

*Schriever Wall of Honor  
Ceremony*



**14 MAY 2015**

**Schriever Courtyard  
Space & Missile Systems Center  
Los Angeles Air Force Base, California**

# Schriever Wall of Honor

In 2007, the Air Force Associations' Schriever Chapter 147, with support from industry partners, sponsored and commissioned the Statue of General Bernard A. Schriever and the Wall that you see before you. In November 2007, the Space & Missile Systems Center dedicated the Statue and Wall as the General Schriever Memorial. The 60<sup>th</sup> SMC Anniversary last year was chosen as the initial occasion to recognize some of the earliest pioneers who have made tremendous contributions to our community by adding their names to the Schriever Wall of Honor. Every year additional pioneers are chosen to have their names added to the Schriever Wall of Honor. The 2015 Honorees are Col Clarence L. Battle, Jr., Col Thomas O. Haig, Col Edward N. Hall, Mr. Joseph J. Knopow, Maj Gen Ben I. Funk, and Lt Gen Charles H. Terhune, Jr.



**General Schriever Memorial  
Space & Missile Systems Center  
Los Angeles Air Force Base, California**

## Colonel Clarence L. Battle, Jr.



Col Lee Battle worked on propulsion projects at Air Force headquarters and the Air Force Flight Test Center during the early 1950s. He transferred to the Western Development Division soon after its creation in 1954, where he became the chief of systems engineering for the Advanced Reconnaissance System (WS 117L), the first Air Force satellite program.

In 1958, he was selected to be the director of the satellite program, which soon became known by the unclassified name Discoverer and the CIA's classified designation Corona. Discoverer/Corona was not only the first Air Force satellite program, it was also the world's first satellite designed to perform a military mission. Col Battle was the director of the Discoverer/Corona program during its early period as an Air Force program (1958-1963), its most critical period, after which it was managed by the National Reconnaissance Office. He managed the program through its eventual success in film recovery from orbit beginning in 1960 with Discoverer 14.

The lessons in management that he learned through a dozen early launch and payload failures leading to the first successful launch, on-orbit operations, and payload recovery were summarized in Battle's Laws. In them, he laid out the fundamental principles for direction of successful space programs, emphasizing a streamlined approach with simple clarity. Battle's Laws are still well known among acquisition managers as a distillation of practical wisdom for achieving program success.

## Major General Ben I. Funk



Maj Gen Ben Funk oversaw Gen Schriever's logistics, materiel, and acquisition functions during 1956-1962, improving activities vital to the success of SMC's predecessors. Gen Schriever then personally selected him to be the commander of Space Systems Division (1962-1966).

As commander, he oversaw many pioneering space programs. He was known especially for his support to the Mercury and Gemini programs. He was responsible for man-rating the Atlas missile for Mercury and the Titan II missile and Agena Target Vehicle for Gemini. Three-fourths of the hardware used in NASA's first two manned space programs were developed and launched under Gen Funk's management. Despite the inherent risk of using equipment originally developed for very different applications to carry out unprecedented manned missions, no astronauts were lost in either program, an accomplishment of which he was justifiably proud.

Gen Funk also oversaw the development of the Titan III launch vehicle, which provided an enormous increase in launch capacity for the nation's military and civil space programs. He oversaw the beginning of many vital satellite programs, including the Initial Defense Communications Satellite Program. The nation's first military space station, the Manned Orbiting Laboratory began under his leadership but was subsequently cancelled. Los Angeles Air Force Base, the headquarters for SMC and its predecessors since 1964, was acquired, remodeled, and occupied during his management as well.

## Colonel Thomas O. Haig



During the early 1950s, Col Haig worked on balloon reconnaissance programs. Later, he managed requirements for satellite ground support at the Air Force Ballistic Missile Division until 1961, developing tracking and control stations for early surveillance programs.

In 1961, the National Reconnaissance Office established a meteorological satellite program to provide information on cloud cover over the Soviet Union for its Corona photographic reconnaissance satellites. Col Haig was selected to create and manage the Defense Meteorological Satellite Program for the NRO. Although intended at first as an interim program until NASA developed a more capable weather satellite, a replacement did not emerge, and Col Haig's program continued to deliver excellent data within tight cost and schedule constraints. Col Haig solved the problem of inadequate launch vehicles by replacing Scout boosters with excessed Thor missiles complemented by a new upper stage built to the program's requirements.

