LS-4500AF

Nikon
Film Scanner
LS-4500AF
User's Manual

Nikon

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Film Scanner

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User's Manual

Cautions

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- The information contained in this manual is subject to change without notice.
- We have made every effort to produce a perfect manual, but should you find any mistakes, we would be grateful if you would kindly let us know.
- We cannot assume any responsibility for consequences resulting from the operation of this product, despite the terms mentioned above.

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 Indication

The indications in this manual signify important safety precautions. In order to use this product safely, please read every section where these indications are placed before beginning operation, this product. These indications are also placed in the table of contents so users can find them easily.

✔ **Indication**

The ✔ indications in this manual signify the need for caution when using the products. These indications are placed in sections that should be read by users before beginning operation, in order to avoid damage to the product.

Federal Communications Commission (FCC) Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

CAUTION

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Nikon Corporation may void the user's authority to operate the equipment.

SCSI Cable

Please use the SCSI cable listed on page 5 in the user's Manual supplied with the scanner. Using other interface cables may exceed the limits of the class B Part 15 of FCC rules.

Notice for customers in Canada

This class B digital apparatus meets all requirements of the Canadian interference Causing Equipment Regulations.

ATTENTION

Cet appareil numérique de la class B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Notice for customers in European countries

ACHTUNG

Dieses Gerät entspricht den Bestimmungen der EG-Direktive 87/308/EEC zur Störungsunterdrückung. Lärmemission kleiner 70 dBA

Safety Precautions

To ensure safe and proper use of the LS-4500AF, and to prevent problems, please take special note of the following points:

• Be sure to use an AC100V-120V/AC 200V - 240V, 50/60Hz power supply. The power cord should be changed to suit the power voltage.

When using a power voltage of more than AC 125V:

Use a power cord that meets the safety standards of the country in which it is used with insulation of at least SVT type and more than AWG18 in thickness, and a plug with an AC 250V, 15A rating (NEMA 6P-15.

When using a power voltage of AC 125V or less:

Use a power cord that meets the safety standards of the country in which it is used with insulation of at least SVT type and more than AWG18 in thickness, and a plug with an AC 125V, 10A rating.

• Make sure that the electrical outlet of the power supply is grounded. Use the same grounding route used for other equipment connected to the LS-4500AF. Unless common grounding is used, a ground loop will occur, which will result in noise static and the danger of an electric shock.
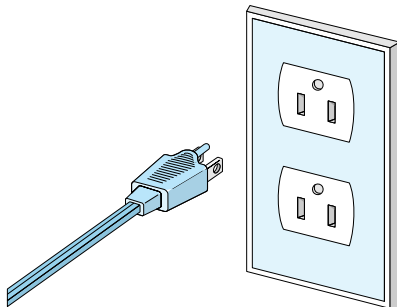
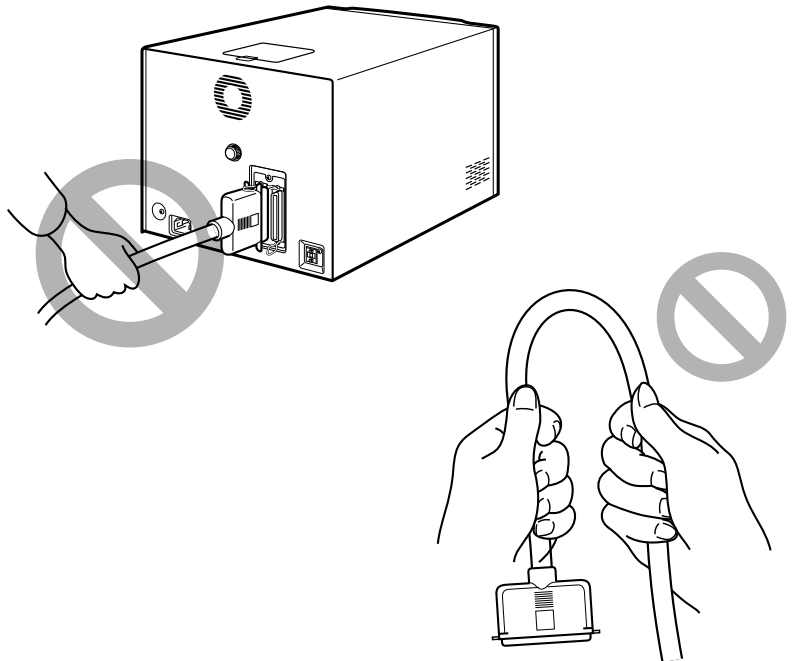*The shape of the plug depends on the country of use.

• Do not ground the equipment to a gas or water pipe.

- When plugging in or unplugging the power cord, be sure to touch only the plug.
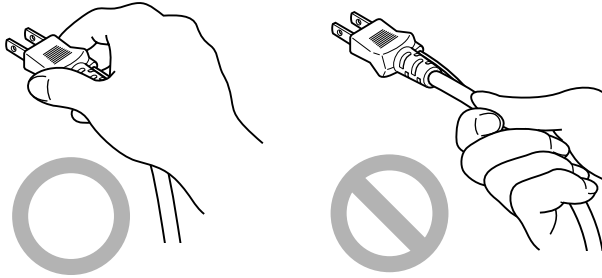

*The shape of the plug depends on the country of use.

- Do not pull or bend the SCSI cable, as this can cause the cable to break.

- Do not connect or remove peripheral equipment while the power is on.

- Do not unplug the power cord while the power is on.

- Do not move the unit while the power is on.

- Once the power has been turned off, wait at least five seconds before turning on again.

- On no account disassemble the unit. The high voltage parts inside the unit can cause an electric shock.
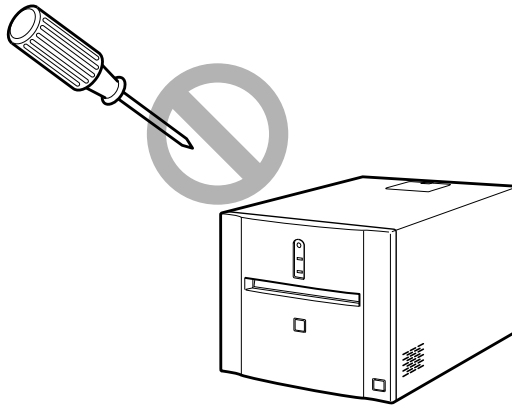
- Do not insert any foreign object into the unit. If any flammable object, metal, or water comes into contact with the internal components of the unit, failure, fire, and/or an electric shock may result.

- Avoid harsh substances such as alcohol, benzine, thinner, or pesticides, as failure, fire, and/or an electric shock may result.

• Do not subject the unit to any strong shocks. This can cause breakage and failure.
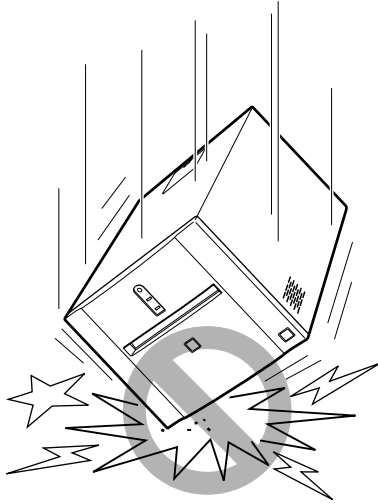
• Do not place heavy objects (weighing 11lbs (5kg) or more) on the unit.

11 lbs
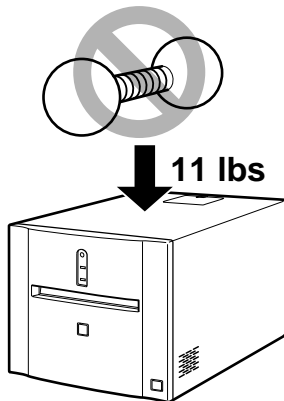
If You Notice Anything Abnormal

If you notice any unusual noise, odor or smoke, switch the unit off immediately and disconnect the power cord and the SCSI cable. Contact your retailer or Nikon sales representative in your country.
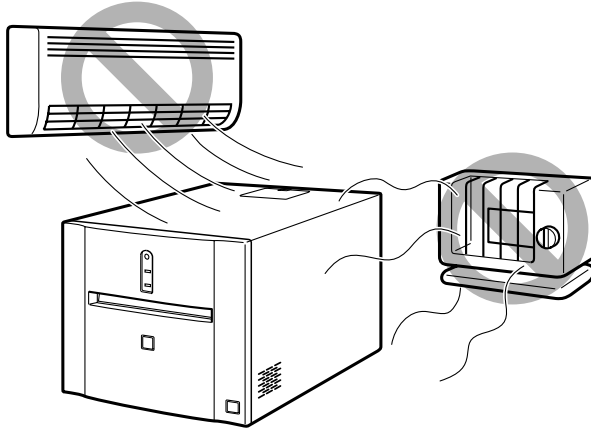

Storage and Operating Locations

Proper storage will ensure the long life of the unit. In order to prevent dust accumulating internally, it is recommended that an appropriate cover be used when storing the unit.
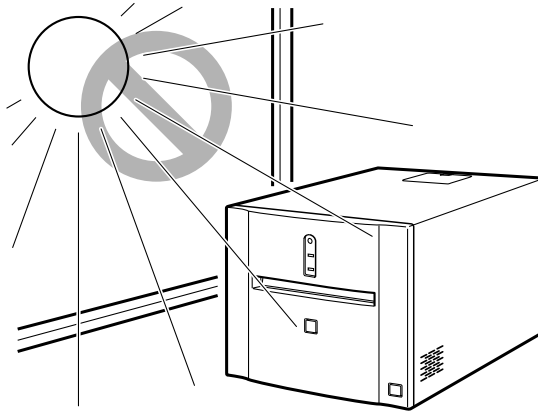
Do not store or use where:

•   The temperature is above 95°F (35°C) or below 50°F (10°C), the temperature changes drastically, or condensation occurs.
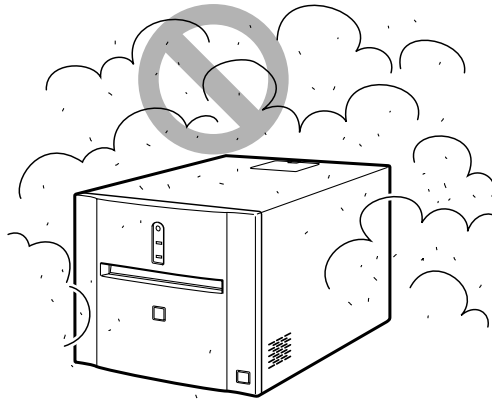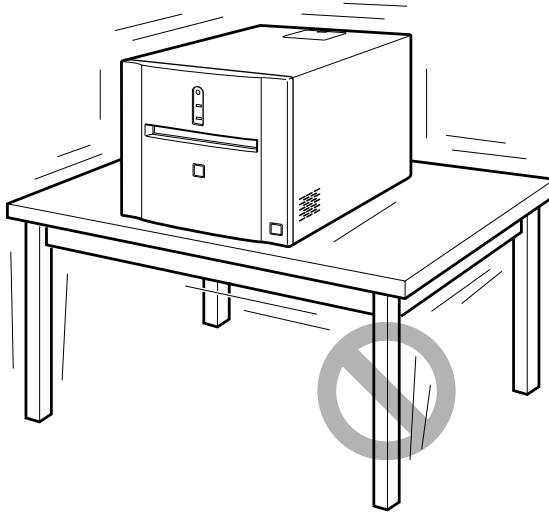

•   The humidity exceeds 80%.
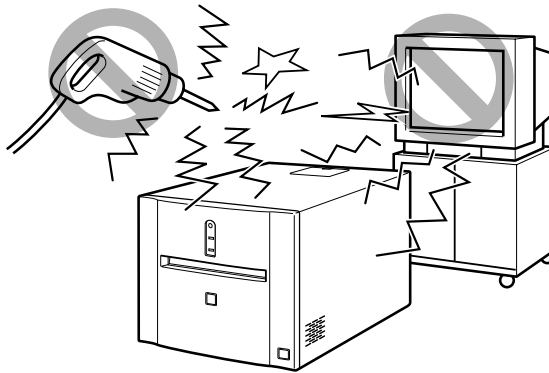
- The Unit is exposed to direct sunlight.

