Use a Signal Mirror

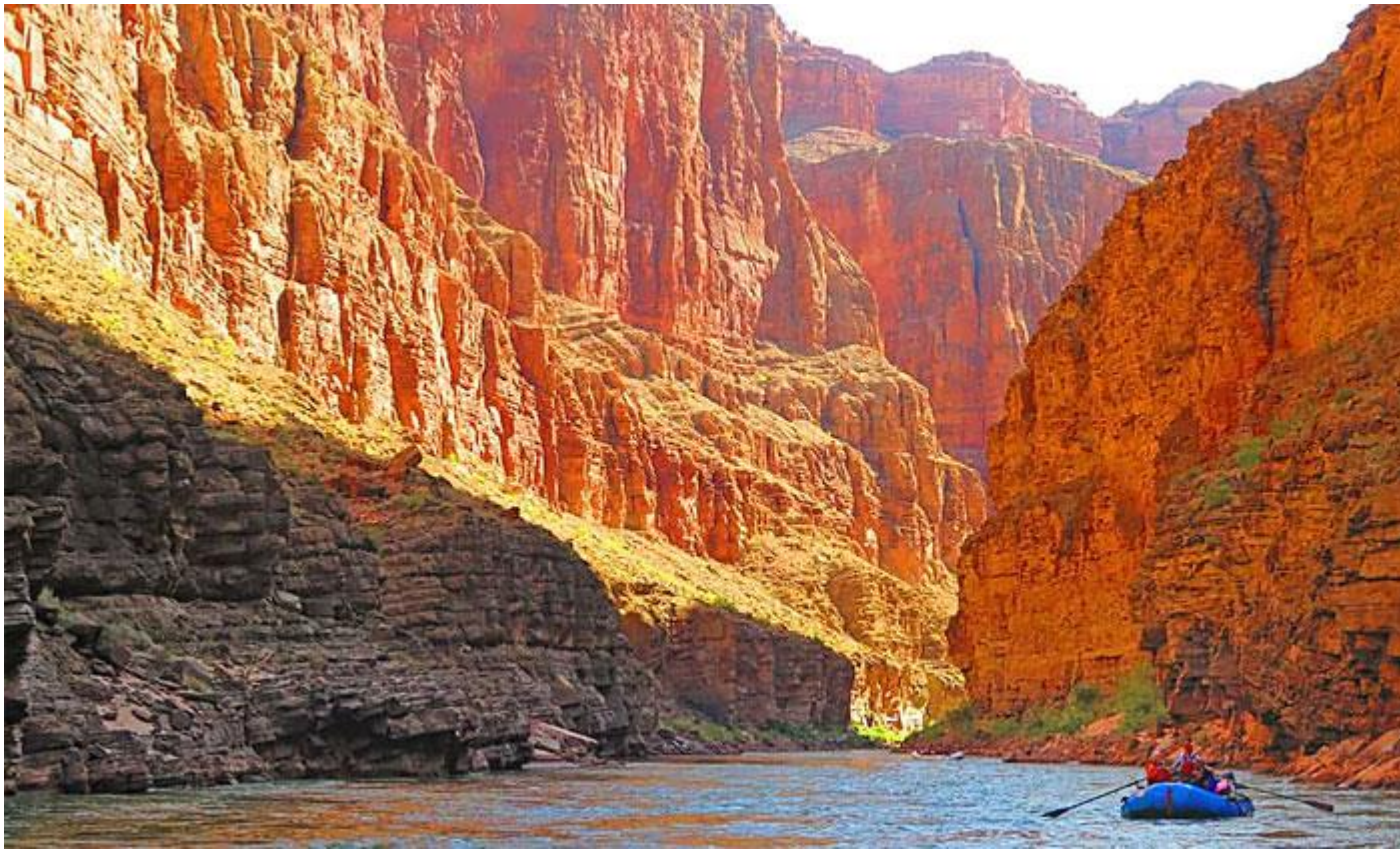
Back in the late 1980s, an oral surgeon was in the middle of a two-week raft trip down the Colorado River in the Grand Canyon in Arizona, when disaster struck.

