

# Photography Under Arctic Conditions



The extreme cold of arctic environments stresses cameras, film, and other equipment, as well as the photographer. In the temperate zones, winter temperatures usually do not fall much below  $-20^{\circ}\text{F}$  ( $-29^{\circ}\text{C}$ ). In arctic regions, however, winter temperatures of  $-40^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$ ) are fairly common, and temperatures of  $-60^{\circ}\text{F}$  ( $-51^{\circ}\text{C}$ ) aren't unusual.

Under arctic conditions, camera shutters become sluggish and unreliable, or even fail completely. Lens diaphragms and auto-focus mechanisms often bind, and film-transport mechanisms stiffen. Lens elements contract and may separate. Batteries lose efficiency and deliver only a small portion of their power. Battery-operated flash units, motor drives, exposure systems, and motion-picture camera drives may not function. Film may become brittle and break in the camera. Photographers are likely to be less alert; they may perform the simplest physical actions with difficulty.

Careful preparation will help you to deal with these problems. Carefully selecting your equipment and keeping it warm (and perhaps winterizing it) will provide more reliable operation and better photographic results.

## SELECTING CAMERAS

The camera that you select is a matter of personal choice. Do not, however, expect reliable performance from equipment that has not been tested under the particular working conditions you expect to encounter. Shakedown testing ahead of time will usually uncover any malfunctions or problems. Thoroughly understanding your equipment and knowing that you can rely on it allows you to concentrate on lighting, composition, and other photographic techniques.

Each type of camera has its drawbacks, and no one type seems to be superior to the others overall. You should select a camera that is compact, lightweight, easy to use, dependable, and adaptable to various needs. If possible, use a manual camera with a built-in meter instead of an automatic camera. If you use a fully automatic camera, make sure it allows you to override automatic exposure and focusing systems so that you can operate it manually.

### 35 mm Cameras

Many 35 mm single-lens-reflex (SLR) cameras fill the basic requirements for arctic photography and offer the advantages of interchangeable lenses and a wide variety of film choices. The 36-exposure rolls of film minimize roll changes under adverse conditions. Single-lens-reflex cameras also offer the advantage of through-the-lens viewing for accurate framing in critical close-up work.

Optical rangefinder cameras tend to be somewhat smaller and lighter, and have fewer mechanical movements. Rangefinder cameras are also easier to focus in dim light. However, only those non-SLR automatic cameras that allow you to alter the exposure manually are suitable for arctic photography.

In cold weather, between-the-lens leaf shutters are more reliable than focal-plane shutters, but most 35 mm SLR cameras have focal-plane shutters. Metal focal-plane shutters tend to give more even exposure over the full frame than treated-cloth focal-plane shutters.

Lenses for 35 mm SLR cameras cover a broad range, from the fish-eye (extra-wide-angle) to the extra-long telephoto. Your selection of extra lenses is critical, because each lens adds weight and bulk to your pack. A zoom lens may be a good substitute for several lenses of different focal lengths; however, zoom lenses may freeze up more quickly than single-focal-length lenses because of their extra lubrication.

A good selection of equipment for your expedition might be two identical 35 mm camera bodies with interchangeable 28 mm, 55 mm, and 135 mm lenses. Take along an ample supply of black-and-white and color film in 36-exposure rolls.

You may want to take along an all-weather point-and-shoot camera as a backup. These compact cameras feature automatic exposure, automatic film advance and rewind, built-in flash, and easy-to-use controls. Although these cameras are tightly sealed for protection from water and snow, they are designed for everyday snapshotting. All the automatic features may work well under normal conditions, but they may cause problems in an arctic environment. Snow-filled scenes will cause an automatic camera to underexpose the film, a situation that may be very difficult to overcome because most of these cameras lack manual exposure overrides. To minimize exposure problems, use a negative film and move in close to your subject. Demands on battery power combined with cold temperatures will drain batteries fairly quickly, so carry extra batteries. Keep your camera warm under your parka to preserve battery power and to avoid film breakage and static discharge from the camera's auto-advance and rewind.

### Roll-Film Reflex Cameras

Some single- and twin-lens-reflex cameras that use 120- or 220-size roll film have many of the conveniences of 35 mm cameras, plus the advantages of a larger film format. Some of the considerations that apply to 35 mm cameras also apply to these cameras.

Many of the single-lens-reflex models suitable for arctic photography will accept a fairly broad range of accessory lenses. Most of these lenses have automatic diaphragms. The more versatile single-lens-reflex cameras have interchangeable backs that hold 12- and 24-exposure rolls. With only one camera and a few extra backs, you can readily switch from one film type to another. Because the backs are small and lightweight, you can easily carry them inside your parka, where the film will be warm and ready to use.

