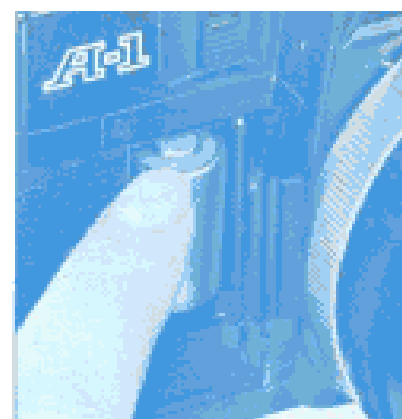
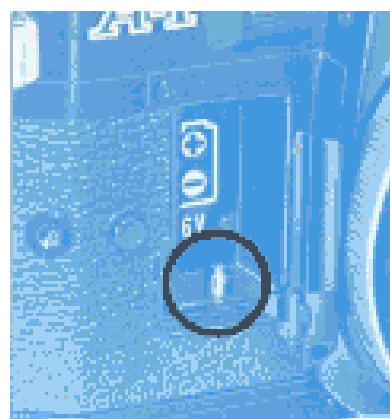




Loading the Battery

This camera will not function unless a battery is loaded. Use one brand-new silver oxide or alkaline-manganese battery as specified in the table below or an equivalent battery of another brand.

Usable Batteries	
Silver Oxide Battery (6V)	Eveready (UCAR) No. 544 JIS 4G13 Mallory PX 28
Alkaline-manganese Battery (6V)	Eveready (UCAR) No. 537

It can be loaded and unloaded more easily before the lens is mounted, and, of course, if the action grip is attached, it must be removed while loading. You should always wipe the battery poles with a clean, dry cloth before insertion to prevent any cor-

rosion and damage to the camera due to dirt or fingerprints.

To load the battery:

1. Apply either a fingernail or the eyepiece protective cover, which is inserted into the accessory shoe of the camera, into the groove of the battery chamber cover and lift lightly so that the cover flips up.
2. Following the diagram on the inside of the battery chamber, load the battery negative pole first, pushing it downwards in the chamber. Make sure the poles are facing in the correct directions. Incorrect loading can lead to possible corrosion and damage to the battery terminals besides causing the battery to discharge very quickly.

To unload the battery, simply tip the positive end forwards and pull it out from the top. The battery should be removed if the camera is not to be used for an excessively long period of time.

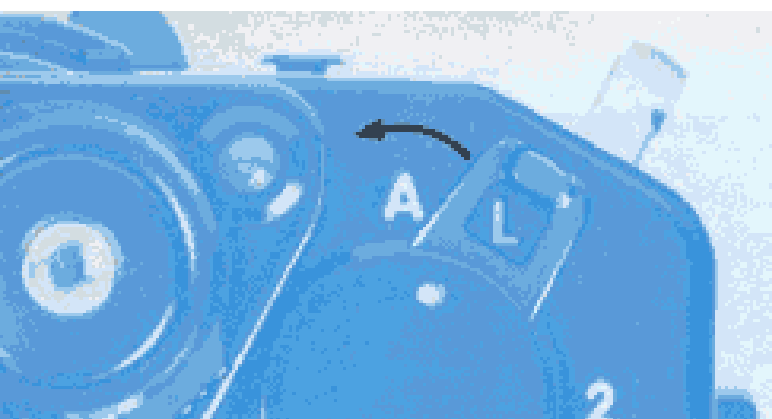


The battery check button also serves to cancel the self-timer or to cancel the shutter in long exposures. The circuit is cancelled the moment you press the button, and the second shutter curtain will close when your finger is removed from the button. The shutter will not be released if you press the shutter button while pressing the battery check button.

Getting a Feel for Your A-1

Now that the battery is loaded, your A-1 will function. Before loading the film or doing anything else, play with it a little. Operate the shutter button and the film advance lever until they feel like natural extensions of your fingers.

Shoot and develop at least one roll of film with a new camera before using it on a shooting expedition or on a trip to make sure you know how to operate it properly and that everything is in proper operation.



Film Advance and Shutter Release

At the base of the film advance lever is the main switch of the camera. When it is at the "L" (LOCK) setting, all active circuits are turned off and the shutter button is locked to prevent unintentional shutter release. This switch should always be in the "L" position to prevent battery consumption and film wastage when the camera is not in use, such as when it is in a camera case.

When the main switch is set at "A", the shutter button can be operated. The shutter button serves to activate both the AE meter and shutter operation. Since it is electromagnetic, it requires only gentle pressure for both a very smooth shutter release as well as immediate meter response when shooting in quick succession. Pressing the shutter button lightly only halfway gives a meter reading preview inside the viewfinder. When you press it gently all the way, the mirror flips up, the diaphragm closes down and the



shutter releases. After shutter release, the mirror and diaphragm automatically reset and the film advance lever is ready to be advanced.

With the tip of your thumb, lightly push the film advance lever away from the camera body to its 30° stand-off position. Now it can be easily operated with the tip of your thumb. Push it all the way to the right in a single, short 120° throw to wind the film, cock the shutter and prepare the diaphragm and mirror for the next shutter release all in one motion. Or you can advance the lever in several short strokes. Each winding will also advance the number in the frame counter, indicating the number of pictures taken.



Attaching a Cable Release

A cable release is a device which, used in conjunction with a tripod, allows the shutter to be held open for long exposures without your ever having to touch either camera or shutter button directly. This is especially useful for reducing the chances of blurred images in copy work, photomacrography and photomicrography.

The A-1 is provided with a socket for a cable release in the center of the shutter button. The cable release simply screws into this socket. The main switch must also be at the "A" setting.

Holding the Camera

The best precaution in preventing camera shake is to press the shutter button gently. Never punch it. It is also helpful to hold the camera properly, not only for good image results but also for comfort and ease in handling.

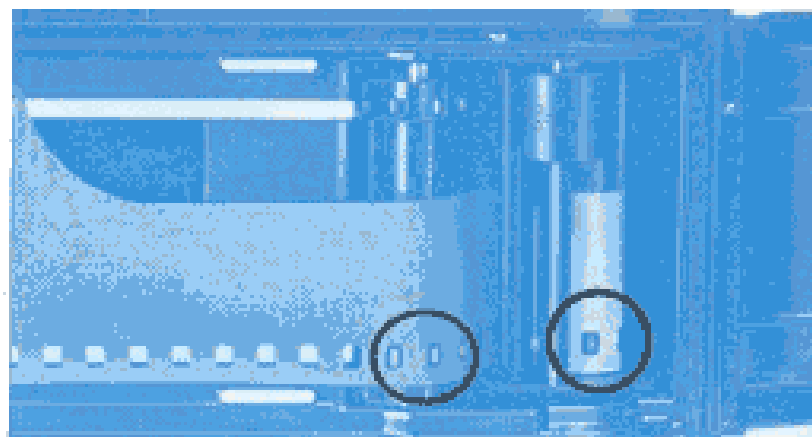
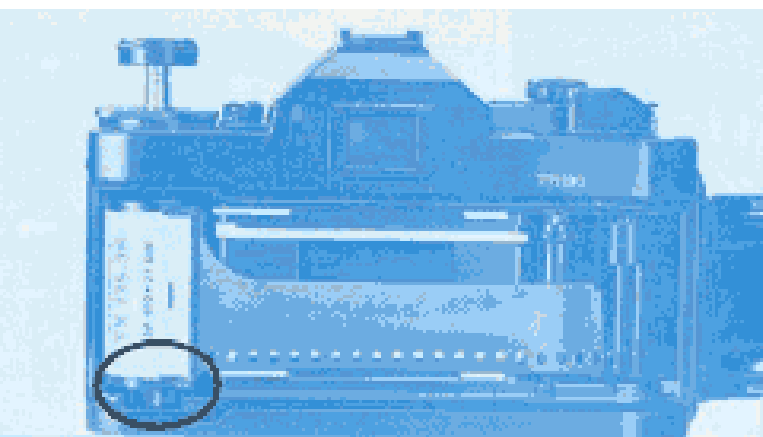
We suggest first that you hold the camera firmly in both hands, the tip of your right thumb on the film advance lever, the right index finger on the shutter button and the other right fingers on the finger grip. For best balance and easy focusing, the left thumb and index finger should be under the lens barrel. Press both elbows firmly against your body when holding the camera in a horizontal position, at least one elbow in a vertical position. Press the camera firmly to your cheek or forehead. Spread your feet slightly apart with one a little ahead of the other. Don't tense up. Now release the shutter button gently as you exhale.

It is always advisable to lean against a steady support, such as a wall or a tree, if any is available. Use a tripod and a cable release with a telephoto lens or when shooting at a shutter speed of 1/30 sec. or slower.

If the tripod screw of your tripod is quite long, be especially careful not to forcefully screw it all the way in beyond the limit of the camera's tripod socket.

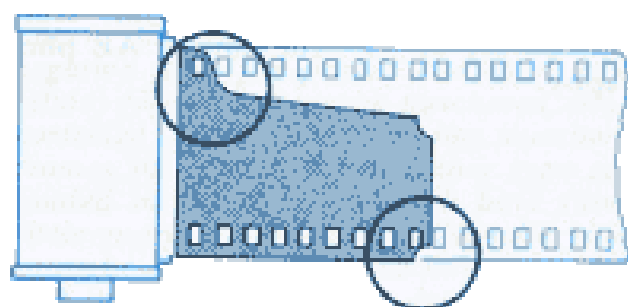
Since this is a single-lens reflex camera, the viewing lens and the camera lens are not separate. When you look into the camera's viewfinder, you are seeing your subject through the lens exactly as the lens "sees" it and exactly as it will be exposed. There is no need to be concerned with parallax.

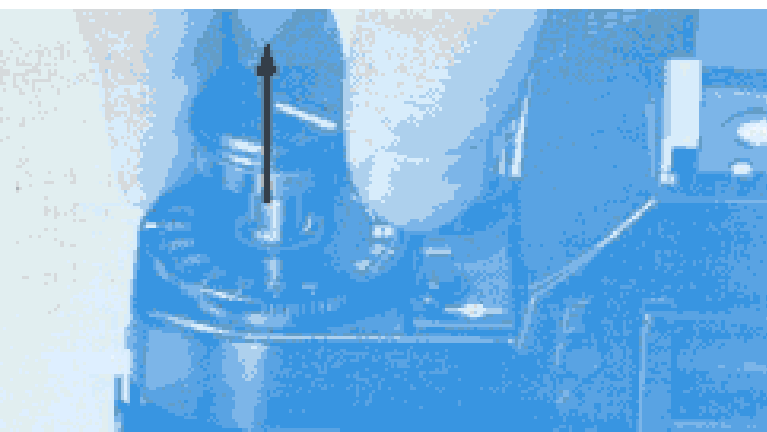




rewind crank clockwise to take up film slack, open the back cover and reload the film.

The A-1 can also be loaded with bulk film in which case the tip of the film should be trimmed as illustrated below before it is loaded into the camera.





Film Loading

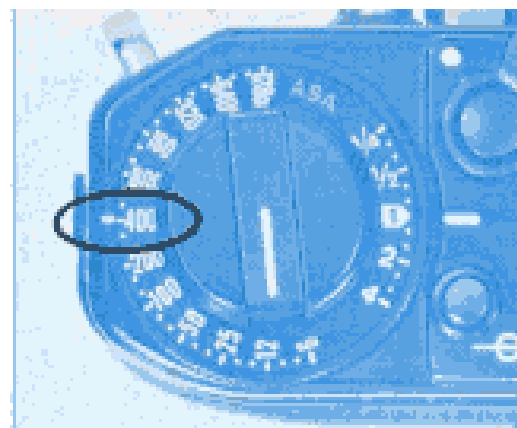
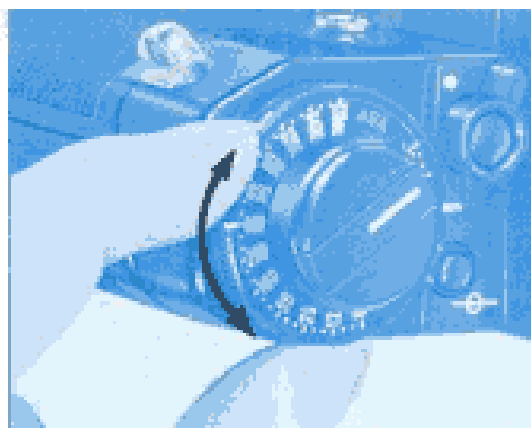
The Canon A-1 accepts color or black and white film in standard 35mm cartridges. When loading and unloading film, avoid direct sunlight and take care not to touch the shutter curtain, the film rails or the pressure plate.

To load the film, first fold out the rewind crank and sharply pull up the rewind knob. The camera's back cover will pop open. Put the cartridge into the film cartridge chamber so that the protruding part of the spool is on the bottom and push down and rotate the rewind knob until it drops into its fully-seated position. Now pull the film leader across the camera and insert the tip up to at least the first perforation of the film into any slot of the multi-slot take-up spool. Advance the film once, making sure the film sprocket holes are engaged with the teeth of the film transport sprocket.



Check to see that the cartridge is in a fully-seated position and that the film is taut. If there is film slack, gently turn the rewind crank clockwise until it stops. Snap the back cover shut. Gently turn the rewind crank in the direction of the arrow to take up film slack and then fold the rewind crank back in.

Switch the AE mode selector to Tv and turn the AT dial to a fast shutter speed. Now make two blank shots, turning the film advance lever and releasing the shutter, so that the frame counter advances from "S" to "0". While doing this, keep an eye on the rewind knob. If it rotates, the film is properly loaded. If it does not rotate, chances are that the film is sagging or the film perforations are not properly engaged in the take-up spool and film transport sprocket. If the rewind knob still does not rotate once you have gently turned the



Setting the ASA Film Speed

The ASA is a numerical rating of a film's sensitivity to light. The higher the ASA rating, the faster the film and the more sensitive it is to a given amount of light as compared to a film of a lower ASA rating. In other words, the higher the ASA rating, the less light you need to expose the film. When buying film, choose one with an ASA rating appropriate for the lighting conditions. The film manufacturer's recommended ASA rating can be found on the film packaging or data sheet.

Since the ASA film speed is one of the essential factors in determining proper exposure, it is very important that it be correctly set on the camera. The table on the opposite page shows the ASA ratings which can be set on the A-1. Figures in parentheses are intermediate film speeds which are indicated by dots on the ASA dial. To set the

ASA, press in the ASA film speed dial lock button with your fingernail and turn the outer knurled edge of the dial until the desired film speed rating is aligned with the film speed index. The dial cannot be turned lower than ASA 6 or higher than ASA 12800.

There is an exposure compensation scale on the ASA film speed setting dial. The function of this scale will be explained later, but at this point, please note that this scale should be set at "1" for normal AE photography.

ASA	6	•	•	12	•	•	25	•	•	50	•	•	100	•	•	200	•	•	400	•
	(8)	(10)		(16)	(20)		(32)	(40)		(64)	(80)		(125)	(160)		(250)	(320)		(500)	
	•	800	•	•	1600	•	•	3200	•	•	6400	•	•	12800						
	(650)		(1000)	(1250)		(2000)	(2500)		(4000)	(5000)		(8000)	(10000)							

The choice of film is an important part of photography, and you have a wide variety to choose from. Films differ in a number of ways including ASA rating, exposure latitude, color rendition and color temperature among other variables. Some, such as infrared film, require the use of certain filters. Depending on the type of film, a color temperature conversion filter may be necessary under certain lighting conditions. And, of course, you have the basic choice between two types of color film: color negative film (for prints) and color reversal (slide) film. Film can be purchased either in cartridge form with varying numbers of frames or in bulk form. Either type can be loaded in the A-1. Although bulk film is a little more complicated to handle since it must be cut to the desired number of frames and handled in complete darkness, there are simple devices for this purpose on the

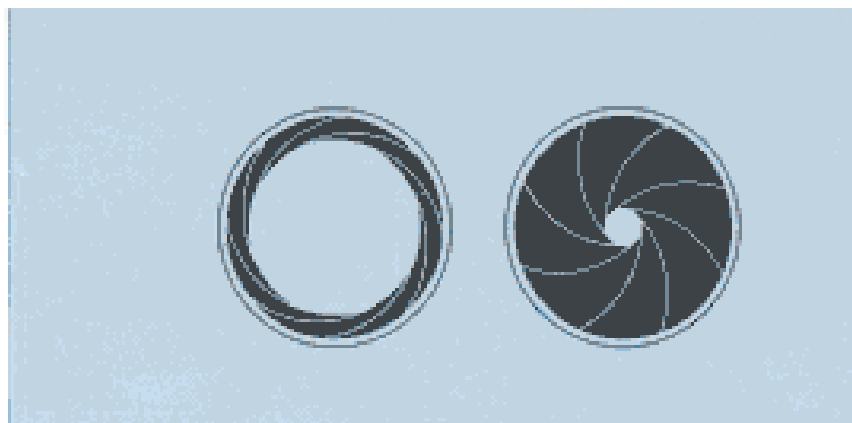
market and it is cheaper than cartridge film. For more information concerning film, please refer to a book on photography or ask your local film dealer, and please pay careful attention to the film data sheet.

Aside from those instances when a specific filter is required, filters can also be used to emphasize certain colors for more clarity or special effects. Canon offers a wide variety of filters for both black and white and color films. It also offers a gelatin filter holder which can hold up to three filters at a time and can be attached to various diameter lenses by means of adapters. Since the A-1 has a through-the-lens meter, there is no need to make any exposure correction with filter factors when a filter is attached.



Memo Holder

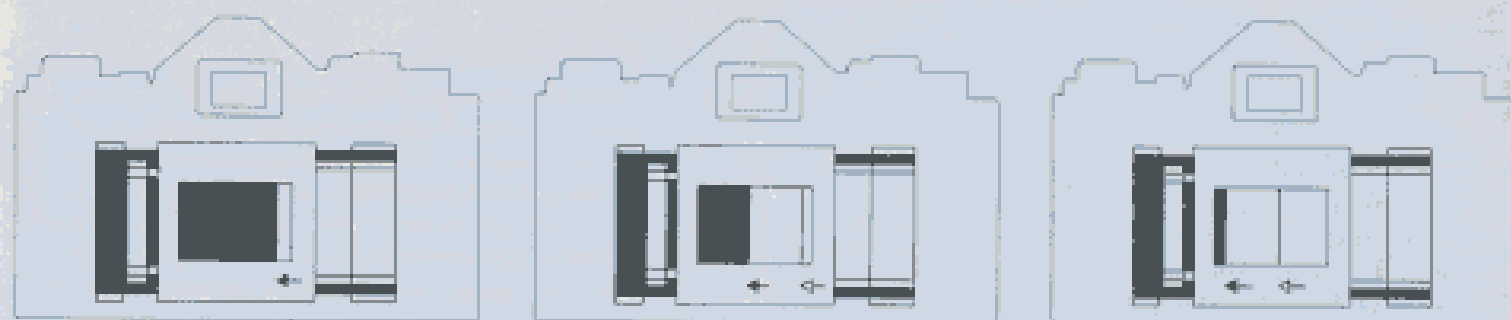
The back cover of this camera is provided with a memo holder. Once you have loaded the film and set the ASA, it is very useful to tear off the end of the film box and insert it into this memo holder as a constant reminder of the type of film in use. Add other information as you like.



The Basics of Exposure

This section contains some terms and definitions which will be used throughout this instruction booklet.

The amount of exposure is a matter not only of the amount of light allowed to strike the film but also of the amount of time the light is allowed to strike the film. The camera has two mechanisms to control exposure, the diaphragm and the shutter. The diaphragm consists of blades which open and close to certain size openings called apertures. The size of the aperture determines the amount of light which will fall on the film. The various size apertures are indicated by a set series of numbers called *f/stops* or *f/numbers*. Each *f/stop* represents some amount of light that is allowed to pass through the lens. The smaller numbers are called large *f/stops* while the larger numbers are called small *f/stops*. This is because the larger numbers represent smaller apertures and allow less light to pass



through the lens. Each time you move from one *f*/stop to the next smaller *f*/stop (larger number), the amount of light allowed through is exactly halved. In effect, the amount of exposure itself is also halved. Using *f*/2 as a standard, the amount of light reaching the film will change according to *f*/stop as indicated below:

On the A-1, aperture can be controlled either by turning the AT dial or the lens aperture ring to the desired *f*/stop. Otherwise the camera controls the aperture.

The largest *f*/stop on the lens is called the lens maximum aperture. The smallest *f*/stop on the lens is called the lens minimum aperture. The maximum and minimum apertures differ according to the lens. The maximum lens aperture is important because it indicates the largest amount of light that the lens will transmit. Sometimes the maximum aperture is a half-*f*/stop rather than a full *f*/stop on the aperture scale.

<i>f</i> /stop	1.2*	1.4*	1.8*	(2)	2.8	3.5*	4	5.6	8	11	16	22
Brightness ratio	3	2	1½	(1)	½	⅓	¼	⅛	⅙	⅓	¼	⅙

*Half *f*/stops.

The length of time that the light is allowed to strike the film is determined by the shutter speed. The relationship between shutter speeds is like that between f/stops. As you move from one shutter speed to the next higher shutter speed, exposure is halved. Your image is actually exposed by the opening of the shutter. Shutter speed can be controlled on the A-1 by turning the AT dial. Otherwise the camera controls it. Now suppose that you have the camera set for a certain exposure value (EV), say the exposure you get with f/4 at 1/60 sec. There are certain other combinations of aperture and shutter speed which will give you the same amount of exposure as that above. Some of these combinations in this example include f/5.6 at 1/30 sec, and f/2.8 at 1/125 sec. You simply move up and down the f/number and shutter speed scales. It is not important to know this relationship when you use the A-1 in an AE mode. The camera will do the figuring for you. But it is an important photographic fact which you may find useful when you use the camera manually or in correcting exposure.

AE Photography

AE photography means automatic exposure. The camera is selecting either shutter speed or aperture or both for you.

The most obvious, unusual feature of this camera is the absence of the shutter speed dial which has been replaced by the AT dial. This dial allows you to set either shutter speed or aperture for any of five different AE modes.

Through-the-lens full-aperture metering

Shutter-speed priority AE

Aperture priority AE

Programmed AE

AE flash photography

Through-the-lens stopped-down metering

Stopped-down AE

In shutter-speed priority AE, you set the shutter speed, and the camera automatically selects the necessary aperture according to lighting conditions for correct exposure. Shutter-speed priority AE is applicable to most subjects but especially useful in action photography.

In aperture priority AE, you set the aperture while the camera automatically selects the necessary shutter speed for correct exposure. It is convenient for the various forms of still photography in which depth of field is of importance.

The camera automatically selects both



Instead of an “A” mark, some earlier FD lenses have a small green circle on the aperture ring for AE photography. Its use is the same as that of the “A” mark, and the procedure is the same as that described above except that some of these lenses may not have an EE lock pin for locking the aperture ring at the automatic setting.



AE Mode Selector

The AE mode selector has two possible settings, Tv (time value) and Av (aperture value). When the AE mode selector is switched to Tv, the camera is set for the shutter-speed priority AE mode. You set the shutter speed and the camera selects the aperture. When switched to Av, the camera is set for aperture priority. Here you set the aperture, and the camera automatically selects the shutter speed.

The AE mode selector click stops at  for Tv and at  for Av.

aperture and shutter speed in the programmed AE mode. This mode is helpful when your only goal is correct exposure and neither depth of field nor control of movement are very important in the picture. It is the easiest mode for the beginner.

In stopped-down AE, you set the aperture manually on the lens aperture ring while the camera automatically selects a shutter speed for correct exposure. This is a big advantage when using non-FD lenses and in specialized areas of photography such as photomacrography and photomicrography.

AE flash photography is possible with the Canon Speedlites 155A or 199A. In this mode, the camera sets both aperture and shutter speed automatically, eliminating any worries about guide number calculations and flash synchronizing shutter speeds.

The first three AE modes discussed above are explained in more detail in the following sections. For more information concerning the stopped-down AE and AE flash modes, please refer to the section entitled SPECIALIZED PROCEDURES.

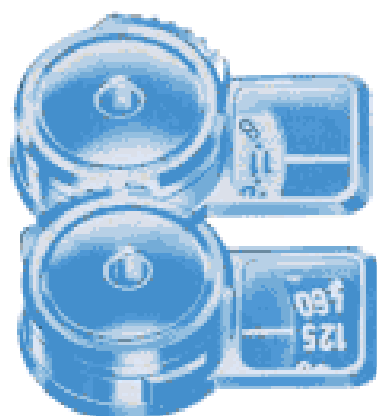
Please note that shutter priority AE, aperture priority AE, programmed AE and AE flash are possible only with an FD lens and only when the lens aperture ring is set to the "A" mark. See SETTING THE LENS FOR AE PHOTOGRAPHY.



Setting the Lens for AE Photography

The first four AE modes described above, i.e. shutter-speed priority AE, aperture priority AE, programmed AE and AE flash photography, are performed with full aperture metering through the lens. This means that the diaphragm is fully open during metering for easiest viewing and operation.

For correct operation in these four full-aperture metering AE modes, only an FD lens can be used and the lens aperture ring must be set to the "A" mark. To do this, simply hold in the EE lock pin on the lens while turning the aperture ring from the minimum aperture to the "A" mark. This can be done either before or after the lens is mounted on the camera. At the "A" mark, the aperture ring is locked and cannot be turned to any other setting. Reverse the procedure to disengage the aperture ring from the "A" mark.

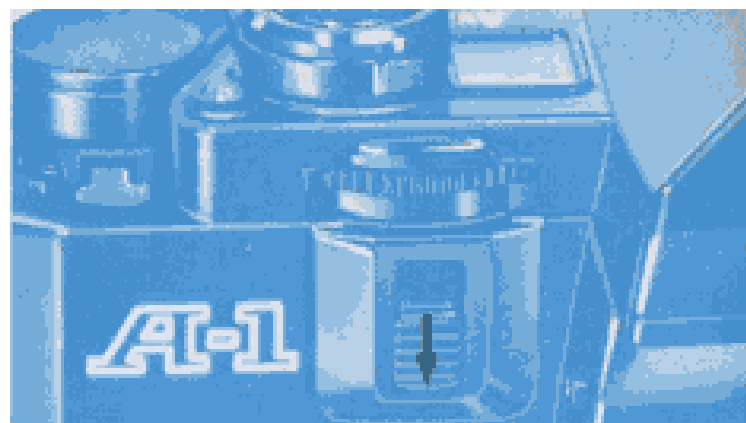


AT Dial

This dial works in conjunction with the AE selector. When the AE selector is set at Tv, it shows the shutter speed scale. When the AE selector is set to Av, it shows the aperture scale.

To operate the AT dial, first slide down the AT dial guard which is designed to prevent accidental movement of the dial. Depending on the setting of the AE selector, turn the AT dial until it click stops at the exact aperture or shutter speed desired so that the setting is aligned with the index mark. The AT dial will not turn past the highest and lowest limits of each scale.

The figure set on the AT dial has priority in determining the exposure. If, for example, you have set a shutter speed on the dial, the camera balances the aperture against the shutter speed you have selected until exposure is correct.



If, on the other hand, you have set an aperture on the dial, the camera selects the necessary shutter speed for correct exposure.



Shutter Speed Scale on the AT Dial

There is a choice of 16 click-stop settings ranging from 1/1000 (sec.) to 30 (sec.) on the AT dial's shutter speed scale. The slow shutter speeds from 2 (sec.) to 30 (sec.) are marked in orange while shutter speeds from 1 (sec.) to 1/1000 (sec.) are in white. The white numbers on the scale are the reciprocals of the true shutter speeds so that a white 2 indicates a speed of 1/2 sec. while a white 1000 indicates a speed of 1/1000 sec. Be careful not to confuse the slower orange range with the faster white range.

