FROM SNARK TO PEACEKEEPER:

A PICTORIAL HISTORY OF STRATEGIC AIR COMMAND MISSILES

OFFICE OF THE HISTORIAN
HEADQUARTERS STRATEGIC AIR COMMAND
OFFUTT AFB, NEBRASKA

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FOREWORD

SAC's Year of Reviewing Fundamentals emphasizes a recommitment to the basic job fundamentals needed to accomplish the Air Force Mission. As part of this review, the Commander in Chief has dedicated the month of May to military heritage and its role in fostering those attitudes and beliefs that are fundamental to serving the nation. This publication has been prepared with these goals in mind. From SNARK to Peacekeeper covers the missile weapon systems the Strategic Air Command has used to provide the nation with a strong deterrent force. Although weapons have tended to garner the publicity, it has been the dedication and professionalism of the people who develop, deploy, operate, and maintain them that ultimately gave the weapon systems their deterrent value. Such attention to the fundamentals of daily operations and commitment to national service are the forces that built and sustain the Strategic Air Command. This study is a tribute to SAC's professionals and their reaffirmation of the values that have made the Strategic Air Command one of the world's most recognized and respected military organizations.

Donald L. Marks

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Major General, USAF
Chief of Staff

PREFACE

From SNARK to Peacekeeper revises and updates a study published by the SAC History Office in 1976. The initial publication was the work of Dr. E. Michael Del Papa. This revision contains the work of several historians. Lieutenant Colonel David R. Fisher and Captain Aida E. Roig-Compton played the major role in rewriting the transcript and adding new sections. Dr. Henry M. Narducci with the support of SSGT Jerry W. Smith edited the manuscript and prepared it for publication. Mr. Herman F. Martin assisted with the photographic layout. Finally, Mrs. Mickie Zeiger and Major Rita Clark provided essential administrative support.

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CHAPTER I

THE WINGED, PILOTLESS AIRCRAFT:

THE SNARK ICM

Since the 1950s, the Strategic Air Command (SAC) had employed several different types of guided missiles to enhance its assigned mission of deterrence. One of the most unusual guided missiles was the Snark, a subsonic, winged intercontinental missile (ICM), developed by the Northrop Aircraft Corporation. Although unofficially designated a surface-to-surface ICM, the Snark was essentially a small, turbojet-powered, unmanned aircraft. It was designed to be fired from a short mobile launcher by means of two solid-fueled rocket boosters. Once airborne, the Snark was powered by a single Pratt and Whitney J-57 turbojet engine capable of cruising at Mach 0.9 to an altitude of approximately 50,000 feet. After a programmed flight of 1,500 to 5,500 nautical miles, the Snark's airframe separated from its nose cone, and the missile's nuclear warhead followed a ballistic trajectory to its target. Plans developed by the Strategic Air Command employed the Snark against enemy defensive systems, especially radars, to ensure the effective penetration of enemy territory by manned bombers.

The genesis of the Snark missile can be traced to the immediate post-World War II period. On 28 March 1946, the Army Air Forces, forerunner of today's United States Air Force, awarded the Northrop Aircraft Corporation a one-year research and study contract for both a subsonic (Snark) and supersonic (Boojum) medium to long-range (1,500 to 5,000 nautical miles) surface-to-surface guided missile.* The Boojum missile program was subsequently cancelled. Throughout the late 1940s and early 1950s, work on the Snark missile program progressed very slowly as a result of both limited research and development (R&D) funding and the low national priority accorded to all guided missile programs. This situation changed dramatically on 8 September 1955 when President Dwight D. Eisenhower assigned the highest national priority to the intercontinental ballistic missile (ICBM) development program. Even though the Snark was not an ICBM, the Air Force ordered its development program accelerated along with that of the Atlas missile.

While responsibility for the development and testing of guided missiles rested with the Air Research and Development Command, (predecessor of today's Air Force Systems Command), the Strategic Air Command maintained a close liaison with the various missile programs by presenting SAC requirements, offering technical assistance, and sending

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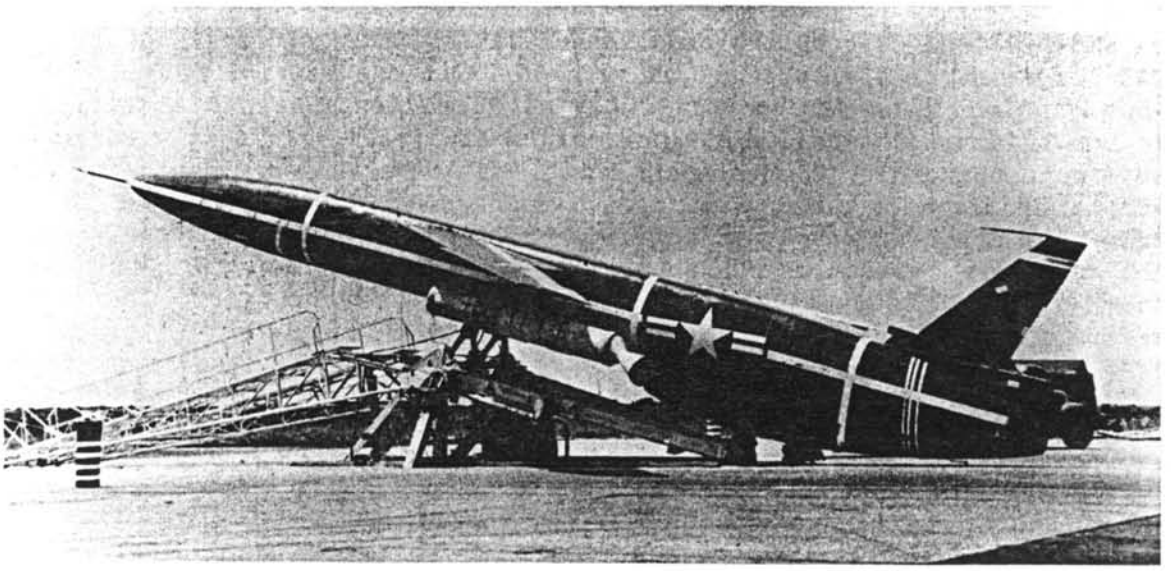
* Jack Northrop, the President of Northrop Aircraft Corporation, selected the names Snark and Boojum from characters created by Lewis Carroll. The Boojum missile program was subsequently cancelled.

representatives to various conferences, meetings, and field demonstrations. At the same time, SAC was actively engaged in developing operations plans for those guided missiles destined for eventual deployment with the command. Thus, on 10 December 1956, SAC published a Snark operational plan that outlined the mission and requirements for equipping, manning, siting, activating, and operating Snark units. Two months earlier, on 22 October, the command had established a Strategic Missile Site Selection Panel to survey potential missile site locations. The panel considered range, expected target assignment, and the overall capabilities of the Snark ICM system when surveying sites. On 21 March 1957, the Air Force, acting on the recommendation of the Strategic Missile Site Selection Panel, designated Presque Isle AFB, Maine, as the site for the first Snark missile base. Two months later, on 17 May, the Air Staff selected Patrick AFB, Florida, as the training and operational testing locale for the Snark ICM. To carry out this important dual assignment at Patrick AFB, SAC activated the 556th Strategic Missile Squadron on 15 December 1957, making it SAC's first Snark and first strategic surface-to-surface guided missile squadron. On 27 June 1958, little more than six months after being activated, the 556th SMS successfully launched its first Snark from Cape Canaveral, Florida.

In the mid and late 1950s, as more progress was made toward the deployment of the Snark ICM, SAC began to lose enthusiasm for the Snark weapon system, due primarily to two factors. First, SAC was greatly concerned with the relatively low speed of the Snark and its inability to operate in the stratosphere, characteristics which rendered the missile highly vulnerable to enemy interception and destruction. Secondly, and of even greater importance, was the Snark's poor test performance record. Throughout the Snark test program, initiated in 1952, numerous launch and guidance failures had raised serious questions regarding the weapon system's reliability. In light of these liabilities, SAC advocated termination of the program. On 16 December 1958, General Thomas S. Power, Commander in Chief Strategic Air Command, informed General Curtis E. LeMay, the Air Force Vice Chief of Staff, that:

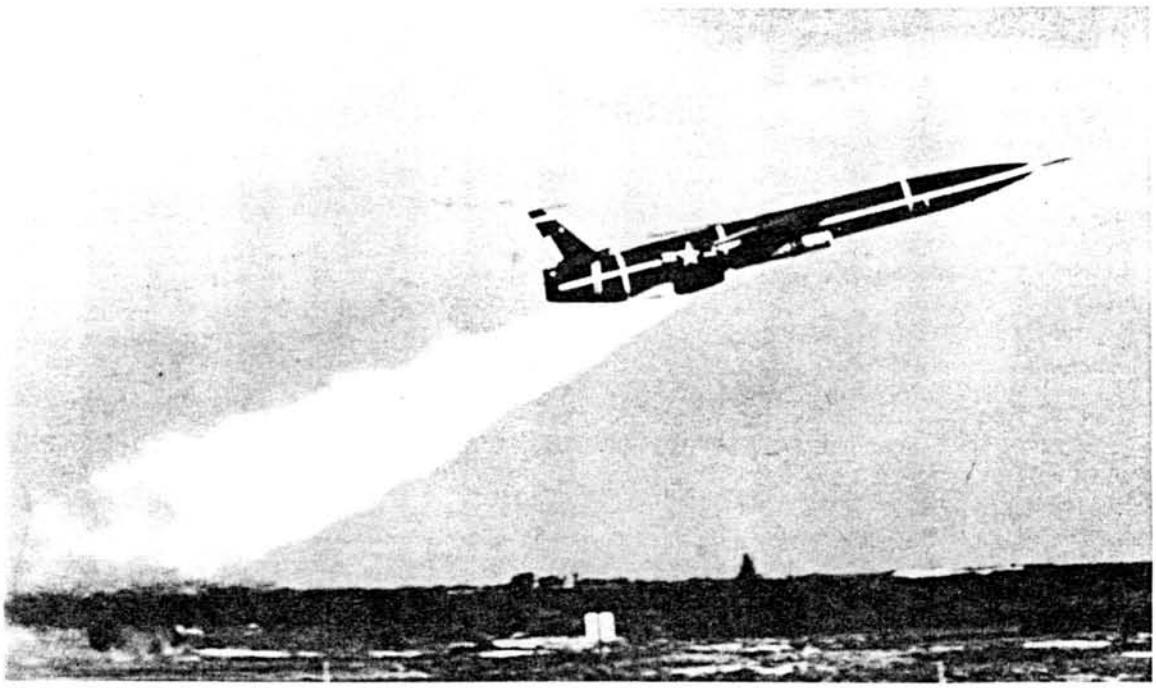
> . . . the limited operational capability of this system adds little or nothing to the strategic offensive force and I believe that a re-evaluation of this program is in order . . . either we should take necessary action to integrate the Snark into the strategic inventory with a capability compatible with our concept of operating or . . . take immediate action to cancel the program.

Despite General Power's recommendation, the Air Force and the Department of Defense decided to continue a limited program for the operational deployment of one Snark squadron to acquire some missile capability until ballistic missiles became available in quantity. On 1 January 1959, SAC activated the 702nd Strategic Missile Wing (ICM-Snark) at Presque Isle AFB, Maine, and assigned it to the Eighth Air Force, thus making it the first SAC missile wing to be assigned to a numbered



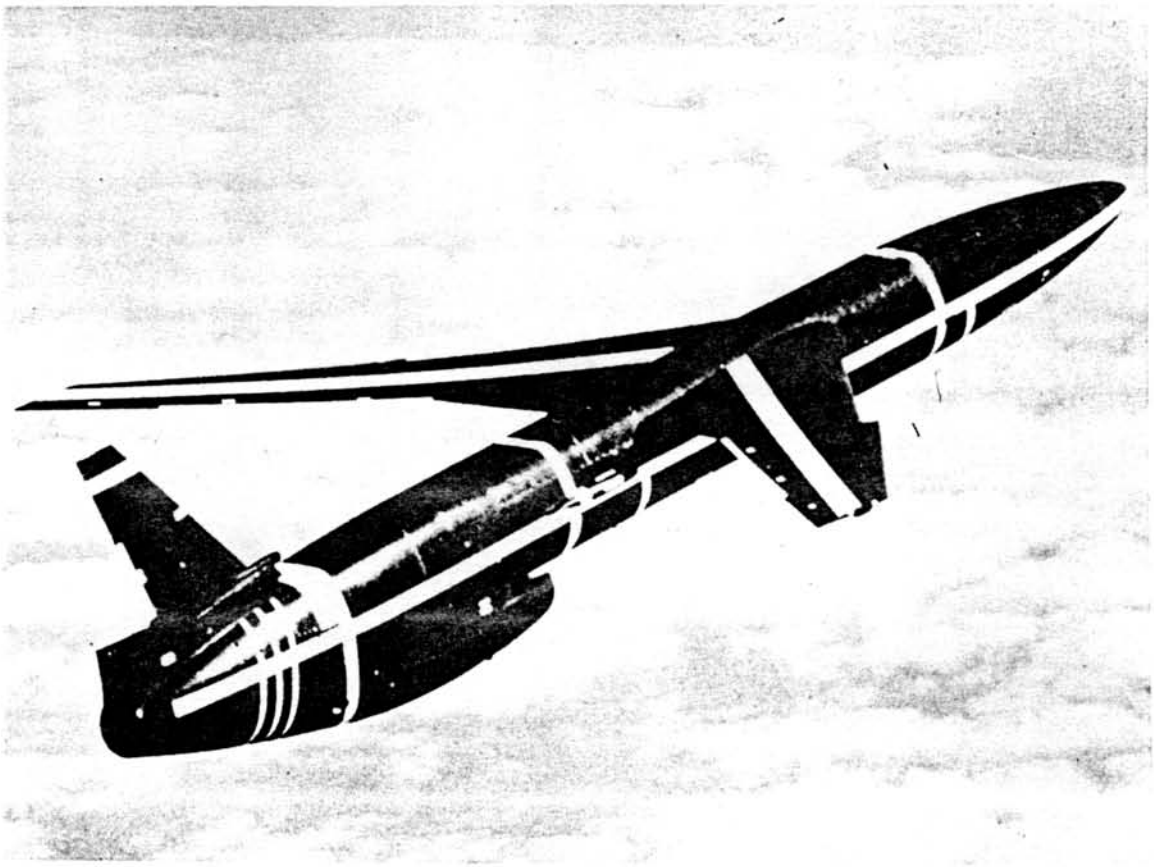
A SNARK ICM IN LAUNCHING POSITION, CAPE CANAVERAL, FLORIDA.

FRONTAL VIEW OF A SNARK ICM
SHORTLY AFTER LAUNCH FROM CAPE CANAVERAL, FLORIDA.



A SNARK ICM BEING LAUNCHED FROM CAPE CANAVERAL, FLORIDA.

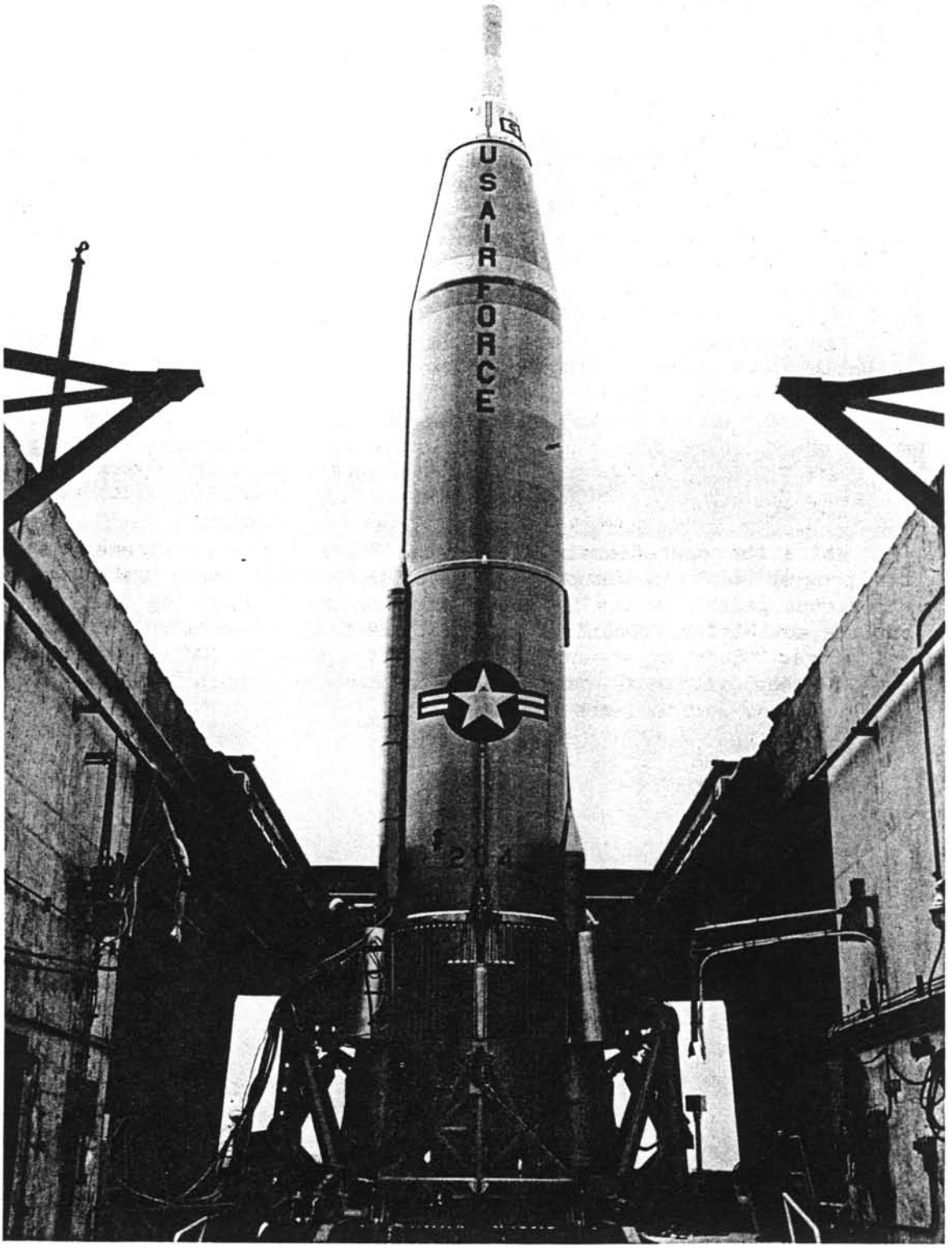
A SNARK ICM IN FLIGHT DOWN THE ATLANTIC MISSILE RANGE.



air force. The 556th SMS at Patrick AFB was assigned to the 702d SMW on 1 April 1959 and was scheduled to move to Presque Isle in July, but SAC inactivated the squadron on 15 July 1959 before the move could be consummated. As a result of this action and the subsequent cancellation of the programmed activation of the 702nd Missile Maintenance Squadron, the 702nd SMW was put in the unique position of having no assigned subordinate units. All operational and maintenance functions associated with the Snark ICM were handled by the 702nd SMW's deputy commander for missiles. The 702d SMW placed the first Snark ICM on alert on 18 March 1960 and by the end of fiscal year 1960, a total of four Snark missiles were on strategic alert. Yet, it was not until 28 February 1961 that SAC was able to declare the 702d SMW operational.

The Strategic Air Command's negative evaluation of the Snark's potential was reinforced on 28 March 1961 when President John F. Kennedy, in a special defense budget message, directed the phase out of the missile because it was "obsolete and of marginal military value." Accordingly, on 25 June 1961, SAC inactivated the 702d Strategic Missile Wing at Presque Isle AFB less than four months after it had been declared operational.

While the operational life of the Snark ICM was extremely short, the program was not without its benefits. Chief among these was the experience gained by the Strategic Air Command in planning and carrying out the activation, training, and deployment of guided missile squadrons and wings. Such experience would be invaluable to SAC as it prepared for the deployment of such follow-on missile weapon systems as the Atlas, Titan, Jupiter, and Minuteman.



AN ATLAS-E STANDS IN ITS COFFIN LAUNCHER, RAISED FROM HORIZONTAL TO VERTICAL POSITION FOR LAUNCH AT VANDENBERG AFB, CALIFORNIA. THE MISSILE CARRIES A MARK-III REENTRY VEHICLE.

CHAPTER II

THE FIRST-GENERATION ICBMs:

THE SERIES D, E, AND F ATLAS AND THE TITAN I

In the era before the current force of SAC intercontinental ballistic missiles, first-generation missile weapon systems such as the Atlas, Titan I, and Minuteman I, like their second- and third-generation counterparts, provided SAC with a vitally important adjunct to the strategic bomber force. These systems taught the command how to plan, deploy, operate, maintain, and inactivate missile systems. Furthermore, when the Cuban Missile Crisis required Strategic Air Command to respond with its full strategic arsenal, it was these first-generation ICBMs that helped tip the scales in favor of peace.

The Convair Division of General Dynamics produced three different models of the Atlas ICBM destined for deployment with the Strategic Air Command. The first operational version of the Atlas, the "D" model, was a one and one-half stage, liquid-fueled, rocket-powered (360,000 pounds of thrust) ICBM equipped with radio-inertial guidance and a nuclear warhead. It was stored in a horizontal position on a "soft" above-ground launcher, unprotected from the effects of nuclear blast, and had an effective range, like all Atlas models, of approximately 6,500 nautical miles. The second Atlas ICBM configuration, the series "E", possessed all-inertial guidance, improved engines (389,000 pounds of thrust), a larger warhead, and was stored in a horizontal position in a "semi-hard" coffin-type launcher. The series "F" missile was superior to its predecessors in several ways. Like the E model, the Atlas F was equipped with all-inertial guidance, but possessed improved engines (390,000 pounds of thrust) and a quicker reaction time due to its storable liquid fuel. The Atlas F missiles also were deployed in "hard" silo-lift launchers which stored the missiles vertically in underground, blast-protected silos and used elevators to raise the missiles to ground level for launch.

In contrast to the Atlas, the Titan I, produced by the Glenn L. Martin Company, was a two-stage, liquid-fueled, rocket-powered (first stage - 300,000 pounds of thrust; second stage - 80,000 pounds of thrust) ICBM which incorporated both radio and all-inertial guidance. Deployed in a "hard" silo-lift launcher, the Titan I had an effective range of 5,500 nautical miles.

American military interest in long-range, rocket-powered ballistic missiles was first generated during the latter part of the Second World War and the immediate post-war period. German success with the rocket-powered V-2 ballistic missile, coupled with the advent of the atomic bomb, provided the potential for the development of an intercontinental ballistic missile capable of delivering an atomic warhead. Such a weapon would, at the very least, completely revolutionize strategic

warfare. Against this background, the Army Air Forces, on 19 April 1946, awarded a research and study contract to the Consolidated Vultee (Convair) Aircraft Corporation for a 1,500 to 5,000 nautical mile surface-to-surface guided missile in subsonic and supersonic versions. But, the Army Air Forces was forced to cancel its contract with Convair in June 1947 because of substantial reductions in missile development funds. The Army Air Forces, however, did allow Convair to use the remaining unexpended contract funds to complete and flight test three rocket research test vehicles then under construction and to continue studies on guidance and nose cone reentry.

In 1949 and 1950, studies completed by the RAND Corporation and several aeronautical firms emphasized the fact that recent technological advances greatly enhanced the feasibility of developing a long-range, rocket-powered guided missile capable of carrying heavy atomic warheads. On the basis of such information, the Air Force directed the Air Materiel Command on 16 January 1951 to institute a two-phase, $500,000 study project with Convair for a rocket-powered guided missile in both a ballistic and glide mode, with a minimum range of 5,500 nautical miles, a speed of at least Mach 6 over the target, a circular error probable (CEP)* of not more than 1,500 feet, and the capability to carry an atomic weapon. Following a September 1951 decision to pursue ballistic rather than glide technology, the Air Force directed Convair to examine existing rocket- and missile-related technologies, fill whatever gaps existed in current knowledge, and prepare a firm technological base from which an orderly development and production program could proceed. From 1951 to 1954, the Convair study project, designated "Project Atlas", remained a poorly-financed, low-priority venture continually hampered by significant technological difficulties in the areas of propulsion, guidance, and nose cone reentry. All of the technical problems could be traced to restrictive performance requirements necessitated by the low yield and heavy weight of atomic weapons.

Then, in late 1953, the Atomic Energy Commission succeeded in developing a high-yield, lightweight atomic weapon. This "thermonuclear breakthrough," coupled with intelligence reports that the Soviet Union was actively engaged in the development of both atomic weapons and long-range ballistic missiles, prompted the Air Force to reexamine the ICBM program. On 31 October 1953, Mr. Trevor Gardner, Special Assistant to the Secretary of the Air Force for Research and Development, invited eleven nationally prominent scientists to form the Strategic Missile Evaluation Committee. Subsequently known as the von Neumann Committee for its chairman, Dr. John von Neumann, the group conducted a searching analysis and evaluation of the Air Force's ICBM program. In its final report, issued on 10 February 1954, the von Neumann Committee pointed out that the recent "thermonuclear breakthrough" reinforced belief in

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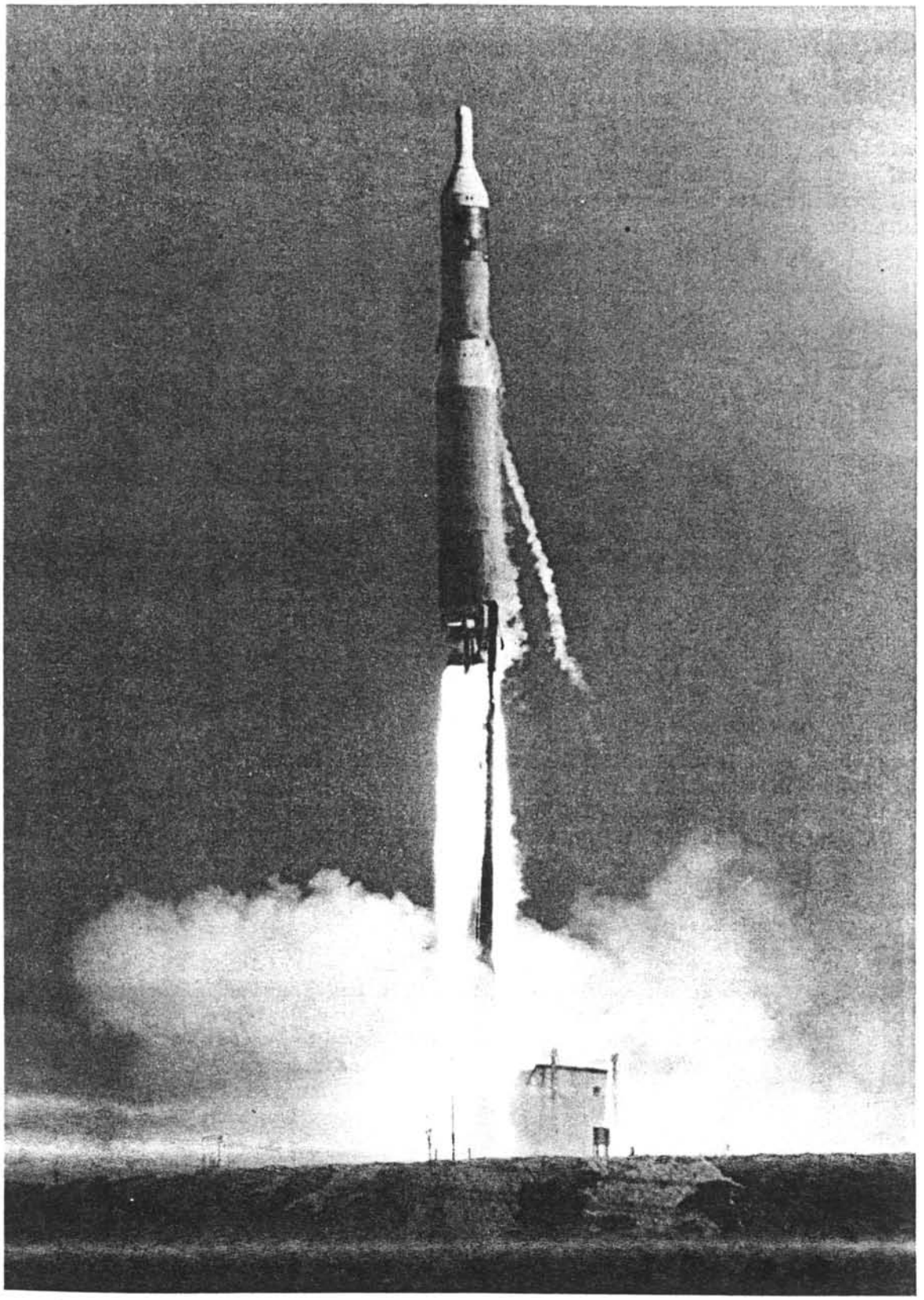
* Circular Error Probable (CEP) - A measure of accuracy, CEP is defined as the radius of a circle centered on the target within which one half of all weapons are expected to land.



TITAN I ICBM LAUNCH FROM VANDENBERG AFB, CALIFORNIA,
9 OCTOBER 1962.

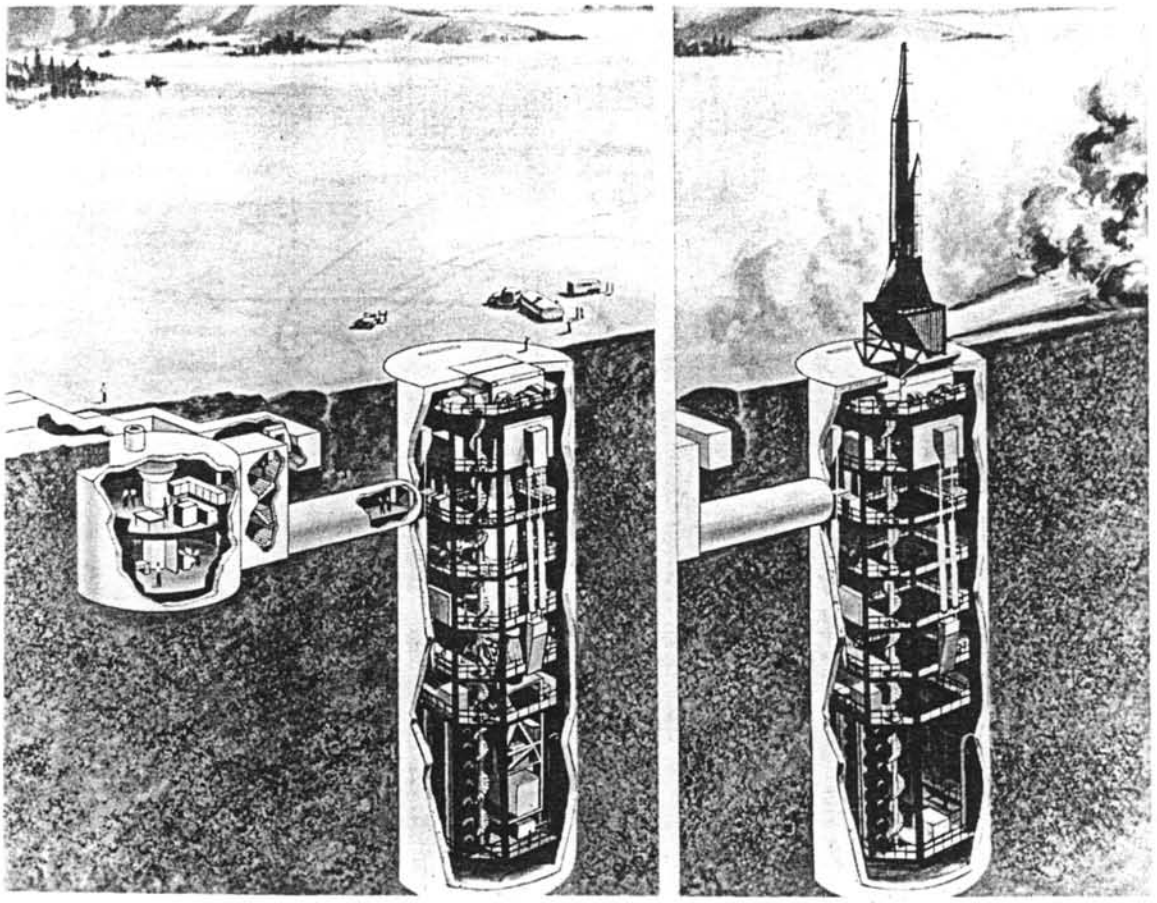
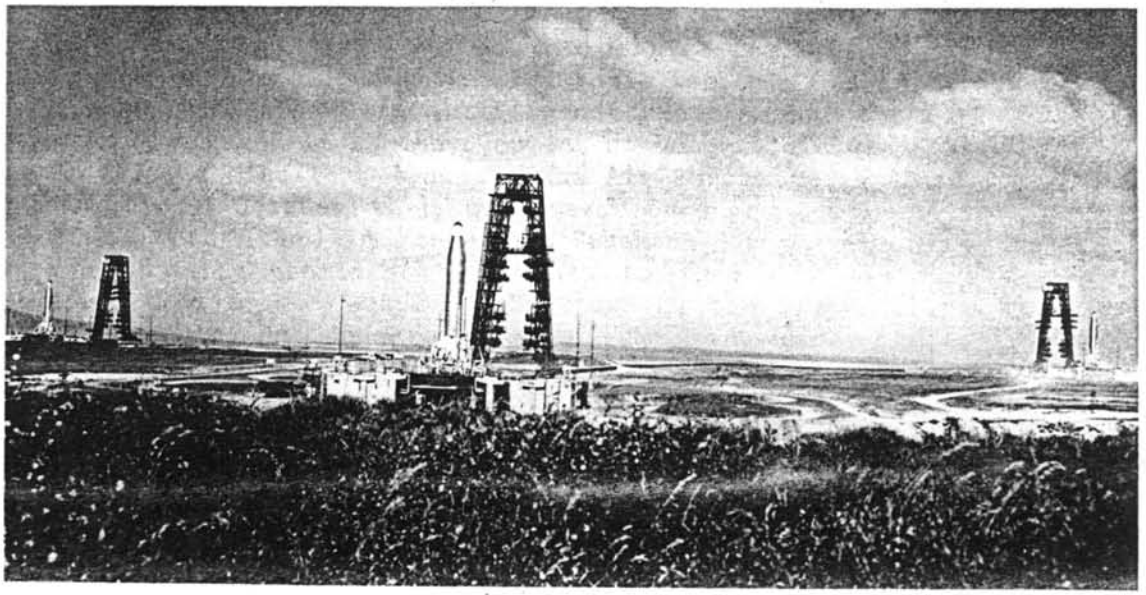


ILLUSTRATION OF AN ATLAS-F MISSILE COMPLEX.

ATLAS-D ICBMS OF THE 576TH SMS,
VANDENBERG AFB, CALIFORNIA, IN LAUNCH POSITION.



the probable resolution of other technological difficulties associated with the development of an ICBM, and recommended a special Air Force development-management organization be established to accelerate the ICBM program. On 8 February 1954, two days before the release of the von Neumann Report, RAND Corporation published a study entitled A Revised Program for Ballistic Missiles of Intercontinental Range. The RAND study predicted that an initial operational capability for the Atlas ICBM could be achieved by the early 1960s if performance criteria were relaxed and the program was accorded increased funding and a higher national priority.

