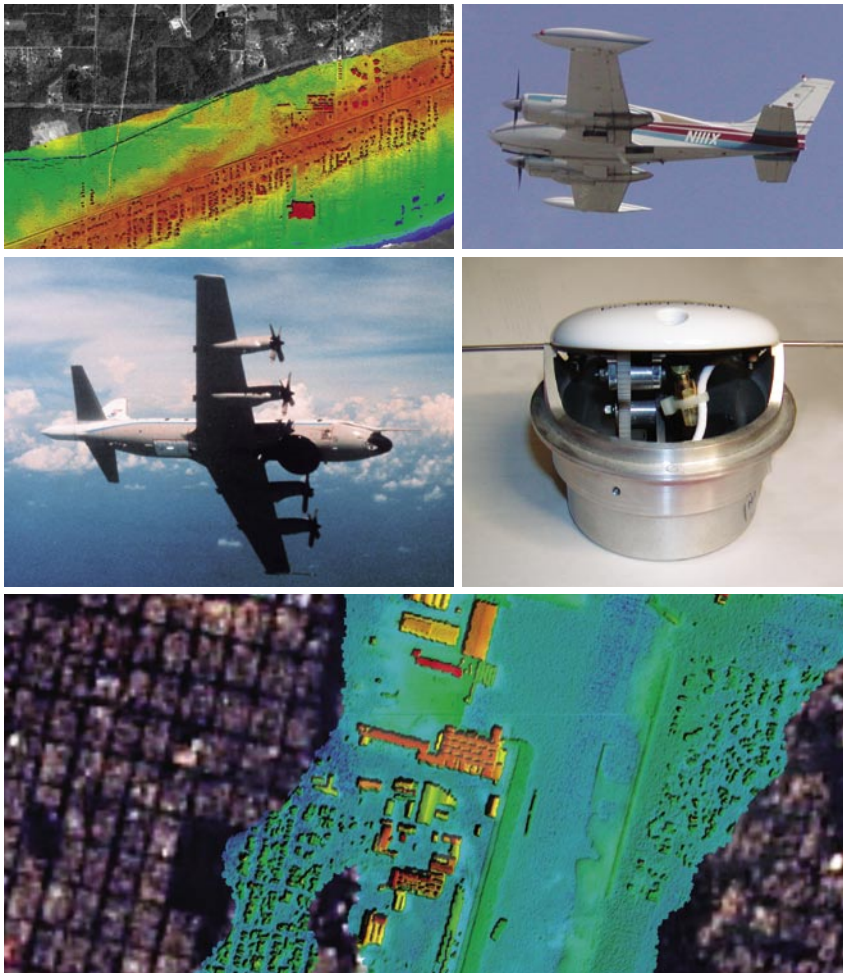




Precision Aerial GPS Antenna Positioning System

... maintains high GPS signal strength for improved aerial positioning efficiency



The airborne LIDAR industry relies on precision GPS positioning for producing high accuracy topographic surveys and aerial photography orthorectification. Loss of GPS signal, known as cycle slips, for even nanoseconds can seriously degrade the accuracy of the survey. This innovative GPS antenna system reduces loss of signal by sensing changes in aircraft attitude and automatically adjusting the antenna to maintain the signal strength and quality.

NASA Goddard Space Flight Center offers this low-cost solution for license to significantly reduce time and costs associated with precision aerial GPS antenna applications.

Benefits

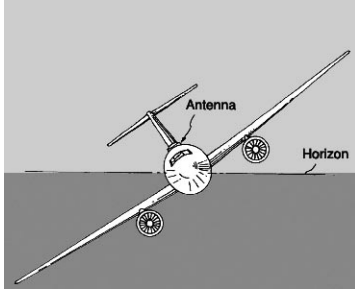
This GPS antenna positioning system offers significant benefits for aerial applications requiring precision (centimeter level) aircraft positioning.

- **Reduces flight time:** By increasing aircraft bank angles to 30 degrees, this GPS antenna reduces aircraft turning time from approximately five minutes to as low as one minute.
- **Increases efficiency:** Because the antenna maintains constant phase lock with GPS stations even while at high aircraft banks angles, no flight time is wasted while waiting to reacquire lock on lost GPS signals. The higher aircraft bank angle reduces the time wasted in turns and increases the time available for flight lines.
- **Reduces flight cost:** The increased efficiency experienced as a result of reduction in turning time reduces fuel use and pilot flight time, thereby reducing overall costs.
- **Minimal investment:** The technology primarily comprises commercially available components, resulting in a low-cost, stabilized GPS antenna that can be easily added to existing aircraft.

Applications

This technology benefits GPS dependent aerial survey operators for:

- Aerial imaging markets
- Surveys
- Terrain mapping
- Photography
- Other information gathering



The Technology

It is critical when performing aerial mapping and surveying to maintain a constant lock on each of the GPS positioning satellites. Even very brief (nanosecond) losses of signal can degrade the accuracy of the aircraft position measurement. In order to avoid these cycle slips, pilots performing aerial surveys and other precision flights typically limit their bank angle during turns to 10 degrees or less. This small angle allows them to maintain constant contact with each of the GPS satellites in the constellation but can require five minutes or more to turn the aircraft around in order to begin the next pass. With even average size surveys, the maneuvering time can be considerable and can often exceed the time spent doing the actual survey. This not only uses more fuel, it also takes much more time and results in more expensive surveys.

NASA's patented (U.S. Patent #6,844,856) GPS antenna positioning system addresses this problem and increases flight productivity and efficiency.

How It Works

The aerial GPS antenna positioning system is mounted on a motor-driven gimbal on the tail of the aircraft. The aircraft's roll attitude sensor sends digital roll information to the gimbal via an onboard microcontroller. As the aircraft banks, the motorized gimbal rotates the antenna assembly in the opposite direction to the aircraft roll, thus keeping it level and parallel to the Earth. This rotation maintains high signal strength and quality with each GPS satellite in the constellation.

Why It Is Better

This innovative system enables pilots to spend more flight time on the desired flight lines and less time on turns. By allowing banks of up to 30 degrees without loss of lock on GPS signals, turning time is decreased from five minutes to approximately one minute on a typical survey aircraft.

Licensing and Partnering Opportunities

This technology is part of NASA's Innovative Partnerships Program, which seeks to transfer technology into and out of NASA to benefit the space program and U.S. industry. NASA invites companies to consider licensing the Precision Airborne GPS Antenna Positioning System (GSC-14436-1) for commercial applications.

For More Information

If you are interested in more information or want to pursue transfer of this technology (GSC-14436-1), please contact:

Office of Technology Transfer
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More information about working with NASA Goddard's Office of Technology Transfer is available online: <http://techtransfer.gsfc.nasa.gov>