AIR COMMAND AND STAFF COLLEGE

STUDENT RESEARCH REPORT

MISSILEERS' HERITAGE

2065-81

'insights into tomorrow'

STUDENT RESEARCH REPORT

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An historical survey of strategic missile operations and the missile career field. This study outlines the evolution of the Intercontinental Ballistic Missile (ICBM) into a strategic offensive weapon system. This is followed by a description of the missiles that make up America's land-based missile force and where they were based. The final section covers the evolution of the missileer' specialty code, the Missile Badge, the annual combat competition of missileer - OLYMPIC ARENA, and the organizational arrangement of the missile units within SAC.

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The Jupiter and the Thor IRBMs had relatively short lives when compared to follow-on systems. Their vulnerability (both were soft systems), their long reaction times (15 to 20 minutes), and technology all combined to bring these programs to an early end. While operational, they provided visible deterrence during the period the United States was fielding its first generation ICBMs; they countered the growing Soviet threat to NATO and the experience SAC gained from the deployment of these systems would pay off during the deployment of its second generation ICBMs. (77:31)

ATLAS: SM-65/WS-107A-1

The history of the development of the Atlas missile was outlined in Chapter Two, as the Atlas was America's first ICBM. During its evolution from concept to operational status, the Atlas missile went through many changes. As originally planned, it would have been 90 feet long, 12 feet in diameter, and its seven engines (five main and two vernier) would have developed more than 650,000 pounds of thrust at launch. However, with the 'thermonuclear breakthrough' much smaller payloads could be planned, thus the mighty Atlas was scaled down in size. (6:76)

Built by the Convair Division of General Dynamics Corporation, the final operational configuration of the Atlas provided a missile that was from 75 to 82.5 feet long (depending on the nose cone), 10 feet in diameter, and weighed about 244,000 pounds at lift off. The Atlas could hurl its payload in excess of 5,500 miles and was flown as far as 9,000 miles. (10:29) Designated as a 'one and one-half' stage ICBM, the Atlas was powered by five engines: two booster, one sustainer, and two vernier. All five engines were ignited on launch and combined to provide 360,000 pounds of thrust. The 'half stage' designation was derived from the operation of the two booster engines which dropped away during powered flight after sufficient fuel was burned. This reduced the weight of the missile to a point where the sustainer engine produced enough thrust to complete the powered phase of the flight. The two small vernier engines provided roll control and trim velocity to the exact amount required. (10:17-23) Another innovative feature of the Atlas was that the main body structural strength was achieved, without internal bracing, through the use of a pressurized fuel tank that had a skin thickness of no greater than forty-thousandths of an inch. This tank was pressurized with helium gas to prevent it from collapsing both prior to fuel loading and during flight as the fuel and oxidizer were consumed. This extremely thin skin design, without internal support, saved significant amounts of structural weight. (10:18-19)

During its lifetime the Atlas was outfitted with two different kinds of guidance systems. The first operational (Series "D") models were equipped with radio-inertial systems. Basically, the missile is tracked by radar and this information is fed into a computer that generates any correction to the flight path. These were then transmitted, via radio, to the missile flight control system. (20:81) This system had one fundamental drawback: the radio command link. If interrupted, either by ground station failure/destruction or through enemy jamming, the accuracy of the missile would be degraded. Thus, an all-inertial guidance system was developed and deployed on later models (Series "E" and "F").