Above the highest speed of 1/1000 is the "P" for programmed AE. Below the lowest speed of 30 is the "B" setting. The dial will not turn past the "P" or the "B".

The "B" (Bulb) setting is intended for exposures longer than 30 sec. When the shutter speed is set at "B", the shutter will remain open as long as you press the shutter

button. AE photography is not possible at the "B" setting. The aperture must be set manually. Remember that it is very important to use a tripod and a cable release, preferably with a lock, in long exposures to reduce the chance of image blur. Also, since long exposures present a real drain on the battery, it may be wise to carry a spare.

The A-1 has a hot shoe and PC outlet for an X-synch (flash synchronization) at 1/60 sec. (the $\frac{1}{2}$ position). This shutter speed need not be considered, however, when the A-1 is used with specified Canon flash units (see page 83).

Intermediate settings on the shutter speed scale cannot be used. However, if you accidentally set an intermediate shutter speed, the camera will automatically select the next lower or higher shutter speed as the effective shutter speed, and that shutter speed will be displayed when you take an exposure preview.

If you mistakenly try a time exposure on "bulb" while the lens is still at "A", exposure will take place at the lens minimum aperture.



Aperture Scale on the AT Dial

The aperture scale on the AT dial is calibrated in *f*/stops ranging from *f*/22 to *f*/1.2. The *f*/1.2 setting is indicated by a dot. The dial click-stops at both full and half *f*/stops. It will not turn past the largest and smallest *f*/stops. The maximum aperture indicated on the AT dial is large enough for any Canon lens.

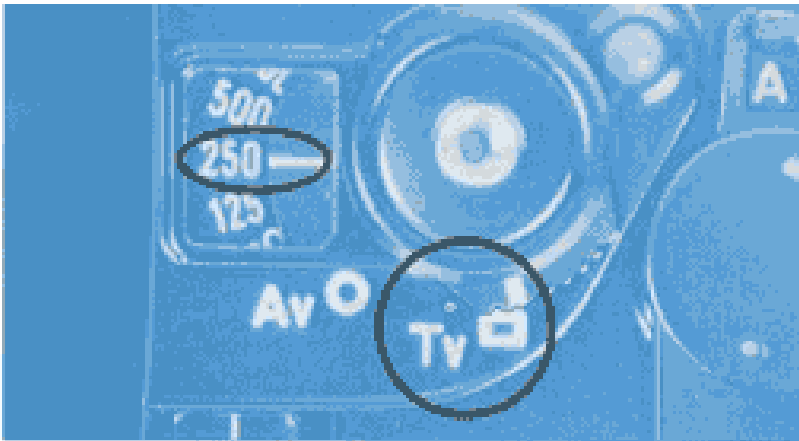
Under certain conditions in the aperture priority AE mode, the maximum and minimum apertures on the lens have priority over the aperture set on the AT dial. For instance, if the aperture you have set on the AT dial is larger than the maximum aperture of the lens in use, the camera will match the shutter speed to the lens maximum aperture rather than the aperture you have set on the AT dial for correct exposure. Thus, if you are using an FD 50mm *f*/1.8 S.C. lens with the AT dial set to *f*/1.4, the camera will use

f/1.8 as the aperture setting. In this case, the maximum aperture of the lens will be displayed in the viewfinder when you take an exposure preview regardless of the setting on the AT dial. On the other hand, if you have set an aperture on the AT dial smaller than the minimum aperture of the lens, the image will be exposed at the lens minimum aperture but the shutter speed will not be adjusted accordingly, resulting in over-exposure. In this case, the aperture set on the AT dial will be displayed in the digital read-out.

Since the smallest aperture that can be set on the AT dial is *f*/22, if you want to set an aperture smaller than *f*/22, switch to stopped-down AE and manually set the aperture on the lens aperture ring.

Shutter-Speed Priority vs. Aperture Priority

Having now read how to control the camera for shutter-speed priority and aperture priority AE photography, you might well wonder when it is best to use which mode. Basically, it depends upon what you want your photograph to portray. Shutter speeds are most effectively used to freeze or emphasize movement. The shutter-speed priority AE mode is applicable to most photographic situations. Aperture priority is most applicable to still photography such as portraiture and landscape photography in which depth of field is an important factor. Some of the best creative commercial and architectural photographs are taken in the aperture priority AE mode. This, however, does not apply to such fields of photography as close-ups and photomicrography for which you should refer to the section entitled STOPPED-DOWN AE.



Selecting a Shutter Speed

The table below can be used as a general guide in selecting an appropriate shutter speed according to lighting conditions when using a standard 50mm lens and 100 ASA film.

Brightness	Shutter Speed (Seconds)
Indoors	1/30 to 1/60
Outdoors	1/125 to 1/250
Mid-summer Beach or Snow-covered Mountains	1/500 to 1/1000

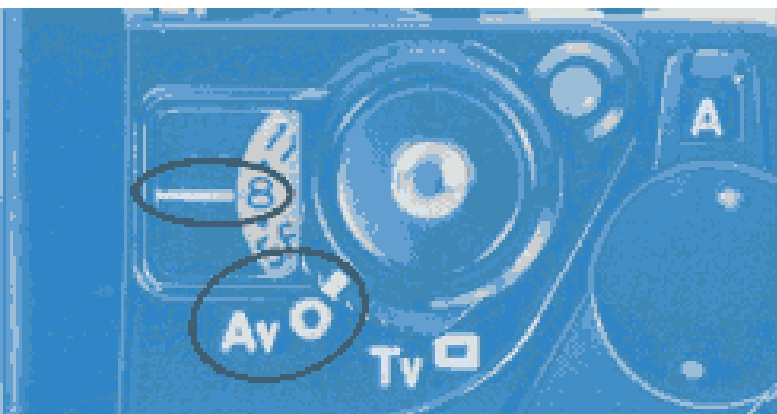
This table does not necessarily apply when using a lens of a different focal length. If you are using a telephoto lens, for instance, any subject movement and the least bit of camera shake can have a magnified effect on image sharpness. For a telephoto it is necessary to use faster shutter speeds than with a standard lens under the same lighting conditions. It is generally said that, for sharp image results in hand-held shooting, the minimum shutter speed should be equal to or faster than 1 divided by the focal length of the lens. This means that for a 100mm lens, the shutter speed should be at least 1/125 sec.; for a 200mm lens, it should be at least 1/250 sec.

There are other considerations in the selection of shutter speed. You can usually freeze the action of relatively slowly moving pedestrians or traffic at a shutter speed of 1/250 sec. The same is not necessarily true of a rapidly moving bicycle. Instead of freezing the action, you may want to emphasize it by blurring some part of the picture. For instance, you could blur a moving subject with a relatively slow shutter speed. Or, using a panning technique, turning the upper part of your body to follow the subject's movement, at a relatively slow shutter speed of perhaps 1/30 sec., you can

blur the background to stress the movement. In this last technique, it is best to continue panning as you release the shutter.

The direction of movement should also be considered. A subject moving directly across in front of the camera will be blurred to a greater degree than a subject which is moving diagonally across or is heading straight for or away from the camera and may require faster shutter speeds than you would use considering speed of movement alone.

In fashion photography, a rapid succession of shots at fast shutter speeds, or using a flash while the model continuously changes the pose, helps to capture natural expression.



Selecting an Aperture

A discussion of how to select an appropriate aperture boils down to an explanation of depth of field. When your subject is in focus, there is only a limited range in the foreground and background of the subject which is also in focus. This zone of sharpness is called depth of field.

Depth of field is governed by three factors: aperture, lens focal length and shooting distance. Remember the following relationships:

- (1) The smaller the aperture, the deeper the depth of field (the other two factors remaining the same).
For example, if the lens focal length and the shooting distance stay the same, the depth of field is much deeper at $f/16$ than at $f/1.4$.
- (2) The shorter the lens focal length, the deeper the depth of field (the other two

factors remaining the same).

For example, comparing a 28mm lens with a 50mm lens at the same aperture and shooting distance, depth of field is deeper with the 28mm lens.

- (3) The greater the shooting distance, the deeper the depth of field (the other two factors remaining the same).

For example, if the subject is photographed from three and then from seven meters away, the zone of sharpness in the foreground and background is greater at seven meters.

Another characteristic of depth of field is that it is generally deeper in the background than in the foreground.

When depth of field is important in your picture, it is best to control the aperture directly using the aperture priority AE mode. Using a small aperture is great for getting sharp overall focus in a landscape or any other type of subject, but shallow depth of field also has its merits. Using a relatively large aperture will make your subject stand out against its surroundings by blurring the background. This is an especially successful technique in portraiture and special effects.

There are ways to check the extent of depth of field. For this information, please refer to page 76.

◀ Aperture priority AE

FD 300mm $f/2.8$ S.S.C. FLUORITE, $f/2.8$ ASA 125



Programmed AE

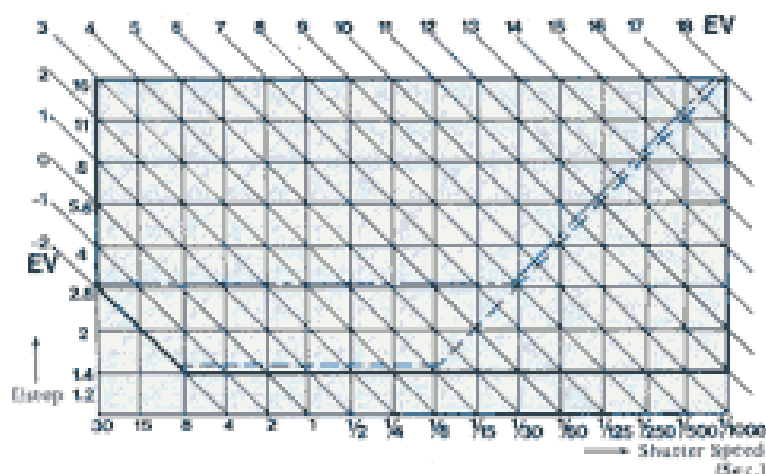
When the AE mode selector is set to Tv and the AT dial turned to "P" on the shutter speed scale, the camera is set for programmed AE. Correct exposure, both aperture and shutter speed, is automatically set by the camera according to the brightness of the subject and a programmed set of combinations of apertures and shutter speeds. Metering control is done steplessly from a combination of the highest shutter speed and minimum aperture all the way to slower shutter speeds and larger apertures.

Under some circumstances, the camera behaves as if it were set for aperture priority AE. For example, if lighting conditions are so low that an aperture larger than the maximum aperture of the lens would be necessary, the maximum aperture remains fixed, and the camera's electronic control automatically shifts to slower shutter speeds until the shutter speed is balanced against

the aperture for correct exposure. Of course, if it shifts to a shutter speed lower than 1/60 sec., it is advisable to use a tripod and a cable release or to switch to flash photography.

The advantage of this particular mode is that it takes your mind completely off exposure so that you can concentrate on your subject.

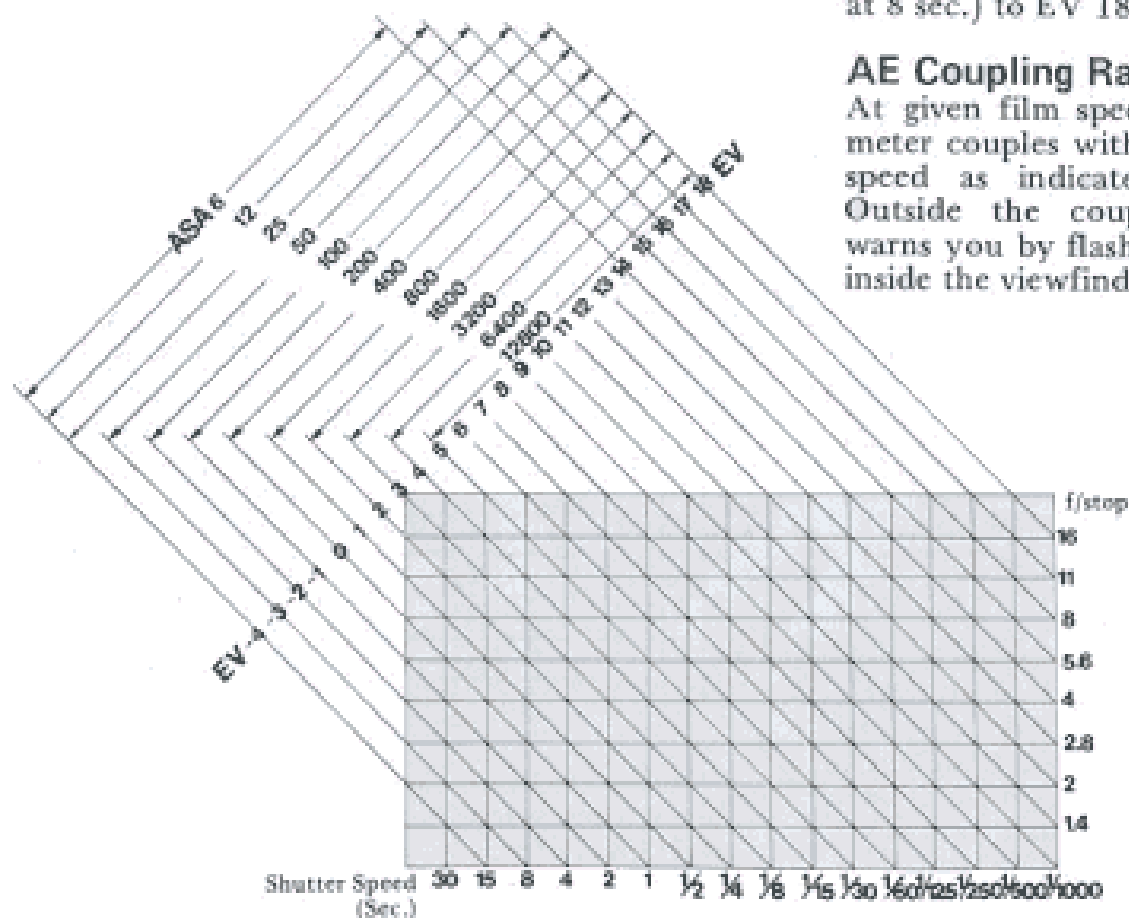
Programmed Combinations of Shutter Speed and Aperture in Programmed AE (with ASA 100 film)



--- indicates programmed combinations when a lens with a maximum aperture of f/2.8 is used.

..... indicates programmed combinations when a lens with a maximum aperture of f/1.4 is used.

AE Range of Silicon Photocell at Various ASAs FD 50mm f/1.4 S.S.C. Lens



Meter Coupling Range

When using the FD 50mm f/1.4 S.S.C. lens and ASA 100 film, the built-in exposure meter couples within a range of EV -2 (f/1.4 at 8 sec.) to EV 18 (f/16 at 1/1000 sec.)

AE Coupling Range

At given film speeds, the built-in exposure meter couples with the aperture and shutter speed as indicated in the chart below. Outside the coupling range, the camera warns you by flashing the photographic data inside the viewfinder.

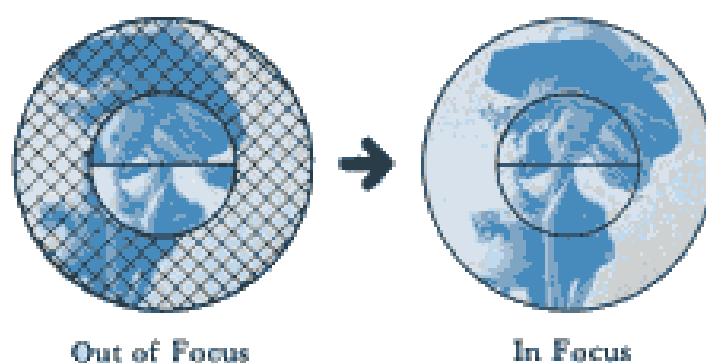
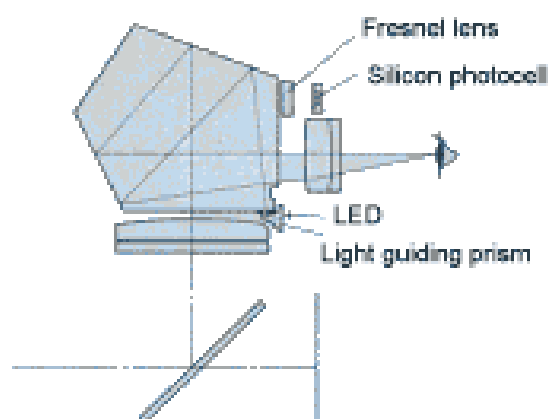
Metering at Low Light Levels

With AE coupling all the way down to EV -2 (with ASA 100 film), the A-1 is capable of metering and producing a natural rendition of the light in very dim lighting conditions. Since EV -2 is practically the lowest light level at which you can even perceive your subject through the viewfinder, you can basically perform AE photography with the A-1 as long as you can see your subject in the viewfinder when using a film with appropriate sensitivity. This means that the A-1 will usually give you a meter reading even in the most adverse of lighting conditions when performing photomacrography and photomicrography in the stopped-down AE mode.

What this also means is that you will be using very slow shutter speeds and may be subject to failure of the reciprocity law. The reciprocity law is that relationship between apertures and shutter speeds discussed earlier in which several combinations of the two will give the same exposure value. The trouble with this law is that it may not hold true at slow shutter speeds. More exposure may be necessary. You will find information concerning reciprocity law failure and how to correct it in the data sheet that comes with your film. Correction of reciprocity failure may involve increasing the light

level so that higher shutter speeds can be used. Even when following the instructions of the film data sheet, it is advisable to slightly adjust the exposure over several shots to get at least one perfectly exposed image.

Be especially on the alert for reciprocity failure when using color reversal (slide) film which has a smaller exposure latitude than black and white or color negative film. Having a smaller exposure latitude means that it is more touchy about exposure error. Incorrect exposure by only 1/2 exposure step may make a noticeable difference in the image results. Reciprocity failure with color film will result in color shifts as well as underexposure and may require corrective filtration as recommended by the film manufacturer.



Viewfinder

A less conspicuous, unusual feature of the A-1 is the fact that, unless you are taking a meter reading, the only thing you can see in the bright viewfinder is the viewing area. All other information is eliminated, leaving you undistracted freedom to focus and compose your picture.

The A-1 uses the Central Emphasis Metering method of exposure measurement which reads the entire viewing area with emphasis on the central portion where the subject is most likely to be placed. This metering system ensures correct exposure even when skylight is present in your picture.

This camera is equipped with a split-image/micropism rangefinder focusing screen.

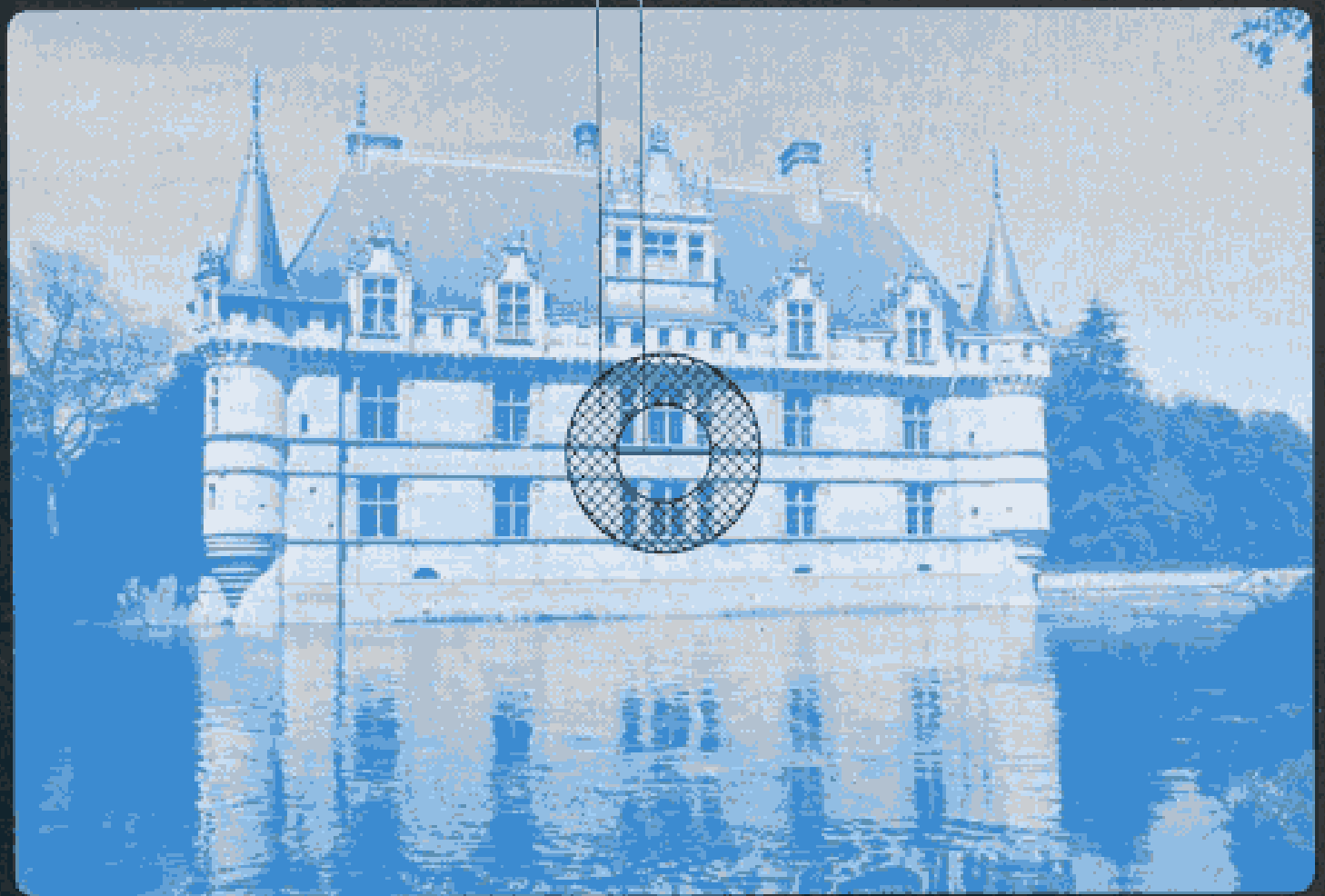
Viewing and Focusing

To focus, rotate the focusing ring of the lens as you view the subject through the viewfinder. Do not swing your upper body backward and forward as you focus.

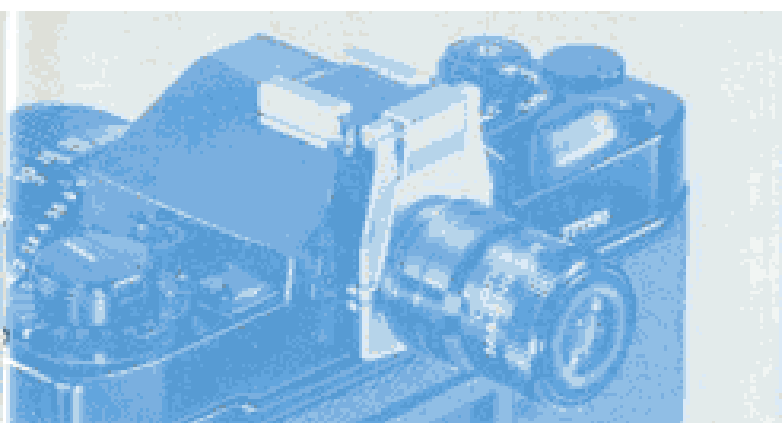
The focusing screen is composed of three different focusing aids: a micropism ring and a split-image rangefinder in the central area, and a surrounding matte screen. The split-image rangefinder tells you that the image is "in focus" when the image divided horizontally in half merges to become one complete image. The micropism rangefinder presents a clear, steady image when in focus but a broken, shimmering image when not accurately in focus. When the entire image in the viewfinder is sharp, you know that the focus is correctly set. You can focus with any of these three focusing aids as you like depending on the subject and your preference.

Microprism Ring

Split-Image Rangefinder

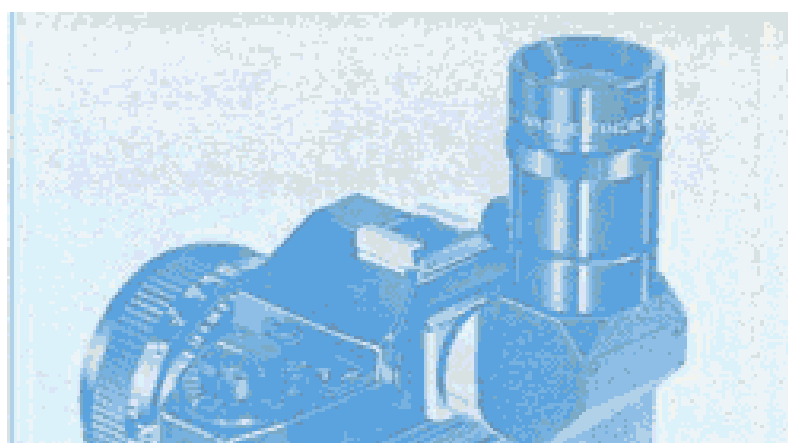
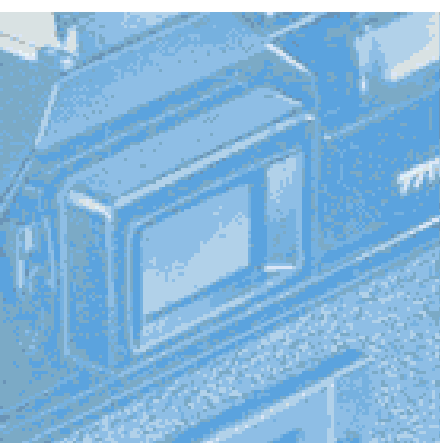


250 11



Magnifier S

The Magnifier S inserts into the grooves of the viewfinder eyepiece with its adapter to give a 2.5X magnification of the center of the viewing area for precision focusing in close-up work and wide-angle photography. Its power is adjustable to your eyesight within a range of +4 to -4 diopters. Its adapter is hinged so that the magnifier can be swung upward from the eyepiece after focusing, leaving the entire screen image visible.



OPTIONAL VIEWING AIDS

Dioptric Adjustment Lenses S

The dioptric adjustment lens S is an accessory which slides into the grooves of the viewfinder eyepiece from above to correct individual eyesight. With them, eyeglass wearers can photograph without glasses.

The A-1's eyepiece has a standard dioptric adjustment of -1 for normal eyesight. The following 10 kinds of dioptric adjustment lenses are optional accessories: +3, +2, +1.5, +1, +0.5, 0, -0.5, -2, -3 and -4 (diopters). The specified diopters of these lenses are recorded as the real power when attached to the camera, reflecting the -1 power of the camera's viewfinder.

