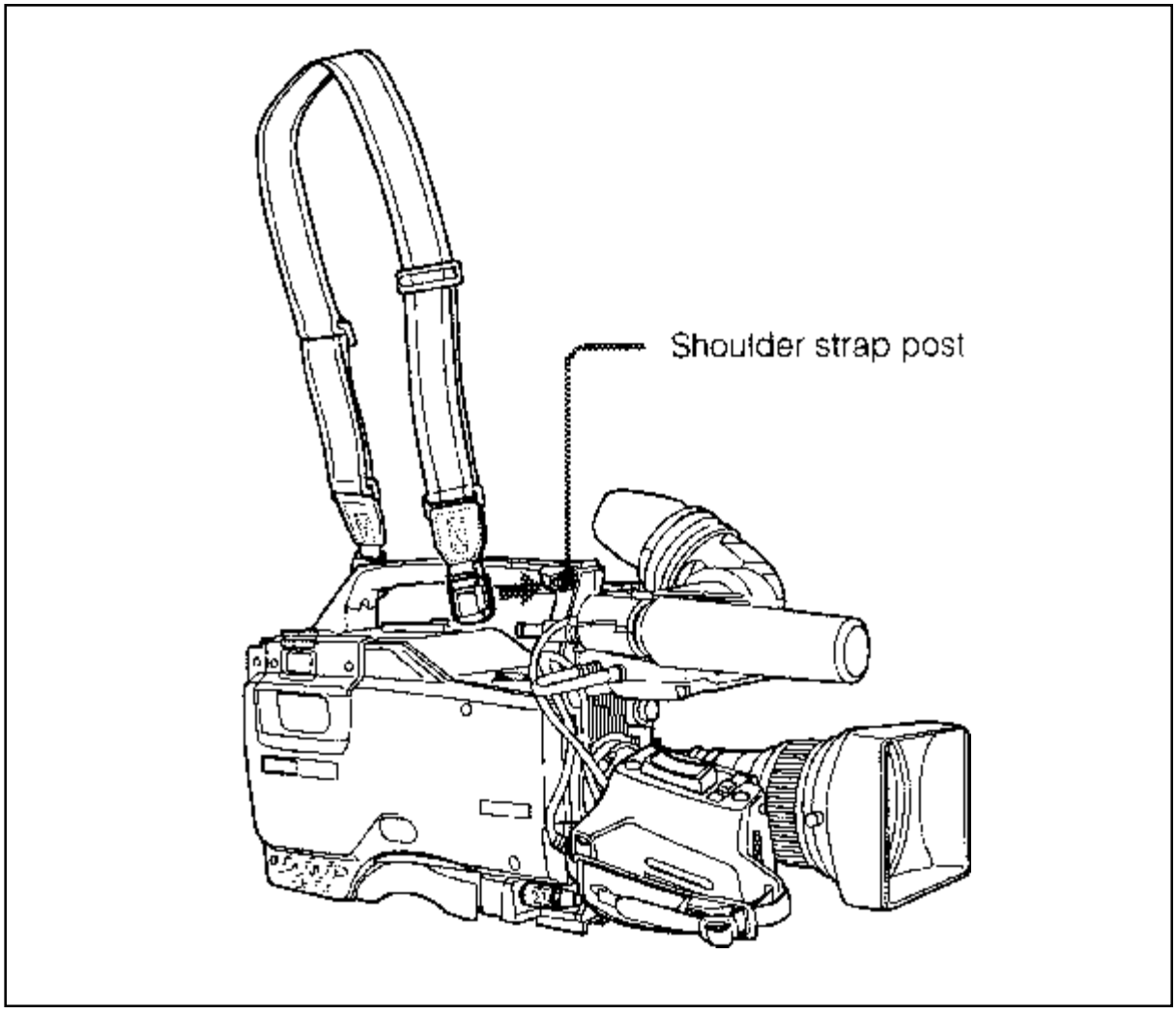
The tripod adaptor pin may remain in the engaged position even after the camcorder is removed. If this happens, press the red button against the level a second time and move the lever as shown below until the pin returns to the stowed position. If the pin remains in the engaged position, you will not be able to mount the camcorder on the tripod adaptor.



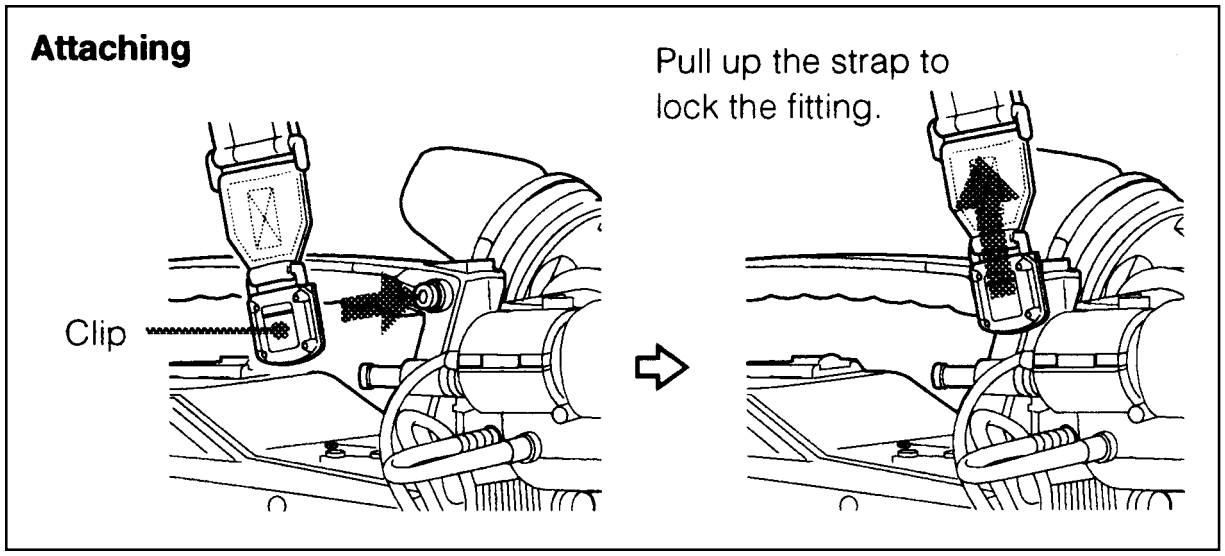
If the pin remains in the engaged position

5-7 Attaching the Shoulder Strap

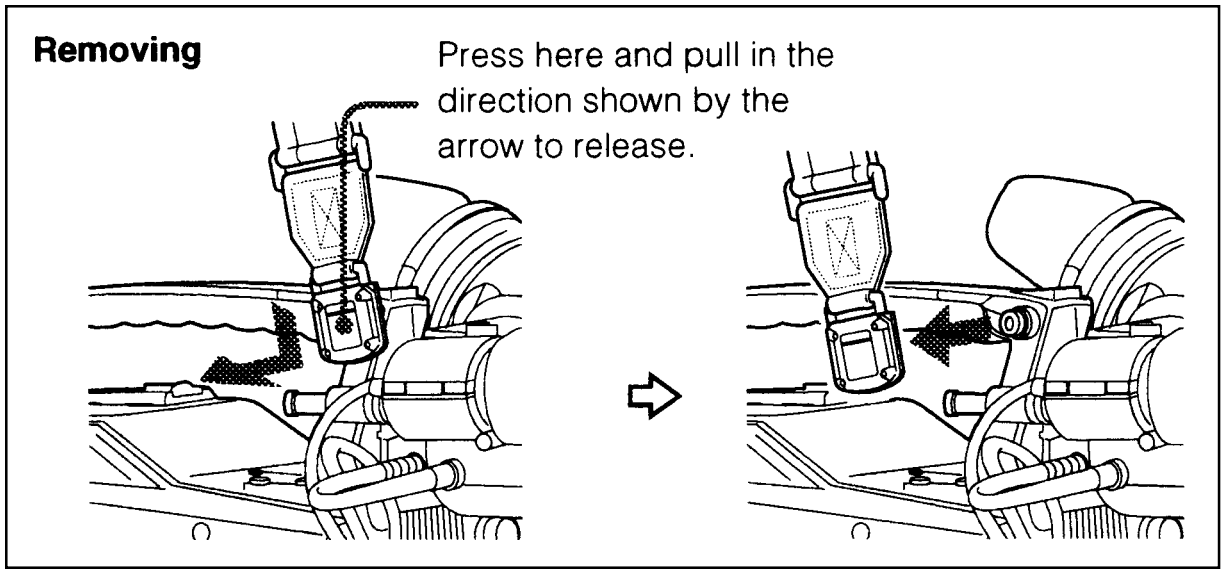
Attach the supplied shoulder strap as shown below.