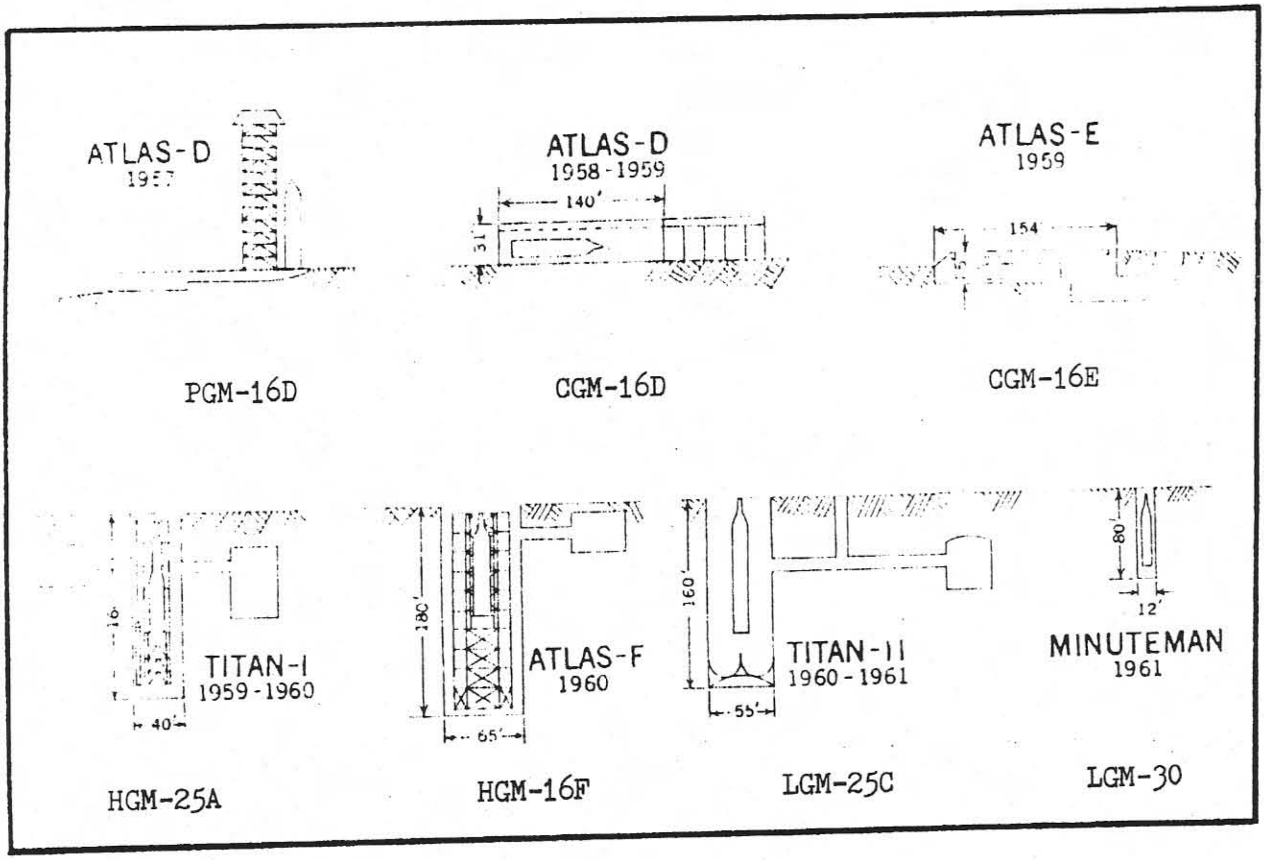

Figure 2. Evolution of ICBM Launchers

Basing of the Atlas also went through four phases. At the first operational/training Atlas sites at Vandenberg AFB, the missiles (PGM-16D) were maintained on their launchers, in a vertical position, protected only by a gantry that was rolled back prior to launch. (2:6) (see figure 2) Environmental protection was offered by the next system in which the missiles (CGM-16D) were horizontally housed in an above ground 'coffin' shaped shelter with a removable roof. When the launch sequence was initiated: the roof was rolled back; the missile, supported by the missile erecting boom, was erected to the vertical position; fueled and fired. This sequence took approximately 15 minutes. (4:52) In both configurations, the missiles were completely exposed to the effects of nuclear blast. (see figure 3)

The next modification provided somewhat greater protection to the missile (CGM-16E) but was still only 'Hollywood Hard.' (4:52) In this basing mode, the 'coffin' was buried in the ground with only the reinforced roof exposed at surface level. Additionally, most support equipment was consolidated into one building and it too was buried. The launch sequence is similar to the coffin type launcher. (4:52) (see figure 4)