He and two other men were on the bank, getting their 18-foot (5.4-meter) raft ready for a trip down the Crystal Rapids when it got caught in a wave, filled with water and ripped the line from their hands.

In the confusion, the rope wrapped around the doctor's leg and dragged him across the rocks toward the raging water.

Fortunately, his 24-year-old son rushed to him and, at the last moment, cut the rope.

But the victim, left with a fractured knee and pelvis and a dislocated hip, was in bad shape. He needed to get out of the wilderness in a hurry. But there wasn't any way to call someone for help.



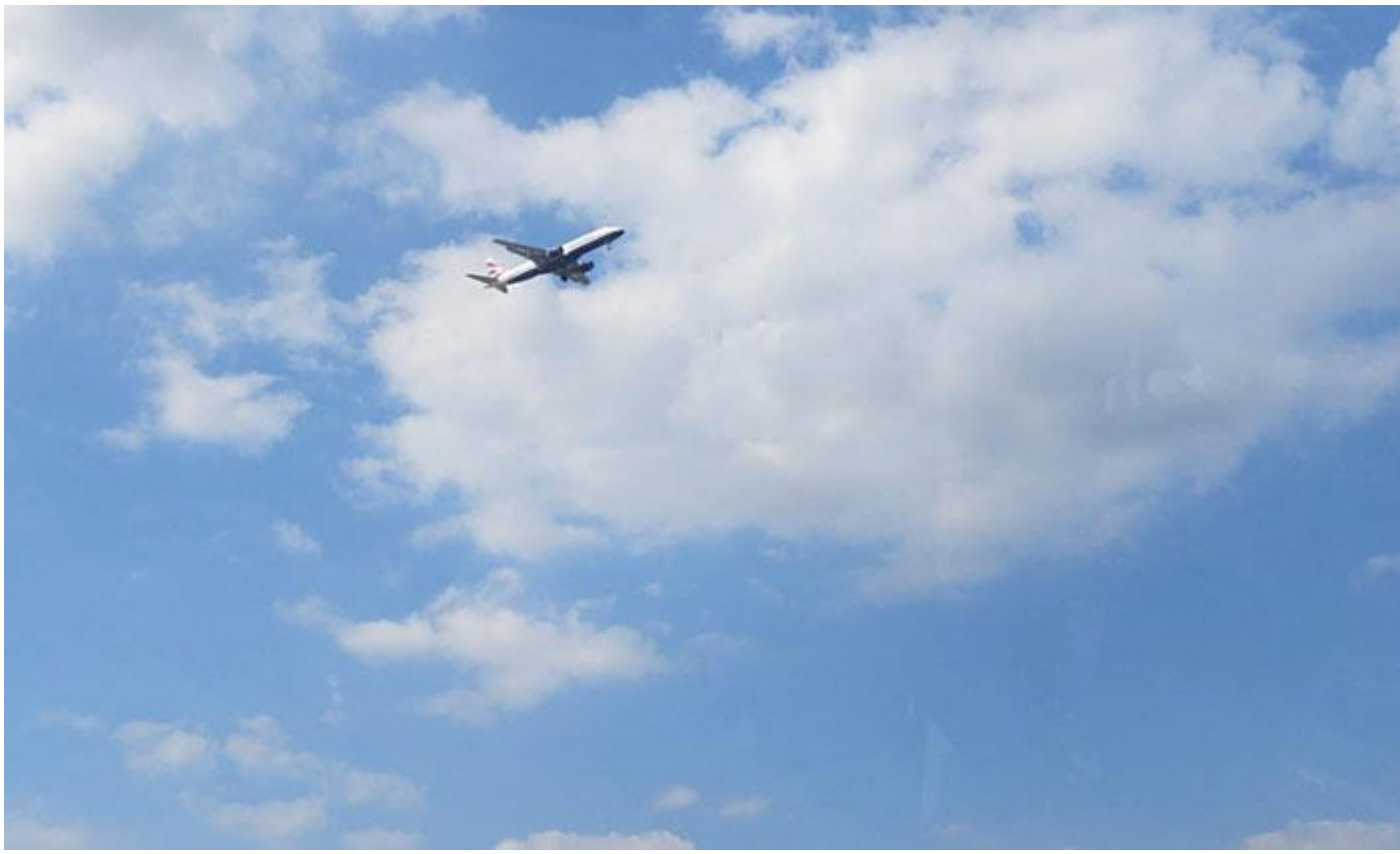
Fortunately, another member of the expedition knew exactly what to do. He took a signal mirror and held it to reflect the sunlight.

