Eastern Illinois University ROTC

Military Advancements Using GPS Technology

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- Components
- Brief History
- Selective Availability
- Military Handheld Devices
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Overview

- The Global Positioning System (GPS) is a Department of Defense (DoD) developed, worldwide, satellite-based radio navigation system
- The NAVSTAR (NAVigation Satellite Timing And Ranging) constellation consists of over 30 operational satellites
- GPS is owned and operated by the United States Government as a national resource. DoD and the US Air Force operates and maintains GPS – *Free of charge to the public*
- DoD is required by law to:
  - "Maintain a Standard Positioning Service that will be available on a continuous, worldwide basis."
  - "Develop measures to prevent hostile use of GPS and its augmentations without unduly disrupting or degrading civilian uses."

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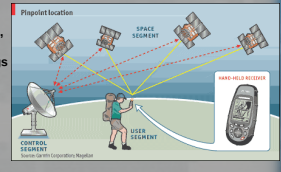
Components

The GPS consists of three major segments:

- SPACE segment consists of over 30 operational satellites in six orbital planes.
- CONTROL segment consists of:
  - Five Monitor Stations – Hawaii, Kwajalein, Ascension Island, Diego Garcia, Colorado Springs
  - Three Ground Antennas – Ascension Island, Diego Garcia, Kwajalein
  - Master Control Station (MCS) located at Schriever AFB in Colorado.
- USER segment consists of antennas and receiver-processors that provide positioning, velocity, and precise timing to the user.



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Brief History

- Originally designed for military and intelligence applications at the height of the Cold War in the 1960s
- "Transit" was the first satellite system launched by the USA and tested by the US Navy in 1960
  - Five satellites orbiting the earth allowed ships to fix their position once every hour
- Transit was succeeded in 1967 by the "Timation" satellite
  - Demonstrated that highly accurate atomic clocks could be operated in space
- The first NAVSTAR satellite was launched in 1989 and the 24th satellite was launched in 1994

Brief History (cont.)

- Reagan Administration opened GPS for civilian applications after USSR shot down a Korean passenger jet on September 1, 1983 after it strayed over 200 miles into Soviet territory
- The Gulf War from 1990 to 1991 was the first conflict in which GPS was widely used; 16 NAVSTAR satellites were in orbit providing coverage lasting about 19 hours per day
- Initial Operational Capability (IOC) achieved in December 1993, indicating a full constellation (24 satellites) was available and providing the Standard Positioning Service (SPS)
- Full Operational Capability (FOC) was declared in April 1995, signifying full availability of the military's secure Precise Positioning Service (PPS)

Selective Availability

- GPS provides two levels of service:
  - The Standard Positioning Service (SPS) is available to all GPS users on a continuous, worldwide basis with no direct charge.
  - Precise Positioning Service (PPS) is a highly accurate military positioning, velocity and timing service which will be available on a continuous, worldwide basis to users authorized
- Initially, the highest quality signal was reserved for military use, and the signal available for civilian use was intentionally degraded
- President Clinton ordered Selective Availability turned off at midnight May 1, 2000; civilian GPS accuracy increased from 100 meters to 10 meters
- Department of Defense retains the capability to degrade capability for civilian use based on National Security

Military Handheld Devices

Small Lightweight GPS Receiver (SLGR)

- Approximately 6,000 procured in the early 1990s
- Only operated using the SPS signal
- Satisfied the urgent need of the military in Desert Shield / Desert Storm

Military Handheld Devices

Precision Lightweight GPS Receiver (PLGR)

- Acquisition started in 1993
- Operated using the PPS signal
- Satisfied the need to have encrypted "military only" signal

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Military Handheld Devices

Defense Advanced GPS Receiver (DAGR)

- Production began in 2004
- Operates using the PPS signal
- Smaller and lightweight; incorporates a graphical screen

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Military Handheld Devices

Micro Defense Advanced GPS Receiver (DAGR)

- Currently in production to replace PLGR and DAGR
- Color touch screen technology; similar to COTS systems
- Smaller and lightweight; can be carried and stored easily

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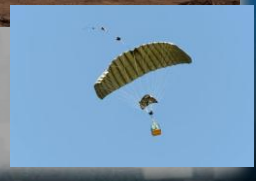
Global War on Terrorism

- Positioning
- Navigation
- Precision Munitions
- Mapping
- Accurate time for systems



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EIU ROTC Land Navigation Training

- 9-mile range
- Track up to 10 individuals at a time
- Advanced mapping with satellite imagery and TOPO maps

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