The final basing mode was the most secure of the four. The 'silo' emplacement protected the Atlas (HGM-16F) from all but a direct hit. This steel-reinforced concrete structure was 154 feet deep, 52 feet in diameter,

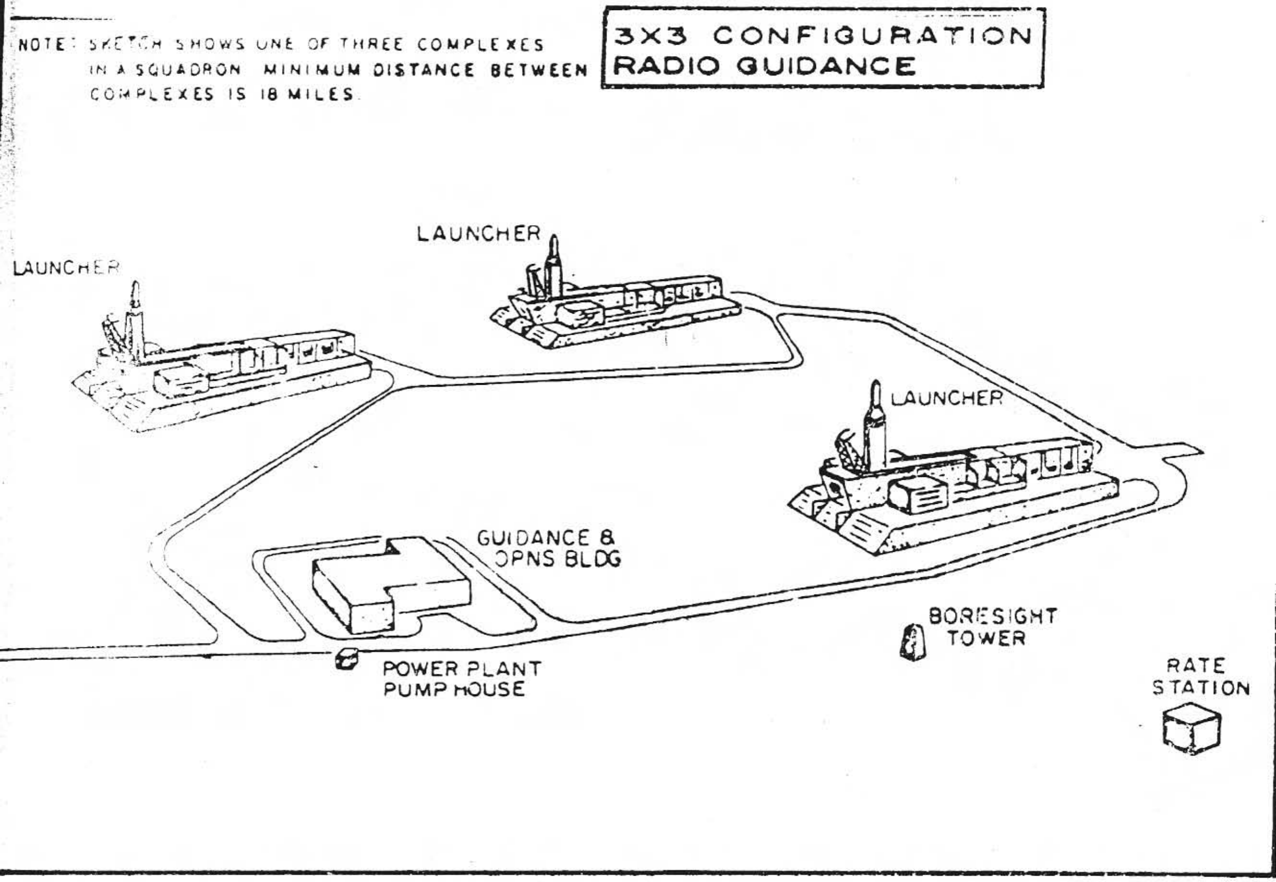

Figure 3. ATLAS D: Typical Complex Layout

had walls that were from two to nine feet thick and was capped by a 30 inch thick steel-reinforced concrete door that opened rapidly when the launch occured. (10:27-28) Also underground, about 100 feet away, in a 44 foot diameter, 33 foot high building was the Operations Center which housed the launch crew and all necessary launch equipment. (10:28) The launch sequence in the Atlas 'F' system was as follows: following oxidizer loading, the two silo blast doors were opened; then, the fueled missile was raised to the surface, and fired. (10:29) (see figure 5)

