

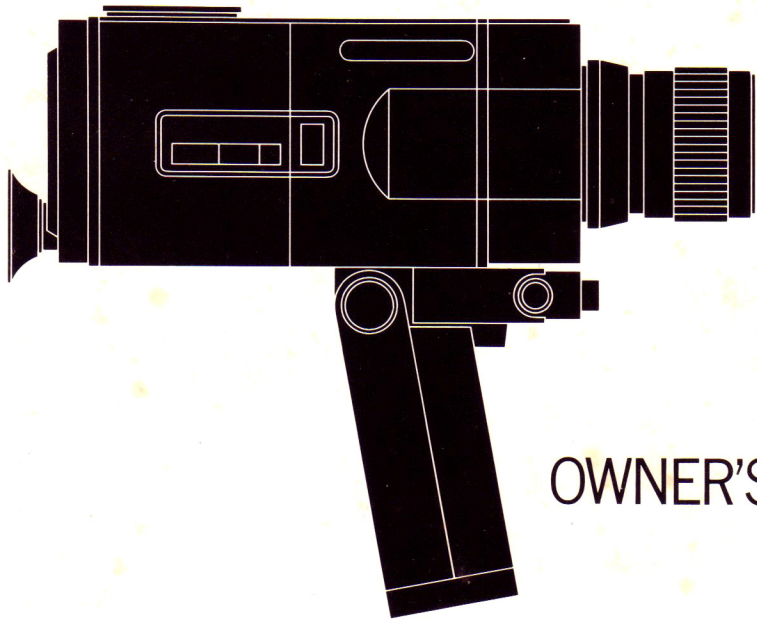
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# MINOLTA AUTOPAK-8 D6



OWNER'S MANUAL



A product of Minolta research and precision technology, the Minolta Autopak-8 D6 is an outstanding Super-8 movie camera.

It is a sophisticated instrument that combines Super-8 quality and convenience with a fine Rokkor 6x Zoom Lens, completely automatic exposure, electromagnetic shutter release, and many other advanced features.

Simplest foolproof operation and compact portability make it ideal for all beginning or long-time home movie-makers who want impressive results with utmost shooting ease.

But the Autopak-8 D6 is also the heart of a system whose variety of accessories suits it to many applications, including time-lapse, strobe-synchronized, remote-control, and wireless filming, making it a really valuable tool for advanced cameramen as well.

Before using your Minolta Autopak-8 D6 the first time, please read this manual all the way through—or at least far enough to cover your own filming needs—while loading batteries and film, handling and acquainting yourself with your camera and its parts and features. In this way, you can take good movies and begin to realize the full potential of your Autopak-8 D6 right from the start.

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## MAIN FEATURES

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### Easy-to-operate Super-8 type

The Minolta Autopak-8 D6 lets you enjoy all the Super-8 system advantages: simply click the cartridge into position to load—no need to handle or thread film. 50 feet of film run straight through, eliminating the lost time, light-struck film, and splicing of old double-8 film turnover.

Film speed is automatically set by the cartridge, and a filter for outdoor filming is automatically positioned when you use indoor color film. Nearly 50 per cent larger film image area gives you sharper, brighter pictures.

### Unique through-the-aperture EE system

A highly sensitive cadmium-sulfide cell and special circuit automatically and continuously adjust the lens for extremely accurate exposure. Located behind the aperture, this electric-eye system measures only image-forming light and automatically makes all compensations for frame speed

focal length, filter, and lens-accessory variations. You are freed to get the best shots of your subject.

### System camera for many uses

Superb camera versatility and a wide range of accessories available make it easy for you to shoot slow-motion, time-lapse, remote- or wireless-controlled, and tape recorder-synchronized motion pictures.

### Variable-speed power zoom lens

At a touch of your finger, the high-performance Rokkor Lens power zooms 6 diameters between wideangle and telephoto at your choice of two speeds or manually.

### Three convenient shutter settings

Two handy frame speeds plus single-frame exposure setting enable slow-motion for analysis of sports scenes, recording wildlife habits, etc., as well as smoothing pans and

camera movement; time-lapse for animation and plant and weather studies, in addition to regular filming.

**Effortless remote-control filming**

The electromagnetic shutter release and cord accessories make remote-control filming simple at any shutter setting.

**Bright "information-center" viewfinder**

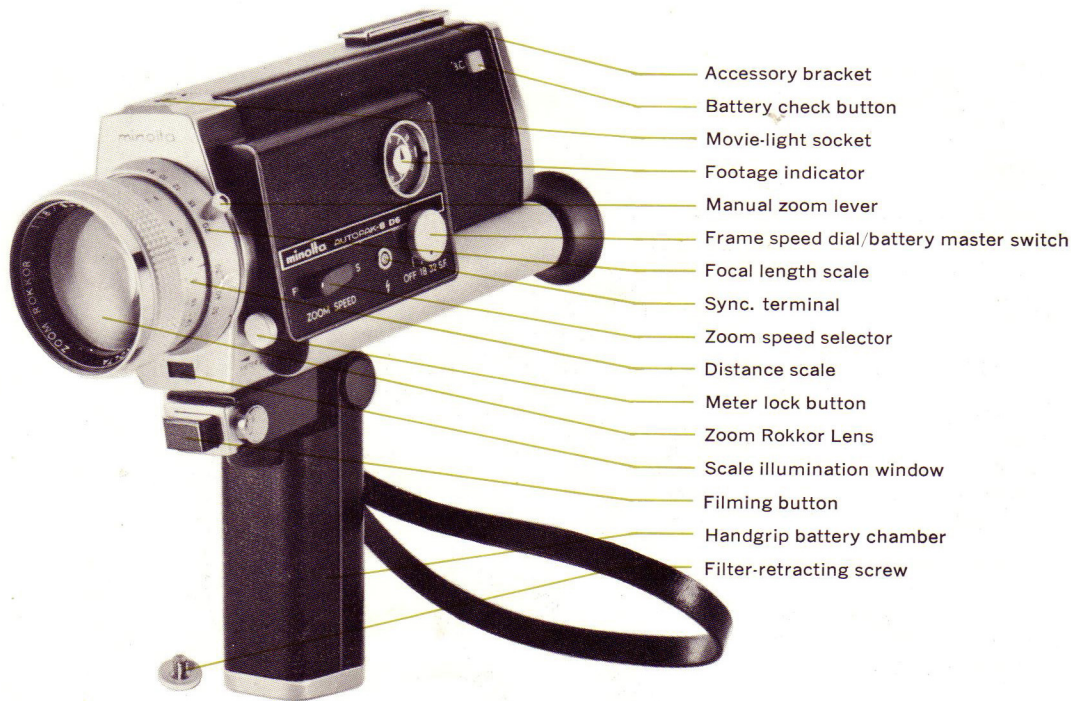
Thanks to a special mirror and through-the-lens viewing, you see the subject at it is, bright and without distortion, with positive microprism focusing in the center and with all essential filming indications in view — without taking your eye from the finder. Eyepiece adjusts and locks to suit your vision.

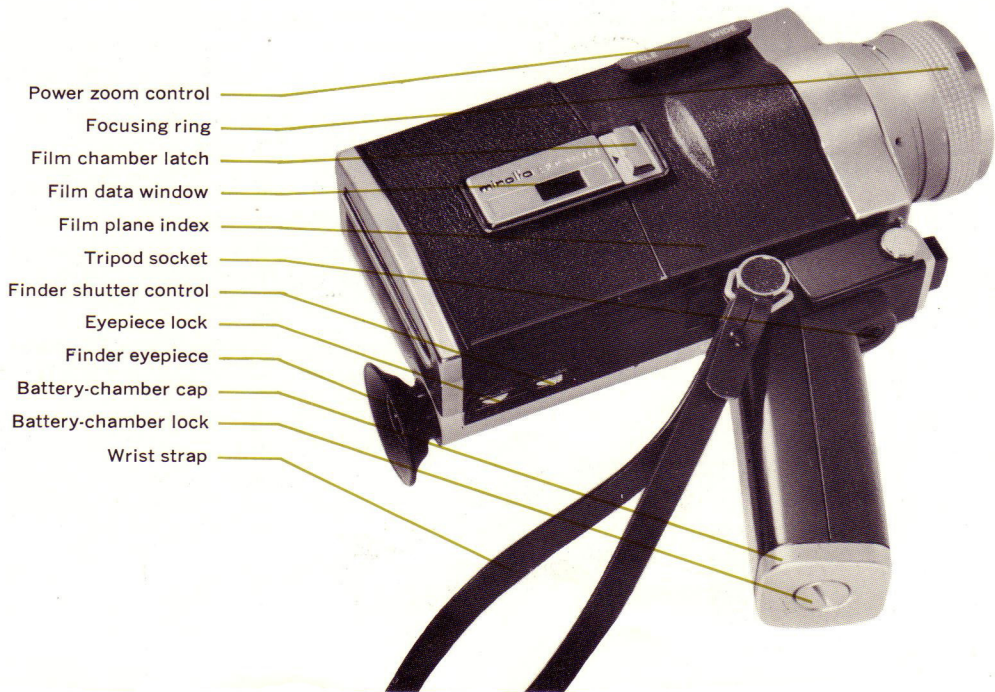
**Folding handgrip portability**

Easy-to-hold battery-chamber handgrip conveniently folds flush against camera for carrying or storage.