Attaching the Shoulder Strap



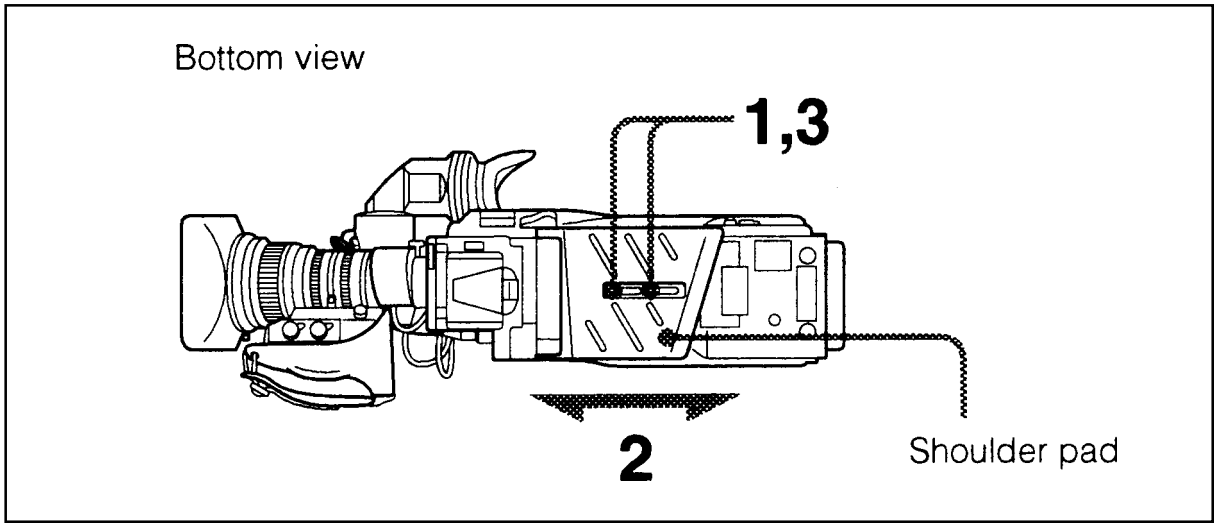
Attaching the Shoulder Strap



Removing the Shoulder Strap

5-8 Adjusting the Shoulder Pad Position

You can shift the shoulder pad from its center position (factory setting) backward or forward by up to 10mm (3/8 inch). This adjustment helps you get the best balance for shooting with the camcorder on your shoulder.



Adjusting the Shoulder Pad Position

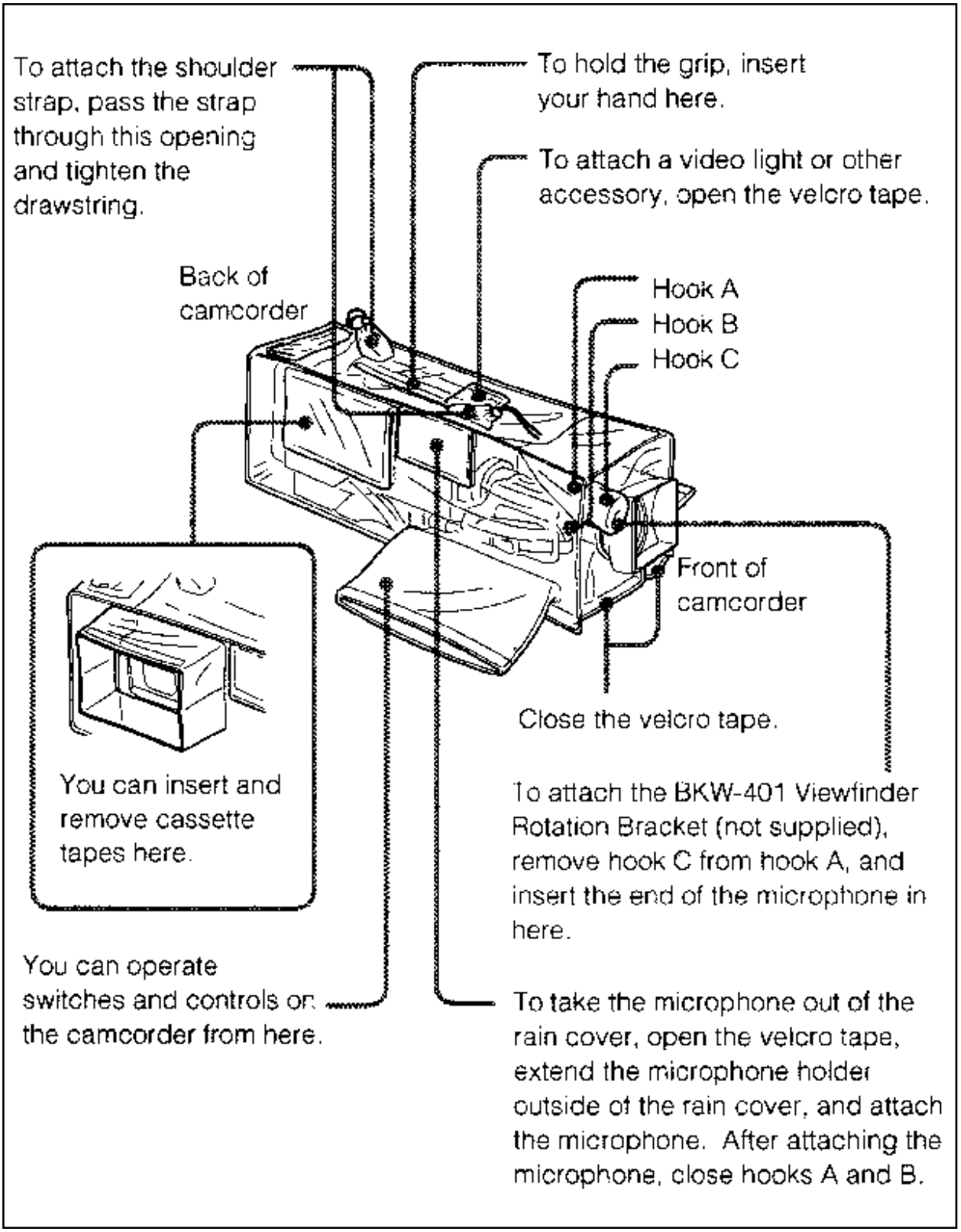
1 Loosen the two screws.