- The atmosphere is excessively dusty.

• The Unit may be subjected to excessive vibration or physical shocks.

• The Unit is exposed to noise from other equipment nearby.

Leave sufficient space around the unit to ensure that the ventilation slots are not blocked. Blocking these slots may cause internal heat build-up. Place the unit on a level and stable surface for operation. If operated in any other way, problems will occur.

⚠ Precautions When Inserting the Film Holder
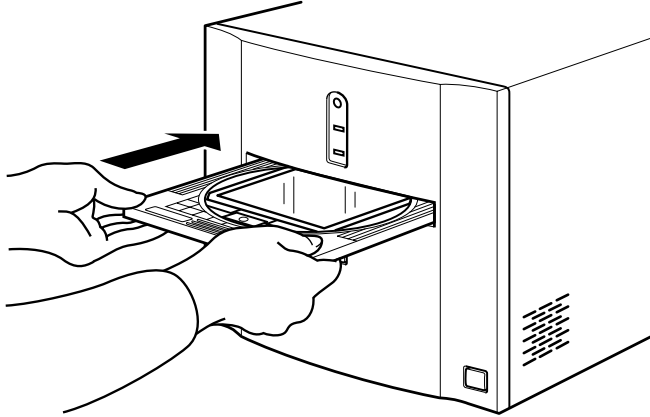
Caution

On no account put your fingers inside the door of the film loading slot, as they may be caught and injured by the internal mechanism.

Achtung

Wegen Einklemm- und Verletzungsgefahr durch die interne Mechanik auf keinen Fall die Finger in die Tür des Filmladeschlitzes bringen.

Attention

En aucun cas ne placez un doigt dans la trappe de la fente de chargement du film car le mécanisme interne pourrait vous blesser.

When Taking the Unit Out of The Country

The use of this product may violate local laws and restrictions in some countries. If this is the case, we cannot assume any responsibility for violations resulting from the use of this product.

Notice concerning prohibition of copying or reproduction

Note that simply being in possession of material which has been copied or reproduced by means of a scanner may be punishable by law.

- Items prohibited by law from being copied or reproduced

   Do not copy or reproduce paper money, coins, securities, government bonds, or local government bonds, even if such copies or reproductions are stamped "Sample".

   The copying or reproduction of paper money, coins, or securities which are circulated in a foreign country is prohibited.

   The copying or reproduction of unused postage stamps or post cards issued by the government without obtaining approval from the government is prohibited.

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- Cautions on certain copies and reproductions

   The government has issued cautions on copies or reproductions of securities issued by private companies (shares, bills, checks, gift certificates, etc.), commuter passes, or coupon tickets, except when a minimum of necessary copies are to be provided for business use by a company. Also, do not copy or reproduce passports issued by the government, licenses issued by public agencies and private groups, ID cards, and tickets, such as passes and meal coupons.

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   The copying or reproduction of works such as books, music, paintings, woodcut prints, maps, drawings, movies, and photographs which are copyrighted creative works is prohibited except when it is done for personal use at home or for similar restricted and non-commercial use.

Contents

Contents

1.   Overview

Thank you for purchasing the Nikon Film Scanner LS-4500AF. This manual describes the procedures for unpacking, setting up, and connecting the scanner, with emphasis on hardware use and cautions.

Please read this manual thoroughly to ensure proper operation of your scanner.

For an explanation of how to scan and reproduce images with the LS-4500AF, please refer to the Software Manual.

We hope that you will find this manual helpful.

1.1 Features

The LS-4500AF is an advanced type of film scanner capable of scanning 4 x 5 inch and 120/220 formats, including 6 x 4.5, 6 x 6, 6 x 7, 6 x 9, (color/monochrome, negative/positive) at high speed and high resolution.

- Basic resolution: Loaded with the following two types of optical systems:

    1,000dpi x 2,000dpi (optical system for 4"x 5" film)

    3,000dpi x 3,000dpi (optical system for 35mm film)

    4"x 5" system achieves 2,000dpi x 2,000dpi through the interpolation

- Enables user to set resolution (dpi) by 1 dpi

- Effective scanning area: 5"x 6" (optical system for 4"x 5" film)

    1.66"x 6" (optical system for 35mm film)

- High-speed scanning capability

- High quality images produced by using a 12 bit-A/D converter

- Autofocus function, eliminating the need for manual focusing

- Automatic set-up function achieved by a prescanning function

- User-defined sharpness function

- Low power consumption and power-saving function when not in use

- Three types of film carriers and masks are used to mount film according to aperture and frame size. All carriers can be rotated manually for exact alignment during scanning, except the 35mm 6-frame strip carrier.

1.2 Operating Environment

When installing the unit, leave space around and above it to ensure smooth operation. Please refer to the drawing below for the amount of space to be provided.
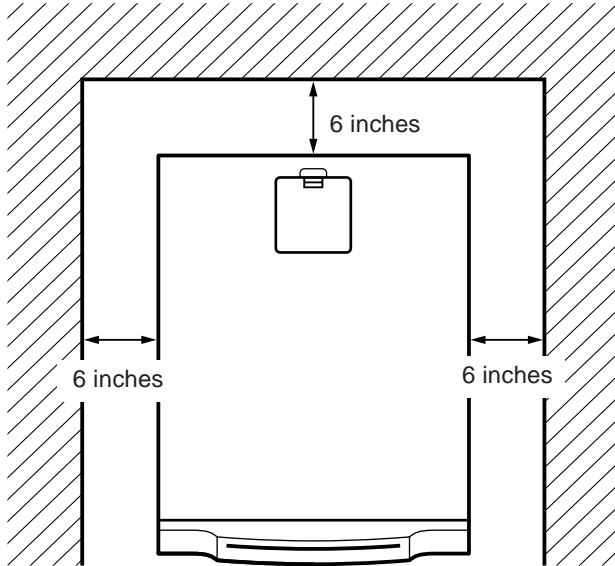
Since an air inlet and a vent are provided on the side and rear of the unit, leave a space of 6 inches (15cm) when placing the unit near other devices.

If possible, place a suitable cover over the unit to prevent dust accumulating when it is stored.

2. Before Operation

2.1 Inspection

Inspect the package to see whether any damage has occurred during shipment. If there is any damage to the package, please contact your retailer directly and do not unpack the unit.

2.2 Accessories

The following items are included with the LS-4500AF. When you open the package, check whether all the items are present. If there are any missing items, please contact your retailer immediately.
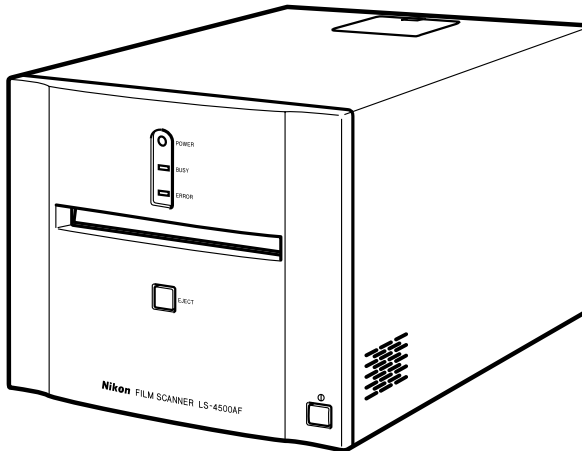
Main body of LS-4500AF

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Power cord (1)

*The shape of the plug depends on the country of use.
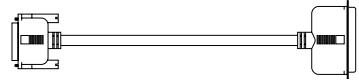
SCSI cable (1)
(50pin full pitch Dsub 25pin)
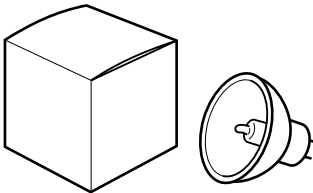
Spare lamp (1)

Terminator (1)

Open Me First
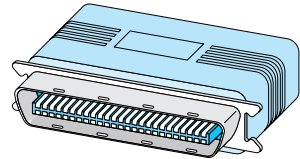
LS-4500AF user's manual(s)
Software disk(s)

A set of film holders for sheet film
    Film holder for sheet film (FH-45)
    11 masks for different film sizes
    For 4x5 size (1)
    For 6x9 size (1)
    For 6x8 size (1)
    For 6x7 size (1)
    For 6x6 size (1)
    For 6x4.5 size (1)
    For 35mm size (1)
    For 6x6 size x 2 frames (1)
    For 6x4.5 size x 2 frames (1)
    For 35mm size x 2 frames (1)
    For 35mm size x 4 frames (1)
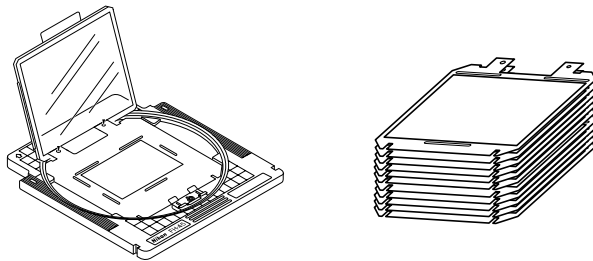
A set of film holders for 35mm mounted film
    Film holder for 35mm mounted film (FH-351)
    Tray for 4 frames of 35mm mounted film (1)
    Tray for 1 frame of 35mm mounted film (1)
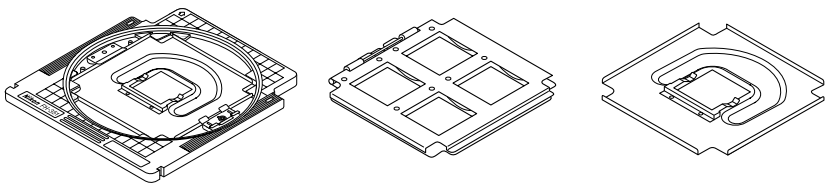
Strip film holder for 12 frames of 35mm film (FH-356)
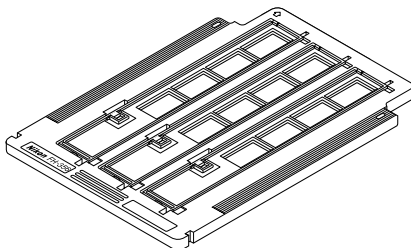
2.3   Cleaning the Unit

⚠️ When carrying out routine maintenance and cleaning, ensure that no volatile liquids such as alcohol, benzine, or thinner come into contact with the LS-4500AF as this may cause a failure, fire, or electric shock.

Please observe the following points:

- Before cleaning, always turn the power off, and pull out the power plug.

- Since the front cover is made from plastic material, remove dust with a blower or a dry cloth.

  Use a soft, dry cloth to remove dust from the metal panel at the rear.

- If the unit has become badly soiled, clean with a cloth moistened with a neutral liquid detergent, then dry with a dry cloth.

  Avoid harsh substances such as alcohol, benzine, thinner, or pesticides, as they may damage the surface, or remove the exterior finish.

