

## CHAPTER VI: AIR FORCE SATELLITE CONTROL NETWORK

American military satellites are controlled in orbit by the Air Force Satellite Control Network (AFSCN), a worldwide system which tracks the satellites, receives and processes data transmitted by them, and sends commands to them. Dedicated control segments support individual satellite systems, but a common user element provides support to all satellites belonging to DOD. The common user element presently consists of two control nodes, two scheduling facilities (one at each node), eight remote tracking sites, and the associated communication links.

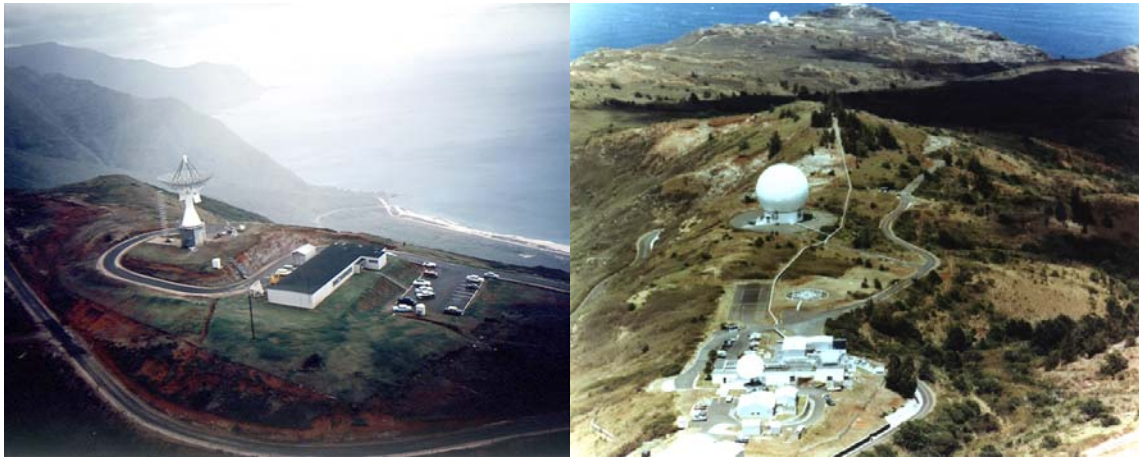


*Top left: A TLM 18 high gain telemetry antenna for the Discoverer program nears the end of construction at Point Mugu in 1958. Top right: A photograph taken in 1959 shows part of the inside of Lockheed's satellite control center. Bottom left: A photograph taken in 1961 shows part of the newly completed master control room in the Air Force Satellite Test Center at Sunnyvale, California. Bottom right: This photograph shows the operations center, known as the Blue Cube, of the Air Force Satellite Control Facility at Sunnyvale AFS, California, as it appeared during the late 1960s and early 1970s. The Blue Cube was constructed during 1967-1968. The Satellite Test Annex was named Sunnyvale AFS on 1 January 1971 and Onizuka AFB on 24 July 1986.*



The common user element of the AFSCN was originally activated to support the Discoverer program of the late 1950s and early 1960s. The Air Force Ballistic Missile Division (AFBMD) first established an interim satellite control center at a facility

belonging to Lockheed Missile and Space Division in Palo Alto, California, on 15 August 1958.<sup>46</sup> On 6 April 1959, AFBMD established the 6594<sup>th</sup> Test Wing to operate the control center, and on 1 March 1960, the 6594<sup>th</sup> transferred its operations to a permanent control center in Sunnyvale, California. The installation in Sunnyvale was originally referred to as the Satellite Test Annex, then as Sunnyvale AFS, and finally as Onizuka AFS.<sup>47</sup> The control center at Sunnyvale was complemented at one time or another by remote tracking stations established at nine different locations between 1959 and 1961. In later years, some of those tracking stations were taken out of service, others were added,<sup>48</sup> and a second control center was also added—the Consolidated Space Operations Center (CSOC), located at Schriever AFB, Colorado.<sup>49</sup>



*Left: The Air Force satellite tracking station at Kaena Point on the island of Oahu, Hawaii, soon after its construction in 1959. Right: Kaena Point in about the early 1990s.*

