

HELIOGRAPH

DESCRIPTION: The heliograph was a communications device used to transmit messages over long distances. It uses a mirror attached to a surveying device to direct a beam of light to a receiving station. Sunlight is used as the light source. Messages could be sent in any direction during daylight hours. If the sun was in front of the sender, the sun's rays were reflected directly from the sender to the receiving station. If the sun was behind the sender, a secondary mirror was used to reflect the rays toward the receiving station. A keying system was used to generate the flashes required to transmit messages using the Morse Code. The distance that the signals could be seen depended on several variables. A clear line of sight was required and because of the curvature of the earth, the heliograph stations were located on the highest convenient point. The clarity of the sky and the size of the mirrors were also significant factors. The maximum range was about 10 miles for each inch of mirror diameter. Under normal conditions using the naked eye, a flash could be seen for about 30 miles, much farther using a telescope. The speed at which messages could be sent was dependent on the proficiency of both the sender and the receiver.



Heliograph at Fort Bowie Visitor Center

EARLY HISTORY: A forerunner to the heliograph, the heliotrope, was developed by Professor Carl Friedrich Gauss of the University of Göttingen in Germany. The heliotrope was used to direct a controlled beam of sunlight to a distant station to be used as a survey marker. Its use led to the concept of using it for telegraphic communications. Sir Henry Christopher Mance of the British Army Signal Corps became familiar with heliotropes while he was stationed at Karachi, then part of British India, when they were used during the Great India Survey. He developed the first heliograph that was accepted for use by the British Army. It was light in weight (about 7 pounds) and could be easily carried and operated by one man. It was first used during wartime in 1877 during a military expedition conducted by the British-Indian government. The heliograph quickly caught on and was soon in use for military communications by other countries. During the era before radios, the heliograph was often the only means of communication that could span long distances with a lightweight portable instrument. In the United States, it was first used by the U.S. Army Signal Corps in 1878 in Montana when Nelson A. Miles (then a U.S. Army Colonel) established a series of heliograph stations between Fort Keogh and Fort Custer, a distance of 140 miles.

APACHE WAR USE: The Chiricahua Apache Reservation was closed in 1876 and an attempt was made to relocate all of the Chiricahua Indians to the San Carlos Reservation. Many of the Indians were unhappy with the conditions at San Carlos and would periodically breakout and return to their traditional homeland of Southern Arizona and Mexico. The army would pursue them in an attempt to return them to the reservation. After the last breakout by Geronimo and Naiche and their followers, the band was tracked down in the Sierra Madre Mountains of Mexico

and Naiche and Geronimo in a meeting with General Crook 25 –27 March 1886 agreed to surrender once more. However, before crossing the border back into the United States, the Apaches got spooked by threats that the group would be hanged and went on the run again. This led to General Crook’s reassignment to another command and on 12 April 1886, General Miles replaced General Crook in the effort to capture this last band of Chiricahua Apaches. General Miles, based on his experience with the heliograph in Montana, considered it to be an excellent way to communicate with his forces who were trying to track down Geronimo and immediately requested support from the U. S. Army Signal Service in establishing a heliograph system. Lieutenants Fuller (for the Arizona portion of the system) and Dravo (for the New Mexico portion) were assigned to oversee the operation. Thirty-four heliographs were located at various Army posts and shipped to Arizona. Fourteen heliograph stations were established in Arizona and thirteen in New Mexico with the first one being established on 26 April at Fort Huachuca on Huachuca Peak with the designation of Heliograph Station # 7. Signalman C. F. von Herrmann was assigned to establish the station and develop a training program to train all subsequent Signalmen. The headquarters for the system was established at Fort Bowie with that station designated as Station #1. Bowie Peak became Station #2. Station # 8 was initially activated on Baldy Peak in the Santa Rita Mountains but was soon relocated to “Little Baldy Peak” (subsequently named Josephine Peak) because it had the necessary lines of sight and was easier to access. The following heliograph sites were in operation in September 1886 at the time of the final Apache surrender. The Arizona and New Mexico heliograph sites were linked together via the Arizona controlled site at Stein’s Pass.

Arizona Heliograph Sites

- # 1 Fort Bowie
- # 2 Bowie Peak
- # 3 White Ranch (Sulphur Springs)
- # 4 Swisshelm Mountains
- # 5 Antelope Springs
- # 6 Rucker Canyon
- # 7 Fort Huachuca
- # 8 Little Baldy Peak
- # 9 Tubac
- #10 Bisbee Canyon
- #11 Stein’s Pass Bluff
- #12 Fourr Ranch (Cochise Stronghold)
- #13 Fort Crittenden
- #14 Bowie Station

New Mexico Heliograph Sites

- Alma (Camp Maddox)
- Siggen Ranch
- Lydia Springs (Mule Springs)
- White House
- Pinos Altos
- Fort Bayard
- Camp Henely
- Deming
- Hschita Mining Camp
- Hillsboro
- Lake Valley
- Fort Cummings
- Lockhart’s Well

The typical manning of a station was eight men consisting of operators, guards and couriers. Records kept by Lt. Fuller indicated that during the campaign against Geronimo, 2,264 messages had been sent by Arizona stations alone. Station #2 at Bowie Peak dispatched 334 messages.