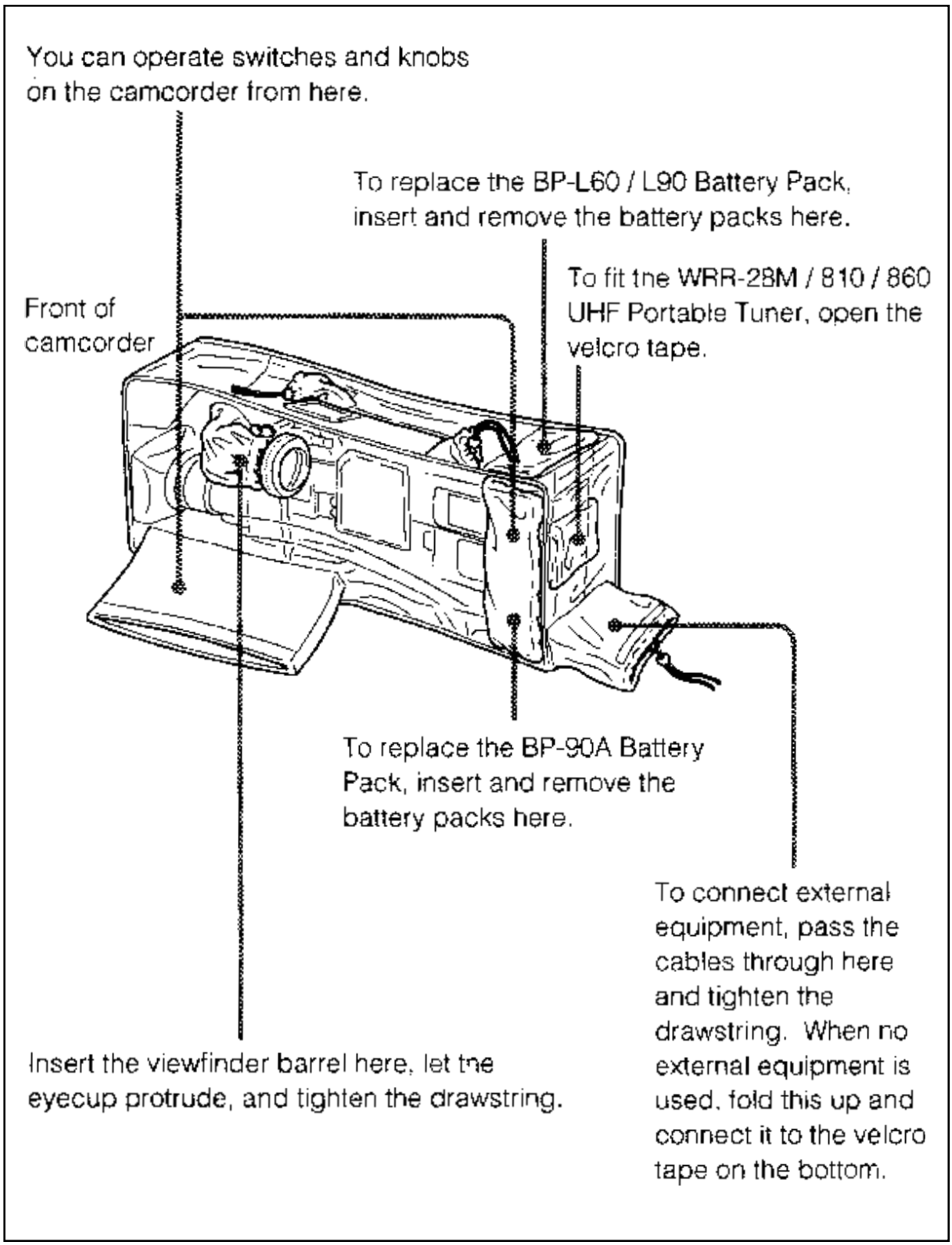
2 Slide the shoulder pad backward or forward until it is in the most convenient position.

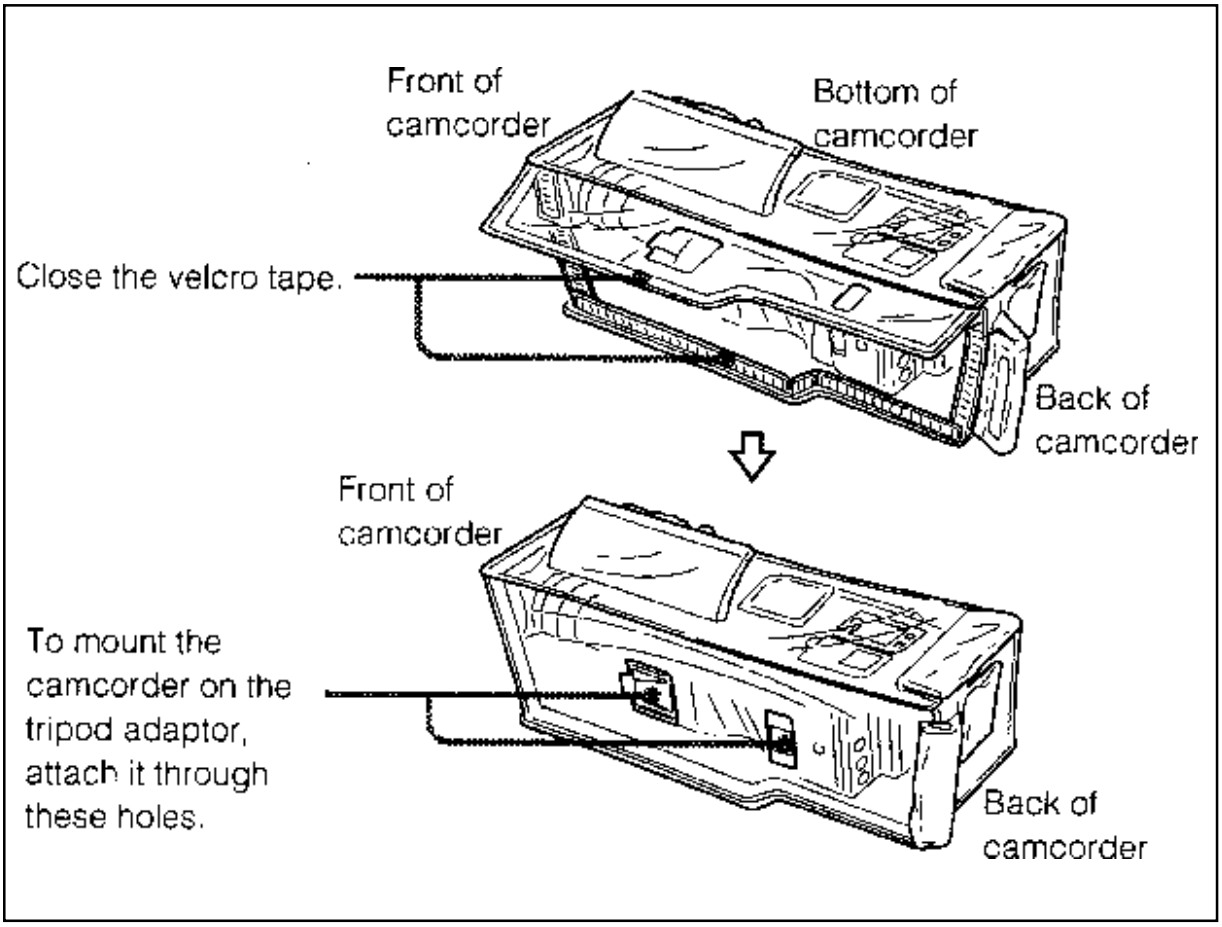
3 Tighten the screws.

5-9 Putting On the Rain Cover

Attach the rain cover as illustrated below. You can insert and remove cassette tapes, operate various switches and controls, and mount the camcorder on the tripod adaptor with the rain cover attached.