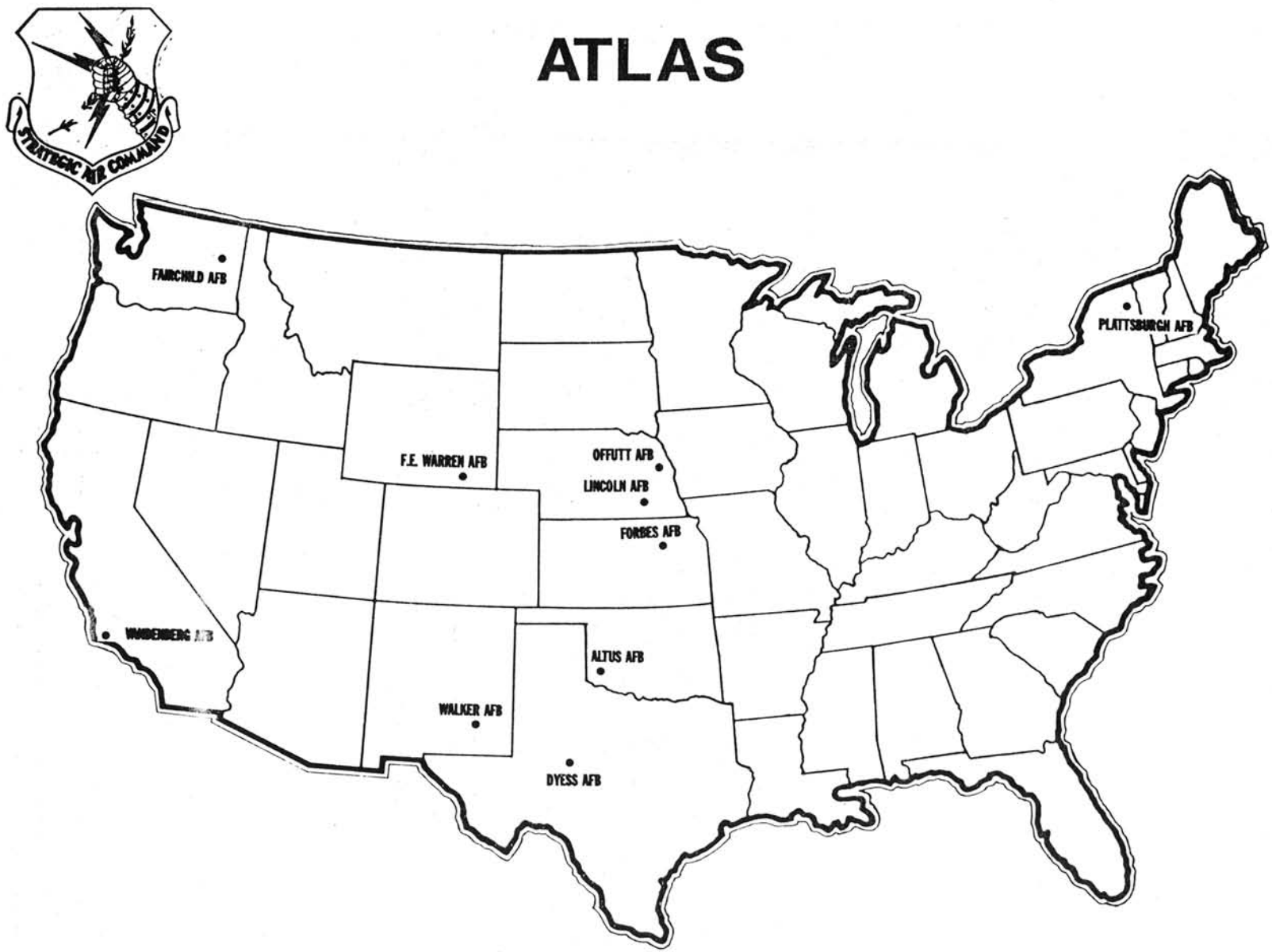
Together, the von Neumann Report and the RAND study had a profound impact upon Project Atlas. In May 1954, General Thomas D. White, Air Force Vice Chief of Staff, assigned Project Atlas the highest Air Force priority. A month later, Lieutenant General Donald L. Putt, Deputy Chief of Staff for Development, directed the Air Research and Development Command (ARDC) to reorient and accelerate Project Atlas. In turn, ARDC activated the Western Development Division (WDD) at Inglewood, California, and assigned it specific responsibility for, and total authority over, the Atlas ICBM development program. In May 1955, WDD's responsibilities were expanded to include the development of the Titan as an alternative or backup to the Atlas ICBM system.

While the Air Force was expanding and accelerating its ICBM program, pressure was brought to bear on President Dwight D. Eisenhower to assign the highest national priority to the program. In the fall of 1954, President Eisenhower established the Technological Capabilities Panel of the Science Advisory Committee, Office of Defense Management, to conduct an in-depth study of the nation's then-current defense measures. The committee, chaired by James R. Killian, forwarded its report to the President on 14 February 1955. The Killian report urged the President and the National Security Council to assign Project Atlas the highest national priority. At the same time, the panel recommended that a 1,500-mile intermediate range ballistic missile (IRBM) be developed concurrently with the Atlas ICBM.

While President Eisenhower was studying the recommendations of the Killian Report, he received a letter, dated 30 June 1955, from Senators Clinton P. Anderson (D-New Mexico) and Henry M. Jackson (D-Washington), respective chairmen of the Joint Congressional Committee on Atomic Energy and its Subcommittee on Military Applications. Both men urged the Chief Executive, in the strongest possible terms, to approve the speedy development and deployment of an operational ICBM force.

The combination of the Killian Report and Congressional pressure proved effective, on 8 September 1955 President Eisenhower assigned the highest national priority to the Air Force ICBM development program. Exactly two months later, Secretary of Defense Charles E. Wilson approved the ICBM Administrative Procedures Evaluation Group's proposals to include: (1) the establishment of two committees, the Office of the Secretary of Defense/Ballistic Missile Committee and the Air Force Ballistic Missile Committee as the centralized, decision-making agencies

ATLAS


STRATEGIC AIR COMMAND
FAIRCHILD AFB
F.E. WARREN AFB
OFFUTT AFB
LINCOLN AFB
FORBES AFB
PLATTSBURGH AFB
ALTUS AFB
WALKER AFB
DYESS AFB

for the ICBM development program; and (2) the concept of an initial operational capability (IOC) for ICBMs, with all aspects of the project, including planning, programming, development, training, and operations, under the command jurisdiction of the ARDC's Western Development Division.

On 18 November 1955, Headquarters USAF assigned the responsibility for establishing ICBM IOCs to the ARDC's Western Development Division, in cooperation with the Strategic Air Command. Command jurisdiction, retained by WDD until completion of IOC, would then transfer to SAC. While SAC accepted the emphasis and priority accorded the ICBM program, it objected to the belief held by some Air Force officials that the ICBM constituted the "ultimate weapon" and would eventually replace the long-range manned bomber. SAC officials argued that the ICBM could only accomplish part of the strategic mission and would supplement, not replace, the manned bomber. Nonetheless, SAC supported the enhanced strategic deterrent value of a mixed force of bombers and ICBMs.

Plans concerning the actual number of first-generation Atlas and Titan I ICBMs to be assigned to the Strategic Air Command went through a series of changes. In December 1955, the Air Force first proposed that the ICBM initial operational capability consist of one wing with three bases (2 Atlas and 1 Titan), each deploying 40 missiles and 20 launchers. Ten missiles would be operational on 1 April 1959 and the entire force of 120 ICBMs by 1 January 1960. On 29 March 1957, however, President Eisenhower approved a new ICBM plan that called for only 80 missiles (40 Atlas and 40 Titan). One launch complex of three launchers and six missiles would achieve operational status by March 1959, while the entire force of 80 ICBMs would be operationally deployed by March 1961. This plan was revised following the Soviet Union's success in placing Sputnik I in orbit on 4 October 1957. A new "emergency" ICBM plan, approved by President Eisenhower and the National Security Council on 30 January 1958, called for the deployment of nine Atlas squadrons (83 missiles) and four Titan squadrons (40 missiles). The first Atlas complex of three launchers would become operational in June 1959 and the entire force of 123 ICBMs would achieve alert status by March 1963. Within the next few years, changes were made to the "emergency" ICBM plan. Eventually, between the period 1 April 1958 and 1 October 1961, the Strategic Air Command activated 13 Atlas and 6 Titan I ICBM squadrons, as indicated in the following chart:

ATLAS AND TITAN I ICBM SQUADRONS
ACTIVATED BY HEADQUARTERS SAC
1 APRIL 1958 - 1 OCTOBER 1961

UNIT	BASE	MISSILES	ACTIVATION DATE
576th Strategic Missile Squadron (SMS)	Cooke AFB,[1] California	6 Atlas D 1 Atlas E 2 Atlas F	1 April 1958

564th Strategic Missile Squadron (SMS)	F.E. Warren AFB, Wyoming	6 Atlas D	1 July 1958
565th Strategic Missile Squadron (SMS)	F.E. Warren AFB, Wyoming	9 Atlas D	1 December 1958
566th Strategic[2] Missile Squadron (SMS)	Offutt AFB, Nebraska	9 Atlas D	15 August 1959
848th Strategic[3] Missile Squadron (SMS)	Lowry AFB, Colorado	9 Titan I	1 February 1960
567th Strategic Missile Squadron (SMS)	Fairchild AFB, Washington	10 Atlas E	1 April 1960
548th Strategic Missile Squadron (SMS)	Forbes AFB, Kansas	9 Atlas E	1 July 1960
849th Strategic[4] Missile Squadron (SMS)	Lowry AFB, Colorado	9 Titan I	1 August 1960
549th Strategic[5] Missile Squadron (SMS)	F. E. Warren AFB, Wyoming	9 Atlas E	1 October 1960
850th Strategic Missile Squadron (SMS)	Ellsworth AFB, South Dakota	9 Titan I	1 December 1960
851st Strategic Missile Squadron (SMS)	Beale AFB, California	9 Titan I	1 February 1961
568th Strategic Missile Squadron (SMS)	Larson AFB, Washington	9 Titan I	1 April 1961
550th Strategic Missile Squadron (SMS)	Schilling AFB, Kansas	12 Atlas F	1 April 1961
551st Strategic Missile Squadron (SMS)	Lincoln AFB, Nebraska	12 Atlas F	1 April 1961

569th Strategic Missile Squadron (SMS)	Mountain Home AFB, Idaho	9 Titan I	1 June 1961
577th Strategic Missile Squadron (SMS)	Altus AFB, Oklahoma	12 Atlas F	1 June 1961
578th Strategic Missile Squadron (SMS)	Dyess AFB, Texas	12 Atlas F	1 July 1961
579th Strategic Missile Squadron (SMS)	Walker AFB, New Mexico	12 Atlas F	1 September 1961
556th Strategic Missile Squadron (SMS)	Plattsburgh AFB, New York	12 Atlas F	1 October 1961

The 569th Strategic Missile Squadron at Mountain Home AFB, Idaho, the sixth and last Titan I ICBM squadron, was declared operational by Headquarters SAC on 16 August 1962. Four months later, on 20 December 1962, the last Atlas squadron, the 556th Strategic Missile Squadron (ICBM-Atlas F) at Plattsburgh AFB, New York, achieved operational status.

Launch facilities for SAC's first Atlas squadron, the 576th Strategic Missile Squadron (activated in April 1958 at Cooke AFB, California) initially had two "soft" series D Atlas complexes. Later additions included one "semi-hard" series E coffin-type and two "hard" Atlas F silo-lift launchers. For its motto, the 576th SMS chose the Latin verb ducimus, meaning "we lead." Appropriately, on 31 October 1959, the 576th placed a Series D Atlas equipped with a nuclear warhead

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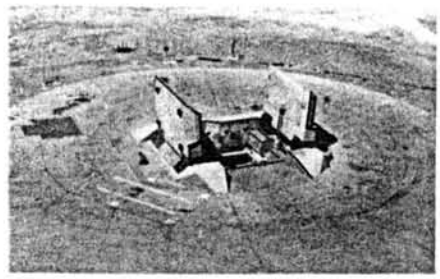
1 On 4 October 1958, Cooke AFB, California, was renamed Vandenberg AFB in honor of the late General Hoyt S. Vandenberg, former Chief of Staff, United States Air Force.

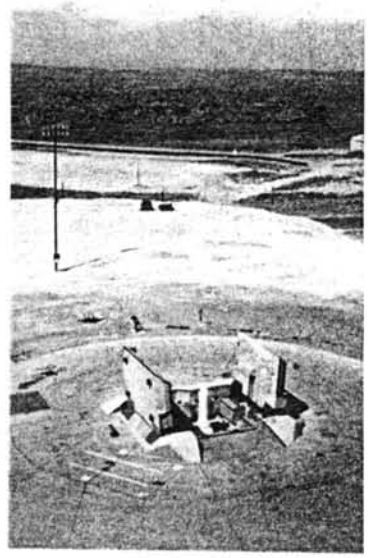
2 On 1 July 1961, Headquarters SAC changed the squadron designation of the 566th SMS at Offutt to the 549th SMS.

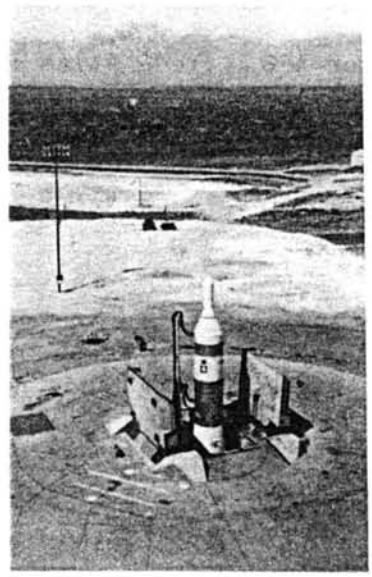
3 On 1 July 1961, Headquarters SAC discontinued the 848th SMS and in its place organized the 724th SMS.

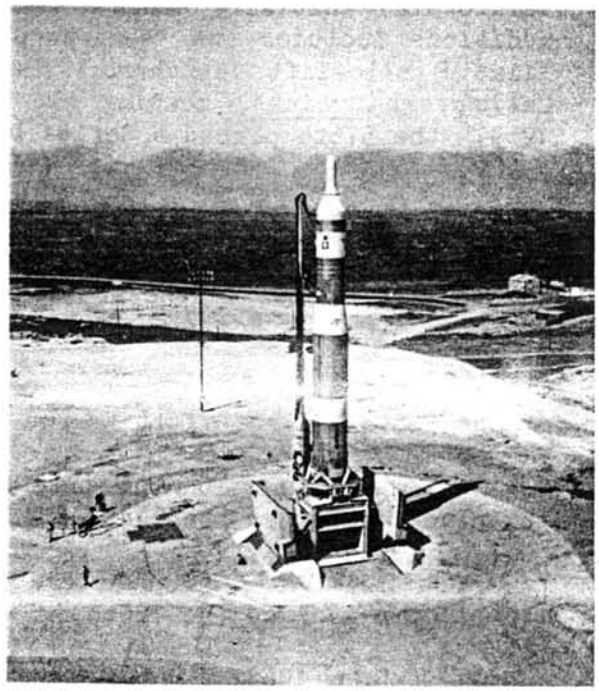
4 On 1 July 1961, Headquarters SAC discontinued the 849th SMS and in its place organized the 725th SMS.

5 On 1 July 1961, Headquarters SAC changed the squadron designation on the 549th SMS at F. E. Warren to the 566th SMS.

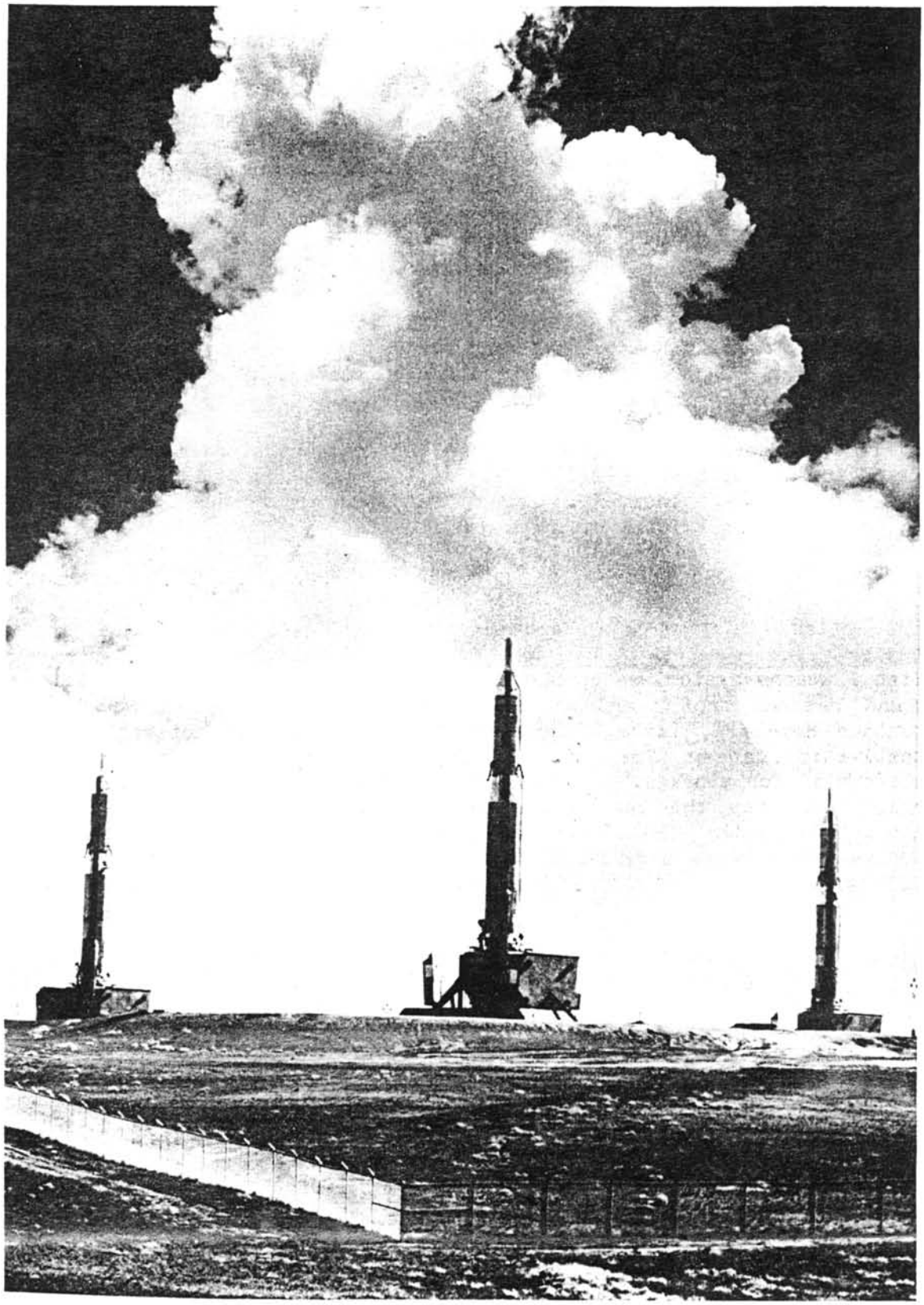








A TITAN I ICBM IS RAISED FROM
ITS SILO AT VANDENBERG AFB,
CALIFORNIA, 18 AUGUST 1961.



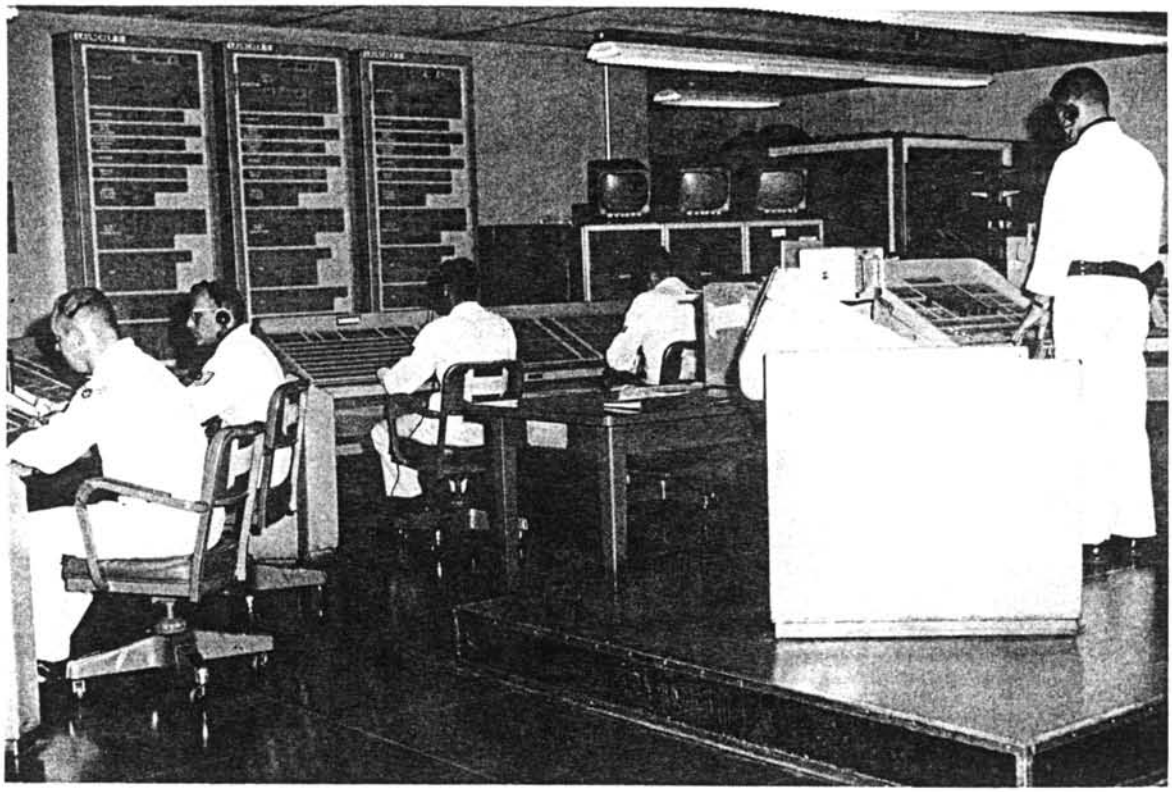
TITAN I ICBMS RAISED TO LAUNCH POSITION.

on strategic alert--ready to launch on 15 minutes notice--from Vandenberg AFB, California.

Meanwhile, considerable progress was made in developing two second-generation ICBMs, the Titan II and the Minuteman. Among the numerous advantages the newer missiles had over the Atlas and the Titan I was their ability to be launched from hardened and widely dispersed underground silos. In general, the Titan II and the Minuteman were more economical to operate, more reliable, and because of their silo-launch capability, better able to survive a nuclear first strike than their first-generation counterparts. Consequently, on 24 May 1963, General Curtis E. LeMay, Air Force Chief of Staff, approved the recommendations of the Air Force Ad Hoc Group for phaseout of the series D and E Atlas and the Titan I ICBMs. Plans called for completion of Atlas D phaseout by the end of FY 1965. The Atlas E's would be retired by the end of FY 1967, and the last Titan I would be gone by the close of FY 1968. On 16 May 1964, Secretary of Defense Robert S. McNamara accelerated the phase-out of the Series E Atlas and the Titan I from the end of FY 1968 to the close of FY 1965. In addition, Secretary McNamara ordered the retirement of all Atlas F ICBMs by the end of FY 1968.

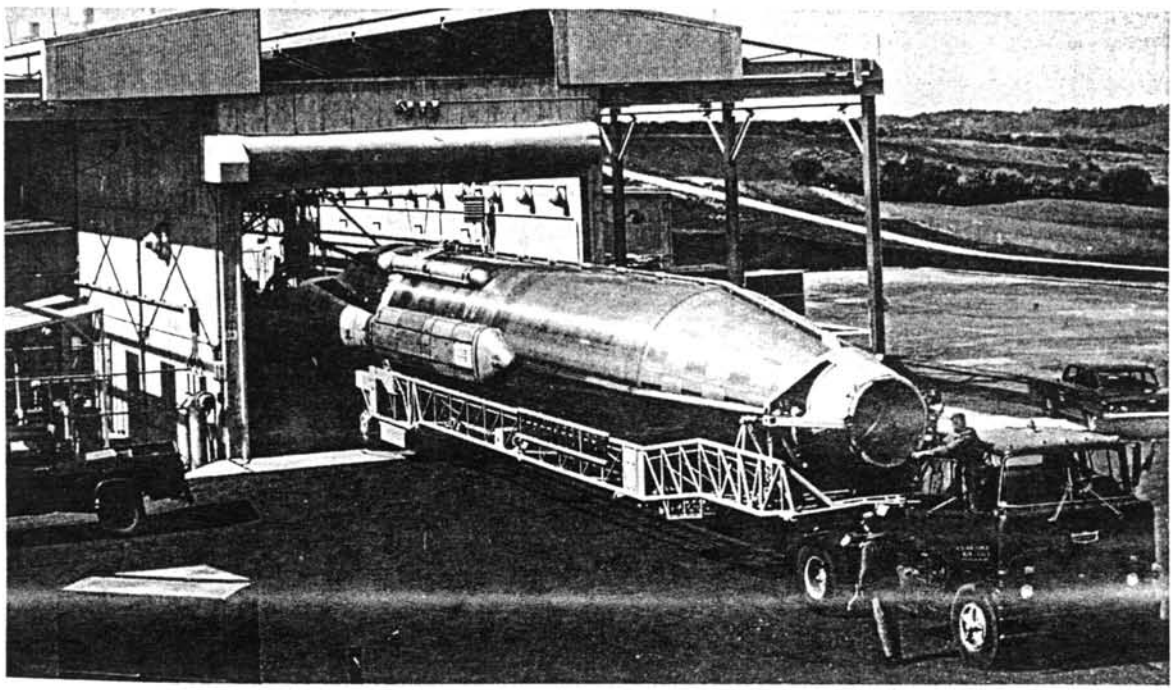
Project "Added Effort", the Air Force nickname for the programmed phaseout of all first-generation ICBMs, began on 1 May 1964 when the first Atlas D's were taken off alert at the 576th Strategic Missile Squadron, Vandenberg AFB, California. The operational phaseout of the Titan I weapon system was completed on 1 April 1965 when the last Titan I was removed from alert at the 569th Strategic Missile Squadron, Mountain Home AFB, Idaho. Appendix E lists both unit activation and inactivation dates. The retired Titans were moved to Miro Loma AFB, California, for storage. Project Added Effort reached completion on 20 April 1965 when the last (first-generation) ICBM, an Atlas F, was shipped from the 551st Strategic Missile Squadron, Lincoln AFB, Nebraska, to Norton AFB, California, where it and other retired Atlas ICBMs were stored for future use as launch vehicles in research and development programs.

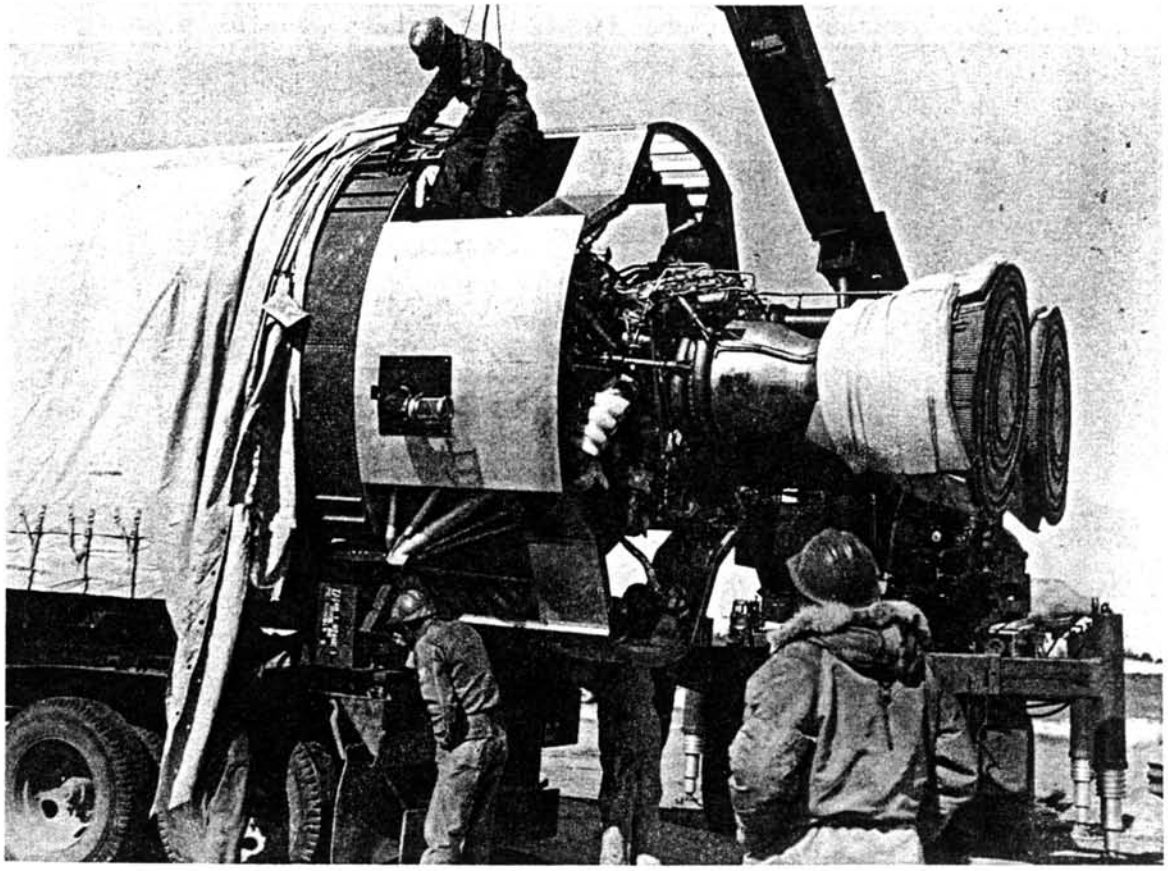
With the completion of Project "Added Effort", an extremely important and highly significant chapter in the military history of the United States came to an end. The series D, E, and F Atlas and the Titan I were the first fruits of America's effort to develop and deploy an economical, efficient, reliable, and highly survivable force of ICBMs capable of countering the threat posed by the Soviet Union's nuclear-armed intercontinental ballistic missiles. The experience Strategic Air Command gained with first-generation ICBMs provided valuable lessons, both positive and negative, in the operation and maintenance of highly sophisticated intercontinental ballistic missile weapon systems. The development of the free world's first ICBM also benefitted non-military programs. Project Mercury, for instance, used an Atlas booster to propel the first American astronaut into orbit. Atlas also pioneered the use of a missile's outer skin as a liquid propellant container and was the first missile to employ swiveling engines for directional control. Over the last three decades, Atlas boosters have carried a variety of



COLONEL JAMES C. ADKINS, COMMANDER, 565TH SMS, WHITEMAN AFB, MISSOURI OBSERVES TITAN I ALERT CREW AT THEIR POSTS.

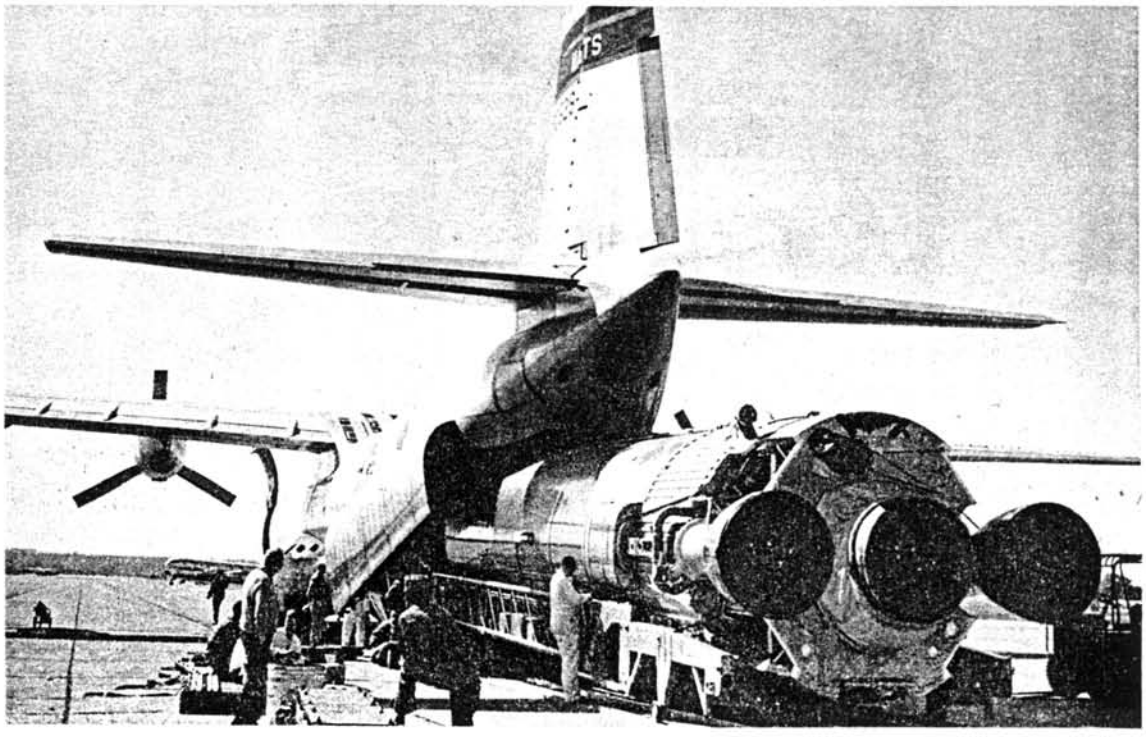
AN ATLAS-D MISSILE BEING DEACTIVATED AT THE 549TH SMS, OFFUTT AFB, NEBRASKA.



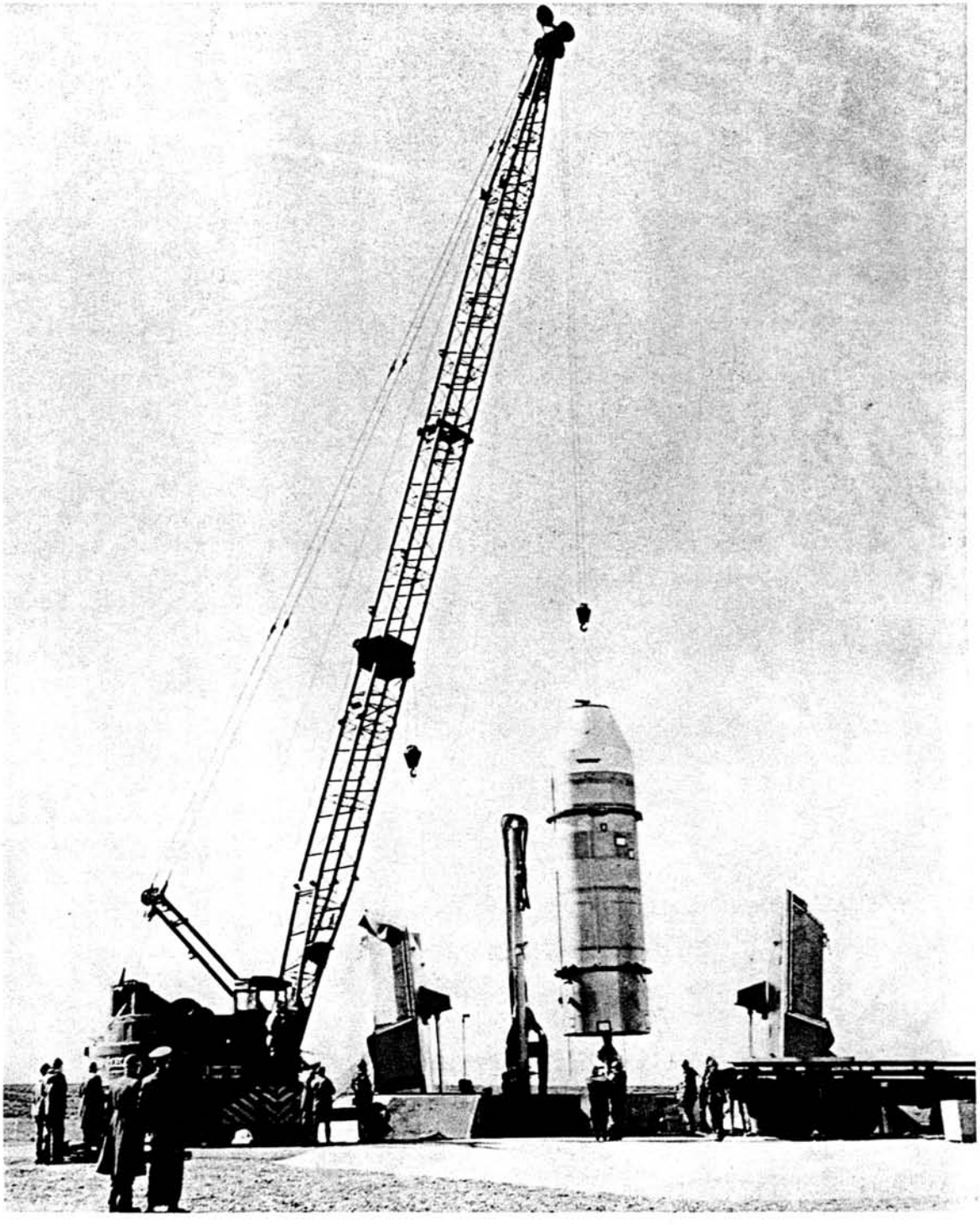


A TITAN I ICBM BEING PLACED ON TRAILER DURING DEACTIVATION AT LOWRY AFB, COLORADO.