Using Morse code, the venerable system of long and short flashes once used by telegraph operators, he spelled out an "SOS" message.

Within a few minutes, the pilots of a jet airliner flying 35,000 feet (10,700 meters) overhead saw the glint of the rafter's mirror, and realized someone was in trouble below.

They radioed for help, and soon a rescue helicopter arrived to lift the injured rafter to safety [source: Associated Press].

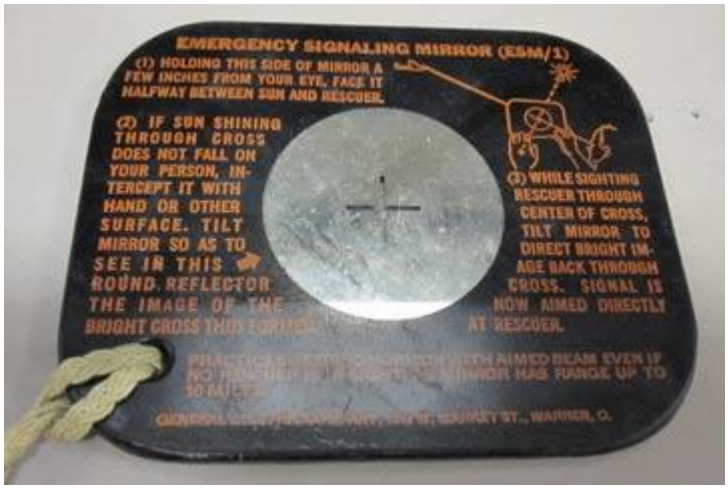
That rafter isn't alone in owing his life to a signal mirror. Over the decades, there have been many other people stranded in dire situations in the wilderness or at sea whose lives have been saved by this simple device.



After all, it fits easily into a backpack or pants pocket; is capable of transmitting messages to rescuers as far as 100 miles (160 kilometers) away or thousands of feet overhead and works in places where there aren't any cell phone towers or electrical outlets to charge batteries.

No wonder that the U.S. Air Force's official survival handbook describes the signal mirror as "probably the most underrated signaling device found in the survival kit." But you need some expertise in using a signal mirror to make it work for you in an emergency.

Where Did Signal Mirrors Originate?



The reverse of an emergency signaling mirror issued to pilots for use in the 1940s. Note the instructions on how to use it.