## NAMES OF PARTS

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## SPECIFICATIONS AND ACCESSORIES

6

- Camera type: 8mm movie camera using Super-8 film cartridge
- Lens: Rokkor F1.8 zoom type, 14 elements in 12 groups, focal length continuously variable from 8.4 to 50mm (6x) for manual or power zoom
- EE system: Through the lens aperture measuring system incorporating high-sensitivity CdS cell, special bridge circuit with double-coil galvanometer, powered by battery-compartment dry cells
- EE working range: Daylight filming : ASA 25–160 (DIN 15–23), artificial light: ASA 40–250 (DIN 17–25); coupled to F45, virtually obviating need for ND filters; film speed set automatically when cartridge loaded
- Drive system: Electric micromotor for filming; separate zoom power micromotor operating at approx. 1.6 or 4 seconds' full zooming time
- Power source: 4 AA-size (penlight) 1.5v dry batteries contained in battery-case located in handgrip
- Shutter: Rotary type with speeds of 1/40 second at single frame and 18 frames per second, 1/72 sec. at 32 fps; X synchronization at single-frame

- Viewfinder:** Erect-image, single-lens-reflex type, with central microprism focusing, locking eyepiece adjustment, extraneous light shutter; under- and overexposure warning zones and F-stop, safe-run and film-end signals, battery/underexposure indicator lamp all visible in viewfinder
- Footage indicator:** Length of exposed film registered in both meters and feet, automatic return
- Others:** Electromagnetic shutter release, built-in automatic-positioning No. 85 filter (for using Type A color film in daylight), built-in X sync. terminal, accessory bracket, movie-light socket, tripod socket, folding handgrip
- Accessories available:** No. 1A filter, lens shade, close-up lens, oversize eyepiece hood, Intervalometer-S, Intervalometer-P, release cord, remote-control cord, wireless remote-control unit, tape recorder-control cord
- Size and weight:** 70×128×196mm ( $2\frac{3}{4} \times 5 \times 7\frac{1}{8}$  in.), 1250g (44 oz)

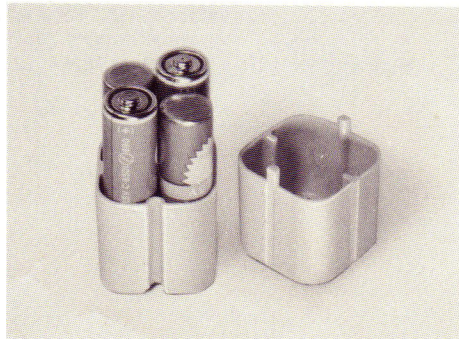
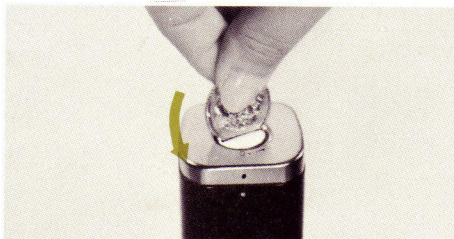
## PREPARATION

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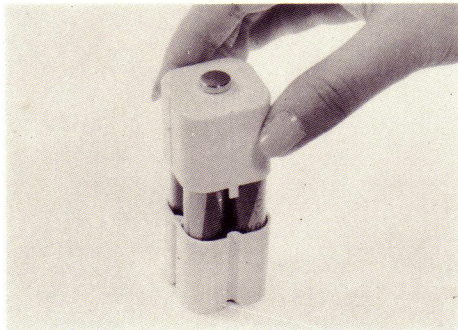
### How to install batteries

Film transport and shutter rotation, automatic exposure, power zoom, and shutter release are all powered by four AA-size 1.5v dry batteries contained in the handgrip. To properly install these:

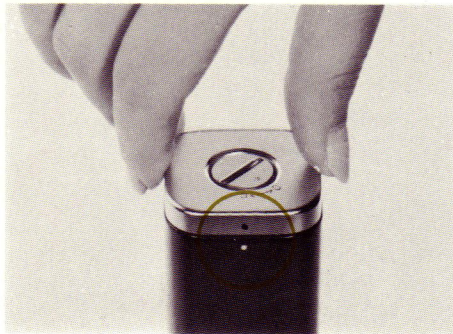
1. Remove cap on bottom of handgrip by turning lock from C to O with a coin or similar object and grasping two edges to lift it off.
2. Take out the plastic battery case and separate its 2 parts by turning the central screw on the end of one part counter-clockwise.
3. Carefully insert batteries into the other part with positive (+) or negative (-) end down according to the markings in the case.



4. Aligning the two projections on one with the matching notches on the other, put the two plastic parts together again and fasten the case together with the screw on the end.



5. Reinsert the plastic case into the battery chamber, align the dots on handgrip body and cap, push cap on, and secure it by turning lock to C position.



**CAUTION:**

- It is essential that the batteries be inserted as indicated in the battery case.
- Be sure to remove batteries when the camera is not to be used for more than a month.
- Do not try to force the battery case into the chamber upside down.

## Battery check

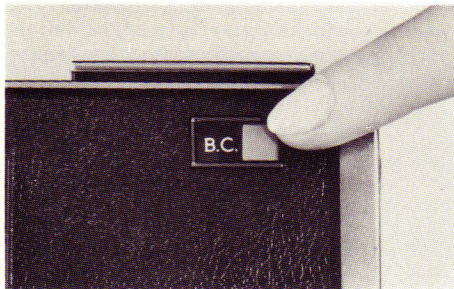
Dry batteries lose power gradually whether actually used or not. From time to time use the battery checker built into your Minolta Autopak-8 D6 to see if your batteries have grown too weak for good filming results. Checking is quick and easy:

Make sure the frame speed dial/battery master switch is not in the OFF position. Then, while looking into the viewfinder, push the battery check button all the way in. If batteries are in good condition, the red battery/underexposure warning signal lamp outside the lower right of the frame will light up. If this red signal does not light when the battery check button is depressed, your batteries are not serviceable and should be replaced with new ones.

### CAUTION:

- Be sure not to press the filming button or power zoom control while pushing battery check button.
- There is no need to push the battery check button repeatedly.

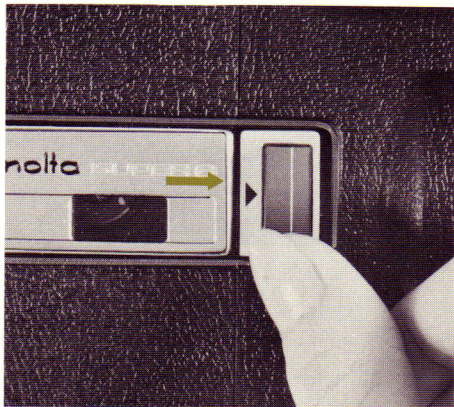
- Do not keep the battery check button depressed for long, as this will weaken batteries.
- Whenever the camera is left unused for a period of time, be sure to turn frame speed dial to OFF.



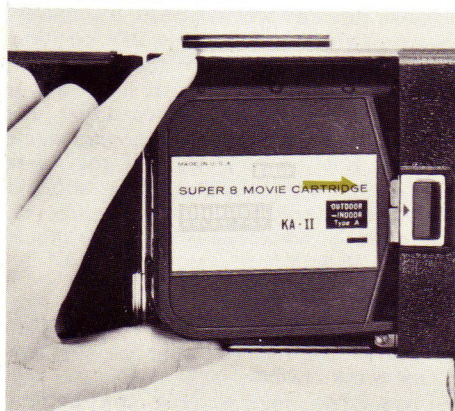
## Inserting and removing film cartridges

### To put in cartridge:

1. Push film chamber latch toward front of camera as indicated by arrow and open film chamber door.



2. Slide the cartridge into the camera from the rear and angled slightly down toward camera front as shown, with the center hole down, the label up, and the opening with film visible toward the front. Then push down gently on the rear edges of the cartridge until it seats flat in the chamber and you hear a click.



3. Close the film chamber door and push in on it near the latch until it locks shut with a snap.



- Putting in the cartridge automatically sets the camera for the proper film speed.
- Loading Type A film automatically positions a No. 85 filter to allow outdoor filming if you are not using a movie light or filter-retracting screw.
- Looking through the film data window, you can see whether and with what kind of film the camera is loaded.

**To take cartridge out:**

Open the side cover as mentioned before and remove the cartridge by lifting it from the back and sliding it out toward the back at a slight angle.



## Using various film types

### Outdoor filming

Regardless of the kind of film you load in your camera, you are ready for daylight filming immediately.

If you load with Type A color film (balanced for use with a movie-light or photofloods of 3400°K color temperature), the film cartridge automatically positions a built-in filter between lens and film to balance the daylight to suit your film.