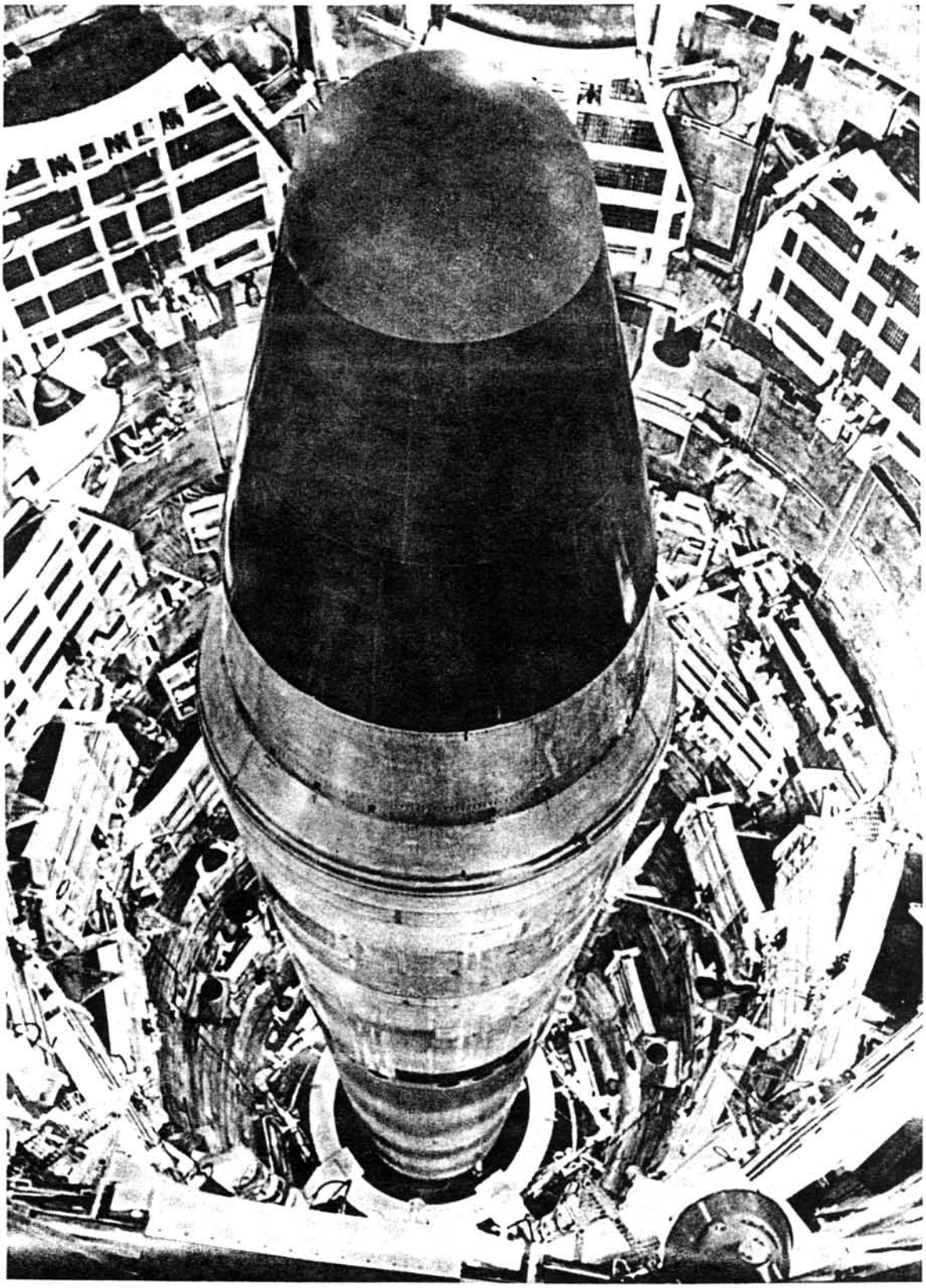
AN ATLAS-D ICBM IS LOADED INTO AIRCRAFT FOR DEACTIVATION AT THE 549TH SMS, OFFUTT AFB, NEBRASKA.



payloads into orbit for the Air Force and the National Aeronautics and Space Administration. Finally, the deployment of the Atlas and the Titan I greatly increased the deterrent value of America's strategic offensive nuclear forces and, as a result, significantly decreased the possibility of nuclear aggression against the United States.



THE SECOND STAGE OF A TITAN I ICBM IS REMOVED FROM ITS SILO.



A TITAN II IN ITS SILO AT THE 381ST SMW, McCONNELL AFB, KANSAS.

CHAPTER III

THE SECOND-GENERATION ICBMs:

TITAN II AND MINUTEMAN

The development of America's first-generation ICBMs - the Atlas and the Titan I - was dictated by the need to counter the threat posed by the Soviet Union's strategic offensive missile force. But, while the deployment of ICBM weapon systems added immeasurably to the overall deterrent value of America's strategic nuclear offensive forces, the missiles themselves proved to be generally unreliable, very expensive to operate and maintain, and highly vulnerable to the effects of nuclear blast. These shortcomings posed a unique challenge to the ingenuity, intelligence, and resourcefulness of both Air Force planners and civilian contractors. This challenge was successfully mastered with the development of the second-generation Titan II and Minuteman ICBMs.

The Titan II, manufactured by the Martin Company, was a large two-stage, liquid-fueled, rocket-powered ICBM that incorporated significant performance improvements over the earlier model Titan I weapon system. Titan II had more powerful engines (first stage - 430,000 pounds of thrust, second stage - 100,000 pounds of thrust, compared to 300,000 pounds and 80,000 pounds for the Titan I), a larger warhead, all-inertial guidance, hypergolic fuel* and an on-board oxidizer, and the capability of being fired from a hardened underground-silo launcher. Each Titan II silo was directly connected to an underground launch control capsule manned by a missile combat crew of two officers and two airman. The Titan II, like the Titan I, had an effective range of approximately 5,500 nautical miles.

The Air Force had approved the development of the Titan II ICBM in October 1959. By 28 March 1961, the missile force included six Titan I and six Titan II squadrons. SAC activated the first Titan II squadron on 1 January 1962 and during the next eight months activated five more squadrons. The completed Titan II force was as follows:

SQUADRON	LOCATION	ACTIVATION DATE
570th SMS	Davis-Monthan AFB, Arizona	1 January 1962
[illegible] SMS	McConnell AFB, Kansas	1 March 1962
373d SMS	Little Rock AFB, Arkansas	1 April 1962

* Hypergolic Fuel - Fuel which spontaneously ignited with the use of an oxidizer.

TITAN


LARSON AFB
MOUNTAIN HOME AFB
ELLSWORTH AFB
BEALE AFB
VANDENBERG AFB
LOWRY AFB
McCONNELL AFB
LITTLE ROCK AFB
DAVIS-MONTHAN AFB

SQUADRON	LOCATION	ACTIVATION DATE
571st SMS	Davis-Monthan AFB, Arizona	1 May 1962
533d SMS	McConnell AFB, Kansas	1 August 1962
374th SMS	Little Rock AFB, Arkansas	1 September 1962

On 8 June 1963, the 570th Strategic Missile Squadron at Davis-Monthan became the first Titan II unit to achieve operational status. Headquarters SAC completed the deployment of the second-generation ICBM weapon system on the last day of 1963 when it declared the sixth and last Titan II unit, the 374th Strategic Missile Squadron at Little Rock Air Force Base, Arkansas, operational.

By 1981, the Titan II weapon system had served the nation for eighteen years, eight years longer than its predicted service life. The system's advanced age, combined with three accidents that destroyed two sites and killed four airmen, had cast doubts on its safety and effectiveness. SAC, anticipating a Department of Defense (DOD) initiative, began to consider replacement options in October 1980. One month later, the Senate Armed Services Committee asked the Defense Department to prepare a formal Titan II safety report. SAC's replacement options review became the basis for the DOD safety report released in February 1981. The DOD study acknowledged Titan II's significant, albeit declining usefulness in preserving nuclear deterrence, and recommended deactivation of the Titan system as part of the ICBM modernization plan. During the interim, SAC would continue to improve Titan hardware and safety procedures. On 2 October 1981, Deputy Secretary of Defense Frank C. Carlucci directed the retirement of the Titan II at the earliest possible time. The deactivation program, designated Rivet Cap, formally began with the removal from alert of site 571-6 at Davis-Monthan AFB, Arizona, on 30 September 1982. Titan II deactivation was completed on 23 June 1987 when technicians removed the last Titan II missile from its silo at Little Rock AFB, Arkansas. The era of liquid propellant ICBMs came to a close on 18 August 1987 with the inactivation of the last Titan II wing, the 308th Strategic Missile Wing at Little Rock AFB.

In contrast to the Titan II, the Minuteman was a smaller, three-stage, solid-propellant, rocket-powered ICBM with a range of approximately 5,500 nautical miles. Minuteman also possessed an all-inertial guidance system and the capability of being fired from hardened and widely-dispersed underground-silo launchers. A consortium of five contractors produced four distinct models of the Minuteman ICBM weapon system, each model being an improvement over the former: Minuteman I (models "A" and "B"), Minuteman II (model "F"), and Minuteman III (model "G"), the latter capable of carrying multiple independently-targetable reentry vehicles (MIRVs).

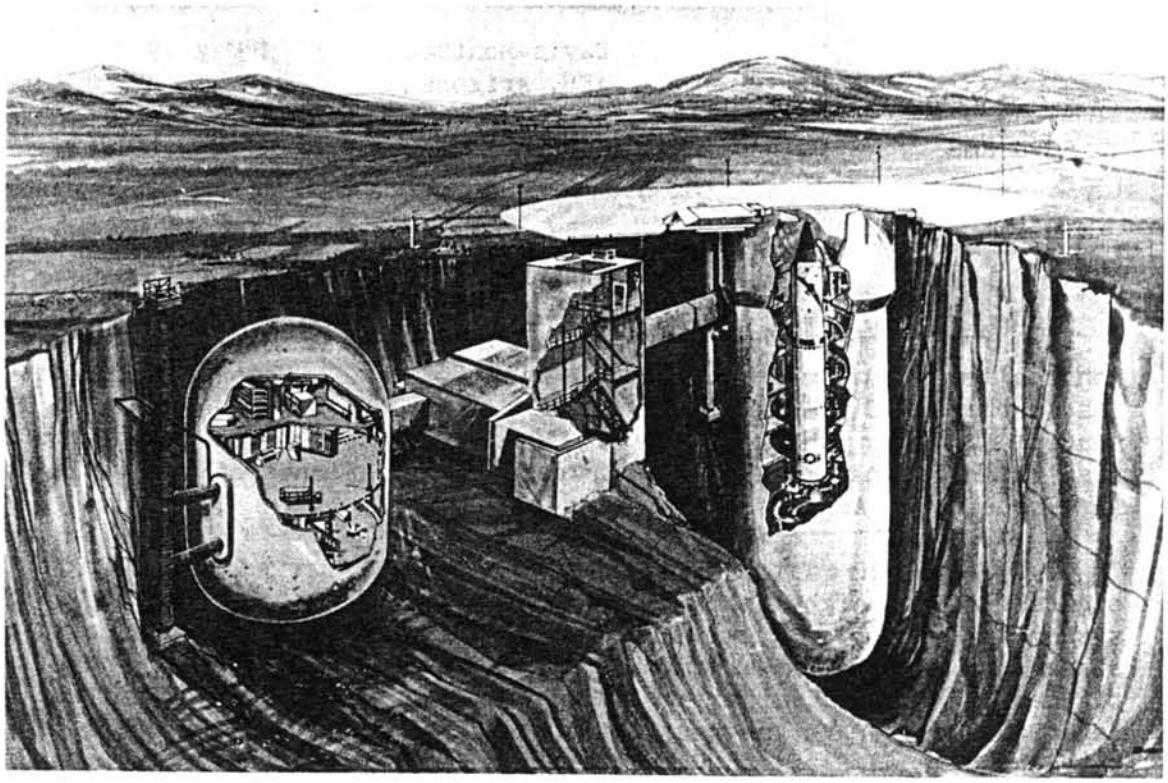
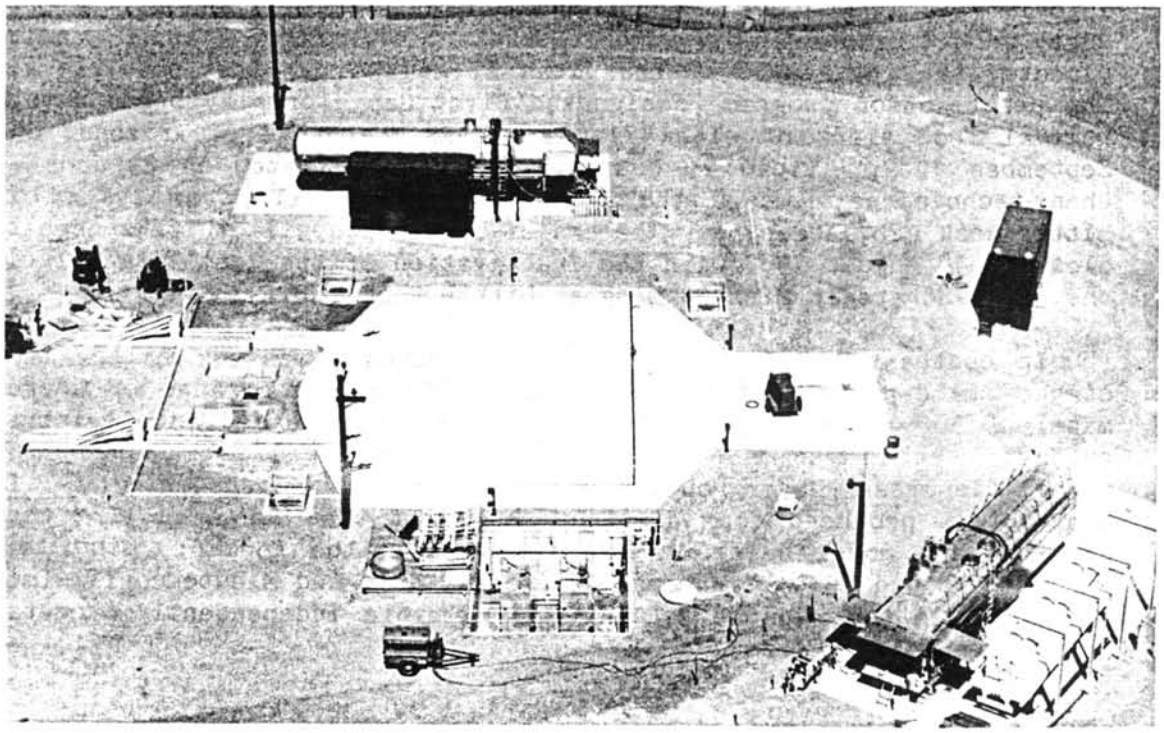
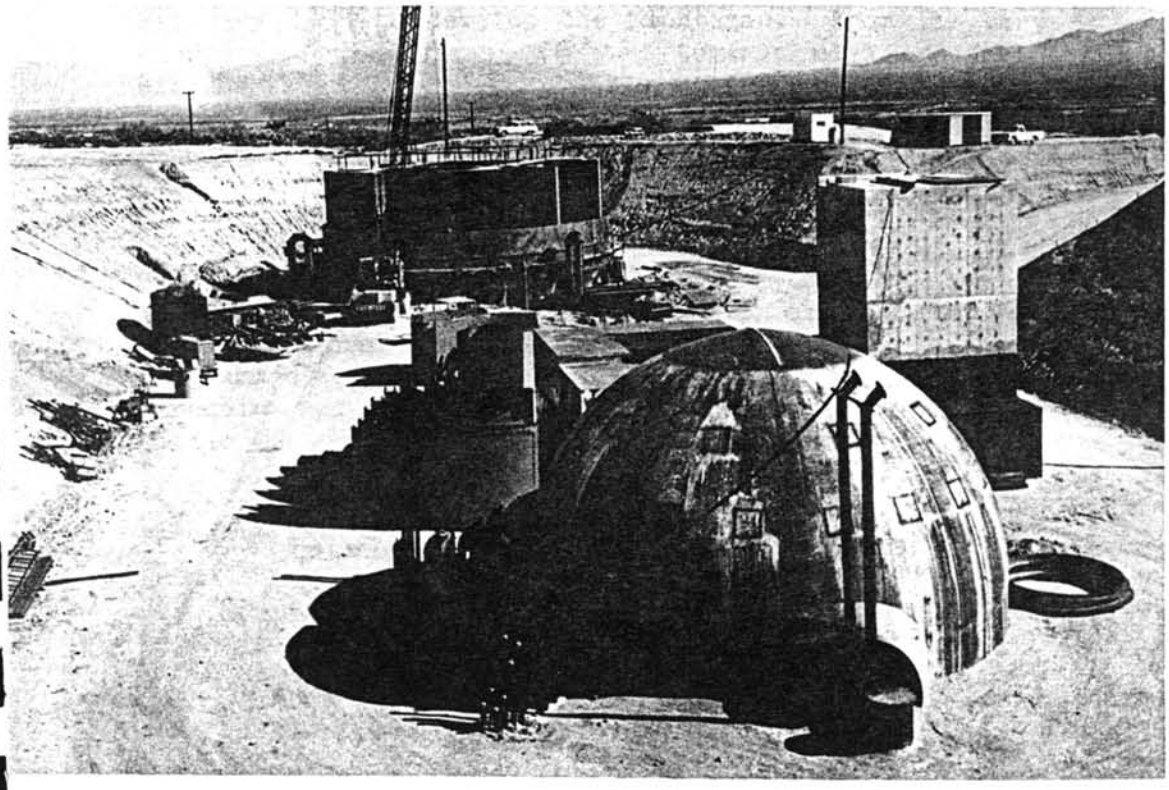


ILLUSTRATION OF A TITAN II COMPLEX.

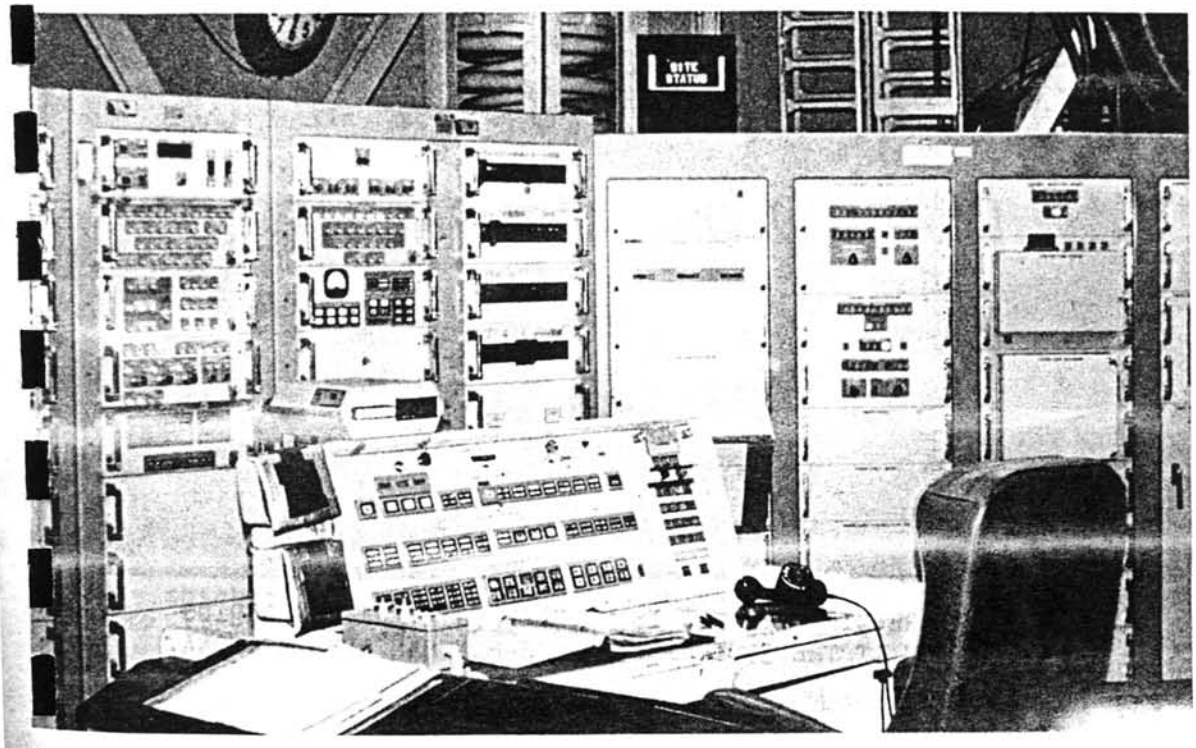
AN ABOVE-GROUND VIEW OF A TITAN II ICBM SITE.

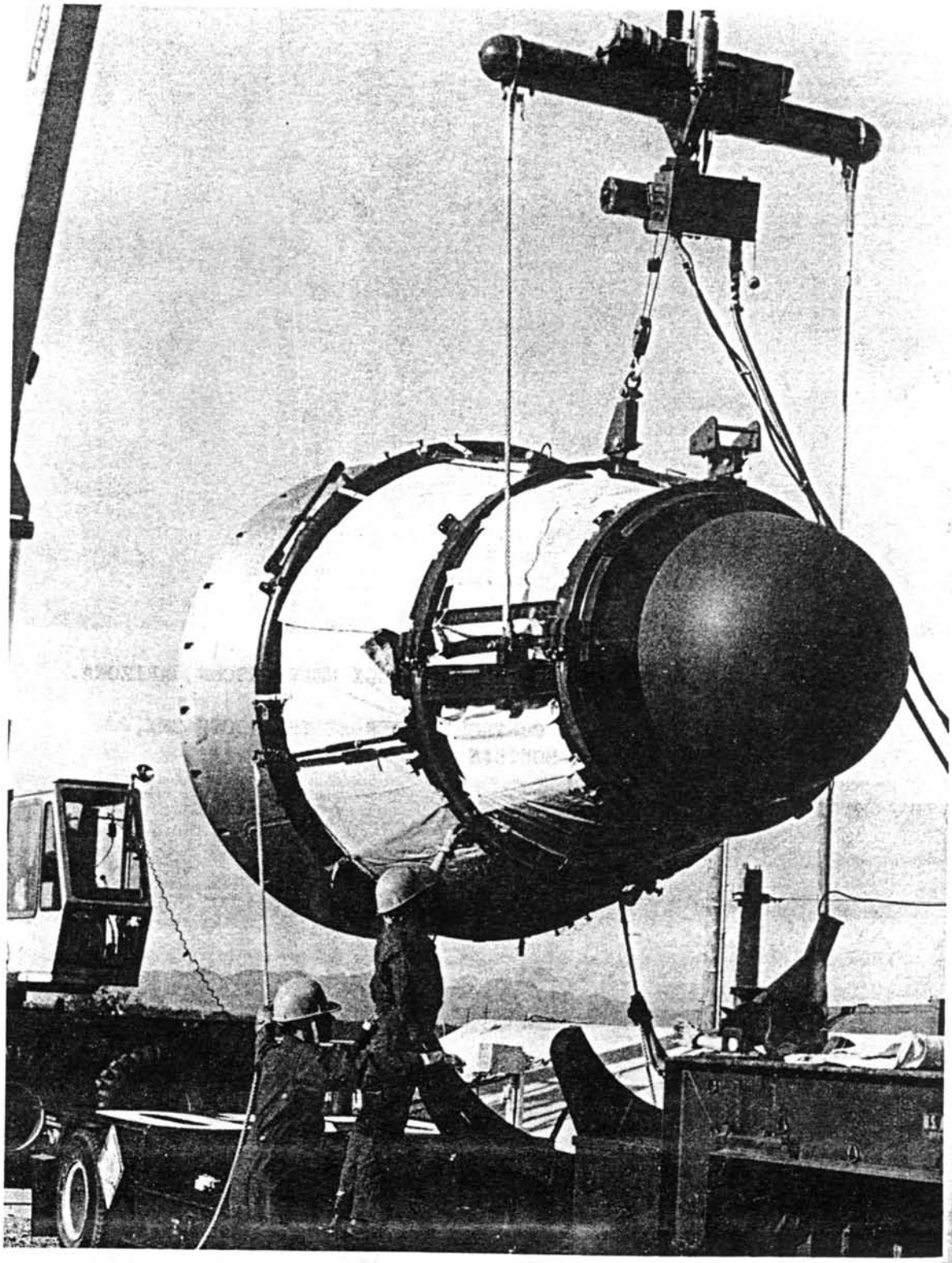




CONSTRUCTION OF A TITAN II ICBM COMPLEX NEAR TUSCON, ARIZONA.

A TITAN II LAUNCH CONTROL CENTER AT THE 390TH SMW,
DAVIS-MONTHAN AFB, ARIZONA.





A TITAN II REENTRY VEHICLE IS LOWERED ON A TRAILER DURING DEACTIVATION AT THE 390TH SMW, DAVIS-MONTHAN AFB, ARIZONA.

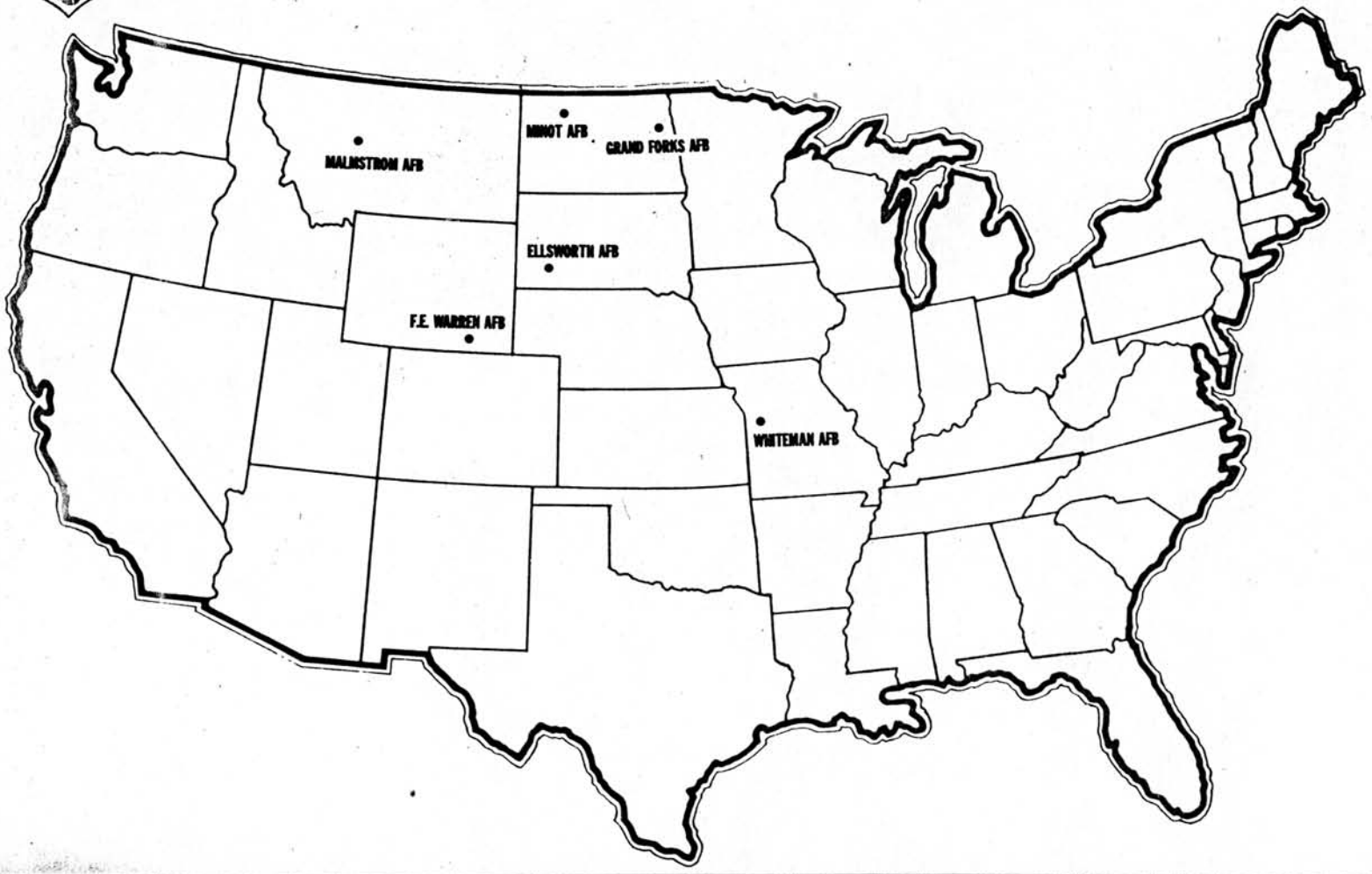
The Air Force secured approval from the Department of Defense on 27 February 1958 to develop the Minuteman. From its very inception, the Minuteman program was oriented towards mass production of a simple, efficient, and highly survivable ICBM capable of destroying all types of enemy targets with consistent reliability. The Air Force hoped that such a program would reverse the unfavorable trend towards succeeding generations of progressively more costly ICBMs and provide the Strategic Air Command with a weapon system that was inexpensive to operate and maintain.

During the early development phase of Minuteman, the Strategic Air Command favored the concept of deploying at least a portion of the programmed force (from 50 to 150 ICBMs) on railroad cars. SAC submitted a requirement to the Air Staff on 12 February 1959 calling for the first mobile Minuteman unit to be operational no later than January 1963. To determine the feasibility of deploying Minuteman ICBMs on mobile launchers, SAC ordered a series of tests to be conducted, nicknamed "Operation Big Star." Beginning 20 June 1960, a modified test train, operating out of Hill Air Force Base, Utah, traveled across the western and central United States so technicians could study factors such as (1) the ability of the nation's railroads to support mobile missile trains; (2) problems associated with command, control, and communications; (3) the effect of vibration on sensitive missiles and launch equipment; and finally, (4) human factors involved in the operation of a mobile missile system. Originally, six trial runs were projected, but only four were necessary to realize all test objectives. On 27 August 1960, the last of four Minuteman ICBM test trains arrived back at Hill AFB and the Air Force announced that the test of the Minuteman mobility concept had been completed satisfactorily.

Despite SAC's repeated pleas in favor of mobile Minuteman, the Air Force assigned top priority to the fixed silo-based Minuteman concept. Furthermore, on 28 March 1961, President John F. Kennedy deferred further action on the development of the three mobile Minuteman squadrons in favor of three additional squadrons of silo-based Minuteman units. Secretary of Defense Robert S. McNamara finally settled the issue on 7 December 1961 when he canceled the mobile Minuteman development program.

A decision regarding the final size of the silo-based Minuteman ICBM force was not made until December 1964. A new Minuteman system program directive issued on 11 December 1964 established the final Minuteman force at 1,000 missiles. Three years earlier, on 1 December 1961, Headquarters SAC had activated the first Minuteman squadron, the 10th Strategic Missile Squadron (ICBM-Model A Minuteman I) at Malmstrom Air Force Base, Montana. Only two other model "A" ICBM squadrons were activated by Headquarters SAC. These were the 12th Strategic Missile Squadron, activated on 1 March 1962, and the 490th Strategic Missile Squadron, activated on 1 May 1962, also located at Malmstrom. The next thirteen Minuteman squadrons activated by the Strategic Air Command were all model "B" Minuteman I units, situated at the following locations:

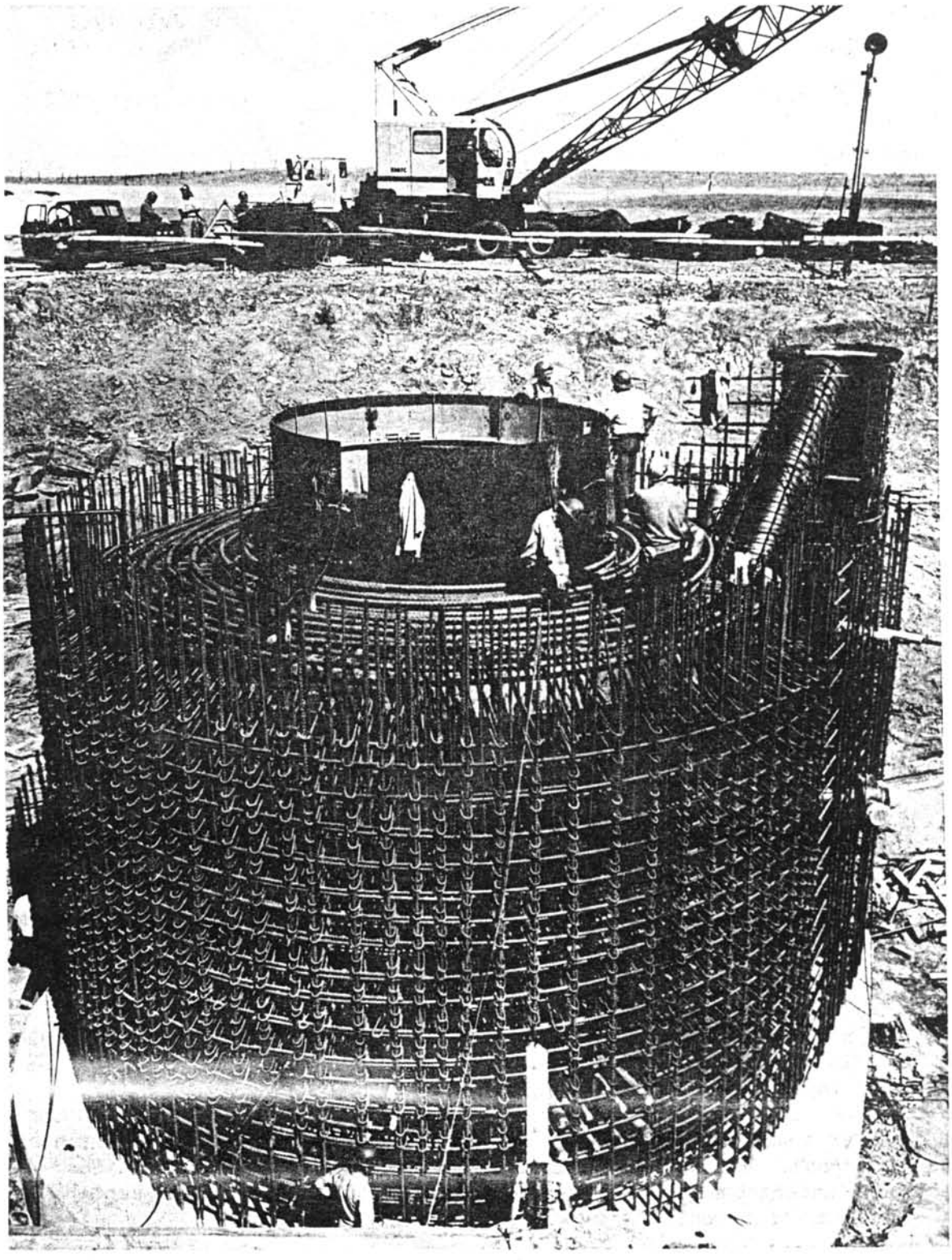
MINUTEMAN


MALMSTROM AFB
MINOT AFB
GRAND FORKS AFB
ELLSWORTH AFB
F.E. WARREN AFB
WHITEMAN AFB

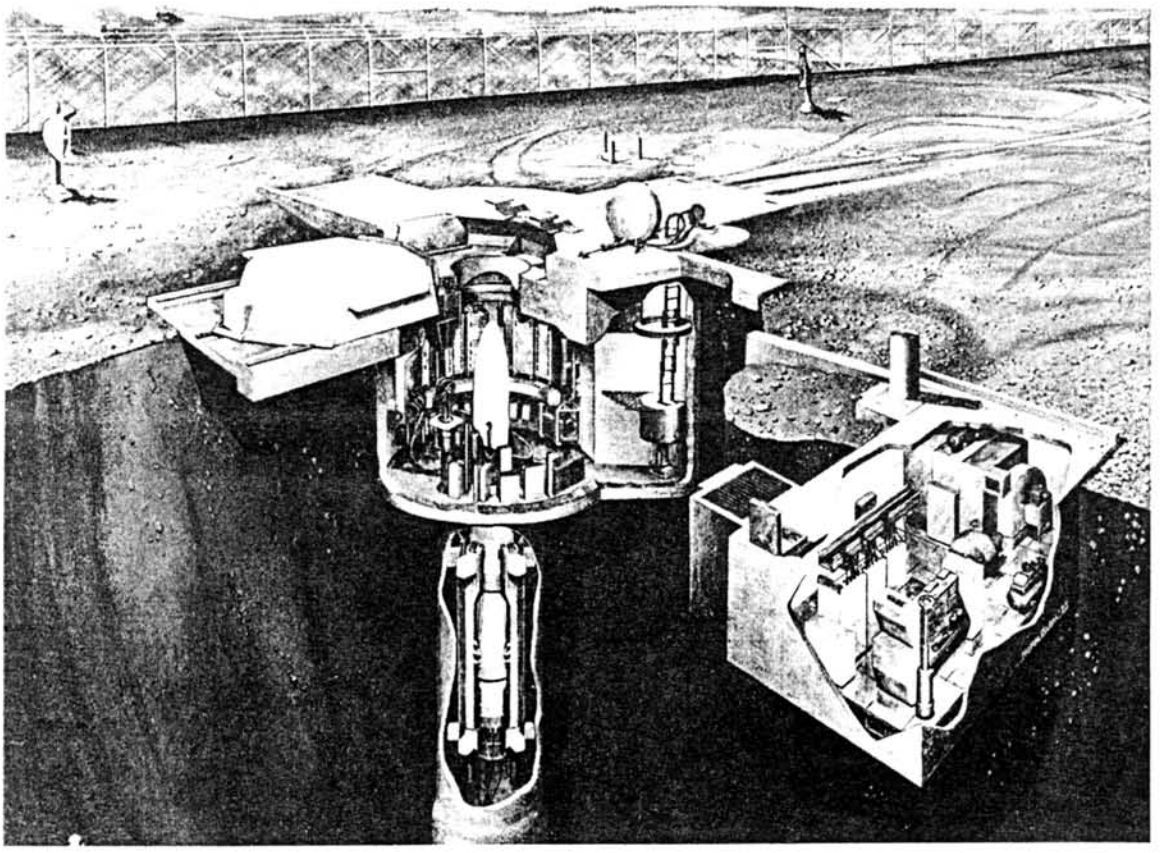
SQUADRON	LOCATION	ACTIVATION DATE
66th SMS	Ellsworth AFB, South Dakota	1 July 1962
67th SMS	Ellsworth AFB, South Dakota	1 August 1962
68th SMS	Ellsworth AFB, South Dakota	1 September 1962
740th SMS	Minot AFB, North Dakota	1 November 1962
741st SMS	Minot AFB, North Dakota	1 December 1962
742d SMS	Minot AFB, North Dakota	1 January 1963
508th SMS	Whiteman AFB, Missouri	1 May 1963
509th SMS	Whiteman AFB, Missouri	1 June 1963
510th SMS	Whiteman AFB, Missouri	1 July 1963
319th SMS	F.E. Warren AFB, Wyoming	1 October 1963
320th SMS	F.E. Warren AFB, Wyoming	8 January 1964
321st SMS	F.E. Warren AFB, Wyoming	8 April 1964
400th SMS	F.E. Warren AFB, Wyoming	1 July 1964

Strategic Air Command housed each Minuteman I, whether a model "A" or "B", in an unmanned, hardened, and widely-dispersed (three-to-seven mile intervals) underground-silo launch facility. A missile combat crew of two officers stationed in a hardened, underground launch control center monitored each flight of 10 launch facilities (five flights per squadron). For purposes of command, control, and communications, hardened underground cables linked all five launch control centers of a Minuteman squdron.