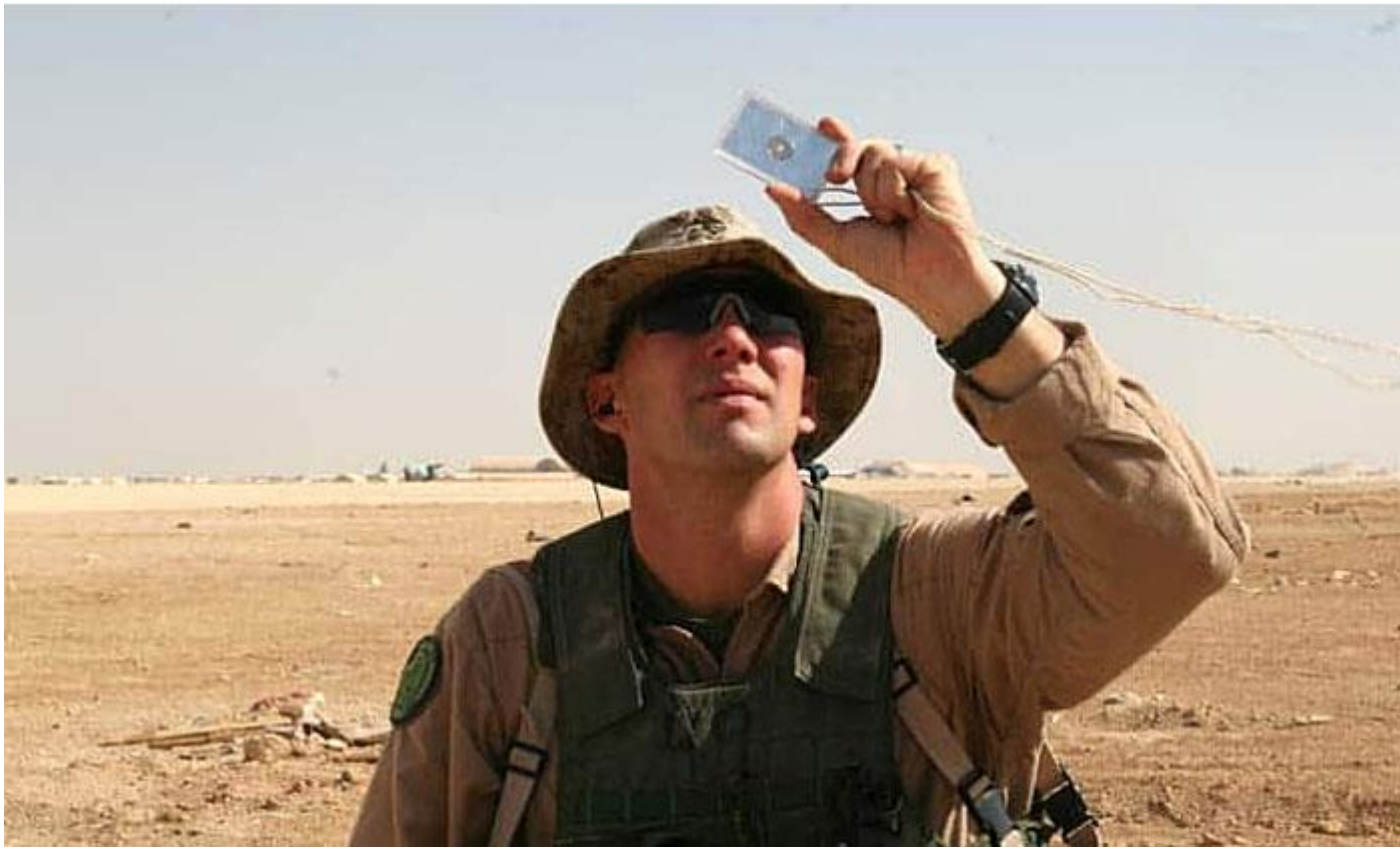
NAVAL HISTORY AND HERITAGE COMMAND

In the early 1800s, a German mathematician, Carl Friedrich Gauss, demonstrated that even a tiny mirror with a surface area of 1 square inch (6.5 square centimeters) could reflect flashes of sunlight that could be seen over a distance of 7 miles (11 kilometers) [source: Coe].

In the 1860s, a British Army officer named Henry Christopher Mance, who was stationed in India, got the idea of using Gauss' discovery to send coded messages. He developed the **heliograph**, a special tripod-mounted mirror with a lever that tilted it, so that it could transmit flashes of light of different lengths.

That enabled a mirror to be used to send Morse code, the same system of dots and dashes developed to transmit messages over telegraph wires.

While a flash of light from a mirror couldn't be transmitted as far as a telegraph message, Mance found this an ideal way to communicate in the rough, mountainous areas of northern India and Afghanistan.



By the late 1800s, the U.S. Army was using relay networks of heliograph stations to send messages through the vast desert expanses of Arizona and New Mexico [source: Coe].

By the early 1900s, radio had taken the place of the heliograph for most routine military communication [source: Coe]. But mirror communication didn't go away. During World War II, U.S. Navy pilots carried mirrors in their survival kits, so that if they crashed or were shot down, they could get the attention of rescuers [source: Flying Magazine].

In 1960, a Life magazine article by Mercury astronaut Alan Shepard noted that in addition to a battery-operated radio transmitter, he carried a signal mirror to help recovery ships locate him in the ocean [source: Shepard].

