

# NRO HONORS PIONEERS OF NATIONAL RECONNAISSANCE

August 18, 2000

Forty years ago today, the world received its first pictures from space when a CORONA satellite capsule carrying film was caught in midair by an Air Force C-119 aircraft. With this recovery, space photo reconnaissance became a reality.

In honor of this anniversary, the National Reconnaissance Office is proud to announce the selection of 46 Pioneers who made significant and lasting contributions to the discipline of national reconnaissance. Also acknowledged are 10 Founders of national reconnaissance, scientists who contributed to the founding of this space discipline. Ceremonies to recognize the Pioneers and the Founders are scheduled for Sept. 27 at the NRO's headquarters in Chantilly, Va.

*The Pioneers of National Reconnaissance\* are:*

**James G. Baker, Ph.D.**

As a young Harvard astronomer, Dr. James G. Baker designed most of the lenses and many of the cameras used in aerial over flights of "denied territory," enabling the success of the U.S. peacetime strategic reconnaissance policy.

**C. Lee Battle, Jr., Colonel, USAF**

Colonel Lee Battle directed the government and contractor team that produced, launched, and operated the world's first satellite film recovery system.

**John T. Bennett**

TRW's chief engineer in support of Program B, Mr. John Bennett conceived the spacecraft design, including the reflectors, used in signals intelligence satellite systems.

**John W. Browning, Colonel, USAF (posthumous)**

Colonel John Browning directed a key signals intelligence satellite project for Program A, managing its first launch and operations.

**Jon H. Bryson, Colonel, USAF**

Colonel Jon Bryson directed the development, acquisition, and operation of a Program A signals intelligence satellite system that handled rapidly increasing data rates.

**A. Roy Burks**

Mr. Roy Burks served as CIA Technical Director of Program B CORONA Program, successfully integrating Air Force, CIA, and contractor development teams.

**Frank S. Buzard, Colonel, USAF**

Colonel Frank Buzard was the Director of a Program A imaging satellite program, described

then as "the most complex electro-mechanical device ever placed in orbit," yielding a record number of consecutive successes.

**Cornelius W. "Connie" Chambers**

Mr. Cornelius Chambers, as a contractor with Lockheed, contributed flight "protective measures" adopted for use on most NRO satellites, thus developing a novel approach to on-board fault detection.

**John O. Copley, Colonel, USAF**

Colonel John Copley guided the development of Program A signals intelligence satellites from the earliest experiments to the later constellations that provided broader coverage.

**Robert H. Crotser**

As Lockheed's business manager for the Program B electro-optical imaging satellite, Mr. Robert Crotser wrote the handbook on cost and schedule management that remains a standard reference in spacecraft acquisition.

**John J. Crowley (posthumous)**

Mr. John Crowley served as CIA Chief of Program B's Office of Special Projects, and he is credited with establishing a true partnership between the CIA and Defense Department elements of the NRO.

**James C. de Broekert**

Mr. James de Broekert, a contractor with Advent Systems, Inc., contributed key payload designs for several of Program A's first-generation signals intelligence satellites.

**Gary S. Geyer, Colonel, USAF**

Colonel Gary Geyer's work resulted in notable improvements in signals intelligence collection, data processing, and dissemination that permitted the product to reach military and civil users in near real time.

**Thomas O. Haig, Colonel, USAF**

In 1961, Colonel Thomas Haig led a team that developed the operational polar-orbiting meteorological satellite, its launch vehicle, and associated ground command and control stations.

**Frederick H. Kaufman**

Mr. Frederick Kaufman directed the TRW team that produced two important Program B signals intelligence satellites, including the first communications cross-link system in space.

**Robert J. Kohler**

A CIA photographic specialist, Mr. Robert Kohler introduced photographic edge measurement and edge sharpening tools used to evaluate and enhance overhead imagery.

**Ellis E. Lapin**

Mr. Ellis Lapin managed the Aerospace Corporation's system design and engineering efforts for

Program A imaging satellites, improving flight operations by nearly doubling functional on-orbit time.

**Lloyd K. Lauderdale, Ph.D.** (posthumous)

Dr. Lloyd Lauderdale was Program Manager for the CIA Program B team that developed an advanced signals intelligence satellite from concept through first launch.

**Richard S. Leghorn, Colonel, USAF**

Colonel Richard Leghorn articulated the concept of peacetime strategic reconnaissance in 1946 as a means to warn of military and strategic surprise, and founded the Itek Corporation that produced lenses and cameras for the CORONA and other systems.