On 2 October 1963, shortly after the first model "A" and "B" Minuteman I squadrons achieved operational status, Headquarters USAF

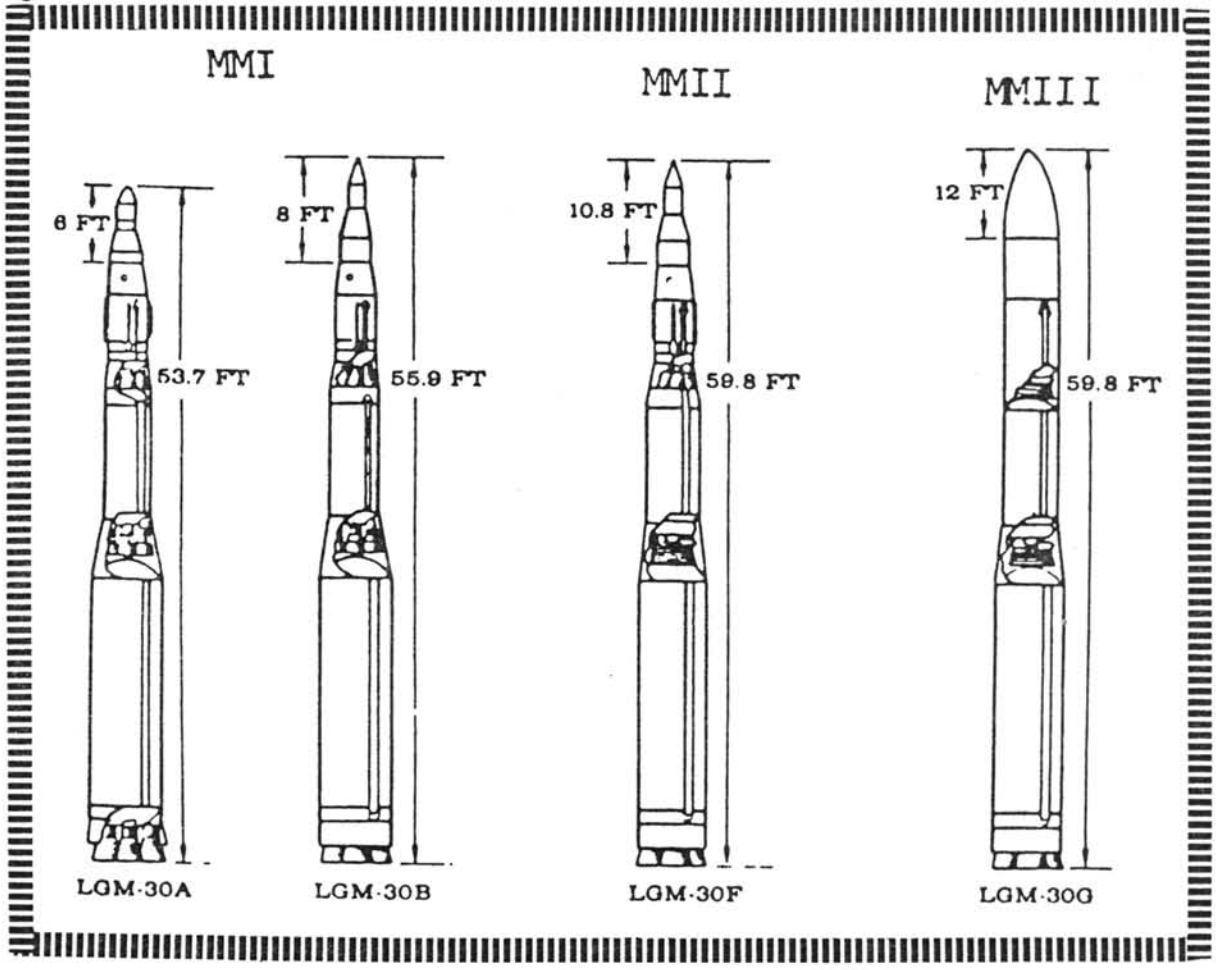


A TRANSFORMER UNDER CONSTRUCTION.



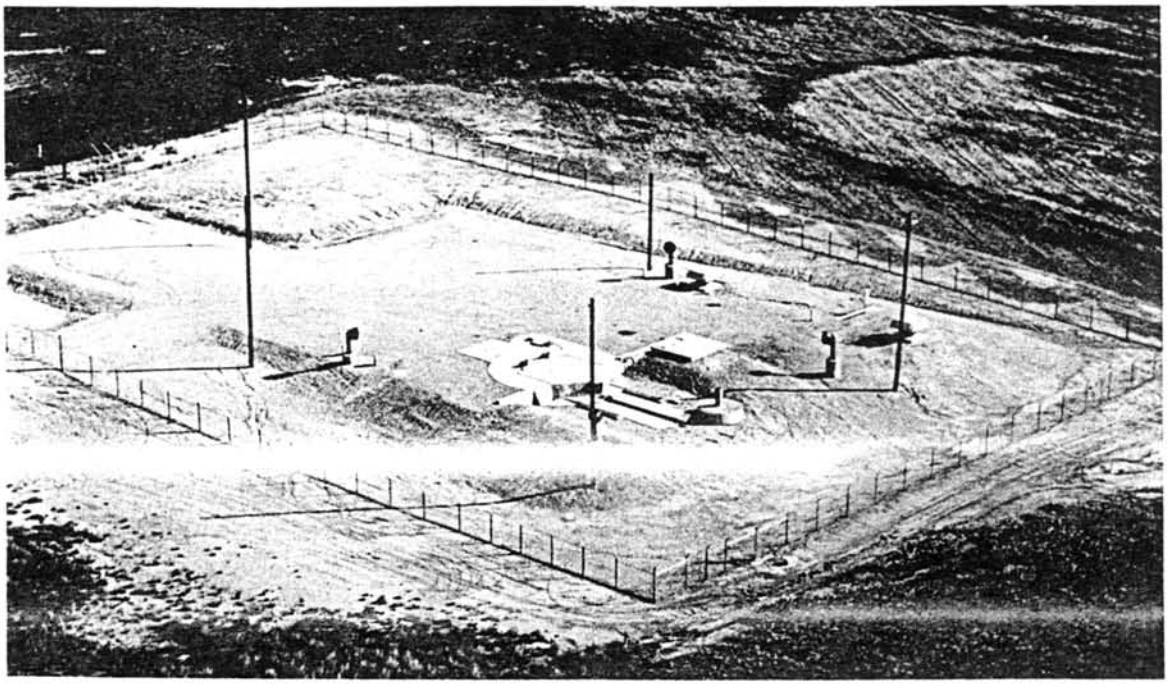
AN ILLUSTRATION OF A MINUTEMAN COMPLEX.

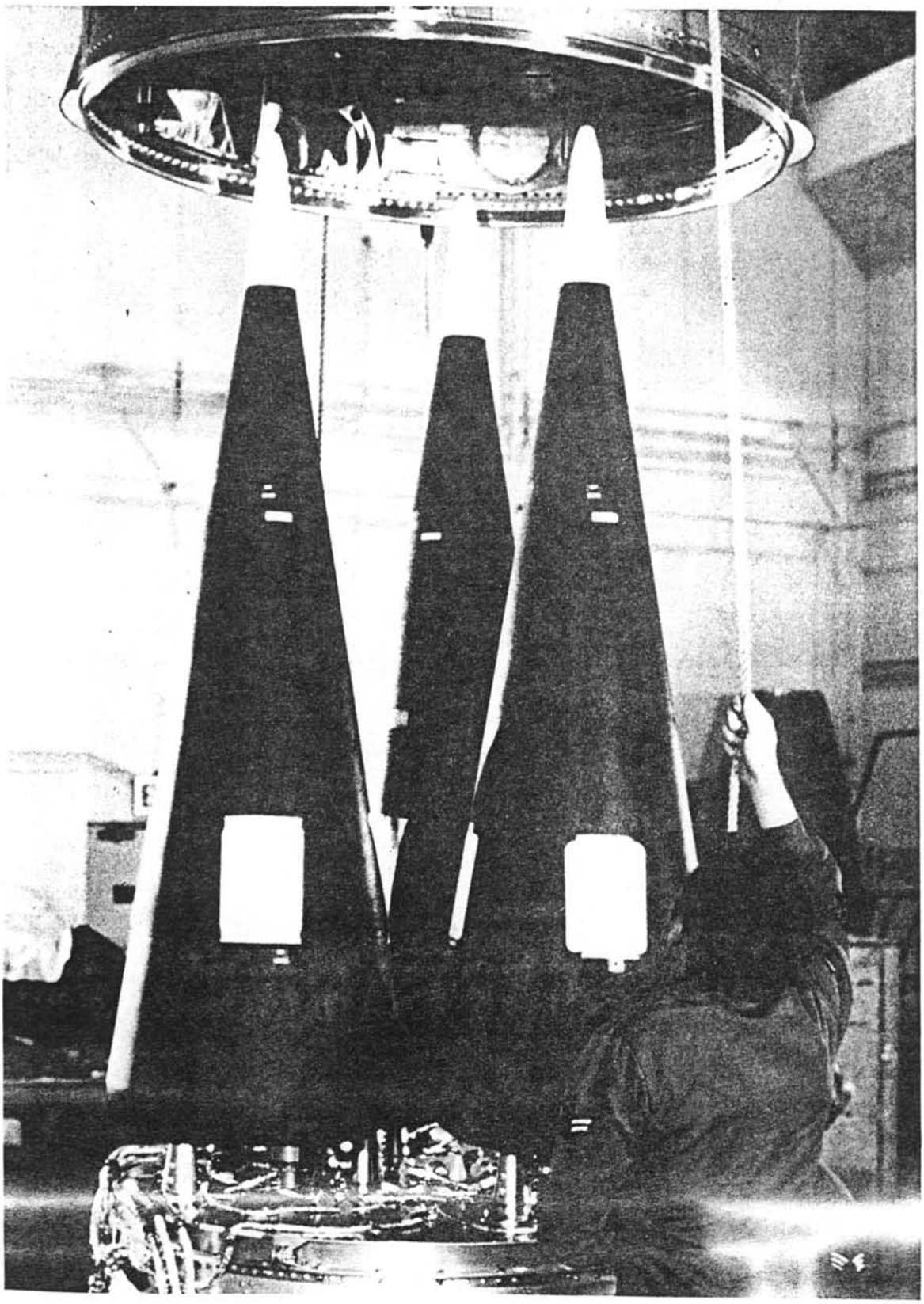
THE MOBILE MINUTEMAN CONCEPT, OPERATION BIG STAR, TEST TRAIN ROLLS THROUGH THE MOUNTAINS OF UTAH IN 1960.



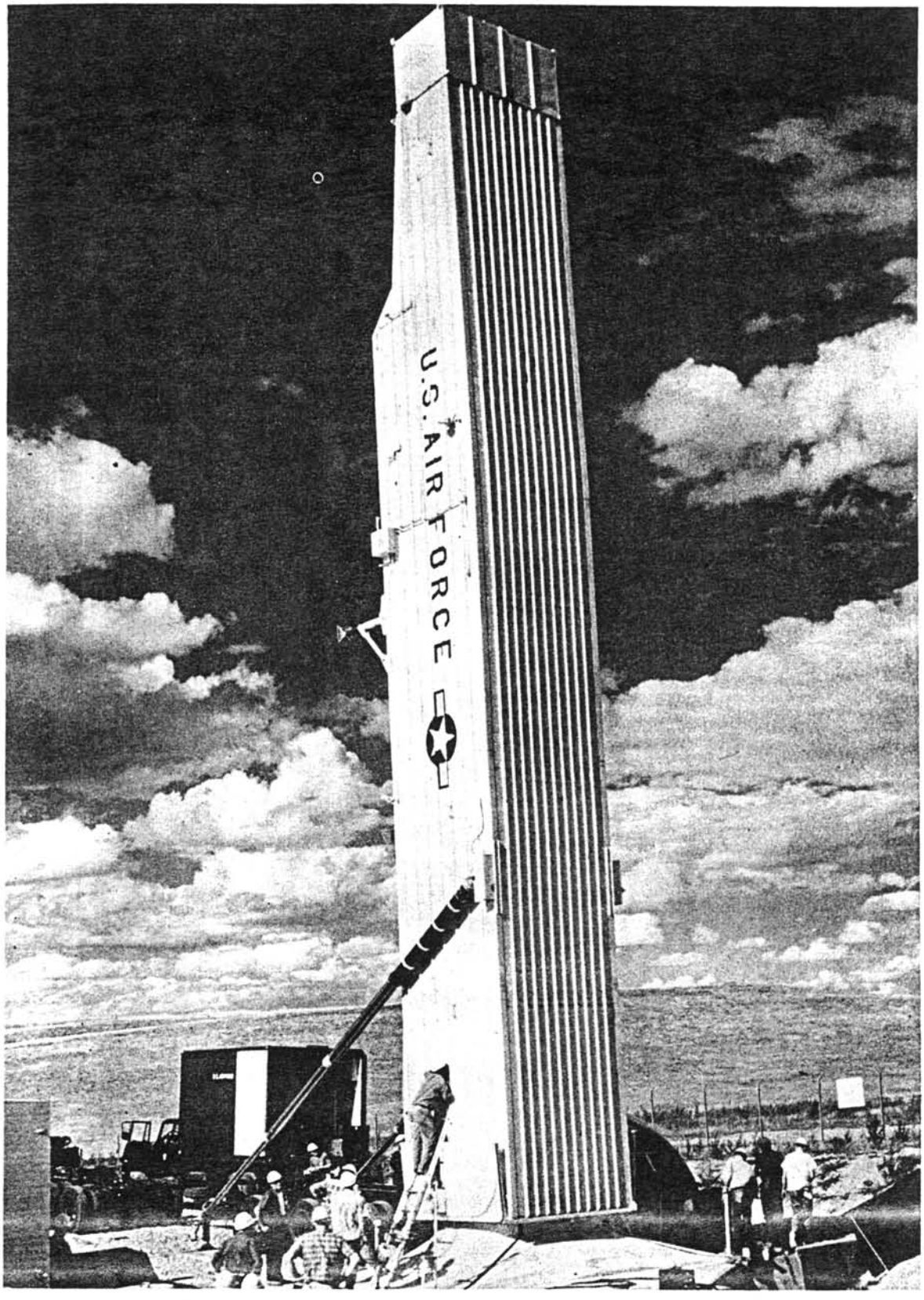
A COMPARISON MINUTEMAN ICBM MODELS.

AERIAL VIEW OF A MINUTEMAN ICBM LAUNCH FACILITY.





THE HEAT ASCENT SHROUD IS LOWERED OVER THE THREE MINUTEMAN III REENTRY VEHICLES PRIOR TO A TEST LAUNCH.



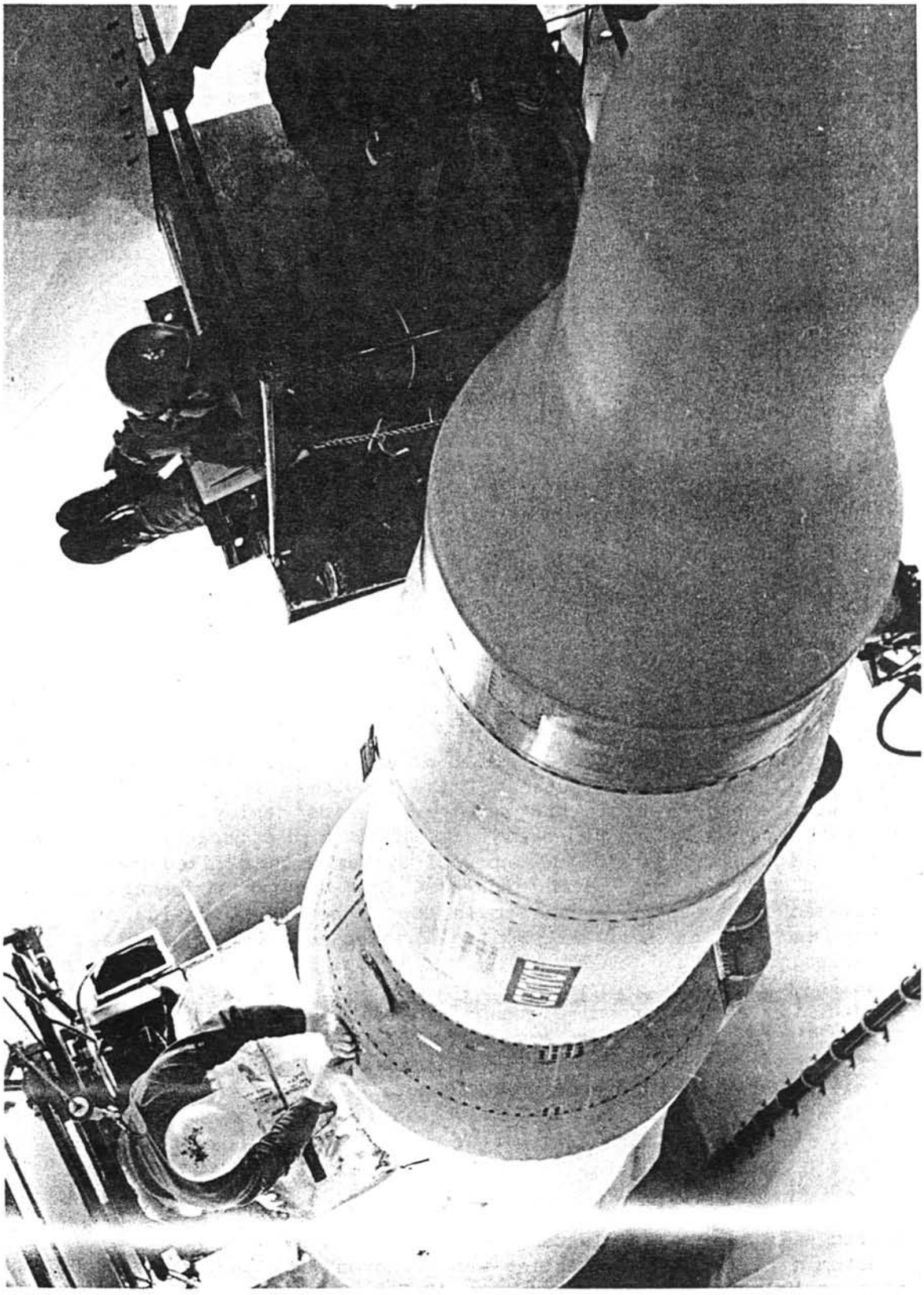
CREWS USE A MINUTEMAN TRANSPORTER-ERECTOR TO PLACE AN ICBM IN A SILO AT MALMSTROM AFB, MONTANA.

issued Annex A to Specific Operational Requirement 171 which established a requirement for the Minuteman II ICBM (Model "F"). A more advanced missile than either model of the Minuteman I, the "F" model incorporated a new, larger second-stage, improved guidance system, a greater range and payload capacity, and an increased capability to survive the effects of nuclear blast. In view of the numerous advantages of the Minuteman II, Secretary of Defense Robert S. McNamara approved the Minuteman Force Modernization Program on 8 November 1963. The project entailed the eventual replacement of the entire force of deployed Minuteman I ICBMs, 150 "A" and 650 "B" models, with Minuteman IIs. To prepare for the emplacement of the newer model Minuteman II ICBM, it was necessary to completely retrofit the original Minuteman I launch facilities, launch control facilities, and associated ground equipment. The Minuteman Force Modernization Program began at Whiteman Air Force Base, Missouri, on 7 May 1966 when the first flight of ten model "B" Minuteman missiles were removed from their silos at the 509th Strategic Missile Squadron.

On 1 February 1965, Headquarters SAC activated the 447th SMS at Grand Forks AFB, North Dakota, making it the seventeenth Minuteman squadron and the first to be equipped with "F" model missiles. Fourteen months later on 1 April 1966, SAC activated the fourth Minuteman II, and the twentieth and last Minuteman squadron, the 564th SMS, at Malmstrom AFB, Montana. Once the 564th SMS achieved operational status on 21 April 1967, the deployment of the programmed force of 1,000 Minuteman ICBMs was completed.

By the time the last Minuteman IIs of the 564th SMS were placed on strategic alert in the spring of 1967, significant progress had been made on the development of an even more advanced ICBM. The Minuteman III, using modernized Minuteman I and Minuteman II ground facilities, provided reentry vehicle and penetration aids deployment flexibility, increased payload, and improved survivability in a nuclear environment. Its liquid injection attitude control system with a fixed nozzle on an improved third stage motor increased the Minuteman's range and the Minuteman III reentry system could deploy penetration aids and up to three Mark 12 or Mark 12A multiple independently-targetable reentry vehicles. A liquid-fueled post-boost propulsion system maneuvered the missile prior to deployment of the reentry vehicles, while upgraded guidance system electronics enhanced computer memory and accuracy. On 17 April 1970, an important Minuteman III milestone was reached when the first missile was placed in a silo assigned to the 741st Strategic Missile Squadron, Minot AFB, North Dakota. At the end of December, the 741st SMS became the first SAC Minuteman III squadron to achieve operational status.

The Minuteman Force Modernization Program initiated in 1966 to replace all Minuteman I's with either Minuteman II's or Minuteman III's continued through the latter 1960s and into the mid-70s. The last Minuteman I series "A" missiles were removed from their launch facilities at Malmstrom AFB, Montana, on 12 February 1969. These facilities were refurbished and outfitted with Minuteman II series "F" missiles. Boeing Aerospace Company, the contractor responsible for remodeling the

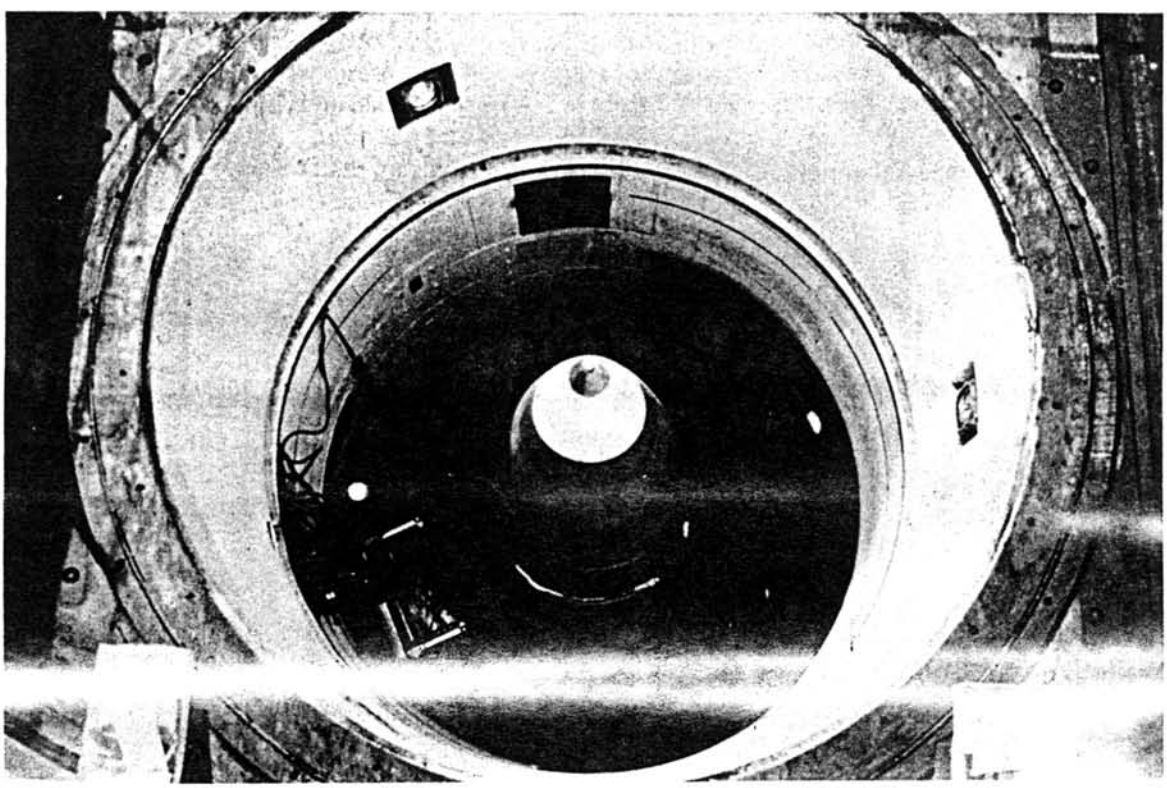


A MAINTENANCE CREW CHECKS A MINUTEMAN II GUIDANCE SYSTEM
AT THE 321ST SMW, GRAND FORKS AFB, NORTH DAKOTA.

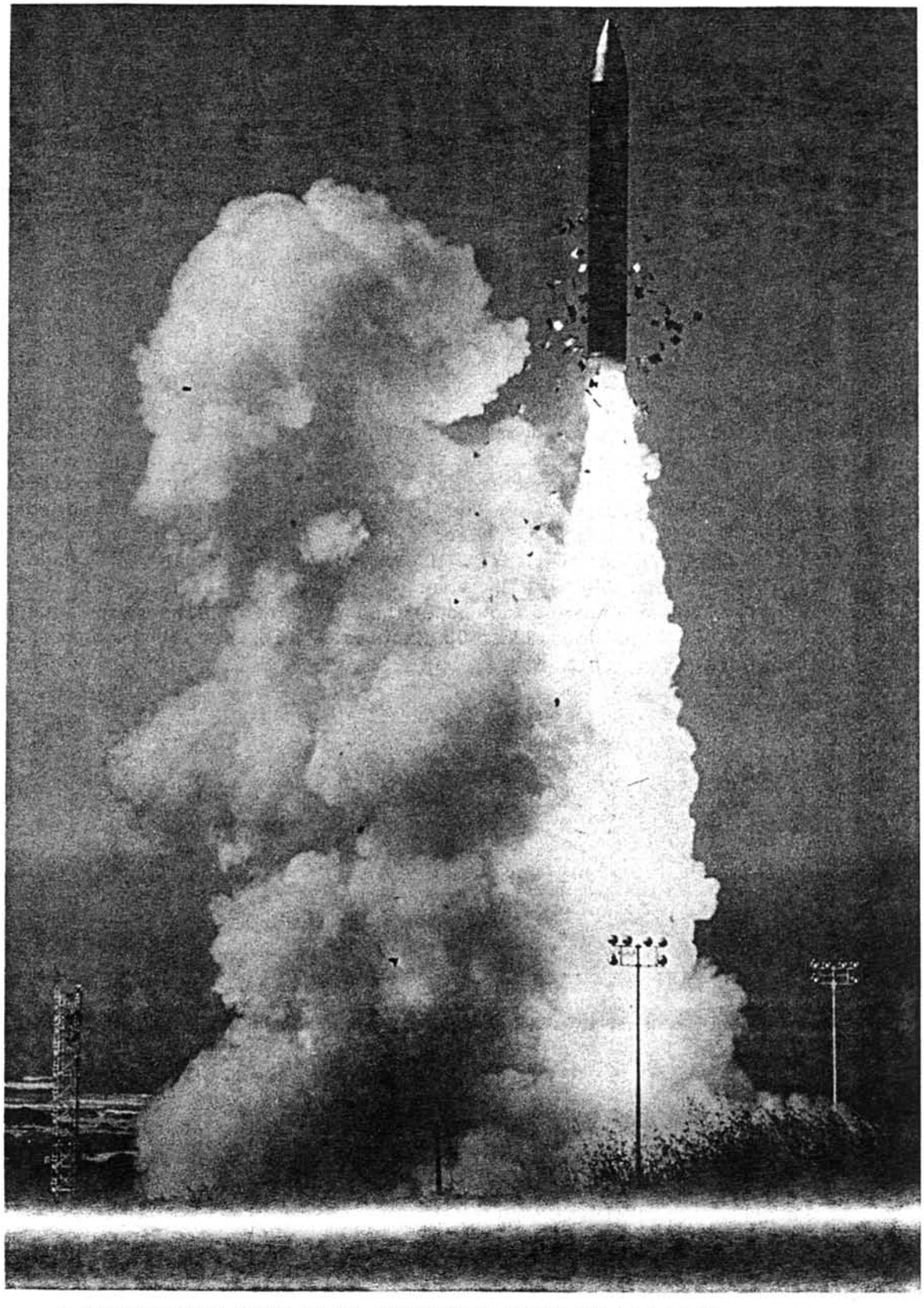
launch facilities, completed the nine year modernization effort on 26 January 1975 when it turned over to SAC the last flight of ten Minuteman III missiles at the 90th Strategic Missile Wing, F.E. Warren AFB, Wyoming.

Strategic Air Command expected Minuteman to play an important role in the command's force structure beyond the year 2000. To ensure the reliability and maintainability of the Minuteman force into the next century, the Air Force initiated a major Minuteman upgrade and modification program. Rivet MILE (Minuteman Integrated Life Extension Program) began 1 April 1985 at the 341st Strategic Missile Wing, Malmstrom AFB, Montana. This joint Strategic Air Command and Air Force Logistics Command effort was the largest single missile logistics program ever undertaken within the ICBM program.

Peacekeeper missile deployment also affected the Minuteman force. As part of the strategic modernization program undertaken in 1982, Strategic Air Command deployed fifty Peacekeeper missiles in modified Minuteman III silos assigned to the 400th Strategic Missile Squadron, 90th Strategic Missile Wing, F.E. Warren AFB, Wyoming. Conversion began on 3 January 1986, when the first Minuteman came off alert, and the phaseout of the 400th SMS's Minuteman IIIs was completed on 11 April 1988. Strategic Air Command now operated hardened, dispersed launch facilities for 450 Minuteman II, 500 Minuteman III, and 50 Peacekeeper missiles.



SAC'S FIRST MINUTEMAN III EMPLACED IN LAUNCH FACILITY
H-2 AT THE 741ST SMS, MINOT AFB, NORTH DAKOTA



A PEACEKEEPER ICBM HEADS DOWNRANGE AFTER [illegible]
LAUNCH FROM VANDENBERG AFB, [illegible]

CHAPTER IV

THE THIRD-GENERATION ICBM: PEACEKEEPER

Once Minuteman III deloyment was underway, Strategic Air Command's planners began their search for a third-generation ICBM that could successfully engage Soviet targets and preserve deterrence into the twenty-first century. SAC again sought the most technologically advanced system to secure increased range, variable warhead yields, and pinpoint accuracy. Several issues complicated the development and acquisition of a new ICBM system. The increased accuracy of Soviet missile systems spawned an intense debate over the survivability of fixed missile sites and the best method for basing the third-generation ICBM. However, the issue of funding, given an atmosphere of burgeoning federal deficits and cost-cutting measures, impeded SAC's efforts to acquire a new missile. Nonetheless, SAC persevered and brought the Missile-X into the ICBM inventory as the Peacekeeper missile.

The Peacekeeper (designated LGM-118A) was a four-stage intercontinental ballistic missile capable of carrying up to ten independently-targetable reentry vehicles. Its design combined advanced technology in fuels, guidance, nozzle design, and motor construction with protection against the hostile nuclear environment associated with land-based systems. Three of the four stages exhausted their solid propellants through a single adjustable nozzle which guided the missile along its flight path. Motorcases made of kevlar epoxy material held the solid propellants. The fourth stage post-boost vehicle employed a liquid bi-propellant rocket propulsion system to provide velocity and attitude correction for missile guidance. The post-boost vehicle also employed a self-contained inertial navigation system that allowed the missile to operate independent of ground reference or commands during flight.

The 28-foot first-stage solid-fuel rocket motor weighed approximately 108,000 pounds and was capable of boosting the missile to about 75,000 feet. The 18-foot long second-stage motor propeled the missile to an altitude of about 190,000 feet and weighed 60,000 pounds. The rocket motor in the eight-foot third stage weighed 17,000 pounds and supplied the thrust to boost the missile to about 700,000 feet. The 2,300 pound post-boost fourth stage vehicle was designed to maneuver the missile into position for the multiple reentry vehicles to deploy in their respective ballistic missile trajectories.

The Peacekeeper was the first U.S. ICBM to use cold launch technology. The missile was placed inside a canister and loaded into the launch facility. When launched, high-pressure steam ejected the canister from the launch silo to an altitude of 150 t[illegible] once the missile has cleared the silo, the first stage ignited and sent the missile on its course. This technique allowed SAC to launch the [illegible] that the Peacekeeper

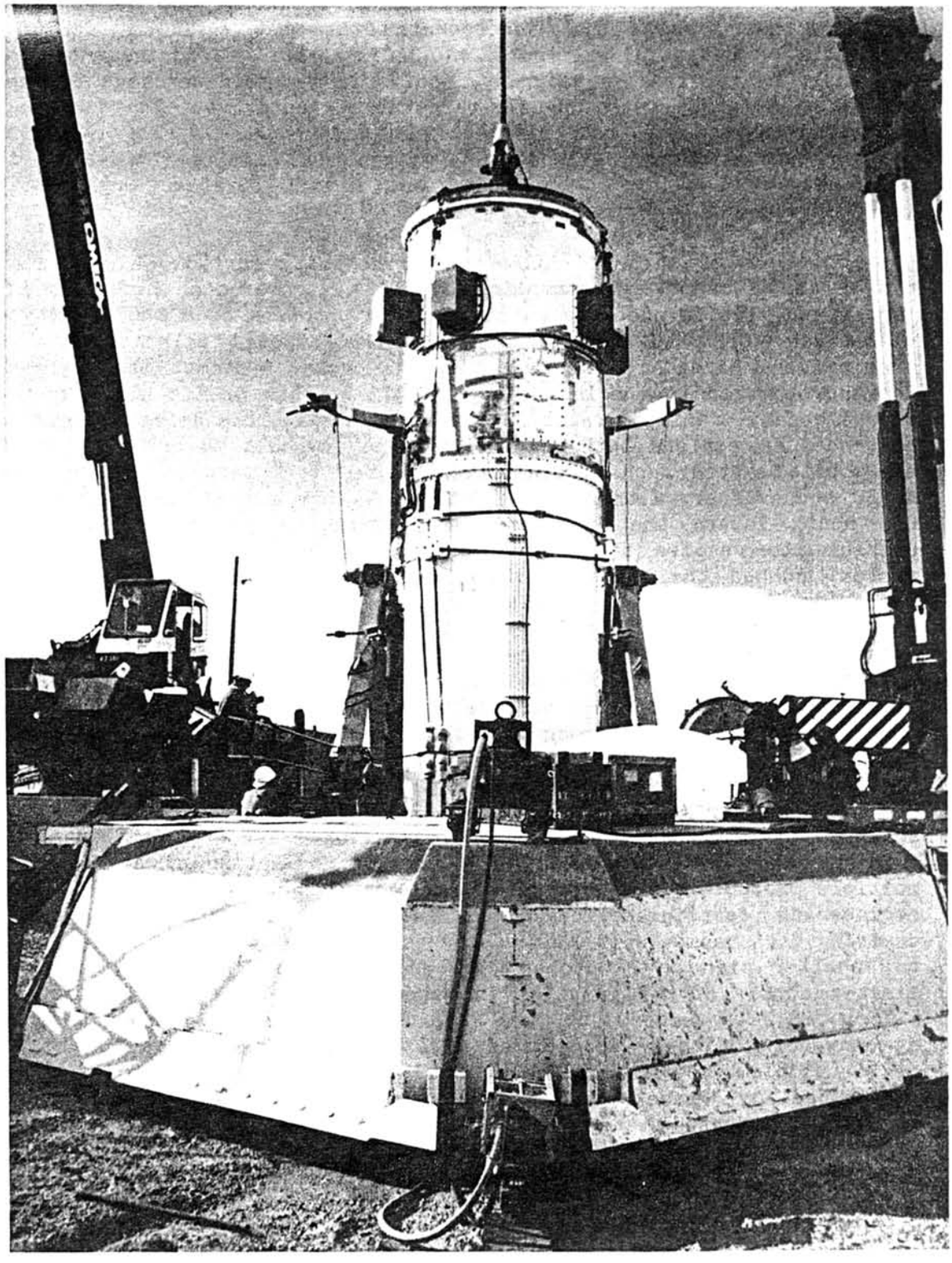
PEACEKEEPER

The search for a system to replace the Minuteman began in 1971. Strategic Air Command, believing Minuteman technology to be obsolete, wanted a new missile that incorporated the most advanced technology available. Essential elements on SAC's list of requirements were increased range, greater accuracy, and variable yield warheads to capitalize on multiple independently-targetable reentry vehicle technology. Progress toward the new missile was made on 4 April 1972 when Headquarters Air Force assigned the designation "Missile-X" (M-X) to the advanced ICBM and made the Space and Missile Systems Organization (SAMSO) responsible for developing it.