3. Parts Identification

3.1 Main Unit

Front panel

Lamp Replacement Cover

POWER LED
BUSY LED
ERROR LED

Ventilation Slots
Power Switch

Eject Button

Film Loading Slot

Nikon Film Scanner LS-4500AF User's Manual
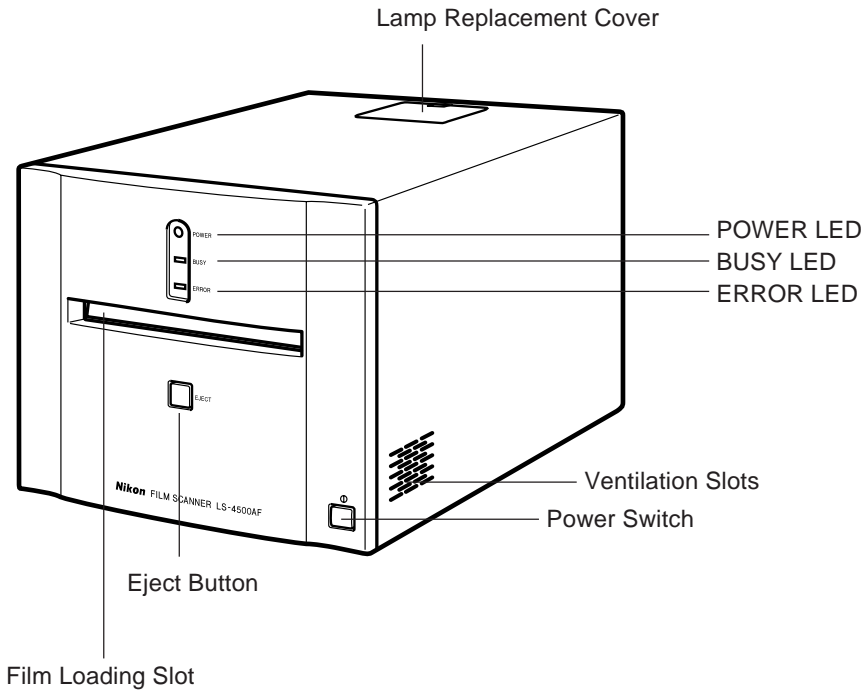
Power Switch: Directly turns the AC power on/off.

Eject Button: Functions include ejecting film, moving the stage lock position.

Film Loading Slot: The film holder is inserted here.

✔ Ventilation Slots: Since air is drawn in through these slots, make sure that they are not blocked by other equipment.

POWER LED: Lights when the power is turned on.

BUSY LED: Lights or flashes while the scanner is in operation.

ERROR LED: Flashes if an error occurs during the scanning operation or light measurement.

Lamp Replacement Cover: Provides access to the lamp for replacement.

Rear panel

Fan

Ventilation Slots

SCSI ID Switch

AC Inlet

SCSI Connector

Loching Screw
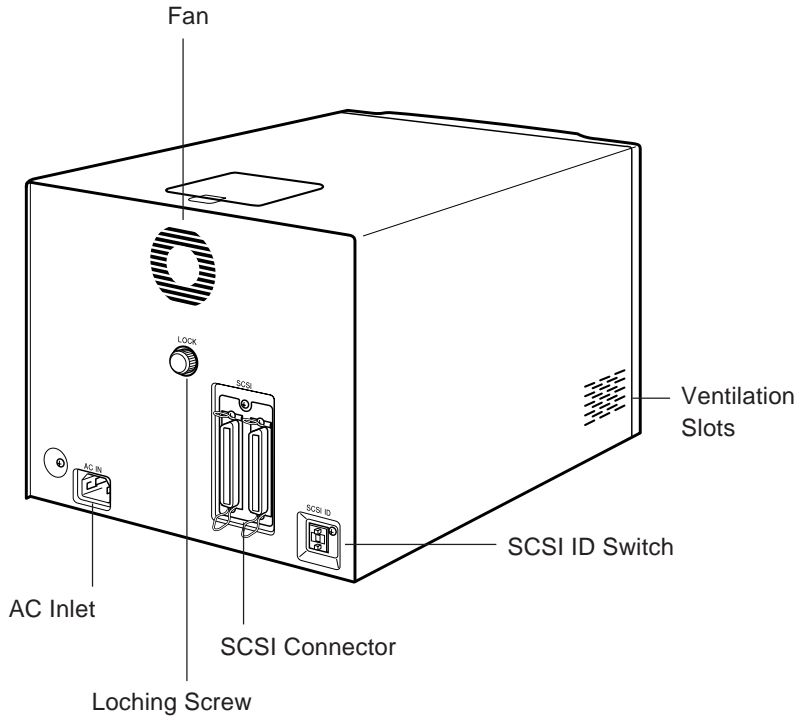
SCSI Connector: For SCSI cable connection. (No difference between IN and OUT.)

SCSI ID Switch: Sets the SCSI ID number. Numbers 1 to 9 are shown, of which numbers 0 to 7 are valid.

AC Inlet: Connect to the AC power source with the power cord provided.

Locking Screw: When transporting the unit, fasten the screw to lock the stage.

Fan: Since the fan motor inside the unit is constantly running, make sure that this fan is not blocked.

3.2 Film Holder FH-45

Mask Positioning Holes

slightly raised bars

Mask

Upper Glass Plate

Holding Section

Mask Positioning Pins

Maske

Angle Index

Turntable

Frame

Glid

Arrow

Sliding Spring Catch

3.3 Film Holder FH-351

Hinge

Mount Holding Plate

Aperture

Sliding Spring Catch

Fixed Spring

3.4   Film Holder FH-356

Catch

Catch

Film Holding Section

Frame

Folding Handles
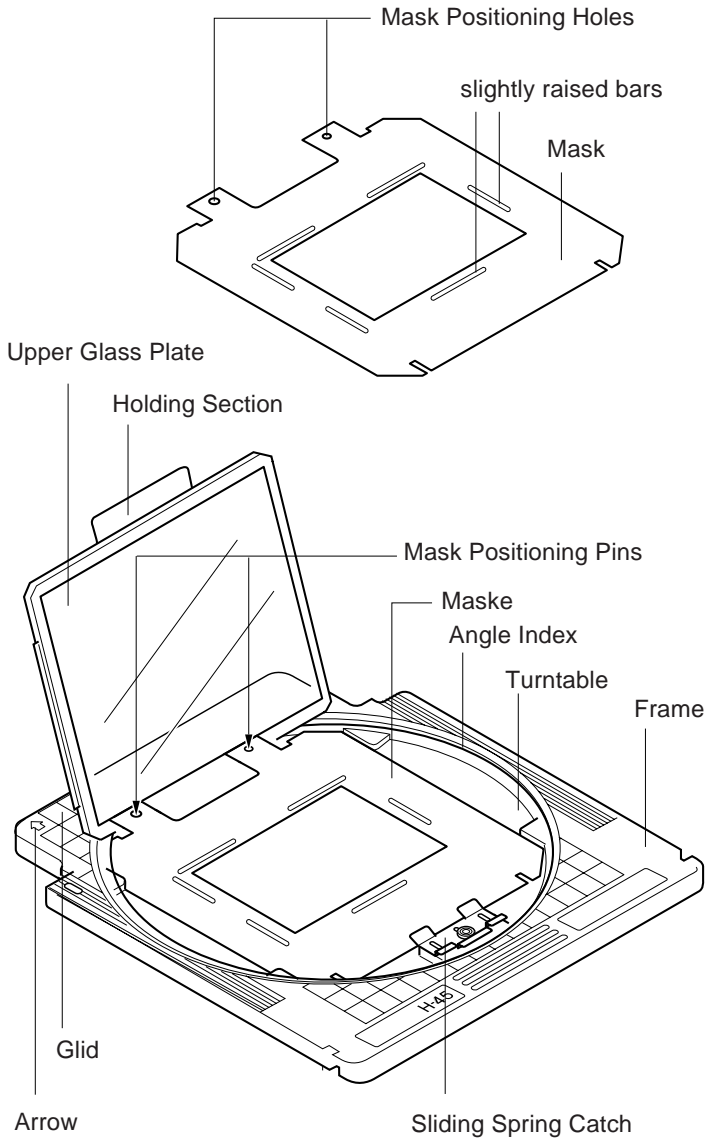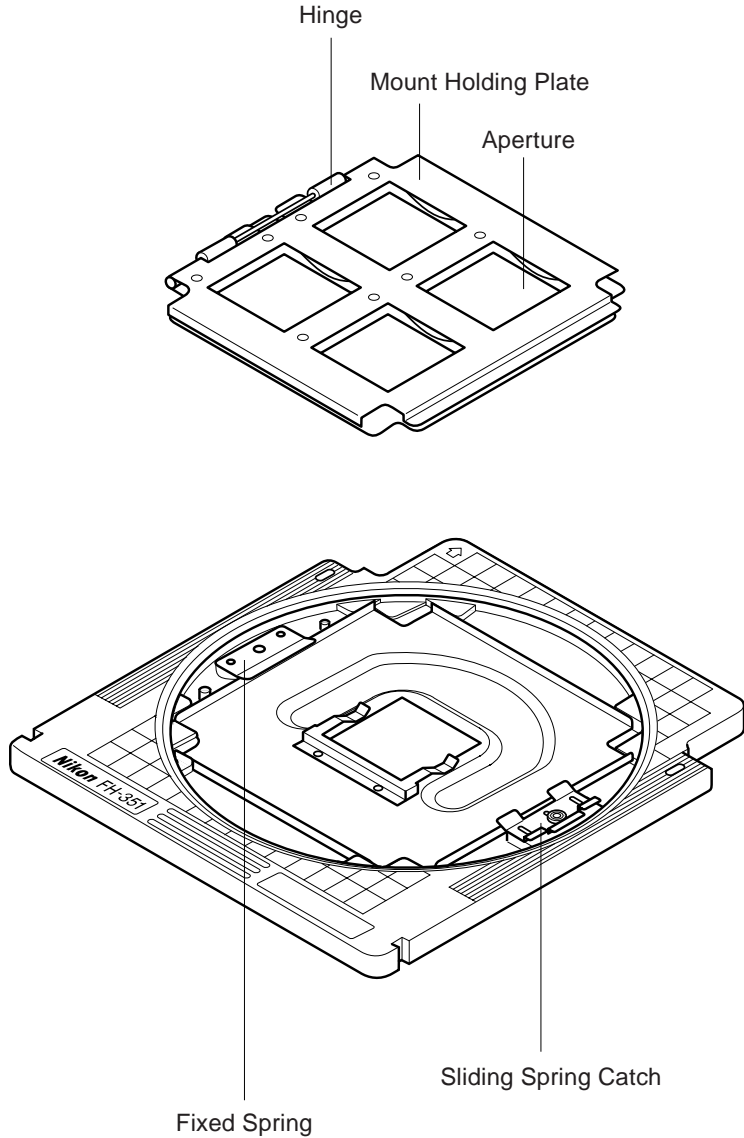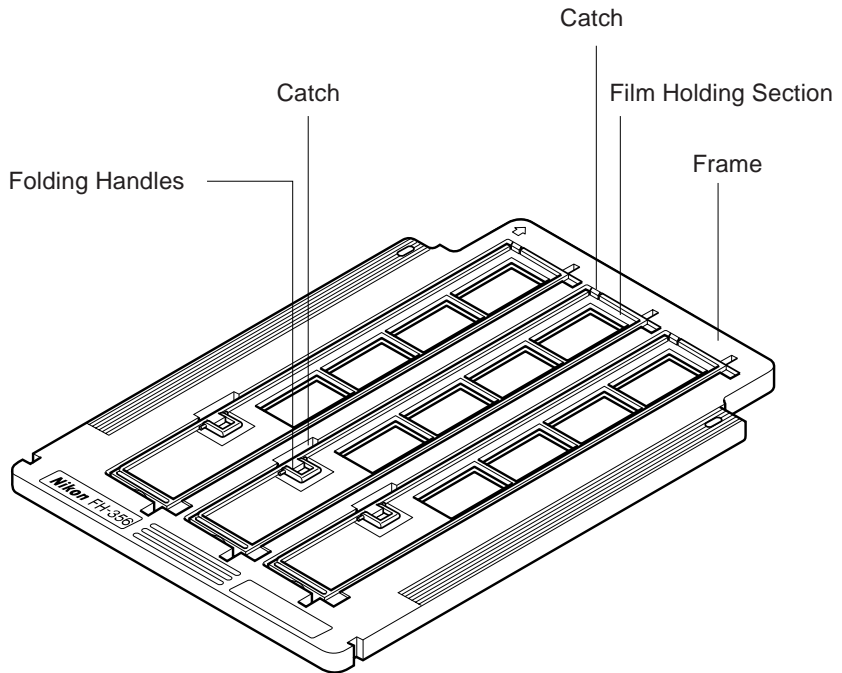
4. Connecting the LS-4500AF

4.1 Before Connection

✔ Before connecting the cables, confirm that the power of all devices, including the computer system and the LS-4500AF, is turned off.