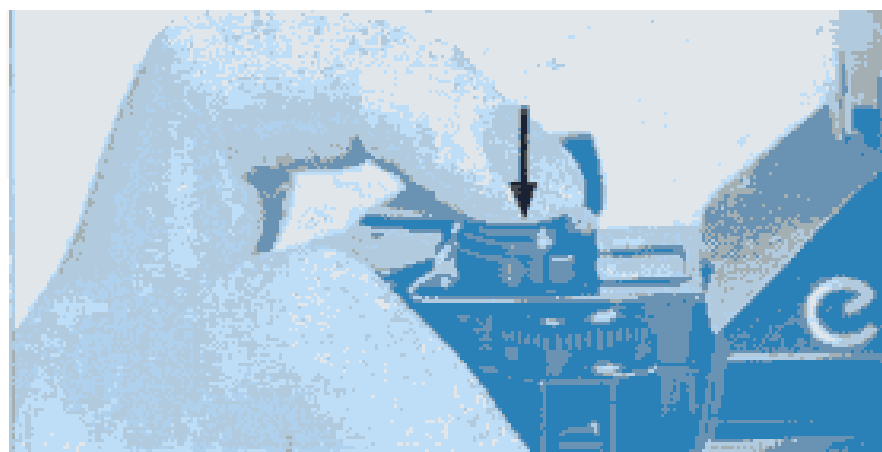
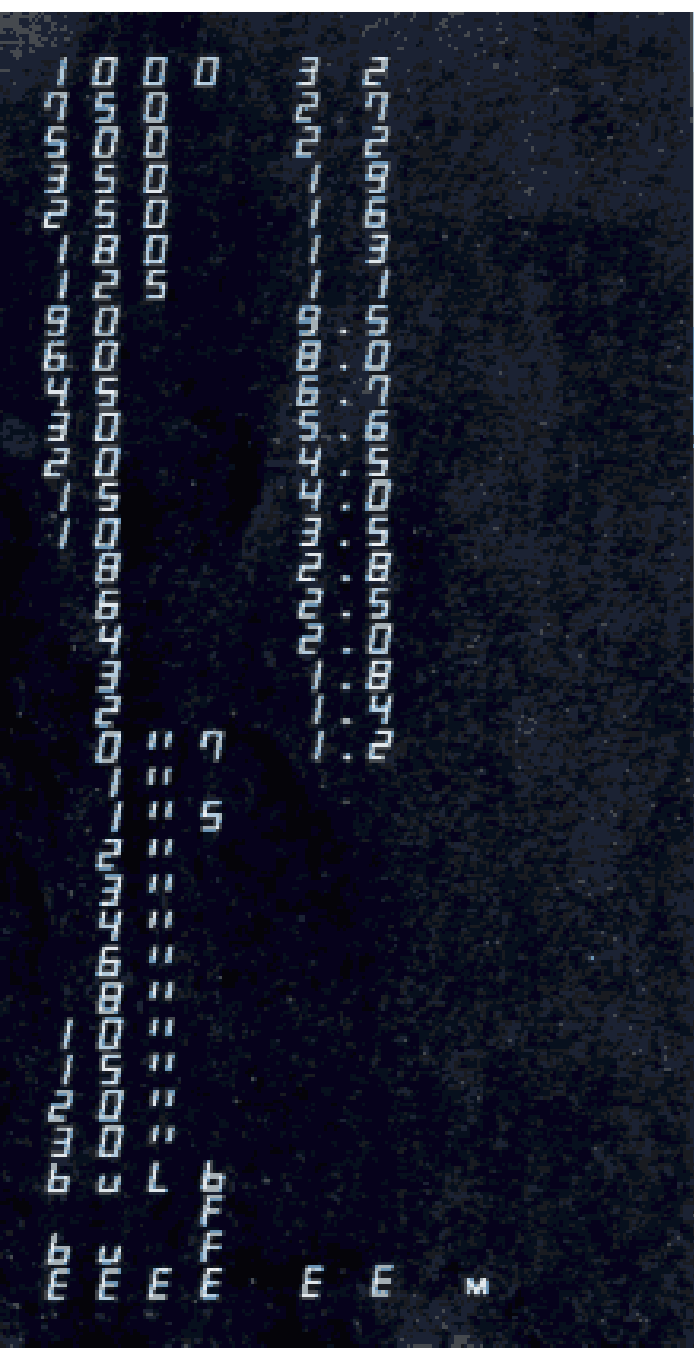
You could select the appropriate dioptric lens by choosing the one closest to the number of diopters in your glasses prescription. But, we propose that you actually look

through the viewfinder after placing the dioptric lens over the eyepiece to be sure you have the best one.

Angle Finders A2 and B

There are some types of photographic subjects for which viewing them through the eye-level viewfinder of the camera is uncomfortable. This is particularly true in the fields of copying, close-ups, photomacrography and photomicrography. Then it might be more convenient to mount one of these angle finders over the camera's eyepiece. Both angle finders rotate 90° for comfortable viewing from above or from the side.

Angle Finder A2 gives a correct image top-to-bottom but reversed left-to-right while the more sophisticated Angle Finder B gives a completely normal image. Both show the entire field of view as well as viewfinder information.



Previewing the Exposure

When you take a meter reading, the viewfinder information will be displayed in a digital readout directly below the viewing area. With the viewfinder display lever switched on, you can take a meter reading in any one of three ways:

1. Depress the shutter button halfway.
2. Press in the exposure preview switch.
3. Press the exposure memory switch.

Full viewfinder information includes shutter speed, aperture, manual aperture control signal, flash signal, exposure warning flashing and a flashing error signal for incorrect operation. The digital display viewfinder gives you the most information in a minimum amount of display capacity.

The camera employs LED circuits to eliminate the need for any extra illumination of viewfinder information. Except when using a flash or the exposure memory switch when the LED maintains constant brightness, the

Numerals and Characters Composing Digital Readout in Viewfinder

Up to the first four digits from the left in the digital readout show shutter speed data ranging from 1/1000 sec. to 30 sec. All speeds from 1/2 sec. and faster will be displayed as a whole number as they are on the AT dial so that an indicated shutter speed of 500 in the digital readout stands for a shutter speed of 1/500 sec. All speeds from 1 sec. and slower will be displayed as a whole number followed by a second mark (") so that an indicated shutter speed of 8" in the digital readout stands for a real shutter speed of 8 sec. When you are in

4 sec. → 4 " 1/4 sec. → 4

aperture priority AE and the camera is calculating the shutter speed, it is possible for intermediate shutter speeds that are not on the AT dial to show up in the viewfinder. In this case, you may see such shutter speeds as 750 (1/750 sec.) or 0" 7 (0.7 sec.) displayed in the viewfinder. It is impossible to set the AT dial to an intermediate shutter speed.

1/750 sec. → 7 5 0 0.7 sec. → 0 " 7

The next two digits following the first four from the left for shutter speed data are reserved for aperture data. The possible apertures to be displayed in the digital readout range from f/1.2 to f/32 even though the minimum aperture it is possible to set on the AT dial is only f/22. The aperture data in the digital readout is displayed in 1/2 f/stop increments, giving numerical values standing for the dots on the aperture scale of the AT dial. An indicated aperture of 9.5, for instance, in the viewfinder stands for the dot between f/8 and f/11 on the AT dial aperture scale. These half f/stops are approximations which are not always exactly halfway between the full f/stops.

f/9.5 → 9 . 5

Although both shutter speed and aperture are indicated in the viewfinder in each 1/2 stop increment, they are actually controlled by the camera steplessly for greatest possible precision.

There are other possible displays, including M, buLb, F, bu F, and a flashing EEEE EE. "M" is the last digit on the right in the digital readout. It appears when the camera is not set for AE control. "F" or "bu F" supplements or replaces the shutter speed data in the digital readout when the camera

is set for flash photography while "buLb" replaces the shutter speed data when the AT dial shutter speed scale is set to "B". "M" is also displayed at the "B" setting. The flashing "EEEE EE" appears to warn of error in the stopping-down process and will be explained in more detail later in this instruction booklet.

When switching from one priority to another under the same exposure conditions, it is possible that the new camera-selected variable will differ a half step from the corresponding previously manually-selected value. For instance, a combination of 1/250 sec. and f/5.6 in the shutter-speed priority AE mode may become 1/180 sec. at f/5.6 in the aperture priority AE mode under the same conditions. This is due to the fact that the camera-selected value is rounded off to half steps in the display. However, since the camera actually controls its variable steplessly, this seeming discrepancy will have no effect upon exposure.

Incorrect Exposure Warnings

The types of incorrect exposure warnings depend on what AE mode you are using.

1. In shutter-speed priority AE mode

When exposure is incorrect, the LED digital readout for aperture flashes on and off.

Underexposure

Usually the digital readout for aperture

flashes showing the lens maximum aperture to indicate underexposure. At very low shutter speeds, it is possible for a different aperture to flash on and off. For correct exposure, turn the AT dial to a lower shutter speed.

Overexposure

Aperture data from 19 to 32 will flash on and off to indicate overexposure. If the minimum aperture of your lens is equal to or smaller than the flashing aperture, exposure will be correct. If the minimum aperture of your lens is larger than the flashing aperture, increase the shutter speed for correct exposure. In other words, whenever any aperture smaller than f/16 appears in the readout, it will always be flashing on and off. Whether this indicates overexposure or not depends on the lens minimum aperture as described above.

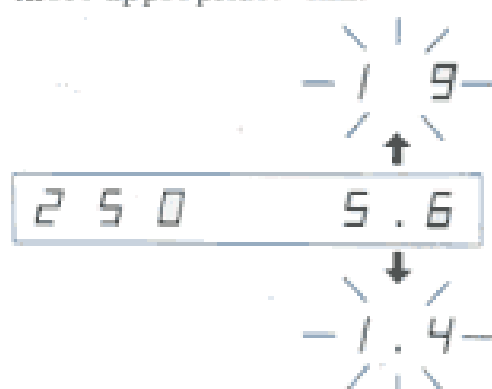
There is one exception to the above which occurs when the minimum aperture of the lens is f/32. Since the smallest f/stop that can appear in the readout is f/32, when the digital readout shows 32, exposure may or may not be correct. Increase the shutter speed one step. If the readout now shows a flashing 22, exposure will be correct even at the original slower shutter speed. If 32 is still flashing once you have increased the shutter speed, increase the shutter speed even further.

There is a rare case where f/16 may flash on

and off in the viewfinder. If you are using a lens with an $f/16$ minimum aperture, the image may be overexposed, so increase the shutter speed. If your lens has a smaller minimum aperture, exposure will be correct.

Outside the Meter Coupling Range

When the light level is so low that it would be outside the meter coupling range regardless of the shutter speed you set, the set shutter speed will flash on and off along with the aperture in the viewfinder. When the light level is too high, a small aperture will flash on and off even when the AT dial is set to the highest shutter speed. In these cases, shooting in the shutter-speed priority AE mode is only possible if you can change the light level accordingly or switch to a more appropriate film.

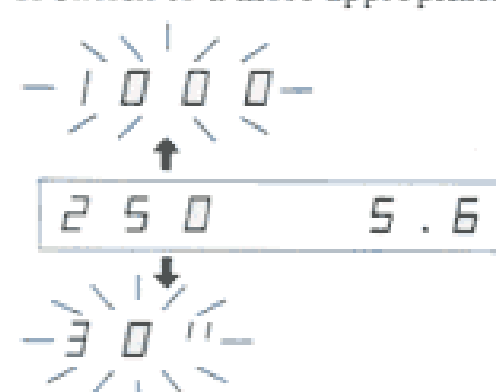


2. In aperture priority AE mode

When exposure is incorrect, the LED digital readout for shutter speed flashes on and off.

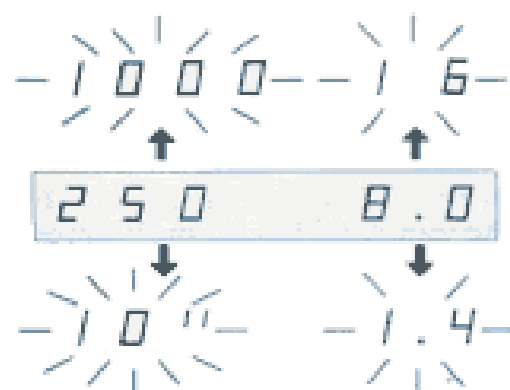
When the highest shutter speed of 1000 flashes in the viewfinder to indicate overexposure, turn the AT dial to a smaller aperture. When a shutter speed of the slow range flashes in the viewfinder to indicate underexposure, turn the AT dial to a larger aperture. The shutter speed value that flashes to indicate underexposure depends on the speed (maximum aperture) of the lens and ASA film speed.

As in the shutter-speed priority AE mode, when the light level is too low, both shutter speed and aperture data will flash on and off to indicate that no matter what aperture you set, the meter will not couple in an AE mode. When the light level is too high, the shutter speed will flash on and off even when the AT dial is set to the minimum aperture possible. Again, AE photography is still possible if you change the light level or switch to a more appropriate film.



3. In programmed AE mode

Both the shutter speed LED and the aperture LED flash on and off simultaneously to warn you of overexposure as well as underexposure. In taking exposure readings, the shutter speed and aperture combination changes as they are programmed in the camera. However, if there should be too little light to be exposed correctly even at the maximum aperture, the maximum aperture of the lens in use will remain fixed, and the camera will work in aperture priority AE, controlling the shutter speed to produce correct exposure. If the camera exceeds the limit of the meter coupling range, the shutter speed and aperture LED values that flash depend on the lens used and the ASA film speed. When the data flashes on and off in programmed AE, photography is no longer possible in that mode unless you change the light level or switch to a more appropriate film.



Double-Check Before Shooting

1. Is the aperture ring of the lens set to the "A" mark?
2. Have you checked the battery power level?
3. Have you properly set the AE mode selector?
The Tv setting (shutter-speed priority AE) is preferable for action photography. The Av (aperture priority AE) is preferable for still photography.
4. Did you set the film speed properly?
This is essential to the proper operation of the camera. See that the memo holder tells the type of film loaded in the camera.
5. Is the film properly loaded?
You can use the rewind knob as an indicator that the film is properly loaded. Every time you advance the film, the rewind knob should rotate.
6. Is the main switch set to the "A" mark?
At the "L" setting, the shutter button is locked.



Shutter Release

Once you have focused, composed your picture and confirmed correct exposure, gently press the shutter button all the way down to set the shutter in motion. When the shutter is released, the exposure will be stored, so there is no problem in removing your finger from the shutter button even in the slow speed range.

If you press the shutter button in one very quick stroke, the viewfinder display will become invisible and the camera's function may be delayed for an instant, but exposure metering will not be affected and your picture will be accurately exposed. If you press the shutter button with an extremely quick punch, it is possible that the shutter will not be released at all. For proper function and the least camera shake, it is best to press the shutter button gently.

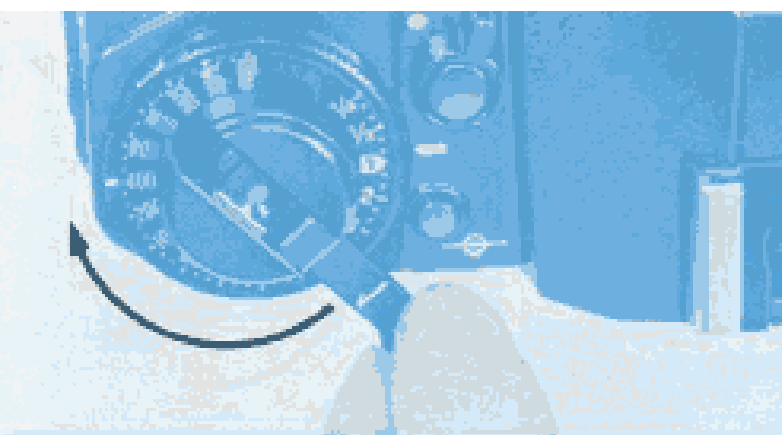
To cancel shutter release, press the battery

check button or return the main switch to "L". Shutter release **WILL NOT** be cancelled in the slow shutter speed range simply by turning the AT dial to a higher shutter speed.

Pressing the shutter button will not make an exposure if the film is only partially advanced or if battery power is too low.

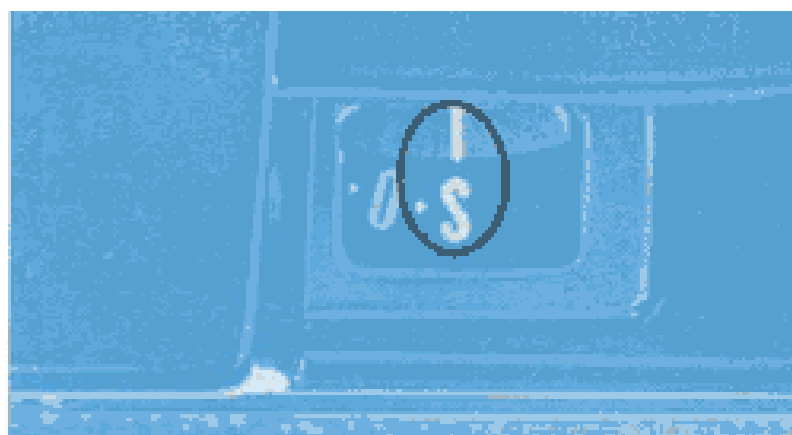
Rewinding the Film

When you have reached the end of the film, the film advance lever will stop suddenly before the end of its stroke. **DO NOT** force the film advance lever beyond this point or the film may become detached from the cartridge or tear, making rewinding impossible and necessitating handling the film in total darkness or a changing bag. Also **DO NOT** open the camera's back cover before rewinding or your film will be totally exposed.



To rewind the film, press in the film rewind button on the bottom of the camera. Once you have pressed it, you can remove your finger. Unfold the film rewind crank and turn it in the direction of the small arrow until the frame counter reaches the "S" mark. At this point only the film leader will not be rewound into the cartridge. *Stop rewinding here if the film is only partially exposed and you want to reload it at some other time. Also, some developing labs prefer the leader to remain protruding, and the leader may also prevent any stray light from entering the cartridge.* Otherwise you may continue to rewind past "S" until you feel no further pressure on the rewind crank. Now pull the rewind knob up sharply to open the back cover and remove the cartridge. It is preferable to place the exposed cartridge back in the canister and to have it developed as soon as possible.

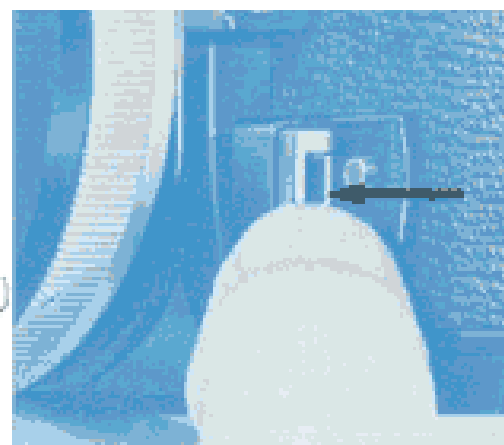
4. *When you are ready to shoot, pull the rewind knob up sharply to open the back cover and remove the cartridge.*



Frame Counter

The frame counter of the A-1 is an additive type. It advances to the next number, indicating the number of frames already exposed, each time the film is wound. It will not advance higher than 38. The numbers 0, 20 and 36 are marked in orange, the latter two as a warning of the end or near-end of films having those numbers of frames. This frame counter is also coupled with the rewinding operation so that it counts back the frame numbers as the film is rewound. It automatically returns to "S" upon opening the camera's back cover.

The frame counter will conveniently stop during multiple exposures so that several exposures on the same frame will not be counted as separately exposed frames.



Stopped-down AE Photography

There are basically two cases which require stopped-down AE photography (unless you wish to operate in manual override). It is necessary when you use any lens which is not FD, such as FL or R lenses or the Reflex Lens 500mm f/8 S.S.C. With the exceptions of the FD-U extension tubes or Extender FD 2x-A, it is also necessary whenever any accessory is inserted between the camera and any lens for increasing the lens' focal length or for increasing lens extension for higher magnifications in close-ups or photomacrography. It is, of course, also necessary in photomicrography. It is possible, but not necessary, to use the stopped-down AE mode when an FD lens is mounted directly onto the camera with no accessory in-between. In the stopped-down AE mode, exposure metering will be done not at full aperture as usual but, rather, at the same aperture that the picture will actually be

taken.

To set the camera in the stopped-down AE mode when using a non-FD lens, simply fold and push in the A-1's stop-down lever.

When using an FD lens, first advance the film and then disengage the lens aperture ring from the "A" mark before you push in the stop-down lever. If the film is not advanced before turning the aperture ring from the "A" mark, the lens will stop down only as far as the aperture set for the previous exposure. It is impossible to push in the stop-down lever when an FD lens is set at "A".

When in the stopped-down AE mode, it does not matter whether the AE mode selector is set to Tv or Av. The camera will behave as if it was in the aperture priority AE mode. You must select the aperture by turning the lens aperture ring while the camera will automatically select a shutter speed. When you preview the exposure, only the shutter speed

data will be displayed in the viewfinder. Unless the shutter speed data is flashing on and off, simply press the shutter button for an accurately exposed image. Exposure warnings are exactly like those in aperture priority AE. Set the aperture ring to a larger aperture if a shutter speed of the slow range flashes on and off in the viewfinder. The shutter speed value that flashes to indicate underexposure depends on the ASA film speed. Set it to a smaller aperture if the highest shutter speed of "1000" flashes on and off. When the shutter speed flashes on and off even when the aperture ring is turned to the extreme limits, you are outside the meter coupling range. Change the light level or switch to a more appropriate film.

3 0

Since you can determine correct exposure simply by watching the shutter speed data in the viewfinder, you need not keep an eye on the lens aperture ring as you turn it. However, for good depth of field when using accessories for close-up photography, it is best to close the lens to a relatively small aperture. More details are given in the instruction booklets for the various accessories involved.

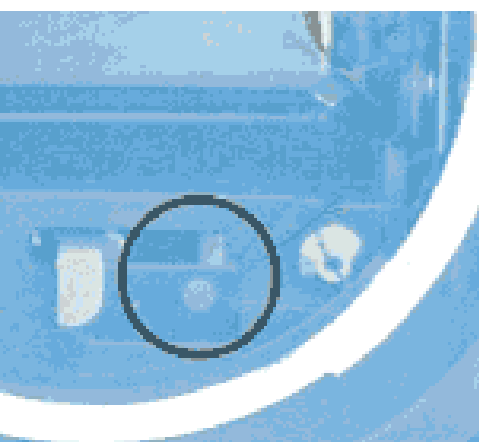
You will find that your A-1 is unusually effective in photomacrography and photomicrography. Even though the amount of

light reaching the film plane is greatly reduced due to attached accessories, the A-1 is capable of metering as low a light level as EV-2 (with ASA 100 film) in the stopped-down AE mode. Furthermore, since the A-1 employs a through-the-lens meter, no exposure correction is necessary when accessories are inserted between camera and lens. When you are finished operating in the stopped-down AE mode, unfold and press down on the stop-down lever. It will pop out and the camera will be reset for full aperture metering. With an FD lens, you can now return the lens aperture ring to the "A" mark if you wish to use the A-1 in a full aperture metering AE mode.

If you return the aperture ring to "A" but leave the stop-down lever pushed in, the camera will remain in the stopped-down AE mode and all subsequent exposures will be made at the lens minimum aperture. Though exposure will be correct, this situation severely strains camera mechanisms and is not recommended.

When performing stopped-down metering, you also have the advantage of being able to confirm depth of field directly in the viewfinder. See Checking the Depth of Field.

It is not possible to shoot sequentially with the Power Winder A or Motor Drive MA when in the stopped-down AE mode using an FD lens. In this situation, only single-frame power winding is possible.



Warnings of Incorrect Operation in Stopped-down Photography

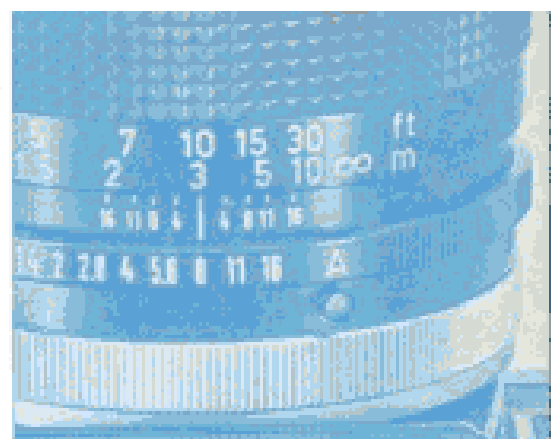
Two problems can arise if you use the camera incorrectly in the stopped-down mode. The first problem occurs if the stop-down lever of the camera is locked in before you mount the lens. If you expose a frame in this situation, it will be incorrectly exposed due to incorrect coupling of the aperture ring. To prevent this, before you mount a lens, make sure there is no red dot beside the stop-down coupling lever inside the camera body. The red dot is very conspicuous and appears only when the stop-down lever is pushed in.

The second problem arises if you push in the camera's stop-down lever and, before taking a shot, release the stop-down lever and return the lens aperture ring to the "A" mark. If you then try to press the shutter

button, you will notice that neither it nor the film advance lever will operate. What's more, this is when the "EEEE EE" mark will flash in the viewfinder whether the viewfinder display switch is turned off or not.

This appears to be a distressing situation, but it is very easily corrected. Push the film advance lever into its retracted position close to the camera body. The multiple exposure lever is underneath. Push it to the left. Now turn the film advance lever. With this operation, the camera will work in the normal way.

E E E E E E



Manual Override

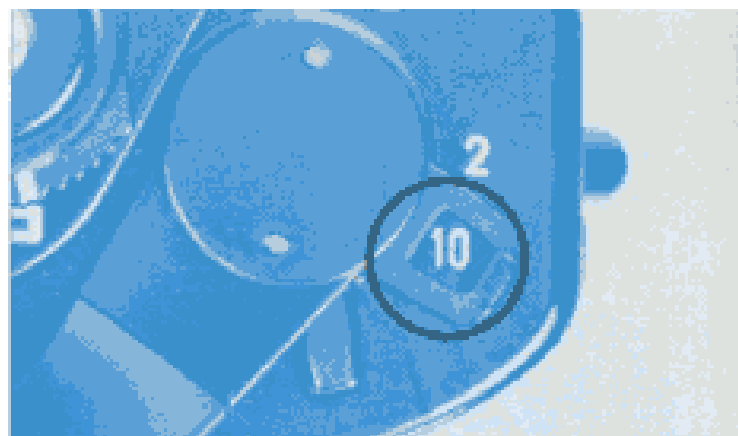
You may have occasion to wish to cancel the A-1's AE capabilities to control exposure, both aperture and shutter speed, by yourself. This will be the case if you are using a separate exposure meter, if you wish to correct exposure in unusual lighting conditions or in flash photography, or if you want to control exposure for creative effects.

With the A-1, this is a simple process. Using an FD lens, first disengage the aperture ring from the "A" mark. Set the AE mode selector to Tv. The Av setting is useless. Set the aperture by turning the lens aperture ring, and set the shutter speed by turning the AT dial. When you press the exposure preview switch or the shutter button half-way to preview the exposure, the data displayed in the viewfinder will be the same as if the camera was in shutter-speed

priority AE. You will see the shutter speed you have set on the AT dial. The aperture displayed is that that the camera would select on Auto. Although the aperture you have manually set on the aperture ring is not displayed, it is at that aperture that your picture will be exposed when you press the shutter button. You will also see the red "M" inside the viewfinder to indicate that you are in the manual mode.

To operate the camera manually using an FL lens or any other lens without a full aperture signal pin, set the AE mode selector to Tv. With these lenses you must always set the aperture by turning the lens aperture ring. In the case of these lenses, the digital readout is unreliable, and it is better to cut it out altogether by switching off the viewfinder display lever. You must rely on your own experience for setting the exposure.

