

## **SATELLITE SYSTEMS – Reconnaissance Satellites**

The Air Force was the last U.S. military department to launch a satellite, but it was the first to sponsor engineering and conceptual studies of a satellite with specific military applications and the first to undertake the development of such a spacecraft. Its first effort emerged on 2 May 1946, when Douglas Aircraft Company's Project RAND issued a 250-page report called "Preliminary Design of an Experimental World-Circling Spaceship" to support the claim of the Army Air Forces to the proposed new mission area of space. RAND's report not only examined solutions to engineering problems for orbiting a satellite, it also discussed some of the major mission areas for satellites that were later developed by the Air Force, including reconnaissance, communications, and meteorology. Under contract after 1947 to the newly independent Air Force, and especially beginning in 1950 to the new Air Research and Development Command (ARDC), RAND continued to conduct studies that examined engineering solutions to problems involved in developing satellites with specific military missions. One of the most influential of those efforts was Project Feed Back, which culminated in a report issued on March 1954 proposing the development of a reconnaissance satellite to provide photographic data on Soviet military preparations. Before the report was even issued, ARDC established a very small office at Wright Air Development Center on 24 December 1953 to manage preparations to award design and development contracts for the satellite, known at first as Project 1115 and soon afterward as the Advanced Reconnaissance System or Weapon System 117L (WS 117L).

The military satellite project was soon added to the mission of the Western Development Division, largely because of the development's intimate association with ballistic missiles, which rapidly acquired a role as space launchers equal to their role as weapons. The commander of Air Research and Development Command transferred responsibility for the program from Wright Air Development Center to WDD on 17 October 1955, and satellites grew into an increasingly important part of the activities of the Division's successors.

WS 117L was, in concept, a family of separate subsystems that could carry out different missions, including photographic reconnaissance and missile warning. After evaluating system design studies from Lockheed, RCA, and Martin, WDD awarded the first Air Force space development contract to Lockheed on 29 October 1956. However, by the end of 1959, WS 117L had evolved into at least three separate satellite programs: the Discoverer Program, the Satellite and Missile Observation System (SAMOS), and the Missile Defense Alarm System (MIDAS). Discoverer and SAMOS undertook the photographic reconnaissance mission, and MIDAS undertook the missile-warning mission.

### **Reconnaissance Systems**

The Discoverer program aimed at developing a film-return photographic reconnaissance satellite. The satellite carried a camera that took pictures from space as it passed over the Soviet Union and China. Film from the camera returned from orbit in a capsule. A parachute deployed to slow the descent of the capsule, and C-119J (later, JC-130) aircraft operated by the 6593rd Test Squadron from Hickam AFB, Hawaii, recovered the capsule in mid-air. However, Discoverer's photo reconnaissance mission was not

revealed to the public at the time. It was, instead, presented as an experimental program to develop and test satellite subsystems and explore environmental conditions in space.

The Discoverer Program carried out 38 public launches and achieved many technological breakthroughs. Discoverer I, launched on 28 February 1959, may have been the world's first polar orbiting satellite. Discoverer II, launched on 13 April 1959, was the first satellite to be stabilized in orbit in all three axes, to be maneuvered on command from the earth, to separate a reentry vehicle on command, and to send its reentry vehicle back to earth. Discoverer XIII, launched on 10 August 1960, ejected a capsule that was subsequently recovered in the water near Hawaii, the first successful recovery of a man-made object ejected from an orbiting satellite. Discoverer XIV, launched on 18 August 1960, ejected a capsule that was recovered in midair northwest of Hawaii by a JC-119 aircraft, the first successful aerial recovery of an object returned from orbit. The capsule from Discoverer XIV was the first to return film from orbit, inaugurating the age of satellite reconnaissance. Satellite reconnaissance filled a crucial need because President Eisenhower had suspended aerial reconnaissance of the Soviet Union just three months earlier after the Soviets had shot down the U-2 spy plane piloted by Francis Gary Powers.

The Discoverer Program ostensibly ended after the launch of Discoverer XXXVIII on 27 February 1962. In reality, however, it continued in clandestine form until 31 May 1972 (the date of the last film recovery), carrying out 145 launches under the secret code name Corona. At the direction first of President Eisenhower and later of President Kennedy, the direction and management of Corona and other satellite reconnaissance programs passed to a new DOD agency, the National Reconnaissance Office (NRO), when it was created in 1961. Corona's first major accomplishment was to provide photographs of Soviet missile launch complexes. It also identified the Plesetsk Missile Test Range, north of Moscow, and provided information about what missiles were being developed, tested, and deployed. These and other accomplishments came to light when the Corona program was declassified in February 1995.

SAMOS, the second program that evolved from WS 117L, aimed at developing a heavier reconnaissance payload that would be launched by an Atlas Agena booster rather than the Thor Agena used to launch Discoverer. The payloads were intended to collect photographic and electromagnetic reconnaissance data. The photographic data would be collected by cameras in the Agena spacecraft, like the Corona payloads. However, the film would be scanned electronically in orbit and transmitted to ground stations. SAMOS had three unclassified launches from the west coast: 11 October 1960, 31 January 1961, and 9 September 1961. Only the launch in January 1961 was successful. In 1962, a veil of secrecy was drawn across the SAMOS program, and the Air Force stopped releasing information about it. After several more classified launches, however, it was apparent that the technology required for downloading the imagery was not yet sufficiently advanced, and Air Force undersecretary Joseph V. Charyk canceled further work on the payload.

Although SMC did not directly manage the development of imaging reconnaissance satellites after this, it did manage programs that were linked to them or their products. One of the most important was the Defense Dissemination System (DDS), whose broad outlines were declassified in 1996. The Defense Dissemination Program Office (DDPO) was established at SAMSO in July 1974 to develop a means to securely and rapidly provide reconnaissance imagery in nearly original quality to both strategic and

tactical users. The DDPO developed a system consisting of segments for processing, transmitting, and receiving. The system was deployed to four strategic sites during 1976-1978, providing the first electronic dissemination of digital imagery for targeting and strategic threat assessment.

The DDS went through three more generations of increasingly sophisticated improvements for compressing, transmitting, receiving, and reconstructing imagery for military users in the field. One of the third-generation DDS units was deployed to the Persian Gulf to support Operations Desert Shield and Desert Storm. Fourth-generation DDS units were fielded to 70 strategic and tactical users by 1998. However, the DDPO itself ceased to exist as a program office on 1 October 1996, when it was combined with other agencies to create the National Imagery and Mapping Agency (later renamed the National Geospatial-Intelligence Agency).