The weather satellite program was transferred to Space Systems Division in the early 1960s. Col Haig served as the director of the increasingly successful DMSP program until 1966, managing it through four satellite block changes. DMSP was used immediately for military operations. The first satellite in orbit provided weather information for reconnaissance missions during the Cuban Missile Crisis of 1962. Block I satellites also supported air operations in the Congo in 1964. By the end of Col Haig's tenure, DMSP satellite data was supporting tactical military operations in Vietnam.

## Colonel Edward N. Hall



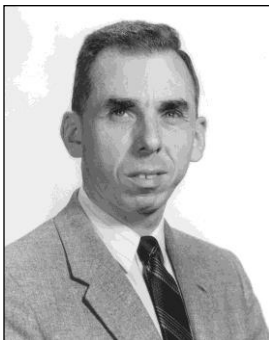
Col Ed Hall was a widely recognized pioneer in the field of early missiles. During World War II, he was involved in intelligence activities focused on German missile capabilities. At the end of the war, he was a vital participant in the operation to find and gather captured V-2 missile components for the allies and for study and launch of U.S. components at White Sands Proving Ground.

During the early 1950s, he worked on propulsion systems for early strategic missiles at Wright Air Development Center. He was one of the principal Air Force people involved in the beginning of the Atlas ICBM program. He served as an Air Force liaison on the Von Neumann (“Teapot”) committee chartered to accelerate the Atlas program, leading to the creation of the Western Development Division, SMC’s first organizational ancestor.

Then-Brigadier General Bernard Schriever selected Col Hall as one of WDD’s original 18 staff members (the “Schoolhouse Gang”) in August 1954. At WDD, Col Hall performed pioneering work on the development of propulsion for all first-generation Air Force strategic missiles. He managed the entire Thor Intermediate Range Ballistic Missile development program through its deployment in England. He personally obtained the required Pentagon support to develop a proposed new solid propellant ICBM. He then managed the Minuteman I development program at WDD and the Air Force Ballistic Missile Division from the early development of solid-fuel propulsion through early Minuteman flight testing in 1959. After completing the Minuteman I program, he worked on the development of a strategic IRBM for NATO.



### Mr. Joseph J. Knopow



Joe Knopow was the father of space-based infrared detection technology. He was in charge of Lockheed's development of MIDAS, the world's first missile detection satellite program, during 1955-1962.

As one of the first members of the Missile Division of Lockheed Aircraft Corporation, Mr. Knopow suggested the design of a surveillance satellite system using infrared sensors to detect the heat of ballistic missiles. The operational analysis and system design that he proposed were presented to the Air Force in June 1956. The concept was subsequently included in the early Air Force development program for WS 117L, the Advanced Reconnaissance System.

Mr. Knopow presented countless briefings in defense of the concept to the Advanced Research Projects Agency (ARPA), which had taken over direction for most military space programs in 1958. ARPA finally established infrared detection as a separate satellite development program, known as the Missile Detection Alarm System (MIDAS), in November 1958.

The MIDAS program, like the early Corona program, experienced many launch and early on-orbit failures before achieving its first spectacular surveillance successes. Mr. Knopow tirelessly planned, guided, and advocated for the program through its early difficulties. The original concepts that he developed for MIDAS are familiar and valuable infrared detection techniques in use today. He had to leave the program for health reasons just before the first MIDAS orbital successes in 1963.

### Lieutenant General Charles H. Terhune, Jr.



Lt Gen Terhune worked on the development of missiles and nuclear warheads for the Office of the Secretary of Defense and the Air Force Special Weapons Center during 1950-1954. Gen Schriever personally obtained his reassignment to the Western Development Division in 1954. As a colonel, he was one of the original contingent of 18 military personnel, known as the "Schoolhouse Gang," including Gen Schriever who arrived at the schoolhouse in Inglewood serving as WDD's temporary headquarters in August 1954 to set up the Atlas development program.

He served as Gen Schriever's technical assistant, deputy for ballistic missiles, and then vice commander during 1954-1960. During this six-year period, Gen Terhune played a vital role in the formulation and implementation of the management concepts which brought the first generation of Air Force intermediate range and intercontinental ballistic missiles to operational status through the combined efforts of a vast government-science-industry team.

Gen Terhune's influence was all-pervasive in early missile and space programs. He chaired source selection boards for the Thor and Titan strategic missiles in 1955 and led a successful effort to save the Titan program from cancellation in 1958. He also led a successful mission to obtain rapid approval from Secretary of Defense McElroy for development of the Minuteman I ICBM. He was a key figure in the development of early space programs, including the Advanced Reconnaissance System (WS 117L) and the Pioneer lunar missions.