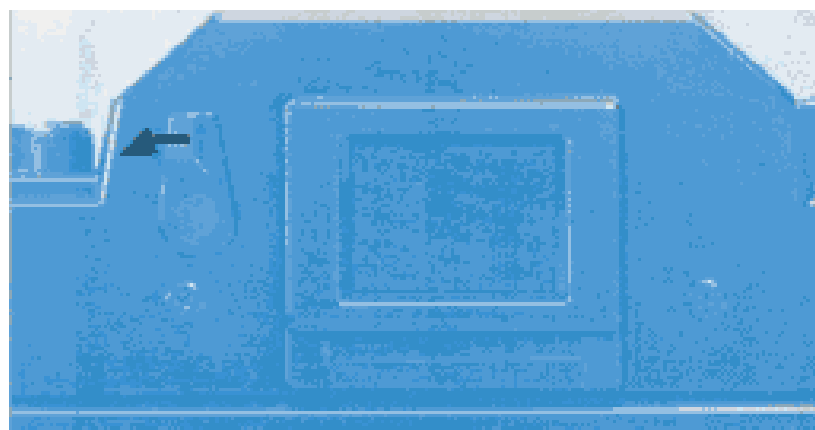
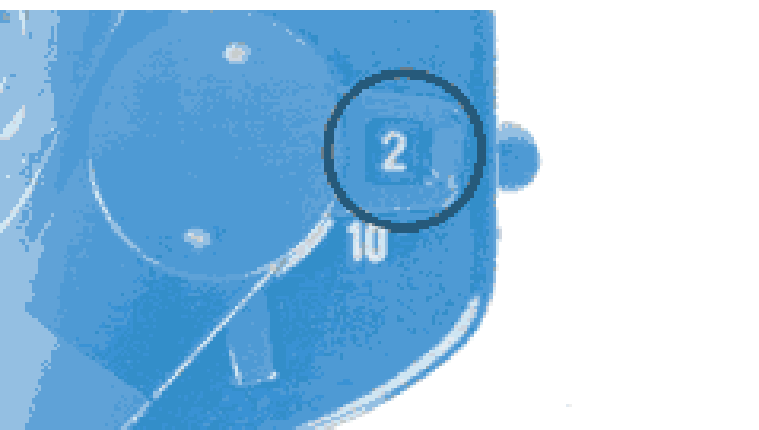
With an FD lens, if you set the AE selector to Av instead of Tv while the lens is away from the "A" mark, the digital readout will show the aperture you have set on the AT dial plus the corresponding camera-selected shutter speed as in aperture priority AE along with "M" for manual aperture setting. Although you are no longer in manual override, it is possible to make an exposure correction by setting the lens aperture ring to a different aperture than that on the AT dial. Exposure will be made at the aperture set on the lens aperture ring and the camera-selected shutter speed.



Self-Timer

The self-timer is usually used either so that you can include yourself in a picture or as an alternative to a cable release for the softest possible shutter release in delicate photography, such as photomacrography and photomicrography, or on other occasions when long exposures are necessary. This particular self-timer allows a time-lag of either two or ten seconds.

To use the self-timer, first make sure the film is wound and that the shutter speed is not at "B". If the film is not wound, the self-timer will act, but the shutter will not. The self-timer will not function normally at "B". Now set the main switch to 2 or 10. Focus and compose your picture. You may press the exposure preview switch to check the exposure. However, remember that, since the A-1 is designed to reflect any last-second changes in exposure when in an



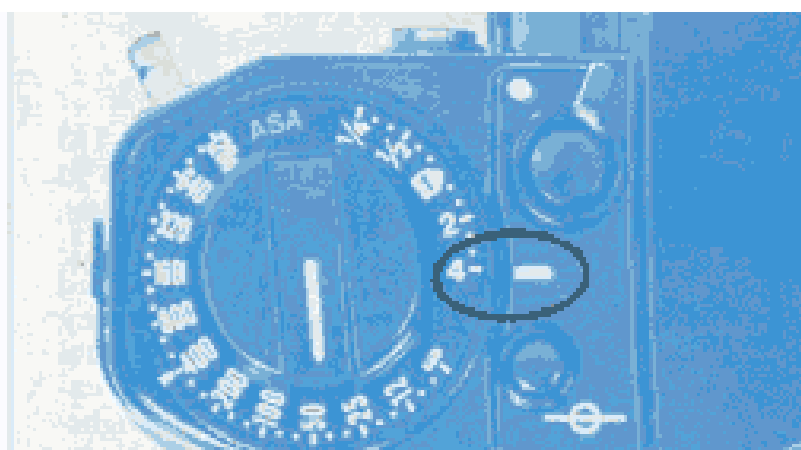
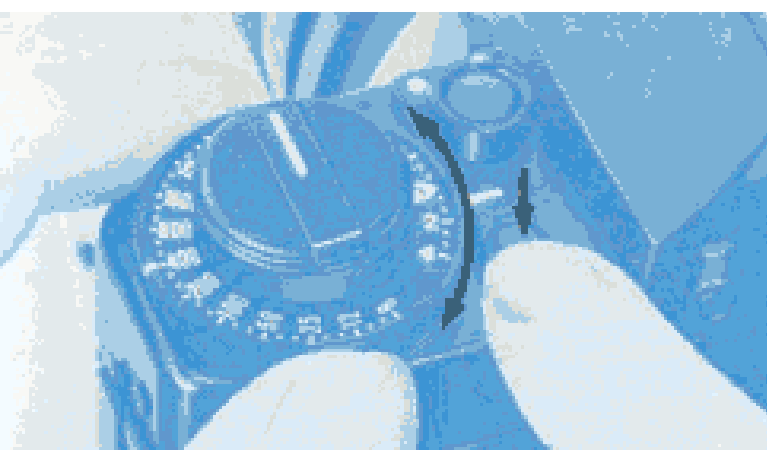
AE mode, it will not set the exposure until a split second before the shutter itself is actually released. Once you have completed these preparations, flick the eyepiece shutter lever to close the eyepiece shutter so that no light comes through the eyepiece to affect the exposure. Now press the shutter button and run into place if your purpose is to include yourself in the picture. The shutter will be released automatically following the time interval you have set.

The moment you press the shutter button, the self-timer lamp starts to flash at the rate of two flashes per second. At two seconds before shutter release, it starts to flash eight times per second to warn you of impending shutter release.

If you wish to cancel the self-timer before shutter release, either switch the main switch to the "L" position or press the battery check button.

You may repeat the self-timer process as many times as you wish. After completing self-timer photography, return the main switch to either "A" or "L".

Please note that the eyepiece shutter should be closed whenever exposure is to be determined when your eye is not to the eyepiece. This is applicable to self-timer photography, remote control photography and often to tripod or copy stand photography and is especially important in night photography.



EXPOSURE COMPENSATION

You can, of course, make exposure corrections by operating the camera manually, but the A-1 is also equipped with other devices which allow you to correct the exposure while in an AE mode.

Unusual lighting conditions which necessitate exposure correction include those instances when light takes up the major part of the viewing area, such as in beach or snow scenes, and contre-jour or backlit situations in which light is shining behind the subject, such as when your subject is in front of a window or when a lamp or the sun is shining behind him/her. In such situations, the camera might be fooled into giving a reading which would underexpose your subject, so you must give it more exposure than the camera shows in AE. This also applies to high-key or intentionally overexposed shots. On the other hand, it is necessary to reduce the exposure for a low-key shot. Some correction may also be necessary if your sub-

ject is not located in the central part of the viewing screen.

Exposure Compensation Dial

One device for correcting exposure in the AE mode is the exposure compensation dial. To make the correction, simply hold in the exposure compensation lock button while turning the outer knurled edge of the ASA setting dial until the compensation dial index is aligned with the desired correction. The exposure compensation scale covers a full ± 2 f/stop range in indications of $1/4$ (underexposure by 2 f/stops), $1/2$ (underexposure by one f/stop), 1 (normal AE exposure), 2 (overexposure by one f/stop) and 4 (overexposure by two f/stops). The scale is engraved in $1/3$ f/stop increments so that intermediate settings may be used. The latter may come in handy for bracketing the exposure.

Since the digital readout is in only $1/2$ f/stop increments, depending on the situation, the readout will not necessarily change to indi-

cate an exposure adjustment of only 1/3 f/stop, but your picture will be exposed in the 1/3 f/stop increment you set on the dial.

Generally, exposure should be corrected whenever the high-key (light) or low-key area occupies more than half of the total viewing area. How much more or less exposure should be given depends on the lighting condition as roughly described below. However, these are only general guidelines meant to help you while experimenting.

Some situations require special measures. For instance, when shooting a subject against the sun or some other exceptionally strong light source, requiring drastic exposure correction, or when you shoot a subject in an unvarying lighting condition such as under photolamps in a studio, it

may be better to use the exposure memory switch as explained on the next page or manual override.

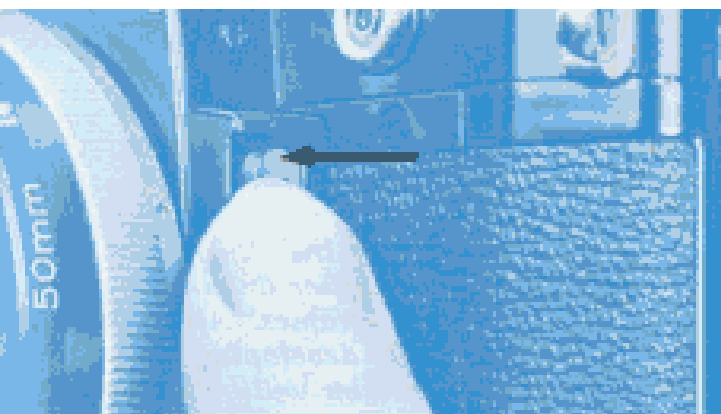
The exposure compensation dial can also be used to correct exposure in multiple exposures as explained later.

Usable Range of Exposure Compensation Dial According to ASA Rating

ASA6:	1/4·1/2·1
ASA12:	1/4·1/2·1·2
ASA25-3200:	1/4·1/2·1·2·4
ASA6400:	1/2·1·2·4
ASA12800:	1·2·4

Once you have made an exposure correction on a specific frame using the exposure compensation dial, do not forget to reset the dial to its original setting. Otherwise, all following frames will be incorrectly exposed.

Scale	Exposure Correction	Application
1/4	2 f/stops underexposure	Black background
1/2	1 f/stop underexposure	Spot lighting
1	Normal	Black background occupying half of viewing area
2	1 f/stop overexposure	Overhead interior lighting
4	2 f/stops overexposure	Subject by a window
		Blue sky or sea backgrounds occupying half of viewing area
		Contre-jour portrait, white background, snow scene or blue sky background



Exposure Memory Switch

The A-1 also offers an exposure memory switch for correcting the exposure in the AE mode. Essentially, this switch assures correct exposure by exposing the picture for your subject no matter what the surroundings are. When you press in the exposure memory switch, it locks the exposure value (EV) for whatever you are metering. You can then compose the picture as you wish, and it will come out correctly exposed for whatever you metered. An extra advantage in this is that, depending upon whether you are in the shutter-speed priority or aperture priority AE mode, you can change either one and the camera will automatically select the other to arrive at the same locked-in exposure value.

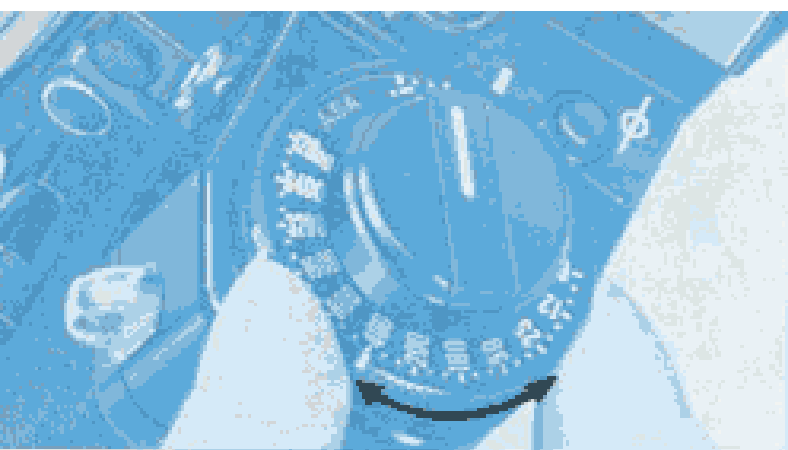
For instance, suppose you want to take a portrait of a subject against the sun. First move in closer to your subject until it is centered in and taking up about one-third of



the total viewing area. Push and hold in the exposure memory switch to lock the exposure value metered for your subject. Now step back and compose the picture as you like. Change the aperture or shutter speed, depending upon which priority you are in, if necessary. Continuing to hold in the exposure memory switch, press the shutter button. Your subject will be correctly exposed.

Of course, you have a problem if you cannot approach your subject to meter it directly. Then try to find an approachable subject which you think would give the same exposure value as your subject. Meter it, push in and hold the exposure memory switch. Compose your subject and shoot for correct exposure.

Please note that you must hold in the exposure memory switch until after you press the shutter button. It does not lock.



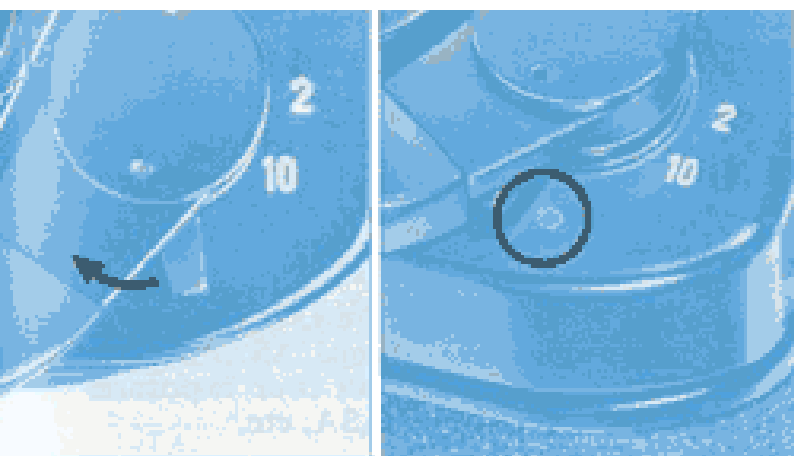
Changing the ASA Setting

There is another way to correct exposure which can be used whether you are in the manual or the AE mode. That is to change the ASA film speed setting on the camera. A film with an ASA rating twice that of another film requires only half the amount of light for correct exposure as compared with the other film. For instance, if you have an ASA 200 film loaded, you can make an exposure correction equal to closing the aperture one f/stop or raising the shutter speed one step by changing the ASA setting on the camera to ASA 400.

Other useful tricks can be performed by changing the ASA setting. You may be stuck, for instance, indoors without flash. Even with ASA 400 film loaded in your camera, you may be forced to use undesirably slow shutter speeds. You may solve this by "pushing" the ASA setting on the

camera to a higher value. Usually this is done by multiplying the normal ASA rating by some multiple of two, say by two or four. In this case, the whole roll of film must be shot at the "pushed" ASA or you will have to sacrifice one or the other of a whole series of frames. Also, do not forget to inform your developing lab of the change or the whole film will be incorrectly developed. This is only an introduction to this technique. Not all films can be "pushed" and not all developing labs will handle them. Read more about "pushing" the ASA in photographic literature and know what you're doing before you try it.

This trick should not be confused with the above which involves intentional exposure correction for only one frame after which the ASA dial should be reset to its original value.



Multiple Exposures

Making two or more exposures on the same frame is an exciting technique which is very simple to perform with the A-1. After making the first exposure, do not turn the film advance lever but return it to its retracted position close to the camera body. Switch the multiple exposure lever underneath the film advance lever to the left. A red dot will appear indicating that the camera is set for a multiple exposure. Now turn the film advance lever. The film will remain stationary, holding its exact position. At the same time the shutter will be re-cocked, and the multiple exposure lever will automatically return to its original position over the red dot. When you press the shutter button, your second shot will be in exact registration over the first. If you turn the film advance lever, the camera will be set for the next frame.



You can make any number of exposures on the same frame simply by repeating the above procedure before turning the film advance lever. There is a possibility of a slight movement of the frame if you make an excessive number of exposures on the same frame, if you turn the film advance lever too forcefully or if there is film slack. The frame counter is stopped until you actually advance the film to the next frame.

Once you have set the camera for a multiple exposure, there is no way to cancel the process before actually making it. If you suddenly decide you don't want a multiple exposure but still want to preserve the one or several shots you have already made on the frame, you have the best chance of doing that if you manually set the lens aperture ring to the minimum aperture, the shutter speed to 1/1000 sec., cover the lens with the lens cap and then release the shutter.

Multiple exposures are not possible when the Motor Drive MA or Power Winder A is mounted on the A-1 and in operation. They are possible even when these accessories are mounted if you switch them off and advance the film manually.

There are some situations which seem to call for a multiple exposure but which are better handled in another way. One of these is recording multiple bursts of fireworks on the same frame. Rather than using the multiple exposure lever, mount the camera on a tripod, set the shutter speed at "B", and set the aperture ring manually to the appropriate f/stop according to the following table. Hold the shutter open with a cable release until several bursts are registered on the frame.

ASA	25	50	100	200	400
f/stop	5.6	8	11	16	22

Exposure in Multiple Exposures

Generally, the first exposure of a multiple exposure should be of a relatively dark subject so that the image in the next exposure will show up clearly. For best results in multiple exposures, it is also advisable to decrease the exposure for each shot. Depending on the situation, there are several ways to do this. One way is to change the

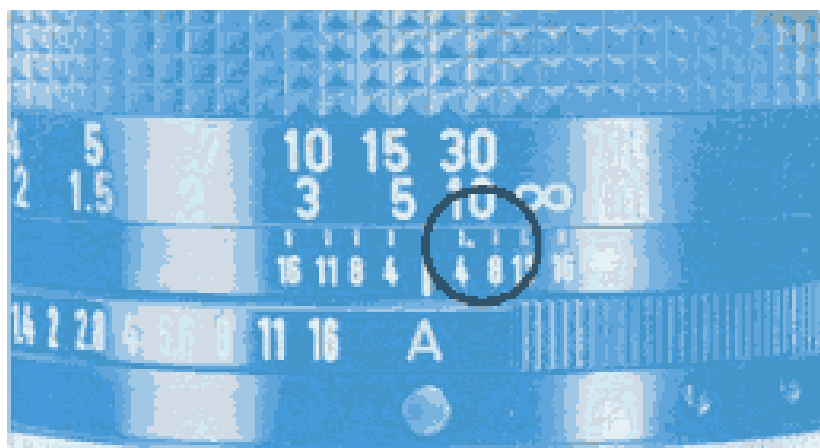
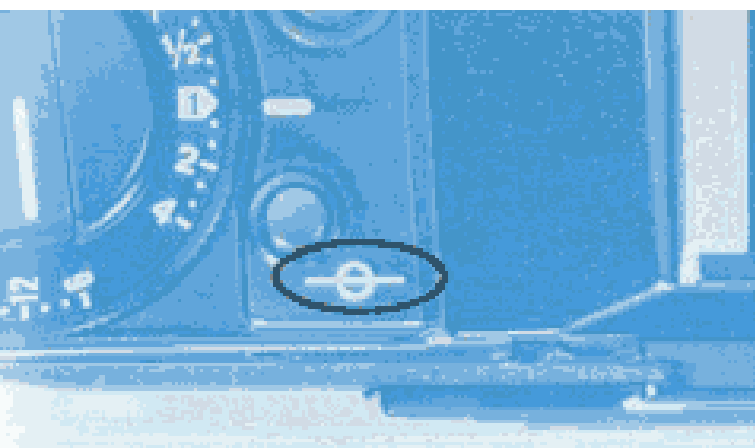
ASA to a higher value as described earlier. In this method, you must first decide how many exposures you want to make on the same frame. If a double exposure, make both exposures at twice the normal ASA; if a triple exposure, make all three exposures at three times the normal ASA; if a quadruple exposure, make all four exposures at four times the normal ASA, etc.

Another way to correct exposure is to use the exposure compensation dial at the settings outlined in the table below.

Number of Multiple Exposures	Exposure Compensation Scale
Double	1/2
Triple	Between 1/2 and 1/4
Quadruple	1/4

The method when using the exposure compensation dial for this purpose is the same as that of changing the ASA. That is, for a double exposure, the dial should be set to 1/2 for both exposures and so on.

Actually, both methods described above are only general guidelines, and your technique will benefit greatly from experience.



Film Plane Indicator

This mark is engraved on the top of the camera beside the film rewind knob, just to the left of the pentaprism, to indicate the exact position of the film plane. It is not used in general photography, but it is helpful in close-up photography and photomacrography for obtaining the exact shooting distance from film to subject.

Distance Scale

The distances on the scale are calibrated from the film plane to indicate the focused distance from film plane to subject.

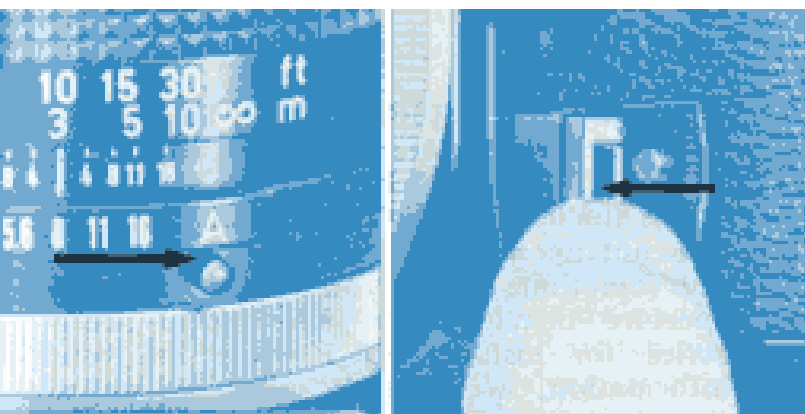
The scale is not generally used except when confirming depth of field, performing guide number calculations in flash photography, or using infrared film.

Read one-digit distances in the middle of the number marked on the scale. Two-digit distances should be read at the point between the two digits.

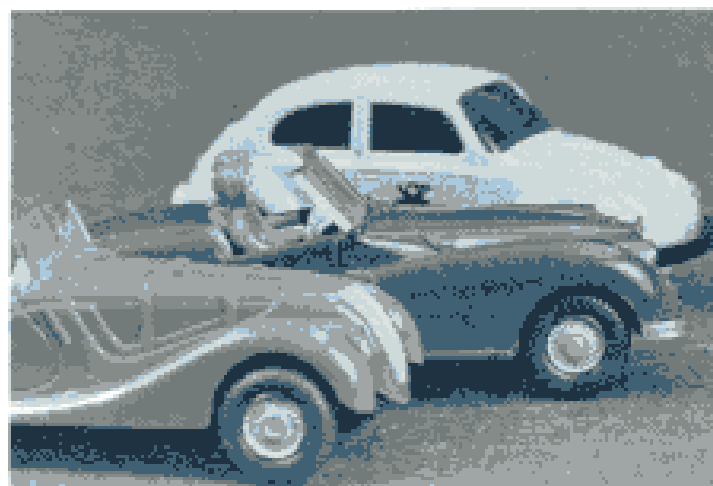
Infrared Index Mark

Since infrared light rays have longer wavelengths which focus on a plane slightly behind that of ordinary visible light rays, it is necessary to slightly adjust the focus of the lens when using black and white infrared film. The infrared index mark engraved on the lens barrel is used for this purpose. After focusing the same as usual, note the tiny red dot engraved on the lens barrel just to the right of the distance index, and turn the focusing ring to align the focused distance with this red dot. For instance, if the focus is at 10m on the distance scale, turn the focusing ring to align the 10m mark with the red dot. After that focusing correction, you can release the shutter.

When using infrared black and white film, visible light rays must be kept out by means of a deep red filter (R1) over the lens. When using infrared color film, there is no need to



field looking at the image through the viewfinder by pushing in the stop-down lever just as in stopped-down AE photography and setting the lens to the working aperture. This will probably be one of those occasions when you will release the stop-down lever and return the lens to "A" before taking a shot. You will have to operate the multiple exposure lever as explained earlier before the camera will properly operate. See **WARNINGS OF INCORRECT OPERATION IN STOPPED-DOWN PHOTOGRAPHY**, p. 64.



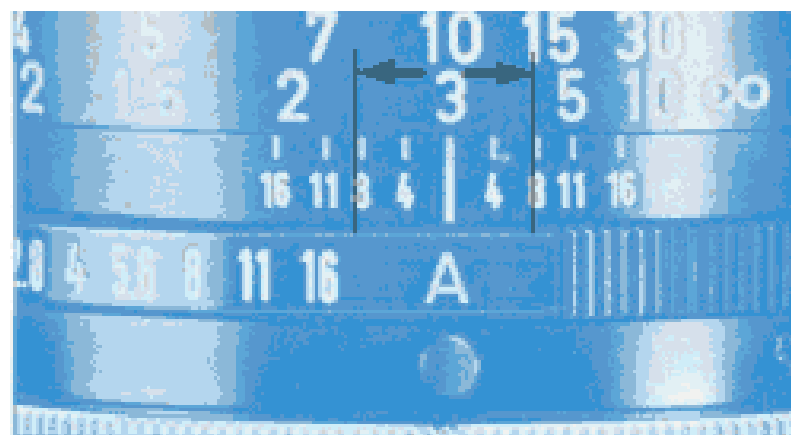
Small Aperture



Large Aperture

make a focusing correction. Follow the detailed instructions of the film manufacturer.

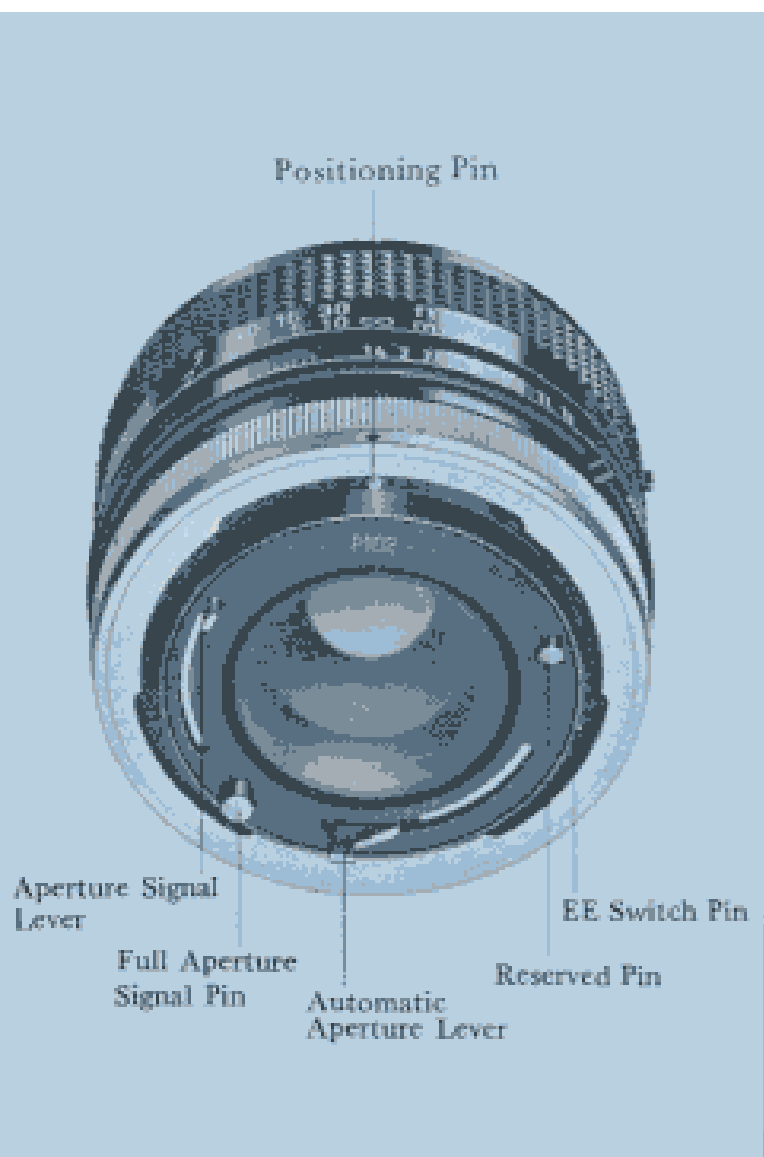
The position of the infrared index mark has been computed for the use of infrared film with peak sensitivity at 800nm (such as Kodak IR 135) and a red filter such as Wratten 87.