You can operate switches and knobs on the camcorder from here.
To replace the BP-L60 / L90 Battery Pack, insert and remove the battery packs here.
To fit the WRR-28M / 810 / 860 UHF Portable Tuner, open the velcro tape.
Front of camcorder
To replace the BP-90A Battery Pack, insert and remove the battery packs here.
To connect external equipment, pass the cables through here and tighten the drawstring. When no external equipment is used, fold this up and connect it to the velcro tape on the bottom.
Insert the viewfinder barrel here, let the eyecup protrude, and tighten the drawstring.


Front of camcorder
Bottom of camcorder
Close the velcro tape.
Back of camcorder
Front of camcorder
To mount the camcorder on the tripod adaptor, attach it through these holes.
Back of camcorder

5

5-10 Connecting the Remote Control Unit

Connecting the RCP-700 Series Remote Control Unit (not supplied) enables remote control of the principle camera functions.
Turning the POWER switch of the camcorder to ON when the remote control unit is connected to the REMOTE connector (8-pin) automatically puts the camcorder into remote control mode. If you disconnect the remote control unit, remote control mode is canceled.

Notes

- Always turn the POWER switch to OFF before connecting or disconnecting the remote control cable.

- When you turn off the camcorder power, the settings and adjustments made with the switches and controls of the remote control unit are canceled. The settings and adjustments made with the setup menu are saved, but some of them are not written in the setup card.

Connecting the RM-B150 Remote Control Unit (not supplied)

Use the black cable supplied with the RM-B150 to connect the monitor output connector (Y signal) on the camcorder to the monitor input connector on the RM-B150. To output the character information that is displayed in the viewfinder screen as well, push the VF DISP switch on the camcorder to MENU while holding the MENU switch on the RM-B150 in the CANCEL position.

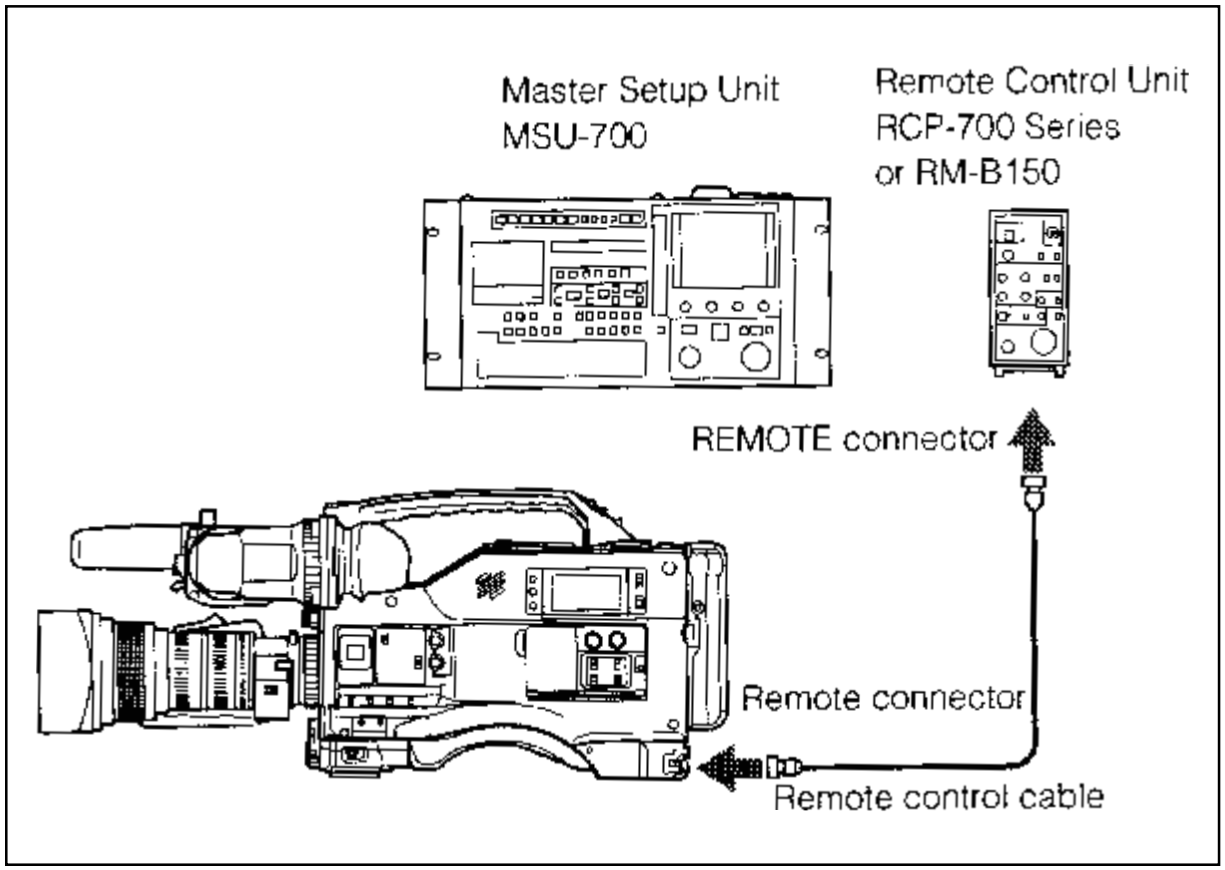
Connecting the MSU-700 Master Setup Unit (not supplied)

Connecting the MSU-700 Master Setup Unit enables various camera settings and adjustments to be made.

Note

To use the MSU-700 Master Setup Unit, install the HKCF-700 HD Master Setup Kit (not supplied).

Refer to the Maintenance manual for more information.



Connecting the remote control unit

Extension cable lengths

An extension cable is supplied with the RCP-700 series or RM-B150 Remote Control Unit and MSU-700 master Setup Unit. The length of each cable is as follows:

RCP-700 series: 10 meters

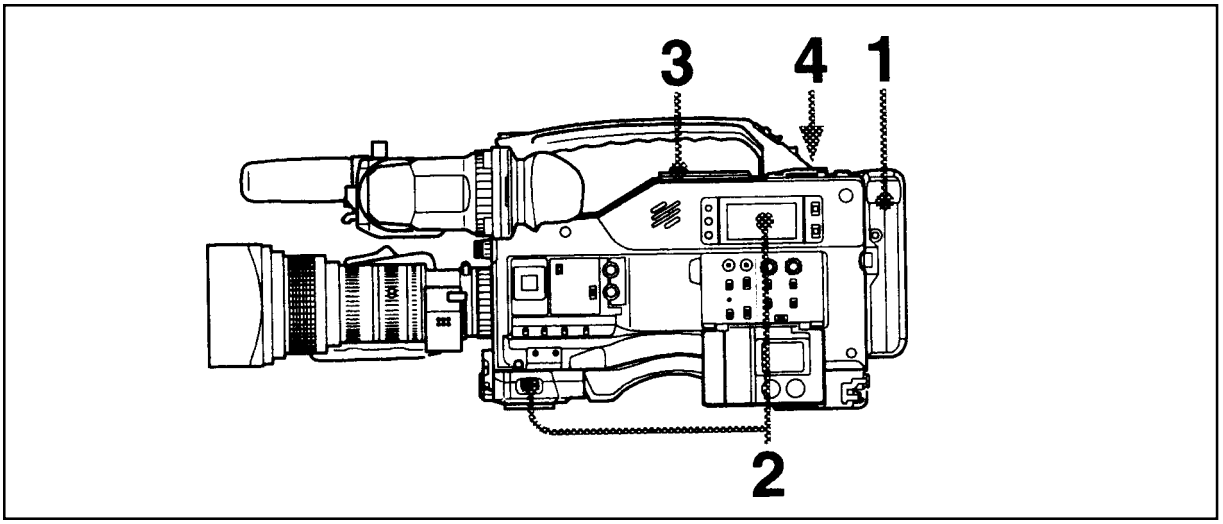
RM-B150: 100 meters

MSU-700: 200 meters

6-1 Testing the Camcorder Before Shooting

Check the functions of the camcorder before setting out for a shooting session, preferably by operating the camcorder together with a color video monitor.