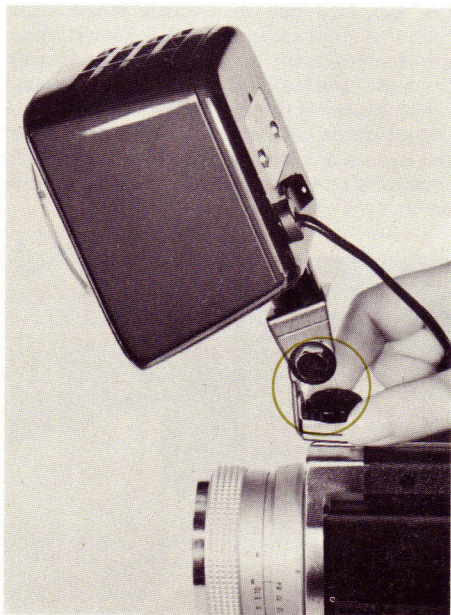
### Indoor filming

When you unscrew the cap screw from the movie-light socket and attach a movie light to your camera by screwing it into the socket, the daylight light-balancing filter positioned by a Type A color film cartridge will be removed from the path of light to the film to provide proper color balance for your indoor movies.

For indoor filming with any other kind of artificial light, screw the filter-retracting screw (similar but longer than the cap screw) supplied with your camera into the movie-light socket to remove the filter from the light path and use filters or gels as necessary to balance the light to the film in use.

Use a properly balanced blue lamp for fill-in lighting in daylight or indoor filming with outdoor film.

No provision for color balance is necessary when you are filming in artificial light with black-and-white film.



**CAUTION:**

Be sure to remove the filter-retracting screw from the movie-light socket unless you are filming with artificial light other than a movie light or proper photoflood.

## Viewfinder

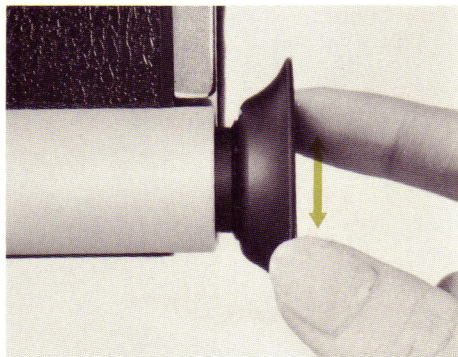
### To adjust the eyepiece

First set the distance scale at infinity ( $\infty$ ) by turning the focusing ring. Then aim the camera at a distant subject such as clouds, mountains, or buildings more than 30m (or about 100 feet) away.

Turn the eyepiece lock in the direction opposite that indicated by the arrow until



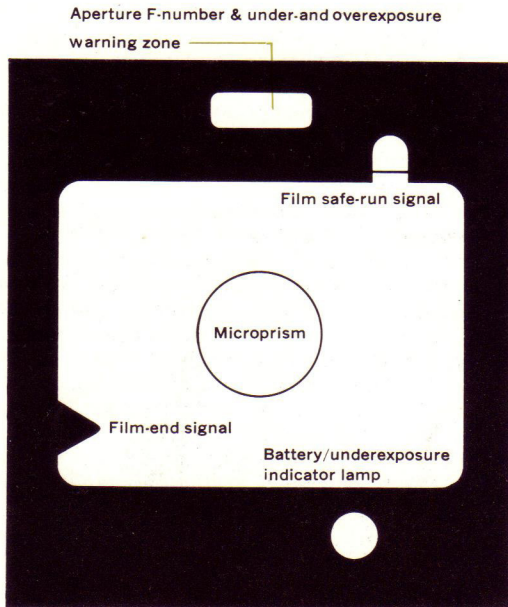
the eyepiece can be rotated freely. Next turn the eyepiece until both a distant image and the edges of the frame appear clearest to you. Then lock the eyepiece in this position by turning the eyepiece lock as far as it will go in the direction of the arrow. Once the eyepiece is adjusted, there should be no reason to change it unless the cameraman or his eyesight changes.



## Viewfinder information

Besides providing an accurate, parallax-free view of your subject, the viewfinder of your Autopak-8 D6 is a rather complete information center that gives you all necessary filming control information continuously as you film. In it you can see the microprism focusing center spot, aperture F-number scale with red under- and overexposure zones, battery/underexposure indicator lamp, and safe-run and film-end signals positioned as shown.

Each of these is explained below, some in this section, others later in connection with other mechanisms and the functions they relate to.



### Focusing by microprism

To focus a subject, zoom the lens toward the 50mm telephoto focal length until the viewfinder image is relatively large.

Then while looking into the viewfinder, turn the focusing ring clockwise or counterclockwise until the image in the central microprism circle becomes clear. When the image reaches its clearest point, focusing for the subject is complete.

The standard focal length for general 8mm filming is about 13mm. Depth of field at this focal length and below is so great that there is less need to focus subjects precisely at usual distances and apertures; approximate focus by visual estimation is usually satisfactory. At focal lengths from about 20mm through 50mm, however, accurate focusing is essential.



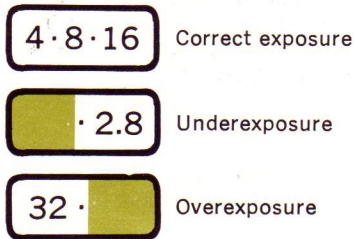
### Lens aperture scale, under- and overexposure warning zones, and underexposure indicator lamp

Black figures on a white background in a rectangular window above the main viewfinder frame continuously register the F-stop number at which the EE system is setting the aperture for filming. Specific reference figures and dots between them on this scale indicate F-numbers of (2), 2.8, 4, (5.6), 8, (11), 16, (22), 32, and (45).

Below the maximum aperture position of F1.8 (slightly to the left of the dot indicating F2), there is a red underexposure warning zone that comes into view from the left as light volume approaches an inadequate level. When filming under relatively low light conditions, keep watch for this warning zone. When the red zone reaches the small index halfway across the top of the window, the red underexposure indicator lamp will light up to warn you whenever the filming button is depressed halfway. When this happens, there is not enough light, and your movies will be underexposed unless you use

more illumination (such as from a movie light or other source) or a slower shutter speed (as by decreasing the frame speed if practical).

It is unlikely that you will ever encounter lighting conditions that will indicate an aperture smaller than F45 (i.e., the dot to the right of 32), but if such should ever become the case under very bright conditions, such as sun on sand or snow, with high-speed films, and the index indicates a point within the red overexposure zone to the right of the F45 dot, increase the shutter speed if acceptable by increasing the frame speed to the extent necessary to register a lens opening of F45 or larger.



### Footage indicator, safe-run and film-end signals

Each super-8 film cartridge contains 50 feet (15.24 meters) of film.

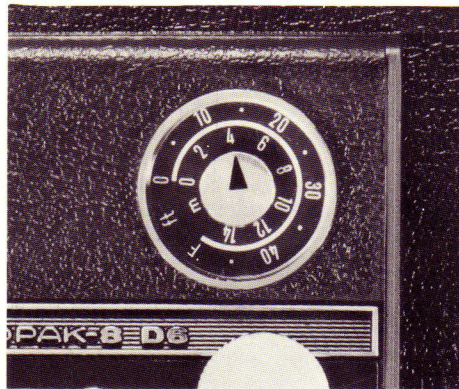
The footage indicator on the side of the camera registers the length of exposed film. It is marked in 5-foot graduations from 0 to F (i.e., "Finish" = 50 ft.) and every 2 meters from 0 to 14 meters.

Regular bobbing up and down of the safe-run signal at the upper right of the viewfinder frame when the filming button is depressed confirms that film transport is proceeding normally.

Just before the F registers on the footage indicator, the black, pointer-shaped film-end signal will swing up into view from the left part of the frame to warn you that the film in your cartridge has all been exposed. This film-end signal will remain visible in the viewfinder until the next cartridge is properly inserted into the film chamber.

The footage indicator automatically resets to zero when a cartridge is removed. Thus,

though you can reinsert and continue to expose partially used cartridges (losing some frames of light-struck film unless you do so and keep the film in total darkness) the footage indicator will start again and advance from zero and thus will not accurately register the actual length of exposed film. The film-end signal will appear when the film is exhausted, however.