Checking the Depth of Field

There are two ways to find out what the depth of field is. One is by using the depth of field scale which is a series of f/stops repeated on each side of the distance index mark on the lens barrel. The scale differs according to the lens. First focus your subject. Find the two f/stops on the depth of field scale which correspond to the aperture you or the camera have set for the exposure. Draw imaginary lines from these two f/stops to the distance scale. The effective depth of field extends between those two distances. For example, using a standard 50mm lens focused at 3m with the aperture set at f/8, depth of field extends from 2.4m to 4.5m. Any subject from 2.4m to 4.5m away will be in reasonably sharp focus in the image.

You can also visually check the depth of



Lens Signal Coupling

There are several levers and pins at the rear of an FD lens which transmit signals between the lens and the camera body. Usually it is not necessary to know what they are, but sometimes, when you must operate the aperture manually for non-coupled accessories for instance, it is. Just for your information, we include explanations of them here.

1. Aperture Signal Lever

With an FD lens, exposure metering is performed through the lens at full aperture. This is nice for you since you have a bright viewfinder to focus and compose, but to determine correct exposure, the camera must know the effective aperture. For most cameras, such as the Canon F-1, this lever transmits the preset aperture on the lens aperture ring to the exposure meter. It is coupled to the lens aperture ring and moves in proportion to its rotation. In AE photography, however, the exposure meter receives a signal directly from the camera.

2. Automatic Aperture Lever

This lever couples to the camera body to stop the diaphragm down to the preset aperture just before the shutter releases. This is the lever that must be locked for manual diaphragm control with a non-coupled accessory.

3. Full Aperture Signal Pin

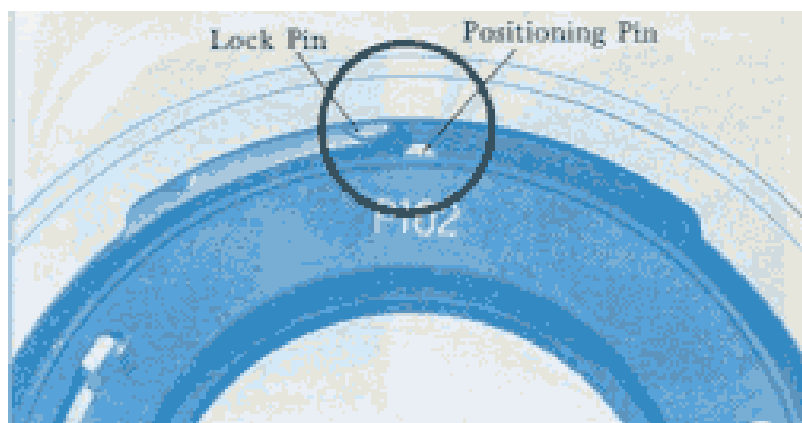
This pin transmits the maximum aperture of the lens to the exposure meter to set the meter coupling range automatically.

4. EE Switch Pin

When the "A" mark of the aperture ring is set to the aperture index, the EE switch pin comes out to insure that the lens, at this setting, can be mounted only on cameras designed for AE photography.

5. Reserved Pin

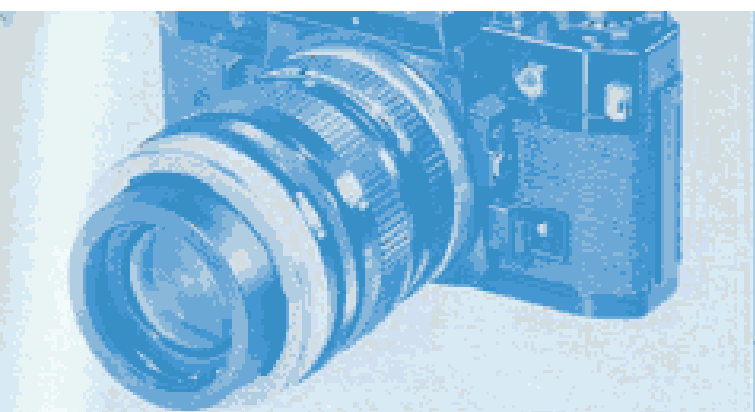
This pin is designed for use with additions to Canon's camera system that may be developed in the future.



Seeing the Lens in Action

FD lenses incorporate a safety feature to prevent the Breech-Lock bayonet ring and diaphragm blades from moving when the lens is dismounted. If you want to check the diaphragm's operation, press the lock pin in the top recess of the Breech-Lock mount while turning the bayonet ring and lock the automatic aperture lever (see p.80). Then turn the aperture ring and watch the diaphragm blades.

Be sure to reset the automatic aperture lever to its normal position before using the lens once more in direct contact with the camera body.



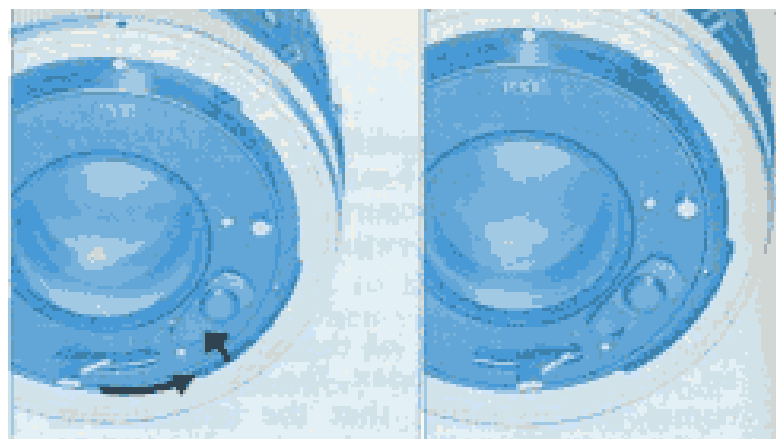
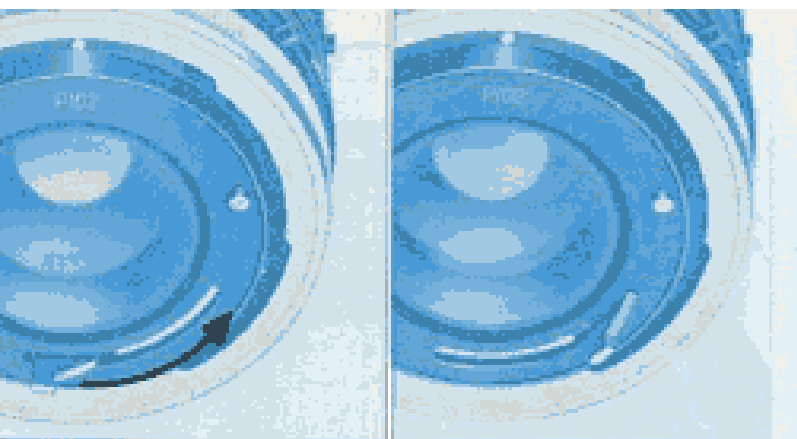
with the aid of a macrophoto coupler. This is supplied with a macro hood allowing the Breech-Lock ring to be unlocked and turned fully to its "closed" position after the automatic aperture lever is pushed all the way to the right.

To meter when the lens is set for manual diaphragm control, use the stopped-down AE procedure.

Unusable Lenses

Out of the several series of Canon lenses, there are a few older individual lenses which cannot be used on the A-1. Do not attempt to mount the following five lenses:

- FL 19mm f/3.5
- FL 58mm f/1.2
- R 58mm f/1.2
- R 100mm f/3.5
- FLP 38mm f/2.8



Automatic Diaphragm Control

When the A-1 is directly coupled with an FD lens, diaphragm control is totally automatic. Exposure metering is performed at full aperture whether the lens aperture ring is at the "A" mark or set to a specific aperture. At shutter release, the diaphragm automatically closes down to the aperture set by the camera or by you with the AT dial or the aperture ring. Following shutter release, the lens automatically returns to maximum aperture.

Manual Diaphragm Control

The insertion of non-automatic accessories between the camera body and lens may call for manual diaphragm control. The instructions for these accessories will tell you whether or not this is necessary.

1. Before attaching the lens, push the auto-

matic aperture lever to the right where it locks.

2. Mount the lens onto the accessory and secure the Breech-Lock bayonet ring. The aperture ring will now act directly on the diaphragm.

A few FD lenses have an additional lock lever which holds the automatic aperture lever in the "automatic" position. With these particular lenses, the automatic aperture lever must be pushed fully to the right while pushing the lock lever to the "L" position.

Be sure to reset the automatic aperture lever to its normal position before using the lens once more in direct contact with the camera body. In the case of a lens with a lock lever, switch it back to the position of the white dot.

Manual diaphragm control will also be necessary if you wish to mount the lens in reverse



FLASH PHOTOGRAPHY WITH THE A-1

AE Flash Photography

There are two special automatic flash units, the Canon Speedlites 199A and 155A, which make AE flash photography possible with the A-1. Just slip the Speedlite into the accessory shoe, switch it on, focus and shoot. It does not matter whether the AE mode selector is set to Av or Tv. Except for "B", whatever the shutter speed set, as soon as the pilot lamp of the Speedlite comes on, the A-1 switches to the X synchronization speed of 1/60 sec. --- automatically. The camera's microcomputer controls the light output for perfect automatic exposure within auto working ranges. And just as automatically will the camera switch back to the shutter speed actually set on the dial as soon as the pilot lamp goes out. The viewfinder offers you full information needed for flash photography. Moreover, when the main switch of the Speedlite is turned off, the flash circuitry is completely cut off and the A-1 switches over to function as an AE control camera with the Speedlite mounted on it.

Of course, with the flash still on Auto you can set the aperture manually should you wish to use an FL lens. Even then, however, the camera will automatically switch to 1/60 sec. as soon as the Speedlite

is ready for firing.

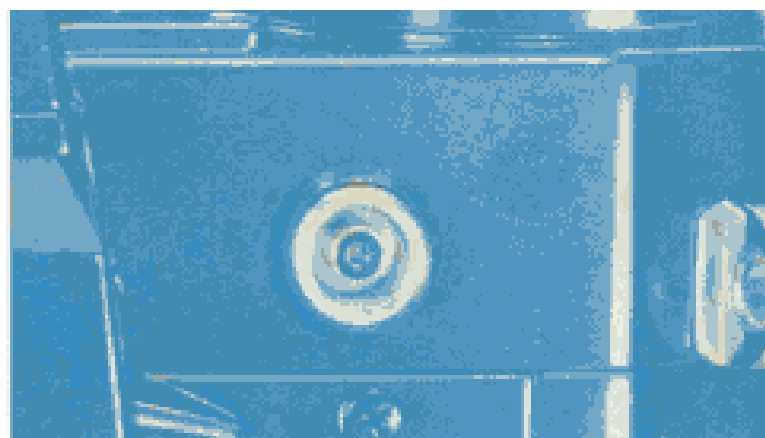
Both the Speedlite 199A and 155A employ a unique light sensing system which reduces excessive reflection from the central area to give better overall exposure.

With the Speedlite 199A, shutter speeds slower than 1/60 sec. can be optionally selected for the effect of a lighter background. It is a powerful flash unit with a guide number of 30m (ASA 100). To control depth of field, you can choose between three working apertures (f/2.8, f/5.6, and f/11 for ASA 100 film) that are automatically preset by the camera as soon as the pilot lamp comes on. The 199A also allows bounce flash and flash coverage of a 24mm lens field with the wide angle adapter. Its thyristor circuit offers you continuous flash shooting at close distances.

General Flash Photography

When you use the A-1 with flash units other than the Speedlites 199A and 155A, set the AE mode selector to Tv and the shutter speed to 1/60 sec. or slower. With this setting on the camera, other types of electronic flash units can be synchronized with your A-1 either through the hot shoe or via the PC socket on the front of the camera body. These allow two separate flash units to be fired simultaneously.

Aperture should be manually set on the



aperture ring to the working apertures specified for an automatic electronic flash or be determined through a guide number calculation using the following formula.

$$\text{Aperture} = \frac{\text{Guide Number}}{\text{Shooting Distance}}$$

When doing the math, make sure that the guide number and shooting distance are both in the same unit, whether meters or feet.

The fastest shutter speed for use with electronic flash is 1/60 sec., for use with M or FP bulbs, 1/30 sec.

Digital Readout in Flash Photography

When you preview exposure in flash photography, the digital readout will differ depending on the type of flash photography.

1. AE Flash with Canon Speedlites 155A or 199A and an FD Lens

The flash is on Auto while the lens is set to the "A" mark. The digital readout will display a shutter speed of 1/60 sec., the flash signal "F" and the auto working aperture set on the flash as follows: 60 F 2.8. The A-1 automatically switches to 1/60 sec. when the flash is charged regardless of the shutter speed set as long as it is not set to "B". The "F" flash signal appears in the viewfinder only when the flash pilot lamp lights up to indicate that the flash is charged. Thus, you will know the flash is ready simply by looking in the viewfinder. The aperture value displayed is the auto working aperture you have set on the flash depending on the ASA film speed. (The aperture displayed in the readout may be 1/2 f/stop larger or smaller than the auto working aperture set on the flash though the auto working aperture is the effective aperture). The auto working aperture value is automatically set on the camera.

Exposure warnings are very similar to those in shutter-speed priority AE. If you have set an auto working aperture larger than the maximum aperture of the lens, the maximum aperture of the lens will flash on and off to indicate underexposure. If you have set an auto working aperture smaller than f/16, the set auto working aperture will flash on and off. If the minimum aperture of the lens is equal to or smaller than the flashing aperture, exposure will be correct. If larger, the image will be overexposed.

If, with Speedlite 199A, you want to use a shutter speed of 1/30 sec. or slower, set the AE mode selector to Tv and the AT dial to the desired shutter speed and set the shutter speed selector switch on the 199A to the MANU position. In this case, the shutter speed on the AT dial will be displayed in the readout.

A rectangular digital readout display with a light beige background. It shows the text "60 F 2.8" in a black, sans-serif font. The "60" is on the left, followed by a small space, then "F", another small space, and "2.8" on the right. The digits are evenly spaced.

2. Automatic Flash Control with Canon Speedlites 155A or 199A

The flash is on Auto but the aperture is manually set by turning the lens aperture ring. This type of automatic flash control is necessary with an FL lens and other non-FD lenses and possible with an FD lens when it is not set to "A".

2) Automatic Flash

b	u	F	2.8	M
---	---	---	-----	---

3) Manual Flash

b	u	F		M
---	---	---	--	---

The "B" setting is useful in flash photography for obtaining intentionally blurred images or a zooming effect. At this setting, the flash of the Speedlite synchronizes with the opening of the first shutter curtain.

5. Ordinary Flash Photography with Flashes other than the Canon Speedlites

When flashes other than the two special Canon Speedlites are used with the A-1, the digital readout will include the same information as in manual override. See p. 65. However, since the aperture displayed has no meaning in this case, it might cause less confusion to switch off the viewfinder display lever.

The digital readout will be the same as in AE flash control but will also include the "M" signal for manual aperture control. Though the set flash auto working aperture value is displayed in the readout, it is not automatically set as in AE flash control. The same aperture value as set on the flash must be manually set on the lens aperture ring. As in AE flash control, the shutter speed is automatically set at 1/60 sec. as long as the AT dial is not at "B".

When using an FD lens, exposure warnings are the same as those for AE flash control. Since FL lenses lack a full aperture signal pin, you cannot always rely on the digital readout of apertures and exposure warnings. It is, therefore, advisable to switch off the viewfinder display lever.

6 0 F 2.8 M

3. Manual Flash Control with Canon Speedlites 155A or 199A

The flash is on Manual and the aperture is determined by a guide number calculation and then set manually on the lens aperture ring. The digital readout will include shutter speed, "F" flash signal and the "M" signal for manual aperture control. No aperture data will be displayed. *When the flash is set to Manual, the viewfinder will display "M" even if an FD lens is at the "A" mark.*

6 0 F M

4. Long Exposures with Canon Speedlites 155A and 199A

When the shutter speed is at "B", the shutter speed data in the digital readout will be replaced by "bu" for "bulb". The remaining information as well as exposure warnings remain the same as in each of the above three cases.

For example:

1) AE Flash

6 bu F 2.8



MOTORIZED FILM WINDING

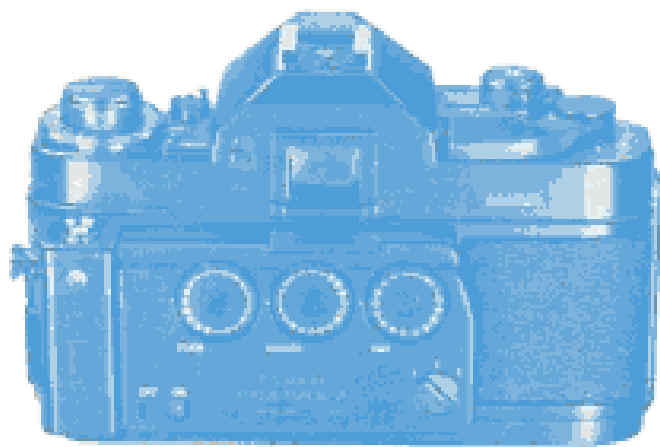
There remains one last mechanical operation in the A-1 that could possibly distract your attention from your subject: you have to wind the film. Canon has solved that problem for you too. Both the miniaturized Canon Power Winder A, originally designed for the AE-1, and the Canon Motor Drive MA, specially developed as a natural extension of the A-1's AE possibilities, automatically wind the film and recock the shutter without your ever having to touch the film advance lever, all even when you are using the A-1 in an AE mode (except for stopped-down AE).

The Motor Drive MA is a compact, high-performance device employing Monolithic IC and an electromagnetic clutch. It offers a selection of three speed settings: H (max. 5 fps), L (max. 3.5 fps) and S (single frame). With the Battery Pack MA, the unusually high speed (H) is instantly accessible for those fast-breaking situations. For maximum ease of operation, there is also a selection of three shutter buttons depending on how the camera is hand-held.

Both accessories stop automatically at the end of the film at which time an LED glows steadily to tell you that the roll is completed. They mount onto the A-1 with ease, and, even when mounted, can simply be switched off to wind the film manually.

DATA BACK A

Within seconds, the A-1's back cover can be exchanged for the Data Back A, which, again, becomes an integral part of the camera's electronic system. As you press the shutter release, the day, month and year will be recorded clearly but unobtrusively in the lower right hand corner of every picture, i.e., unless you decide to leave it blank. Since letters and Roman numerals are also available, the Data Back can serve as a convenient coding system as well.



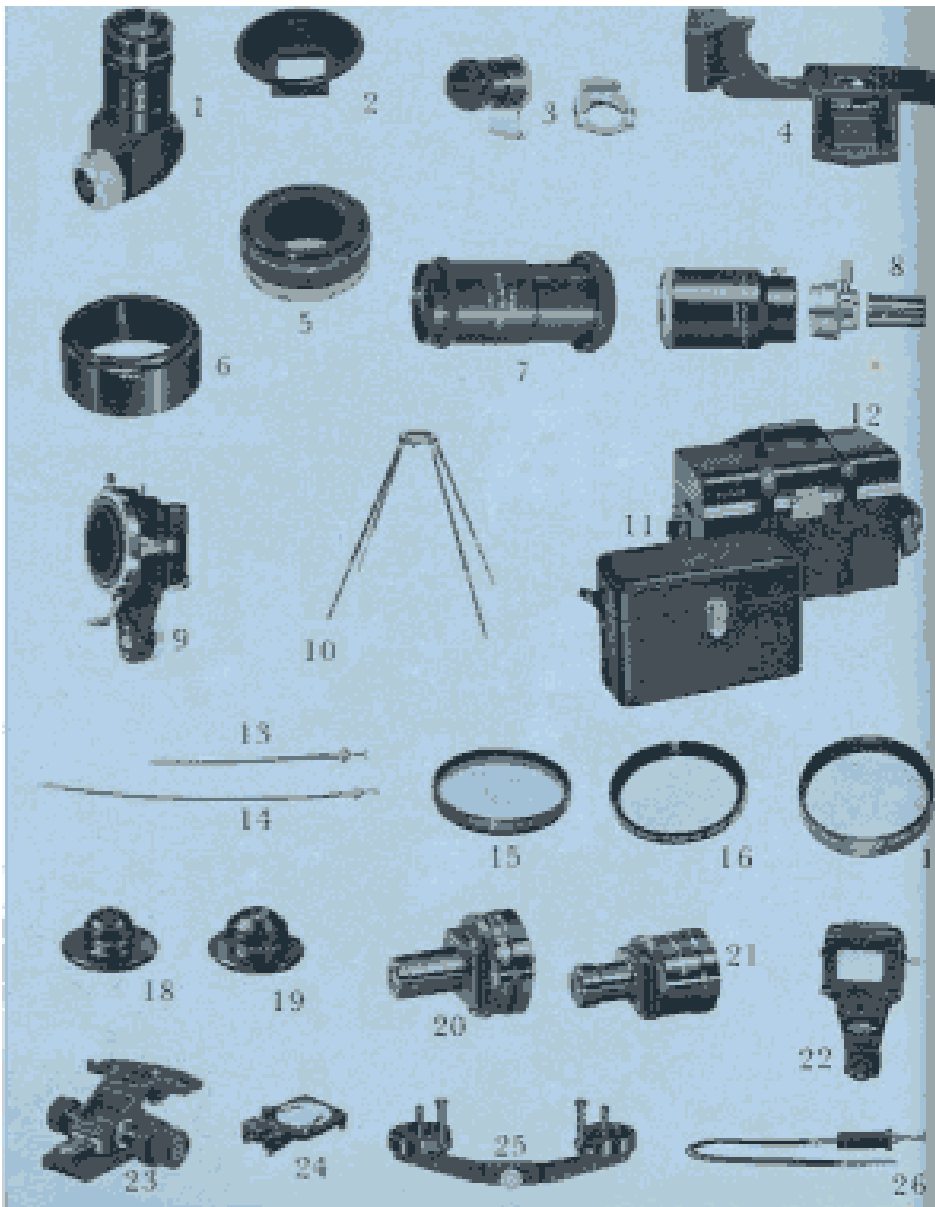
Various Accessories for Close-ups and Photomacrography

Canon offers a whole gamut of accessories which give you unlimited possibilities in close-ups, photomacrography and photomicrography. At the center of the system stands the elegant, versatile Auto Bellows featuring a three-way focusing mechanism, immediate lens reversal and automatic diaphragm coupling with the Canon Double Cable Release. For higher magnifications with excellent image quality there are the specially aberration-corrected Macro and Macrophoto lenses. A Macro Stage and three slide duplicators provide the maximum of ease in shooting difficult subjects.

Of course, close-up lenses and reversing rings are also offered along with three sets of extension tubes. The remarkable set of extension tubes FD-U permit full-aperture metering, automatic diaphragm coupling and AE photography with the A-1. There is also a simpler bellows unit, the Bellows M. Even with these non-automatic accessories, the Macro Auto Ring and Double Cable Release preserve automatic diaphragm coupling. Canon's extra-large, ultra-stable Copy Stand 5, the smaller Copy Stand 4, a small, collapsible copy stand, camera supports, a Focusing Rail, cable releases and microscope adaptors round out Canon's up-to-date, integrated, comprehensive close-up system.

ACCESSORIES

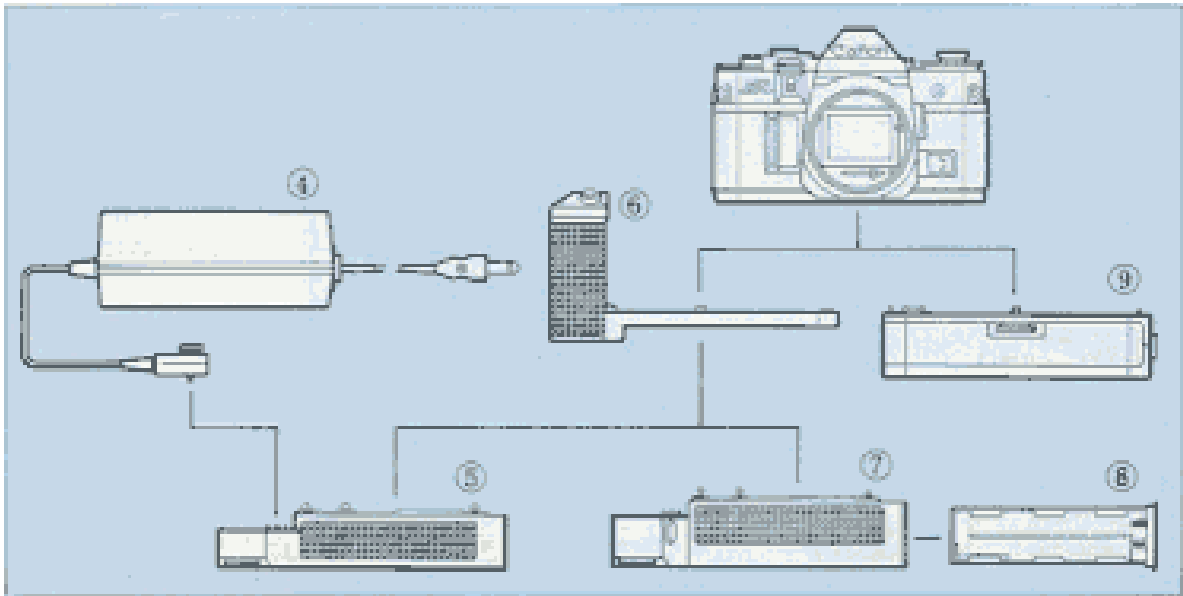
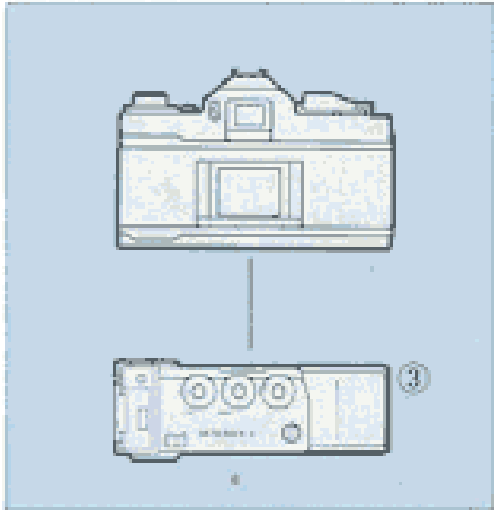
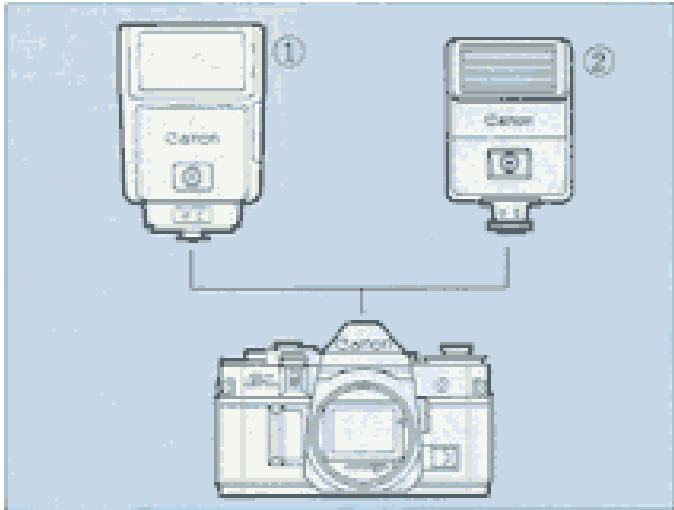
- 1. Angle Finder A2 and B
- 2. Eyecup 4S
- 3. Magnifier S
- 4. Camera Holder F3
- 5. Macrophoto Coupler FL 55 and FL 58
- 6. Lens Hood BS-55
- 7. Microphoto Hood
- 8. Photomicro Unit F
- 9. Slide Duplicator
- 10. Handy Stand F
- 11. Gadget Bag 4-type
- 12. Gadget Bag G-1
- 13. Canon Release 30
- 14. Canon Release 50
- 15. 55 mm filters
- 58 mm filters
- 16. 58 mm Close-up Lenses (240, 450)
- 17. 55 mm Close-up Lenses (240, 450)
- 18. Macrophoto Lens 20 mm f/3.5
- 19. Macrophoto Lens 35 mm f/2.8
- 20. Duplicator 8
- 21. Duplicator 16
- 22. Duplicator 35
- 23. Focusing Rail
- 24. Macro Stage
- 25. Roll Film Stage
- 26. Double Cable Release





27. Copy Stand 5
28. Copy Stand 4
29. Auto Bellows
30. Bellows M
31. Bellows FL
32. Extension Tube M Set
33. Extension Tube FD 25-U and FD 50-U
34. Extender FD 2x-A
35. Dioptric Adjustment Lens S (10 kinds)
36. Speedlite 155A
37. Speedlite 199A
38. Motor Drive MA
39. Battery Pack MA
40. Ni-Cd Pack MA
41. Power Winder A
42. Data Back A
43. Action Case A
44. Holder for Gelatin Filter with Filter Holder Adapter and Hoods
45. Wireless Controller LC-1

- ① Speedlite 199A
- ② Speedlite 155A
- ③ Data Back A
- ④ Ni-Cd Charger MA
- ⑤ Ni-Cd Pack MA
- ⑥ Motor Drive MA
- ⑦ Battery Pack MA
- ⑧ Battery Magazine MA
- ⑨ Power Winder A



Proper Care of the Camera

Your A-1 is a rugged, high-quality camera. It will work properly if operated and cared for properly. Never force anything. If you have a problem that is not answered in the instructions below, follow the advice of your nearest Canon serviceman. We recommend taking the A-1 to an authorized Canon service facility at least once every three years for a complete checkup.