For an IBM PC/AT or compatible in which a SCSI board has not been installed, install a SCSI board as explained in the manual supplied with the board.

When installing a SCSI board for the first time, be careful not to use the same number as used for another purpose such as an I/O address or interrupt number, or the graphic board DMA channel.

Note: *Make sure that the PC is powered off before installing the SCSI board.*

4.2 Connecting the Power Cord

Before connecting the power cord, confirm that the unit's power switch is in the off position.

Insert the female end of the supplied power cord into the AC inlet located on the rear panel, then insert the plug into the AC power outlet.

- *The power source must be grounded.*

- *If possible, try to use an independent electric outlet. If the unit is connected to an outlet to which an electric household appliance, such as a vacuum cleaner or air-conditioner, is connected, the product may experience power source noise interference.*

- *Do not extend the power cord of the product, as this may cause malfunction.*
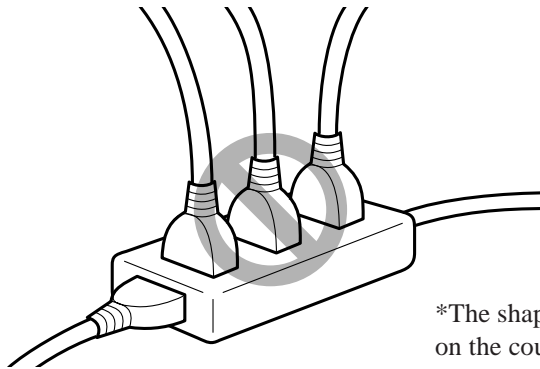
*The shape of the plug depends on the country of use.

4.3   Connecting the SCSI Cable

Before connecting the SCSI cable, confirm that every SCSI device, including the computer system, has been turned off.

Connect the unit to the computer using the SCSI cable. After attaching the connector, be sure to lock it in place. You can connect the SCSI cable to either of the SCSI connectors on the rear panel of the unit.
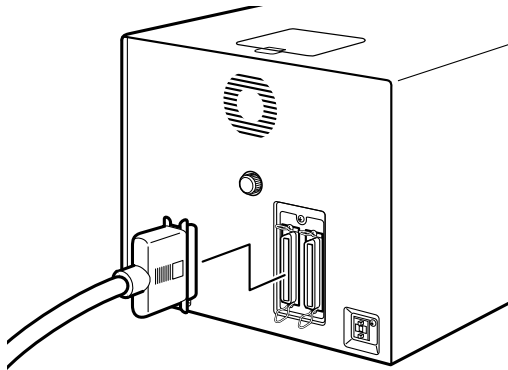
If the unit is the only connected SCSI device, or if the unit is connected at the end of the SCSI chain, attach a terminator (terminal resistance) to the other SCSI connector. At this point, remove the terminator of the other SCSI device that has been placed between them. The terminator is not needed when the unit is connected between other SCSI devices.
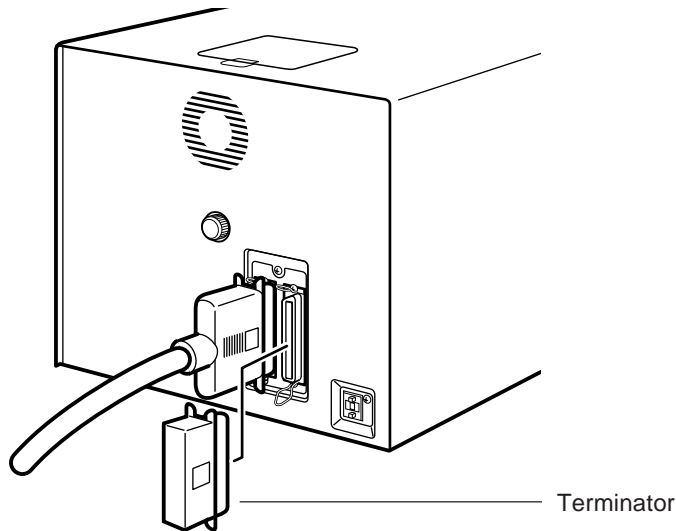
Terminator

When SCSI devices are connected, connect them so as not to make a loop, and attach terminators to both ends of the SCSI chain. Since the terminator is built into the host computer in most cases, the host computer should be at the end of the SCSI chain. The operation manuals of some notebook computers require a terminator to be attached outside the computer; please refer to the operation manual for the computer to which the unit is connected.

Note: *The SCSI cable used for SCSI connection should be of high-impedance type.*

SCSI Chain Connection with Other Devices

If LS-4500AF is connected at the end of the SCSI chain;

• Connect the 50-pin full pitch connector of the SCSI cable to the SCSI connector located on the rear panel of the unit, and insert the other end to the SCSI connector of other SCSI device.

• Connect the supplied terminator (terminal resistance) to the other SCSI connector on the rear panel of the unit.

Terminator inside
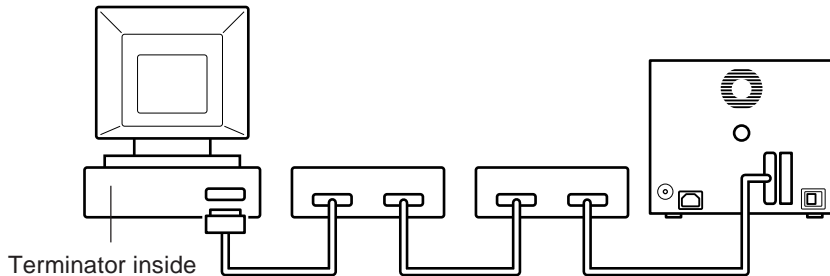
If LS-4500AF is connected between the other SCSI devices;

• Connect the 50-pin full pitch connector of the SCSI cable to the SCSI connector located on the rear of the unit, and insert the other end to the SCSI connector of other SCSI device.

• Connect the other SCSI device by using the other SCSI connector on the rear panel of the unit.

• Connect the terminator (terminal resistance) to the SCSI device connected at the end of SCSI chain.

Terminator inside
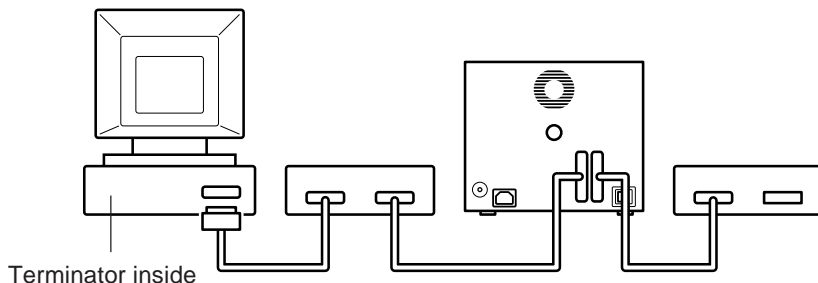
Remarks

- The maximum number of SCSI devices that can be connected to one computer is eight. In the case of a host computer with a built-in SCSI hard disk or built-in CD-ROM, note that SCSI ID numbers have been pre-assigned for the host CPU and the SCSI devices.

- The SCSI cable must not be extended beyond a total length of 19 feet (6 meters), or else failure may result.

- If you use the type of terminator that is inserted between the SCSI cable and SCSI interface connector, install a terminator independent of the other SCSI connector of the LS-4500AF.

- Terminators must be attached to the devices located at both ends of the SCSI chain.

  If the host computer is a Macintosh, the Macintosh itself will provide termination at one end of the chain.

  If the host computer is an IBM PC/AT or compatible, equipped with a SCSI board, the SCSI board itself will present termination at one end of the chain.

  Note that when a SCSI chain connection is made inside a computer, the end of the SCSI device inside the computer will become the end terminal.

- Before installing a SCSI board, be sure to read the user's manual provided with the board. The numbers for the I/O address, interrupt level (INT) and DMA channel might be used for other interface boards and peripheral devices. If so, change them as explained in the manual.

4.4   Setting the SCSI ID

The SCSI ID for the LS-4500AF is set at "5" when the unit is shipped. If other SCSI devices are connected to your computer, make sure that the SCSI ID for the LS-4500AF is different from those assigned to other SCSI devices.

Note that in the case of a host computer which has a built-in SCSI hard disk or built-in CD-ROM, the ID numbers of the host CPU and each SCSI device have already been assigned.

If the IDs are the same, you must change the ID number of the other SCSI device or the ID of the LS-4500AF to avoid any conflict.

Remarks

- To change the ID, confirm that the LS-4500AF power is off. The ID cannot be changed when the power is on.

- As 7 has been assigned for the CPU and 0 has been assigned to the built-in hard disk for a Macintosh, and 0 and 7 have also been assigned to other personal computer systems, any number from 1 to 6 is recommended for the ID number.

- If the same ID numbers are assigned, the system might not function, or important data on the hard disk might be destroyed. It is therefore essential to check the ID numbers carefully before connecting the LS-4500AF.

5. Operation

5.1 Turning on the Power

Before turning on the power, confirm that the locking screw is loosened.

To loosen the locking screw
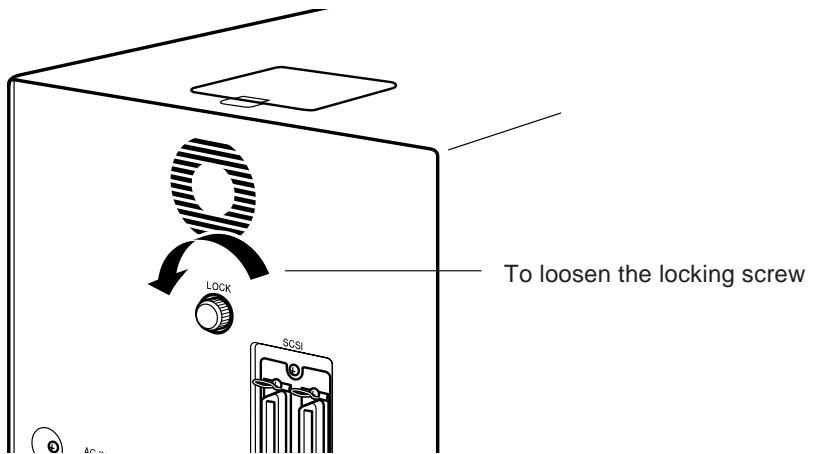
Turn on the power of peripheral SCSI devices (including the LS-4500AF) first, and then turn on the host computer's power. As soon as the power is turned on, the POWER LED and BUSY LED light up. After stage movement has started, the BUSY LED begins flashing. After ejection of the stage (film holder), the lamp (the light source in the unit) lights for measurement of the characteristics of the lamp (a click will be heard, which is the sound of the switch being operated), and the stage is moved to the waiting position to complete the initial setting. The BUSY LED then goes out.

After the BUSY LED has gone out, a command can be received from the interface. It takes about 30 seconds from when the power is turned on to when the BUSY LED goes out.

Remarks

✔

• When turning the power off, first turn off the host computer, then the peripheral SCSI devices, in order (in the reverse order to that in which the power was turned on).

• After turning the power off, wait at least five seconds before turning on again.

• Do not turn off the power while the unit is scanning or operating.

5.2 Inserting and Ejecting the Film Holder

Inserting the Film Holder

- Insert the film holder, in which the film has been set, into the film loading slot in the front panel of the unit, in the direction of the arrow. When the film holder is correctly set in the unit you will hear a click and the holder will be automatically inserted.

