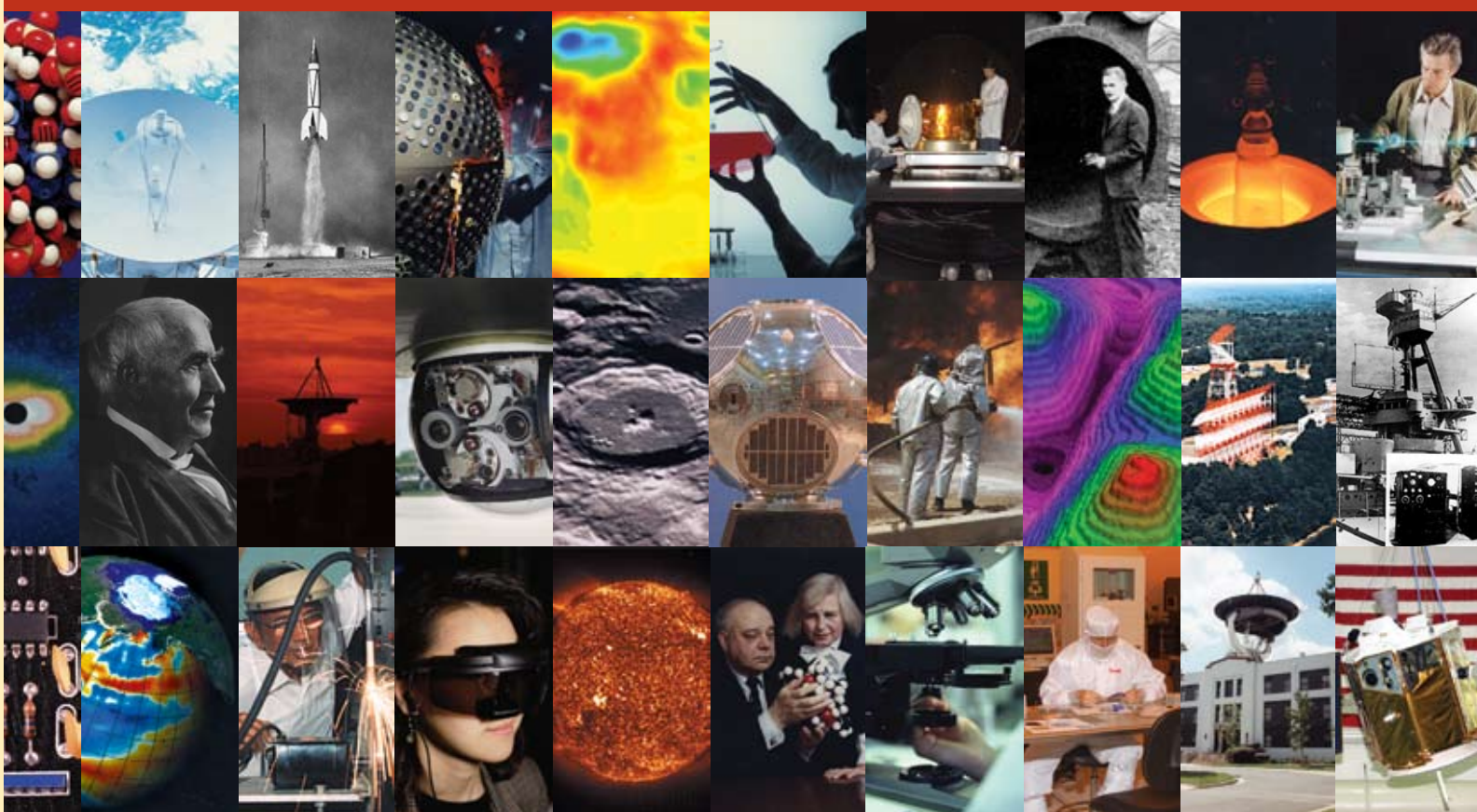


# 2006

## NRL REVIEW



THE NAVY'S CORPORATE LABORATORY

**NAVAL RESEARCH LABORATORY**  
Washington, DC 20375

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General information on the research described in this NRL Review can be obtained from the Public Affairs Office, Code 1030, (202) 767-2541. Information concerning Technology Transfer is available from the Technology Transfer Office, Code 1004, (202) 767-7230. Sources of information on the various educational programs at NRL are listed in the chapter entitled "Programs for Professional Development."

For additional information about NRL, the Fact Book lists the organizations and key personnel for each division. It contains information about Laboratory funding, programs, and field sites. The Fact Book can be obtained from the Technical Information Services Branch, Code 3430, (202) 404-4963. The web-based NRL Major Facilities publication, which describes each NRL facility in detail, can be accessed at <http://www.nrl.navy.mil>.

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Daniel R. Gahagan, Captain, USN  
Commanding Officer

*President announces*  
**ROGER EASTON**  
*recipient of*  
**National Medal of Technology**



President George W. Bush announced that Roger L. Easton is the recipient of the National Medal of Technology for his extensive pioneering achievements in spacecraft tracking, navigation and timing technology that led to the development of the NAVSTAR-Global Positioning System (GPS).

The National Medal of Technology is the highest honor awarded by the President of the United States to America's leading innovators. Established by an act of Congress in 1980, the Medal of Technology was first awarded in 1985. The Medal is given annually to individuals, teams, and/or companies/divisions for their outstanding contributions to the Nation's economic, environmental and social well-being through the development and commercialization of technology products, processes and concepts; technological innovation; and development of the Nation's technological manpower. The purpose of the National Medal of Technology is to recognize those who have made lasting contributions to America's competitiveness, standard of living, and quality of life through technological innovation, and to recognize those who have made substantial contributions to strengthening the Nation's technological workforce. By highlighting the national importance of technological innovation, the Medal also seeks to inspire future generations of Americans to prepare for and pursue technical careers to keep America at the forefront of global technology and economic leadership.

Roger Easton was awarded the National Medal of Technology for "his invention of the Minitrack satellite tracking system used to track Vanguard satellites and determine orbits; his development of the Naval Space Surveillance System still in use today cataloging all known man-made space objects orbiting Earth; his invention of a "Navigation System Using Satellites and Passive Ranging Techniques" and his subsequent development of Time Navigation and Navigation Technology Satellites that formed the technological basis for modern GPS."

Easton conceived, patented, and led the development of critical enabling technologies for the United States Global Positioning System (GPS). GPS today is a constellation of Earth-orbiting satellites providing precise navigation and timing data to military and civilian users. Easton, as a scientist and engineer at NRL, developed his concept for a time-based navigational system with passive ranging, circular orbits, and space-borne high precision clocks synchronized to a master clock. The U.S Patent Office received his invention, "Navigation System Using Satellites and Passive Ranging Techniques," on October 8, 1970. His earlier work exploiting space-based systems for geodesy, navigation, and timing laid the foundations for his visionary leap to the concept he dubbed TIMATION, for time navigation. He tested his concepts at NRL through development and launch of four experimental satellites: TIMATION I and II (in 1967 and 1969) and Navigation Technology Satellites (NTS) 1 and 2 (in 1974 and 1977). NTS-2, the first satellite to fly in the GPS 12 hour orbit and transmit GPS signals, flew the first cesium atomic frequency standard in space. Using time measurements from NTS-2, he experimentally verified Einstein's theory of relativity. A relativistic offset correction that he applied is still in use by every satellite in the GPS constellation.