Storage

The best thing you can do for your A-1 is to use it regularly, but in the event that it won't be used for quite a while, first remove it from any camera bag or soft case. Then remove the battery to prevent possible corrosion to the terminals. Recap the lens, and if the body is stored separately from the lens, put the body cap and the rear lens cap on. Wrap it in a clean, soft cloth along with silica gel or some other desiccant to keep it dry, and store it in a cool, dry, dust-free place. Avoid storing it in the rear window, glove compartment or other "hot spots" of an automobile, in a place such as a laboratory where chemicals could cause corrosion and rust, or in a dusty, damp, or hot place. Keep it out of direct sunlight. Before using the A-1 after it has been stored for a long

time, carefully check the operation of each part.

Cleaning the Camera and Lens

Before doing anything else, clean the camera with a blower brush. It is best to have two blower brushes, one for the camera body and the lens barrel, the other for the lens surfaces, eyepiece and mirror. If the blower brush is sufficient to get the camera clean, stop there. By all means, avoid touching the lens. Should you accidentally get fingerprints or smudges on the lens or eyepiece, use lens tissue (not eyeglass tissue!) or a clean, soft, untreated cloth, after breathing on the lens surface, if necessary. Never use a handkerchief, facial tissue or any other cloth which might permanently scratch the lens, and never use a cloth treated with a chemical which might totally ruin the lens coating.

Put only one or two drops of lens cleaning fluid on the tissue, not the lens, and, starting at the center of the lens, lightly wipe it while working towards the outer edges in a circular motion. Use a silicon cloth, if necessary, to wipe smudges off the camera body and lens barrel only. The mirror is another part you should never touch. A dirty mirror does not affect the image though it may impair viewing. If it is dusty, clean it very gently with the lens blower brush. If more cleaning

is necessary, do not attempt to do it yourself but take it to an authorized Canon service facility. The film compartment also requires occasional cleaning with a blower brush to remove accumulated film dust particles which might scratch the film. When doing this, take special care NEVER to exert pressure on the shutter, the rail surfaces or the pressure plate.

Salt and sand are your camera's worst enemies. After using it on a beach, clean it thoroughly. If you accidentally drop it in the water, it may be irreparable but take it immediately to an authorized Canon service facility.

Using the Camera in Extremely Cold Conditions

In extremely cold conditions, always protect the camera from outside air and try to finish shooting as quickly as possible.

In temperatures below 0°C (32°F), the battery may be affected, so you may want to carry a spare. Keep the camera and spare battery close to your body or in a pocket to keep them warm until you are ready to take a picture. Although the battery may not function well in cold conditions, don't throw it away. It may work perfectly again when you use the camera in warmer temperatures.

Avoid extreme temperature changes. Condensation forming on a camera and lens taken from subzero outside temperatures into a warm room may cause corrosion. Let the camera gradually adjust to the temperature change by placing it in a completely sealed plastic bag for a while.

SPECIFICATIONS

Type: 35mm SLR (Single-Lens Reflex) camera with selective, electronically controlled AE (Automatic Exposure) and focal plane shutter.

Format: 24 x 36mm.

Photographic Modes: Six modes; including five AE modes: shutter-speed priority AE, aperture priority AE, programmed AE, full AE flash photography with specified Canon electronic flashes, and stopped-down AE; and manual override.

Interchangeable Lenses: Canon FD series lenses (usable with four full-aperture metering AE modes and stopped-down AE); Canon FL series lenses (usable with stopped-down AE).

Standard Lenses: Canon FD 55mm and 50mm lenses.

Lens Mount: Canon Breech-Lock mount. Canon FD, FL and R lenses can be mounted.

Viewfinder: Fixed eye-level pentaprism.

Field of View: 93.4% vertical and 95.3% horizontal coverage of the actual picture area.

Magnification: 0.83X at infinity with a standard 50mm lens.

Focusing Screen: Standard split-image/

microprism rangefinder.

Viewfinder Information: Displayed in form of LED digital readout below viewing area. Includes shutter speed (1/1000 sec.—30 sec.), aperture (f/1.2—f/32), flashing warning of incorrect exposures and settings, bulb indication, charge completion indicator for specified Canon flash units, manual aperture control signal, error indication for incorrect stopping-down operation. Shutter speed and aperture data displayed in 1/2 step increments. Viewfinder information can be cancelled by turning off viewfinder display switch.

Dioptric Adjustment: Built-in eyepiece is adjusted to standard —1 diopter.

Eyepiece Attachments: Angle Finders A2 and B, Magnifier S, 10 different Dioptric Adjustment Lenses S for eyesight correction and Eyecup 4S.

Eyepiece Shutter: Built-in. Keeps out extraneous light during self-timer or remote control operation.

Mirror: Instant-return type with shock-absorbing mechanism. No image cut-off in the viewfinder even with the FD 400mm telephoto lens.

AE Mechanism. Electronically controlled. Information input by means of AE mode selector and AT dial for full-aperture AE metering (FD lens at "A") and stopped-down AE metering.

Employs three LSI's with 1^2L , one Linear LSI and one Bi-MOS IC for light metering.

AE Mode Selection: By means of AE mode selector. Two settings: Tv (Time value) for shutter-speed priority AE, Av (Aperture value) for aperture priority AE.

Light Metering System: Through-the-lens Central Emphasis metering by silicon photocell located just above eyepiece lens. Light reaches silicon photocell after passing through fresnel lens condenser.

ASA Film Speed Setting: ASA6 to ASA 12800 in $1/3$ step increments. With lock.

Meter Coupling Range: EV-2 (8 sec. at $f/1.4$) to EV 18 ($1/1000$ sec. at $f/16$) at ASA 100 with FD 50mm $f/1.4$ S.S.C. lens.

Exposure Compensation: ± 2 f/stop range in $1/3$ f/stop increments: $1/4 \cdot 1/2 \cdot 1 \cdot 2 \cdot 4$.

Exposure Memory: EV locked in when exposure memory switch is pressed. When pressed, the shutter-speed/aperture combination can be changed for the same

locked-in EV.

Exposure Preview: Viewfinder digital read-out activated by pressing shutter button halfway or by pressing exposure preview switch or exposure memory switch.

Stop-down Lever: Foldable. Stopping-down an FD lens is possible only when aperture ring is disengaged from "A" mark.

Manual Override: Possible by disengaging FD lens from "A" mark and setting AE mode selector to Tv. Aperture manually controlled with aperture ring, shutter speed with AT dial.

Shutter: Cloth focal plane shutter with four spindles. Electronically controlled, steplessly, from 30 sec. to $1/1000$ sec. Shock and noise damper mechanisms are incorporated.

Shutter Speed Scale: B, 30, 15, 8, 4, 2, 1, 2, 4, 8, 15, 30, 60, 125, 250, 500, 1000 plus P (with the AE mode selector at Tv). "P" setting is for programmed AE mode. Intermediate speeds not on the scale cannot be set.

Aperture Scale: $\cdot 1.4 \cdot 2 \cdot 2.8 \cdot 4 \cdot 5.6 \cdot 8 \cdot 11 \cdot 16 \cdot 22$ (with the AE mode selector at Av).

Shutter Release Button: Oversized, two-step button with electromagnetic shutter

back frames as film rewound. Automatically resets to "S" upon opening back cover. Does not advance during multiple exposures.

Film Rewinding: By pressing rewind button and cranking rewind knob. Rewind button automatically resets when film advance lever turned.

Other Safety Devices: Camera will not function when power level insufficient. Film winding impossible while shutter is in operation. Lockable controls.

Size: 141 x 91.5 x 47.5mm (5-9/16" x 3-5/8" x 1-7/8") body only.

Weight: 620 g (21-7/8 ozs.) body only, including battery.

With the 50mm f/1.8 S.C. lens. — 820 g (28-15/16 ozs.)

With the 50mm f/1.4 S.S.C. lens — 925 g (32-5/8 ozs.)

Subject to change without notice.

release. Pressing it halfway activates meter circuit, pressing it all the way sets shutter in operation. Can be locked by setting main switch to "L" to guard against accidental shutter release. With cable release socket.

Power Source: One 6V silver oxide battery (Eveready No. 544, UCAR No. 544, JIS 4G13, Mallory PX28) or alkaline manganese battery (Eveready No. 537, UCAR No. 537). The battery lasts approximately one year under normal use. Battery is loaded in the battery chamber on the front of the camera body.

Battery Check: A red LED on top of camera flashes on and off to indicate power level when battery check button is pressed. Flashing frequency decreases with power level.

Main Switch: Two positions: "A" and "L". At "L" all active circuits are off and shutter button is locked as safety feature. Doubles as self-timer lever.

Cancellation of Camera Circuit: Shutter and self-timer operation cancelled by setting main switch to "L" or by pressing battery check button.

Multiple Exposure: Possible by setting multiple exposure lever before winding film advance lever to recock shutter. Frame counter does not advance. Automatically resets. Unlimited.

Self-Timer: Electronically controlled. Activated by pressing shutter button. Time-lag of 2 or 10 seconds possible. Red LED flashes on and off to indicate its operation. Flashing frequency increases 2 sec. before shutter release.

Flash Synchronization: X-synch at 1/60 sec.; FP- and M-synch at 1/30 sec. and slower.

Flash Coupling: Accessory shoe has contacts for directly-coupled flash units and automatic flash control contacts for automatic exposure. JIS-B (PC) type flash terminal with shock preventive rim on front of body.

Automatic Flash: Full AE flash photography with Canon Speedlites 155A and 199A. Shutter speed automatically set. Aperture automatically controlled according to setting of flash when flash is fully charged.

Back Cover: Opened by pulling up rewind knob. Removable for attaching Data Back A. With memo holder.

Film Loading: Easy film loading with multi-slot take-up spool.

Film Advance Lever: Single-stroke 120° throw with 30° stand-off. Winding with several short strokes possible. Automatic winding possible by mounting Canon Motor Drive MA or Power Winder A.

Frame Counter: Additive type. Counts



Canon AUTO BELLOWS

E

Instructions

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Canon Auto Bellows

The Canon Auto Bellows is a high quality bellows for use with Canon single-lens reflex cameras which offers automatic diaphragm coupling when used with the Canon Double Cable Release. It is the cornerstone around which Canon's close-up system is built. With the use of a standard macro lens, magnifications from around 0.8X to 4X are possible. Many other applications are possible with the accessories in the system. The Canon Duplicator 35 for copying 35mm slides, Macrophoto Lenses for obtaining high magnifications, and photomicrography using a microscope, are only few examples of wide applications with the Auto Bellows.

Auto Bellows & Accessories

Auto Bellows Set (includes Canon Double Cable Release)

Size and Weight: 135mm (W) × 158mm (H) × 219mm (L), 1,170g

Related Accessories: Attachment Rings 52 and 55mm for lens reversal, Duplicator 35, Duplicator G, Macro Stage, Copy Stand 4, Copy Stand 5, Macrophoto Lens 35mm f/2.8, Macrophoto Lens 20mm f/3.5, Manual Diaphragm Adapter, Macrophoto Couplers FL, Macrophoto Adapters MA, Vari-Extension Tubes, Extension Tube M Set, etc.

Specifications subject to change without notice.

Main Features

1. Automatic Diaphragm Control with the Use of Double Cable Release

The lens standard of the Auto Bellows is equipped with a cable release socket. The automatic diaphragm of FD or FL lens is stopped down when the double cable release is pressed halfway and a picture is shot when it is pressed all the way. Metering and the confirmation of depth-of-field is, therefore, done when the double cable release is pressed halfway.

2. Three-way Focusing Systems

You can independently alter the lens-to-subject distance and camera-to-subject distance. As there is a supporting runner, it is also possible to move the whole bellows unit back and forth. To achieve a change in magnification and to make final adjustments in focusing, there is no need to move the whole set-up of bellows plus a tripod.

3. Reversing the Lens for Attachment

The lens standard can be reversed for reverse-mounting the lens. This means more than life-size magnification is possible without the use of the Macrophoto Coupler.

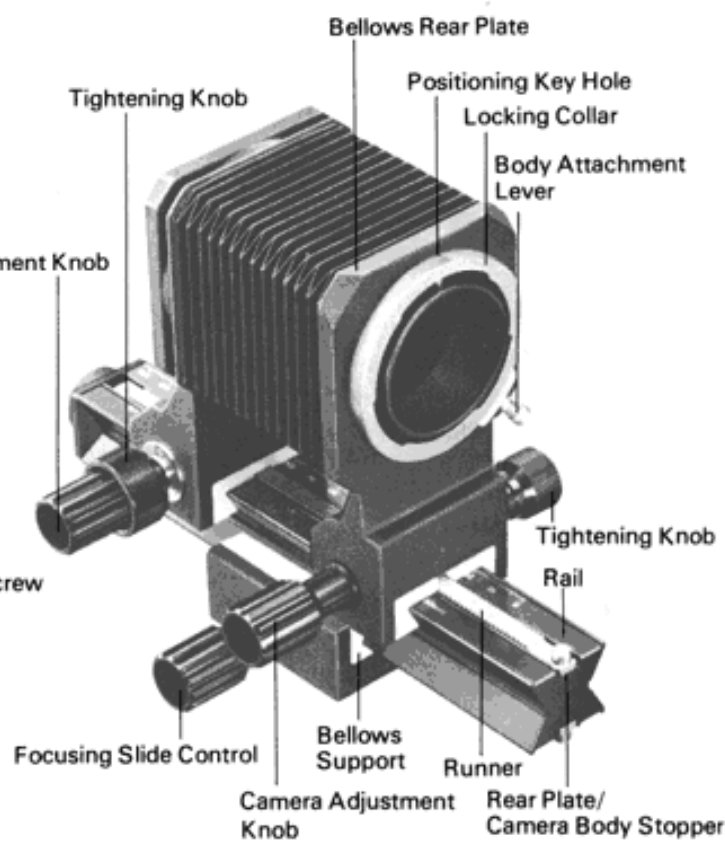
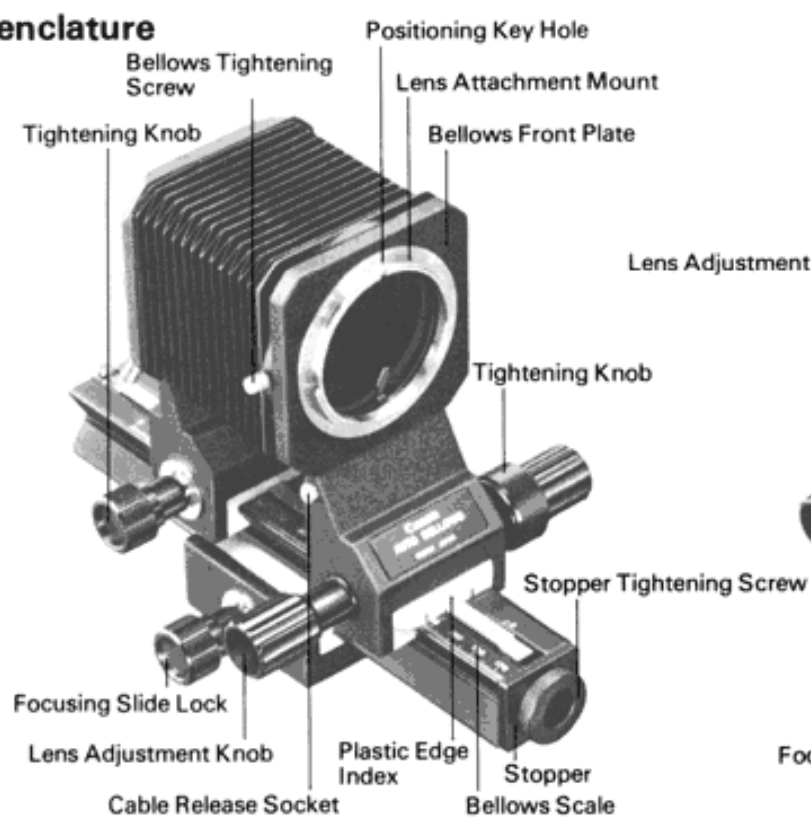
4. Revolving Mechanism

A vertical format shot is possible by rotation of the camera body 90°. With power winder accessory attached, the Auto Bellows permits camera body rotation at the rear of the rail.

5. The Bellows Extension of from 39mm to 175mm

6. Sturdily-built Construction for Durability.

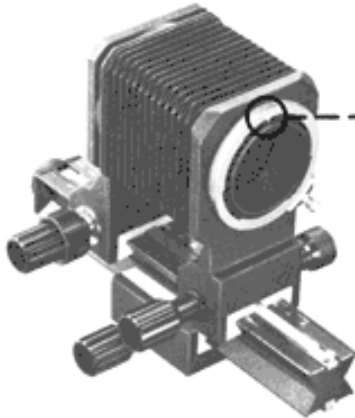
Nomenclature



Subject to change without notice.

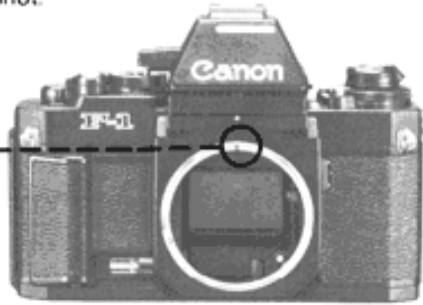
Attachment to the Camera

1. Rotate the body attachment lever downwards until it stops so that the red dot on the body attachment mount is right above the positioning pin.
2. Next align the red dot above the camera mount with the red dot on the bellows' body attachment mount, push the camera body in and rotate the body attachment lever upwards to secure. When removing the camera, rotate this lever in the opposite direction.



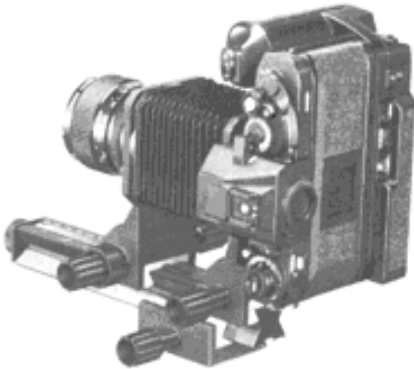
Camera with Winder and Motor Drive Accessories

A camera body with a winder or motor drive accessory can be attached to the bellows. With a winder attached to the camera body, the camera can be secured to the bellows more or less centered on the runner for a horizontal shot. However, with a motor drive accessory, the bellows rear plate should be moved to the rearmost position of the runner for a horizontal shot.



Horizontal/Vertical Change of Camera Position

The camera can be changed from a horizontal to vertical position if the camera body is used alone without a winder or motor drive accessory. It does not matter whether the bellows is more or less centered on the runner or its rear plate moved to the rearmost position. However, when the camera is used with a winder or motor drive accessory, change the camera from a horizontal to vertical position at the rearmost position of the runner. Once the camera is changed to a vertical position with a winder or motor drive attached, the bellows can be moved freely from the rear end to the center of the rail.



Recommended Lens

For professional results in close-up and photomacrography, Macro and Macrophoto lenses especially designed for close-up and macro work are recommended.

Lens Attachment

The basic method in using the Auto Bellows is to use the Double Cable Release for automatic diaphragm control. The user also has a choice to operate the diaphragm manually by locking the automatic/manual aperture lever in the back of the lens to the manual position. This is possible with FD lenses having a locking collar, Macro 50mm and Macro 100mm lenses. However, for Macro 200mm lens and other compact FD lenses (without the chrome locking collar), manual diaphragm adapter is used to lock the lever to the manual position. See page 7 for the required preparations before actual shooting.

Remove the aperture ring of the lens from the 'A' mark. The lens is attached to the bellows front plate in much the same way the lens is mounted onto the camera body. However, it is important to remember removing the aper-

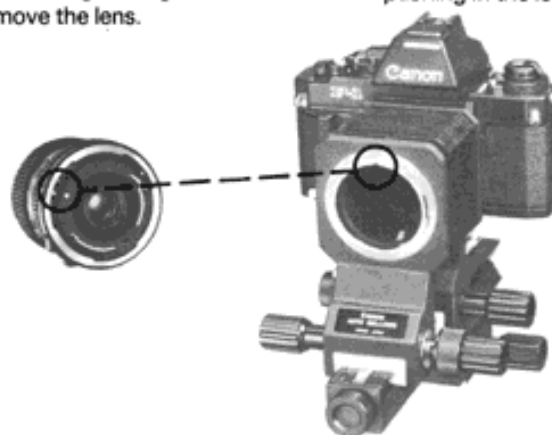
ture ring of the lens from the 'A' mark beforehand. The lens will not mount if its aperture ring is set at the 'A' mark.

The Procedure for FD Lens with a Locking Collar:

Align the positioning key hole of the bellows with the red dot on the locking collar of the lens. Push the lens straight in and clamp the lens in place by rotating the tightening collar clockwise. Rotate the tightening collar counterclockwise to remove the lens.

The Procedure for FD Lens without a Locking Collar:

Align the positioning key hole of the bellows with the red mount positioning point of the lens and rotate the whole lens clockwise until a click sound is heard. Lens release button springs up to indicate that the lens is firmly clamped. Do not apply pressure on this button while attaching the lens. For dismounting the lens, rotate the lens counterclockwise while pushing in the lens release button.



Manual Diaphragm Control

When the Double Cable Release is not used, there is no automatic diaphragm coupling of the lenses. The lens must be closed down manually and the automatic/manual aperture lever of the lens should be locked to the manual position before attaching the lens to the Bellows unit.

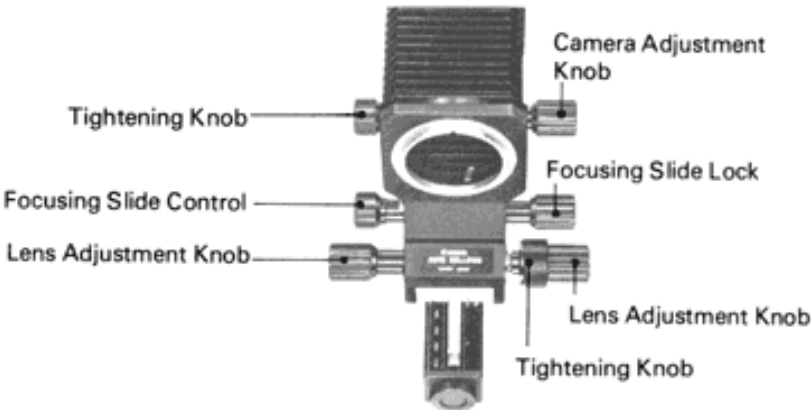
For FD lenses having a separate locking collar, turn the automatic/manual aperture lever in the back of the lens counter-clockwise until it locks in the manual position. On the FD 50mm f/1.8 S.C. and the FD 35mm f/3.5 S.C. lenses, an additional locking lever has to be swivelled to lock the automatic/manual aperture lever. The lock position is marked with a red L. The lenses used in these ways on the Bellows give manual operation of the diaphragm. When this function is no longer needed, simply unlock the automatic/manual aperture lever from the manual position.

* For FD lenses without the chrome locking collar, manual diaphragm control is possible only with the 50mm, 100mm Macro lenses (not requiring the use of the manual diaphragm adapter to lock the lever in the manual position) in case the lens is at-

tached directly to the Auto Bellows or other accessories designed to preserve diaphragm automation. When the manual diaphragm adapter is attached to the rear of the FD lenses (which require the use of this adapter to lock the lever in the manual position), do not attempt attaching the lens directly to the Auto Bellows or other accessories designed to preserve diaphragm automation.

Bellows Adjustment

The whole set-up of lens/bellows/camera body can be moved back and forth by turning the focusing slide control. When the approximate distance between the camera and the subject has already been established, the focusing slide control is useful for camera-to-subject distance fine adjustment. The



facility to adjust the movement of the whole unit is also useful for proper weight balance when the Bellows unit is mounted on a tripod. The knob on the other side is turned clockwise to lock the movement of the whole unit on the focusing slide.

- * There is a socket for the tripod at the bottom of the Bellows support platform.
- * Incidentally, the Bellows unit can be removed from the sliding base by removing the stopper tightening screw at the front end of the scale. When the Bellows is fitted back so its front now faces the rear of the sliding base, knobs have to be turned in the opposite direction for backward/forward movement. See page 24 for pictures.

Attachment of Canon Double Cable Release

When this double cable release is screwed into the cable release socket on the side of the front plate of the bellows, the diaphragm is automatically coupled and will automatically close down to the preset aperture upon shutter release (see page 11).

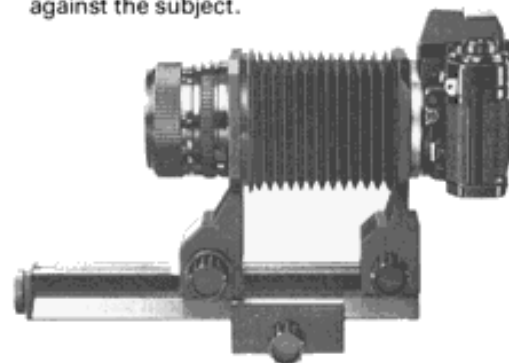
If you do not use the double cable release, manual aperture control is necessary. Before you mount the lens, lock the automatic aperture lever at the rear of the FD lenses with a



locking collar and FD 50mm and 100mm Macro lenses without a locking collar.

Positioning the Camera on the Bellows

Ordinarily it is best to position the rear plate/camera body at the rear part of the scale so that the front edge of the rear plate is aligned with the "0" mark. This makes it easier to calculate the amount of bellows extension. When the magnification desired calls for only slight bellows extension, set the camera in the middle of the scale. If it is positioned at the rear, there is the possibility of the front end of the bellows bumping against the subject.