6-1-1 Preparations for Testing



1 Attach a fully charged battery pack.

2 Set the POWER switch to ON and check that the HUMID indicator does not appear and that the BATT indicator shows at least five segments.
- If the HUMID indicator appears, wait until it disappears.
- If the BATT indicator does not show at least five segments, replace the battery pack with a fully charged one.

3 Check that there are no obstructions near the cassette lid, and then press the EJECT button to open the cassette lid.

4 After checking the points below, load the cassette and close the cassette lid.
- The cassette is not write-protected.
- There is no slack in the tape.

Condensation

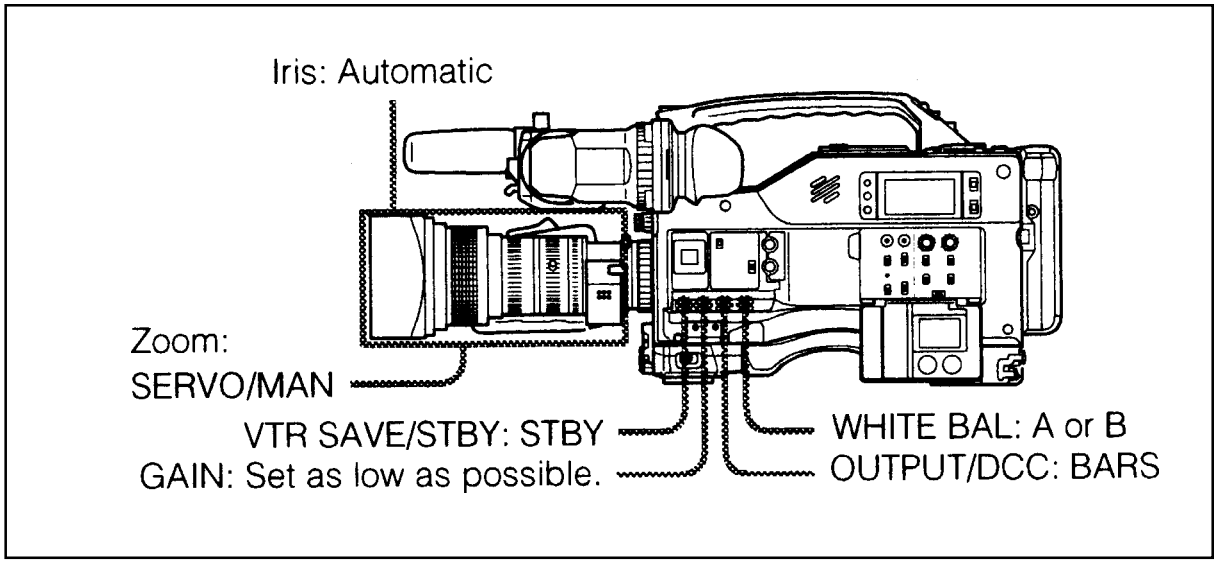
If you move the camcorder from a very cold place to a warm place, or use it in a damp location, condensation may form on the head drum. Then, if the camcorder is operated in this state, the tape may adhere to the drum and cause a failure or even permanent damage. Do the following to prevent this from happening.

- When moving the camcorder from a cold place to a warm place, be sure no cassette is loaded in the camcorder.
- Whenever you turn on the power, check that the HUMID indicator does not appear. If it appears, wait until it disappears before loading a cassette.

For more information, see Section 3-1-1 "Loading and Unloading a Cassette" (page 3-1) and Section 6-3 "Operation Warnings" (page 6-12)

6-1-2 Testing the Camera

Set the switches and selectors as follows.



Testing the viewfinder

1 Adjust the position of the viewfinder.

2 Check that the color bars are displayed in the viewfinder, and adjust the BRIGHT, CONTRAST, and PEAKING controls to give the best color bar display.

3 (1) Set the VF DISP switch to MENU and check that the setup menu is displayed on the viewfinder screen.
(2) Turn the MIC/MENU knob and check that the setup menu page changes to the next page.
(3) Push the MIC/MENU knob and check that settings of each item of the selected page are displayed.
(4) Turn the MIC/MENU knob and check that the arrow (→) moves within the page.
(5) Push the MIC/MENU knob and check that the arrow (→) changes to a question mark (?).
(6) Turn the MIC/MENU knob and check that the setting of the selected item or the ON/OFF indicator changes.

4 Set the OUTPUT/DCC switch to CAM and change the FILTER selector position in the sequence of 1, 2, 3, 4. Check that the FILTER indicator on the viewfinder screen displays the correct numbers.

(Continued)

5 Check each of the following operations and make sure that the ⓘ indicator lights if the corresponding item has been turned on in the '!' LED page.

(1) Set the gain to anything but 0 dB by using the GAIN selector and the GAIN SW page of the OPERATION menu.
(2) Set the SHUTTER selector to ON.
(3) Set the WHITE BAL switch to PRST.
(4) Use the lens extender.
(5) Set the FILTER selector to anything but "1B".

6 Push the SHUTTER selector from ON to SEL repeatedly, and check that the shutter setting changes on the viewfinder screen.

7 Pointing the camera at a suitable subject, focus the camera and check the picture on the viewfinder screen.

.

8 Set both of the AUDIO IN switches to FRONT, and check that when sound is input to a microphone connected to the MIC IN connector on the front of the camcorder, the audio level indication appears on the viewfinder screen.

9 Check that setting the ZEBRA switch to ON and OFF makes the zebra pattern appear and disappear on the viewfinder screen.

Note

The current display status may inhibit one or more of the displays or operations mentioned in steps **3** to **9**. If this happens, set the desired items in the VF DISPLAY page of the OPERATION menu.

Testing the iris and zoom functions

1 Set the zoom to automatic mode and check that the power zoom operates correctly.

2 Set the zoom to manual zoom mode and check the zoom functions manually.

3 Set the iris switch on the lens to AUTO and point the camera at objects of different brightness. Check that the automatic iris adjustment operates correctly.

4 Set the iris switch on the lens to MANUAL and check that turning the iris ring manually adjusts the iris correctly.

5 Hold down the instant automatic iris button on the lens and point the camera at objects of different brightness. Check that the iris ring turns as the instant automatic adjustment is made.

6 Set the iris switch on the lens back to AUTO and check the following points when the GAIN selector is moved from L to M to H.

- For objects of the same brightness, the iris is adjusted to correspond to the change in setting.
- The gain indicator on the viewfinder screen changes to correspond to the change in setting.

7 If an extender mechanism is incorporated in your lens, put it into the operative position and check the effect.

6-1-3 Testing the VTR

Perform tests (1) to (6) consecutively.

(1) Testing the tape transport functions

1 Set the VTR SAVE/ STBY switch to SAVE and check that the VTR SAVE indicator in the viewfinder goes on.

2 Set the VTR SAVE/STBY switch to STBY and check that the VTR SAVE indicator in the viewfinder goes off.

3 Set the F-RUN/SET/R-RUN switch to R-RUN.

4 Set the DISPLAY switch to CTL.

5 Press the VTR START button and check the following points.

- The tape reels are turning.
- The counter indication is changing.
- The REC indicator in the viewfinder is on.
- The RF and SERVO indicators on the display panel are off.

6 Press the VTR START button again and check that the tape stops and that the REC indicator in the viewfinder goes off.

7 Repeat the checks of steps **5** and **6**, this time using the VTR button on the lens.

8 Press the RESET button and check that the counter display goes to “00:00:00:00”.

9 Turn on the LIGHT switch and check that the display panel is illuminated.

10 Hold down the REW button to rewind the tape for a while, then press the PLAY button. Check that the rewind and playback functions operate normally.