- Take care to insert the holder the right way round. Inserting the wrong side first will cause damage or malfunction.
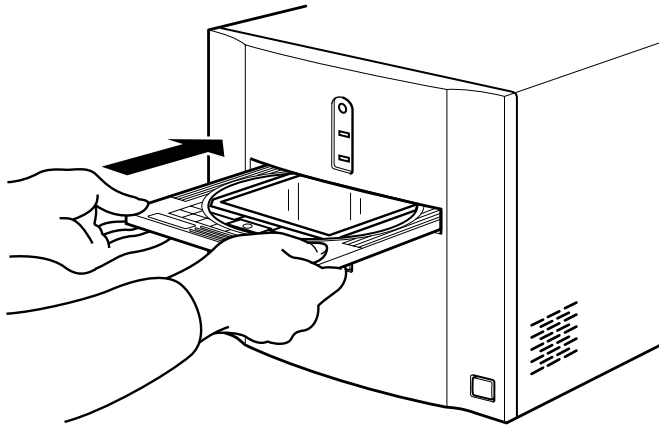
Caution
On no account put your fingers inside the door of the film loading slot, as they may be caught and injured by the internal mechanism.

Achtung
Wegen Einklemm- und Verletzungsgefahr durch die interne Mechanik auf keinen Fall die Finger in die Tür des Filmladeschlitzes bringen.

Attention
En aucun cas ne placez un doigt dans la trappe de la fente de chargement du film car le mécanisme interne pourrait vous blesser.

Ejecting the Film Holder

- When the Eject button on the front panel of the unit is pressed, the film holder will be ejected. You can then remove the holder from the slot by hand.

- When using driver software which has an eject function, the film holder can be activated by the host computer.

- The LS-4500AF does not perform automatic ejection when a scanning operation is completed. If the power has been turned off while the film holder is still loaded, turn the power on again. The film holder will be ejected by the initializing operation.

Eject Button
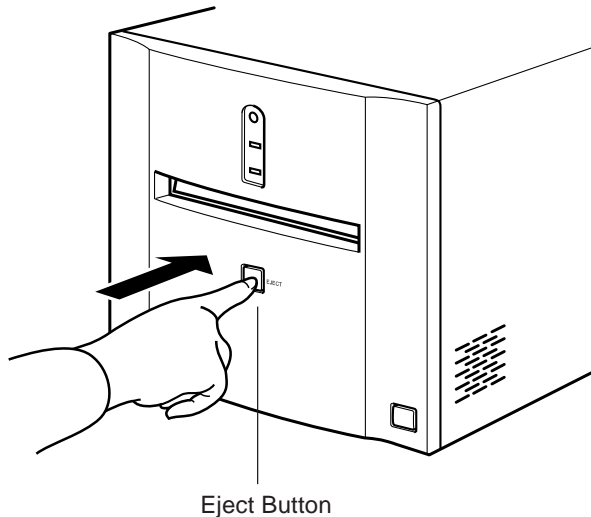
6. Using the Film Holder

6.1 Usable Film

- Transparent film of both negative and positive types can be scanned.

- A variety of film holders are provided for different types and sizes of film. Select the appropriate holder for the film to be used.

Note: *The scanning area of the LS-4500AF varies according to the scan resolution.*

5 x 6 inches (127 x 152mm) at 1,000dpi
1.66 x 6 inches (42 x 152mm) at 3,000dpi

6.2 Using the FH-45 for Sheet Film

When scanning a sheet film, the FH-45 can be used. By using the FH-45,

4 x 5, 6 x 9, 6 x 8, 6 x 7, 6 x 6, and 6 x 4.5 inch, and 35mm film, can all be scanned.

- Place the film in the holder on a dust-free surface.

- The film is secured with two anti-Newton treated glass plates. Take care to keep the glass plates clean while handling the holder.

Nikon *Film Scanner LS-4500AF User's Manual*

Step 1

Slide the sliding spring catch forward, and carefully raise the frame holding the upper glass plate. The frame supports itself in the upright position. Remove the film if scanning has been completed.

Mask

Upper Glass Plate

Sliding Spring Catch
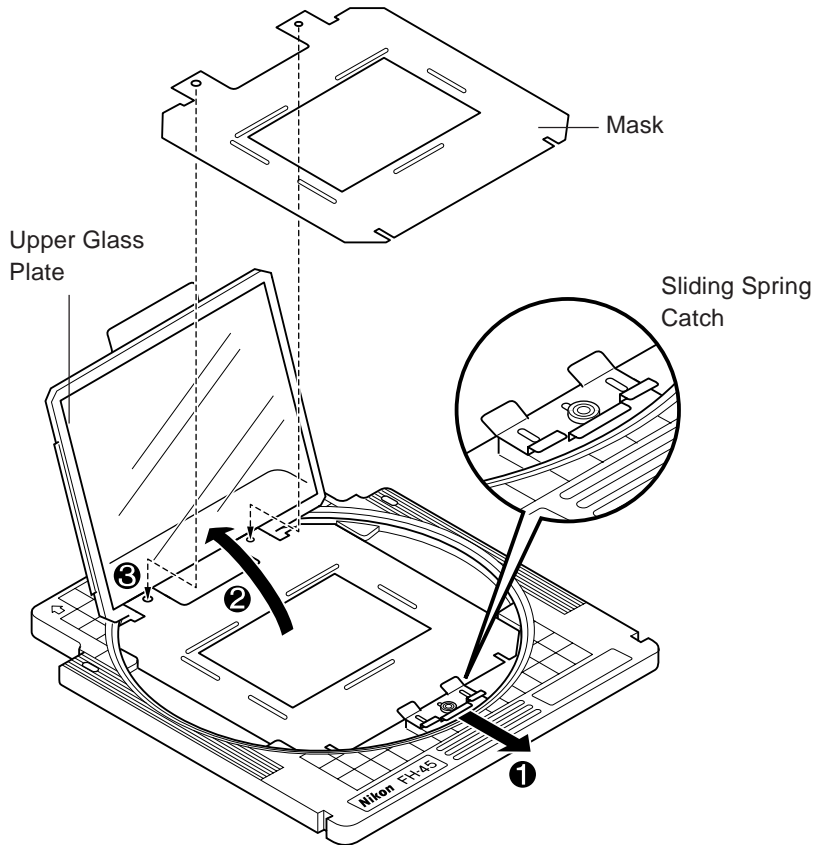
Note: *Confirm that the mask corresponds to the size of the film to be scanned. Scanning may not be performed properly if there is any transparent area between the image on the film and the mask.*

Step 2

If the mask needs to be replaced, remove the mask from the mask position-ing pins on the turntable, and fix the new mask in place, fitting the mask positioning holes over the mask positioning pins. (The holes are of differ-ent sizes, corresponding to the different-sized positioning pins.) Slightly raised bars provided as a guide for the outer edges of the film will be visible on the upper side of the mask.

Mask Positioning Holes

Turntable
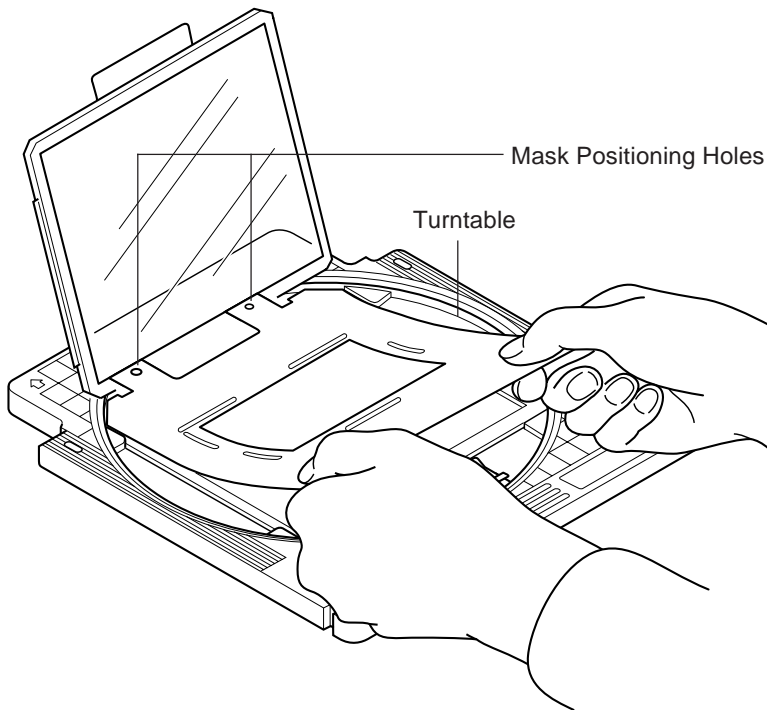
Step 3

Place the film on the upper side of the mask, with the emulsion side downward. Slightly raised bars are provided around the aperture in the mask as a guide for the outer edges of the film. Refer to these to decide the position of the screen.

Gently lower the frame holding the upper glass plate, taking care not to move the film.

Fix the holding section of the frame firmly in place with the sliding spring catch.
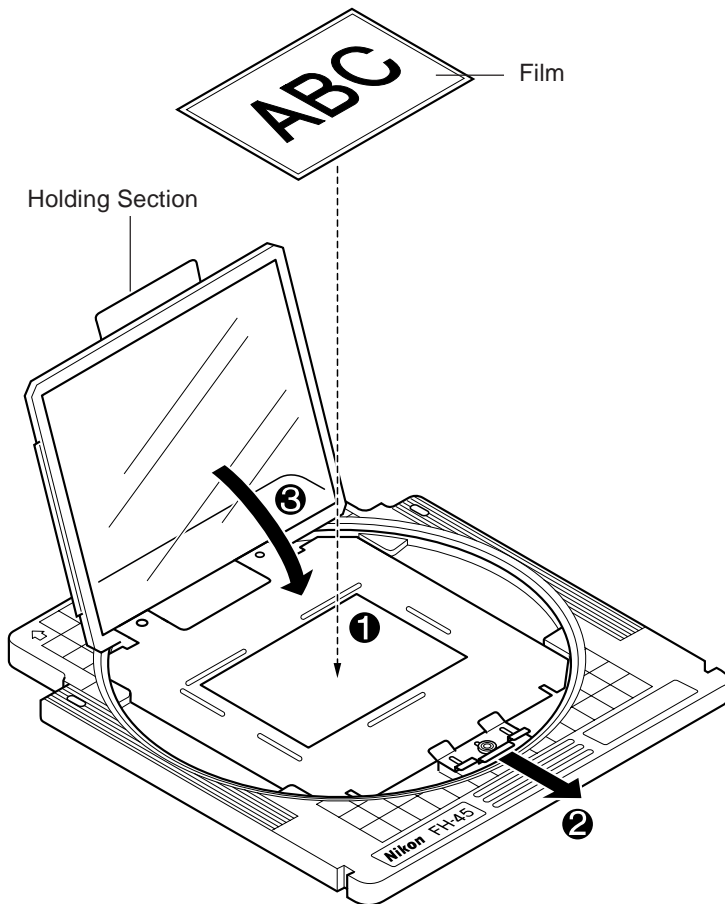
Step 4

The arrow indicates the scanning direction. Set the image angle by rotating the turntable.