The final Atlas discussion item is the arrangement of the missiles at each base. Initially, the series "D" models in the above ground coffins were arranged with three missiles grouped closely about and controlled by one operations center, with three launch complexes making up one squadron. (Except the 564th SMS at Warren AFB, Wyoming which had all six missiles located on one site.) This arrangement was poor in that one near miss could knock out three missiles (all six in the case of the 564th SMS). (4:52)

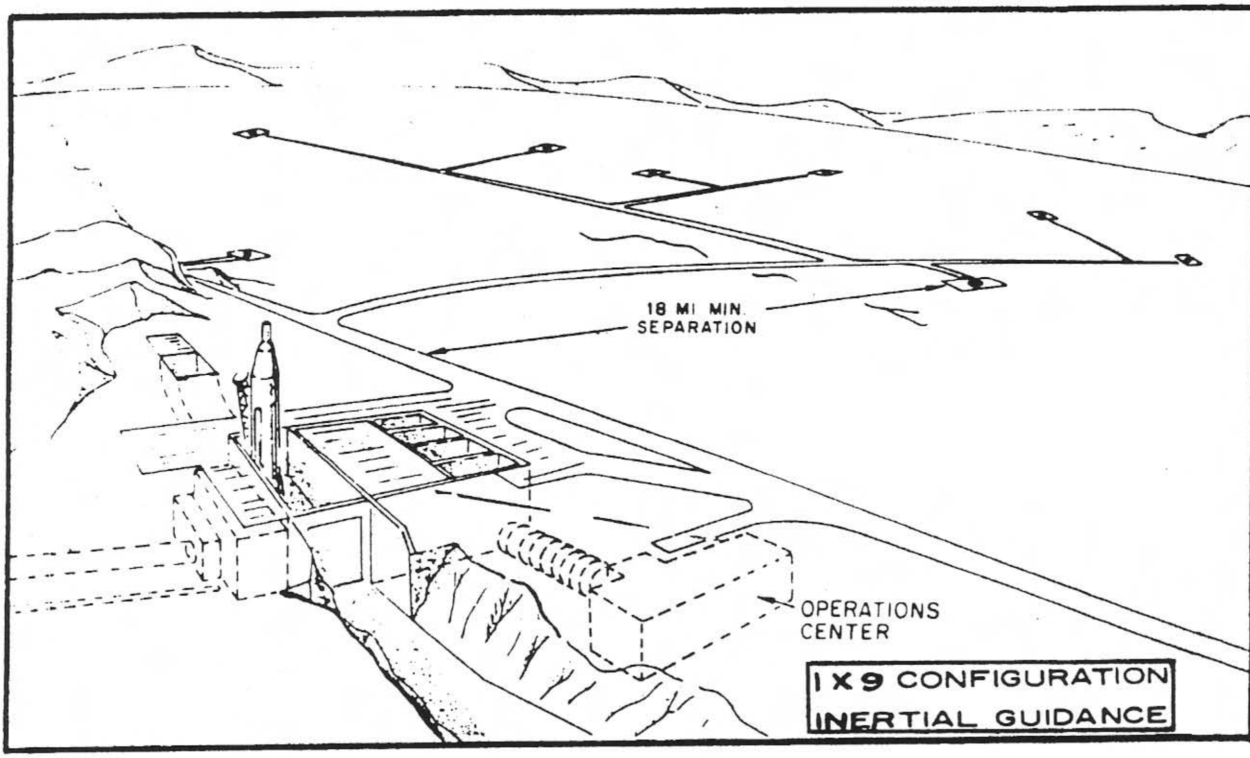

Figure 4. ATLAS E: Typical Complex Layout

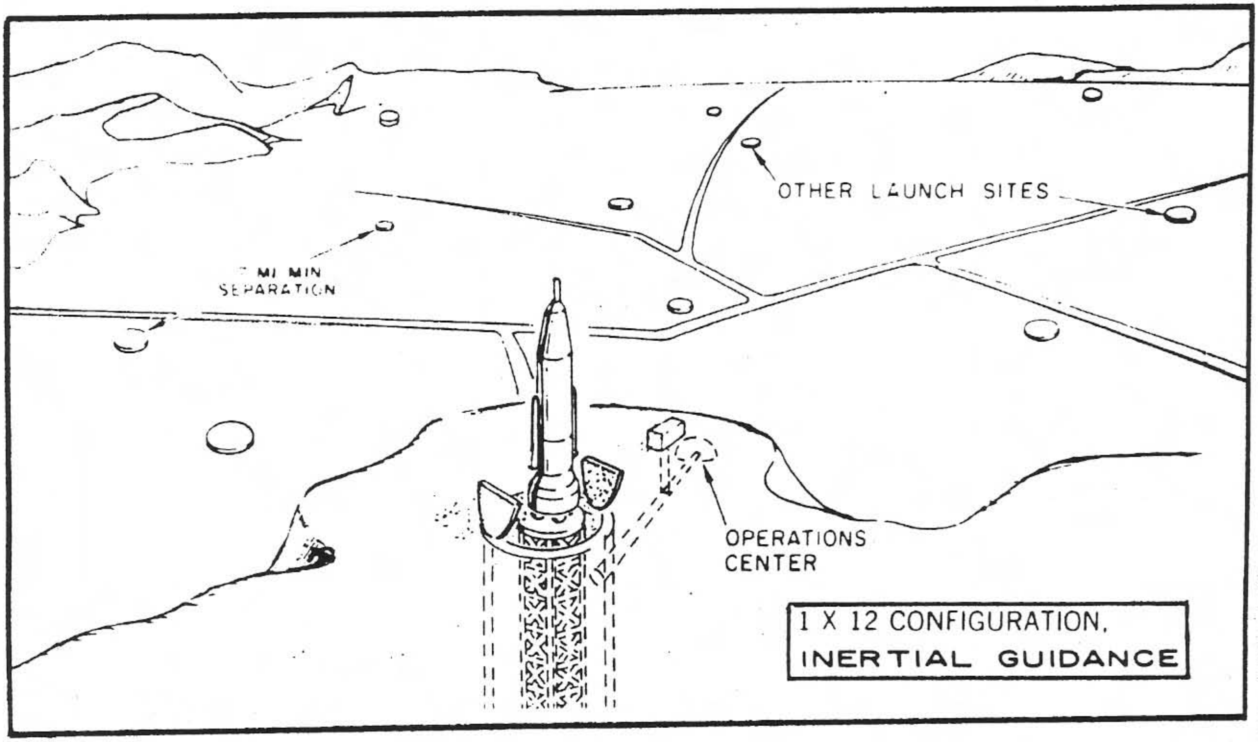

Figure 5. ATLAS F: Typical Complex Layout

WALKER AFB, NEW MEXICO

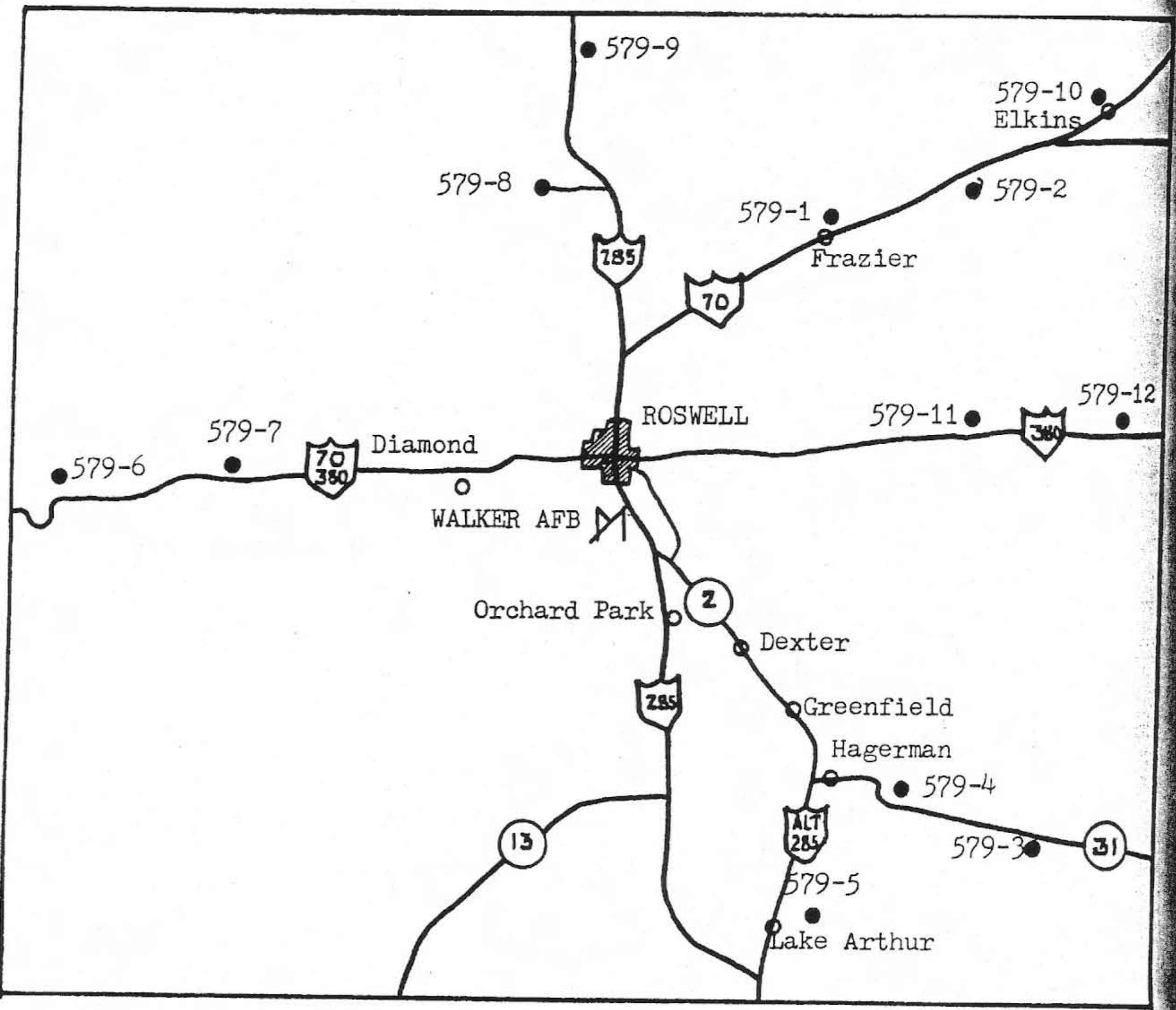

Figure 27. Walker AFB: ATLAS Sites

The fifth operational Atlas 'F' squadron was located at Walker AFB, near Rosewell, New Mexico. Like the other Atlas 'F' squadrons, it was equipped with a dozen unitary silo-lift storage/launchers and arranged in the standard '1x12' squadron configuration. (see figure 27) The 579th SMS (ICBM-Atlas) was activated at Walker on 1 September 1961. (77:18) The squadron did not attain full operational capability until 30 November 1962. (99:302)

The 579th SMS turned out to be the shortest lived of any of the Atlas squadrons. Following removal of all its sorties from alert, the 579th SMS was deactivated on 25 March 1965, not quite 30 months after becoming fully operational. (99:156)