11 Press the STOP button and press the F FWD button. Check that the fast forward function operates normally.

(2) Testing the automatic audio level adjusting functions

1 Set the AUDIO IN switches to FRONT.

2 Set the AUDIO SELECT CH-1/CH-2 switches to AUTO.

3 Aim the microphone connected to the MIC IN connector at a suitable sound source. Check that the level indications for both channels correspond to the sound level.

(3) Testing the manual audio level adjusting functions

1 Set the AUDIO IN switches to FRONT.

2 Set the AUDIO SELECT CH-1/CH-2 switches to MANUAL.

3 Set the VF DISP switch to ON.

4 Push the MENU switch to CANCEL, then turn the MIC/MENU knob. Check that the level indications in the viewfinder go up and down.

(4) Testing the earphone and speaker

1 Set the VTR SAVE/STBY switch to STBY.

2 Turn the MONITOR control and check that the speaker volume changes accordingly.

3 Connect an earphone to the EARPHONE jack. Check that the speaker sound is cut off and that you can hear the sound from the microphone in the earphone.

4 Turn the MONITOR control and check that the earphone volume changes accordingly.

6

(5) Testing external microphones

1 Connect external microphones to the AUDIO IN CH-1/CH-2 connectors.

2 Set the LINE/MIC/+48 V ON switches to MIC.

3 Set the AUDIO IN switches to REAR.

4 Aim the microphones at a sound source.

5 Check that the audio level meter in the display panel and the audio indication in the viewfinder reflect the changing sound level.

(6) Checking the functions of the user bits and time code

1 Set the user bits as required.

For more information see Section 4-4-1 “Setting the User Bits” (page 4-17).

2 Set the time code.

For more information, see Section 4-4-2 “Setting the Time Code” (page 4-19).

3 Set the F-RUN/SET/R-RUN switch to R-RUN.

4 Press the VTR START button, and check that the tape starts and that the counter indication changes.

5 Press the VTR START button again, and check that the tape stops and that the counter indication also stops changing.

6 Set the F-RUN/SET/R-RUN switch to F-RUN, and check that the counter indication changes regardless of whether the tape is running.

7 Set the DISPLAY switch to U-BIT, and check that the user bit value that was set is displayed.

6-2 Maintenance

6-2-1 Cleaning the Video Heads

To clean the video heads, use a Sony BCT-HD12CL Cleaning Cassette. Follow the instructions given with the cleaning cassette, as incorrect or excessive use could damage the video heads.
To clean the heads, follow the procedure below.

1 Load the cleaning cassette according to the procedure described in “Loading a cassette” (page 3-1).

2 After the cleaning cassette is inserted, the tape runs automatically in PLAY mode for about 3 seconds to clean the head.

3 After the tape runs, the cleaning cassette is automatically evacuated.

Note

Do not run the cleaning cassette 5 or more times consecutively.

6-2-2 Cleaning the Viewfinder

Use a dust blower to clean the CRT screen and mirror inside the barrel. Clean the lens and protecting filter with a commercially available lens cleaner.

Caution

Never use organic solvents such as thinners.

Fog-proof filter

Depending on the temperature and humidity, the protecting filter may mist because of vapor or your breath. To ensure that the viewfinder is always clear, replace the protecting filter with a fog-proof filter (Part No. 1-547-341-11, not supplied).

Fitting the fog-proof filter

Replace the protecting filter on the packing ring with the fog-proof filter. Be sure to correctly assemble the fog-proof filter, the packing ring, and the eyecup so that the reassembled eyepiece is waterproof.

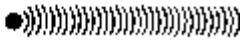
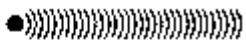
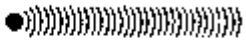
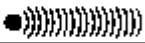
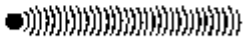
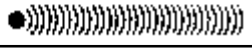
Note

When cleaning the fog-proof filter, wipe it very gently with a soft cloth to avoid impairing the anti-fogging coating.

6-3 Operation Warnings

When a problem occurs either at power on or during operation, warnings are given by the WARNING indicator and TALLY indicator, in the display panel, and in the viewfinder. The speaker and earphone also give audible warnings.

Operation warnings

Display panel		Indicators in the viewfinder			Warning sounds
Warning/ Battery status indication	**Flashing/ continuous**	**WARNING**	**REC/tally**	**BATT**	**: Continuous : 2 flashes/s : 1 flash/s : 4 flashes/s : 4 beeps/s : 1 beep/s : Continuous beep**
RF	Continuous[a]				 a)
SERVO	Continuous				
	Continuous				
HUMID	Continuous				 a)  b)
SLACK	Continuous				
TAPE[c]	Flashing[a]	 a)			
TAPE and E	Flashing				
BATT	Flashing				 d)
BATT and E	Flashing				
(No indication on the display panel)					

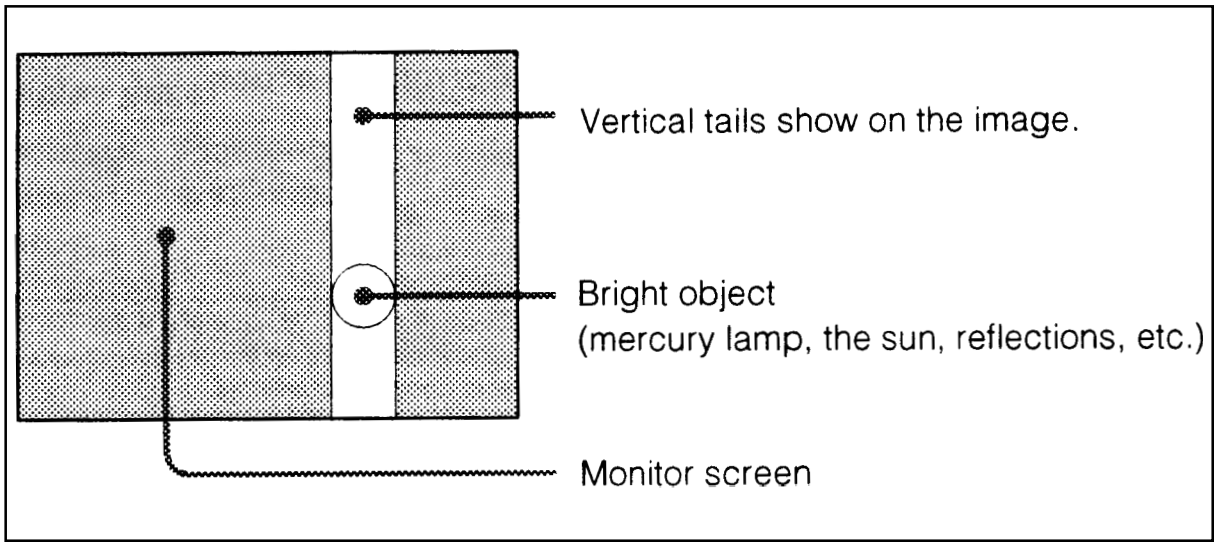
a) During recording b) During playback, fast forward, or rewind c) Also, “5-0” appears for the tape remaining indication. d) During recoding or stop mode.