For fine adjustment, refer to the angle index marked on the edge of the turntable. The index may not match over the entire circumference.
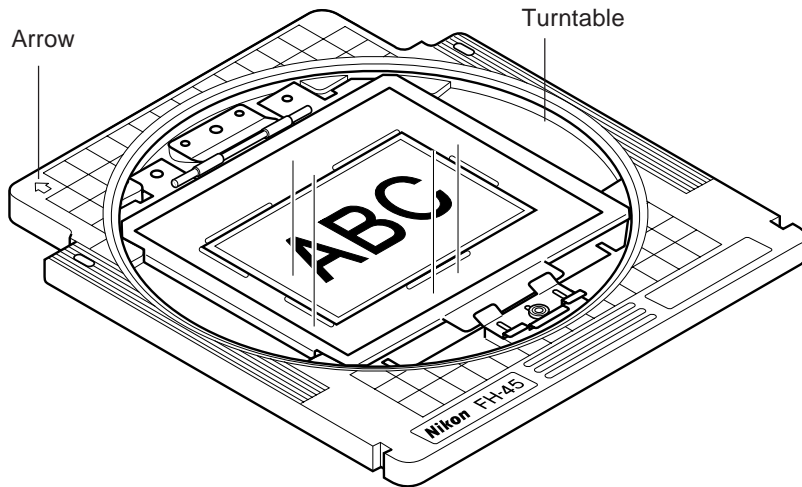
Note: *When rotating large-sized film, the length may exceed 5 inches, and scanning of some part of the film may be impossible.*

6.3   Using the FH-351 for Mounted Film

When scanning a mounted film, the FH-351 can be used.

• The maximum thickness of the mounted film is 3mm.

• The flatness of the film depends on the condition of the mount. If there is any problem with the flatness, use of a glass-type mount, or use of the FH-45 with the film removed from the mount, is recommended.

Step 1

Select the tray for one frame or four frames. When the tray for one frame is used, all the screens can be scanned at 3,000dpi.
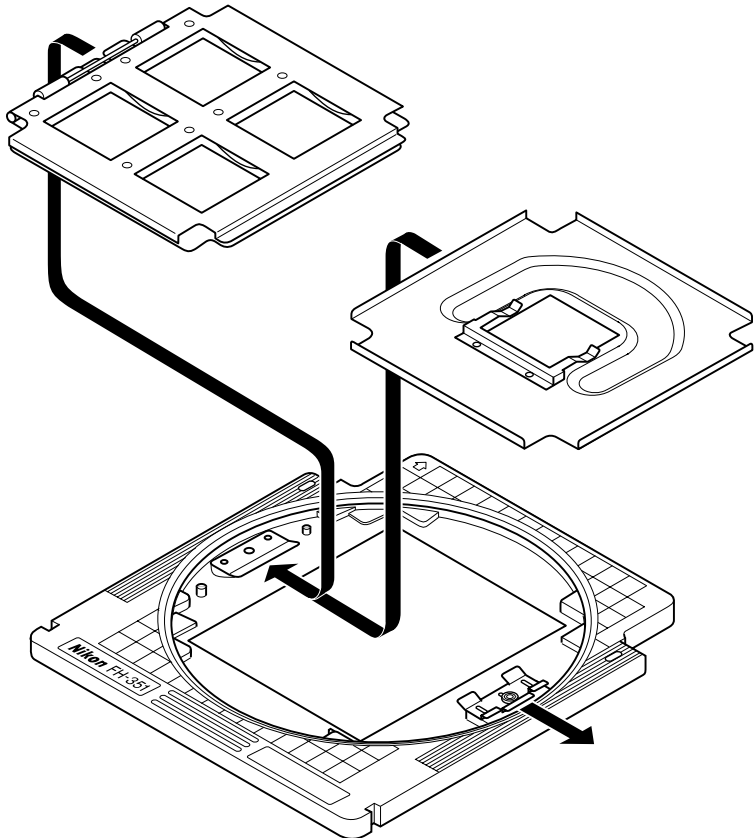
6. Using the Film Holder

To replace a tray, pull the sliding spring catch forward to release the tray, remove it, replace with a new tray, and secure it with the sliding spring catch.

Step 2

When a tray for one frame is fitted, check that the turntable and the back side of the depression in the tray do not interfere with each other.

When a mount is set in the tray for four frames, first slide the sliding spring catch and carefully open the mount holding plate. The frame supports itself in the upright position. If there is any mount for which scanning has been completed, remove it.

Mount Holding Plate

Sliding Spring Catch
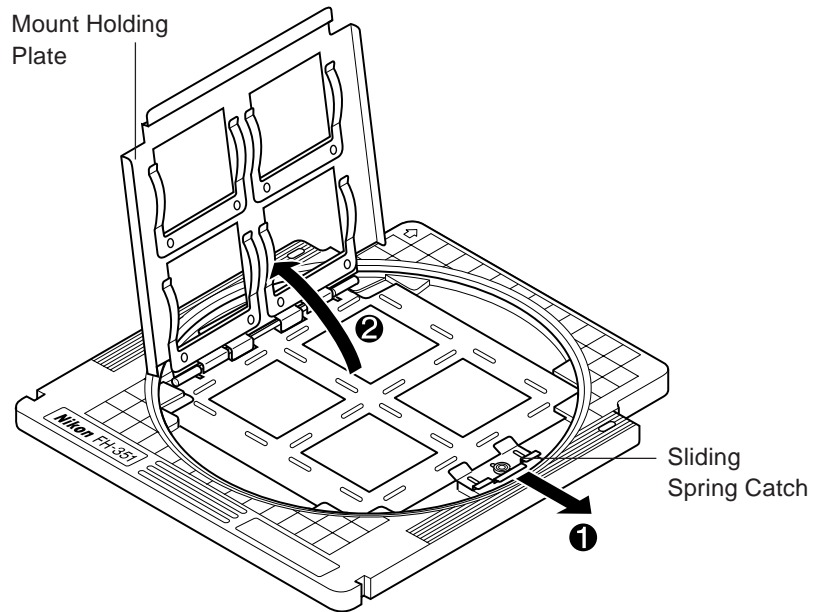
Put the mount on the mount plate after positioning it by means of the slightly raised bars; close the mount holding plate carefully; fix the mount holding plate firmly in place with the sliding spring catch. Make sure that the emulsion side is facing downward.

Note: *If there are fewer than four images to be scanned, add dummy films. Proper scanning may not be performed if any transparent area is left.*

Step 3

The arrow indicates the scanning direction. Rotate the turntable to set the image angle.

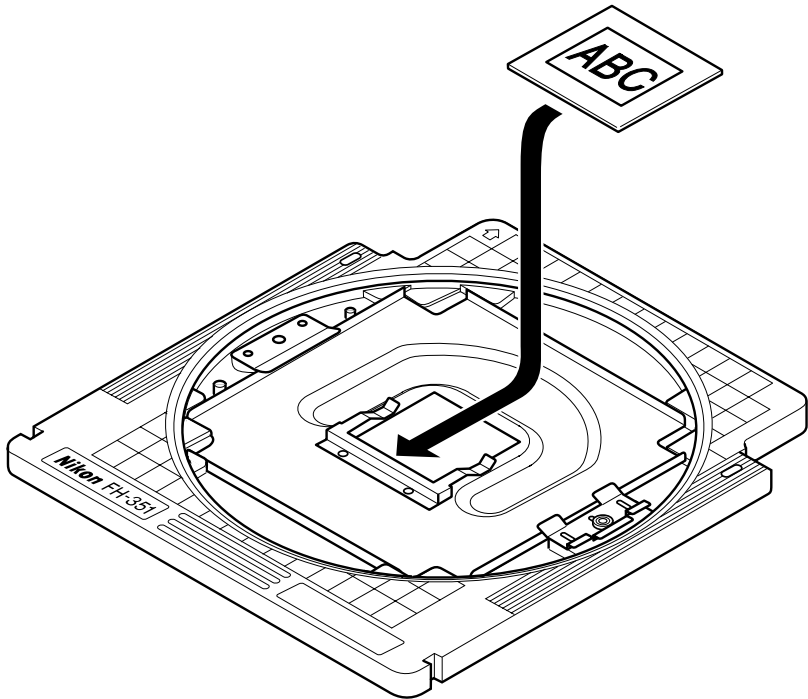For fine adjustment, refer to the angle index marked on the edge of the turntable. The index may not match over the entire circumference.

6.4   Using the FH-356 for Strip Film

When scanning a 35mm strip film, the FH-356 can be used.

- The maximum size of the strip film that can be scanned is six frames.

- The maximum number of strip films that can be scanned is three.

- The number of screens that can be scanned at one time is 4 frames x 3; that is, 12 images.

- If set in the film housing at the center part of the holder, scanning can be performed at 3,000dpi.

- The scanning area is decided by holding down the sections outside the image. If there is any problem with flatness, use of the FH-45 is recommended, with the film separated into individual frames.

Step 1

The small folding handle will be raised when it is slid; at this point, lift it up. Grasp the handle and pull it toward you; the cover will be disengaged from the catch section of the frame, at which point the cover can be opened. The cover will be held firmly in place while it is open.

Folding Handle
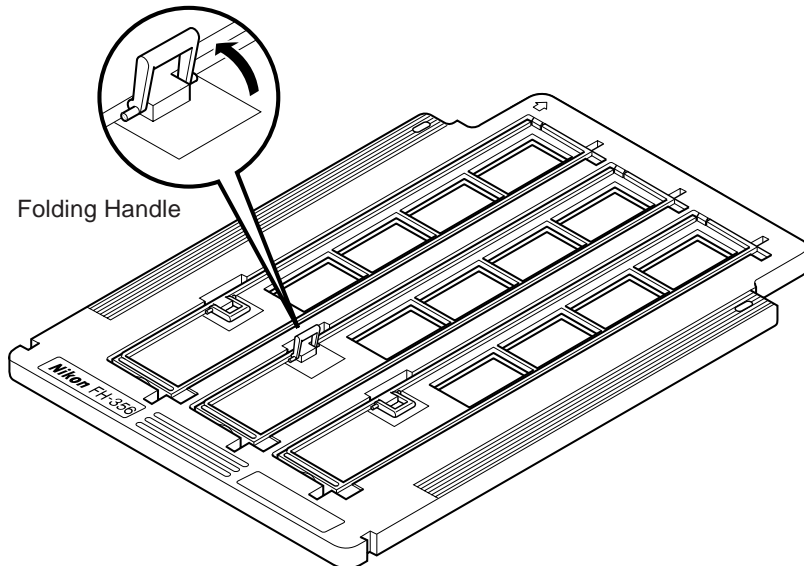
Step 2

Set the film in the film compartment with the emulsion side downward. The four frames aligned with the apertures can be scanned.

The fourth image will be read.

The third image will be read.

The second image will be read.

The first image will be read.
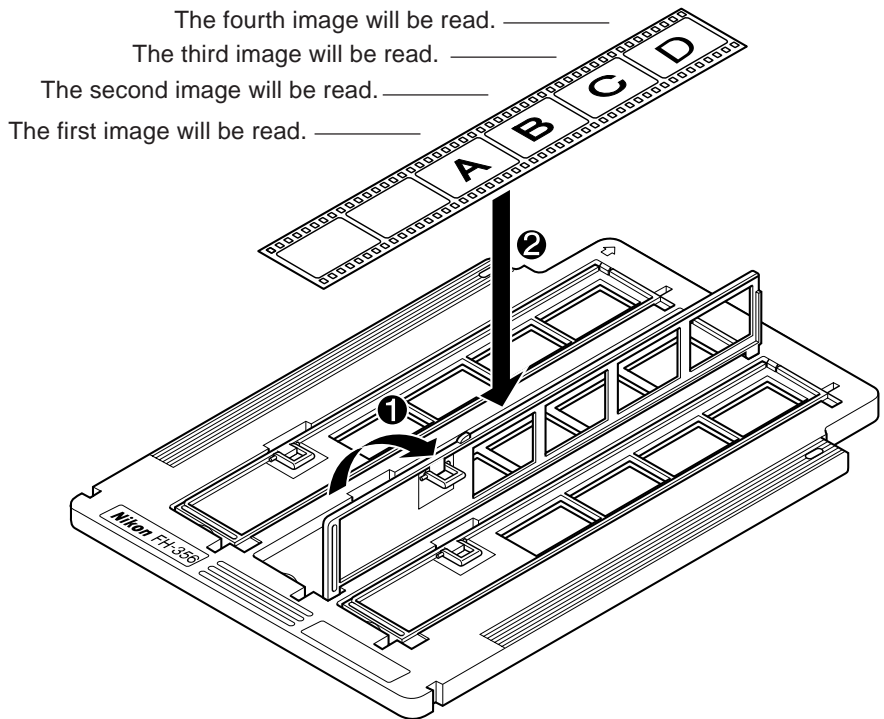
Step 3

Carefully close the lid after positioning the images in the apertures at the front of the film compartment. Press the cover closed against the spring section of the frame and confirm that the catch is engaged. If the cover has not been closed securely, proper scanning may not be performed.