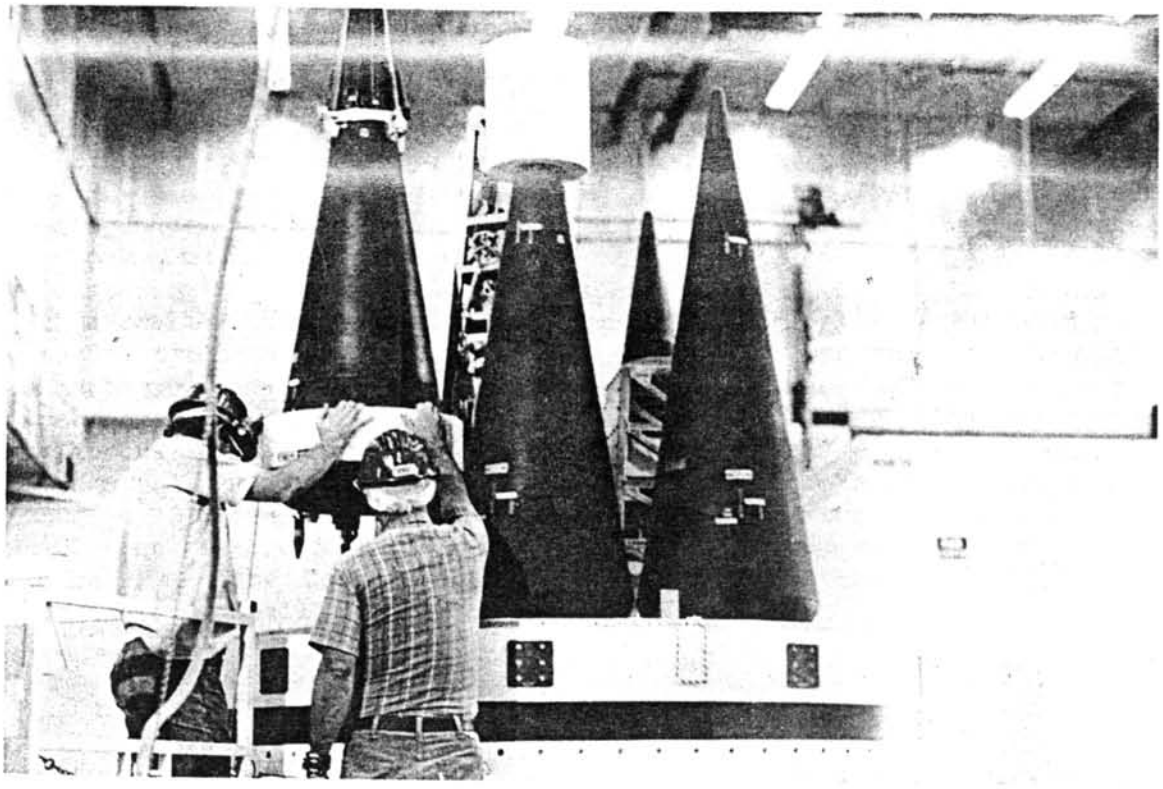
The issue of hardened silos versus mobility surfaced almost immediately as a major M-X stumbling point. Improvements in Soviet ICBM forces and missile accuracy raised serious concerns over the ability of silo-based ICBMs to survive an attack. Proposed solutions to the problem were hardened silos and a mobile basing system. Strategic Air Command objected to mobile basing in 1973 because of its high expense, poor accuracy, and slow reaction time. Meanwhile, the defense community continued to explore both solutions. One approach to mobility was an air-mobile system, and during a 24 October 1974 test of the concept, SAMSO successfully launched a Minuteman I from a C-5A cargo aircraft. One month later, the Secretary of Defense, under intense political pressure to resolve basing issues and produce an economical missile system, pushed the M-X's initial operational capability from 1983 to 1985. At the same time, he initiated studies to determine the feasibility of developing a common M-X/Trident missile. In July 1976, Congress, convinced that silo-based missiles would be vulnerable to Soviet ICBMs, refused to appropriate funds for validation of a silo-based M-X system. Congress also deleted funds for air-mobile basing and directed validation of either a buried trench or shelter basing plan.

The defense establishment examined nearly forty basing modes before President Carter made his 12 June 1979 decision to proceed with full scale engineering development of the Missile-X. The President augmented this decision on 7 September 1979 with the selection of a horizontal multiple protective shelter basing plan for the new missile. Full scale engineering development began one week later. President Reagan, desiring more rapid deployment of the new missile, canceled the horizontal shelter plan on 2 October 1981 and advocated the deployment of a limited number of M-X missiles in superhardened Titan II or Minuteman silos. On 22 November 1982, the President further refined his position by announcing Closely Spaced Basing as the final solution to the M-X basing problem. President Reagan used the same speech to indicate his preference for "Peacekeeper" as the name of the M-X missile. Congress, which had rejected interim Peacekeeper basing in Minuteman silos in March 1982, also rejected Closely Spaced Basing and refused to approve Peacekeeper funding. The Congress urged that the President undertake a comprehensive technical assessment of the ICBM and ba alternatives.

President Reagan responded by first directing Headquarters

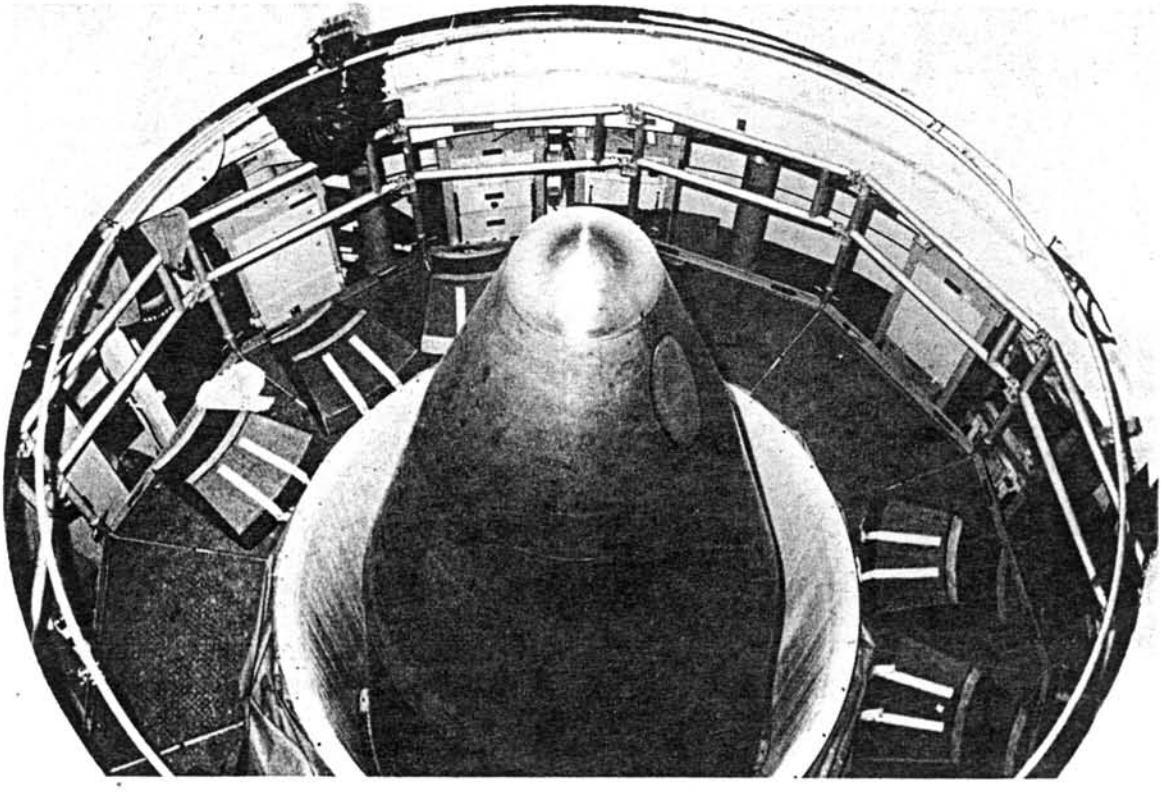


A PEACEKEEPER ICBM IN A CANNISTER IS LOADED INTO A REFURBISHED MINUTEMAN SILO AT F.E. WARREN AFB, WYOMING.



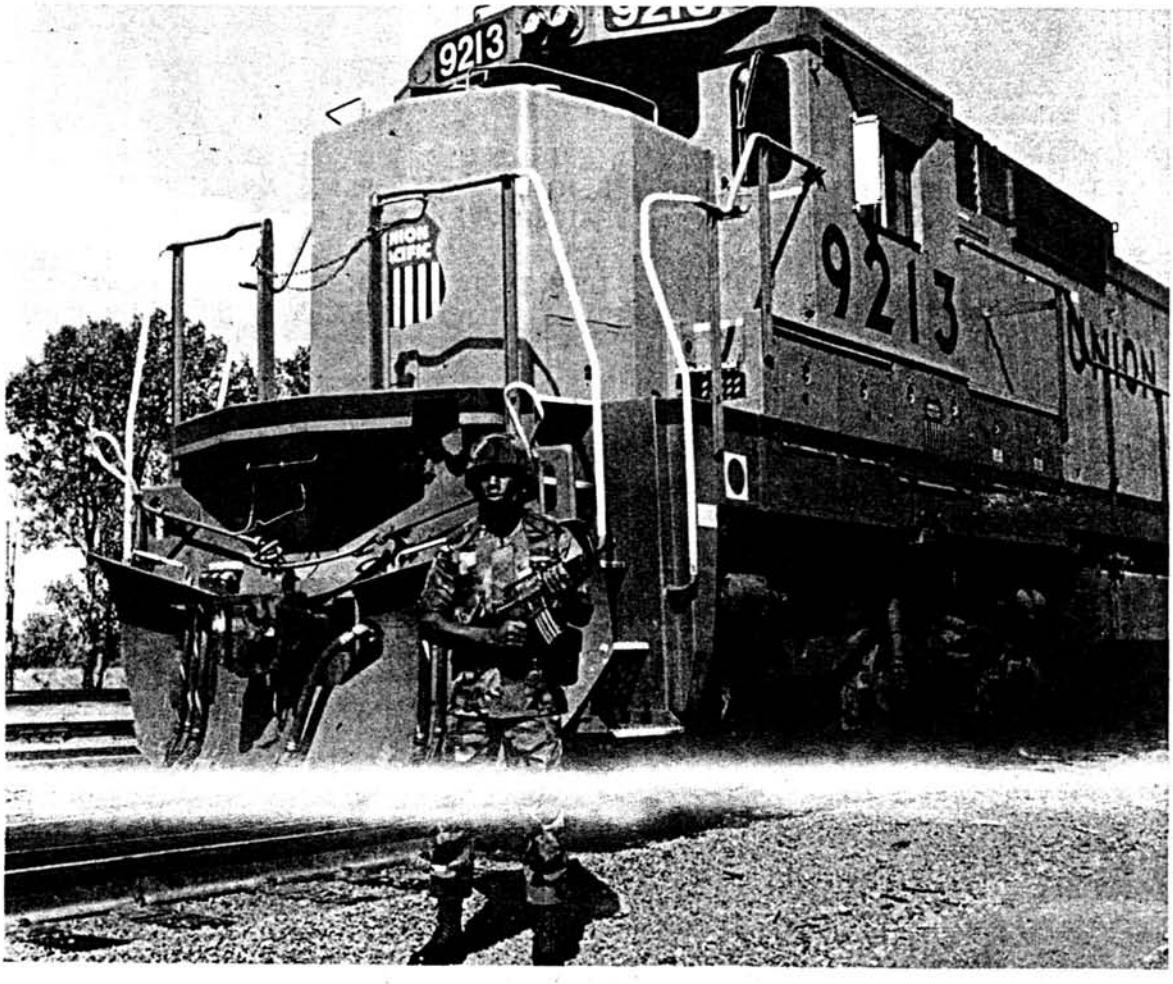
TECHNICIANS AT VANDENBERG AFB, CALIFORNIA, PLACE A NOSE CONE ON A PEACEKEEPER REENTRY VEHICLE PRIOR TO A FLIGHT TEST.

A PEACEKEEPER ICBM IN ITS SILO.



PEACEKEEPER RAIL GARRISON

US AIR FORCE



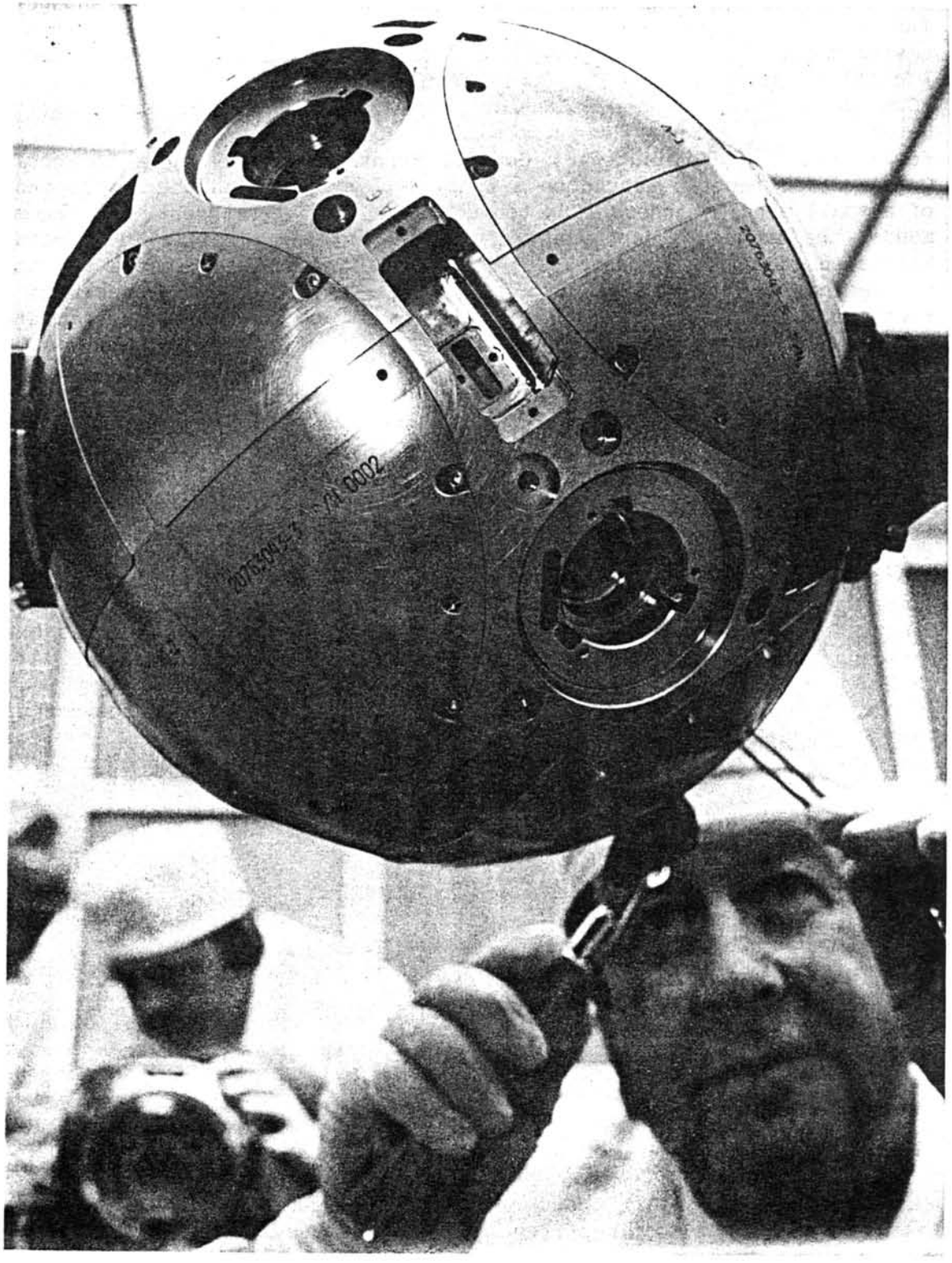
A SAC SECURITY POLICEMAN STANDS GUARD BEFORE A PEACEKEEPER RAIL GARRISON TEST TRAIN.

March 1983, advocated deployment of a new, highly accurate ICBM in sufficient numbers to eliminate the Soviet Union's "coercive advantage." The Air Force also recommended concurrent deployment of a survivable basing method that allowed credible, effective, and timely retaliation. A critical point in the Air Force assessment was the need to deploy an ICBM quickly as a demonstration of national resolve to preserve deterrence. President Reagan also appointed a Commission on Strategic Forces chaired by Lieutenant General Brent Scowcroft. The Scowcroft Commission's report, issued on 6 April 1983, encouraged the development of a small single-warhead ICBM to meet the long-range threat, but recommended the immediate deployment of 100 Peacekeeper missiles in existing Minuteman silos to demonstrate national will and to compensate for the retirement of Titan II ICBMs. The Scowcroft report also encouraged a vigorous examination of all basing alternatives. President Reagan and Congress concurred with the Scowcroft Commission's findings and on 10 August 1983 the Secretary of Defense instructed the Air Force to deploy 100 Peacekeepers in Minuteman silos at F.E. Warren AFB, Wyoming. At the same time, the Defense Secretary directed the Air Force to initiate design of a small, single-warhead ICBM.

Air Force Systems Command conducted its first Peacekeeper test launch on 18 June 1983 from an above-ground canister-type launch facility at Vandenberg AFB, California. Peacekeeper production began in February 1984. Under plans prepared by Strategic Air Command, 50 Minuteman IIIs assigned to the 400th Strategic Missile Squadron, 90th Strategic Missile Wing, F.E. Warren AFB, Wyoming, would be removed and replaced with Peacekeeper missiles, which had an estimated service life of twenty years. Peacekeeper deployment was scheduled to begin in January 1986 and initial operational capability was set for December of the same year. The second increment of 50 missiles would replace Minuteman IIIs belonging to the 319th Strategic Missile Squadron at F.E. Warren. The expected completion date of the deployment was December 1989.

These plans were interrupted in July 1985 when Congress limited Peacekeeper deployment to 50 missiles until the administration could produce a more survivable basing plan. President Reagan's solution for basing the remaining 50 missiles, announced 19 December 1986, was Peacekeeper Rail Garrison. Three days later, the 90th SMW achieved initial operational capability for Peacekeeper by placing the first flight of ten missiles on strategic alert. Full operational capability occurred in December 1988, when the 90th Strategic Missile Wing accepted the fiftieth Peacekeeper missile.

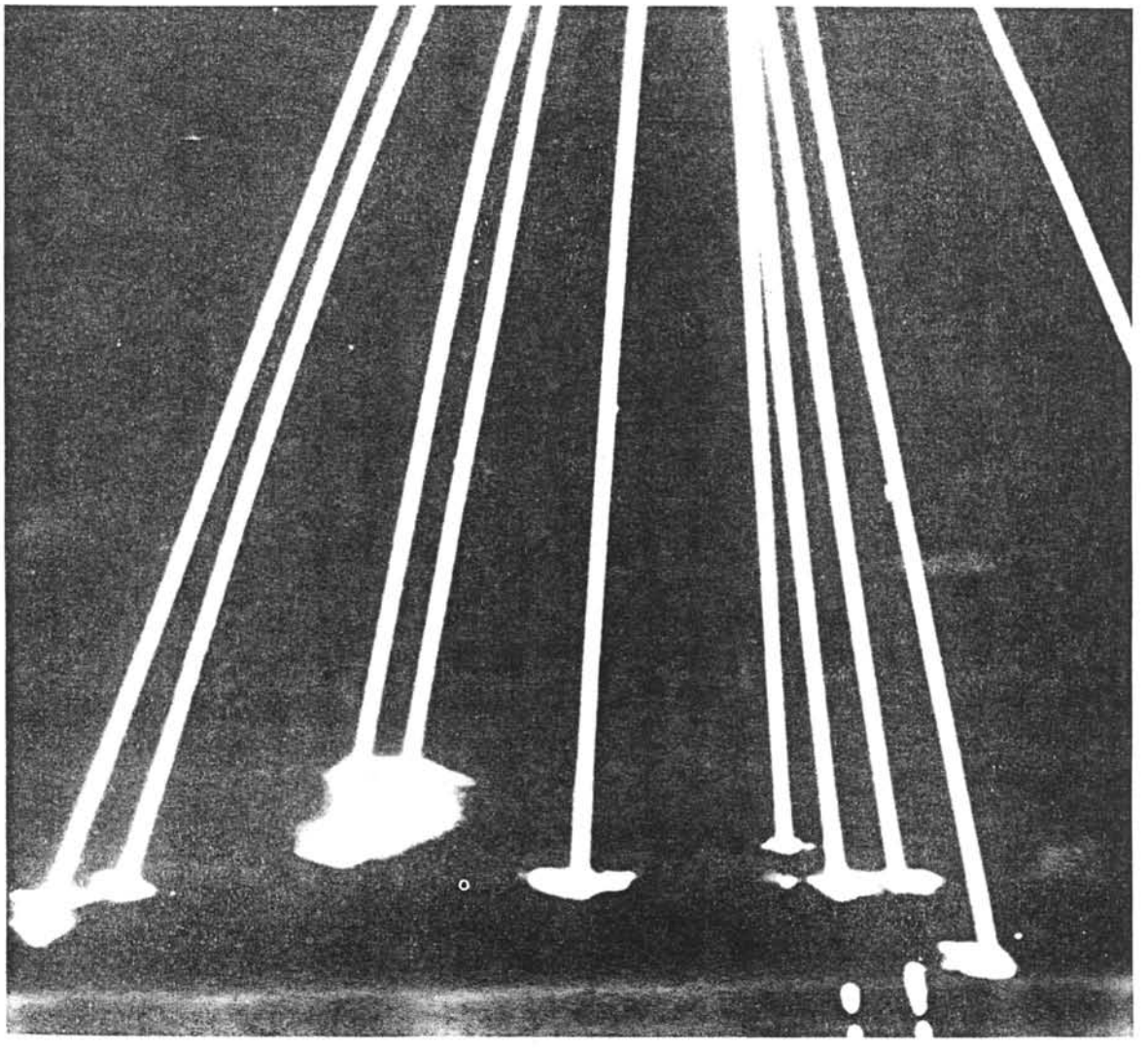
Under the rail garrison concept, the remaining Peacekeeper missiles would be placed on trains stationed at various U.S. Air Force installations. The 25 trains, each carrying two missiles, would deploy off-base and onto the national railroad network during periods of international tension to improve survivability. F.E. Warren AFB would serve as the Main Operating Base for the rail garrison force. In February 1987, the Air Force selected ten additional bases as candidate rail garrison locations. That same year, Congress appropriated $350 million to fund



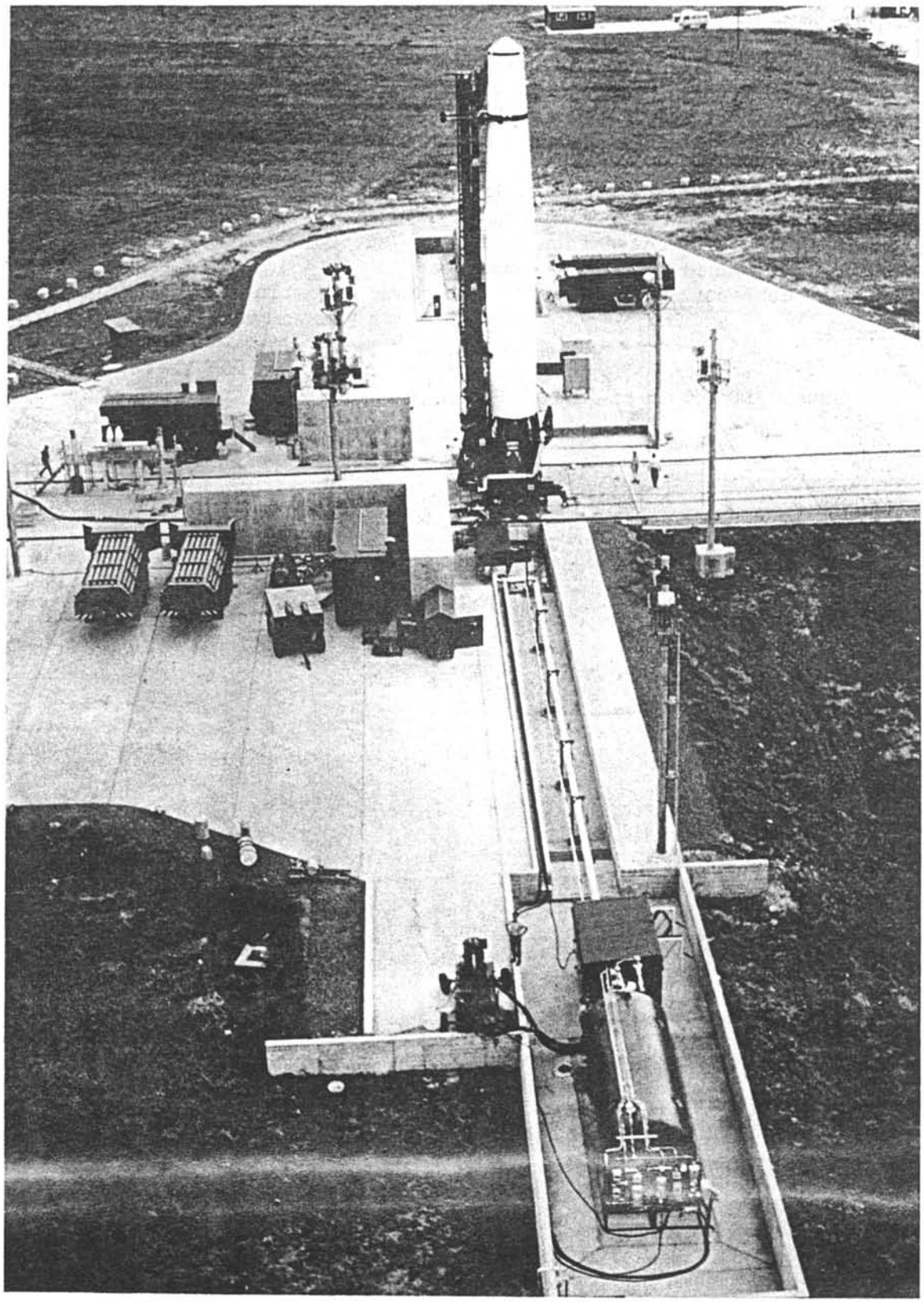
A TECHNICIAN WORKS ON AN INERTIAL MEASUREMENT UNIT, THE HEART OF A PEACEKEEPER GUIDANCE SYSTEM. THE UNIT CONTAINS OVER 20,000 PARTS.

rail garrison research and development. Exercises conducted in 1988 tested and refined the concept of operations, and in May the Secretary of Defense authorized the Air Force to proceed with Peacekeeper Rail Garrison full scale development.

A further review of ICBM moderization produced a Presidential decision in April 1989 that limited the Peacekeeper system to the existing 50 missiles but directed they be redeployed from silos to rail garrison. In November, the Air Force announced the selection of seven bases to house Peacekeeper Rail Garrison. The Main Operating Base would be F.E. Warren AFB, Wyoming, and the other six bases were Barksdale AFB, Louisiana; Little Rock AFB, Arkansas; Grand Forks AFB, North Dakota; Dyess AFB, Texas; Wurtsmith AFB, Michigan; and Fairchild AFB, Washington. December 1992 was the date established for delivery of the first asset.



TEN PEACEKEEPER REENTRY VEHICLES ENTER THE ATMOSPHERE ONTO THE TARGET AREA OF A MISSILE TEST RANGE.



A THOR IRBM IN LAUNCH POSITION AT THE 97TH RAF SMS,
RAF STATION CAISTER, ENGLAND.

CHAPTER V

THE IRBMs: THOR AND JUPITER

On 1 December 1955, President Dwight D. Eisenhower assigned the highest national priority to the development of the Thor and Jupiter intermediate range ballistic missiles (IRBMs), placing them on an equal footing with the ICBM development program. The decision to build IRBMs was based on several factors. First, the highly influential Killian Committee had recommended that a 1,500-mile IRBM be developed concurrently with the Atlas ICBM. Second, intelligence reports indicated that the Soviet Union had made significant advances in the IRBM field, a situation that posed a serious threat to America's Western European allies and the Strategic Air Command's foreign bases. Finally, the IRBM's less restrictive performance requirements meant the missile could be developed and placed in operation more quickly than the larger, more complex ICBM.

The Thor, developed for the Air Force by the Douglas Aircraft Company, and the Jupiter, produced for the Army by Chrysler Corporation, were single-stage, liquid-fueled, rocket-powered (150,000 pounds of thrust) ballistic missiles equipped with all-inertial guidance. The Thor was stored horizontally, and the Jupiter vertically, on tactical, field-deployed launchers. Both missiles could be fueled and fired to an effective range of 1,500 nautical miles upon approximately 15 to 20 minutes notice. Strategic Air Command employed the two systems primarily to supplement the command's manned bomber force.

On 22 March 1956, Headquarters USAF assigned responsibility for Thor's initial operational capability jointly to the Air Research and Development Command and the Strategic Air Command. Thor IOC would consist of one wing of 120 missiles, situated at three SAC bases in the United Kingdom. Each base would have four soft, dispersed launch complexes containing five launchers. Planning called for the first 10 Thor IRBMs to attain combat status by October 1958, and the entire 120-missile force by 1 July 1959. After a month and a half of negotiations, ARDC and SAC completed a Thor IOC agreement on 7 May 1956. Under terms of the agreement, ARDC's Western Development Division would develop, man, train, and equip operational Thor units. The Strategic Air Command would deploy operational units overseas and bring them to combat readiness.

The Thor development program, like Atlas and Titan, underwent a series of changes. On 28 March 1957, President Eisenhower approved a revised Thor IOC plan calling for 60 missiles (four squadrons of 15 missiles each). The first of the squadrons was scheduled to become operational by July 1959 and the entire force by July 1960. The plan was revised once again following the Soviet Union's success with Sputnik I. The new IRBM plan (involving both the Air Force's Thor and the Army's Jupiter), approved by President Eisenhower and the National Security

THE LAST THOR MISSILE AT RAF HEMSWELL, ENGLAND, BEING LOWERED FOR DEACTIVATION.

Council on 30 January 1958, would deploy four Thor and four Jupiter IRBM squadrons, each squadron possessing 60 missiles. The first Thor and the first Jupiter squadron would attain operational status by 31 December 1958, and the entire force of 120 IRBMs would be operationally deployed by March 1960. Additional changes to the plan were made late in FY 1958 and in FY 1959. Eventually, the Strategic Air Command was involved in the overseas deployment and combat training of four Thor and three Jupiter IRBM squadrons:

UNITED KINGDOM

SQUADRON	LOCATION	MISSILE
77th Royal Air Force SMS	Feltwell, England	15 Thor
97th Royal Air Force SMS	Hemswell, England	15 Thor
98th Royal Air Force SMS	Driffield, England	15 Thor
144th Royal Air Force SMS	North Luffenham, England	15 Thor

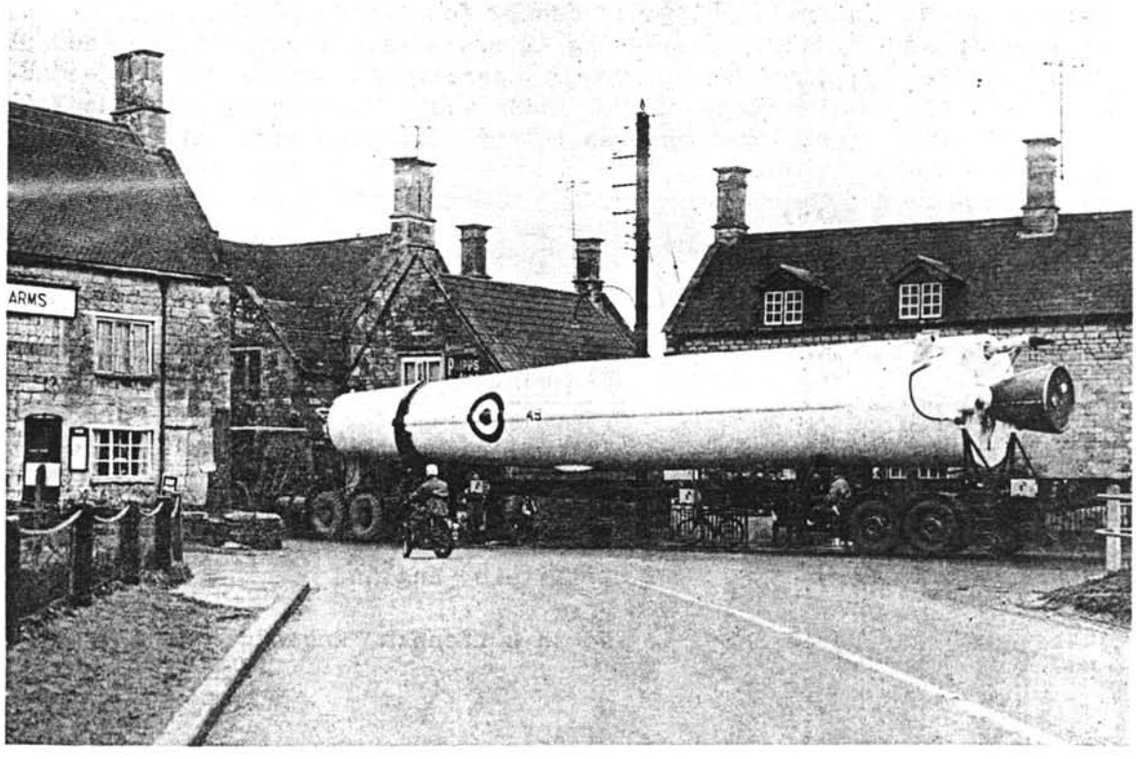
ITALY

SQUADRON	LOCATION	MISSILE
NATO I (2 Squadrons)	Gioia Del Colle	30 Jupiter

TURKEY

SQUADRON	LOCATION	MISSILE
NATO II (1 Squadron)	Cigli	15 Jupiter

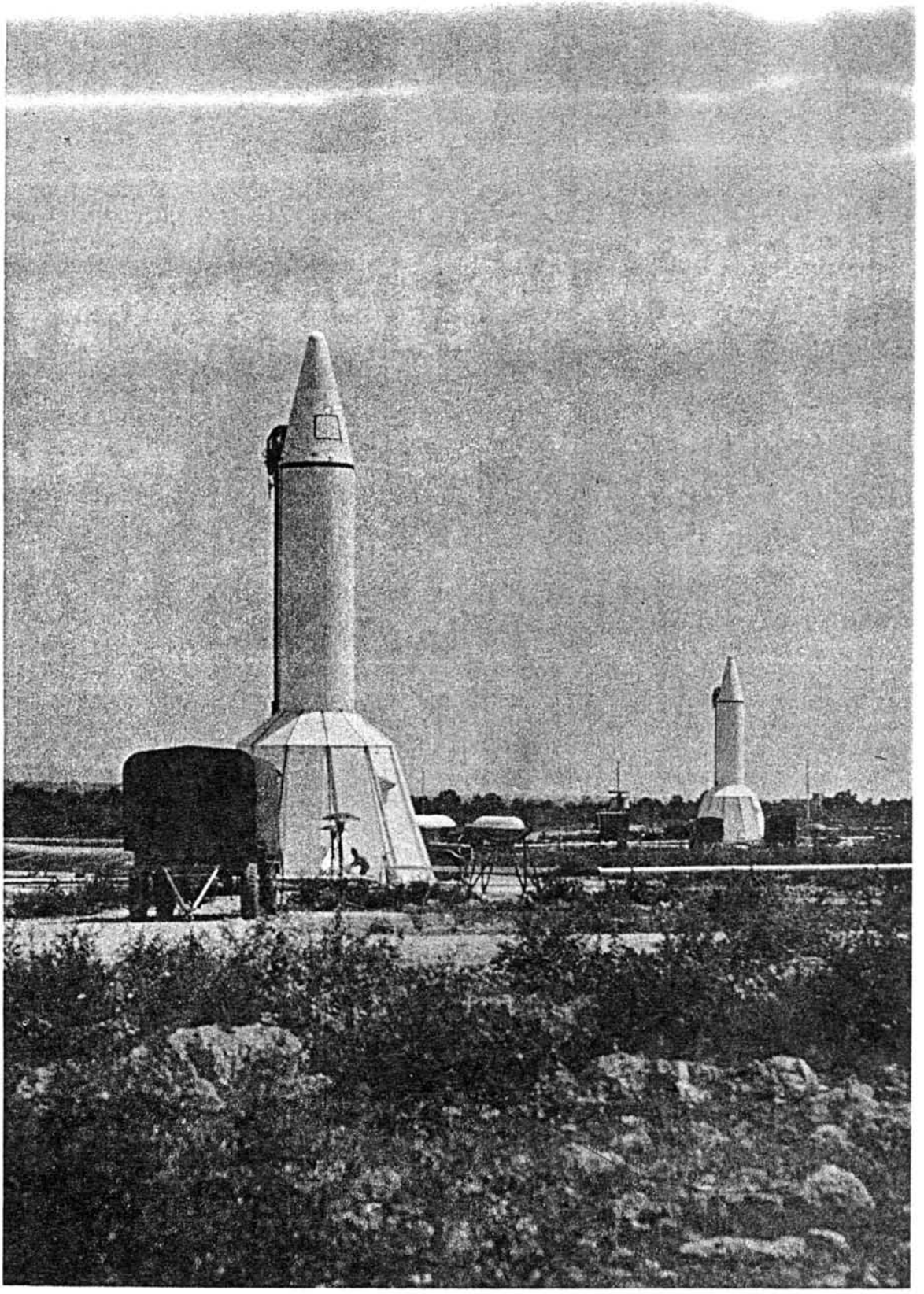
The first Western European nation to receive American-made IRBMs was Great Britain. On 25 March 1957, the last day of the Bermuda Conference, President Dwight D. Eisenhower and British Prime Minister Harold MacMillan issued a joint communique announcing a broad agreement on the deployment of Thor IRBMs in the United Kingdom. Eleven months later, the two governments signed an agreement providing for the deployment of four Thor IRBM squadrons to England. Headquarters SAC activated the 705th Strategic Missile Wing (IRBM-Thor) on 20 February 1958 at Lakenheath Royal Air Force (RAF) Station, United Kingdom, to monitor the Thor IRBM program in the United Kingdom and provide technical assistance to the four RAF Thor squadrons. Shortly thereafter, the Air Force transferred the 705th SMW to South Ruislip and merged it with Headquarters 7th Air Division.



