

# SIGNALING WITH MIRRORS

A NEW TYPE of survival signaling mirror for use on life rafts has been developed after many tests and is being procured by BuAer for distribution to the Fleet. Early production of the reflex-button type mirror will go to Com-AirPac; general distribution to follow.

The new mirror has a red reflector button set at approximately 30° angle behind a clear glass square in the middle. By sighting through this square at the proper angle to the sun, a person sees a red dot which is aimed at the plane or other object being signaled. Tests showed the device superior to the old rearsight mirror now supplied with rafts, or to a plain mirror aimed by the sighting-surface method. Future survival equipment will carry the reflex-button type.

▶ Those who have not seen the proof find it hard to believe, but flashes of sunlight from a tiny mirror not more than 3" x 4" in size can be seen at distances three to five times those at which a much larger life raft or lifeboat can be recognized at sea.

A mirror for signaling with the aid of sunlight thus is an extremely valuable device for downed aviators or shipwrecked sailors to use in attracting attention of possible rescuers. Since mirrors for signaling are effective emergency equipment items, they now are included in all life rafts and emergency back pad kit units in naval aircraft.

Although signaling mirrors may be small, they must be shiny and reasonably flat to be effective. They owe

## REFLEX-BUTTON TYPE OF MIRROR ADOPTED FOR NAVY SURVIVAL

their effectiveness to the fact that they direct practically all the sunlight which falls on them in a narrow cone of directions. When a mirror is not flat, the flashes of sunlight reflected from it are spread out and weakened, the amount of spreading depending on how bent the mirror is. This spreading of the directions of reflection is what weakens the strength of the rays.

Silver and aluminum deposited on glass and chromium-plated sheet steel have been used in manufacture of mirrors specifically designed for signaling. However, almost anything that is reasonably flat and shiny enough to reflect images will serve as a signaling device.

A metal toilet mirror can be used without change. A shiny tin can may be cut open and flattened by hand. Pieces of flat glass and flat plastic windshields and windows make good signaling mirrors. Flat metal mirrors need to be only 3" x 4" in size to produce signals which will be visible at any distance from which rescue craft can be seen. Mirrors which are not of glass or metal, or which are not flat, need to be larger. The distance they are visible depends on how brilliant the reflecting surface is,

its size, and also atmospheric conditions and sun intensity.

The difficult part of signaling with a mirror is always in aiming the reflected sunlight toward the intended target. It is impossible to determine by guess the proper angle at which to hold a mirror so that it faces exactly half way between the sun and target. Many schemes to aid in finding this angle have been suggested. Methods which are suggested in instructions applicable to signaling mirrors furnished as emergency equipment carried in naval aircraft are described here. Diagrams showing essential elements of each of these methods are on page 33.

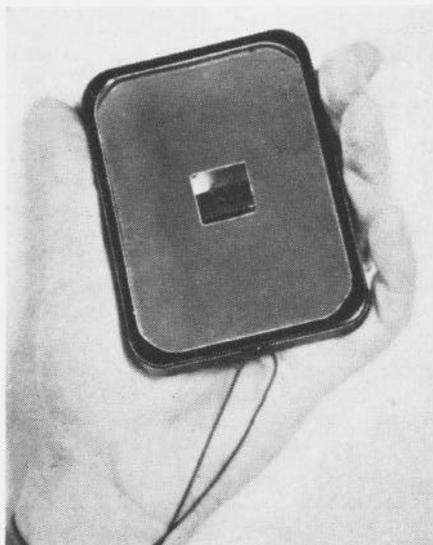
Tests have been conducted recently to compare effectiveness of the methods described in the illustration. In these tests, subjects trained briefly, then made repeated attempts to direct flashes of sunlight from a life raft on water to a circling patrol plane two to five miles away. Only one subject worked at a time and he alternately used one and then another of the aiming methods. The average frequencies with which flashes were received by the plane from the different mirrors are as follows:

	Average number flashes observed per minute
Mirror aimed by sighting surface method (figure 1).....	0.2
Tempered glass (4" x 5") rearsight mirror (figure 3).....	14
Reflex-button (3" x 4") mirror (figure 4).....	35

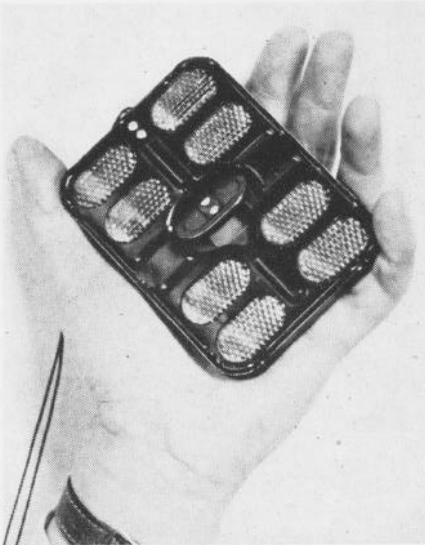
It is concluded from these results that the reflex-button method of mirror signaling is superior to those that have been proposed and used heretofore.

OF THE different methods of signaling, the rearsight (figure 3) method is the most worth memorizing. According to the above results, it is the second most effective method, and it is a method which readily can be improvised for signaling with different mirror materials.

A flattened piece of tin can may be used after a hole is punched in it. A flat piece of glass or clear plastic can be aimed by the rearsight method if a piece of opaque sheet material with a hole near the center is held in front of a small part of the whole transparent mirror. That part of the glass behind the opaque sheet material becomes the part of mirror used for rearsight aiming.



