

## Global Positioning System Marks 20<sup>th</sup> Anniversary

**P**ETERSON AIR FORCE BASE, Colo. (AFNS) – Twenty years ago, on Feb. 22, 1978, the first Navstar Global Positioning System satellite was launched from Vandenberg Air Force Base, Calif. It was the first of four GPS satellites to be launched that year.

By December 1978, this minimal constellation of military satellites was providing real-time, three-dimensional navigational information to limited Earth-bound users.

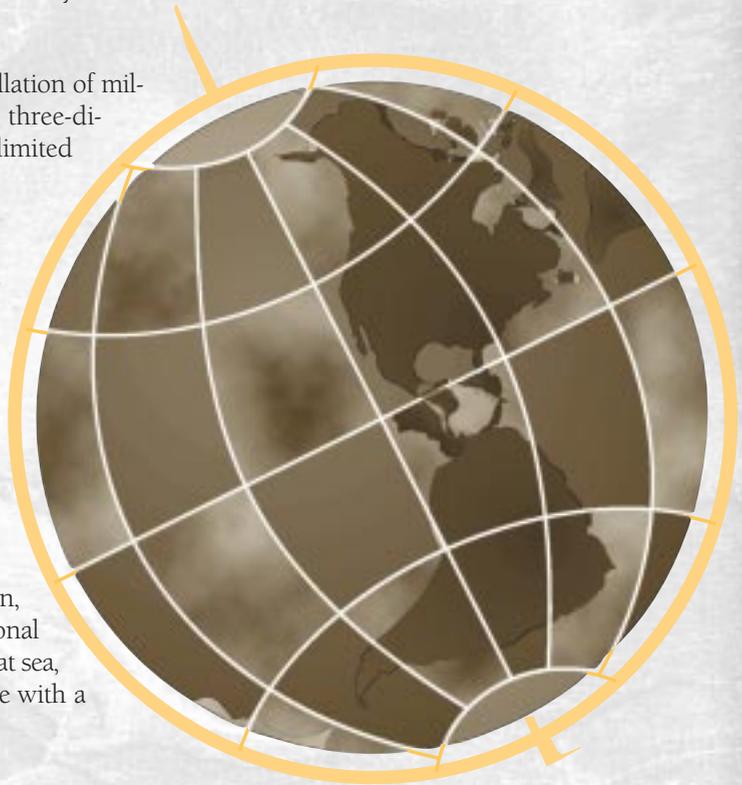
The GPS is operated by the Air Force Space Command's 2<sup>nd</sup> Space Operations Squadron at Falcon AFB, Colo. Today, the system has a minimum constellation of 24 operational satellites that blanket the Earth around the clock with precise, all-weather, navigational information.

Reaching far beyond military application, the GPS satellites today provide navigational information to commercial aircraft, ships at sea, hikers, rental car customers, and anyone with a GPS receiver.

With its real-time accuracy of positioning users to within a few feet, the GPS is credited with revolutionizing areas as broad as land surveying to search and rescue. In fact, it is often referred to as the system that has taken the "search" out of search and rescue, as demonstrated in 1995 during the rescue of Capt. Scott O'Grady in Bosnia, according to an AFSPC official.

During the Persian Gulf campaign of 1991, the GPS played a critical part in synchronizing military action during a lightning-blink, 100-hour war that was fought on an endless, featureless, ocean of sand, added the command officials.

So popular were the GPS receivers that troops, who at this time were using civilian-grade receivers, were writing home to family members requesting them to purchase civilian receivers and send them "ASAP" to the gulf.



GPS use in the civilian world goes way beyond vehicle navigation as well. By using stationary receivers, geologists are able to determine minute movements of the Earth's crust in earthquake zones, and archeologists are identifying hard-to-find sites in jungle foliage. GPS receivers on bulldozers are helping farmers grade their land to within a few inches of where they want it. Giant ocean vessels are now steering their cargo through previously [unnavigable] routes.

This incredible satellite navigation system can trace its legacy back to the military's oldest space system, TRANSIT, say AFSPC officials. TRANSIT is a U.S. Navy navigational satellite used to accurately locate ballistic missile submarines and surface vessels. The first TRANSIT satellite was launched in 1960, and the system of four satellites became operational in 1965.

TRANSIT was slow, intermittent, and subject to errors with even the slightest motion of the observer, according to George W. Bradley III, Air Force Space Command chief historian.

"In short, TRANSIT, while a big step forward in radio position location, was impractical for use on aircraft or missiles, he said."

The space system [that] ultimately became GPS, traces back to 1963 when the Air Force began work with the Aerospace Corporation in El Segundo, Calif., to develop its own multisatellite navigational system. Following many years of design modifications and tests, the first satellite was launched Feb. 22, 1978.

Today, GPS satellites travel in 12-hour, circular orbits 11,000 nautical miles above Earth. They occupy six orbital planes, inclined 55 degrees, with four operational satellites in each plane.

The spacecraft are positioned so that an average of six are observable nearly 100 percent of the time from any point on Earth, and each is equipped with an atomic clock, accurate to within 10-billionth of a second of the standard set by the U.S. Naval Observatory. Additional GPS satellites are being readied for use when aging satellites require replacement.

By the year 2000, approximately 17,000 U.S. military aircraft are expected to be equipped with GPS receivers, and more than 100,000 portable receivers will be in use by U.S. ground forces and on military vehicles.

Meanwhile, the National Academy of Sciences reports that by 2005, the commercial market for GPS services will be close to \$30 billion, marking the system as one of the most important American investments in space.

**Editor's Note:** This news release, courtesy of the Air Force Space Command News Service, is in the public domain and may be accessed at <http://www.af.mil/news> on the World Wide Web.