polarization (SOP) so that all of the beams would have the same SOP. The two wavelength beam paths were then recombined using a dichroic filter such that they were co-aligned. A negative lens array following the HWP array was used to provide specific beam divergence. A final lens was used to provide the angular spread of the multiple beamlets.

This work was done by Anthony W. Yu, Luis Ramos-Izquierdo, David Harding, and Tim Huss of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). ***GSC-15950-1***

Optical Communications Link to Airborne Transceiver

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An optical link from Earth to an aircraft demonstrates the ability to establish a link from a ground platform to a transceiver moving overhead. An airplane has a challenging disturbance environment including airframe vibrations and occasional abrupt changes in attitude during flight. These disturbances make it difficult to maintain pointing lock in an optical transceiver in an airplane. Acquisition can also be challenging. In the case of the aircraft link, the ground station initially has no precise knowledge of the aircraft's location.

An airborne pointing system has been designed, built, and demonstrated using direct-drive brushless DC motors for passive isolation of pointing disturbances and for high-bandwidth control feedback. The airborne transceiver uses a GPS-INS system to determine the aircraft's position and attitude, and to then illuminate the ground station initially for acquisition.

The ground transceiver participates in link-pointing acquisition by first using a wide-field camera to detect initial illumination from the airborne beacon, and to perform coarse pointing. It then transfers control to a high-precision pointing detector. Using this scheme, live video was successfully streamed from the ground to the aircraft at 270 Mb/s while simultaneously downlinking a 50 kb/s data stream from the aircraft to the ground.

This work was done by Martin W. Regehr, Joseph M. Kovalik, and Abhijit Biswas of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. ***NPO-47181***