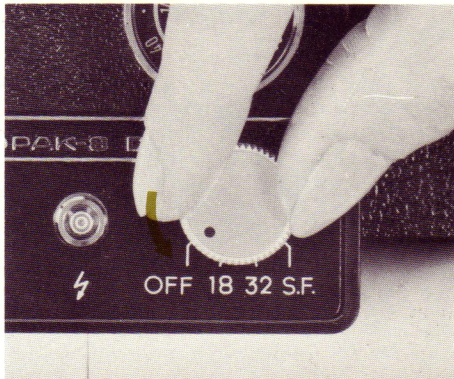


## Pre-filming checklist

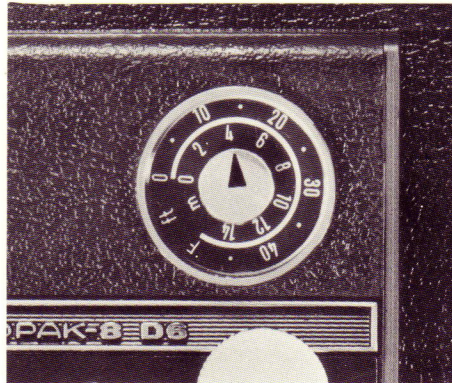
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For better movies without false starts, run through the following checklist each time you get your camera out for some normal filming:

1. Set the frame speed dial at other than OFF position and use the battery checker to make sure your batteries are good.

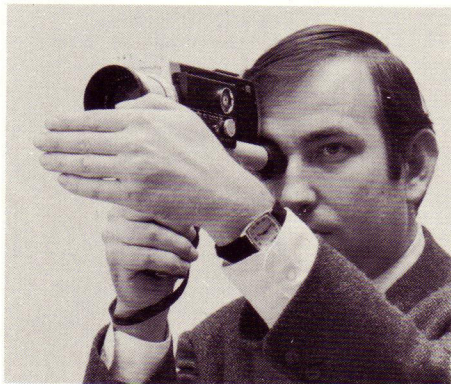


2. Check to be sure you have enough film remaining or load a new cartridge.

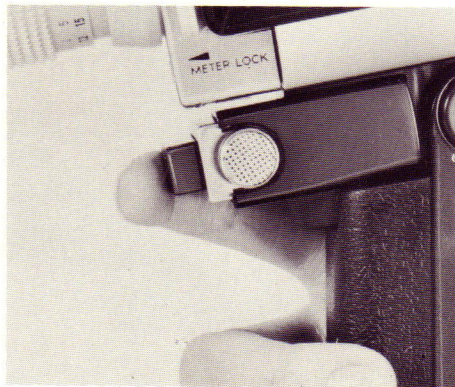




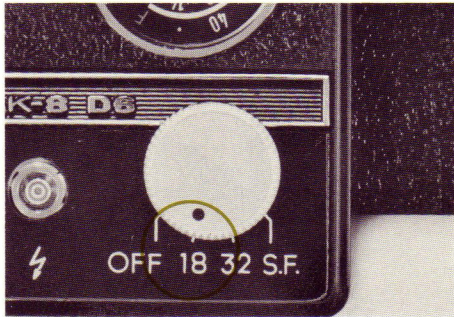
3. Turn the camera to a bright direction and move your hand back and forth in front of the lens to confirm that the F-number scale is working. If it does not move with adequate light, make sure the meter lock button is pushed in to its unlocked position. (If the viewfinder appears completely black, remove the lens cap and/or open the viewfinder shutter.)



4. If you wish, depress the filming button briefly to see that the shutter is releasing properly.



5. Set the frame speed dial at 18 (frames per second) for normal-speed filming.



6. Adjust focal length, visual angle, and focus.
7. Make sure neither under- nor overexposure warning zone is being registered.

## NORMAL FILMING

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### How to support the camera

Since an unsteady camera generally produces unsatisfactory movies, be sure to support your camera positively and properly.

For best results, use of a good tripod intended for use with a movie camera is recommended wherever practicable.

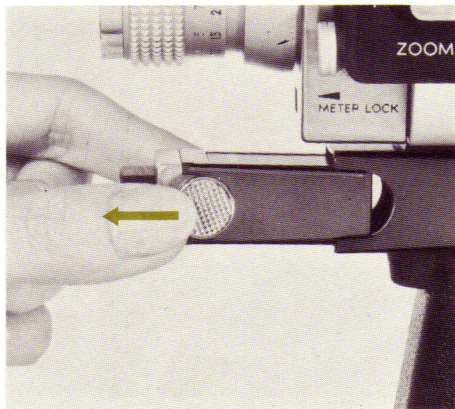


To handhold the camera, slip either wrist through the wrist strap loop and grasp the handgrip with the same hand. Place the other hand on top of the camera to steady it. The power zoom control can probably be operated better if the left hand is the one placed on top.

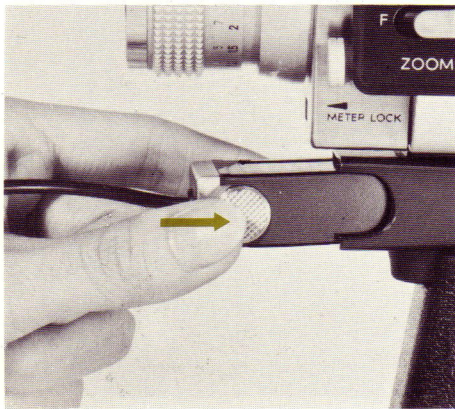


## Filming button

To actuate the electromagnetic shutter release (located inside the camera) to start filming at either speed or to make each single-frame exposure, simply depress the filming button. Make sure not to cover the scale illumination window above it.



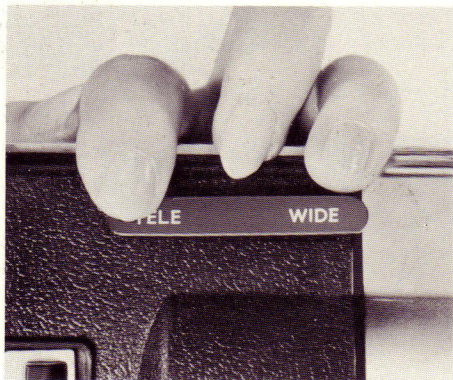
By grasping the knurled round grips on either side of the filming button with thumb and forefinger, the regular filming switch assembly is easily detached from the camera. Electrical connections of the release cord, Intervalometer-P or -S, wireless remote-control unit, or tape recorder-control cord can be inserted in its place in the socket.



## Zooming

Your Minolta Autopak-8 D6 is equipped with a fine Zoom Rokkor Lens with a continuously changeable focal-length range from 8.4mm (wideangle) to 50mm (telephoto). The focal length at which the lens is set at any given time is indicated by the index of the focal-length scale. When you press the

TELE side of the power zoom control or use the manual zoom lever to increase the focal length, your subject image becomes larger; pressing the WIDE side or decreasing the focal length makes it smaller. Power or manual zooming can be used for adjusting focal-length to subject distance for composing or cropping before filming or for useful or impressive effects during filming.



## Changing zooming speed

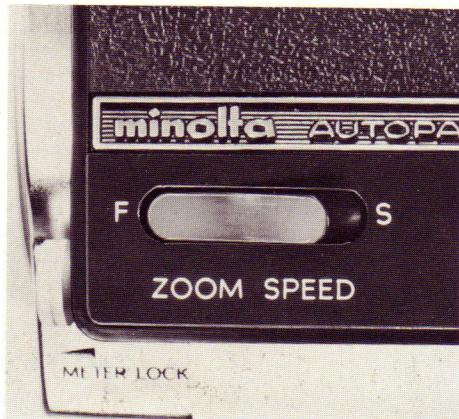
Your camera has 2 zooming speeds, fast and slow. To set the fast speed of approx. 1.6 seconds' full zooming time from one extreme to the other, push in on the F end of the zoom speed selector until it clicks. For the slow approx. 4-second full zooming time, push the S end of the zoom speed selector.

- Choose a zoom speed suitable to your subject and effect you desire to create.
- If you use the zoom too much, the projected movies will be difficult to view.
- When planning a zoom sequence, be sure to focus at the telephoto extreme before beginning to film it.
- When zooming manually during filming, use a tripod to prevent camera movement.
- Screw the manual zoom lever into whichever of the 2 sockets provided is more convenient for your operation of the camera.
- Any camera movement is magnified in telephoto pictures and further exaggerated when they are projected. You should therefore use a suitable sturdy tripod and

pay special attention to camera movement in filming at extended focal lengths.

### CAUTION:

- Do not depress power zoom control to zoom toward same direction after lens has reached wideangle or telephoto extreme, as this will exhaust batteries.



## MORE ADVANCED FILMING

### Meter lock button

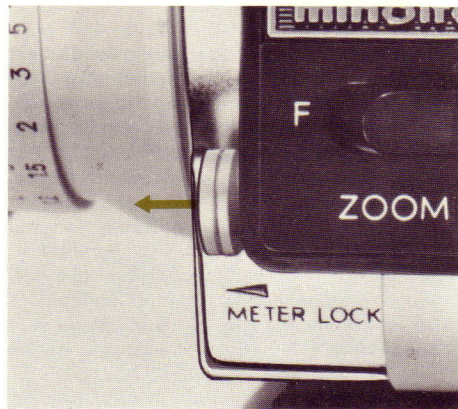
This device is used to override the meter to keep exposure uniform at a given level regardless of changes in background brightness due to zooming or panning, entrance of large bright or dark areas into the field of view, and so forth.

The meter lock should also be used when taking single-frame exposures, using electronic flash, or when calculating an F-stop from a guide number.

To use the meter lock, aim your camera at the subject to register the exposure you wish to maintain and pull out the meter lock button until it snaps.

#### CAUTION:

- When resuming normal filming after using the meter lock, don't forget to push the meter lock button back in until it snaps.



