

# Varsity Scout Operation On-Target

## July 21, 2012

### A Basic Description of Operation On Target

Operation On Target is a great mountain-top experience that centers around hiking to a mountain summit and signaling to other scout units with special On Target mirrors. Other fun and exciting activities that can be included in Operation On Target are mountain-top ceremonies, competition in various areas of performance, making and learning to use On Target mirrors, learning about and using ham radios, or an awards banquet at which prizes are awarded for outstanding performance during On Target. Also, signaling base-stations can be set up on the valley floors at which parents can come and signal their sons on the nearby mountains.

Operation On Target came into existence as a scout activity in the early 1980's, but the use of reflected sunlight to send signals has a much older history. The HELIOGRAPH was a signaling device used by the armies of several countries during the late 1800's, especially by the United States Cavalry in the great American Southwest. The heliograph was an instrument that was used to send messages by reflecting sunlight with a mirror or mirrors. The heliograph used by the U.S. Army had a mirror with a sighting rod, and the entire device was mounted on a tripod. A screen or shutter for interrupting the flashes was mounted on another tripod. If the sun was in front of the sender, its rays were reflected directly from a mirror to the receiving station. The sender used the sighting rod to line the flash up with the receiver. If the sun was behind the sender, its rays were reflected from one mirror to another, and then to the receiver. The flash was lined up with the receiver by adjusting the two mirrors. Messages were sent as short and long flashes by opening and closing the shutter. The flashes represented the dots and dashes of the Morse Code. The distance that heliograph signals could be seen depended on the clearness of the sky, the length of uninterrupted sight, and the size of the mirrors used. Under ordinary conditions, a flash could be seen 30 miles with the naked eye and much farther if the receiver used telescope or binoculars.

Operation On Target as we know it today uses the same principles of mirrors and reflected sunlight. This outstanding activity is open to Scout troops, Varsity teams, and Venturer crews. Operation On Target can be as basic or as involved as your unit would like it to be. Some units will incorporate a variety of activities into On Target such as radio communication, the making of elaborate or unique mirrors, photography competitions, overnight backpacking excursions to the more remote mountain summits, nature study, and even video productions.

For interested units, there are many merit badges which could be included in your On Target experience, including Astronomy, Backpacking, Camping, Communications, Cooking, Geology, Hiking, Indian Lore, Nature, Photography, Radio, and Signaling. The only limit to the fun and adventure of Operation On Target is your own imagination.

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The key to a successful On Target experience is PREPARATION. I would offer the following suggestions to help you in your preparation process:

- Discuss On Target with the young men in your unit. Their enthusiasm will be directly proportional to your enthusiasm!
- Commit the scouts to participating in this great activity.
- Enlist the help of your unit committee. Assign scouts and committee members to work side-by-side on various assignments, such as mirror making, mirror aiming techniques, peak selection, ham radio operator recruitment, mountain-top experience, competition areas, time capsule construction, photography, and hiking and camping.
- Focus on the various areas of responsibility in your unit meetings as On Target date approaches.
- Send two adult leaders and two boy leaders to the On Target Kickoff Workshop held each spring.
- Be sure to file a Tour Permit with the Council office two weeks before the event.

## **On Target mirrors, how to make them, and how to use them**

### **Making On Target mirrors**

- On Target mirrors actually consist of two mirrors which are glued or taped together. Typically, the reflecting mirror is larger than the sighting mirror which is attached to it. The larger reflective surface is used to direct sunlight to your target, and the sighting mirror is used to helping with aiming the beam of light.
- Some On Target participants like to use plexi-mirror rather than glass mirror. I personally have not had good luck with plexi-mirror. The silver plating of plexi-mirror does not scratch off cleanly as it does with glass mirror. I have also found the thinner plexi-mirror to be somewhat flimsy and sometimes not perfectly flat. The big advantage of plexi-mirror is that it is much lighter than glass, and thus more readily transportable to mountain tops. Also, it does not crack or break as does glass mirror.
- To make an On Target mirror, you must scratch or remove the paint and metallic film from a small circular area of each mirror. I like to use a circle template, a very sharp pin, and an exacto knife to remove the film. Once you have scraped as much of the film off as possible, you can then use a pencil eraser to remove the last remnants of the film. You then glue or tape the two mirrors together with the two holes perfectly aligned.
- The larger the mirror, the greater the reflective surface and the farther you can send your signal. Plans and designs for larger mirrors will be available at the Kickoff Workshop on mirror-making. Building and using a large mirror on the mountain-top is one of the most fun and challenging aspects of On Target. Are you up to the challenge?

• Here are some great links that deal with mirror-making (thanks to Richard Fowell for these links):

a. Here is a link to a mirror design for a 2 foot-by-2 foot mirror from the Mesa Varsity Scouts

<http://ontarget.mesavarsity.org/resources/Wham-Bam-Biggee.pdf>

b. Here is a link that shows designs for both a 2x2 foot and 3x3 foot mirror:

<http://ontarget.mesavarsity.org/resources/OT%20Prog%20Feature.pdf>

c. The Mesa Varsity scouts On Target website has other great ideas:

<http://ontarget.mesavarsity.org/resources/>

d. Here is a link (KB7UZO's website) that shows front and back photos of a 2x2 foot mirror in action at

<http://blog.ashcraft.ws/?p=33> (double-click on the photos to see the full size)

## Aiming On Target mirrors

• Using an On Target mirror is fairly easy, though it appears somewhat difficult at first. Practice will soon have you aiming your mirror like a professional.

• Aiming the mirror requires that you do two things at the same time. The first thing to do is locate your target while looking through the hole in the mirror. The large reflective surface should be facing the target and the smaller sighting mirror should be facing your face.

• With the mirror facing in the general direction of the sun and having spotted your target through the hole, look in the small sighting mirror and find a small dot of light. You will usually see this dot of light somewhere on your face, your collar, or your shirt.

• Now comes the tricky part. While looking at the dot of light and simultaneously looking at the target through the hole, slowly adjust the angle of the mirror so that the "dot" approaches the hole. By crossing the dot back and forth over the hole you will be sending your beam to your target.

• An easy way to check yourself for accuracy is to aim at a license plate, a reflective street sign, or a reflector that you place yourself. As you bring the dot, the hole, and the target into line, these reflective surfaces will really light up.

• A 3" or 4" mirror will send a noticeable signal for 15 to 20 miles, but larger mirrors will be necessary if you want to make longer contacts. The smaller sighting mirrors are taped or glued on the corners of larger mirrors to assist in aiming.

• Richard Fowell supplied this link to a diagram from the back of a 1943 US Navy signal mirror:

<http://www.richard-fowell.fotopic.net/p62917651.html> with an Operation On Target mountain substituted for the rescue plane.

• Here is another link that talks about making On Target mirrors:

<http://www.ontargetbsa.org/makemirror.htm>

• Very large mirrors require specially-constructed frames and support systems.