Secretary of Defense Harold Brown authorized development of the CSOC in 1979. Originally, it was to consist of two parts—a Satellite Operations Complex (SOC), which would be used for on-orbit control of military satellites, and a Shuttle Operations and Planning Center (SOPC), which would be used for the planning and control of DOD's missions on the Space Shuttle. However, the SOPC was canceled on 13 February 1987, leaving the CSOC with one mission, that of satellite control. The CSOC came on

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<sup>46</sup> Lockheed was the prime contractor for WS 117L (the original military satellite program out of which the Discoverer program emerged in 1958), including the on-orbit tracking and control efforts, known as Subsystem H for the ground systems and Subsystem D for the components on the spacecraft.

<sup>47</sup> During the late 1980s and early 1990s, Onizuka was an Air Force base rather than an Air Force station.

<sup>48</sup> At the time this overview was written, there were eight remote tracking stations. Their locations (with the years in which they were built) were as follows: Vandenberg Tracking Station (1959) at Vandenberg AFB, California; New Hampshire Station (1959) near New Boston, New Hampshire; Hawaii Tracking Station (1959) on the island of Oahu, Hawaii; Thule Tracking Station (1962) at Thule AFB, Greenland; Guam Tracking Station (1965) at Anderson AFB, Guam; Oakhanger Telemetry Control Station (1978) near London, United Kingdom; Colorado Tracking Station (1989) at Falcon AFB, Colorado; and Diego Garcia Tracking Station (1991) on the island of Diego Garcia in the Indian Ocean.

<sup>49</sup> The facility that supported the CSOC was called Falcon AFB at the time that the CSOC became operational. It was renamed Schriever AFB in honor of General Bernard A. Schriever in 1998.

line gradually, starting in 1989. It successfully completed Initial Operational Test and Evaluation on 13 August 1993, and SMC turned it over to Air Force Space Command for operation on 27 September 1993.

The hardware and software used in the AFSCN has undergone numerous upgrades during the last four decades. One of the most significant upgrades was the Data Systems Modernization (DSM) program, which introduced state-of-the-art computer hardware and software to perform command and control of orbiting satellites. The program was initiated in 1980, and by February 1992, the new system was able to perform all of the functions needed to support the satellites then in orbit. DSM was more reliable than the old system, cheaper to maintain, and faster in its operation, allowing it to support a steadily increasing satellite support workload.



*The Consolidated Space Operations Center (CSOC), now the headquarters of Air Force Space Command's 50<sup>th</sup> Space Wing, is shown soon after its completion. SMC developed, built, and tested this satellite control node and its support facilities, turning the complex over to Air Force Space Command in 1993.*

Another significant upgrade was the Automated Remote Tracking Station (ARTS) program, which introduced more modern equipment at the tracking stations. The contract for Phase I of the ARTS program was awarded to Ford Aerospace and Communications Corporation on 1 June 1984, and the contract for Phase II was also awarded to Ford Aerospace on 5 August 1988. The Phase II contract expired in March 1995. By that time, ARTS equipment had been installed at all the existing tracking stations and had been used to establish new tracking stations in Colorado Springs and on the island of Diego Garcia. The new equipment offered improved reliability, increased the operational capacity of the tracking stations, and automated many of the functions they performed. Automation and improved reliability reduced the manpower required to operate and

maintain the tracking stations and reduced operations and maintenance costs.

SMC awarded a series of contracts dealing with the AFSCN to Lockheed Martin in 1996. These efforts would modernize most segments of the AFSCN and increase its capabilities. They covered range and communications development, network operations, network integration, and command and control sustainment. By early 2003, the contractor had completed most of these efforts except for certain improvements to the AFSCN's communications segment. However, the program office decided to consolidate sustainment of the AFSCN with ongoing development, systems engineering, and integration. On 18 December 2001, SMC awarded the effort, known as the Satellite Control Network Contract, to Honeywell Technology Solutions.

By 2002, SMC was also managing a coordinated series of modernization projects, known as the Remote Tracking Station Block Change, to upgrade and standardize each of the tracking stations in turn. Design reviews took place in 2002 and 2003, and the tracking stations were scheduled to actually receive the changes from 2004 through 2009.