## Shutter speeds

The shutter speed (length of exposure) of your Autopak-8 D6 camera is  $1/40$  second at 18fps and single frame and  $1/72$  second at 32fps.



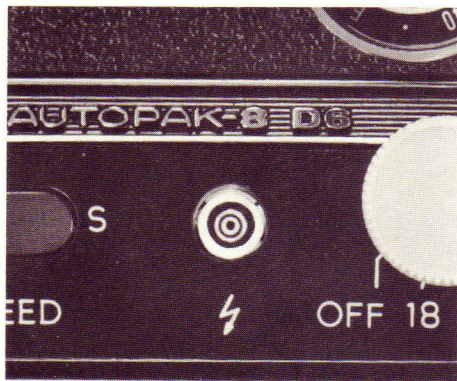


### X Sync. terminal for strobe

The strobe terminal provided on your Autopak-8 D6 enables you to use electronic flash (strobe) lighting for individual single-frame exposures and for time-lapse filming intervals sufficient to allow proper recycling between exposures.

Since automatic EE aperture setting is not suitable for making strobe exposures, the proper aperture is generally determined by dividing a guide number for the flash and film in use by the flash-to-subject distance. To set the camera aperture for strobe exposures:

1. With the meter lock button pushed in, look through the viewfinder and point the camera toward dark or light subjects until the proper F-stop indication registers opposite the index of the lens aperture scale.
2. Then lock the aperture at the desired F-stop value by pulling out the meter lock button until it snaps.



## Frame speeds and their uses

Your Minolta Autopak-8 D6 will film at 18 and 32 frames per second and also single frame. Suggested uses follow for each of these:

### 18fps

This is the standard frame speed for silent Super-8 movies. Use it for all general filming for natural effects with minimum flicker and greatest film economy.

### 32fps

Filming at this higher speed and projecting at normal 18 fps gives you impressive slow-motion shots of such subjects as the billowing sea, children chasing a ball, plants rustling in the wind, horses running, and so on.

This also tends to smooth camera movement in the projected movie.

The 32fps speed is useful for filming sports scenes and the habits of wildlife. Its faster shutter speed reduces blur from subject movement for sharper results that enable better analysis.

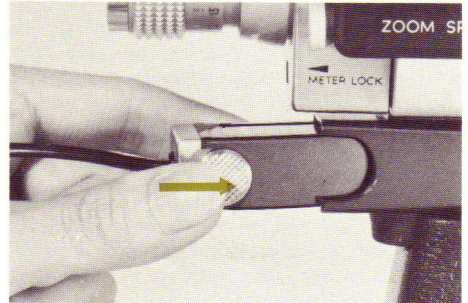
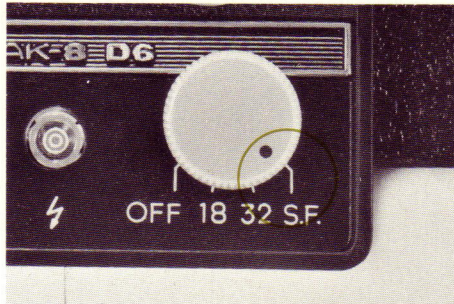


## Single-frame photography

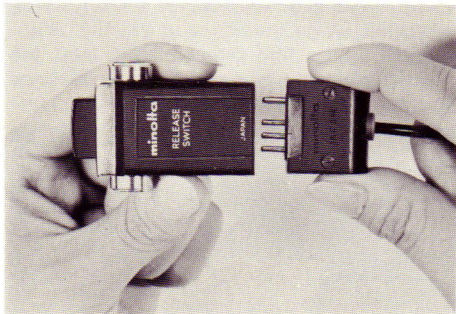
The single-frame provision on your camera enables you to expose just one frame at a time for animating titles, cartoons, etc., time-lapse photography, and trick and special effects. SF shutter speed is the same as that for 18fps, that is, 1/40 sec.

General instructions for SF use are:

1. Attach the camera to tripod or similar firm support and set the frame speed dial to SF.
2. Remove the filming-button switch assembly and insert the 4-hole release-cord connection in its place.



3. Insert the 4-prong plug on the other end of the release cord into the 4-hole jack of the filming-button switch assembly.



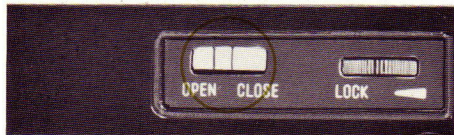
4. After making sure focus and exposure are correct, release the shutter.
- Single-frame photography can be done using the filming button in the normal position plugged into its socket on the camera, but use of the release cord is strongly recommended to prevent camera movement.



### Viewfinder shutter

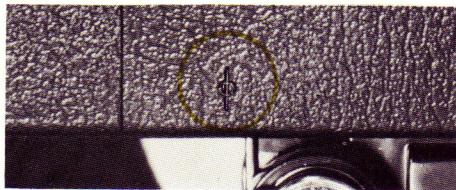
Since your head and/or the oversize eyepiece hood shields the viewfinder during normal filming, there is little problem of strong stray light entering it. In such special types of filming as remote-control and time-lapse work, however, there may be nothing over the eyepiece to do this. The viewfinder shutter is used to prevent such light from affecting exposure. It should be closed whenever you are not using the viewfinder during filming.

To close this shutter, simply switch the control to CLOSE until nothing can be seen in the viewfinder. To open it, turn the control back to OPEN.



### Film plane index

The small circle with a line running through it ( $\phi$ ) on the left side of your Auto-pak-8 D6 is the film plane index. Use this to calculate film-plane-to-subject distance for close-up photography, etc.



## HINTS FOR BETTER MOVIES

### Length of scenes

While the length of individual scenes will naturally vary with conditions and effects desired, too many short scenes will be difficult to view. For a normal, easy-to-view effect, scene length should not be shorter than 5 to 10 seconds. 5 seconds' filming at 18fps is equivalent to 38cm (1.25ft.) of film.

Nearly any movie benefits from careful editing, and this can be done more conveniently from longer scenes than from ones that are too short.

### Panning

To cover panoramic scenes with the relatively narrow angle of view that can be photographed at one time with motion-picture film, the camera can be rotated through a wide angle while filming continuously. This technique is called panning.

- Do not move the camera too fast, as this will make projected movies appear to flicker and jump across the screen.
- Move the camera evenly as well as slowly.
- Use a movie tripod with a panning head whenever possible.
- Do not allow the camera to waver or move at right angles to the direction of panning during a pan.
- Film with the camera stationary for a short time at the beginning and end of a pan.
- Start pans with less important objects and include the main subject(s) toward the end.
- Use a faster-than-usual frame speed (i.e. 32 rather than 18fps) for smoother, sharper results especially with hand-held pans.

## Titles

Titles are essential in commercial and educational films, and your home movies will be all the more enjoyable when you edit them with main or subtitles. These will add life and sparkle to movies of all kinds of family activities from backyard antics and vacation trips to graduations and weddings.

Titles are especially easy with your Minolta Autopak-8 D6 because there is no difference in the field of view between the viewfinder image and that striking the film. You get only what you see in the viewfinder.

Your camera has a minimum lens-to-subject distance of 1.2m (4ft.). When the lens is zoomed to 50mm at this distance, an area about 89×119mm (3½×4¾ in.) can be photographed. Many titles can thus be filmed very simply without using a titler or other accessories.

For closer filming, use the optional close-up lens and release cord intended for this camera. With this you can shoot at a film-plane-to-subject distance of 40.6 to 50.8cm (16 to 20 in.). See page 37 for details.



## OPTIONAL ACCESSORIES

### Close-up lens

This lens allows filming titles and other close-up subjects at filming distances between about 40.6 to 50.8cm (16 to 20 in.). Zooming is also possible when the close-up lens is used.

Focusing is done by means of the view-

finder microprism as with general filming.

The term *filming distance* means the actual distance between the film plane (indicated by the camera-side  $\phi$  mark) and the subject. The following table indicates what this distance will be when using the close-up lens focused at various distances indicated by the focusing scale.

37

Distance scale setting (m)	$\infty$	10	5	3	2	1.5	1.2
Filming distance (cm)	50.8	49.3	47.9	46.2	44.1	42.3	40.6
Distance scale setting (ft.)	$\infty$	20	10	7	5	4	
Filming distance (in.)	20	19	$18\frac{1}{4}$	$17\frac{1}{4}$	$16\frac{3}{4}$	16	



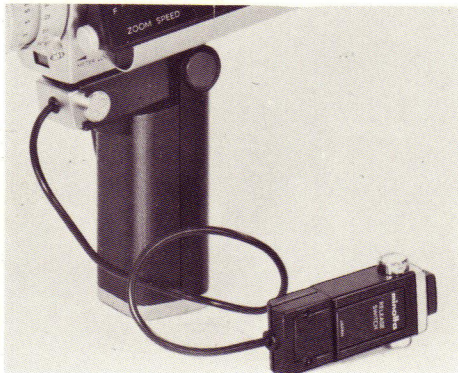
The following table shows maximum and minimum subject view areas attainable by zooming in relation to distance scale setting.