A ROYAL AIR FORCE THOR IRBM BEING TRANSPORTED
THROUGH THE VILLAGE OF WELDON, ENGLAND.

THE LAST THOR IRBM DEACTIVATED AT RAF HEMSWELL, ENGLAND,
BEING LOADED ON AN AIRCRAFT.

A JUPITER IRBM BEING PREPARED FOR LAUNCH AT CAPE CANAVERAL, FLORIDA.



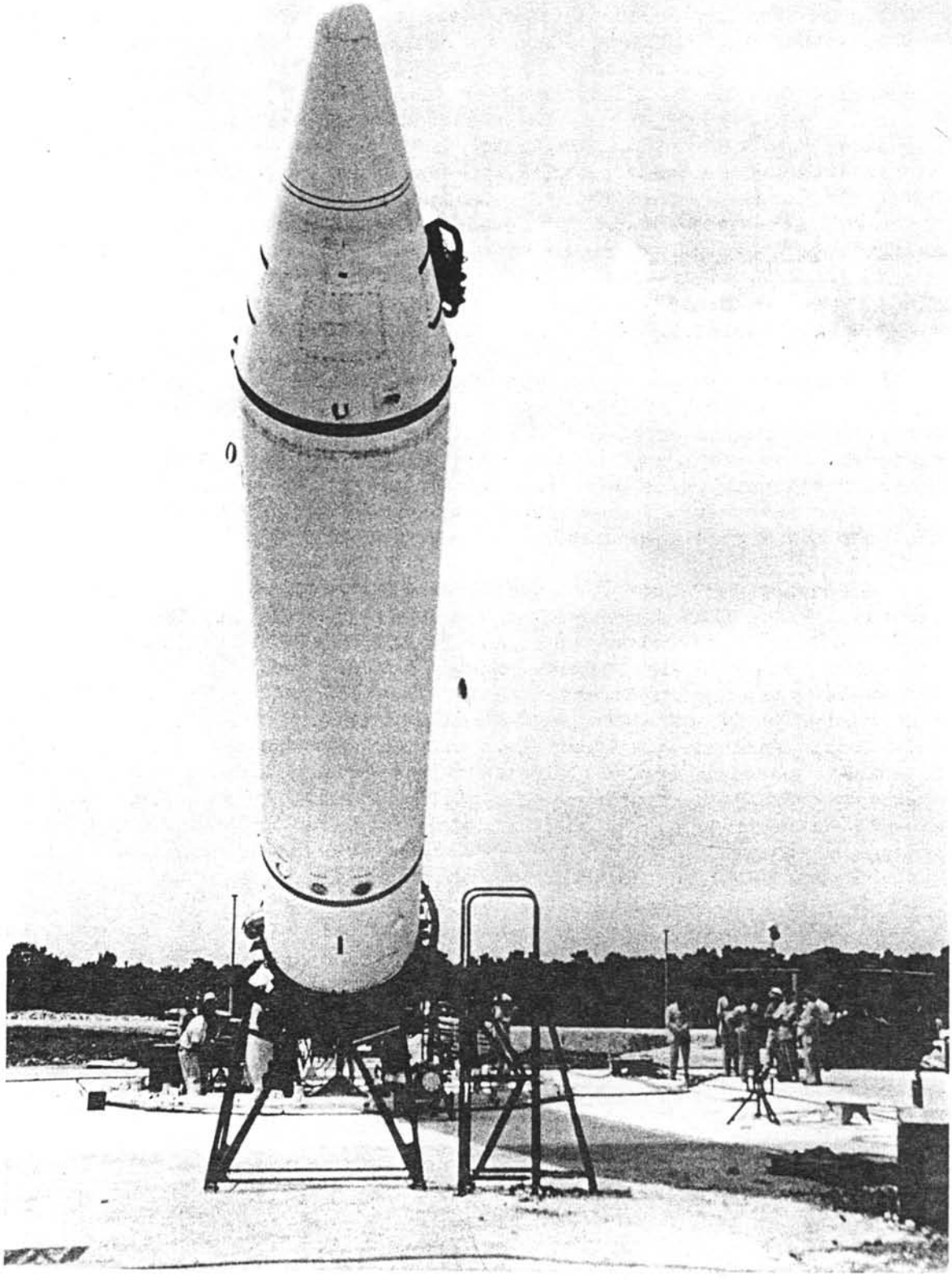
TWO JUPITER IRBMS IN LAUNCH POSITION AT GIOIA DEL COLLE, ITALY.

Transferred to the Royal Air Force on 22 June 1959, the [illegible] Strategic Missile Squadron at Feltwell, England became the first British-based Thor IRBM squadron to reach operational status. At the same time, SAC retained control over the squadron's nuclear warheads and assigned a detachment to perform four functions: (1) retain custody and control over, and provide maintenance for, nuclear vehicles and warheads; (2) receive and initiate U. S. warhead release orders; (3) operate USAF communications facilities; and (4) provide training to the Royal Air Force. On 11 September and 22 December 1959, the second and third British-based Thor IRBM squadrons were declared operational and assigned to Royal Air Force personnel. When SAC turned over the fourth and final British-based Thor IRBM to the Royal Air Force on 22 April 1960, the deployment of the Thor IRBM weapon system in the United Kingdom was completed.

In contrast to the relatively smooth deployment of Thor IRBM units in the United Kingdom, IRBM negotiations between the United States and other NATO nations proceeded at a slow pace. The entire IRBM program suffered a severe blow in June 1958 when Charles De Gaulle, the new French President, refused to accept any Jupiter missiles. This setback was tempered somewhat when Italy agreed to accept two squadrons of Jupiters and signed an agreement in March 1959.

In January 1959, however, the Strategic Air Command had recommended terminating the IRBM program after the deployment of four Thor squadrons in England and two Jupiter squadrons in Italy. SAC questioned the need for IRBMs, given their limited strategic value and high vulnerability, and wanted the funding diverted to ICBM development. IRBM negotiations continued in spite of SAC's protests due to several military and political considerations. First, European-based IRBMs, despite their drawbacks, posed a serious threat to the Soviet Union. Furthermore, American-made IRBMs represented the only visible presence of Western missile strength on the European continent. Finally, the United States' dogged determination to deploy IRBMs clearly demonstrated a commitment against communist aggression in Western Europe.

On 26 March 1959, the United States and Italy signed an agreement to deploy two Jupiter squadrons on Italian soil. Seven months later, on 28 October 1959, the United States and Turkey concluded an agreement to deploy one Jupiter squadron on NATO's southern flank. SAC made steady progress on these deployments, but significant advances in the ICBM program largely overshadowed the achievement. By late 1962, the United States was completing deployment of its first-generation ICBMs and work was well advanced on the second-generation Titan II and Minuteman missiles. These new developments coupled with the high vulnerability and slow reaction time of Thor and Jupiter, hastened the IRBM's obsolescence. Secretary of Defense Robert S. McNamara informed British Minister of Defense Peter Thorneycroft on 1 May 1962 that the United States would not provide logistical support to the Thor squadrons in Britain after 31 October 1964. On 24 January 1963, President John F. Kennedy confirmed that Jupiter IRBMs would be phased out as announced by the Italian and Turkish Governments.



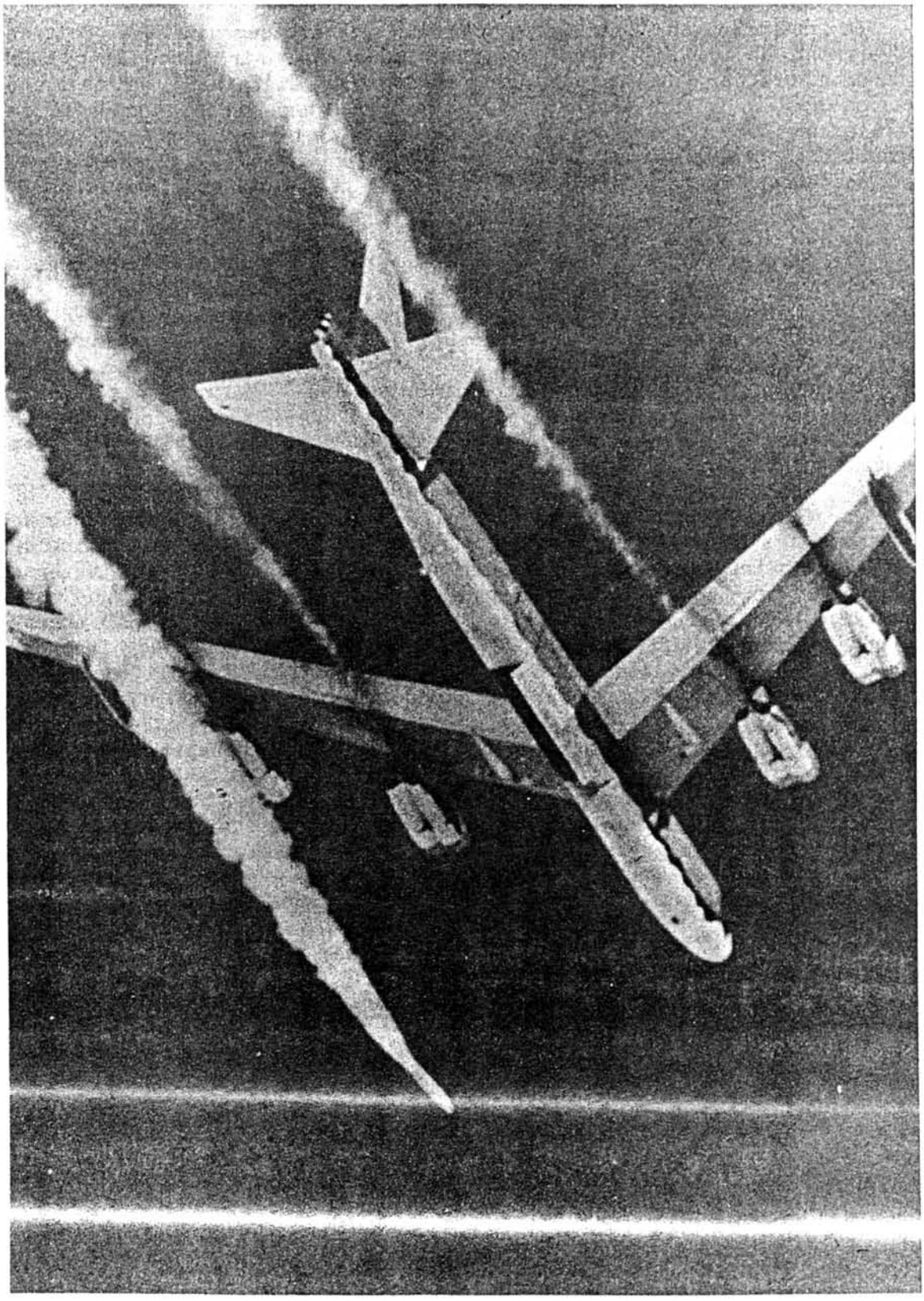
A JUPITER IRBM BEING RAISED TO LAUNCH POSITION
AT GIOIA DEL COLLE, ITALY.

In response to Secretary McNamara's announcement, the British government decided to phase out the four Royal Air Force Thor IRBM squadrons rather than assume the burden of maintaining an obsolete weapon system. On 1 August 1962, Minister Thorneycroft announced in Parliament that Thor would be phased out by the end of 1963. Operational phaseout was planned for 30 September 1963, while technical and equipment deactivation was scheduled for completion no later than 31 December 1963.

The Strategic Air Command's 7th Air Division was the Air Force's single point of contact for Thor in the United Kingdom. The 7th Air Division planned and carried out the phaseout of the four Royal Air Force Thor squadrons. On 29 November 1962, the first Thor came off alert at the 98th Royal Air Force SMS in Driffield. Nine months later, on 15 August 1963, the last 15 Thor IRBMs were declared non-operational. The technical and equipment portion of the Thor phaseout program was completed on 20 December 1963, and SAC ended responsibility for the Thor program in the United Kingdom.

The 4300th Support Squadron at Vandenberg AFB, California, conducted one of SAC's last Thor launches on 8 February 1967. The following month, SAC transferred its remaining Thor boosters to Air Defense Command. When the Air Force reorganized Aerospace Defense Command on 1 November 1979, SAC reacquired the Thor boosters. However, SAC transferred the last modified Thor space booster on 4 September 1981 from the 394th ICBM Test Maintenance Squadron, Vandenberg AFB, California, to storage facilities at Norton AFB, California.

During their short operational lives, Thor and Jupiter provided Strategic Air Command with a means to counter Soviet IRBM threats to America's NATO allies and SAC's overseas bases. The IRBM deployments demonstrated the United States' commitment to defend Western Europe against communist aggression. Finally, the deployment and maintenance of Thor and Jupiter IRBMs proved both instructive and rewarding. When SAC deployed the complex, highly sophisticated, and relatively expensive second-generation ICBMs, the command drew upon practical experience gained with the Thor and Jupiter weapon systems.



A SRAM IN FLIGHT SHORTLY AFTER LAUNCH FROM A B-52H BOMBER.

CHAPTER VI

THE AIR-LAUNCHED MISSILES:

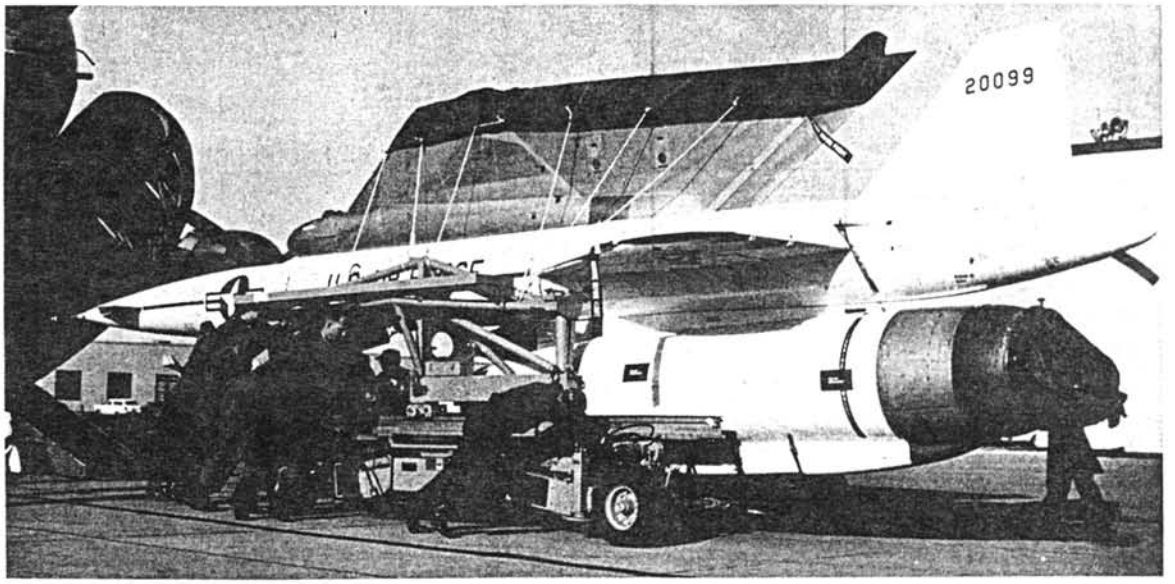
QUAIL, HOUND DOG, SRAM, ALCM, ACM, AND HARPOON

While the progressive development of SAC's surface-launched missile force was both important and highly significant, it was by no means an isolated phenomenon. In most instances, it was parallelled by qualitative improvements to the command's manned bomber force. When the Strategic Air Command was first established on 21 March 1946 as one of the three major combat commands of the United States Army Air Forces, its initial bomber force consisted of 148 veteran World War II B-29 Superfortresses. Two years later, in 1948, this force was augmented with the first models of two new bombers, the B-36 and the B-50. In 1951, the all jet-engine B-47 medium bomber made its first appearance in SAC. This revolutionary aircraft was joined in 1955 by the first B-52 Stratofortress, destined to become the mainstay of the SAC manned bomber force into the 1990s. Further additions to the SAC bomber fleet included the supersonic B-58 Hustler, introduced on 1 August 1960, and the FB-111A medium bomber accepted by SAC on 8 October 1969. The first operational B-1B, the newest addition to Strategic Air Command's aircraft arsenal, joined the command on 7 July 1985.

The growing maturity and sophistication of the SAC manned bomber force was matched by both qualitative and quantitative improvements to the air defense systems of the leading communist powers, especially the Soviet Union. This latter development over a thirty-year period led to SAC's employment of a number of air-launched guided missiles to ensure that SAC's manned bombers successfully penetrated enemy territory.

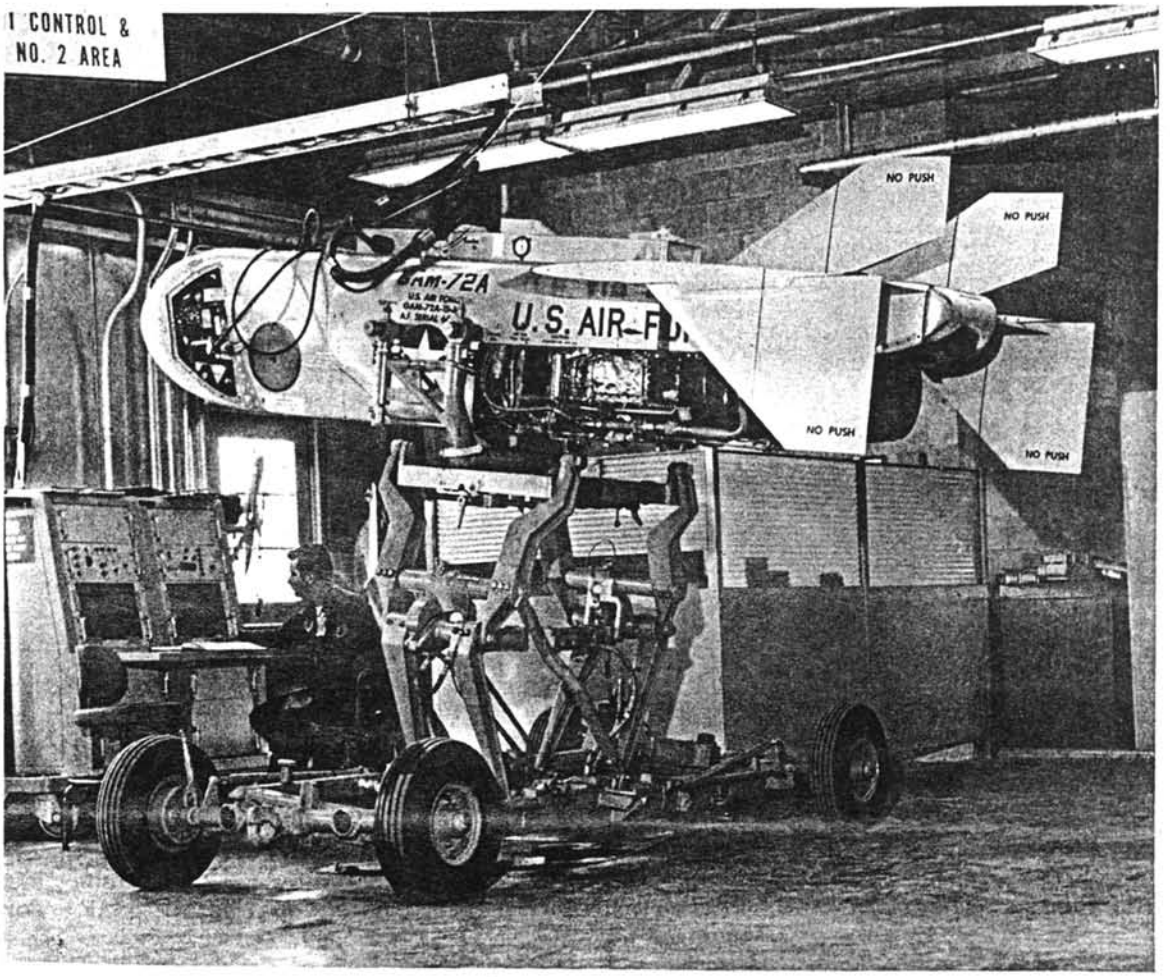
The Quail, manufactured by the McDonnell Aircraft Company, was designed to confuse, dilute, saturate, and otherwise degrade enemy radars in heavily defended areas. It was equipped with radar reflectors, electronic repeaters, chaff, and infrared simulators programmed to generate a radar and infrared image similar to a B-52 bomber on enemy radars and infrared detection equipment. Powered by a single turbojet General Electric J-85 engine, the Quail had a maximum range of 393 nautical miles at an altitude of 35,000 feet and a speed of Mach 0.8 and 460 nautical miles at an altitude of 50,000 feet and a speed of Mach 0.85. A B-52 bomber could carry up to four Quail missiles. Once launched from its B-52 carrier aircraft, the Quail was capable of performing at least two turns and one speed change. SAC planned to launch the Quail beyond the maximum range of enemy air defense ground radars and allow it to accompany the bomber through the defended area. The Quail was unique among air-launched missiles in that it was the only decoy missile in the United States Air Force.

The Quail missile program began on 13 October 1952 when the Strategic Air Command submitted a requirement to Headquarters USAF for



MAINTENANCE BRING PERFORMED ON A QUAIL AIR DECOY MISSILE.

FAIRCHILD AFB, WASHINGTON, RECEIVES ITS FIRST HOUND DOG MISSILE.



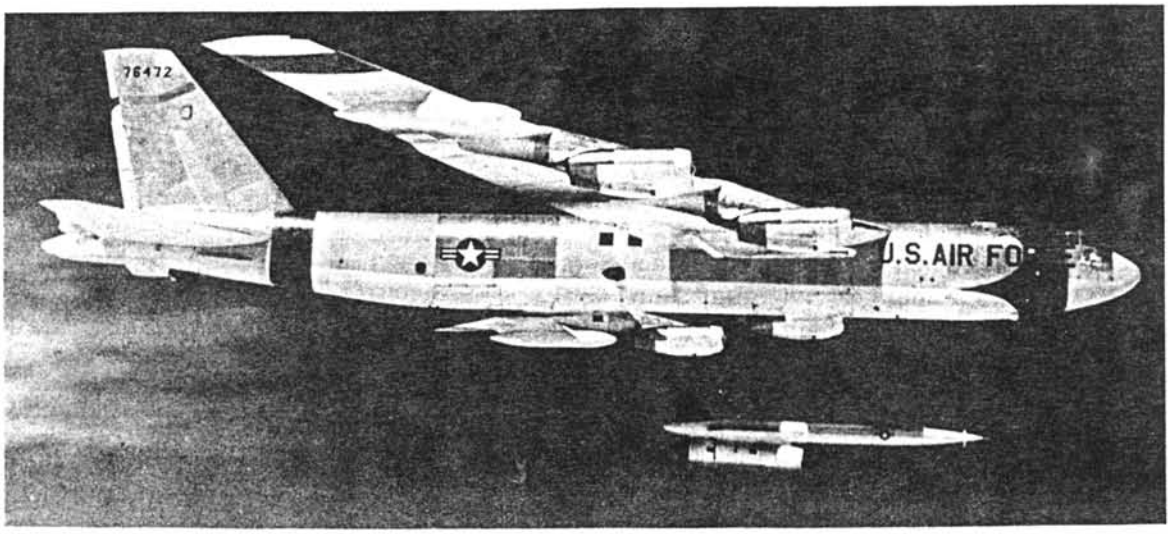
an air-launched decoy missile. The latter, in turn, directed the Air Research and Development Command to study the technological feasibility, costs, and other pertinent aspects of such a proposed weapon system. On 1 February 1956, the Air Material Command notified the McDonnell Aircraft Company of its selection as prime contractor for the Quail. It was not until 31 December 1958, however, that Headquarters USAF awarded McDonnell a production contract for the Quail missile. Twenty months later, on 13 September 1960, the first production-line Quail missiles were delivered to the 4135th Strategic Wing, a B-52G unit at Eglin Air Force Base, Florida. Headquarters SAC declared one Quail-equipped squadron of the 4135th Strategic Wing operational on 1 February 1961. Of the 14 B-52 squadrons programmed to receive Quail missiles, eleven were fully equipped and operational by 31 December 1961. The fourteenth and final Quail-equipped B-52 squadron became operational on 15 April 1962. The McDonnell Aircraft Corporation delivered the last Quail missile to the Strategic Air Command on 28 May 1962.

The Quail remained operational until 1978. Although Strategic Air Command continued to support Quail as an effective and inexpensive penetration aid, the Air Force elected to phase out the missile because the lack of spare parts and adequate test equipment had made the system difficult to maintain. The last Quail missile came off alert on 30 June 1978 and the Quail was eliminated from SAC's missile inventory by mid-December.

In contrast to the Quail, the Hound Dog, produced by North American Aviation, Inc., was an air-to-surface missile capable of delivering a nuclear warhead approximately 500 nautical miles from its launch point at high altitude and supersonic speed, or approximately 200 nautical miles from its launch point at low altitude and subsonic speed. Each Hound Dog was powered by a single Pratt and Whitney J-52 turbojet engine, situated in a pod mounted below the aft fuselage, and possessed a self-contained inertial autonavigational guidance system. Two Hound Dogs could be carried under the wings of the newest models of the B-52 Stratofortress, the G and H series. In addition, the missiles' engines could be employed to provide the bomber with an extra power boost during takeoff and/or flight. When used in this manner, the Hound Dogs were refueled from the bomber's fuel tanks before missile release and launch.

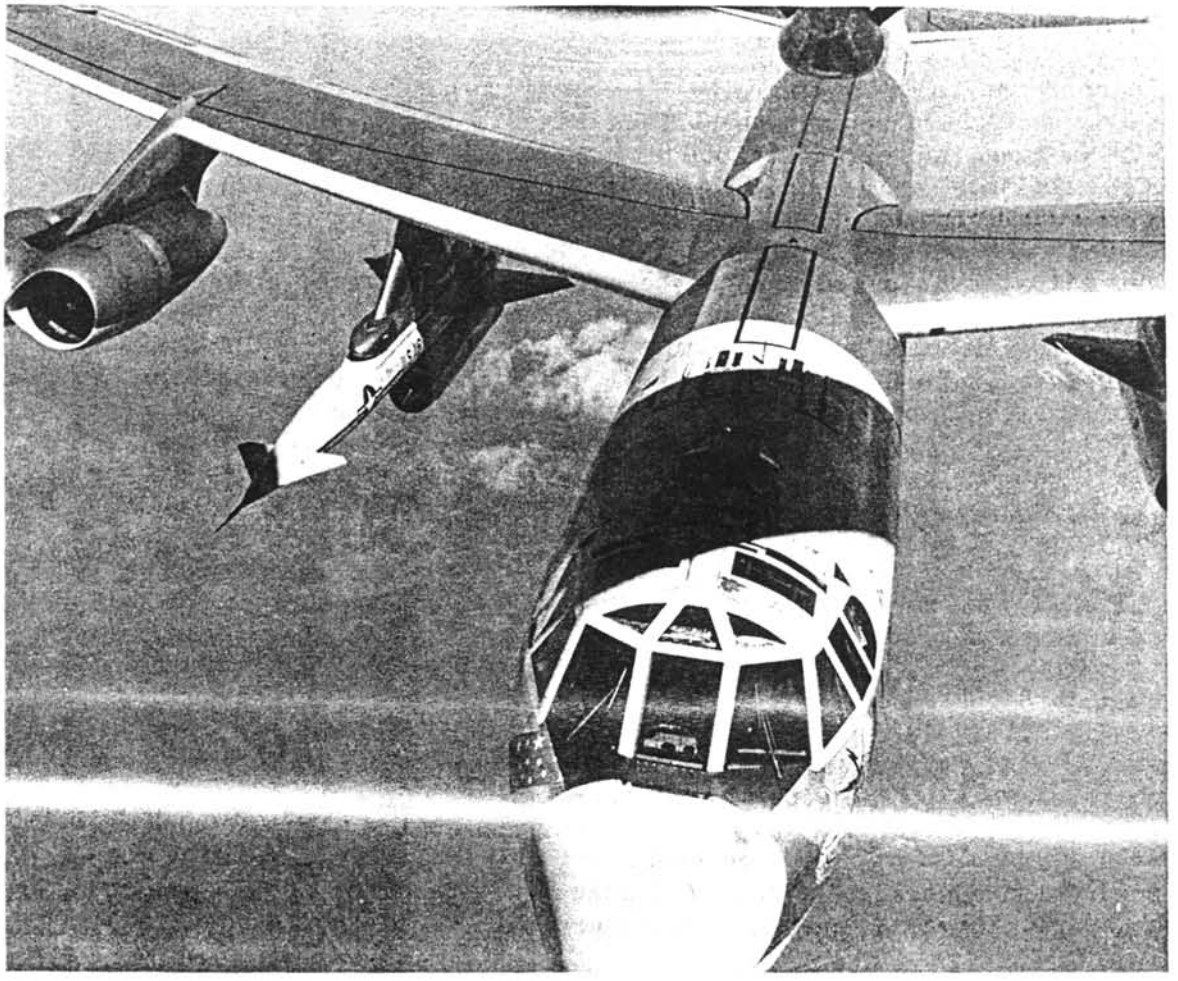
The overall mission of the Hound Dog was to aid B-52s in successfully carrying out the strategic bombing offensive. This would be accomplished by providing a means of attacking and destroying heavily defended enemy targets without subjecting the B-52 fleet to unacceptable loss levels, and by assisting bombers in penetrating enemy targets by attacking and destroying segments of the enemy's air defense system.

The Hound Dog missile program began on 15 March 1956 when Headquarters Air Force issued a requirement for an air-to-surface missile to b[illegible] B-52 strategic ma[illegible] half years later, on 26 October 1959, Headquarters USAF awarded a Hound Dog production contract to North American Aviation, Inc. On 21 December 1959, General Thomas S. Power, Commander in Chief of the Strategic Air



A B-52G BOMBER LAUNCHES A HOUND DOG MISSILE.

A B-52H BOMBER ARMED WITH A HOUND DOG MISSILE
PREPARES TO REFUEL IN FLIGHT.



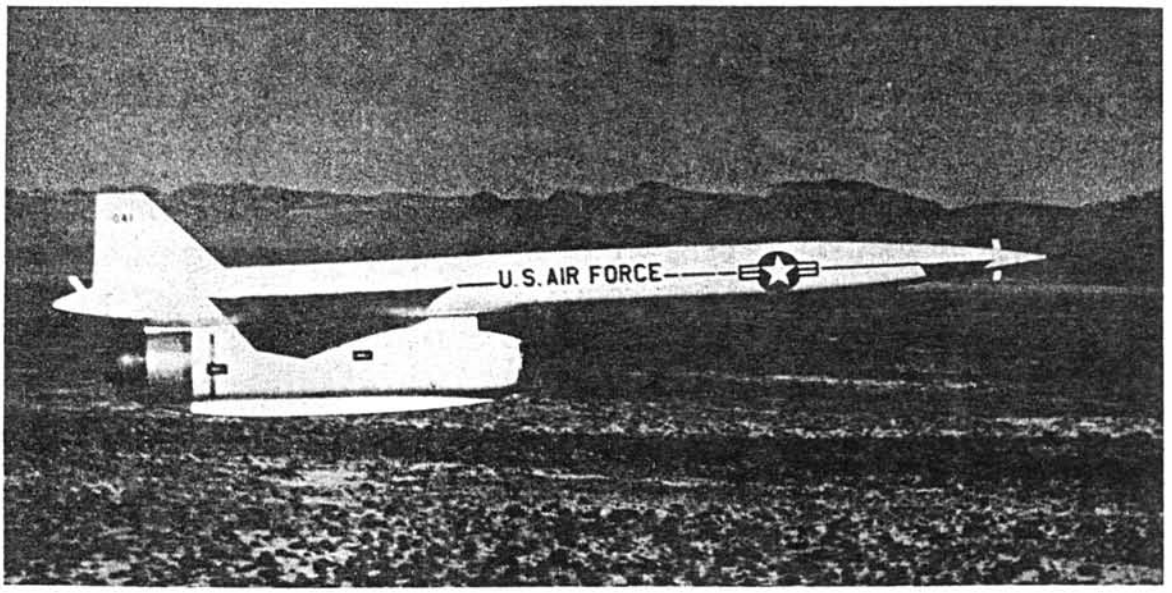
Command, formally accepted the first production model Hound Dog missiles in a ceremony conducted at North American Aviation's Downey, California, plant. Headquarters Air Force finalized the Hound Dog missile program at the end of fiscal year 1959 when it approved a force of 29 B-52 squadrons equipped with Hound Dog missiles. Twenty-three of the 29 Hound Dog-equipped B-52 squadrons were operational by 30 June 1962. The final six B-52 squadrons equipped with Hound Dog missiles achieved operational status by the end of FY 1963.

After thirteen years of service in the Strategic Air Command, the last Hound Dog missile was removed from alert on 30 June 1975. Nearly three years later, on 15 June 1978, the 42d Bombardment Wing, Loring AFB, Maine, destroyed the last last Hound Dog missile and removed it from the SAC inventory.

The next air-to-surface missile to enter service with the Strategic Air Command, the Short Range Attack Missile (SRAM), remained operational into the 1990s. Developed and produced by the Boeing Aerospace Company, the SRAM measured 14 feet in length, 18 inches in diameter, and weighed approximately 2,230 pounds. Armed with a nuclear warhead and equipped with a simple inertial guidance system, the SRAM was propelled to its range of 20 to 50 nautical miles by a solid-propellant rocket motor. Each SAC B-52 G and H model bomber could carry up to 20 SRAMs, six on each of two wing pylons and eight on a rotary launcher located in the bomb bay. The FB-111, on the other hand, could be equipped with a total of six missiles, two mounted internally and four carried on wing pylons. The B-1B was designed to carry up to 24 SRAMs on three rotary launchers, each equipped with eight SRAMs. Originally, the SRAM's primary mission was to improve the survivability of the SAC manned bomber force through the "neutralization of surface-to-air missile defenses." The mission was later expanded to encompass a secondary objective, the destruction of selected strategic targets.