The Reflex-Button type of signaling mirror has a red reflector behind the window



Rear view of the signaling mirror shows reflector buttons intended for night use

# FOUR METHODS OF USE SHOW REFLEX IS BEST

Detailed explanation of the three principal types of mirror signaling systems is given below to accompany the drawing (right). The No. 2 method illustrated is the foresight or British mirror type and is somewhat similar in principle to No. 1, or sighting-surface method.

**1. SIGHTING-SURFACE METHOD OF AIMING**—The simplest method of aiming a plain mirror or unprepared reflecting surface requires a nearby object adjacent to signaler's line of sight to the signaling target. To aim the beam of mirror-reflected sunlight, the signal first is directed onto this sighting object where the resultant bright spot can be seen. The mirror then is twisted to bring this bright spot on the target. It is slowly oscillated so that the beam of reflected sunlight alternates between the object and the target, which are almost exactly in line with each other.

**2. REARSIGHT SIGNALING METHOD**—A rearsight signaling mirror must be shiny on both sides, with a sighting aperture. The small pencil of sunlight which passes through this hole is intercepted, as shown in figure 3 of the drawing, by either signaler's hand or some part of his face. The small bright spot formed on signaler's person is seen by him in the rear of the mirror at the same time he sights the target through the viewing hole. To aim signals, the man adjusts the mirror angle until this spot of light in the rear of the mirror disappears into the sighting hole.

**3. REFLEX-BUTTON AIMING METHOD**—To make this signaling mirror, a red reflector button is used in conjunction with a glass mirror. Near the center of the mirrorized surface is a  $\frac{1}{4}$ " square clear glass window. As shown in figure 4, the reflector button is attached behind the mirror at about 30° angle. When the mirror is aimed in the direction of the sun, the observer, peering through the back, sees a red disc. By placing this disc on the plane or other object being signaled to, the sun's rays are reflected as a signal to the craft.

**THIS METHOD** has four advantages over the others: 1. Signaler has a large clear window rather than a small peep hole through which to observe his target. 2. He does not need to look for reflected light on a nearby surface at the same time he is observing the distant target. 3. The red dot shows the direction of reflection. 4. There is no difficult problem of focusing the eye, as in methods involving shifting of his gaze.

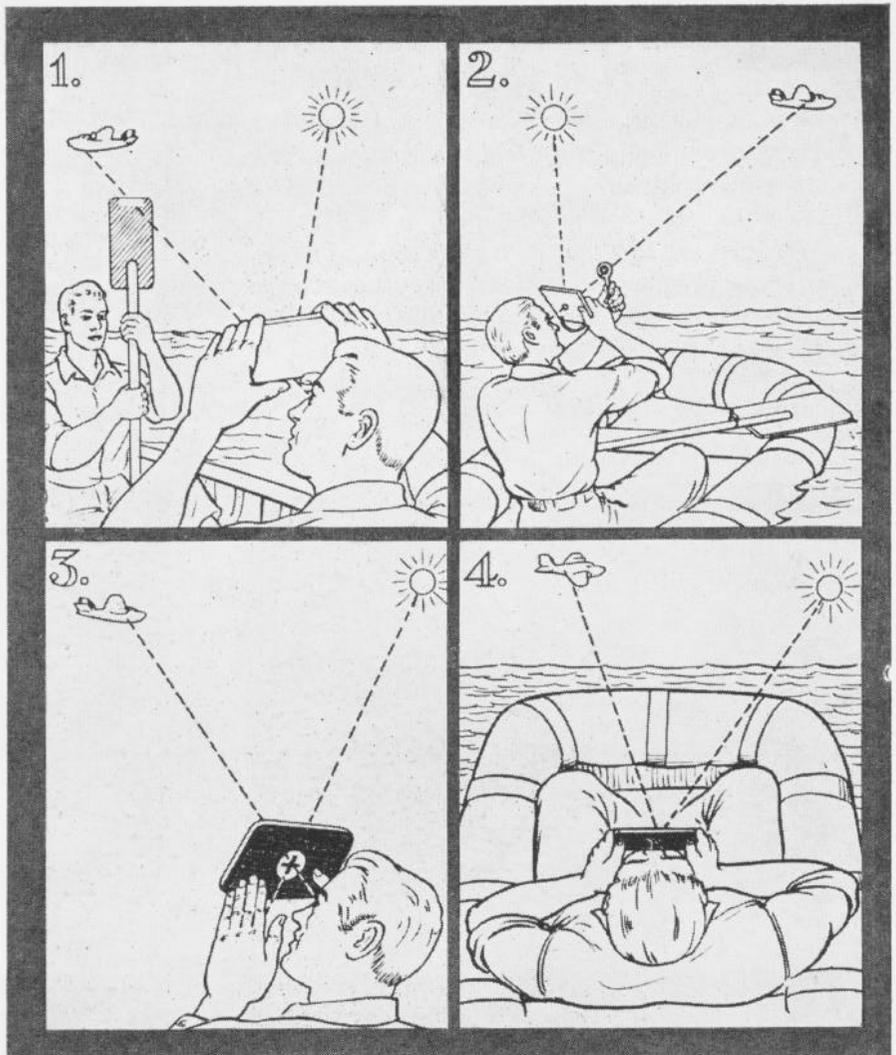


Diagram illustrates four methods of aiming mirror flashes: 1. Sighting-surface, 2. Foresight (British), 3. Rearsight, and 4. Reflex-button, now being distributed to Navy units



MAN IN LIFE RAFT DEMONSTRATES THE CORRECT METHOD OF USING REFLEX-BUTTON TYPE OF MIRROR