Distance scale setting	Filming distance	Lens focal length	Dimensions of area covered by lens
$\infty$	50.8cm	8.4 mm	199 × 268 mm
		50 mm	33.3 × 45.5 mm
1.2m	40.6cm	8.4 mm	140 × 188 mm
		50 mm	23.4 × 31.3 mm
$\infty$	20 in.	8.4 mm	$7\frac{7}{8} \times 10\frac{1}{2}$ in.
		50 mm	$1\frac{3}{8} \times 1\frac{3}{4}$ in.
4 ft.	16 in.	8.4 mm	$5\frac{1}{2} \times 7\frac{3}{8}$ in.
		50 mm	$\frac{7}{8} \times 1\frac{1}{4}$ in.

## Release cord

The release cord serves with the electromagnetic shutter release system in place of a cable release. It is used to avoid camera movement in single-frame and tripod filming. Its other major use is to connect an Intervalometer with the camera.



## Remote-control cord

This accessory allows you to release the electromagnetic shutter of camera from a distance. It is useful for cover filming of wildlife and various scientific subjects. You can also use it when operating more than one camera at a time or to get in the picture yourself.



### 1A (skylight) filter

This filter absorbs ultraviolet rays very well but has no filter factor.

Use the 1A filter to improve probable bluish rendition of subjects in shade illuminated mainly by blue sky, on overcast days, or obscured by atmospheric haze. It can also be used to protect the taking lens.



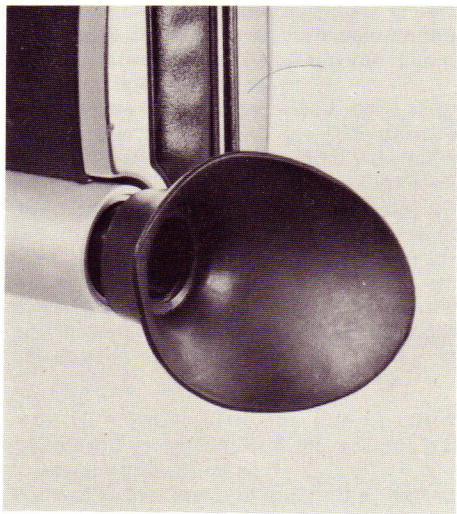
### Lens shade

This lens shade is effective not only for preventing flare from strong direct light on the lens but also for protecting the lens and front of the barrel from rain or snow.



### Oversize eyepiece hood

This is used to exclude extraneous light at the finder when filming with the naked eye.



### Intervalometer-P

An Intervalometer is a kind of repeating timer. This one enables you to do ultra-slow or time-lapse filming at rates from 0.5 through 60 seconds between single-frame exposures.

A variety of applications includes work and motion analyses, observation of animals and plants, and recording of medical operations.



### **Intervalometer-S**

This is a high-quality timer capable of actuating exposure at a broad range of intervals from 0.2 second to 10 minutes.

More versatile than the Intervalometer-P, this unit can be used for sampling (a series of continuous-run sequences filmed for a certain duration at regular intervals) and indent sampling (a series of time-lapse sequences filmed for a certain duration at regular intervals), as well as time-lapse work and motion analyses, nature studies of animals and plants, traffic and meteorological studies, etc.

### **Wireless remote-control unit**

This unit is used to put the cameraman into the picture, film inaccessible subjects, in filming a subject with two or more cameras simultaneously from different angles, or similar shutter actuation from a distance.

### **Tape recorder-control cord**

This cord is used to connect the camera with a tape recorder for synchronizing filming with sound recording. The tape recorder operates while the filming button is depressed.



## DEPTH-OF-FIELD CHART

44 Depth-of-Field Chart (in feet)      F=8.4mm

F No. D (ft.)	2	2.8	4	5.6	8	11	16	22	32
∞	∞ 10' 1 "	∞ 7' 1 "	∞ 6' 5 <sup>7</sup> / <sub>8</sub> "	∞ 4' 7 <sup>5</sup> / <sub>8</sub> "	∞ 3' 4 "	∞ 2' 5 "	∞ 1' 9 <sup>1</sup> / <sub>4</sub> "	∞ 1' 3 <sup>1</sup> / <sub>2</sub> "	∞ 11 <sup>3</sup> / <sub>4</sub> "
20	∞ 6'11" "	∞ 6' 5 <sup>1</sup> / <sub>2</sub> "	∞ 5' 7 <sup>7</sup> / <sub>8</sub> "	∞ 3'11" "	∞ 2'11 <sup>3</sup> / <sub>4</sub> "	∞ 2' 2 <sup>7</sup> / <sub>8</sub> "	∞ 1' 8 <sup>1</sup> / <sub>4</sub> "	∞ 1' 3 <sup>1</sup> / <sub>4</sub> "	∞ 11 <sup>1</sup> / <sub>2</sub> "
10	143' 5' 2 <sup>1</sup> / <sub>4</sub> "	∞ 5'00" "	∞ 4' 2 "	∞ 3' 4 <sup>1</sup> / <sub>2</sub> "	∞ 2' 8 <sup>1</sup> / <sub>4</sub> "	∞ 2' 1 <sup>1</sup> / <sub>4</sub> "	∞ 1' 7 <sup>3</sup> / <sub>8</sub> "	∞ 1' 2 <sup>7</sup> / <sub>8</sub> "	∞ 11 <sup>1</sup> / <sub>2</sub> "
7	18' 6" " 4' 4 <sup>1</sup> / <sub>2</sub> "	22' 9" " 4' 2 <sup>3</sup> / <sub>8</sub> "	497' 3' 7 <sup>3</sup> / <sub>8</sub> "	∞ 3' 3 <sup>3</sup> / <sub>8</sub> "	∞ 2' 5 <sup>3</sup> / <sub>4</sub> "	∞ 1'11 <sup>3</sup> / <sub>4</sub> "	∞ 1' 6 <sup>3</sup> / <sub>4</sub> "	∞ 1' 2 <sup>5</sup> / <sub>8</sub> "	∞ 11 <sup>3</sup> / <sub>8</sub> "
5	8' 6 <sup>3</sup> / <sub>8</sub> " " 3' 6 <sup>3</sup> / <sub>4</sub> "	9' 3 <sup>3</sup> / <sub>4</sub> " " 3' 5 <sup>1</sup> / <sub>2</sub> "	14' 9" " 3' 7 <sup>7</sup> / <sub>8</sub> "	87'11" " 2' 7 <sup>7</sup> / <sub>8</sub> "	∞ 2' 2 <sup>7</sup> / <sub>8</sub> "	∞ 1'10 <sup>1</sup> / <sub>4</sub> "	∞ 1' 5 <sup>7</sup> / <sub>8</sub> "	∞ 1' 2 <sup>1</sup> / <sub>4</sub> "	∞ 11 <sup>1</sup> / <sub>4</sub> "
4	5'10" " 3' 3 <sup>4</sup> / <sub>4</sub> "	6' 1 <sup>3</sup> / <sub>4</sub> " " 2'11 <sup>7</sup> / <sub>8</sub> "	7'11 <sup>1</sup> / <sub>2</sub> " " 2' 8 <sup>1</sup> / <sub>2</sub> "	13'10" " 2' 4 <sup>7</sup> / <sub>8</sub> "	∞ 2' 7 <sup>7</sup> / <sub>8</sub> "	∞ 1' 9 "	∞ 1' 5 <sup>1</sup> / <sub>4</sub> "	∞ 1' 2 "	∞ 11 <sup>1</sup> / <sub>4</sub> "

Depth-of-Field Chart (in meters)  $F=8.4\text{mm}$

F No. D (m)	2	2.8	4	5.6	8	11	16	22	32
$\infty$	$\infty$ 3.1	$\infty$ 2.8	$\infty$ 2.0	$\infty$ 1.4	$\infty$ 1.0	$\infty$ 0.7	$\infty$ 0.5	$\infty$ 0.4	$\infty$ 0.3
10	$\infty$ 2.4	$\infty$ 2.2	$\infty$ 1.7	$\infty$ 1.3	$\infty$ 0.9	$\infty$ 0.7	$\infty$ 0.5	$\infty$ 0.4	$\infty$ 0.3
5	$\infty$ 1.97	$\infty$ 1.85	$\infty$ 1.48	$\infty$ 1.15	$\infty$ 0.89	$\infty$ 0.67	$\infty$ 0.51	$\infty$ 0.39	$\infty$ 0.29
3	34.8 1.59	$\infty$ 1.52	$\infty$ 1.26	$\infty$ 1.03	$\infty$ 0.82	$\infty$ 0.64	$\infty$ 0.49	$\infty$ 0.38	$\infty$ 0.29
2	4.7 1.28	5.6 1.23	23.4 1.07	$\infty$ 0.90	$\infty$ 0.74	$\infty$ 0.60	$\infty$ 0.47	$\infty$ 0.37	$\infty$ 0.29
1.5	2.5 1.07	2.8 1.04	4.3 0.93	19.9 0.80	$\infty$ 0.68	$\infty$ 0.56	$\infty$ 0.45	$\infty$ 0.36	$\infty$ 0.29
1.2	1.7 0.92	1.8 0.90	2.3 0.82	3.0 0.73	$\infty$ 0.63	$\infty$ 0.53	$\infty$ 0.44	$\infty$ 0.35	$\infty$ 0.28