**Walter J. Levison** (posthumous)

Mr. Walter Levison, with the Itek Corporation, designed the camera for the GENETRIX overflight program, the camera for the WS-461L over flight program, and its panoramic variant for CORONA satellites.

**Howard O. Lorenzen** (posthumous)

An early advocate of signals intelligence satellites, Mr. Howard Lorenzen directed the development of GRAB, the nation's first such program, at the Naval Research Laboratory.

**Frank J. Madden**

As chief engineer of the Itek Corporation's camera systems development program, Mr. Frank Madden directed the design, test, and production of the CORONA cameras and its improved versions.

**James T. Mannen, Colonel, USAF**

As director of a vital imagery satellite program, Colonel James Mannen introduced procedures that improved target tasking and significantly increased ground resolution and on-orbit system reliability.

**Paul W. Mayhew, Ph.D.**

Dr. Paul Mayhew served as TRW's payload project manager and system engineer for two unprecedented signals intelligence satellite systems.

**Reid D. Mayo**

Mr. Reid Mayo, at the Naval Research Laboratory, conceived and designed the first Navy signals intelligence satellite, GRAB/DYNO, and later served as project engineer and technical director of Program C.

**James E. Morgan** (posthumous)

An early Navy champion of electronic intelligence satellite tactical support to military operations, Mr. James Morgan developed the target tasking and data dissemination architectures for key Program C systems.

**Mark N. Morton**

Mr. Mark Morton directed General Electric's Reentry Systems Division that designed, fabricated, and tested the reentry capsules used in the CORONA film-return satellite and in subsequent satellite reconnaissance programs.

**Alden V. Munson, Jr.** Mr. Alden Munson, a contractor with the Aerospace Corporation and TRW, conceived and developed a fully automatic electronic intelligence system that directly supported U.S. military forces in the field.

**Charles L. Murphy, Colonel, USAF**

Colonel Charles Murphy served as the first field technical director of the CORONA Advanced Projects Integration Facility, the main link to the Intelligence Community.

**Frederic C.E. "Fritz" Oder, Colonel, USAF**

In the late 1950s, Colonel Frederic Oder directed the nation's first reconnaissance satellite enterprise, the USAF WS-117L (later SAMOS) Program, continuing his career with Lockheed and Eastman Kodak.

**Julius P. "Val" Peline, Ph.D.**

Dr. Julius Peline served as Lockheed's system test director and program manager for a key imagery intelligence satellite program.

**Robert M. Powell**

Mr. Robert Powell, Lockheed's program manager for a key high-resolution satellite reconnaissance program, devised a novel orbital maneuver that greatly extended the lifetimes of satellites in orbit.

**Edward H. Reese**

Mr. Edward Reese, General Electric's program technical director, led the development of the ground data system that integrated hardware and software to process digital imagery from electro-optical imaging satellites.

**Osmond J. "Ozzie" Ritland, Major General, USAF (posthumous)**

As the Air Force manager of the U-2 Program, General Osmond Ritland developed the service infrastructure that made early overflights of the USSR possible.

**Lee W. Roberts, Colonel, USAF (posthumous)**

Colonel Lee Roberts directed improvements in an important Program A satellite reconnaissance effort that produced high-resolution imagery of the earth's surface.

**Charles R. "Charlie" Roth (posthumous)**

Mr. Charles Roth served as the CIA manager in Program B for the government-industry team that produced the first electro-optical imaging reconnaissance satellite system.

**Robert W. "Rob" Roy, Colonel, USAF**

Colonel Robert Roy directed NRO launch operations at Vandenberg AFB at a time when these activities increased dramatically.

**Charles P. Spoelhof**

Mr. Charles Spoelhof, an Eastman Kodak official, collaborated on the design of the U-2, A-12, and SAMOS cameras, and directed efforts that led to the application of thin-based Mylar film in NRO reconnaissance satellites.

**Forrest H. Stieg**

Mr. Forrest Stieg, a CIA engineer and spacecraft operations specialist in Program B, devised a process for selecting an optimum orbit that balanced signals collection with vehicle longevity.

**Marvin S. Stone, Ph.D.**

Dr. Marvin Stone served as a TRW payload systems engineer and project manager on Program B electronic intelligence satellite programs.

**Don F. Tang**

Mr. Don Tang, as a Lockheed spacecraft engineer in Program A, established a "collection scale" for determining what signals could be technically collected at affordable costs.