Focusing

Please refer to the tables on pages 16–23. These tables indicate the shooting distance and the required bellows extension for each type of lens according to the desired magnification. First decide the magnification you want, then read the corresponding shooting distance and position the camera. Then adjust the bellows to the specified distance on the bellows scale. For fine adjustments in focus, move the camera/bellows/lens unit as a whole by turning the focusing slide control. The unit can be locked into position by turning the focusing slide lock knob on the support platform.

For more details on calculating image magnification, please refer to page 13.

Explanation of Bellows Scale

There are two scales on the bellows rail. One scale is calibrated in millimeters from 0mm to 175mm and indicates the amount of bellows extension. The shortest optical length on the bellows scale is 39mm. The other scale is calibrated in various image magnifications possible using a 50mm macro lens. The

gradations in the bottom row of this scale (referring to the picture below) indicate image magnifications for a 50mm macro lens mounted onto the bellows in standard direction. The gradations on the top row apply to a 50mm macro lens which is reverse-mounted onto the bellows. Since the image magnification values change with lens focal length, the magnification scale cannot be used with lenses having focal lengths other than 50mm macro lens.

The specific values on both the millimeter and the magnification scales apply to when the rear plate and camera body are positioned at the rear of the scale on "0".

For reverse-mounting the lens, see page 24.



Using the Bellows Scale

The function of the two scales is to indicate how far you should extend the bellows to obtain a desired magnification. When using a 50mm macro lens with the rear plate at the very rear of the bellows rail, simply turn the lens adjustment knob until the edge of the plastic forerunner (with the two red marks) of the front plate is aligned with the magnification desired.

When using other focal length lenses, read the appropriate table for the required bellows extension in millimeters depending on the

magnification desired. Align the slanted plastic edge (with the two red marks) of the front plate with the value in millimeters on the scale.

The slanted plastic edge of the front plate remains the index even when mounted on the bellows in reverse (see page 24).

In situations where it is necessary to position the rear plate with the camera body somewhere in the middle of the scale instead of at the end, add the necessary bellows extension from the appropriate table to the value aligned with the front portion of the rear plate

and move the front plate of the bellows until the plastic edge is aligned with the sum. For example, if the front edge of the rear plate is aligned with 60mm and the necessary bellows extension is 50mm, add 50mm to 60mm to obtain 110mm and align the plastic edge of the front plate with 110mm. When using a 50mm macro lens, you may simplify the process by aligning the front edge of the rear plate with a specific magnification, adding the desired magnification to that value and aligning the edge of the front plate with the sum of the two magnifications.



Canon Double Cable Release

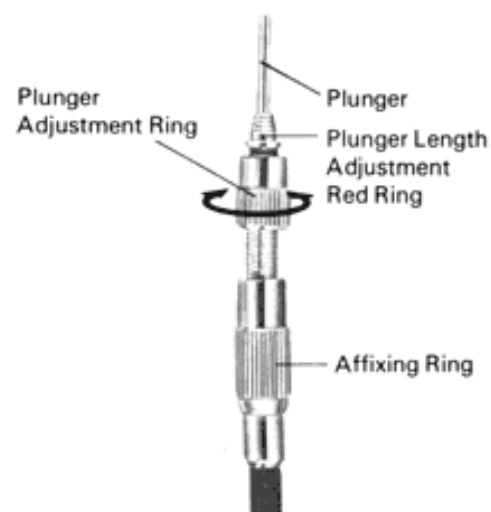
The Canon Double Cable Release is an accessory designed for use with the Auto Bellows or the Macro Auto Ring in photomacrography and photomicrography to allow automatic diaphragm coupling of FD and FL lenses. The double cable release has two plungers. At the half stroke of the cable release, the red-coded plunger screwed into the Auto Bellows or Macro Auto Ring closes the lens down to the preset aperture. Macro Auto Ring mounts onto the rear of the lens for preserving the automatic diaphragm function when non-automatic accessory is interposed between the lens and the Auto Bellows and the lens is reversed. This reversed lens/non-automatic accessory combination is used when magnification higher than can be possibly obtained by simply attaching the reversed lens directly to the Auto Bellows is required. At the full stroke of the cable release, the plunger screwed into the camera's shutter release button releases the shutter.

Instructions

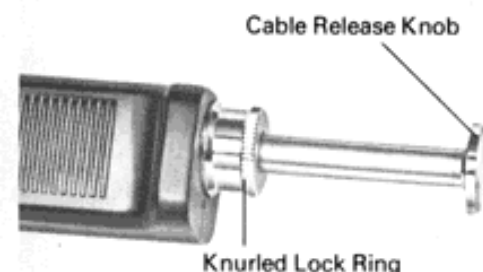
1. Adjust the length of the red-coded plunger by turning the lower threaded ring at the lower end of the cable. When used on the Auto Bellows, it should be protruded to its maximum length and for use with the Macro Auto Ring it should be shortened to the minimum length. The plunger length of the supplied Double Cable Release comes adjusted for using it with the Macro Auto Ring.
2. For adjusting the red-coded plunger to its maximum length for using it with the Auto Bellows, first press down the cable release knob all the way down after adjusting the knurled ring at its base upwards in an unlocked position. While holding the affixing ring, slightly loosen the plunger adjustment ring and turn the plunger length adjustment ring clockwise, looking from the front, until it stops. Upon pressing the cable release knob, the plunger will protrude out to its maximum length of about 15mm for completely closing down the diaphragm of the lens attached to the Auto Bellows to the minimum or whatever pre-set aperture. For shortening to the minimum length of

around 9mm for use with the Macro Auto Ring, turn the plunger length adjustment red ring counterclockwise, looking from the front.

3. Screw the red-coded plunger into the cable release socket of the Auto Bellows or Macro Auto Ring by turning the affixing ring and the other plunger into the camera cable release socket.



4. Adjust the knurled ring at the base of the cable release knob. This ring has two positions. It can be upwards in an unlocked position or pressed down while turning clockwise where it will lock. Make sure it is in the upwards, unlocked position.
5. Focus at full aperture.
6. Press the cable release knob halfway. The red-coded plunger will protrude to close down the lens to the preset aperture. As long as the knurled ring at the base of the knob is in the upward position, the plunger will be locked in the protruded position to facilitate metering.



Metering and Releasing the Shutter

1. With cameras such as the AE-1 PROGRAM, AE-1, or A-1, use the exposure preview switch instead of shutter button for metering after closing down the lens to the pre-set aperture. With cameras such as the New F-1 and AV-1 without the exposure preview switch, cable release knob must be pressed slightly down for switching on the meter and taking a reading. If you are not quite ready for a shot at this instance, be careful not to press the cable release knob all the way in or deep enough to prematurely release the shutter. With cameras such as the New F-1 and AV-1, be especially careful not to prematurely release the shutter as only the shutter button functions as a meter switch and it has to be pressed to get the meter in the switched-on state.
2. Press the cable release knob all the way in to release the shutter.
3. Before winding the film, press down on the knurled ring beneath the cable release knob. The cable release knob will then pop out and the lens will return to full aperture. Be sure to pop out the cable re-

lease knob before advancing the film for the next shot. Otherwise in case of cameras with two-step electromagnetic shutter release such as the AE-1, AE-1 PROGRAM, or A-1, the operation of the winding lever (when you wish to only advance the film) while the shutter button is still being held down by the cable release will release the shutter as well.

- On most cameras, shutter button functions as a meter switch and the weight of the cable release sometimes keeps the meter in the switched-on state between shots. You can prevent this by using a cable holder to take up the slack of the cable release.

Use of Macro FD 50mm f/3.5 and FD 100mm f/4 Lenses

These lenses have aperture lever which if pushed all the way against resistance, locks into the stop-down mode to give manual operation of the diaphragm. Lens returns to full aperture only by turning the aperture ring and therefore Double Cable Release is not used in this instance. Use ordinary cable release instead to release the shutter. Macro FD 50mm f/3.5 and Macro FD 100mm f/4 lenses (without chrome locking collars) are only lenses having aperture lever which locks into the stop-down

mode and if you wish to use Double Cable Release, you must remember to keep the aperture lever in unlocked position.

Simple Photographic Procedure

Refer to your lens instruction booklet and the tables in these instructions while following these steps for shooting.

1. Choose the image magnification.
2. Read the shooting distance corresponding to the image magnification from the table and position the camera accordingly.
Measure the shooting distance from the film plane indicator on the camera body to the subject.
3. Read the bellows scale setting from the table and position the lens by turning the lens adjustment knob.
4. Look into the viewfinder and focus by turning the shooting distance adjustment knob located on the side of the support platform.
5. Set the camera for stopped-down metering function. It means that the stop-down lever (available on some cameras) or stop-down slided (for the New F-1) must be first locked

in the stop-down position. Take a meter reading by using the exposure preview switch or by application of slight pressure on the shutter button. In the case of a non-through-the lens camera, correct the exposure following the exposure factor conversion table. (See page 30.)

6. Press the double cable release all the way to trip the shutter.
7. Press down on the knurled ring beneath the cable release knob to pop out the knob after the shooting.

Obtaining Image Magnification

Image magnification is a ratio between the image size and the object size and can be calculated according to the following formula:

$$M = \frac{y'}{y}$$

M = image magnification

y' = image size

y = object size

Example: If you wish to shoot a flower with a 4cm diameter so that it fills up the entire film frame from top to bottom, the resulting calculations look like the following:

$$\frac{24}{40} = 0.6X$$



* The film frame size of a 35mm camera is 24 × 36mm.

You can also obtain image magnification by using the following formula: $M = \frac{r}{f}$

M = image magnification

f = lens focal length ("f" is a nominal value)

r = lens extension

Exposure

Camera with through-the-lens meter

When the lens is extended away from the camera body by means of accessories such as the bellows, extension tubes, etc., the amount of light reaching the film plane diminishes. Since a camera with a through-the-lens meter measures the light after it comes through the lens, the meter automatically takes the decreased light into account and there is no need to correct exposure. Metering is to be done when the lens is closed down to the pre-set aperture meaning that the lens is used in the stop-down mode. This can be confirmed by darkening of the screen image after pressing the Double Cable Release knob halfway and then turning the aperture ring toward the minimum aperture.

When stopping the lens down to a very small aperture, the light level may be too low for meter coupling. In this case, meter the exposure at maximum aperture, then close the lens down to the desired aperture and figure the necessary shutter speed according to the metered exposure. For example, if you close the lens down three f/stops, reduce the shutter speed by three steps.

Camera without through-the-lens meter

When doing close-up/photomacrography by inserting accessories between the lens and camera body and using a camera without a through-the-lens meter, it is necessary to use a separate meter and to increase the metered exposure. An incident light-reading exposure meter is recommended. The exposure correction must be made according to the total length of all accessories inserted between the lens and the camera body or according to image magnification. The amount of exposure correction is called the exposure factor and can be calculated by using the following equations:

$$1) B = (1 + M)^2 \text{ and } 2) M = \frac{r}{f}$$

where

B = exposure factor

f = lens focal length

r = amount of lens extension

M = image magnification

To determine the amount of lens extension, read it from the bellows scale. Add the length of any additional tubes or other accessories which are inserted between the lens and the bellows. The exact lengths of these other accessories may be found on page 32.

Example: If you are using a 50mm lens extending up to 100mm, you can calculate the expo-

sure factor as follows. Using formula 2, the image magnification becomes 2X; putting this answer into formula 1 gives $B = (1 + 2)^2 = 9$. In other words, an exposure nine times the metered exposure value must be given. Once you have calculated the exposure factor, make the exposure correction by multiplying the metered shutter speed by the exposure factor.

An easier way to find out how much exposure correction is necessary is to use the exposure factor conversion table included in these instructions. Simply find the exposure factor which corresponds to the image magnification. The table also gives the corresponding amounts of exposure correction in exposure degrees. One exposure degree equals one f/stop or one shutter speed step. Make the exposure correction by opening the diaphragm or reducing the shutter speed by the specified number of exposure degrees or a combination of the two. For instance, using the same above example, and referring to the exposure factor conversion table, the exposure must be increased by 3-1/4 exposure degrees for a magnification of 2X. One way to make this correction is to open the lens three or 3-1/2 f/stops from the metered aperture.

- To compensate for errors in close-up exposure adjustment, take extra shot each of about one stop more and one stop less from the recommended exposure.

Hints and General Precautions in Close-ups and Photomacrography

1. Focus before metering the exposure. If you are using the camera with stop-down lever or slide, lock the lever or slide in the stop-down position. When using a separate exposure meter, increase the exposure using the figures in the exposure factor conversion table.
2. Whether using a through-the-lens or a separate exposure meter, some exposure correction may be necessary depending upon the subject's tone. If the subject is composed of many white tones, increase the exposure. Decrease the exposure if the subject has many dark tones. This exposure correction must be added to the exposure factor correction made when using a separate exposure meter.
3. Depth of field becomes very shallow in high-magnification photography. Close the diaphragm down to at least f/5.6 and

make any necessary corrections in exposure by reducing the shutter speed rather than opening the aperture.

When using an ordinary lens, it is also necessary to use a small aperture to eliminate aberrations due to abnormally close shooting distances. Canon macro and macrophoto lenses are specially corrected against these aberrations, but using a small aperture is still recommended for good depth of field. If it becomes too dark to meter or if the shutter speed becomes too slow, raise the light level.

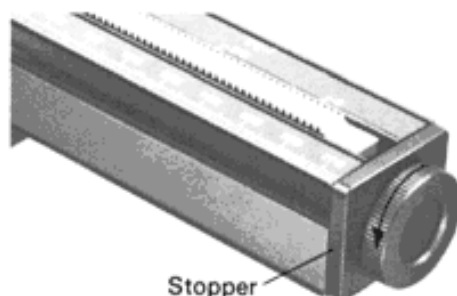
4. The least bit of camera shake results in exaggerated image blur in high-magnification photography. Make sure the shooting site is vibration-free. Always use a tripod or copy stand and a cable release.
5. In case of higher magnification, image cut-off in the viewfinder sometimes occurs but it does not affect the exposed image.

Shooting with the Lens in Reverse

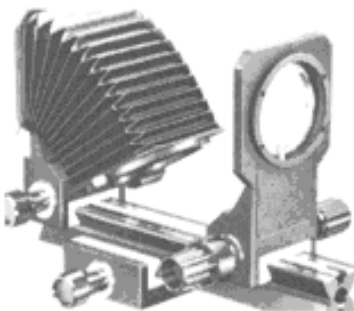
Mounting a regular lens in reverse when shooting with magnifications larger than life-size improves lens performance at abnormally close shooting distances. This is especially true for retro-focus wide-angle lenses. Usually, except sometimes for telephoto lenses, reversing the lens also permits higher magnifications than when the lens is mounted in the normal direction. And automatic diaphragm function is possible even when the lens is reversed, by using the Double Cable Release.

It is possible to reverse the lens on the Auto Bellows by turning the front plate around. Follow these steps:

1. Unscrew and remove the stopper tightening screw and the stopper from the front end of the bellows rail.



2. Loosen the bellows tightening screw and separate the bellows from the front plate.

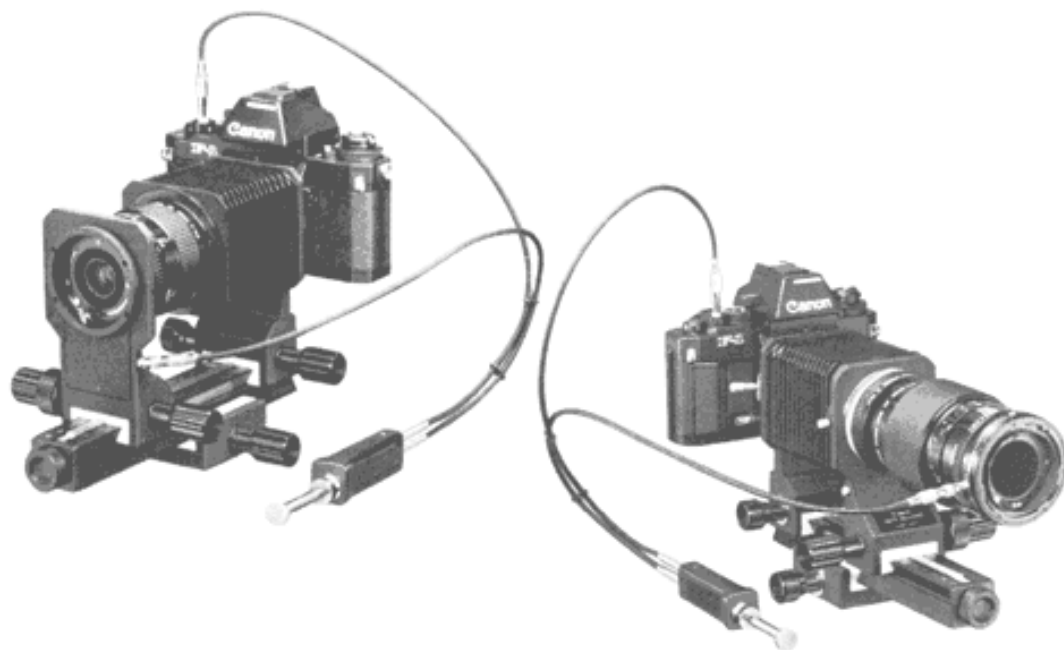


3. Turn the lens adjustment knob to move the front plate forward and pull it off the bellows rail.
4. Turn the front plate around, slide it onto the bellows rail and replace the stopper and the screw.



5. Screw an attachment ring into the lens filter threads. Attachment rings are sold separately in the two diameters of 52mm and 55mm corresponding to the lens filter size.

6. Mount the lens onto the bayonet side of the front plate.
7. Insert the lens with attachment ring into the bellows and tighten the bellows tightening screw.



Another Way in Shooting with the Lens in Reverse

The lens can be reverse-mounted and still maintain automatic diaphragm function using different accessory combination and set-up. As shown by the second picture on this page, the front plate of the bellows is not turned around. The red-coded plunger of the Double Cable Release is screwed into the socket of the Macro Auto Ring instead of into the socket of the Auto Bellows. The procedure is as follows:

1. Attach the Macrophoto Coupler FL to the Auto Bellows.
2. Screw the lens (in reverse position) to the Macrophoto Coupler FL (the number such as 52 on this accessory corresponds to the lens filter size).
3. Secure the Macro Auto Ring to the lens mount of the lens.

- Please be careful not to make a mistake in reading the magnification scale when the lens has been reverse-mounted (see page 9).

Flash Photography

For close-range work and photomacrography, the workable aperture becomes less than the marked aperture on the lens. The change in the effective aperture due to fall-off in light intensity as the lens is extended out is no longer negligible. The usual guide number and f/stop from automatic flash photography cannot be relied upon and true aperture must be found out to make the required exposure compensation. And in order to prevent irregular light distribution on the picture arising from the difference between the optical axes of the electronic flash unit and the lens, the electronic flash unit should usually be placed off-camera by using a cord.

Guide Number and Exposure Compensation

For close-range work guide number, use the following calculation on the condition the flash is used off-camera.

$$\text{aperture} = \frac{\text{guide number}}{\text{flash distance}}$$

When doing the math, make sure both guide number and the flash distance are in the same unit.

With the guide number of f/16 (meter), for example, for the flash unit and assuming the distance between the flash and the subject is one meter, f/16 is obtained from the equation $F = 16/1$. Next the exposure correction is to be made in the same way corrections are made over the metered exposure value in close-range work. If the camera is positioned to obtain 1.5x magnification, refer to the exposure factor conversion table on page 30 for the amount of exposure correction to be made. According to this table, the exposure must be increased by 2-3/4 exposure degrees for a magnification of 1-1/2x. For making the correction, the lens should be opened 2-3/4 f/stops from f/16. Since there is no one quarter click stop between the f/stops on the lens, set the aperture ring to f/5.6 which is slightly more than the required exposure increase but within the exposure tolerance. But in close-range magnification work, the depth of field becomes quite shallow and it is desirable to shorten the flash distance instead of opening the aperture. One of the solutions to this problem is to position the camera on the Bellows unit to a specific magnification from

where it is easy to make exposure compensation.

In photography using electronic flash unit, there can be many situations which affect exposures. It is best to obtain fine results through experience and test shots. After finding out the amount of exposure correction and opening the diaphragm to a certain f/stop, take extra shots of one f/stop over and under as well.

Procedures for Flash Photography

1. Position the camera on the Bellows scale in accordance with the magnification required.
 2. Determine where the flash unit will be placed off-camera.
 3. Use guide number to determine the f/stop required for the flash to subject distance.
 4. Make exposure correction necessary for close-range work by opening the f/stops.
 5. Decide the picture composition and focus on the subject.
 6. Press the shutter button.
- * For more information, refer to books especially devoted on the subject.

Table of Accessory Length

Accessory		Length
Macro Auto Ring		10mm
Extension Tube FD 15-U		15mm
Extension Tube FD 25-U		25.8mm
Extension Tube FD 50-U		50mm
Extension Tube	FL15	15mm
	FL25	25mm
	M5	5mm
	M10	10mm
	M20	20mm
Macrophoto Coupler FL	52mm	20mm + 13mm
	55mm	20mm + 13mm
	58mm	20mm + 13mm
Macrophoto Adapter	MA52	5mm
	MA55	5mm
	MA58	5mm
Vari-Extension Tube	M15-25	15mm + 10mm
	M30-55	30mm + 25mm
Mount Converter A		2.8mm
Mount Converter B		13.2mm
Extension Tube	6mm	6mm
	9mm	9mm
	12mm	12mm
	25mm	25mm

Accessory		Length
Extension Tube	50mm	50mm
	75mm	75mm
	100mm	100mm
	150mm	150mm
	200mm	200mm

Extension Length of Lenses Attached in Reversed Direction Using Macrophoto Coupler FL

FD Lenses without a Locking Collar		FD Lenses with a Locking Collar	
FD 35mm f/2	44mm	FD 35mm f/2 S.S.C.	51mm
FD 35mm f/2.8	42mm	FD 35mm f/3.5 S.C.	47mm
FD 50mm f/1.2	40mm	FD 50mm f/1.8 S.C.	35mm
FD 50mm f/1.4	35mm	FD 50mm f/1.4 S.S.C.	47mm
FD 50mm f/1.8	25mm	FD 50mm f/3.5 S.S.C.	41mm
FD 50mm f/3.5 Macro	39mm	Macro	

- Total extension length when using Macrophoto Coupler FL is obtained by the following formula:
Total extension length = Bellows scale length + Extension length of Macrophoto Coupler FL (20 ~ 33mm) + Extension length of each lens (given in the above table). Extension length in the above table is rounded to the nearest whole number.
- For the data when the front plate of the bellows is turned around, see the tables on pages 26 and 27. There is no need to go through the process of calculation.

Accessories for Close-ups and Photomacrography

Canon Macrophoto Couplers FL 52

The macrophoto coupler is attached between the lens and the camera body for mounting the lens in reverse to obtain higher magnifications with improved image quality.

When an FD lens is reverse-mounted onto the Auto Bellows by means of the macrophoto coupler, automatic diaphragm coupling is possible by attaching the Macro Auto Ring and using the Canon Double Cable Release.

Canon Macrophoto Adapters MA-52

These accessories are for attaching the lens in reversed position to obtain higher magnifications in close-up photography. Macrophoto Adapter may be interposed between the lens and a bellows unit, between the lens and extension tubes such as Extension Tubes M (of 5mm, 10mm, or 20mm length) or one of the Extension Tubes FD-U. Focusing is possible with bellows movement.

Canon Extension Tubes FD 15-U, FD 25-U and FD 50-U

These tubes are 15, 25, and 50mm in length. Their special merit is that they are intermediate tubes with full FD functions. In other words, full aperture metering and automatic diaphragm coupling are possible. The Extension Tubes can be used with any Canon FD lens having a focal length from 35mm to 200mm except for the FD 85mm f/1.2 L. The FD 15-U can also be used with FD 28mm lenses. Only one Extension Tube FD-U should be used between the FD lens and the camera.

Canon Vari-Extension Tubes M15-25 and M30-55

The Vari-Extension Tubes M15-25 and M30-55 are used between the camera body and the lens. With extensions up to 10mm and 25mm for the M15-25 and M30-55 tubes respectively, a wide range of image magnifications is attainable. Manual diaphragm control is necessary unless the Macro Auto Ring and Double Cable release are attached for automatic diaphragm control. When the lens is reversed, a

Macrophoto Adapter MA and Macro Auto Ring (or Macro Hood) are used in combination.

Canon Duplicator 35

This is an accessory designed for use with the Auto Bellows which reproduces a 35mm slide, mounted or unmounted. Trimming is possible by reproducing only a part of the 35mm film frame. It will also duplicate 110 slides into 35mm slides. And to make duplication of slides in long strip form easier, the Canon Roll Film stage attaches to the front of the Duplicator 35.

Canon Roll Film Stage

This accessory is used with the Canon Duplicator 35 when duplicating from 35mm bulk film to make handling the bulk film easier.

* Please refer to the table on page 32 for the extension length for various attachments.

Lens Mount Converter A

This accessory contains a female breech-lock ring and female screw thread for mounting Canon screw mount accessories onto Canon breech-lock mounts of single-lens reflex cameras and bellows. It is also used to connect the Microphoto Hood necessary in photomicrography using the bellows.

Lens Mount Converter B

This accessory contains a male breech-lock mount and male screw thread for mounting Canon lenses and accessories with a breech-lock mount onto Canon screw-mount accessories.

Extension Tubes (Screw-Mount) A (6mm), B (9mm), C (12mm), 25, 50, 75, 100, 150 and 200mm

These tubes of fixed lengths have a screw mount and are attached to a breech-lock mount bellows by using Lens Mount Converter B at the rear of the tube. When using a number of tubes, it is practicable to limit the extensions within 300mm.

Extension Tube M Set

This set includes one 5mm tube, one 10mm tube and two 20mm tubes. With the attachment to the standard lens, they are used for making possible reproduction ratios up to 1:1. Used in conjunction with the bellows unit and Macrophoto Coupler FL (the latter for reversing the lens), reproduction ratios may be increased. Manual diaphragm control is necessary whether the lens is normally or reverse-mounted unless the Macro Auto Ring and Double Cable Release are attached.

- * Please refer to the table on page 32 for the extension length for various attachments.

Canon Macrophoto Lenses 20mm f/3.5 and 35mm f/2.8

Ordinary lenses are not designed for photomacrography calling for great magnifications. When they are used for high-magnification photomacrography, image quality tends to decrease with increased magnification. The Canon macrophoto lenses 20mm f/3.5 and 35mm f/2.8 are specially corrected to give optimum image quality in such high magnification photography. When used with the Auto Bellows, macrophoto lens 20mm f/3.5 gives 4 to 10X magnifications and the 35mm f/2.8, 2 to 5X magnifications.

Canon Macro Auto Ring

When the Macro Auto Ring is attached to the lens mount and used with the Canon Double Cable Release, automatic diaphragm coupling is possible even when non-automatic accessories, such as Extension Tubes M or a Vari-Extension Tube, are inserted between the lens and the camera body or when the lens is mounted in reverse, using Macrophoto Coupler FL.

* Please refer to the table on page 32 for the extension length for various attachments.

Canon Macro Stage

This accessory, which has a built-in diffusion screen, helps to hold the subject in place for close-ups and photomacrography. It is principally designed for use with the Canon macrophoto lenses when attached to the Auto Bellows, but it can also be used with a Canon 50mm standard lens.

Canon Copy Stand 5

This is a sophisticated copy stand for holding the camera steady during delicate photography such as copying and photomicrography. A weight balance built into its pole ensures smooth, light operation of the arm for changing the position of the camera to vary the shooting distance.

Canon Copy Stand 4

This is a high-quality copy stand with simpler design but made to the same exacting standard as the Copy Stand 5.