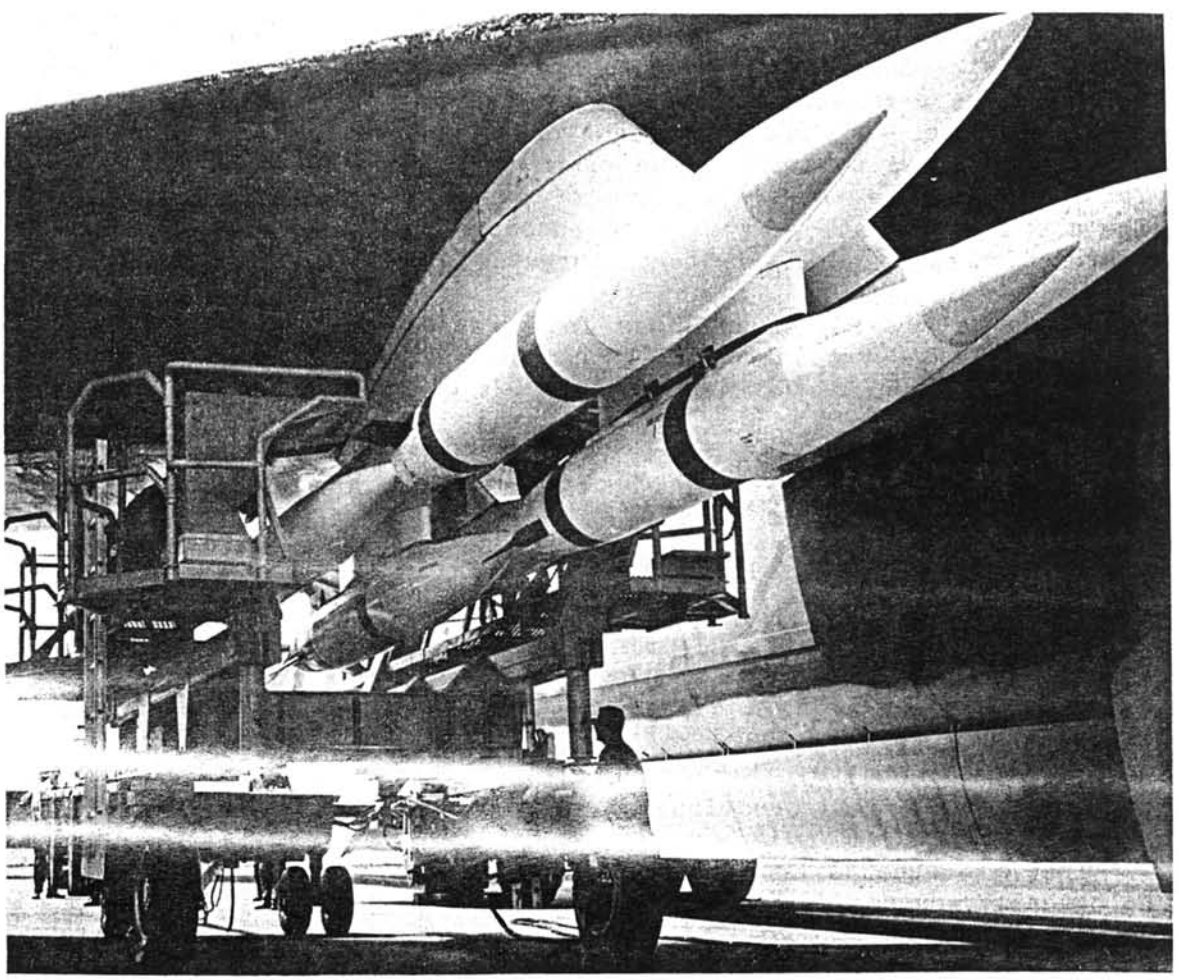
The SRAM missile program was inaugurated on 23 November 1963 when Headquarters SAC submitted a requirement to the Air Staff for a short-range air-to-surface attack missile for its G and H model B-52 Stratofortresses. Headquarters Air Force expanded the SAC proposal to include the FB-111 and possibly the future B-1 bomber. Secretary of Defense Robert S. McNamara approved the initial development of the air-launched guided missile weapon system on 23 March 1965. The Boeing Company received a contract from Headquarters Air Force on 31 October 1966 to develop and produce the SRAM. Strategic Air Command accepted delivery of the first production-line SRAM on 1 March 1972. The first B-52 and FB-111 units to become operational with the new missile were the 42nd Bomb Wing (B-52G), Loring AFB, Maine, on 15 September 1972, and the 509th Bomb Wing (FB-111), Pease AFB, New Hampshire, on 1 January 1973. On 20 August 1975, the last 1500 SRAMs were delivered to SAC's 320th Bombardment Wing, Mather AFB, California. The first live launch of a SRAM from a SAC operational B-1B took place on 3 June 1987.

The Air-Launched Cruise Missile (ALCM) was a newer and more technologically advanced weapon system. The small, unmanned, winged missile



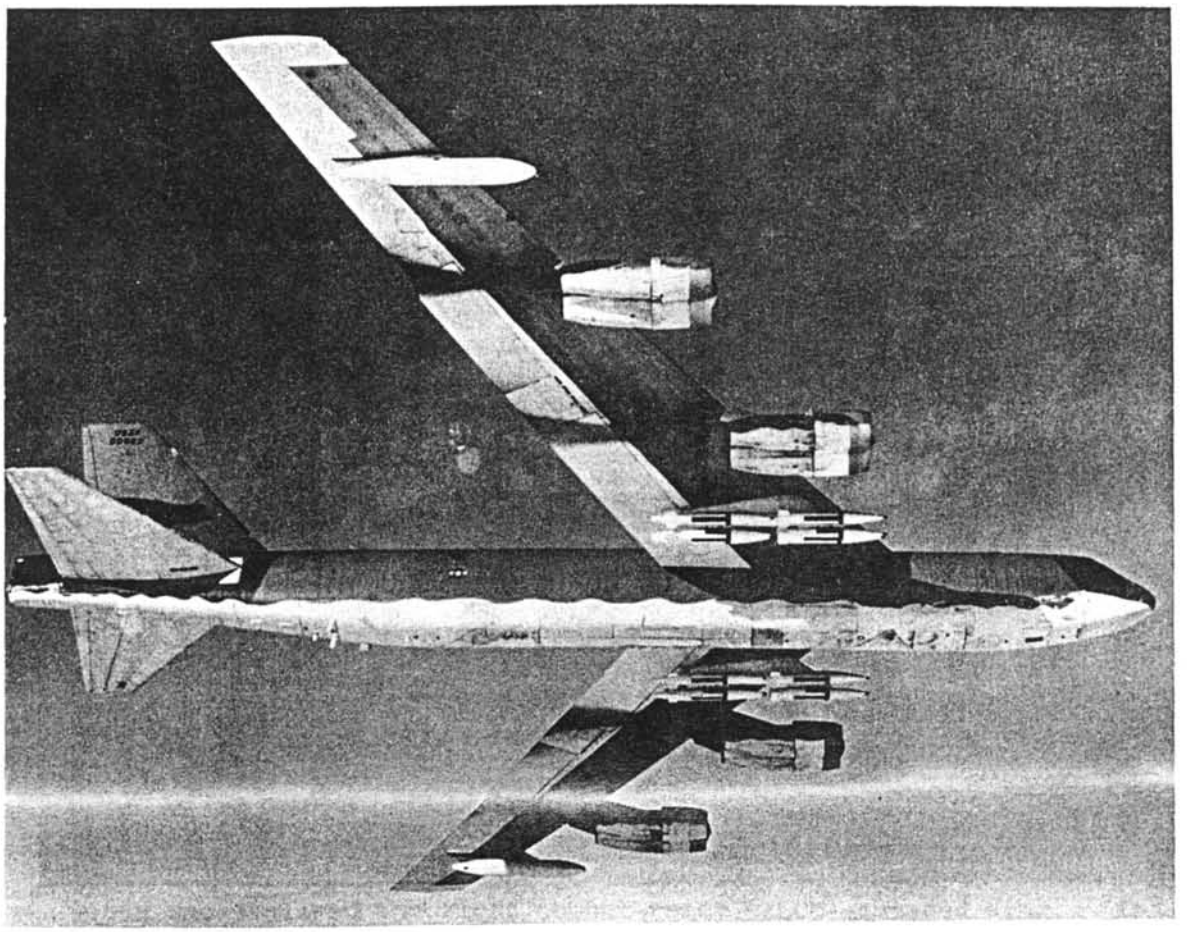
A HOUND DOG AIR-TO-SURFACE MISSILE IN FLIGHT.

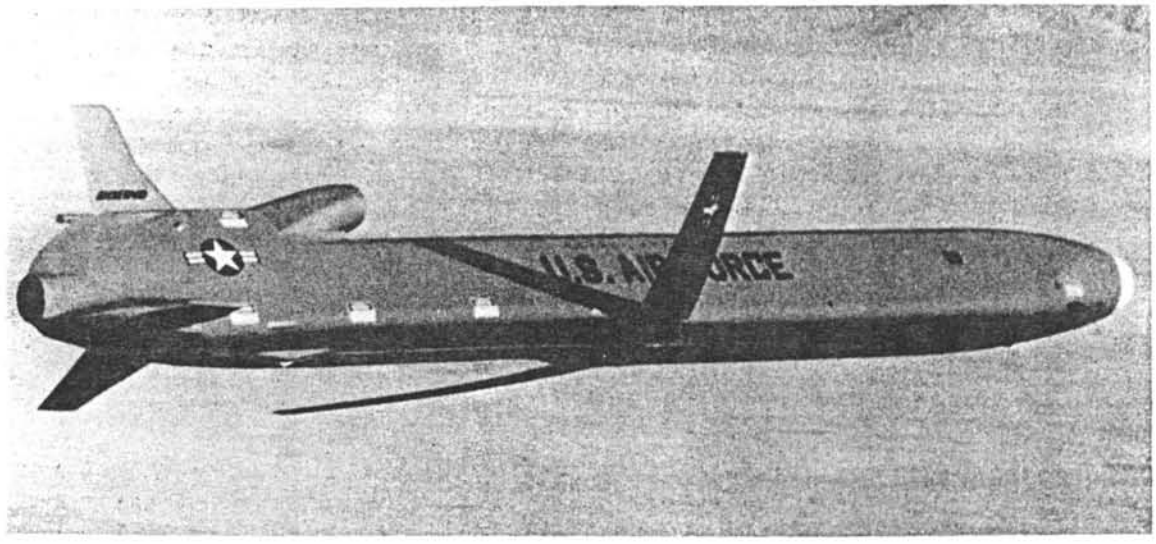
SRAM AIR-TO-SURFACE MISSILES BEING LOADED ON A B-52 BOMBER PYLON.



A SRAM BEING LAUNCHED FROM AN FB-111A EXTERNAL PYLON.

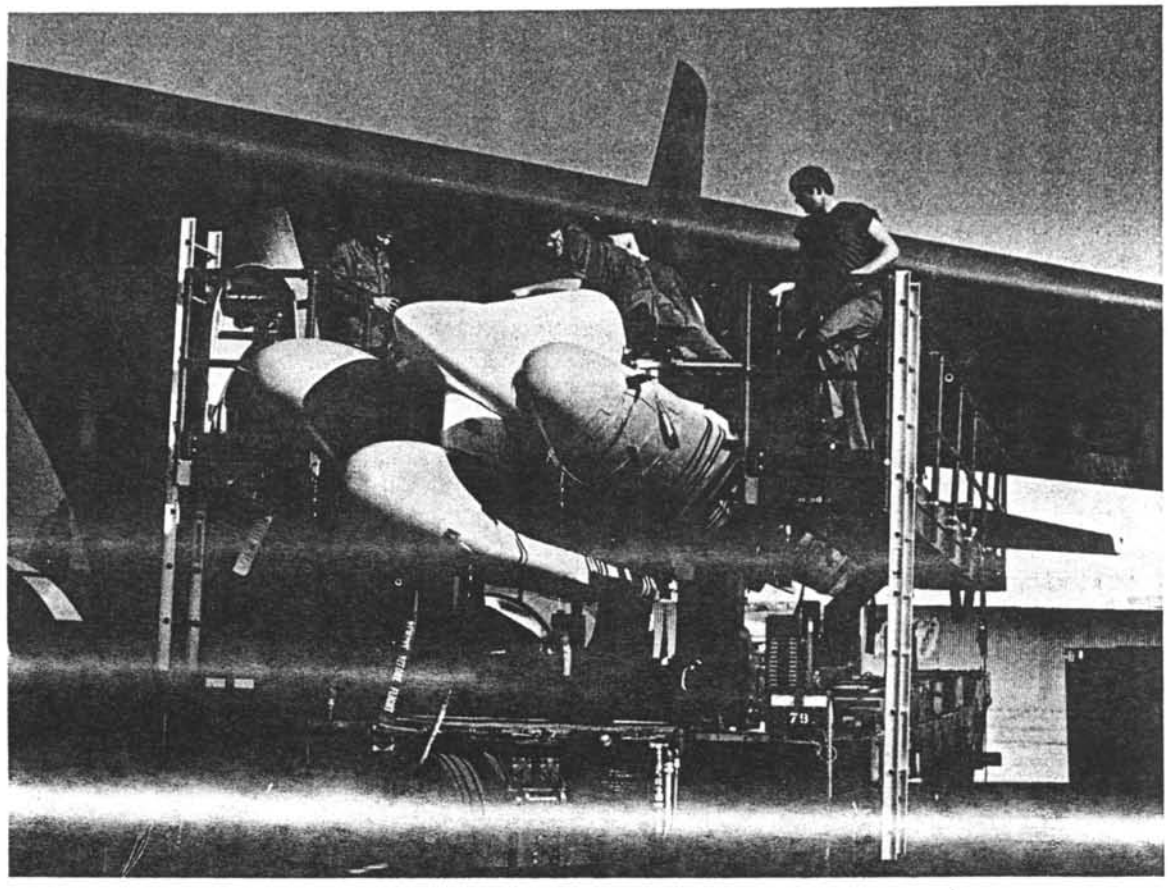
AN EXTERNAL LOAD OF SRAMS ON A B-52H BOMBER.





AN AIR-LAUNCHED CRUISE MISSILE IN FLIGHT.

MUNITIONS SPECIALISTS LOAD ALCMS ON A B-52H AT CARSWELL AFB, TEXAS.



was designed to attack surface targets. The weapon's concept was over a half-century old, but inadequate technology had prevented development of an effective missile. Two technical breakthroughs in the early 1970s transformed the concept into a practical weapon system. The first breakthrough came in computer technology, specifically a dramatic reduction in the physical size of computers coupled with equally dramatic increases in computer capabilities. These achievements fostered the development of a sophisticated guidance system that enabled the missile to fly at very low altitudes, making detection difficult. The second breakthrough, advances in propulsion, allowed engineers to decrease the missile's size while increasing its capabilities. The promise of a reliable and relatively inexpensive penetrating weapon system led to President Carter's 30 June 1977 announcement that the production of a B-1 bomber would be discontinued in favor of ALCM development.

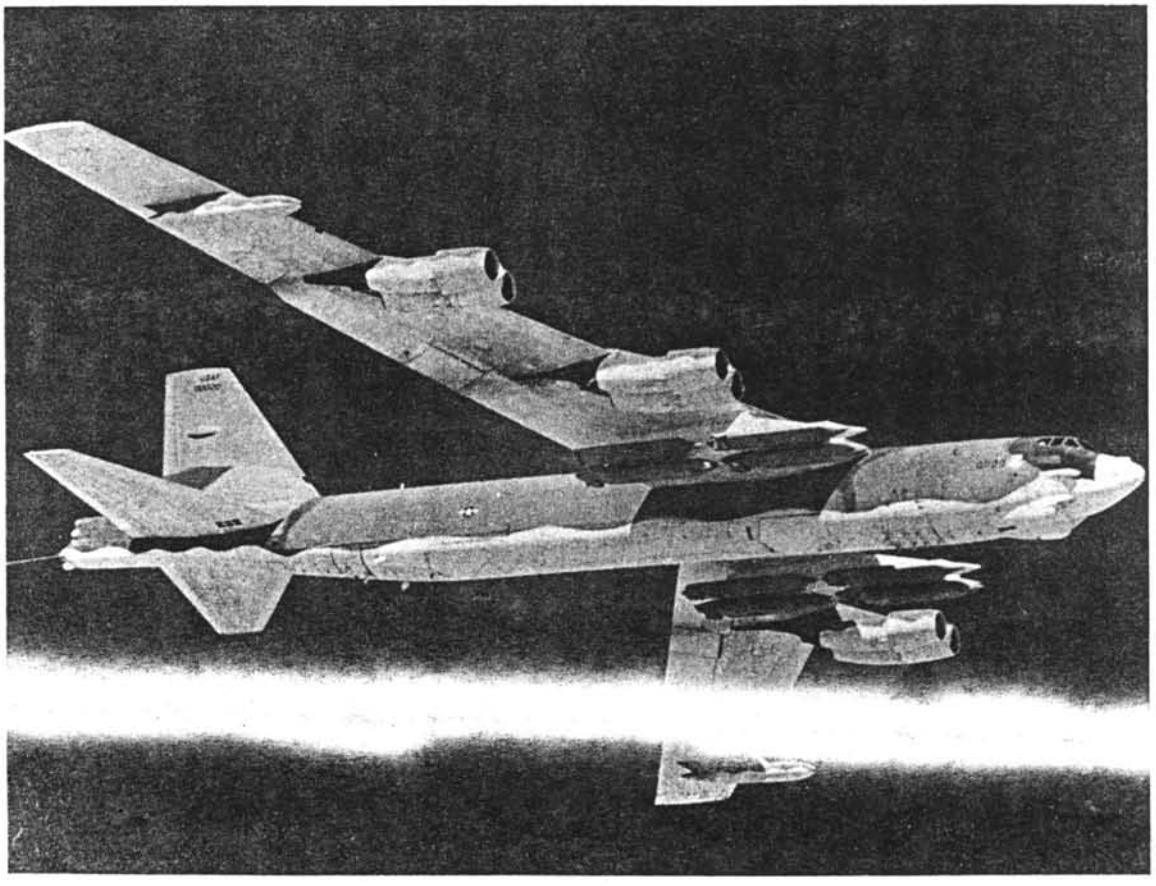
The ALCM was designed as a self-guided, low-flying, terrain-following weapon capable of attacking ground targets with great accuracy at speeds of 500 miles per hour. The system allowed SAC B-52 crews to launch the missiles from standoff positions 1,500 miles from the targets. A small turbofan jet engine provided the ALCM's thrust and deployable wings added aerodynamic lift.

The Air Force entered into a contract with Boeing Aerospace Compnay in February 1974 to develop and flight test a prototype ALCM (designated AGM-86A). The first ALCM powered flight took place on 5 March 1976 over the White Sands Missile Range in New Mexico when a B-52G crew ejected an ALCM from a SRAM rotary launcher. On 9 September 1976, the Air Force conducted the first fully-guided ALCM flight test. During the 30-minute flight, the ALCM successfully negotiated four terrain correlation mapped areas and completed a terrain correlation update in each area. The missile used in the flight tests was an AGM-86 "A" model which was slightly smaller than the the final production version, the AGM-86B. A production order was not placed for the Boeing model and by the time President Carter made his decision to proceed with the ALCM both Boeing and General Dynamics had developed cruise missiles. Boeing won a competitive flyoff between the two missiles and on 25 March 1980 received a contract to produce the AGM-86B.

Boeing delivered the first two ALCMs to the 416th Bombardment Wing, Griffiss AFB, New York, on 11 January 1981. These missiles were used initially by the wing for environmental testing and maintenance training. The first operational missile was assigned to the wing on 23 April 1981. On 15 August 1981, the 416th BMW received the first B-52G modified to carry the ALCM. The bomber could carry six missiles under each wing and had been outfitted with the Offensive Avionics System (OAS) to improve navigation and weapon delivery. The OAS replaced older analog computers and navigation components with a solid-state, digital system, which helped align, target, and launch the missiles. The first ALCM training flight was conducted on 15 Sept[illegible] 1981 by the 416th [illegible]. On 27 September 1982, the 416th became the [illegible] to conduct an ALCM operational test launch, and on 16 December, the 416th was declared the first combat-ready ALCM-equipped [illegible]

ADVANCED AIR-LAUCHED CRUISE MISSILES LOADED ON A B-52H BOMBER.

HARPOON MISSILES BEING LOADED ON A B-52 BOMBER.



1985, the 7th Bombardment Wing at Carswell AFB, Texas, became the first unit to receive ALCM-modified B-52H model bombers. A modified B-52H bomber could carry twenty ALCM missiles, six under each wing and eight mounted internally on a rotary launcher. By 23 August 1986, 98 B-52G aircraft had completed the cruise missile modification program. Boeing completed production of the 1,715th and last ALCM on 7 October 1986.

In 1983, the Air Force contracted with the Convair Division of General Dynamics to develop and produce an advanced cruise missile, or ACM. The ACM, designated the AGM-129, was an improved version of the ALCM in terms of range, penetration, and accuracy. The 410th Bombardment Wing, K.I. Sawyer AFB, Michigan, took delivery of the first ACM on 23 July 1988.

The Strategic Air Command also had a collateral maritime mission that included sea search, aerial mining, and the interdiction of enemy sea power. In 1982, SAC began testing the AGM-84 Harpoon anti-ship missile to support the maritime mission. The Harpoon was a 12.5 foot, liquid-fueled, cruise missile already in use by the Navy. It could be launched from aircraft, ships, or submarines. When launched, the conventional warheaded missile flew at sea-skimming altitudes to a range of 60 miles and used radar terminal guidance to acquire and engage targets. From 15 to 28 March 1983, the 320th Bombardment Wing, Mather AFB, California, conducted flight tests with Harpoon-equipped B-52G bombers at the Pacific Missile Test Range. The 42d Bombardment Wing, Loring AFB, Maine, became the first SAC unit to achieve a limited operational capability when it received three B-52Gs modified to carry the Harpoon on 6 October 1983. In July 1984, the wing's 69th Bombardment Squadron accepted SAC's first operational Harpoon missile. The Harpoon weapon system reached full operational capability on 29 June 1985 when the 43d Bombardment Wing, Andersen AFB, Guam, became SAC's second Harpoon-equipped wing.

The Quail, Hound Dog, SRAM, ALCM, ACM, and Harpoon weapon systems have supplied SAC's manned bomber force with the necessary means to successfully penetrate enemy defenses. This capability has, in turn, significantly enhanced the overall deterrent value of the Strategic Air Command's B-52, FB-111, and B-1 fleet. Thus, SAC's air-launched guided missile weapon systems, like their surface-launched ICBM counterparts, have contributed immeasurably to the command's ability to successfully accomplish the mission of deterring nuclear war. Of equal importance, all of SAC's guided missiles, whether air or surface-launched, have provided the Strategic Air Command with the means, should deterrence fail, to retaliate in any nuclear engagement.

APPENDIX A

GLOSSARY

ACM	Advanced Cruise Missile
AFB	Air Force Base
ALCM	Air Launched Cruise Missile
ARDC	Air Research and Development Command
BMW	Bombardment Wing
D-	Democrat
ICBM	Intercontinental Ballistic Missile
ICM	Intercontinental Missile
IOC	Initial Operational Capability
IRBM	Intermediate Range Ballistic Missile
LOC	Limited Operational Capability
M-X	Missile-X (Peacekeeper)
NATO	North Atlantic Treaty Organization
OAS	Offensive Avionics System
R-	Republican
R & D	Research and Development
RAF	Royal Air Force
SAC	Strategic Air Command
SAMSO	Space and Missile Systems Organization
SMS	Strategic Missile Squadron
SMW	Strategic Missile Wing
SRAM	Short Range Attack Missile
USAF	United States Air Force
WDD	Western Development Division

APPENDIX B

MISSILE DESIGNATIONS

This list contains the official designations assigned those missiles deployed with the Strategic Air Command.

ACM: Designated AGM-129A

ALCM: Designated AGM-86B

ATLAS: Originally designated B-65, then designated SM-65D, SM-65E, and SM-65F, finally designated CGM-16D, CGM-16E, HGM-16F.

HARPOON: Designated AGM-84A

JUPITER: Originally designated SM-78, then designated PGM-19A.

HOUND DOG: Originally designated GAM-77 and GAM-77A, then designated AGM-28A.

MINUTEMAN: Originally designated SM-80, then designated HSM-80A and HSM-80B, finally designated LGM-30A and LGM-30B (Minuteman I), LGM-30F (Minuteman II), and LGM-30G (Minuteman III).

PEACEKEEPER: Designated LGM-118A

QUAIL: Originally designated GAM-72, GAM-72A, and GAM-72B, then designated ADM-20A, ADM-20B, and ADM-20C.

SNARK: Originally designated SSM-A-3, then designated B-62, finally designated SM-62.

SRAM: Designated AGM-69A.

THOR: Originally designated SM-75, then designated PGM-17A.

TITAN I: Originally designated SM-68, then designated HGM-25A.

TITAN II: Originally designated SM-68B, then designated LGM-25C.

APPENDIX C

SNARK, THOR, AND JUPITER UNIT

ACTIVATION AND INACTIVATION DATES

UNIT	BASE	MISSILE	ACTIVATION DATE	INACTIVATION DATE
556th Strategic Missile Squadron (SMS)	Patrick AFB, Florida	Snark	15 Dec 57	16 Jul 59
702d Strategic Missile Wing (SMW)	Presque Isle AFB, Maine	Snark	1 Jan 59	25 Jun 61
705th Strategic Missile Wing (SMW)	Lakenheath RAF Station, United Kingdom	Thor	20 Feb 58	1 Apr 60
644th Strategic Missile Squadron (SMS)	Vandenberg AFB, California	Thor	1 Jul 59	1 Nov 59
864th Strategic Missile Squadron (SMS)	Huntsville, Alabama	Jupiter	15 Jan 58	1 Jun 60
865th Strategic Missile Squadron (SMS)	Huntsville, Alabama	Jupiter	1 Jun 58	1 Nov 59
866th Strategic Missile Squadron (SMS)	Huntsville, Alabama	Jupiter	1 Sep 58	25 May 62

APPENDIX D

ATLAS ICBM UNITS

ACTIVATION AND INACTIVATION DATES

UNIT	BASE	MISSILE	ACTIVATION DATE	INACTIVATION DATE
576th Strategic Missile Squadron (SMS)	Cooke AFB,[1] California	Atlas D Atlas E Atlas F	1 Apr 58	22 Mar 65
Strategic Missile[2] Wing (Provisional) (SMW Prov)	F.E. Warren AFB, Wyoming	Atlas D	1 Jan 58	1 Feb 58
4320th Strategic[2] Wing (Missile) (SW)	F.E. Warren AFB, Wyoming	Atlas D	1 Feb 58	23 Feb 58
706th Strategic[2] Missile Wing (SMW)	F.E. Warren AFB, Wyoming	Atlas D	23 Feb 58	1 Jul 61
389th Strategic[2] Missile Wing (SMW)	F.E. Warren AFB, Wyoming	Atlas D	26 Apr 61	25 Mar 65
564th Strategic Missile Squadron (SMS)	F.E. Warren AFB, Wyoming	Atlas D	1 Jul 58	1 Sep 64
565th Strategic Missile Squadron (SMS)	F.E. Warren AFB, Wyoming	Atlas D	1 Dec 58	1 Dec 64
566th/549th Strategic[3] Missile Squadron (SMS)	Offutt AFB, Nebraska	Atlas D	15 Aug 59	15 Dec 64
567th Strategic Missile Squadron (SMS)	Fairchild AFB, Washington	Atlas E	1 Apr 60	25 Jun 65
548th Strategic Missile Squadron (SMS)	Forbes AFB, Kansas	Atlas E	1 Jul 60	25 Mar 65

549th/566th Strategic[4] Missile Squadron (SMS)	F. E. Warren AFB, Wyoming	Atlas E	1 Oct 60	25 Mar 65
550th Strategic Missile Squadron (SMS)	Schilling AFB, Kansas	Atlas F	1 Apr 61	25 Jun 65
551st Strategic Missile Squadron (SMS)	Lincoln AFB, Nebraska	Atlas F	1 Apr 61	25 Jun 65
577th Strategic Missile Squadron (SMS)	Altus AFB, Oklahoma	Atlas F	1 Jun 61	25 Mar 65
578th Strategic Missile Squadron (SMS)	Dyess AFB, Texas	Atlas F	1 Jul 61	25 Mar 65
579th Strategic Missile Squadron (SMS)	Walker AFB, New Mexico	Atlas F	1 Sep 61	25 Mar 65
556th Strategic Missile Squadron (SMS)	Plattsburgh AFB, New York	Atlas F	1 Oct 61	25 Jun 65

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[1] On 4 October 1958, Cooke AFB, California, was renamed Vandenberg AFB in honor of the late General Hoyt S. Vandenberg, former Chief of Staff, United States Air Force.

[2] On 1 February 1958, the 4320th SMW replaced the Strategic Missile Wing (Provisional) at F.E. Warren. The 706th SMW then replaced the the 4320th SW on 23 February 1958. The 389th SMW replaced the 706th on 1 July 1961.

[3] On 1 July 1961, Headquarters SAC changed the squadron designation of the 566th SMS at Offutt to the 549th SMS.

[4] On 1 July 1961, Headquarters SAC changed the squadron designation on the 549th SMS at F. E. Warren to the 566th SMS.

APPENDIX E

TITAN ICBM UNIT

ACTIVATION AND INACTIVATION DATES

UNIT	BASE	MISSILE	ACTIVATION DATE	INACTIVATION DATE
703d Strategic[1] Missile Wing (SMW)	Lowry AFB, Colorado	Titan I	25 Mar 63	1 Jul 61
451st Strategic[1] Missile Wing (SMW)	Lowry AFB, Colorado	Titan I	26 Apr 61	25 Jun 65
848th/724th Strategic[2] Missile Squadron (SMS)	Lowry AFB, Colorado	Titan I	1 Feb 60	25 Jun 65
849th/725th Strategic[3] Missile Squadron (SMS)	Lowry AFB, Colorado	Titan I	1 Aug 60	25 Jun 65
850th Strategic Missile Squadron (SMS)	Ellsworth AFB, South Dakota	Titan I	1 Dec 60	25 Mar 65
851st Strategic Missile Squadron (SMS)	Beale AFB, California	Titan I	1 Feb 61	25 Mar 65
568th Strategic Missile Squadron (SMS)	Larson AFB, Washington	Titan I	1 Apr 61	25 Mar 65
569th Strategic Missile Squadron (SMS)	Mountain Home AFB, Idaho	Titan I	1 Jun 61	25 Jun 65
390th Strategic Missile Wing (SMW)	Davis-Monthan AFB, Arizona	Titan II	1 Jan 62	31 Jul 84
570th Strategic Missile Squadron (SMS)	Davis-Monthan AFB, Arizona	Titan II	1 Jan 62	31 Jul 84

571st Strategic Missile Squadron (SMS)	Davis-Monthan AFB, Arizona	Titan II	1 May 62	2 Dec 83
381st Strategic Strategic Wing (SMW)	McConnell AFB, Kansas	Titan II	1 Mar 62	8 Aug 86
532d Strategic Missile Squadron (SMS)	McConnell AFB, Kansas	Titan II	1 Mar 62	8 Aug 86
533d Strategic Missile Squadron (SMS)	McConnell AFB, Kansas	Titan II	1 Aug 62	1 Nov 85
308th Strategic Missile Wing (SMW)	Little Rock AFB, Arkansas	Titan II	1 Apr 62	18 Aug 87
373d Strategic Missile Squadron (SMS)	Little Rock, AFB, Arkansas	Titan II	1 Apr 62	18 Aug 87
374th Strategic Missile Squadron (SMS)	Little Rock AFB, Arkansas	Titan II	1 Sep 62	15 Aug 86
395th Strategic Missile Squadron (SMS)	Vandenberg AFB, California	Titan II	1 Feb 59	31 Dec 69

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[1] On 1 July 1961, the 451st SMW replaced the 703d SMW at Lowry AFB, Colorado.

[2] On 1 July 1961, Headquarters SAC discontinued the 848th SMS and in its place organized the 724th SMS.

[3] On 1 July 1961, Headquarters SAC discontinued the 849th SMS and in its place organized the 725th SMS.

APPENDIX F

MINUTEMAN ICBM UNITS

ACTIVATION AND INACTIVATION DATES

UNIT	BASE	MISSILE	ACTIVATION DATE	CONVERSION* DATE	INACTIVATION DATE
4062d Strategic Wing (Missile) (SW)	Hill AFB, UT		1 Dec 60		20 Feb 62
341st Strategic Missile Wing (SMW)	Malmstrom AFB, MT	I-A II-F III-G	15 Jul 61	30 May 69 8 Jul 75	
10th Strategic Missile Squadron (SMS)	Malmstrom AFB, MT	I-A II-F	1 Dec 61		
12th Strategic Missile Squadron (SMS)	Malmstrom AFB, MT	I-A II-F	1 May 62		
490th Strategic Missile Squadron (SMS)	Malmstrom AFB, MT	I-A II-F	1 May 62		
564th Strategic Missile Squadron (SMS)	Malmstrom AFB, MT	II-F III-G	1 Apr 66		
44th Strategic Missile Wing (SMW)	Ellsworth AFB, SD	I-B II-F	1 Jan 62	13 Mar 73	
66th Strategic Missile Squadron (SMS)	Ellsworth AFB, SD	I-B II-F	1 Jul 62		
67th Strategic Missile Squadron (SMS)	Ellsworth AFB, SD	I-B II-F	1 Aug 62		
68th Strategic Missile Squadron (SMS)	Ellsworth AFB, SD	I-B II-F	1 Sep 62		

* The date conversion to the new model was completed.