A single-lens-reflex camera with interchangeable 40 mm, 80 mm, and 150 mm lenses, and three extra magazine backs loaded with black-and-white, color negative, and color transparency film, can be a relatively lightweight, reasonably compact, and highly versatile outfit.

Only one twin-lens camera model offers interchangeable lenses. This is not necessarily a drawback, because the focal length of the normal lens for this camera is about 75 or 80 mm, which encompasses an angular field of approximately 50 degrees. This field of view is quite satisfactory for general pictorial photography.

### Sheet-Film Cameras

You can use 4 x 5-inch sheet film in a press or commercial-type camera if you need negatives or transparencies larger than 120 size. A serious disadvantage of these cameras is that they are heavy and bulky, and you will have to store and carry sheet-film holders. At low temperatures, the bellows of these cameras can stiffen and come apart instead of expanding and contracting normally.

You cannot carry sheet-film holders under your clothing. We recommend that you select a smaller-format camera for arctic photography unless the benefits of having larger negatives and transparencies outweigh the limitations and disadvantages of the equipment.

### Motion-Picture Cameras

Electrically powered motion-picture cameras are generally better than spring-driven models if a generator or another source of electricity is available. Batteries are not a dependable power source when they are exposed to extreme cold for extended periods.

Film in rolls is less likely to break in the camera than film in magazines. You can load magazine and cartridge-type motion-picture cameras easily and quickly in the field, but there is no practical way to winterize magazines and cartridges. If you use magazines or cartridges, we recommend keeping each day's working reserve as warm as possible inside your parka. Another way to keep film warm is to carry it in an insulated thermal bag with a few small hand warmers. Place the hand warmers in plastic bags to protect the film from damage from fumes.

You can protect cameras by keeping them in an insulated blimp or blanket with a few hand warmers. Some suppliers of professional motion-picture equipment carry ac- or dc-operated heaters that you can use with blimps or blankets to keep cameras and film magazines warm. The covering helps to retain heat in the same way that thermal clothing retains body heat. A blimp or a blanket used without an integral heat source has no practical value except to protect the camera from windblown snow.

## PREPARING YOUR EQUIPMENT

You can prepare your equipment for arctic conditions in a number of ways, including winterizing.

### Cameras

Winterizing a camera is expensive, and after the lubricants have been removed, you cannot use the camera under normal conditions without damaging it. Winterizing involves dismantling the camera and lens to remove all lubricants. A qualified technician should do this for you.

If your camera is an older model or will be exposed to extreme cold for prolonged periods, winterizing may be necessary. Don't winterize a camera without first consulting the camera manufacturer. A practical alternative to winterizing is simple preventive maintenance and cleaning of the camera body and lens.

Current 35 mm SLR cameras usually don't require winterizing. The lubricants used in them will continue to work for brief periods in extreme cold. However, it is important to prevent the camera from cold soaking. Cold soaking occurs when the camera cools to the ambient air temperature; complete soaking takes several hours. Protect your camera and lens from prolonged exposure to the cold. When you are not taking photographs, keep the camera and lens under your parka. Some camera companies offer cases that deaden camera noise and also insulate the camera.

### Meters

Photoelectric exposure meters do not require special winterizing. They are usually reliable, although the batteries in CdS and silicon blue meters can cause problems. You should carry replacement batteries and protect them from very low temperatures. A battery power supply may not be a good choice, because it may lose efficiency in extreme cold.

If your meter or camera has an LCD (liquid crystal display), low temperatures will make the LCD pulsate and decrease the angle of view. You will have to look directly down at the LCD to see the display. As temperatures near 14°F (-10°C), the display will stop operating. Because the display will freeze very quickly, expose the meter to cold for only a very short time, and keep it under your parka when you're not using it. You may also want to carry a selenium-cell meter (which does not use batteries) to make comparison readings or to provide a backup.

## Flash Units

Extremely low temperatures also have a detrimental effect on electronic flash units. You can't predict the effect of cold weather on the light output of a flash unit accurately. Efficiency will vary from one unit to another because of the differences in capacitors and batteries.

**Note:** Nickel-cadmium batteries operate at approximately 60-percent capacity and yield fewer flashes per charge at  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ). Don't recharge these batteries at temperatures below  $50^{\circ}\text{F}$  ( $10^{\circ}\text{C}$ ), because this causes venting and permanent damage.

## Other Equipment

Tripods ordinarily do not require professional winterizing. You can remove any lubricants by rinsing the legs and the pan-tilt head in kerosene or alcohol. You can use either a metal or wooden tripod. Winterize tripod heads for motion-picture equipment if the equipment includes gyros, motors, fluid drives, or other revolving parts.

## Batteries

Batteries also need to be warm to function properly. The three most popular types of batteries used in cameras are lithium, alkaline, and silver oxide or button batteries.