**Albert D. "Bud" Wheelon, Ph.D.**

The first director of the CIA's Directorate of Science and Technology, Dr. Albert Wheelon was responsible for U-2 overflights and development of OXCART and three major satellite reconnaissance systems.

**Peter G. Wilhelm**

As the chief spacecraft engineer at the Naval Research Laboratory, Mr. Peter Wilhelm invented new techniques and devices that added capabilities and improved performance of signals intelligence satellites.

**Roy H. Worthington, Colonel, USAF**

Colonel Roy Worthington, Deputy Commander of the 6594th Aerospace Test Wing, directed the integration and launch of some 200 satellites from the Western Test Range.

**Robert W. Yundt, Colonel, USAF**

Colonel Robert Yundt directed the Signals Intelligence Project Office in Program A, introducing a new, long-lived, multi-purpose signals intelligence satellite.

*The Founders of National Reconnaissance are:*

**William O. Baker, Ph.D.**

A physical chemist and signals intelligence expert at AT&T Bell Laboratories, Dr. William Baker served as scientific counselor to the NSA, CIA, USN, and NRO on overhead reconnaissance systems. He also served on the President's Science Advisory Committee and the President's Foreign Intelligence Advisory Board.

**Merton E. Davies**

An engineer, reconnaissance system designer, imagery interpreter, and space cartographer, Mr. Merton Davies invented the Spin-Pan camera and worked on designs for a family of film-based reconnaissance satellites that led to CORONA. Employed throughout his career at RAND, he also served on the panels that established reconnaissance requirements and advised on competing systems.

**Sidney D. Drell, Ph.D.**

A theoretical physicist, Dr. Sidney Drell served on the President's Foreign Intelligence Advisory Board and the President's Science Advisory Committee. He served as a key scientific consultant to Program B, and served on the Technology Review Panel of the Senate Select Committee on Intelligence where he was instrumental in securing approval and support for several NRO special projects.

**Richard L. Garwin, Ph.D.**

A physicist, Dr. Richard Garwin served on the President's Science Advisory Committee, and chaired its panels on Military Aircraft, Anti-submarine and Naval Warfare. He established standards and found solutions for electromechanical design of modern spacecraft. As a champion of Electro-Optical Imaging, he helped Henry Kissinger understand its role for our national defense.

**Amrom H. Katz** (posthumous)

A physicist involved in lens and camera design, Mr. Amrom Katz performed the first experimental simulation of electro-optical satellite imaging. At RAND, he co-directed a project on overflight reconnaissance, and co-proposed film-recovery satellites as an immediate alternative to the near-real-time readout satellite, a proposal eventually established as the CORONA Project.

**James R. Killian, Jr., Ph.D.** (posthumous)

President of the Massachusetts Institute of Technology, Dr. James Killian chaired the panel that recommended building the U-2 aircraft and reconnaissance satellites. He chaired the President's Foreign Intelligence Advisory Board and the President's Science Advisory Committee. He also worked on Department of Defense-CIA agreements that structured the NRO.

**Edwin H. Land, Ph.D.** (posthumous)

An imagery intelligence expert, Dr. Edwin Land was the Polaroid CEO and chaired the Intelligence Subcommittee of the Technology Capabilities Panel. As Chairman of the President's Science Advisory Committee Intelligence Panel, he advised the NRO on new and existing overhead systems. He played a vital role in advising President Nixon on the capabilities of Electro-Optical Imaging.

**Frank W. Lehan** (posthumous)

An electrical engineer, Mr. Frank Lehan was a President's Science Advisory Committee member and served on the Land Panel that advised the NRO and Program B on overhead reconnaissance systems. He was instrumental in the decision to proceed with an important high altitude signals intelligence satellite system, and contributed to the reflector design for that system.

**William J. Perry, Ph.D.**

A mathematician, Dr. William Perry served in the U.S. Army, and advised NSA and the CIA in programs to intercept and evaluate Soviet missile telemetry and communications intelligence. He chaired the "Perry Panel" that advised the CIA on all overhead signals intelligence collection, and later served as Under Secretary of Defense for Research and Engineering and Secretary of Defense.

**Edward M. Purcell, Ph.D.** (posthumous)

Harvard Nobel Laureate and radar expert, Dr. Edward Purcell worked on all early overhead reconnaissance projects that operated at extreme altitudes. His main contribution involved methods to make these vehicles, if not invisible to radar, hard to observe with radar. He also chaired the Land Panel subcommittee that selected the Program B follow-on film recovery reconnaissance system.

\*One Pioneer requested no identification.