46 Depth-of-Field Chart (in feet) F=15mm

F No. D (ft.)	2	2.8	4	5.6	8	11	16	22	32
∞	31' 8" <sup>∞</sup>	28' 6" <sup>∞</sup>	20' 1" <sup>∞</sup>	14' 3" <sup>∞</sup>	10' 1" <sup>∞</sup>	7' 1 7/8" <sup>∞</sup>	5' 7/8" <sup>∞</sup>	3' 7 1/4" <sup>∞</sup>	2' 6 3/4" <sup>∞</sup>
20	50' 5" 12' 6" <sup>∞</sup>	60' 9" 12' 0" <sup>∞</sup>	390' 11" 10' 3" <sup>∞</sup>	8' 6 3/4" <sup>∞</sup>	6' 11 1/4" <sup>∞</sup>	5' 8 1/2" <sup>∞</sup>	4' 2 3/8" <sup>∞</sup>	3' 2" <sup>∞</sup>	2' 4 3/8" <sup>∞</sup>
10	14' 0" 7' 9 1/4" <sup>∞</sup>	14' 8" 7' 7" <sup>∞</sup>	18' 3" 6' 10 3/4" <sup>∞</sup>	27' 8" 6' 1 3/8" <sup>∞</sup>	103' 7" 5' 3 1/4" <sup>∞</sup>	4' 4 7/8" <sup>∞</sup>	3' 7" <sup>∞</sup>	2' 9" <sup>∞</sup>	2' 2 1/4" <sup>∞</sup>
7	8' 8" 5' 10 1/2" <sup>∞</sup>	8' 10 3/4" 5' 9 1/4" <sup>∞</sup>	10' 0" 5' 4 5/8" <sup>∞</sup>	12' 3" 4' 10 7/8" <sup>∞</sup>	17' 8" 4' 4 1/2" <sup>∞</sup>	48' 7" 3' 9 3/8" <sup>∞</sup>	3' 2 1/4" <sup>∞</sup>	2' 1 1/4" <sup>∞</sup>	2' 3/4" <sup>∞</sup>
5	5' 8 7/8" 4' 5 1/4" <sup>∞</sup>	5' 10" 4 1/2" <sup>∞</sup>	6' 3 1/4" 4' 1 7/8" <sup>∞</sup>	7' 1/4" 3' 10 5/8" <sup>∞</sup>	8' 5" 3' 6 3/4" <sup>∞</sup>	11' 9" 3' 2 1/4" <sup>∞</sup>	26' 7" 2' 9 1/4" <sup>∞</sup>	2' 3" <sup>∞</sup>	1' 11" <sup>∞</sup>
4	4' 5 1/4" 3' 7 3/4" <sup>∞</sup>	4' 5 3/4" 3' 7 3/8" <sup>∞</sup>	4' 8 5/8" 3' 5 5/8" <sup>∞</sup>	5' 1 1/4" 3' 3 1/2" <sup>∞</sup>	5' 9 1/4" 3' 3/4" <sup>∞</sup>	7' 3/4" 2' 9 1/2" <sup>∞</sup>	10' 4" 2' 5 3/4" <sup>∞</sup>	30' 1" 2' 1 3/4" <sup>∞</sup>	1' 9 5/8" <sup>∞</sup>

Depth-of-Field Chart (in meters) F=15mm

F No. D (m)	2	2.8	4	5.6	8	11	16	22	32
$\infty$	$\infty$ 9.5	$\infty$ 8.7	$\infty$ 6.2	$\infty$ 4.4	$\infty$ 3.1	$\infty$ 2.2	$\infty$ 1.6	$\infty$ 1.1	$\infty$ 0.8
10	$\infty$ 5.0	$\infty$ 4.7	$\infty$ 3.9	$\infty$ 3.1	$\infty$ 2.4	$\infty$ 1.8	$\infty$ 1.4	$\infty$ 1.0	$\infty$ 0.7
5	9.8 3.4	11 3.2	21 2.8	$\infty$ 2.4	$\infty$ 2.0	$\infty$ 1.6	$\infty$ 1.2	$\infty$ 0.9	$\infty$ 0.7
3	4.2 2.3	4.4 2.3	5.4 2.1	8.1 1.9	26.7 1.6	$\infty$ 1.3	$\infty$ 1.1	$\infty$ 0.9	$\infty$ 0.7
2	2.4 1.7	2.5 1.7	2.8 1.6	3.3 1.4	4.6 1.3	9.7 1.1	$\infty$ 0.9	$\infty$ 0.8	$\infty$ 0.6
1.5	1.7 1.33	1.8 1.32	1.9 1.25	2.1 1.17	2.5 1.07	3.4 0.96	7.4 0.84	$\infty$ 0.71	$\infty$ 0.58
1.2	1.33 1.10	1.34 1.08	1.41 1.04	1.52 0.99	1.72 0.92	2.09 0.84	3.00 0.75	7.97 0.65	$\infty$ 0.55

48 Depth-of-Field Chart (in feet) F=29mm

F No. D (ft.)	2	2.8	4	5.6	8	11	16	22	32
$\infty$	$\infty$ 118' 5 "	$\infty$ 106' 6 "	$\infty$ 75' 3 "	$\infty$ 53' 1 "	$\infty$ 37' 7 "	$\infty$ 26' 6 "	$\infty$ 18' 8 "	$\infty$ 13' 2 "	$\infty$ 9' 2 $\frac{7}{8}$ "
20	23' 10 " 17' 3 "	24' 4 " 17' 0 "	26' 9 " 15' 11 "	31' 1 " 14' 9 "	40' 3 " 13' 3 "	69' 1 " 11' 7 "	$\infty$ 9' 10 $\frac{5}{8}$ "	$\infty$ 8' 1 $\frac{3}{4}$ "	$\infty$ 6' 6 $\frac{1}{4}$ "
10	10' 10 " 9' 3 $\frac{1}{2}$ "	10' 11 " 9' 2 $\frac{5}{8}$ "	11' 4 " 8' 11 "	12' 1 " 8' 6 $\frac{1}{2}$ "	13' 2 " 8' 5 $\frac{5}{8}$ "	15' 1 " 7' 5 $\frac{1}{4}$ "	19' 2 " 6' 8 $\frac{5}{8}$ "	30' 6 " 5' 10 $\frac{7}{8}$ "	178' 2 " 5' 3 $\frac{3}{8}$ "
7	7' 4 $\frac{1}{2}$ " 6' 7 $\frac{1}{8}$ "	7' 5 $\frac{1}{4}$ " 6' 7 $\frac{1}{2}$ "	7' 7 $\frac{3}{8}$ " 6' 5 $\frac{3}{4}$ "	7' 10 $\frac{3}{4}$ " 6' 3 $\frac{3}{8}$ "	8' 4 $\frac{1}{4}$ " 6' 1 $\frac{1}{4}$ "	9' 5 $\frac{5}{8}$ " 5' 8 $\frac{1}{4}$ "	10' 4 " 5' 3 $\frac{1}{4}$ "	12' 9 " 4' 10 "	19' 1 " 4' 2 $\frac{1}{2}$ "
5	5' 2 $\frac{1}{8}$ " 4' 9 "	5' 2 $\frac{3}{8}$ " 4' 9 $\frac{3}{4}$ "	5' 3 $\frac{3}{8}$ " 4' 8 $\frac{7}{8}$ "	5' 5 " 4' 7 $\frac{3}{4}$ "	5' 7 $\frac{1}{4}$ " 4' 6 $\frac{1}{8}$ "	5' 10 $\frac{7}{8}$ " 4' 4 "	6' 4 $\frac{1}{2}$ " 4' 1 $\frac{1}{4}$ "	7' 2 $\frac{1}{8}$ " 3' 9 $\frac{3}{4}$ "	8' 8 $\frac{1}{2}$ " 3' 5 $\frac{1}{2}$ "
4	4' 1 $\frac{1}{4}$ " 3' 10 $\frac{3}{4}$ "	4' 1 $\frac{3}{8}$ " 3' 10 $\frac{5}{8}$ "	4' 2 " 3' 10 $\frac{1}{8}$ "	4' 3 " 3' 9 $\frac{3}{8}$ "	4' 4 $\frac{1}{4}$ " 3' 8 $\frac{3}{8}$ "	4' 6 $\frac{1}{4}$ " 3' 7 "	4' 9 $\frac{3}{8}$ " 3' 5 $\frac{1}{4}$ "	5' 2 $\frac{3}{8}$ " 3' 2 $\frac{3}{4}$ "	5' 10 $\frac{7}{8}$ " 2, 11 $\frac{7}{8}$ "