Canon Focusing Rail

This accessory can be attached to the arm of either Copy Stand 4 or Copy Stand 5 to facilitate fine adjustments in camera position.

Canon Macro Lenses FD 50mm f/3.5, FD 100mm f/4, and FD 200mm f/4

These lenses are high-quality lenses specially aberration-corrected to give excellent image quality at close shooting distances. Alone, the 50mm and 100mm Macro lenses are capable of magnification up to 0.5x and with one of the Extension Tubes FD, the magnification increases to life-size. With the 200mm Macro, new system is used, and the focusing range extends far enough for 1:1 life-size photography without the use of an accessory tube. All three Macro lenses can be used in general photography as well at shooting distances up to infinity and the lenses also feature full aperture metering and automatic diaphragm control coupling. The lenses are optically ideally suited for close-ups and photomacrography and give top performance in copying when used with a bellows.

Macro system

Canon



Edition française
1979

De telles photos, Canon les simplifie pour vous



Beaucoup d'entre vous ne sauront jamais que dans le passé, le profane ne s'attaquait pas impunément à la proxiphotographie. Il n'y a pas si longtemps, il fallait un sérieux bagage technique et de bonnes connaissances en mathématiques – sans compter qu'il n'y avait pas encore les calculatrices de poche – pour réussir dans cette branche particulière de la photographie. Car après montage du matériel, il était nécessaire de mesurer la lumière avec un posemètre indépendant, de faire plusieurs calculs pour corriger l'exposition en fonction des accessoires d'allonge, puis de régler manuellement l'ouverture du diaphragme. Sans compter qu'il ne s'agissait là que des problèmes de base. Bref, la proxiphotographie relevait du grand art et de ce fait était réservée aux professionnels expérimentés. Le monde particulier de l'extrêmement petit, avec ses couleurs éclatantes et ses structures surréalistes, la beauté cachée du détail et l'attrait de l'inconnu étaient pratiquement fermés à la plupart des photographes, et même des meilleurs.

Aujourd'hui, les choses ont changé. Les techniques photographiques modernes nous ont apporté les appareils reflex mesurant la lumière à travers l'objectif – ce qui est le cas de tous les reflex Canon – appareils qui ont relégué au passé les classiques corrections d'exposition à l'aide de facteurs appropriés. Tout ce qu'il reste à faire, c'est de fermer le diaphragme à l'ouverture de travail et de faire la

mesure. Sans compter qu'avec le matériel Canon approprié, le couplage du diaphragme est automatique, autorisant ainsi la mesure à pleine ouverture; et qu'avec le Canon A-1, même l'exposition est automatique à diaphragme fermé, l'appareil réglant lui-même la vitesse d'obturation en fonction de l'ouverture choisie et de la luminosité du sujet.

Canon a tout mis en œuvre pour réaliser un système de proxiphotographie digne de ses appareils et de sa réputation d'innovateur en matière de technologie photographique. Que vous soyez photographe commercial ou industriel, scientifique, médecin ou dentiste, voire simplement intéressé par des aspects nouveaux de la photographie, Canon vous propose le matériel qui vous permettra d'atteindre des résultats parfaits.



Les raisons d'être d'un système de proxiphotographie

Il est exact que plus on rapproche l'objectif du sujet, plus l'image de ce sujet sera grande. Dans une certaine mesure, cela est vrai, à ceci près qu'à un moment donné il n'est plus possible de mettre au point et qu'à partir de certains rapports de grossissement, la qualité de l'image se dégrade. A cela, il y a des raisons mécaniques autant qu'optiques.

Les objectifs normaux sont conçus pour photographier des sujets se trouvant à des distances relativement grandes, et donc avec un rapport de reproduction relativement faible. En fait, ils ne sont pas conçus pour grossir le sujet, mais plutôt pour le réduire étant donné qu'en photographie courante, le sujet est toujours enregistré sur la pellicule à un rapport inférieur à sa grandeur nature. D'autre part, un objectif normal est généralement conçu pour rendre le meilleur équilibre des corrections d'aberrations à une distance d'environ 50 fois sa focale. Plus la distance de prise de vue est réduite, plus on s'éloigne de ce point d'équilibre et plus la définition perd en qualité. Cette tendance est surtout marquée dans les objectifs grand angle de type rétrofocus ainsi que les objectifs ayant une lentille frontale de grand diamètre, mais en fait le principe s'applique à tous. Toutefois, la distance de prise de vue minimale de l'objectif est fixée par son fabricant de telle sorte qu'elle corresponde à la distance la plus réduite à laquelle il est possible d'obtenir une image de qualité. Malheureusement, dans le cas d'un objectif normal, cette distance n'est jamais suffisante pour aborder la photographie rapprochée.

Lorsqu'on règle un objectif sur une distance de prise de vue réduite, il s'allonge quelque peu, tandis qu'il est le plus court lorsqu'il est réglé sur l'infini. De cela, on peut déduire que la mise au point d'un sujet proche dépend de l'aptitude de l'objectif à s'allonger, et c'est là l'on rencontre des problèmes d'ordre mécanique. Le fait d'allonger l'objectif va également allonger son dispositif de mise au point et avoir des effets néfastes sur le couplage du diaphragme automatique, sans compter l'augmentation de poids, le tout au détriment des performances et de la maniabilité. Le problème est important dans le cas des objectifs de focale normale, il se fait moins ressentir sur les téléobjectifs qui sont, de nature, beaucoup plus grands.

Pour surmonter le problème, les fabricants de matériel photographique ont réalisé des accessoires spéciaux pour la prise de vue à rapports de grossissement élevés.

▼ Images successives d'un grain de riz avec facteur de grossissement, champ et combinaison de matériel.

0,5 ×
48 mm × 72 mm



FD 50 mm f/3,5 S.S.C. Macro

1 × (grandeur nature)
24 mm × 36 mm



FD 50 mm f/3,5 S.S.C. Macro + tube-allonge FD 25-U

2 ×
12 mm × 18 mm



FD 50 mm f/1,4 S.S.C. + soufflet M

6 ×
4 mm × 6 mm



Bague macro automatique + FD 50 mm f/3,5 S.S.C. Macro (inversé) + bague d'inversion 55 mm + tube-allonge à vis + bague de conversion A + soufflet coupleur

7 ×
3,4 mm × 5,1 mm



Bague macro automatique + FD 50 mm f/3,5 S.S.C. Macro (inversé) + bague d'inversion FL 55 + bague de conversion B + tube-allonge à vis + bague de conversion A + soufflet coupleur

8 ×
3 mm × 4,5 mm



Objectif Macro 20 mm f/3,5 avec platine et soufflet coupleur

Introduction au système Canon de proxiphotographie

Le système Canon de proxiphotographie est un ensemble vaste, ultra-moderne, qui se distingue avant tout par sa facilité d'emploi. Autour du soufflet coupleur, noyau du système, ont été réalisés plus de trente accessoires parmi lesquels une grande table de reproduction, un rail de mise au point et une platine macro, des duplicateurs de diapositives pour formats 8 mm, 16 mm, 24 × 36 et 110, des objectifs spéciaux de photomacrographie destinés aux très forts grossissements et un déclencheur double permettant de conserver l'automatisme du diaphragme.

De par sa conception, le système de proxiphotographie Canon se prête merveilleusement aux forts grossissements. Comme, cependant, les caractéristiques de l'appareil proprement dit jouent également un rôle important, Canon n'a pas négligé cet aspect des choses. Ainsi les champs de couplage des posemètres incorporés des reflex Canon sont à ce point étendus qu'il est presque toujours possible de faire la mesure, même dans des situations de très faible lumière, comme c'est généralement le cas en photomacrographie. Dans le cas des F-1 et FTb, Canon a prévu des amplificateurs de posemètre. Selon le type d'appareil et le matériel utilisé, il est possible de conserver la présélection automatique du diaphragme, voire même l'exposition automatique.

Avec de telles particularités, le système Canon contribue à changer l'image aussi bien que les techniques de la photographie à rapports de grossissement élevés. Désormais, les problèmes d'exposition et les opérations manuelles ne gâchent plus l'attrait de cette technique. Le photographe peut se concentrer entièrement sur le choix du sujet et de son cadrage, sur l'éclairage ainsi que les techniques spéciales qui sont le secret de la très belle photographie.

Au royaume des grossissements élevés

Les sujets typiques de la proxiphotographie sont les petits animaux et végétaux, tels qu'insectes et fleurs, des petites pièces mécaniques, de petits objets d'art, etc. Professionnellement parlant, son application tombe dans les domaines industriel, scientifique, commercial, documentaire, ainsi que dans la reproduction de documents.

Il est évident que l'éventail des grossissements doit être très large. Le type de photographie que l'on exerce dépend des grossissements, mais la définition des diverses catégories peut varier quelque peu. De l'avis de Canon, les diverses catégories de la photographie se présentent comme suit :

Photographie normale : Cette catégorie inclut tous les grossissements jusqu'à environ 0,1 ×, qui sont possibles avec un objectif standard monté en position normale. Les distances de prise de vue sont celles de l'échelle des distances de l'objectif.

Photographie rapprochée : Définit les grossissements compris entre 0,1 × et 1 ×, soit grandeur nature, que l'on obtient généralement à l'aide d'une lentille d'approche ou de tubes-allonge.

Grandeur nature : Une plage de grossissements très étroite puisqu'elle n'englobe que le rapport 1 : 1.

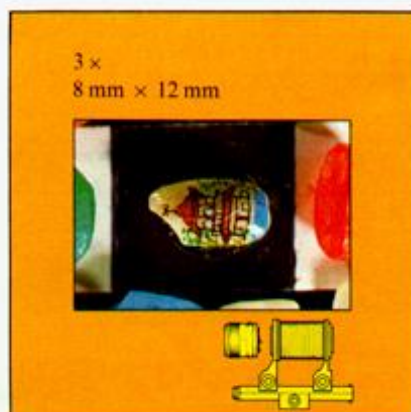
Photomacrographie : Jusque très récemment, cette catégorie comportait les grossissements compris entre la grandeur nature et le rapport 10.

De nos jours, on y inclut souvent les grossissements allant jusqu'à 20 ×. L'accessoire principal utilisé dans cette sorte de photographie est le soufflet-allonge.

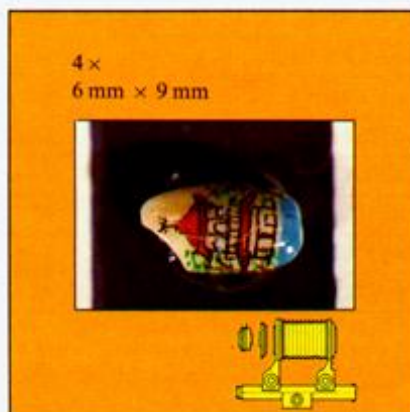
Photomicrographie : Photographie réalisée à l'aide d'un microscope au lieu de l'objectif de l'appareil et qui englobe les grossissements de 10 à 2000 ×.

Reproduction : Il s'agit d'une catégorie à part étant donné qu'elle est définie en termes de sujets plutôt que de grossissements, et cela en raison des diverses techniques photographiques mises en oeuvre. Elle inclut la photographie de tout sujet plan. Les grossissements s'étendent de ceux de la photographie normale à ceux de la photomacrographie.

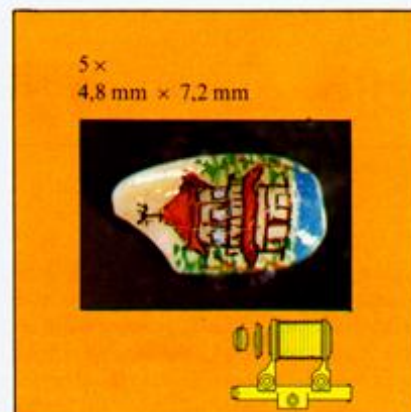
Comme le suggèrent ces définitions, le choix du matériel dépendra des rapports de grossissement désirés et, par conséquent, du type de photographie que l'on aimerait aborder. Canon propose tout le matériel nécessaire afin que vous obteniez les meilleurs résultats dans chacune de ces catégories.



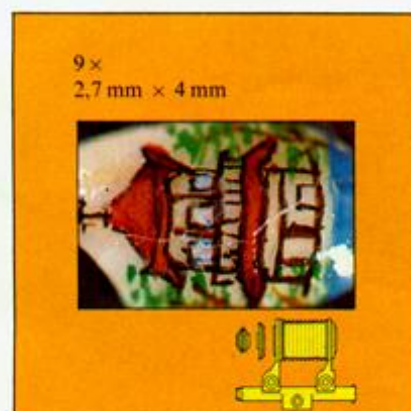
FD 50 mm f/3,5 S.S.C. Macro + soufflet coupleur



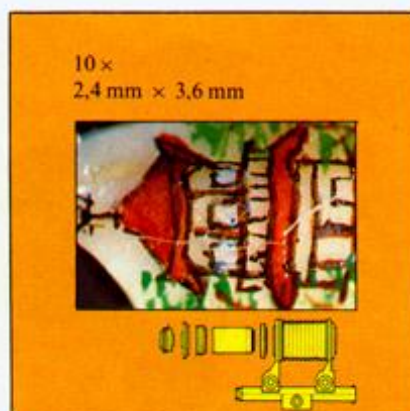
Objectif Macro 35 mm f/2,8 avec platine et soufflet coupleur



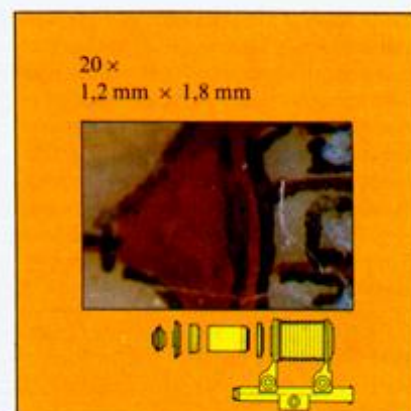
Objectif Macro 35 mm f/2,8 avec platine et soufflet coupleur



Objectif Macro 20 mm f/3,5 avec platine et soufflet coupleur



Objectif Macro 35 mm f/2,8 avec platine + bague de conversion B + tube-allonge à vis + bague de conversion A + soufflet coupleur



Objectif Macro 20 mm f/3,5 avec platine + bague de conversion B + tube-allonge à vis + bague de conversion A + soufflet coupleur

Photographie rapprochée

Tirer le sublime du normal

La photographie rapprochée, qui couvre la plage des rapports de grossissement peu élevés jusqu'au rapport 1 : 1 ne requiert pas l'emploi d'un soufflet. Pour ce type de photographie, Canon propose des lentilles d'approche, des tubes-allonge, deux objectifs spéciaux de photomacrographie et deux objectifs zoom pourvus d'un dispositif de prise de vue rapprochée. Tous ces accessoires sont légers, maniables et d'un emploi très pratique.

Ces lentilles d'approche donnent les meilleurs résultats avec les objectifs de focale comprise entre 35 et 135 mm. Dans cette gamme, le diamètre 55 mm est le plus répandu. Contrairement à beaucoup de lunettes d'approche constituées uniquement d'une lentille convexe, les lentilles Canon de 55 mm sont des doublets composés de deux lentilles convexes rendant des images de haute qualité, exemptes d'aberrations.

Lentilles d'approche

Pour les rapports de grossissement peu élevés, rien n'est supérieur aux lentilles d'approche étant donné leur faible encombrement et leur simplicité d'emploi. Ces lentilles, qui se présentent comme des filtres, se vissent sur la partie antérieure des objectifs; elles ont pour effet de déplacer le point focal de ces derniers tout en n'affectant aucunement leur luminosité. Bien entendu, les meilleurs résultats s'obtiennent aux petites ouvertures. Il existe deux lentilles d'approche, les modèles 450 et 240, livrables en plusieurs diamètres. Les nombres 450 et 240 représentent la distance, exprimée en millimètres, entre le sujet et la lentille quand l'objectif est réglé sur l'infini, comme le modèle 240 permet d'approcher davantage le sujet, c'est lui qui donnera le grossissement le plus fort.



Utilisation des lentilles d'approche

Objectif	Lentille d'approche 450			Lentille d'approche 240		
	Distance de m.a.p. minimale (mm)	Champ (mm)	Grossissement	Distance de m.a.p. minimale (mm)	Champ (mm)	Grossissement
FD 35 mm f/3,5 S.C.	286	126 × 190	0,19 ×	266	93 × 140	0,22 ×
FD 35 mm f/2 S.S.C.	250	96 × 143	0,25 ×	225	76 × 114	0,31 ×
FD 50 mm f/1,8 S.C.	341	110 × 166	0,22 ×	267	76 × 113	0,32 ×
FD 50 mm f/1,4 S.S.C.	305	94 × 141	0,26 ×	252	68 × 103	0,35 ×
FD 55 mm f/1,2 S.S.C.	345	104 × 156	0,23 ×	270	71 × 107	0,34 ×
FD 85 mm f/1,8 S.S.C.	407	77 × 115	0,31 ×	305	49 × 74	0,49 ×
FD 100 mm f/2,8 S.S.C.	422	64 × 96	0,37 ×	313	41 × 61	0,59 ×
FD 135 mm f/3,5 S.C.	490	53 × 80	0,45 ×	357	32 × 48	0,75 ×
FD 135 mm f/2,5 S.C.	493	56 × 84	0,43 ×	357	33 × 50	0,73 ×



F-1, FD 100 mm f/4 S.C. Macro avec flash, 1/60 s à f/22, 64 ASA



Tubes-allonge

Pour atteindre des grossissements plus élevés que ceux obtenus à l'aide des lentilles d'approche, il est nécessaire d'augmenter la distance entre l'objectif et le plan du film. Cela se fait très simplement en plaçant des bagues ou des tubes-allonge entre le boîtier et l'objectif. Cette façon de procéder, simple et peu onéreuse, permet généralement d'atteindre et même de dépasser la grandeur nature. Canon propose deux jeux de tubes-allonge.

Jeu de tubes-allonge M

Il s'agit d'un jeu de quatre tubes avec monture baïonnette composé d'un tube de 5 mm, d'un tube

de 10 mm et de deux tubes de 20 mm de longueur. Leur montage permet de les utiliser avec tous les appareils et objectifs récents de Canon.

En se basant sur la simple formule disant que le grossissement photographique égale la longueur du tube divisée par la focale de l'objectif, on constate d'emblée qu'à l'aide des deux tubes de 20 mm et de celui de 10 mm on peut atteindre la grandeur nature avec un objectif normal de 50 mm. En fait, le tirage peut varier, par degrés successifs de 5 mm, entre 5 et 55 mm par les diverses combinaisons possibles entre les tubes. Ils permettent donc d'atteindre un large éventail de grossissements intermédiaires. Comme les tubes-allonge M n'ont pas de mécanisme de couplage, il est nécessaire de régler manuellement l'ouverture à l'aide de la bague du diaphragme de l'objectif.



Tubes-allonge FD-U

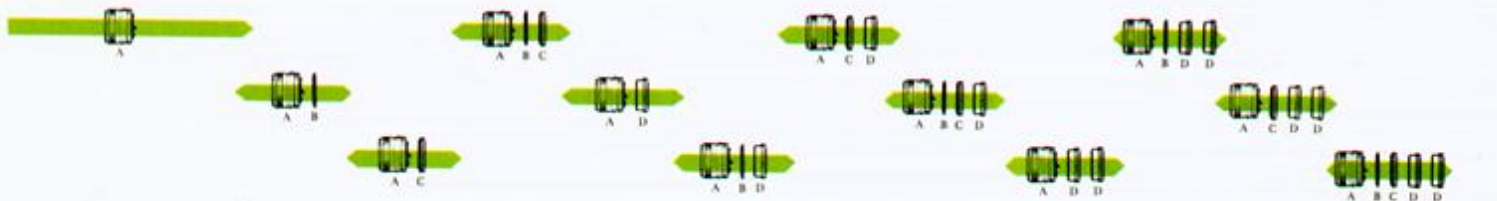
Ce qui caractérise ces deux tubes-allonge, les modèles FD 25-U et FD 50-U, réside dans le fait qu'ils sont pourvus de tous les couplages nécessaires pour exploiter toutes les possibilités d'un objectif FD. C'est-à-dire la mesure à pleine ouverture et le diaphragme automatique. Sans oublier l'exposition automatique avec les boîtiers prévus à cette intention.

Avec pour seule exception le FD 85 mm f/1.2 asphérique, il est possible d'utiliser avec ces tubes tous les objectifs FD de 35 à 200 mm. Bien qu'il ne soit pas possible d'utiliser simultanément deux tubes FD-U, on peut augmenter le grossissement sans perte de qualité en complétant le montage par une lentille d'approche.



Emploi des tubes-allonge M

Champ (mm)	240 × 360	120 × 180	80 × 120	60 × 90	48 × 72	40 × 60	34 × 51	30 × 45	27 × 40	24 × 36	22 × 33	20 × 30
Grossissement	0,1 ×	0,2 ×	0,3 ×	0,4 ×	0,5 ×	0,6 ×	0,7 ×	0,8 ×	0,9 ×	1,0 ×	1,1 ×	1,2 ×



A: Objectifs FD et FL 50mm B: M5 (mm) C: M10 (mm) D: M20 (mm)



Objectifs macro

Les objectifs Canon FD 50 mm f/3,5 et FD 100 mm f/4 Macro sont des optiques de très haute qualité aux possibilités immenses, destinées aux amateurs de perfection. Utilisés seuls, ces objectifs permettent déjà d'atteindre le rapport de 0,5 ×, utilisés avec leur tubes-allonge FD respectifs, ils atteignent la grandeur nature. C'est-à-dire que dans ces conditions, le FD 50 mm a une distance de mise au point de 20,5 cm, le FD 100 mm Macro 'descendant' pour sa part à 40 cm.

Les objectifs macro conviennent parfaitement pour la photographie courante à des distances de prise de vue normales, jusqu'à l'infini. Leur qualité réside surtout dans le fait qu'ils sont spécialement corrigés des aberrations en vue de donner une excellente qualité d'image aux faibles distances de prise de vue. De ce fait, ce sont des outils merveilleux pour la prise de vue rapprochée et la photomacrographie, sans oublier qu'ils permettront d'atteindre des résultats parfaits dans les travaux de reproduction (documents, diapositives, etc.).

Il est clair que le tirage de l'objectif FD 100 mm macro est deux fois plus grand que celui du modèle 50 mm. Alors que ce dernier est donc nettement plus léger, l'avantage du 100 mm Macro réside dans le fait qu'il permet d'atteindre le même rapport de grossissement à une distance de prise de vue dou-

ble. L'avantage en est évident: meilleur éclairage du sujet, moins de risques de déranger le sujet (insectes, petits animaux, etc.). A l'intention des photographes spécialement exigeants, Canon ne peut que recommander l'utilisation de ces objectifs particuliers.

Objectifs zoom avec dispositif macro

Deux objectifs zoom Canon 'courts', les FD 35-70 mm f/2,8-3,5 et FD 28-50 mm f/3,5 sont équipés d'un dispositif désigné 'macro' mais qui en fait n'autorise que la prise de vue rapprochée. Un simple mouvement rotatif de la bague de focale permettra de passer instantanément à des distances de prise de vue réduites. Ces objectifs ne conviennent cependant pas pour les travaux de reproduction, ceux-ci étant réservés aux modèles macro spécialement corrigés à cet effet.

	Grossissement	Champ
FD 35 mm-70 mm f/2,8-3,5 S.S.C.	0,07 × - 0,2 ×	343 mm × 515 mm - 120 mm × 180 mm
FD 28 mm-50 mm f/3,5 S.S.C.	0,06 × - 0,23 ×	382 mm × 572 mm - 103 mm × 155 mm

Photomacrographie

Même la simple mouche, si méprisée, devient belle.

La photographie aux rapports de grossissement inférieurs à 1:1 ressemble en fait beaucoup à la photographie courante, en particulier quand on fait appel à des lentilles d'approche. Il suffit de surveiller la profondeur de champ et la distance de prise de vue. Ce n'est qu'aux rapports 1:1 et au-delà, quand on entre dans le domaine de la photomacrographie, que des problèmes imprévus peuvent surgir. Non seulement la qualité de l'image aura tendance à se dégrader à mesure que le grossissement augmente, ce qui est spécialement le cas avec les objectifs grand angle de type rétrofocus et les objectifs à grande lentille frontale, mais encore il peut arriver, aux très forts grossissements, que l'objectif touche le sujet. Le matériel relève d'un autre problème. Bien entendu, il sera toujours possible de combiner de plus en plus de tubes-allonge. Mais pour obtenir un grossissement de $10\times$, cela signifierait un tirage supplémentaire de 500 mm entre l'objectif standard et le boîtier. Ce qui représente 500 mm d'accessoires devenant peu maniables, peu stables, peu pratiques. Sans oublier qu'avec les tubes-allonge, dont la longueur n'est pas variable en continu, le grossissement est limité à celui imposé par la longueur des tubes.

C'est pour ces raisons que la photomacrographie requiert un matériel très élaboré et que les résultats dépendent dans une grande mesure de la connaissance qu'a le photographe de son matériel. S'il a de l'expérience en la matière, il saura que le fait de retourner l'objectif aura non seulement pour effet d'améliorer la qualité de l'image, mais encore que cette solution permet d'atteindre des rapports plus élevés. Il saura aussi qu'un soufflet-allonge permettra d'augmenter le tirage tout en conservant une excellente stabilité, sans compter que cette variation de tirage peut se faire en continu, c'est-à-dire qu'il est possible d'atteindre tous les grossissements intermédiaires.

Le soufflet coupleur est pour cette raison le noyau du système de photomacrographie Canon. Il est complété par d'autres accessoires destinés à augmenter encore la qualité de l'image, le grossissement, la stabilité de l'appareil, etc. Pour travailler dans la plage des grossissements relevant de la photomacrographie, Canon recommande l'utilisation de ses objectifs macro de la série FD ou les objectifs spécialement prévus pour la photomacrographie à rapports très élevés.

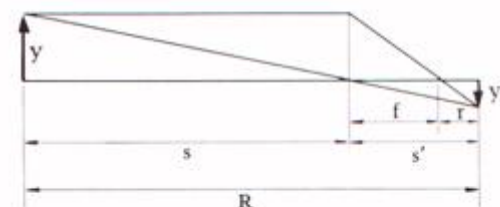
La méthode scientifique

En photomacrographie, l'échelle des distances de l'objectif devient inutilisable. Mais des questions précises se posent d'emblée: comment connaître la distance de prise de vue? Quel matériel utiliser? La meilleure façon d'y répondre consiste à décider tout d'abord à quel rapport et dans quelle position on désire reproduire le sujet. A partir de là, des photographes ont établi des formules mathématiques permettant de travailler avec toute la rigueur scientifique voulue.

La marche à suivre est la suivante:

1. Choisir le grossissement photographique.
2. A partir de cette valeur, décider du matériel à utiliser.
3. Régler la distance de prise de vue en fonction du grossissement désiré.
4. Effectuer la mise au point à pleine ouverture.
5. Mesurer la lumière à diaphragme fermé.
6. Contrôler la profondeur de champ et déclencher.

Le schéma simplifié et les formules ci-dessous permettent de déterminer tous les renseignements nécessaires à l'exécution des trois premières opérations ci-dessus.



$$(1) \quad M = \frac{y'}{y} = \frac{s'}{s} = \frac{f}{s-f} = \frac{s'-f}{f}$$

$$(2) \quad s'-f = r = fM$$

$$(3) \quad R = \frac{(r+f)^2}{r}$$

$$(4) \quad R = \frac{f(M+1)^2}{M}$$



AE-1, objectif Macro 20 mm f/3.5 sur soufflet-coupleur, flash, 1/60 s 64 ASA.