Today, signal mirrors are still recommended to military personnel and adventurers alike as a device to always have on hand.

In the next section, we'll tell you how to find a good signal mirror.

Tips on Buying a Signal Mirror

In a pinch, you can use almost any reflective surface — even the shiny material from the inside of a broken cell phone — as a signal mirror [source: Galloway].

But survival experts say that you'll have the best chance of contacting rescuers if you use a mirror specially designed for signaling.

You want one that's big enough to comfortably fit in your hands — a 2-by-3-inch (5.1-by-7.6-centimeter) size is good — with a small hole in the middle that enables you to see where you're focusing your signal [sources: McDougall, Nester].

That way, you'll capture the eye of a search team, rather than, say, a deer or squirrel.

Some experts advise buying a plastic mirror that's light enough to be manipulated with one hand and resistant to breaking [source: Murray]. But others recommend glass mirrors, which can reflect sunlight much farther.

So use your own judgment on that. If you opt for glass, carry your mirror in a Bubble-Wrap sleeve to prevent it from being damaged [source: Nester].

You can purchase a good signal mirror for less than the cost of a pair of pants. Best Glide offers a model that's equipped with a special viewing window that superimposes a red dot on your target, so that you can pinpoint exactly where you are focusing your signal.

Practice using your mirror before setting out on your next outdoor adventure.

Improvising a Signal Mirror

In 1991, after a plane crashed in the waters of the Caribbean, four survivors in life vests struggled to get the attention of boats and aircraft that passed nearby but did not notice them.

Finally, after two desperate nights in the water, they got the idea of using shiny credit cards to reflect sunlight at a plane, which spotted them [source: Murray].

Using a Signal Mirror

If you're stranded out in the woods or at sea, a signal mirror can save your life — that is, if you use it effectively. Some signal mirrors have instructions printed on one side to help users out. But if you don't have such an aid, here are some basic tips.

You can use a signal mirror in two basic ways. If you don't see anyone in the distance, simply sweep the horizon with the mirror, in hopes that you'll catch the eye of a rescue craft or team that isn't yet in your visual range [source: U.S. Air Force].

But once you do spot rescuers you should aim the reflected light at them, and then send a signal so that they can tell that you're a person out there who needs help.