Depth-of-Field Chart (in meters)      F=29mm

F No. D (m)	2	2.8	4	5.6	8	11	16	22	32
$\infty$	$\infty$ 36.1	$\infty$ 32.5	$\infty$ 22.9	$\infty$ 16.2	$\infty$ 11.4	$\infty$ 8.1	$\infty$ 5.7	$\infty$ 4.0	$\infty$ 2.8
10	13.7 7.9	14.3 7.7	17.3 7.0	24.7 6.3	62.9 5.4	$\infty$ 4.5	$\infty$ 3.7	$\infty$ 2.9	$\infty$ 2.2
5	5.8 4.4	5.9 4.4	6.3 4.2	7.0 3.9	8.5 3.5	11.8 3.2	26.7 2.7	$\infty$ 2.3	$\infty$ 1.9
3	3.2 2.8	3.3 2.8	3.4 2.7	3.6 2.6	3.9 2.4	4.5 2.2	5.7 2.0	8.8 1.8	41.4 1.5
2	2.1 1.9	2.1 1.9	2.2 1.9	2.2 1.8	2.4 1.8	2.5 1.7	2.9 1.5	3.4 1.4	4.9 1.2
1.5	1.55 1.45	1.56 1.45	1.58 1.42	1.62 1.39	1.68 1.35	1.77 1.30	1.90 1.23	2.14 1.15	2.58 1.04
1.2	1.23 1.17	1.24 1.17	1.25 1.15	1.27 1.13	1.31 1.11	1.35 1.08	1.43 1.03	1.55 0.97	1.76 0.90

50 Depth-of-Field Chart (in feet) F=50mm

F No. D (ft.)	2	2.8	4	5.6	8	11	16	22	32
∞	342' <sup>∞</sup> "	308' <sup>∞</sup> "	218' <sup>∞</sup> "	154' <sup>∞</sup> "	109' <sup>∞</sup> "	77' <sup>∞</sup> "	54' <sup>∞</sup> "	38' <sup>∞</sup> "	27' <sup>∞</sup> "
20	21' 2" / 18' 11"	21' 4" / 18' 10"	21' 11" / 18' 5"	22' 10" / 17' 9"	24' 3" / 16' 11"	26' 7" / 15' 11"	30' 8" / 14' 9"	39' 3" / 13' 4"	64' 5" / 11' 8"
10	10' 3" / 9' 8 <sup>7</sup> / <sub>8</sub> "	10' 4" / 9' 8 <sup>1</sup> / <sub>2</sub> "	10' 5" / 9' 7 <sup>1</sup> / <sub>4</sub> "	10' 8" / 9' 5 <sup>1</sup> / <sub>4</sub> "	10' 11" / 9' 2 <sup>5</sup> / <sub>8</sub> "	11' 4" / 8' 11 <sup>1</sup> / <sub>4</sub> "	12' 0" / 8' 6 <sup>5</sup> / <sub>8</sub> "	13' 1" / 8' <sup>3</sup> / <sub>4</sub> "	14' 11" / 7' 5 <sup>3</sup> / <sub>8</sub> "
7	7' 1 <sup>1</sup> / <sub>2</sub> " / 6' 10 <sup>1</sup> / <sub>2</sub> "	7' 1 <sup>5</sup> / <sub>8</sub> " / 6' 10 <sup>3</sup> / <sub>8</sub> "	7' 2 <sup>3</sup> / <sub>8</sub> " / 6' 9 <sup>3</sup> / <sub>4</sub> "	7' 3 <sup>1</sup> / <sub>2</sub> " / 6' 8 <sup>3</sup> / <sub>4</sub> "	7' 5" / 6' 7 <sup>1</sup> / <sub>2</sub> "	7' 8 <sup>1</sup> / <sub>4</sub> " / 5' 5 <sup>3</sup> / <sub>4</sub> "	7' 10 <sup>5</sup> / <sub>8</sub> " / 6' 3 <sup>3</sup> / <sub>8</sub> "	8' 3 <sup>3</sup> / <sub>4</sub> " / 6' <sup>1</sup> / <sub>4</sub> "	9' 0" / 5' 8 <sup>1</sup> / <sub>4</sub> "
5	5' 3 <sup>3</sup> / <sub>4</sub> " / 4' 11 <sup>1</sup> / <sub>4</sub> "	5' 3 <sup>3</sup> / <sub>4</sub> " / 4' 11 <sup>1</sup> / <sub>4</sub> "	5' 1 <sup>1</sup> / <sub>8</sub> " / 4' 10 <sup>7</sup> / <sub>8</sub> "	5' 1 <sup>5</sup> / <sub>8</sub> " / 4' 10 <sup>1</sup> / <sub>2</sub> "	5' 2 <sup>3</sup> / <sub>8</sub> " / 4' 9 <sup>3</sup> / <sub>4</sub> "	5' 3 <sup>3</sup> / <sub>8</sub> " / 4' 8 <sup>7</sup> / <sub>8</sub> "	5' 4 <sup>7</sup> / <sub>8</sub> " / 4' 7 <sup>3</sup> / <sub>4</sub> "	5' 7 <sup>1</sup> / <sub>8</sub> " / 4' 6 <sup>1</sup> / <sub>8</sub> "	5' 10 <sup>5</sup> / <sub>8</sub> " / 4' 3 <sup>7</sup> / <sub>8</sub> "
4	4' 3 <sup>3</sup> / <sub>8</sub> " / 3' 11 <sup>5</sup> / <sub>8</sub> "	4' 1 <sup>1</sup> / <sub>2</sub> " / 3' 11 <sup>1</sup> / <sub>2</sub> "	4' 5 <sup>5</sup> / <sub>8</sub> " / 3' 11 <sup>3</sup> / <sub>8</sub> "	4' 1" / 3' 11"	4' 1 <sup>3</sup> / <sub>8</sub> " / 3' 10 <sup>5</sup> / <sub>8</sub> "	4' 2" / 3' 10 <sup>1</sup> / <sub>8</sub> "	4' 2 <sup>7</sup> / <sub>8</sub> " / 3' 9 <sup>3</sup> / <sub>8</sub> "	4' 4 <sup>1</sup> / <sub>4</sub> " / 3' 8 <sup>1</sup> / <sub>4</sub> "	4' 6 <sup>1</sup> / <sub>4</sub> " / 3' 6 <sup>7</sup> / <sub>8</sub> "

Depth-of-Field Chart (in meters) F=50mm

F No. D (m)	2	2.8	4	5.6	8	11	16	22	32
$\infty$	$\infty$ 104	$\infty$ 94	$\infty$ 66	$\infty$ 47	$\infty$ 33	$\infty$ 23	$\infty$ 17	$\infty$ 12	$\infty$ 9
10	11 9.2	11 9.1	12 8.8	13 8.3	14 7.7	18 7.1	24 6.3	55 5.4	$\infty$ 4.6
5	5.2 4.8	5.3 4.8	5.4 4.7	5.6 4.5	5.8 4.4	6.3 4.2	7.0 3.9	8.3 3.6	11.4 3.2
3	3.1 2.9	3.1 2.9	3.1 2.9	3.2 2.8	3.3 2.8	3.4 2.7	3.6 2.6	3.9 2.4	4.4 2.2
2	2.03 1.92	2.04 1.96	2.05 1.95	2.08 1.93	2.11 1.90	2.16 1.86	2.23 1.81	2.34 1.74	2.52 1.65
1.5	1.52 1.48	1.52 1.48	1.53 1.47	1.54 1.46	1.56 1.45	1.58 1.42	1.62 1.39	1.68 1.35	1.76 1.30
1.2	1.21 1.19	1.21 1.19	1.22 1.18	1.22 1.18	1.24 1.17	1.25 1.15	1.27 1.13	1.30 1.10	1.35 1.07

## MAINTENANCE AND CARE

Your camera should be examined and cleaned from time to time in normal use. When it has been exposed to dust, dirt, or corrosive conditions (such as salt spray), it should be cleaned as soon as practicable after such exposure. It should be kept and stored under proper conditions. If you take care of your camera, it will serve you well for many years.

### Care after use and from time to time

Gently whisk dust, salt particles, or other loose, dry matter off the lens and barrel with a ball-bellows lens brush, then wipe gently with a soft silicon-treated cloth.

If the lens is still not clean, swab it with a gentle circular motion from the center outward with a soft, clean cloth or special photographic lens tissue.

For stubborn stains, place only one drop of lens-cleaning fluid on lens tissue or absorbent cotton and swab lens **gently**. Do NOT drop lens-cleaning fluid directly on lens surface.

### Storage precautions

Store your camera in its case when not in use. Frame speed dial should of course be turned to OFF.

When the camera is to be unused for more than a month, be sure to remove the batteries from the handgrip chamber.

Do not store your camera where the temperature or humidity are high or near salts or corrosive chemicals.

When storing your camera for an extended period, it is best to place the case containing it into an airtight container (such as a heavy or double plastic bag) along with a small bag of a drying agent (such as silica gel).

We hope that you'll enjoy your Minolta camera.

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If you have any questions, ask your Minolta dealer. He is knowledgeable in all aspects of photography, and he can help you with all of your photographic needs.

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