PLATTSBURGH AFB, NEW YORK

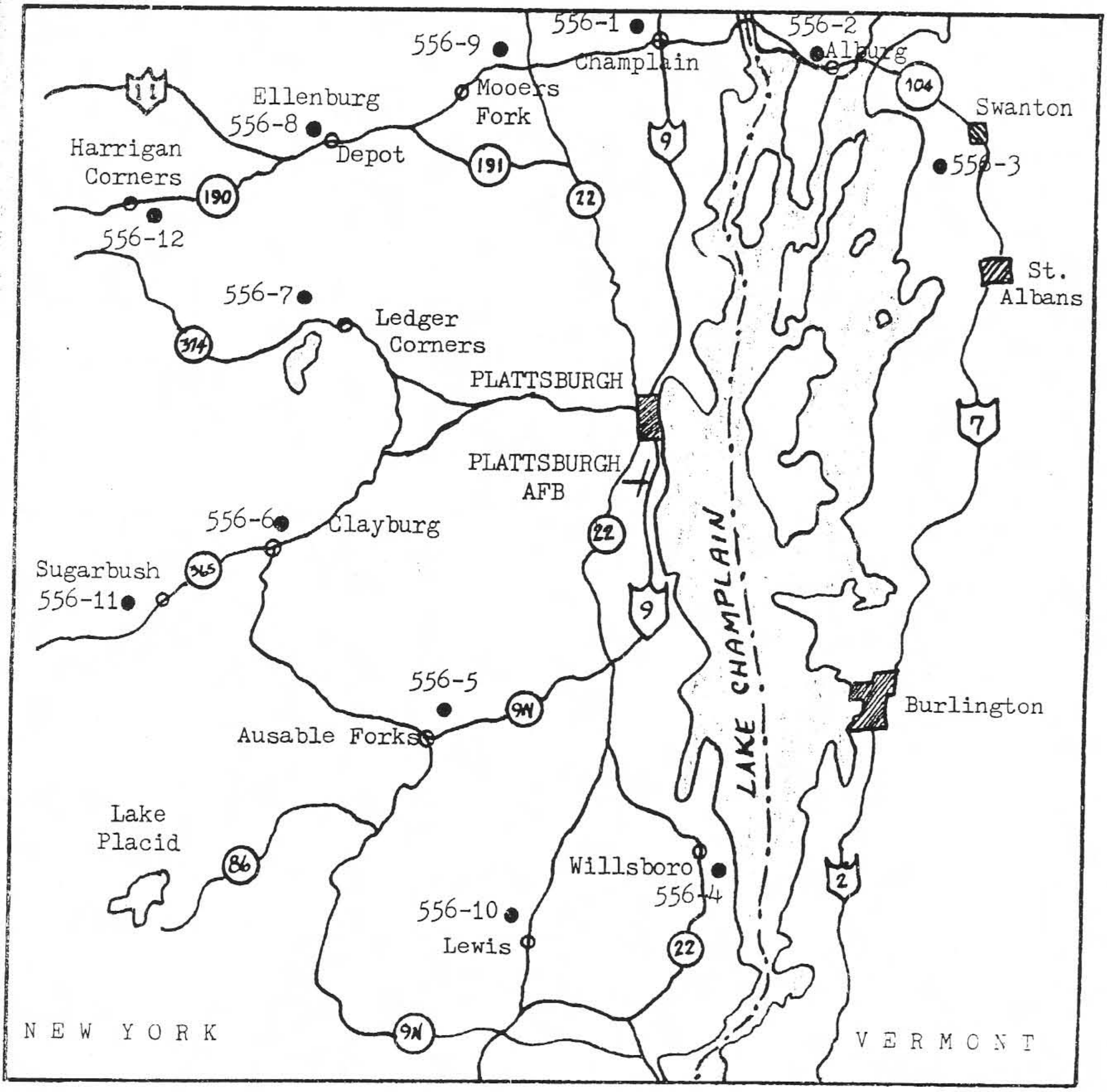

Figure 28. Plattsburgh AFB: ATLAS F Sites