Catch
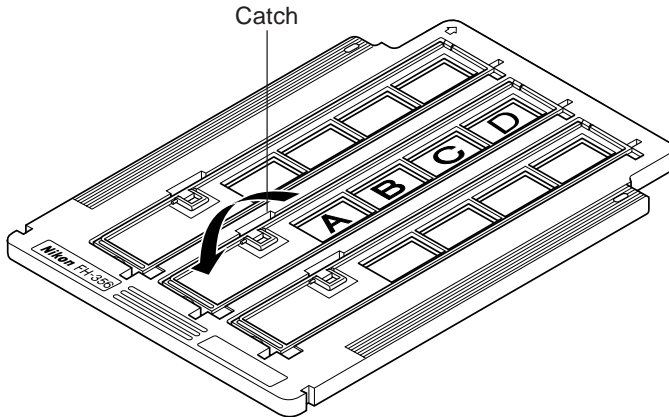
Step 4

Press down the small folding handle on the cover. If the handle is not folded down, it may not be possible to insert the holder in the unit.

Folding Handle
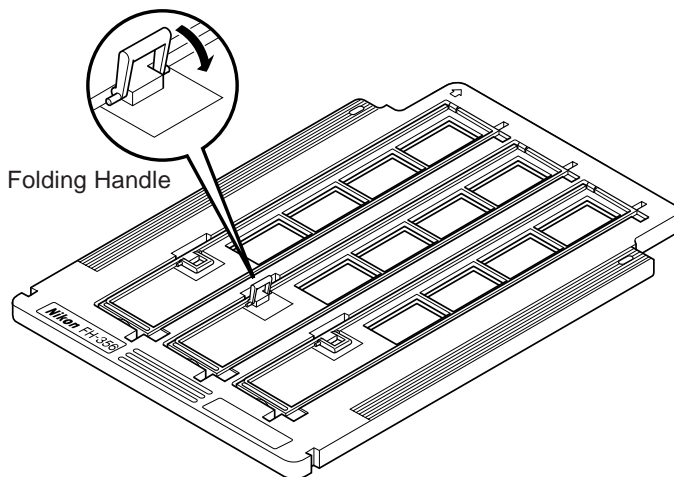
7. Replacing the Lamp

Note the following before replacing the lamp in case that the lamp is out of order.

• Before replacing the lamp, turn off the power and unplug the power cord.

• After the power cord has been unplugged, wait for approximately 15 minutes or more for the lamp to cool down.

• Use JCR 12V 20W/G1/A1.

• Never use a LS-3510AF lamp (12V 35W). It may cause damage to the unit.

• Do not touch the bulb section of the lamp. Oil from your fingers will shorten the life of the lamp.

The usual life of lamp used in the LS-4500AF is 2,000 hours. With normal use, the lamp will need to be replaced approximately once every two years.

Step 1

Wait for about 15 minutes for the lamp to cool down after the power cord has been unplugged, then open the cover on the top of the unit.
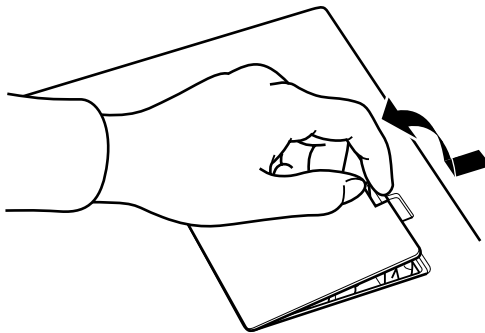
Step 2

Pull the knob on the inner cover to open the inner cover.
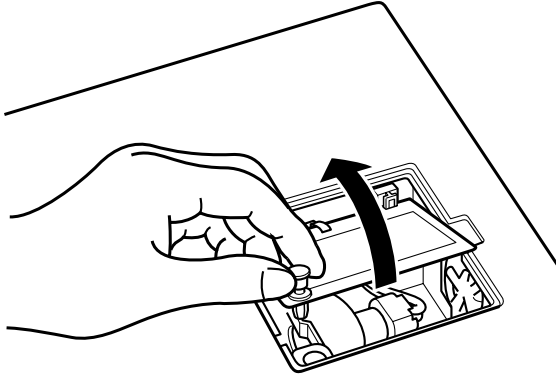
Step 3

Remove the metal clip securing the lamp, then press down the lamp holder lever to remove the lamp from the holder.
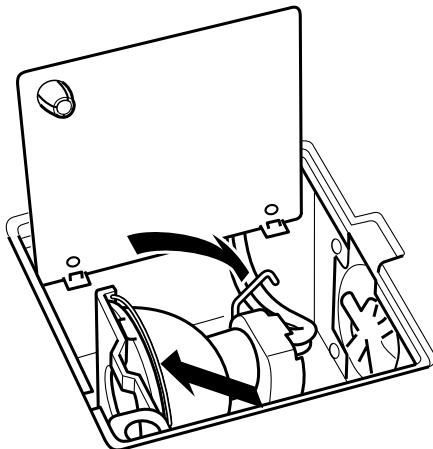
Step 4

Take the lamp out of the holder and remove the electrodes. The electrodes are only pushed in.
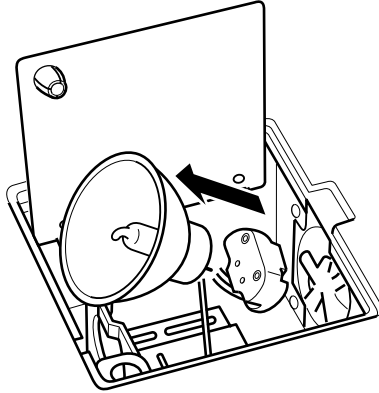
Remarks

Be careful not to pull out the electrode cord when the electrodes are removed. If the cord is pulled out, confirm that the cord does not interfere with the fan motor when it is put back in place.

Step 5

Fix the electrodes in the new lamp. Push the lamp into the holder so that the protruding section of the lamp shade is uppermost. Re-attach the metal clip. Check that the lamp is not tilted too far.
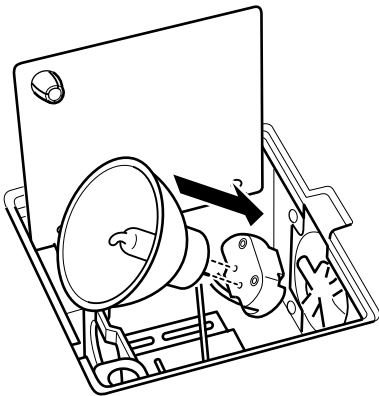
Step 6

Close the inner cover. Push the inner cover closed until it clicks, then close the outer cover.
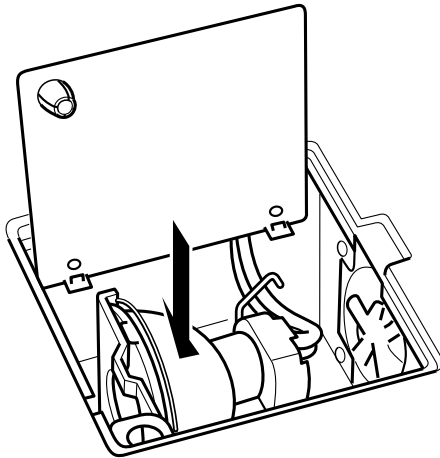
Step 7

Connect the power cord and run the application software after turning on the power. If the application software has a command for lamp calibration, execute it. If the application software does not have a calibration function, and command entry is possible, enter "LCB" from the keyboard.

The LS-4500AF registers the initial value of the lamp in the system. When the BUSY LED goes out, the operation is completed. The calibration operation is only necessary when the lamp is replaced, not in daily use. Calibration is performed when the power is turned on.

8. Transportation

When transporting the unit, first remove the film holder following the procedure below. Move the stage to the position for transportation at the rear of the unit, fasten the locking screw, and pack using the original package box and packing material provided by Nikon. If the locking screw is not completely fastened, and the unit is subjected to excessive vibration or shock, the unit may be damaged.

To fasten the locking screw
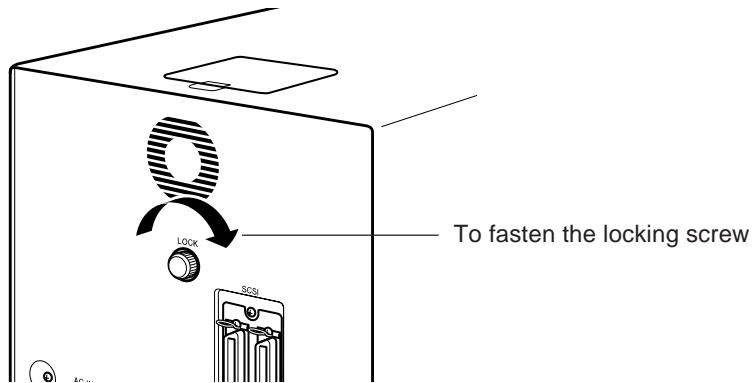
Procedure for Locking before Transportation

1. Remove the film holder by means of a normal eject operation.

2. Keep the Eject button on the front panel of the unit pressed down for more than three seconds. The stage will move backward and stop at the transportation position. You will hear the stage moving. When the stage begins to move, release the Eject button. If you continue to press the Eject button during the transition to the transportation position, another eject operation will be carried out.

3. When the BUSY LED goes out, turn the power off and remove the power cord and connection cable from the unit.

4. Turn the locking screw on the back of the unit clockwise as far as it will go. The stage will then be fixed firmly in place.

9. Technical Tips on the LS-4500AF

When operating the LS-4500AF, knowing the mechanism and operation of the unit will help to avoid problems and assist you in successfully scanning images.

The fact is, however, that the performance of the LS-4500AF largely depends on the software driver. You can make good use of the LS-4500AF by fully understanding the operation of both the LS-4500AF and its software.

Mechanism
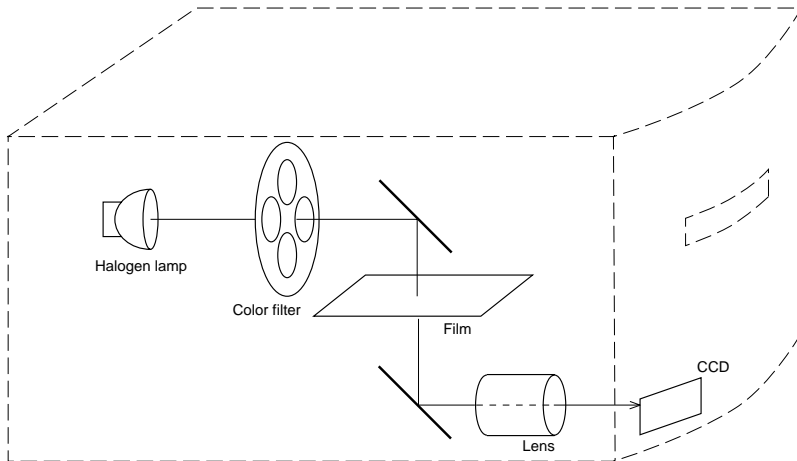
Light from a halogen lamp is passed through red, green, and blue filters, and the film is irradiated with each kind of light. The light transmitted through the film is focused into an image on a linear CCD through an image formation lens.

The film information on which photoelectric conversion is performed by the CCD, undergoes A/D conversion and signal processing after being amplified, and is sent to the host computer via the interface.