Battery manufacturers test their batteries to determine their operating temperature ranges. Batteries will not give full power at the low end of the range. Lithium batteries have a range of  $158$  to  $-40^{\circ}\text{F}$  ( $70$  to  $-40^{\circ}\text{C}$ ), and may be the best performers in the cold. Alkaline batteries have an operating range of  $130$  to  $-4^{\circ}\text{F}$  ( $54$  to  $-20^{\circ}\text{C}$ ) and are good under heavy use. The range for silver oxide batteries is  $130$  to  $10^{\circ}\text{F}$  ( $54$  to  $-12^{\circ}\text{C}$ ). They are used in many older cameras with metal bodies; cold transmitted through the camera body can cause the batteries to freeze rather quickly.

All batteries contain electrolytes to carry the electrical current. At temperatures below  $-40^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$ ), the electrolytes will freeze, making batteries useless. Cold temperatures combined with camera power requirements drain battery power very quickly. Carry extra batteries and keep them warm. Or you may be able to use an external battery pack that connects to the camera battery housing by means of a long cable, allowing you to keep the pack warm in your pocket. You could also attach a small chemical hand warmer to the outside of the battery housing to keep the battery temperature within the operating range.

## FILMS

You must keep film in its original sealed packaging at room temperature to retain its flexibility and other physical characteristics. After you load film into the camera and subject it to extreme cold, the film will lose some of its moisture and may become brittle and break as you advance it. Keep the film warm by attaching a small chemical hand warmer to the camera back. Advance the film slowly from one frame to the next with a steady movement of the transport lever or crank. By carefully advancing the film, you lessen the strain on it and reduce the likelihood of breakage or static discharge.

Rewind film in 135 magazines slowly to help minimize static discharges that can show on the film after it is processed. Don't use a motor drive, because rapid winding contributes to static markings on the film. If your camera has a built-in drive, set it so that it advances only one frame at a time.

With motion-picture films, a rapid loss of moisture at low temperatures may cause curling and brittleness. You can minimize these problems by using films coated on an ESTAR Base. These films maintain their flexibility and strength better than films coated on an acetate base.

Cold temperatures may reduce the effective film speed and alter the color balance of color films. Exposure meters may not give accurate readings. You can minimize these problems by keeping your film and camera warm under your parka. If you can't keep them warm, we recommend bracketing exposures by several stops from the meter reading.

KODACHROME and KODAK PROFESSIONAL EKTACHROME Films are excellent choices for color transparencies under arctic conditions. KODAK PROFESSIONAL EKTAPRESS or KODAK GOLD or MAX Films are good choices for color negative films. In most cases, any slight shift in the color balance of color negative films caused by extreme cold can be corrected with filtration when the negatives are printed. For black-and-white photographs, you can use KODAK T-MAX Professional Films, KODAK TRI-X Pan Film, KODAK PLUS-X Pan Film, or KODAK PROFESSIONAL T400 CN Film (Process C-41).

## KEEPING WARM

The ideal working outfit must provide adequate warmth without unnecessary bulk that will limit your mobility. An expedition outfitter or a cold-weather-clothing dealer can make specific recommendations for clothing for cold temperatures and arctic conditions.

Protecting your hands presents a special problem. Hand coverings must provide warmth and still allow you to manipulate the camera controls. One practical solution is to wear thin silk, polypropylene, or woolen gloves under heavily lined mittens. You can take off one or both mittens while you focus the camera and trip the shutter. Your hands will become warm again quickly when you put the mittens back on. We recommend wearing silk gloves and attaching the mittens to your clothing with clips so that they are handy and won't get lost.

One handy item of apparel is a photographer's vest. You can wear it under a parka, and its many pockets will provide safe and convenient spaces for film, batteries, filters, lenses, exposure meters, and other items that you can keep warm with body heat. Or you can wear a skier's belt that serves a similar purpose. When you wear this type of belt with the pockets in the front, it provides a ledge or a "rest" that comes in handy for reloading cameras and changing magazine backs or batteries.

## PROCEDURES AND PRECAUTIONS

You should be able to alleviate the problem of arctic photography caused by extreme cold by keeping materials and equipment as warm as conditions permit.

Whenever possible, carry film, cameras, lenses, and other accessories under your clothing, where they will stay warm and be protected from the wind. Don't leave equipment out in the cold any longer than necessary; condensation will occur when you put the equipment back under your clothing. Be careful not to breathe on your equipment, because your breath will form a layer of frost.

To conserve space, remove film from its carton; *do not* remove film from its vapor-tight package. Label each roll of film. Carry fresh batteries for flash units or exposure meters in a shirt pocket or a photographer's vest to keep them warm and dry. Carry your working camera on a neck strap at chest height where you can easily remove it from the parka to use it, and return it to cover immediately. Keep your spare camera body and one or two lenses in the pockets of a photographer's vest or in the compartments of a skier's belt.