Problem	VTR action	Corrective action
Video head gap clogged or problem in recording circuit.	After clogged head is detected, recording continues but is substandard.	Clean the heads. If recording is still substandard, turn off the power and consult your Sony representative.
Servo lock lost.	Recording continues but is substandard.	Turn off the power and consult your Sony representative. Note that this indication may be given momentarily when the tape starts moving, but this does not indicate a problem.
Interface error between system CPU and servo CPU.	VTR stops.	Turn off the power and consult your Sony representative.
Condensation on the head drum.	Recording continues but stops if the tape sticks to the head drum. Playback, fast forward, and rewind do not operate.	Stop the tape and wait until the HUMID indicator disappears.
The tape cannot be wound properly.	An error code appears in the time code display section of the display panel. Look up the error code in the Maintenance Manual.	Remove the cassette by the method described in the Maintenance Manual. Close the cassette lid without loading a cassette, turn off the power, and consult your Sony representative.
Near the end of tape.	Operation continues.	Be prepared to change the cassette.
End of tape.	Record, playback, and fast forward do not operate.	Change the cassette or rewind the tape.
Low battery.	Operation continue.	Change the battery.
Dead battery.	Operation stops.	Change the battery.
Interface error between system CPU and servo CPU.	Recording continues, but some operations such as recording review and cueing do not operate. If another problem also occurs, its indication is given priority.	Turn off the power and consult your Sony representative.

Notes on CCD image sensors

Vertical smear

Smear tends to be produced when an extremely bright object is being shot: it is more likely occur with a faster electronic shutter speed.



Aliasing

When patterns of stripes or lines are shot, they may appear jagged.

Specifications

Power voltage
12 $^{+5.0}_{-1.0}$ V DC

Power consumption
40W (with 12 V DC supply, when recording)

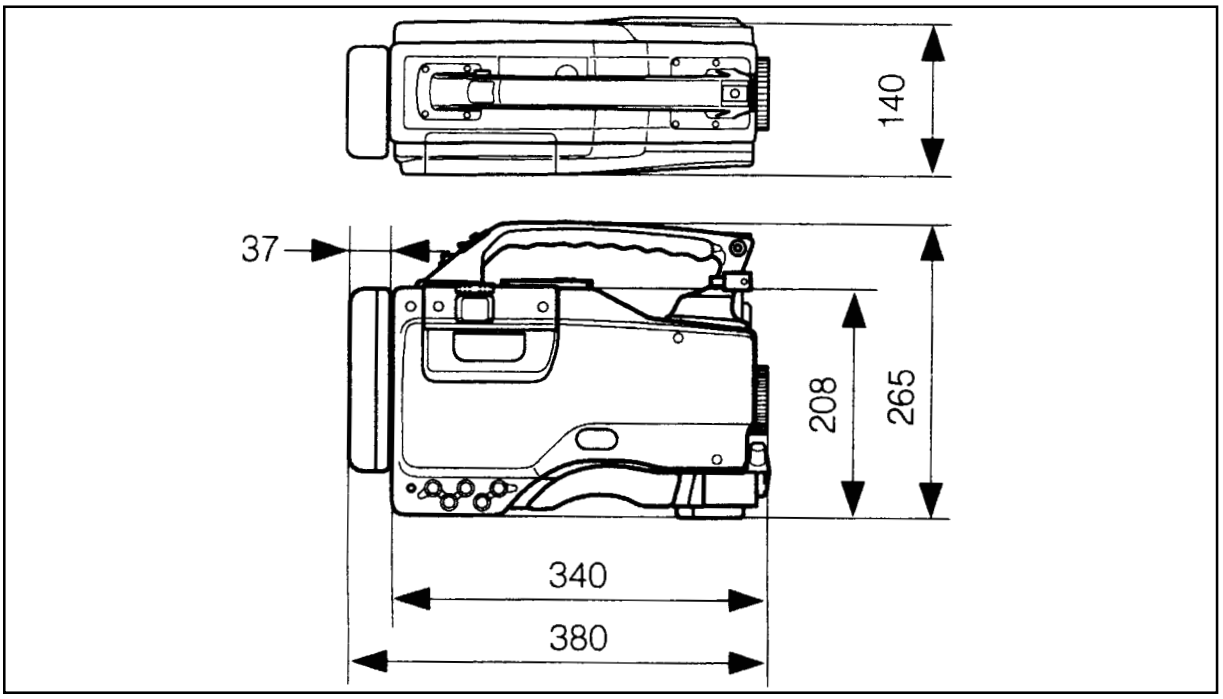
Operating temperature
0°C to +40°C (32°F to 104°F)

Operating humidity
25% to 85% (relative humidity)

Storage temperature
-20°C to +60°C (-4°F to +140°F)

Mass
Approx. 8 kg (17 lb 10 oz) (with lens, cassette, and BP-L60A Battery Pack)

Dimensions



Dimensions in mm

Video Camera Section

General

Imager

2/3 inch frame-interline-transfer type CCD with 2,000,000 pixels

Effective Picture Elements

1920(H) x 1080(V)

Imager Configuration

RGB 3 CCDs

Spectral system

F1.4 prism system (with quartz filter)

Built-in filters

CC filter

- A: Cross filter
- B: 3200K
- C: 4300K
- D: 6300K

ND filter

- 1: Clear
- 2: 1/4 ND
- 3: 1/16 ND
- 4: 1/64 ND

Electronic shutter speed

1/100, 1/125, 1/250, 1/500, 1/1000, 1/2000 second
ECS mode: 30.0 to 7000 Hz
S-EVS mode: 0 to 100%

Lens mount
Special bayonet type

Sensitivity
89.9% reflection chart, 2000 1x (F8 standard)

VTR Section

General

Usable cassette tapes
BCT-22HD/40 HD ½ inch HDCAM cassette tapes

Tape speed
Approx. 96.7 mm/s

Record/playback time
40 minutes (using BCT-40HD video cassette)

Fast forward time
Approx. 6 minutes (using BCT-40HD video cassette)

Rewind time
Approx. 6 minutes (using BCT-40HD video cassette)

Continuous recording time
Approx. 80 minutes (using BP-L60A Battery Pack)

Digital video

Digital video signal

Sampling frequency	Y	74.25 MHz
	P_B/P_R	37.125 MHz
Quantization	10 bits/sample (8 bits/sample for compression processing)	
Compression	Coefficient recording system	
Channel coding	S-NRZI PR-IV	
Error correction	Reed-Solomon code	
Error concealment	Adaptive three dimensional	

Audio (with standard playback machine)

Frequency response	20 Hz to 20 kHz $^{+0.5}_{-1.0}$ dB
Dynamic range	85 dB min. (emphasis ON)
Distortion	0.08% max.
Cross talk	-70 dB max.
Wow and flutter	Below measurable limit

A

Input/output connectors

Signal inputs

AUDIO IN CH-1/CH-2 (XLR, 3-pin, female)

-60 dBu/+4 dBu
(0 dBU=0.775 Vrms.)

MIC IN (XLR, 3-pin, female)

-60 dBu

GENLOCK IN (BNC type)
1.0 Vp-p, 75 Ω

TC IN (BNC type)
0.5 V to 18 Vp-p, 10 k Ω

Signal outputs

MONITOR OUT (BNC type) (Y, P_B, P_R)
1.0 Vp-p, 75 Ω, unbalanced

AUDIO OUT (XLR, 3-pin, male)
0 dBm

TC OUT (BNC type)
1.0 Vp-p, 75 Ω

EARPHONE (minijack)
8 Ω, -∞ to –18 dBs variable

Others

DC IN (XLR, 4-pin, male)
11 to 17 V DC

DC OUT (4-pin)
11 to 17 V DC, maximum current 0.1 A

LENS (12-pin)

REMOTE (8-pin)

Supplied Accessories

HD Electronic Viewfinder (HDVF-20) (1)
Microphone (super cardioid directional, external power supply type) (1)
Tripod Adaptor (VCT-14) (1)
Shoulder Strap (1)
Rain Cover (1)
Setup Card (BCS-1) (1)
Tuner Fitting (1)
Operation Manual (1)
Maintenance Manual (1)

Recommended Additional Equipment

Power supply and related equipment

BP-L60A/L90A Battery Pack
BP-90A Battery Pack
BC-L100 Battery Charger (for BP-L60A/L90A Battery Pack)
BC-210 Battery Charger (for BP-90A Battery Pack)
BC-410 Battery Charger (for BP-90A Battery Pack)
DC-L90 Battery Adaptor (to hold a BP-90A Battery Pack)
AC-550 AC Adaptor

HDCAM cassette tapes

BCT-22HD/40HD

Viewfinder and related equipment

BKW-401 Viewfinder Rotation Bracket
Fog-proof filter (Part No. 1-547-341-11)

Optical attachments

ND filter (1/8 ND) (Part No. 3-174-685-01)
ND filter (1/32 ND) (Part No. 3-174-683-01)
Cross filter (Part No. 3-174-682-01)
Mount ring (Part No. 3-186-442-01)
Consult your Sony representative for more information about these filters.