The film is inserted from the front, moved in sequence and scanned.

The LS-4500AF is a scanner of light source color switching type, film moving type, and surface sequence type.

The machine has two optical systems, and scanning of both 4 x 5 inch film and 35mm film is possible by switching between them.

12-bit A/D and LUT (Look Up Table)

The LS-4500AF has a 12 bit A/D converter.

12-bit resolution is thus possible (2^{12} = 4096 levels). This can be converted to 8-bit data (2^8 = 256 levels) by using an LUT (look up table).

The conversion from 12 to 8 bits is necessary because many systems deal with image data in 8-bit form.
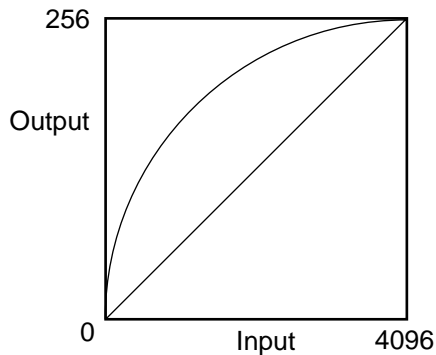
If the number obtained by simply dividing the data by 16 (=4096/256) were output, the LUT would be meaningless. The LUT has the ability to condense data from 4096 levels to 256 levels, without a loss of white data while maintaining keeping black gradations (high density side).

The LUT is used gamma (non-linearity) compensation of the output (as in the case of a CRT monitor).

The LUT also provides for black tuning and white tuning.

It is possible to intentionally lose black data or skip white data.
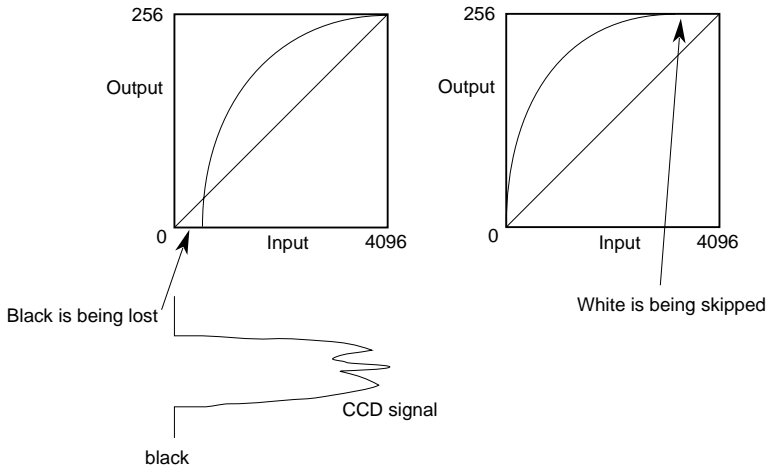
A change of gradient means a change of gain. When a gamma value with twice the gradient is set for only half of the input, 256-step output will be obtained.

However, note that setting a gamma value with a sharp gradient toward the black side means amplifying the noise element.

In addition to an auto-LUT function, the LS-4500AF has an LUT function set by users, enabling downloading from an outside source.
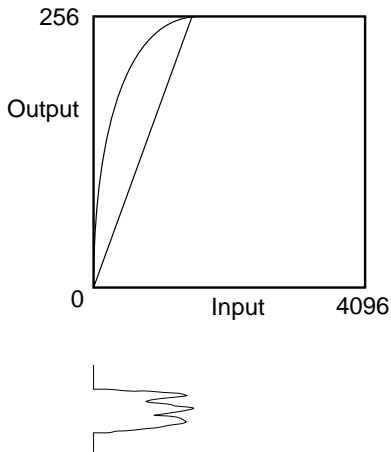
Prescanning and absolute light energy

Prescanning is the function which sets the light energy by scanning the black (maximum density) and white (minimum density) of the film.

Therefore, the meanings of the numbers differ according to the film. In one film 10 steps (of 256 steps) may correspond to a density of 1.5, but correspond to a density of 1.7 in some other film.

It is easier to understand the scanner as a TV camera than as a densitometer.

A TV camera works with a diaphragm which opens in order to take in more light if the subject is dark. The light energy each time scanning is performed is not absolute light energy, but varies according to the film.

While it is possible to set the light energy used by the LS-4500AF, the prescanning mode is recommended in order to obtain a better image.

Auto setup is also possible by prescanning. Compensations can be made, if necessary.

Sharpness

Sharpness adjustment is achieved by means of a 3 x 3 matrix, which can be defined by the user. This is more easily understood if we use a simple figure. To simplify the explanation, consider sharpness as one-dimensional. Suppose that there is an output wave form as shown in the figure, and assume that the sharpness coefficient is -20 140 -20. This means multiplying the picture element of a subject by 120% and adding the elements of both ends multiplied by -20% (subtracting the elements at both ends multiplied by 20%). When this filter is applied to the wave form shown in the left-hand figure, the result will be as shown in the right-hand figure. A change can be seen at the rising point. The edge section is emphasized, as shown here.

80 80

86 80

50 50 50

50 50

44

44=50*(-0.2)+50*(1.4)+80*(-0.2)   86=50*(-0.2)+80*(1.4)+80*(-0.2)
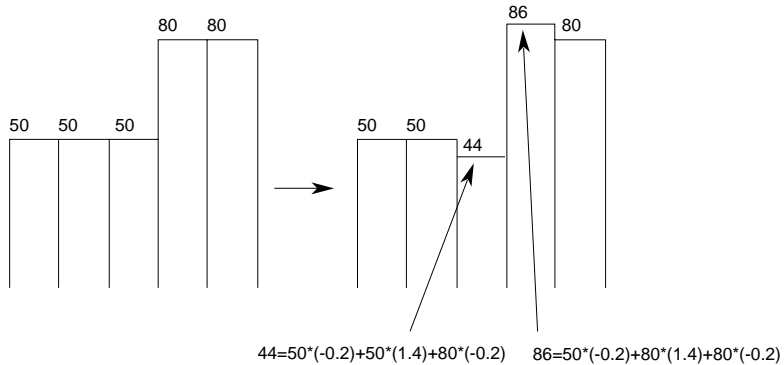
Such action, as demonstrated here, takes place in two-dimensions.

Even if the sharpness appears to be weak on the monitor, it may occasionally be too great when printed out. You should therefore set a parameter suitable for your system.

Since setting the + (plus) value has the effect of averaging (leveling), it is effective in reducing moire when moire is too conspicuous.

Though the picture element multiplied by 1 = 100% is set for the convenience of this explanation, you should follow the directions in the software manual regarding the setting method.

Three scanning modes

The LS-4500AF has three scanning modes.

- **Fast mode:** Keeps scanning without stopping the stage while the interface operates. This mode is used for previewing. A limitation is that sharpness is not attainable.

- **Normal mode:** Stops at every line of picture elements to be scanned, but a small registration difference occurs because the data is scanned during transfer. This mode offers 30% – 50% faster scanning than high quality mode.

- **High quality mode:** Stops at every scanning line and discards data scanned during transfer, then scans data at the point where it stops again.

The only difference between the three modes is a degree of registration difference, but no difference can be seen in density range. The density range is the same regardless of which mode is chosen for scanning.

Three functions of the Eject button

The Eject button has the following three functions:

- Ejects the film holder.

- Moves the stage (the structure on which the film holder is placed for moving) to a fixed position. Next, press the Eject button and take out the film. Continue to press the Eject button for at least three seconds. After the BUSY LED goes out, fasten the locking screw on the rear panel.

- Boots (starts) from EPROM. Turn on the power while pressing the Eject button. Stop pressing the Eject button after five seconds.

ASCII commands

The LS-4500AF has a function which interprets and executes ASCII commands. This function is not usually needed for application software. However, if a problem occurs, we may ask you by telephone or fax to take a simple troubleshooting measure by using this function to solve the problem.

Do you have a "command execution" dialog in your applications? If so, please try executing it.

Enter "EJ" from the keyboard and press the RETURN (ENTER) key; the LS-4500AF will execute an eject operation. The ASCII commands described in this manual are:

LCB: Causes the scanner to memorize the characteristics of a lamp when a lamp is replaced.

BT1: Makes the flash memory program valid.

(BTO: Makes the EPROM program valid.)

10. Troubleshooting

If something unusual should occur during operation of the scanner, refer to the software manual and the troubleshooting section below.

Scanning cannot be performed.

- Did you release the transportation locking screw? When the unit is shipped, the locking screw is locked. If the lock has not been released, release the lock following the directions in this manual.

- Is the SCSI cable connected?

- Is a high impedance SCSI cable being used?

- Have both ends of the SCSI connection been terminated?

- Is there duplication of the SCSI ID number?

- Is the SCSI board being used recommended by Nikon? (For Windows version)

- Do the settings of the I/O, INT, DMA channel, etc., on the SCSI board coincide with those of another board? (For Windows version)

- Has software been installed? For software installation and operation, refer to the software manual.

- Are the configuration settings, such as CONFIG.SYS, correct? Note that some configurations may be changed automatically when a Windows application or other applications is installed. (For Windows version)

- Have other SCSI devices (such as HD, MO, CD-ROM) been confirmed?

The recognition operation has been performed, but the resulting images are totally dark or completely black.

- Is the lamp lit? Look through the fan slots in the rear panel to check whether the lamp light goes out when a scanning operation is performed.

Poor image quality

- Is the film holder's glass plate soiled?

- Is the film loaded properly?

- Is the scanner given to vibrating during scanning?

Appendix: Specifications

Film used:	Transparent film
Scanning method:	Planar scanning, film moving type
Sensor:	5,000 pixel CCD linear sensor
Lamp:	12V 20W Halogen lamp
Color separation:	Surface sequence 3-pass method (red, green, blue optical filter)
Scanning area:	5 x 6 inches (4 x 5 inch optical system) 1.66 x 6 inches (35mm optical system)
Optical resolution:	1,000dpi x 2,000dpi (4 x 5 inch optical system) 3,000dpi x 3,000dpi (35mm optical system)
Interpolation resolution:	2,000dpi x 2,000dpi (4 x 5 inch optical system) 3,000dpi maximum (35mm optical system)
Resolution:	From 50dpi to maximum resolution in 1dpi steps
A/D conversion:	12 bits/color
Dynamic range:	3.0 or more
Output data:	Monochrome, dither, full color (8 bits/color, 12 bits/color)
Scanning modes:	Fast mode, normal mode, high quality mode
Focus:	Auto, manual
Setup:	Auto, manual
Sharpness:	3 x 3 matrix can be set by user

Scanning times for reference:

Standard film (maximum transparent density about 0.2), 3 colors, landscape

35mm film
1,800dpi, 2250 x 1500 (10.1MB)
Approx. 90 seconds in high quality mode
Approx. 60 seconds in normal mode
3000dpi, 3900 x 2600 (30.4MB)
Approx. 200 seconds in high quality mode
Approx. 120 seconds in normal mode

4 x 5 inch film
600dpi, 2,500 x 2,000 (15MB)
Approx. 150 seconds in high quality mode
Approx. 110 seconds in normal mode
1000dpi, 4500 x 3600 (48.6MB)
Approx. 210 seconds in high quality mode
Approx. 180 seconds in normal mode

Film holder:	3 types (35mm mount, sheet film, 35mm strip film)
Interface:	SCSI-2 compliant
Size:	11.6(W) x 9.8(H) x 16.5(D) inches (295 x 250 x 420mm)
Weight:	Approx. 28.9lbs (13kg)
Power supply:	AC 100 - 120V/AC 200 - 240V, 50/60Hz, 0.80 - 0.4A
Accoustic noise:	less than 70dB(A)
Power consumption:	Approx. 45W when the power-saver is off Approx. 10W when the power-saver is on
Temperature:	50˚F - 95˚F (10˚C - 35˚C)
Humidity:	30% - 80% (no condensation)

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