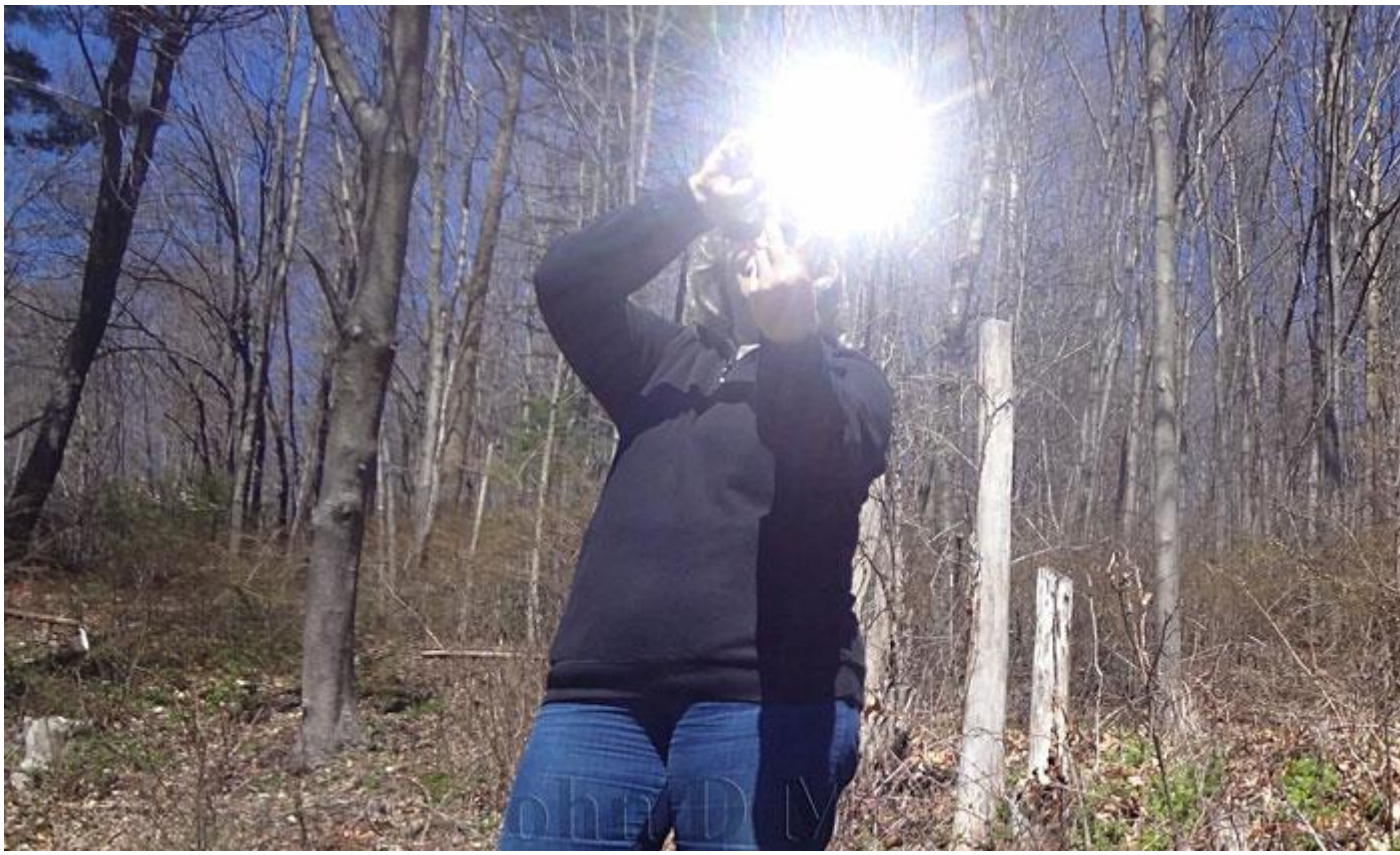


Image source: Survival Resources

The technique for using the signal mirror is pretty straightforward.

1. Use the mirror to reflect sunlight on to a nearby surface like a raft or your hand.
2. Slowly bring the mirror up to your eye, while making sure that the reflective surface is not obscured by your brimmed hat or fingers.
3. Tilt the mirror up toward the sun (not directly into it, though), until you see a small bead of light.
4. Once you've found the bead of light, move it toward your intended target (plane or searcher). Keep the bead of light in view as you do this [sources: Nester, U.S. Air Force].

If you're improvising your mirror, hold up two fingers in a V shape and angle the mirror (or credit card or compact) so that most of the light passes through the V. This will help you to find the bead of light.

It's possible to send detailed messages with a mirror by using Morse code, and some people carry cheat sheets to show them how. But you don't need to do that to be rescued.

Just flash the mirror toward your target, and then cover it or turn it away from the target. Do that three times in quick succession. That's the international distress signal, which any rescuer should recognize [source: Nester].

Another important tip: It's crucial to know when to stop signaling. Once a vehicle or aircraft has spotted you and is zooming in to pick you up, avoid flashing reflected light into the rescuers' eyes, so that you don't cause them to become momentarily blinded and crash [source: Murray].

Wartime vs. Peacetime

Military pilots are taught how to signal friendly forces to rescue them without tipping off their location to the enemy.

They're instructed to keep their mirrors on a string around their necks, and to tuck them inside their shirts or flights suits, so that they don't flash accidentally to hostile forces.

In addition, they should signal only in brief bursts and cover the mirror with their hands before and afterward [source: U.S. Air Force].

Author's Note: How to Use a Signal Mirror

I've always been fascinated with stories of wilderness survival and people who have extreme experiences in the outdoors. In my work as a journalist, I've met and interviewed survival experts, and I've noticed that they tend to have extremely methodical, detail-oriented problem-solving strategies.

While they prepare and equip themselves carefully for their adventures, what gives them the most protection is their own ability to analyze unexpected situations and improvise solutions.