You can use several small hand warmers to supplement body heat and to help keep the spare camera body and lenses in good operating condition. Some photographers tape a hand warmer to the back of the working camera.

Protect against blowing snow when you reload roll and 35 mm cameras. With a little practice, you'll find you can load film under a parka. You can also use a towel or a blanket to protect the open camera from flying snow.

You should keep the ever-present danger of frostbite in mind, particularly when your hands and face come into direct contact with a metal camera body. Cover the exposed metal areas on cameras that you use at eye level and must hold close to your face. You can use heavy electrical tape, plastic foam, or some other insulating material to do this. Under no circumstances should you touch a camera with wet hands; your skin will freeze fast to the cold metal almost instantly.

Avoid taking a cold camera unprotected into a warm room. Condensation will form on both the outside and the inside of the camera and possibly inside the lens. With electronic cameras, the condensation could very well cause malfunctions. Before entering a warm room with a cold camera and lenses, place the camera and lenses in a plastic bag, squeeze the air out, and seal the bag tightly. Allow the equipment to warm up to room temperature (an hour or two) before removing it from the bag.

If your camera is in a tight-fitting case, condensation will form on the outside of the case. Allow the camera to reach room temperature before you remove it from the case.

If condensation forms on your camera, you can let it air-dry, or you can place it in a covered container with some activated silica gel. Silica gel is available through chemical supply houses.

When you are outdoors, do not clean lenses and viewfinders by breathing on them. The moisture from your breath will freeze on the surfaces and be quite difficult to remove. Use a camel's-hair brush or lens-cleaning tissue to clean lenses and viewfinders. If you drop a camera into the snow, pick it up and shake it to remove the snow, or brush it off with a soft brush or cloth. Don't try to blow the snow from the camera, because your breath will freeze on it.

## PICTORIAL EFFECTS

We recommend using back- or sidelighting for the best pictorial effects when you photograph snow scenes. This lighting gives a feeling of depth by capturing the sparkle of sunlight striking individual snow granules. You can enhance the beauty of some snow scenes you photograph on KODAK T-MAX 100 Professional, T-MAX 400 Professional, PLUS-X Pan, or TRI-X Pan Film by using a yellow filter, such as a KODAK WRATTEN Gelatin Filter No. 8, over the camera lens. This filter darkens sky tones and increases overall contrast by absorbing some of the blue skylight that illuminates blue shadow areas. Using a KODAK WRATTEN Gelatin Filter No. 25 (red) creates special effects by exaggerating the contrast of sparkling white snow and gray shadow tones against an almost black sky.

For color photographs, use Kodak color films balanced for daylight. Photographs taken during the period from one hour after sunrise to one hour before sunset will give excellent, accurate color rendition. Shades of yellow, orange, and red will predominate in scenes photographed early or late in the day, including sunrises and sunsets.

You seldom need to use color filters with daylight color films unless you want to produce special effects. You can use a haze (skylight) filter to reduce excessive bluishness. This filter will also protect the camera lens from blowing snow and condensation.

You can use a polarizing filter to darken the tone of blue skies without affecting the color rendition of the other subjects. The darkening effect is greatest when you photograph subjects under a clear sky with the sun at a right angle to the lens axis. Experiment with the filter to obtain the effect you want.

Always use a lens hood to avoid flare from the sun and the snow.

## EXPOSURE

Exposure under arctic conditions can be tricky, especially when your equipment may give unreliable readings in the cold.

### Meter Readings

Make exposure readings frequently, even though the lighting conditions and subject matter don't appear to change very much. If you use your built-in exposure meter or a handheld reflected-light meter to measure the light reflected from snow, you will get a false reading. The meter will indicate only half, or even a quarter, of the actual exposure you should use. Reflected-light meters are fooled by snow because they are calibrated for a gray card that approximates subjects of typical reflectance and the average proportion of light and shadows in a normal scene. To expose your film accurately, adjust your reflected-light meter readings by increasing your exposure by 1 1/2 stops. Adjust incident-light meter readings by decreasing exposure by 1/2 to 1 stop.

### Film Instructions

Use the suggested exposures given in the instructions for your film to photograph snow under bright sunlight. In higher latitudes, the angle of the sun is an important consideration. If the sun is lower than 30 degrees, increase exposure by 1/2 to 1 stop. Snow is a good reflector for the shadow side of subjects that are side- or backlit. This effect reduces the need for increasing your exposure for sidelighted and backlit subjects.

### Bracketing

If you are using slide film, take additional photos of each scene, giving 1/2 and 1 stop more, and 1/2 and 1 stop less exposure than your exposure meter indicates. If the meter seems to be malfunctioning, expand the bracket range up to 2 or even 3 stops. Because negative films have much greater exposure latitude than slide films, you normally don't have to bracket when you use them. You can usually get an acceptable print from a negative that is overexposed by up to 3 stops or underexposed by up to 2 stops.

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