Equipment for remote control

RCP-700 Series Remote Control Unit
RM-B150 Remote Control Unit
MSU-700 Master Setup Unit
HKCF-700 HD Master Setup Kit

Audio equipment

C-74 microphone
ECM-MS5 stereo microphone
CAC-12 Microphone Holder
CRS-3P Cradle Suspension
WRR-28M/810/860 UHF Portable Tuner
WRT-27 UHF Transmitter
BTA-27 UHF Portable Tuner Attachment Kit

Equipment for maintenance and easier handling

BCT-HD 12CL Cleaning Cassette
LC-HD7 Carrying Case
LC-304SFT Soft Carrying Case
EX-410 Extension Circuit Board

Design and specifications are subject to change without notice.

A

Glossary

Aliasing
Distortion that occurs when an analog signal is sampled to create a digital signal.

Bayonet mount
A type of lens mount. The lens can be inserted into the lens mount and quickly locked in place by simply rotating a lens locking ring.

Black balance adjustment
To balance the black levels of the R, G, and B channels of a video camera so that black has no color.

Black set
A reference level for balance adjustment.

CC filter
Color Conversion filter. An optical filter for adjusting the white balance by optically correcting the color temperature of the subject.

CCD
Charge-Coupled Device. A solid state imager used in most video cameras in place of a pickup tube. The device converts light levels into electrical charges that are first stored and then output in the form of voltage variations.

Center marker
A cross that indicates the center of the image on the viewfinder screen.

CLT
Control signal in the form of regular pulses recorded along a longitudinal track on the video tape. By counting these pulses, it is possible to determine the number of frames, and hence the tape running time. Used mainly to adjust the tracking position of video heads, and to achieve time code continuity in continuous recording.

Color bar signal
A test signal that can be displayed as vertical bars of different colors on a color video monitor. This signal is used to check chrominance functions of color television and video systems such as cameras and monitors.

Color temperature
The temperature in Kelvins (K) to represent the color of a light source, determined by heating a perfectly black body until its color matches that of the light source. Color temperature is higher when the color is bluish and lower when reddish.

Condensation
Moisture condensation on the VTR tape transport mechanism. Condensation on the head drum causes the tape to stick to the drum, resulting in damage to the tape and a malfunction of the VTR.

CRT
Cathode-Ray Tube. Video camera viewfinders are equipped with a CRT image display so you can monitor what you are shooting.

DCC

Dynamic Contrast Control. Also called automatic knee. A video camera containing a DCC circuit can handle a wide dynamic range of luminance by automatically varying the knee point and knee slope.

Drop frame mode

To eliminate the discrepancy between the actual time and the time code value generated by the time code generator when the field frequency is 59.94 Hz, drop frame mode drops two frames (frames 00 and 01) from the time code value at the beginning of each minute except every tenth minute.

E-E mode

Electric-to-Electric mode. When you operate a VTR in E-E mode, input video and/or audio signals pass through electric circuits only and then come out from the output connectors, without passing through electromagnetic conversion circuits such as recording heads. You can use E-E mode to directly check and monitor the input signals without recording them on tape.

EFP

Electronic Field Production. The use of electronic equipment such as portable video cameras, VTRs, and sound equipment for television production outside studios.

ENG

Electronic News Gathering. The use of electronic equipment such as portable video cameras, VTRs, and sound equipment for the production of daily news stories and short documentaries.

Ff
See also Flange focal length.

FIT
Frame Interline Transfer. A type of CCD imager featuring substantially reduced vertical smear.

Flange focal length
The distance from the plane of the lens mounting flange to the image focal plane. Abbreviated to Ff.

Flare
Dark or colored flashes caused by signal overload through extreme light reflections of polished objects or very bright lights. As a result, the dark part of the image becomes bleached-looking.

Flicker
Repeated change of brightness on the screen.

Genlock
Generator lock. To synchronize the pulse generator built into video equipment to an external reference (master) synch signal.

HAD
Hole-Accumulated Diode. A CCD sensor structure designed to suppress certain types of noise inherent to CCDs.

Horizontal resolution

The capability of a video camera or a display unit to preserve detail in the horizontal direction. Usually expressed as the number of vertical lines that can be distinguished in the reproduced image of a test chart.

Hunting

Repeated brightening and darkening of an image resulting from repeated response to automatic iris control.

LTC

Longitudinal Time Code. A time code recorded along the tape in the forward direction of a tape run. A VTR cannot reproduce LTC when tape run stops to output a still picture. The output level is very low when tape runs slowly, so an LTC read error is likely to occur while the VTR is playing back in slow motion. *See also* Time code and VITC.

ND filter

Neutral Density filter. ND filters reduce the amount of incident light equally across the entire visible wavelength range without affecting color.

Non-drop frame mode

Non-drop frame mode does not perform the processing of drop frame mode. As a result, when the field frequency is 59.94 Hz, there will be a discrepency between the actual time and the time code value of about 86 seconds in one day.

Override

Temporarily allows the iris to be manually adjusted while in automatic iris adjustment mode.

Sawtooth waveform
A form of signal resembling the teeth of a saw. A video signal having a sawtooth waveform is used to check linearity and other characteristics of video amplifiers.

Shutter speed
The length of time for which the shutter stays open. The higher the shutter speed, the more clearly a moving object can be shot.

S/N
Signal-to-Noise ratio. The ratio of the strength of the desired signal to the accompanying electronic interference, the noise. If S/N is high, sounds are reproduced with less noise and pictures are reproduced clearly without snow.

Time code
A digitally encoded signal that is recorded on video tape to identify each frame of video by hour, minute, second, and frame number. There are two kinds of recorded signals: longitudinal time code (LTC) and vertical interval time code (VITC).

Time code synchronization
To synchronize the built-in time code generator of video equipment such as a VTR to an external time code.

User bits
Bits provided in the time code that the user can use to record such information such as date, scene number, or reel number on video tape.

Vertical smear
A bright vertical line that appears on the screen when shooting a very bright object with a CCD camera. Also called smear.

Video gain
Amount of amplification for video signals, expressed in decibels (dB).

VITC
Vertical Interval Time Code. A time code recorded on video tape in two horizontal lines during each blanking interval of a video signal. Unlike LTC, VITC is recorded in the same tracks as the video information, so they can be read even while the tape is not moving. *See also* Time Code and LTC

White balance adjustment
In the light of a particular color temperature, to adjust the white levels of the R, G, and B channels of a color video camera so that any white object shot in that light is reproduced as a truly white image.

White shading
When shooting a white object, the upper and lower portions of the screen may appear magenta or green while the central portion appears white. This is called white shading.

Zebra pattern

In a video camera, striped patterns that appear in the viewfinder screen to indicate areas of the image where the video level is approximately 70% and 100%. Used to confirm the video level of the subject. If a zebra pattern appears on the skin when the subject is a human being, that is a correct exposure.

Zoom

To gradually change the field of view of a camera lens from wide to narrow angle (zoom in) or narrow to wide angle (zoom out).

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