455th Strategic Missile Wing (SMW)	Minot AFB, ND		1 Nov 62		24 Jun 68
91st Strategic Missile Wing (SMW)	Minot AFB, ND	I-B III-G	25 Jun 68	13 Dec 71	
740th Strategic Missile Squadron (SMS)	Minot AFB, ND	I-B III-G	1 Nov 62		
741st Strategic Missile Squadron (SMS)	Minot AFB, ND	I-B III-G	1 Dec 62		
742d Strategic Missile Squadron (SMS)	Minot AFB, ND	I-B III-G	1 Jan 63		
351st Strategic Missile Wing (SMW)	Whiteman AFB, MO	I-B II-F	1 Feb 63	3 Oct 67	
508th Strategic Missile Squadron (SMS)	Whiteman AFB, MO	I-B II-F	1 May 63		
509th Strategic Missile Squadron (SMS)	Whiteman AFB, MO	I-B II-F	1 Jun 63		
510th Strategic Missile Squadron (SMS)	Whiteman AFB, MO	I-B II-F	1 Jun 63		
90th Strategic Missile Wing (SMW)	F.E. Warren AFB, WY	I-B III-G PK	1 Jul 63	26 Jan 75 30 Dec 88	
319thStrategic Missile Squadron (SMS)	F.E. Warren AFB, WY	I-B III-G	1 Oct 63		
320th Strategic Missile Squadron (SMS)	F.E. Warren AFB, WY	I-B III-G	8 Jan 64		
[illegible] Missile Squadron (SMS)	F.E. Warren AFB, WY	I-B III-G	[illegible]		

400th Strategic Missile Squadron (SMS)	F.E. Warren AFB, WY	I-B III-G PK	1 Jul 64	
321st Strategic Missile Wing (SMW)	Grand Forks AFB, ND	II-F III-G	1 Nov 64	8 Mar 73
446th Strategic Missile Squadron (SMS)	Grand Forks AFB, ND	II-F III-G	1 Jul 65	
447th Strategic Missile Squadron (SMS)	Grand Forks AFB, ND	II-F III-G	1 Feb 65	
448th Strategic Missile Squadron (SMS)	Grand Forks AFB, ND	II-F III-G	15 Sep 65	
394th Strategic Missile Squadron (SMS)	Vandenberg AFB, CA	I II-F III-G	1 Jul 60	

APPENDIX G

ATLAS ICBM

LAUNCHER DESIGNATIONS AND LOCATIONS

BASE	MODEL	LAUNCHER DESIGNATION	SITE NUMBER	LOCATION
F.E. Warren AFB, Wyoming	D	564-A-1,2,3	1	Cheyenne
	D	564-B-1,2,3	1	Cheyenne
	D	565-A-1,2,3	2	Cheyenne
	D	565-B-1,2,3	3	Carpenter
	D	565-C-1,2,3	4	Granite Canyon
	E	566-1	5	Chugwater
	E	566-2	6	Lagrange
	E	566-3	7	Pine Bluffs
	E	566-4	8	Kimball, NE
	E	566-5	9	Grover, CO
	E	566-6	10	Briggsdale, CO
	E	566-7	11	Nunn, CO
	E	566-8	12	Greely, CO
	E	566-9	13	Fort Collins, CO
Offutt AFB, Nebraska	D	549-A-1,2,3	1	Mead
	D	549-B-1,2,3	2	Arlington
	D	549-C-1,2,3	3	Missouri Valley, IA
Fairchild AFB, Washington	E	567-1	1	Deer Park
	E	567-2	2	Newman Lake
	E	567-3	3	Rockford, ID
	E	567-4	4	Sprague
	E	567-5	5	Lemona
	E	567-6	6	Davenport
	E	567-7	7	Wilbur
	E	567-8	8	Egypt
	E	567-9	9	Reardan
Forbes AFB, Kansas	E	548-1	1	Valley Falls
	E	548-2	2	Lawrence
	E	548-3	3	Waverly
	E	548-4	4	Osage City
	E	548-5	5	Council Grove
	E	548-6	6	Eskridge
	E	548-7	7	Wamego
	E	548-8	8	St Marys
	E	548-9	9	Holton

Schilling AFB, Kansas	F	550-1	1	Bennington
	F	550-2	2	Abilene
	F	550-3	3	Chapman
	F	550-4	4	Carlton
	F	550-5	5	McPherson
	F	550-6	6	Mitchell
	F	550-7	7	Kanopolis
	F	550-8	8	Wilson
	F	550-9	9	Beverly
	F	550-10	10	Tescott
	F	550-11	11	Glasco
	F	550-12	12	Minneapolis
Lincoln AFB, Nebraska	F	551-1	1	Elmwood
	F	551-2	2	Avoca
	F	551-3	3	Eagle
	F	551-4	4	Nebraska City
	F	551-5	5	Palmyra
	F	551-6	6	Tecumseh
	F	551-7	7	Courtland
	F	551-8	8	Beatrice
	F	551-9	9	Wilber
	F	551-10	10	York
	F	551-11	11	Seward
	F	551-12	12	David City
Altus AFB, Oklahoma	F	577-1	1	Lonewolf
	F	577-2	2	Hobart
	F	577-3	3	Snyder
	F	577-4	4	Cache
	F	577-5	5	Mantiou
	F	577-6	6	Frederick
	F	577-7	7	Fargo, TX
	F	577-8	8	Creta
	F	577-9	9	Hollis
	F	577-10	10	Russell
	F	577-11	11	Willow
	F	577-12	12	Hobart
Dyess AFB, Texas	F	578-1	1	Abilene
	F	578-2	2	Albany
	F	578-3	3	Clyde
	F	578-4	4	Denton Community
	F	578-5	5	Oplin
	F	578-6	6	Lawn
	F	578-7	7	Bradshaw
	F	578-8	8	Winters
	[illegible]	[illegible]	[illegible]	Shep
	F	578-10	10	Nolan
	F	578-11	11	Anson
	F	578-12	12	Corinth

Walker AFB, New Mexico	F	579-1	1	Roswell
	F	579-2	2	Elkins
	F	579-3	3	Elkins
	F	579-4	4	Roswell
	F	579-5	5	Roswell
	F	579-6	6	Hagerman
	F	579-7	7	Hagerman
	F	579-8	8	Lake Arthur
	F	579-9	9	Picacho
	F	579-10	10	Roswell
	F	579-11	11	Roswell
	F	579-12	12	Roswell
Plattsburgh AFB, New York	F	556-1	1	Champlain
	F	556-2	2	Alburg, VT
	F	556-3	3	Swanton, VT
	F	556-4	4	Millsboro
	F	556-5	5	Lewis
	F	556-6	6	Au Sable Forks
	F	556-7	7	Riverview
	F	556-8	8	Redford
	F	556-9	9	Dannemora
	F	556-10	10	Brainardsville
	F	556-11	11	Ellenburg Depot
	F	556-12	12	Moeers
Vandenberg AFB, California		576-A-1,2,3		Vandenberg
		576-B-1,2,3		Vandenberg
		576-C		Vandenberg
		576-D		Vandenberg
		576-E		Vandenberg

APPENDIX H

TITAN ICBM

LAUNCHER DESIGNATIONS AND LOCATIONS

BASE	MODEL	LAUNCHER DESIGNATION	SITE NUMBER	LOCATION
Lowry AFB, Colorado	I	724-A-1,2,3	1	Bennett
	I	724-B-1,2,3	2	Denver
	I	724-C-1,2,3	3	Denver
	I	725-A-1,2,3	4	Deertail
	I	725-B-1,2,3	5	Bennett
	I	725-C-1,2,3	6	Elizabeth
Ellsworth AFB, South Dakota	I	850-A-1,2,3	1	New Underwood
	I	850-B-1,2,3	2	Hermosa
	I	850-C-1,2,3	3	Sturgis
Beale AFB, California	I	851-A-1,2,3	1	Lincoln
	I	851-B-1,2,3	2	Live Oak
	I	851-C-1,2,3	3	Chico
Larson AFB, Washington	I	568-A-1,2,3	1	Odessa
	I	568-B-1,2,3	2	Warden
	I	568-C-1,2,3	3	Quincy
Mountain Home AFB, Idaho	I	569-A-1,2,3	1	Bruneau
	I	569-B-1,2,3	2	Oreana
	I	569-C-1,2,3	3	Boise
Davis-Monthan AFB, Arizona	II	570-1	1	Oracle
	II	570-2	11	Three Points
	II	570-3	12	Rillito
	II	570-4	13	Rillito
	II	570-5	14	Rillito
	II	570-6	15	Rillito
	II	570-7	16	Oracle Junction
	II	570-8	17	Oracle Junction
	II	570-9	18	Oracle Junction
	II	571-1	2	Benson
	II	571-2	3	Benson
	II	571-3	4	Mescal
	II	571-4	5	Pantano
	II	571-5	6	Continental
	II	571-6	7	Amado
	II	571-7	8	Continental
	II	571-8	9	Palo Alto
	II	571-9	10	Three Points

McConnell AFB, Kansas	II	532-1	10	Wellington
	II	532-2	11	Wellington
	II	532-3	12	Conway Springs
	II	532-4	13	Viola
	II	532-5	14	Nrowich
	II	532-6	15	Rago
	II	532-7	16	Murdock
	II	532-8	17	Kingman
	II	532-9	18	Mount Vernon
	II	533-1	1	Potwin
	II	533-2	2	El Dorado
	II	533-3	3	Leon
	II	533-4	4	Leon
	II	533-5	5	Leon
	II	533-6	6	Smileyville
	II	533-7	7	Rock
	II	533-8	8	Winfield
	II	533-9	9	Oxford
Little Rock AFB, Arkansas	II	373-1	1	Mount Vernon
	II	373-2	2	Rosebud
	II	373-3	3	Heber Springs
	II	373-4	4	Albion
	II	373-5	5	Center Hill
	II	373-6	6	Antioch
	II	373-7	7	Velvet Ridge
	II	373-8	8	Judsonia
	II	373-9	9	Hamlet
	II	374-1	10	Blackwell
	II	374-2	11	Plummerville
	II	374-3	12	St Vincent
	II	374-4	13	Springfield
	II	374-5	14	Springfield
	II	374-6	15	Republican
	II	374-7	16	Southside
	II	374-8	17	Guy
	II	373-9	18	Quitman
Vandenberg AFB, California	II	395-A		Vandenberg
	II	395-B		Vandenberg
	II	395-C		Vandenberg
	II	395-D		Vandenberg

APPENDIX I

ATLAS ICBM BASE MAPS

Altus AFB, Oklahoma

Dyess AFB, Texas

Fairchild AFB, Washington

F.E. Warren AFB, Wyoming

Forbes AFB, Kansas

Lincoln AFB, Nebraska

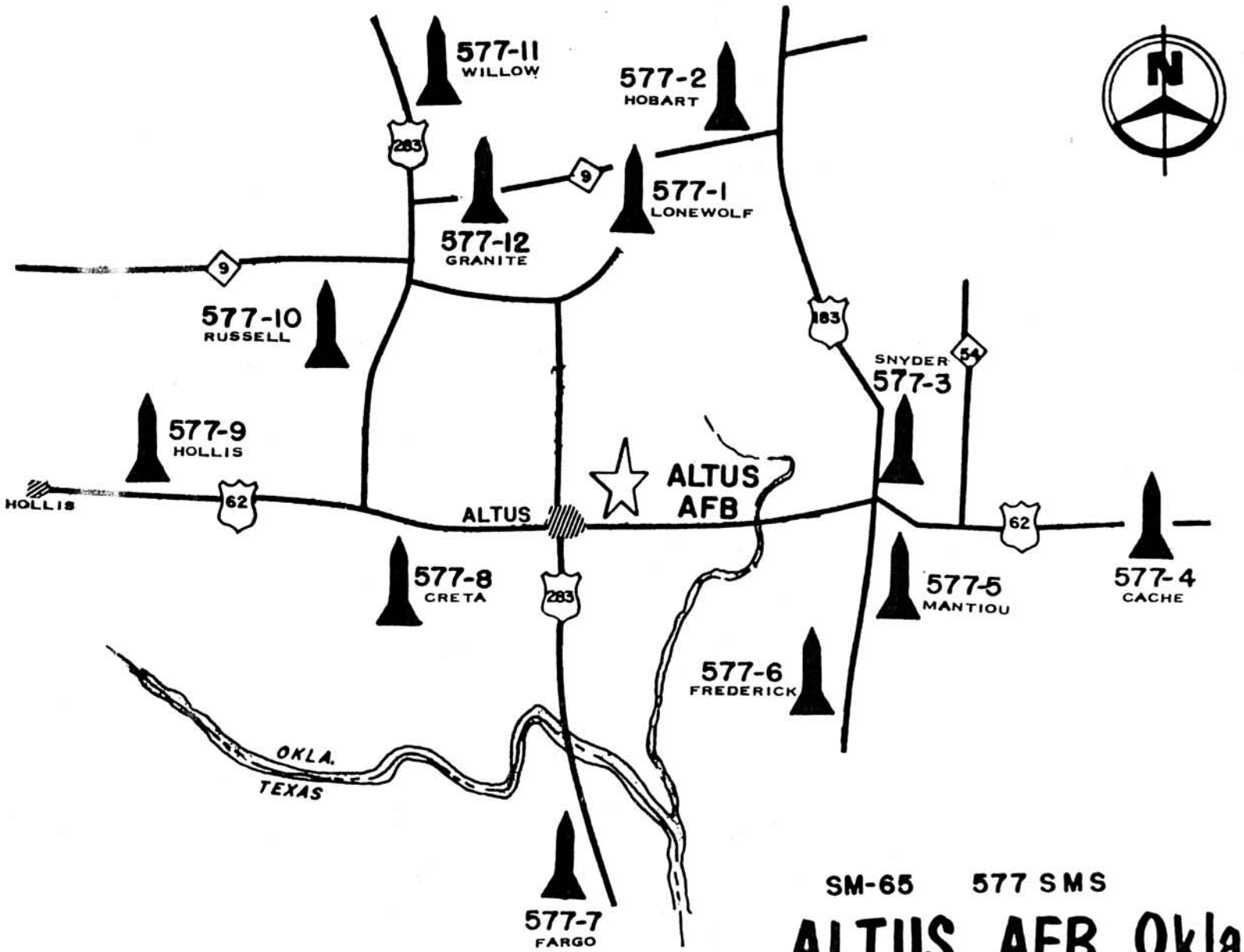
Offutt AFB, Nebraska

Plattsburgh AFB, New York

Schilling AFB, Kansas

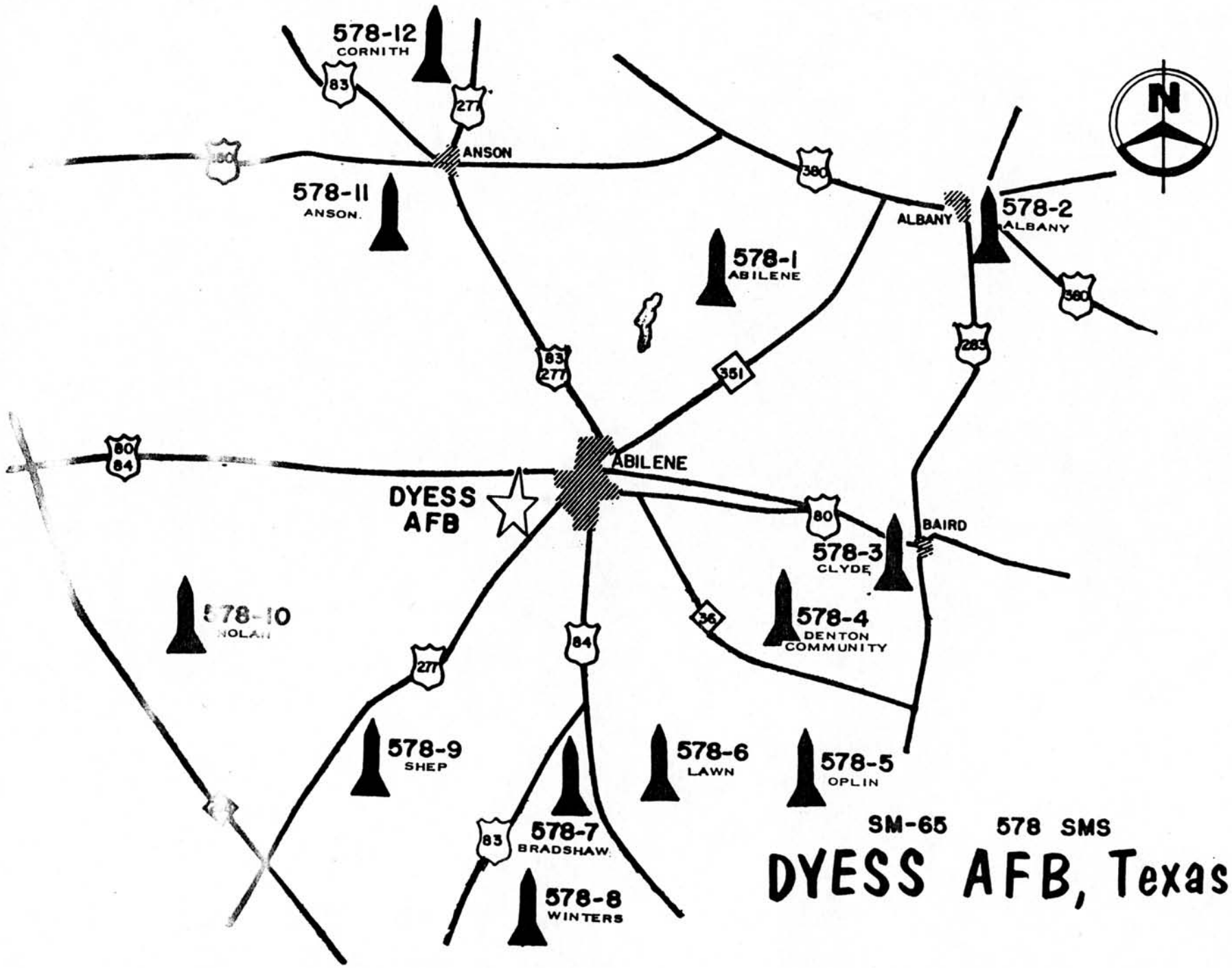
Vandenberg AFB, California

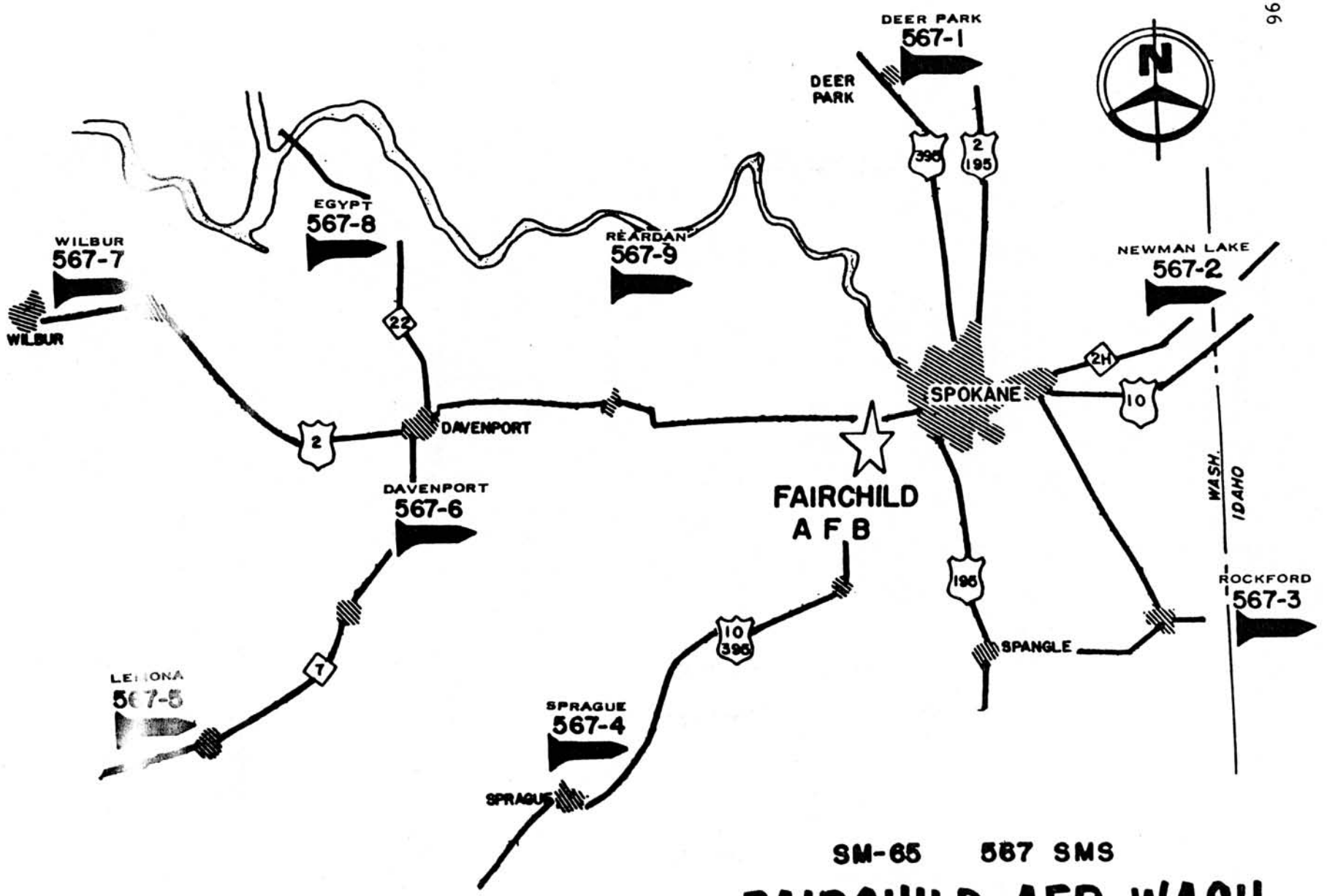
Walker AFB, New Mexico



SM-65 577 SMS

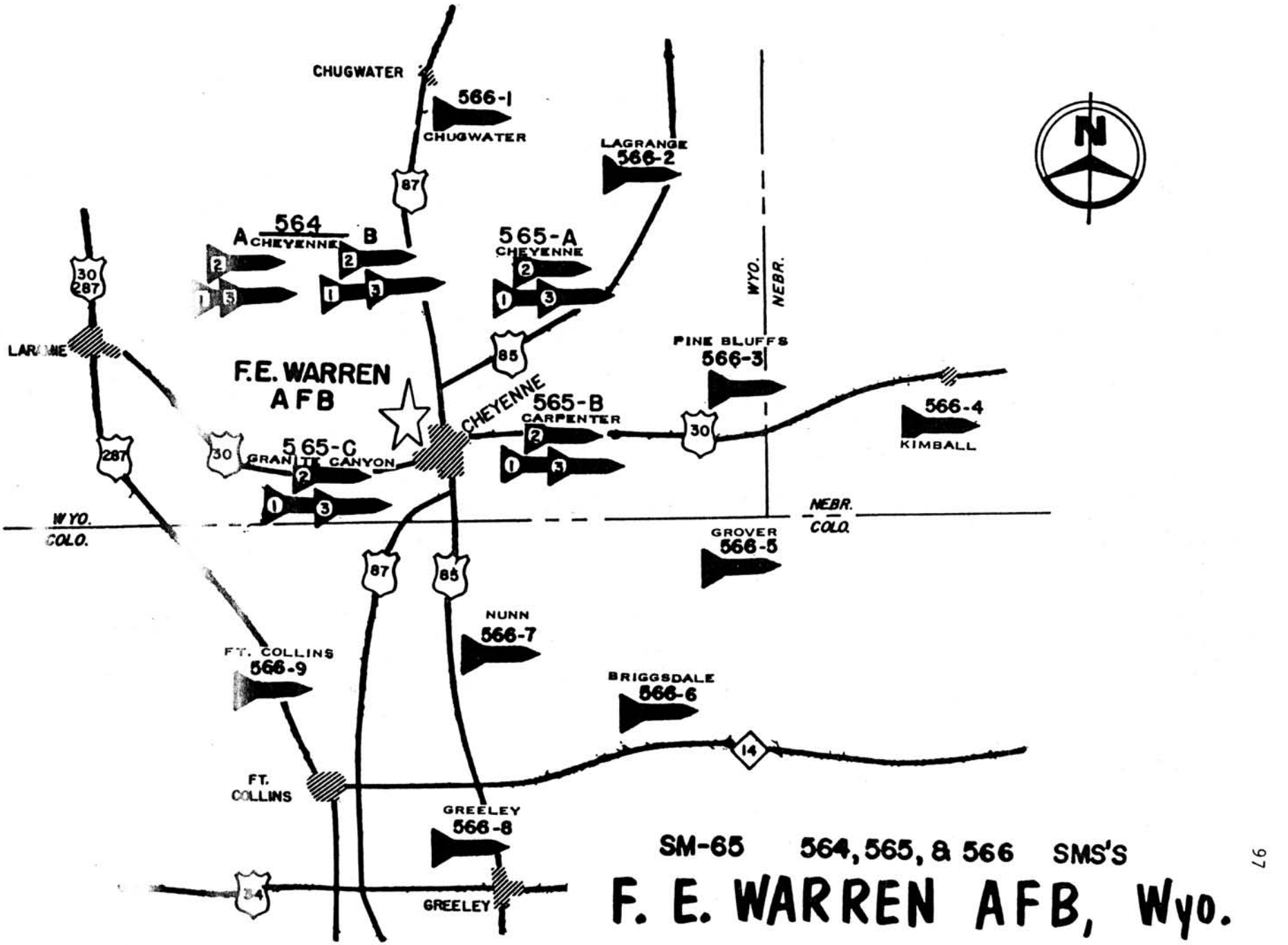
ALTUS AFB, Okla.


578-12
CORNITH
83
277
ANSON
180
578-11
ANSON
380
ALBANY
578-2
ALBANY
N
578-1
ABILENE
580
285
83
277
351
80
84
ABILENE
DYESS
AFB
80
BAIRD
578-3
CLYDE
578-10
NOLAN
36
578-4
DENTON
COMMUNITY
84
277
578-9
SHEP
578-6
LAWN
578-5
OPLIN
83
578-7
BRADSHAW
578-8
WINTERS
SM-65 578 SMS
DYESS AFB, Texas



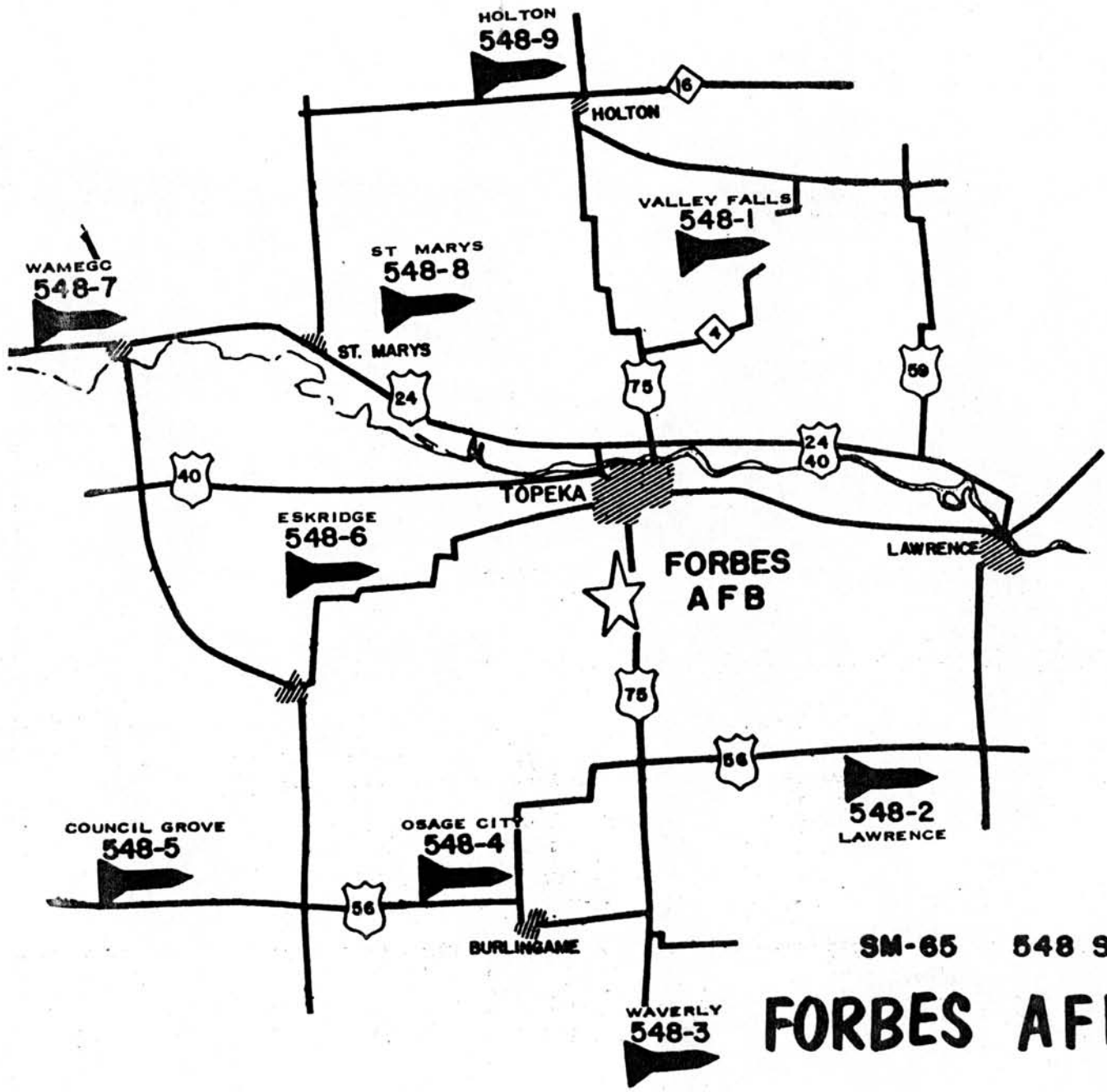
SM-65 567 SMS

FAIRCHILD AFB, WASH.



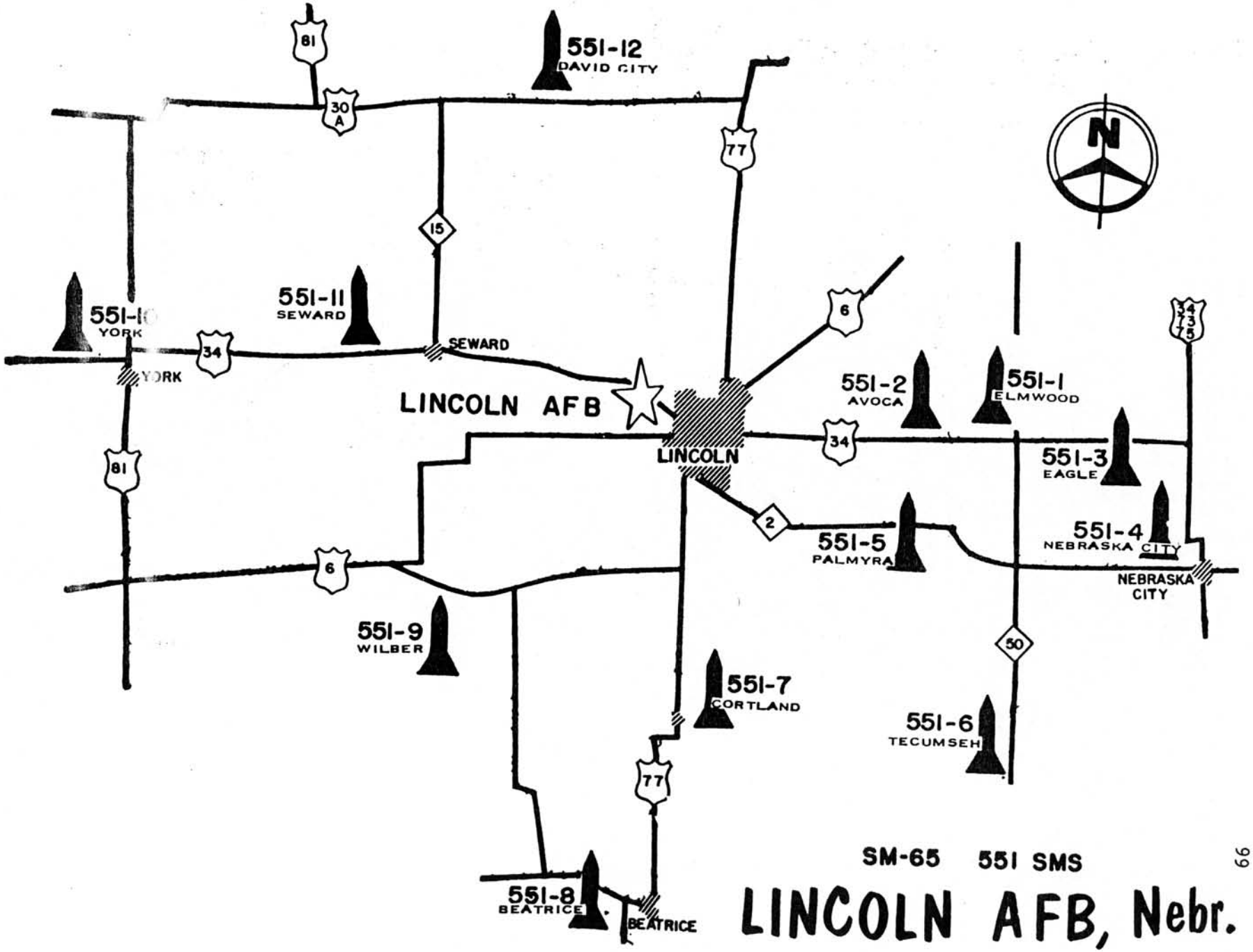
SM-65 564, 565, & 566 SMS's

F. E. WARREN AFB, Wyo.



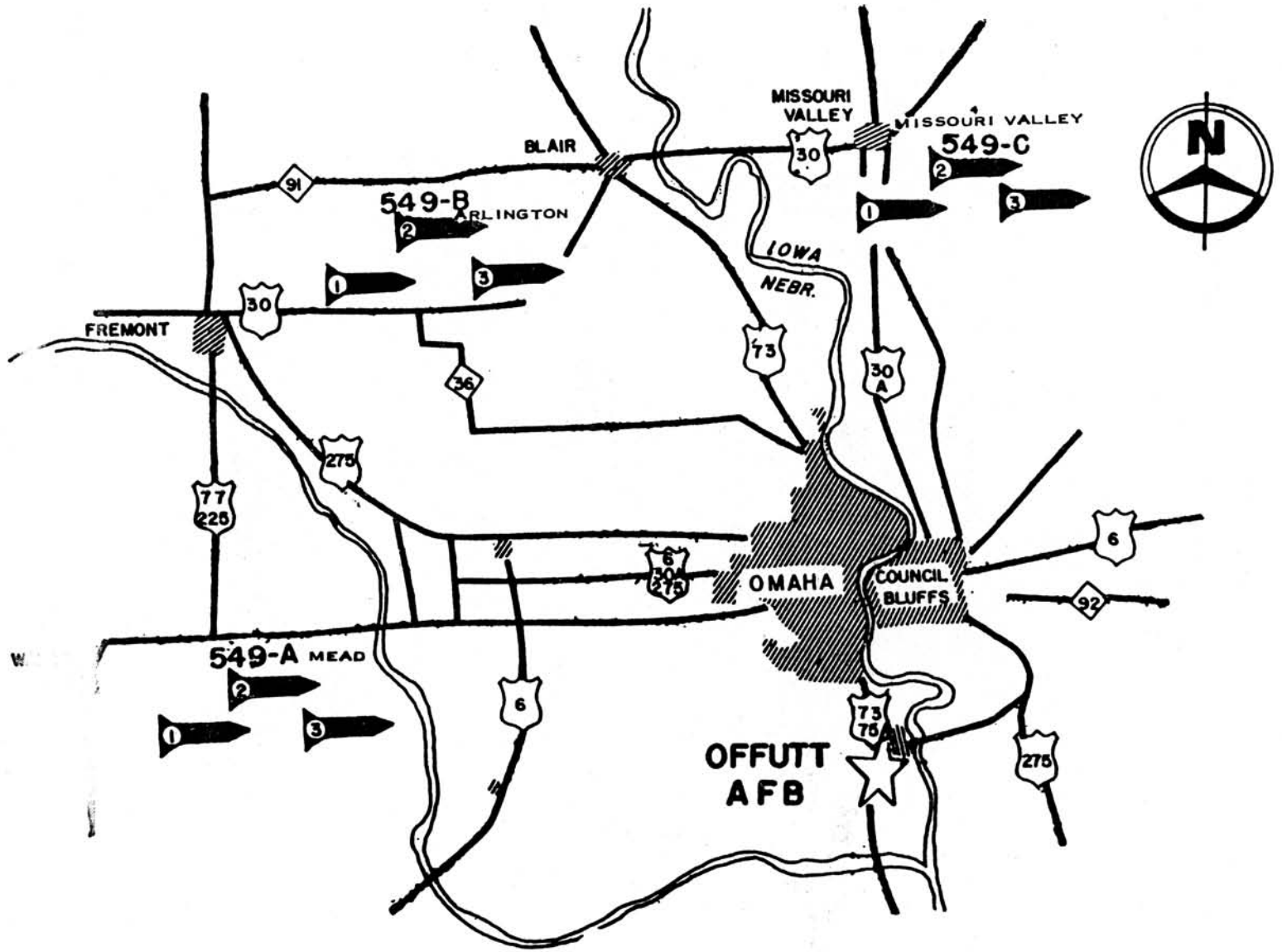
SM-65 548 SMS

FORBES AFB, KANS.



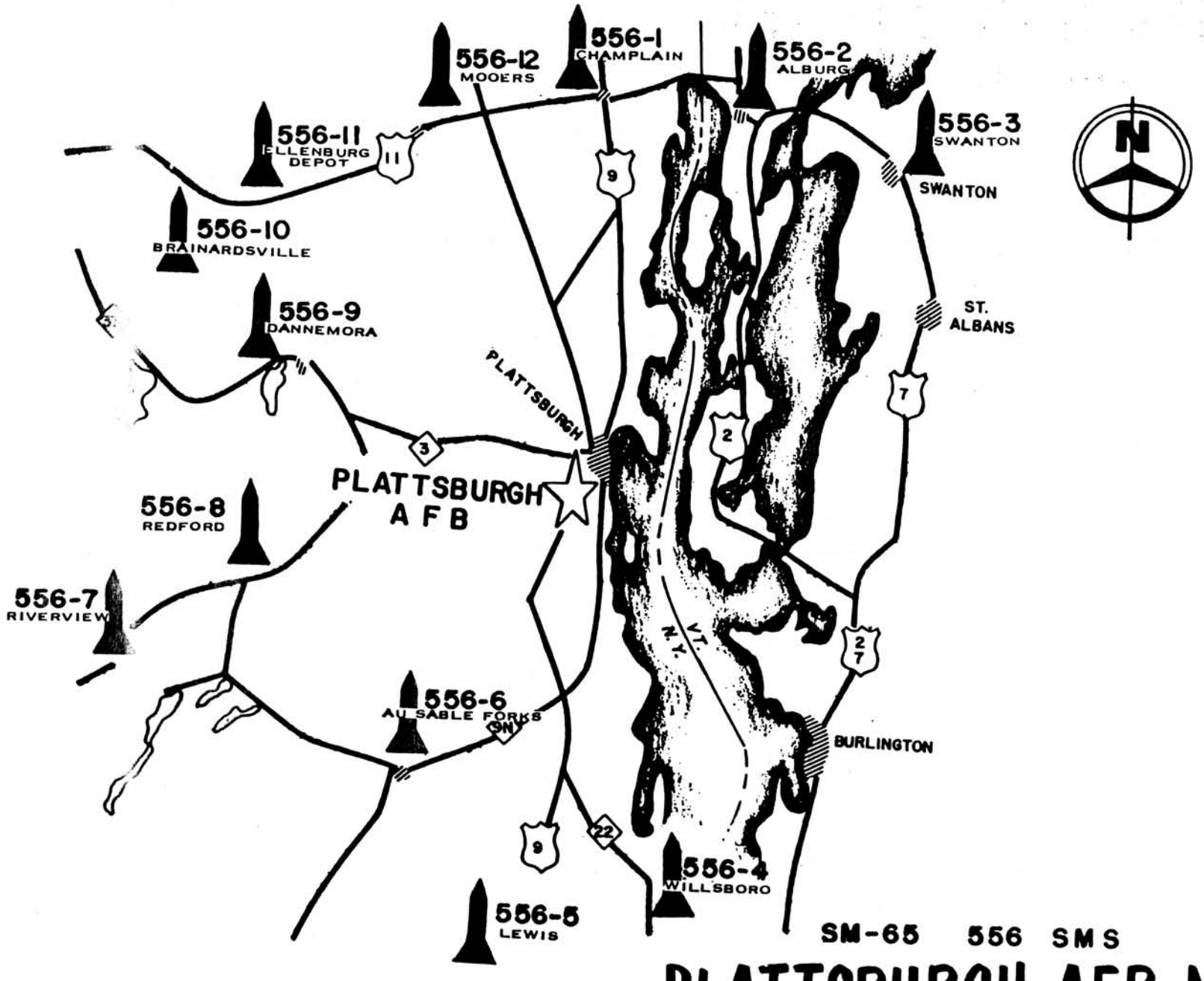
SM-65 551 SMS

LINCOLN AFB, Nebr.



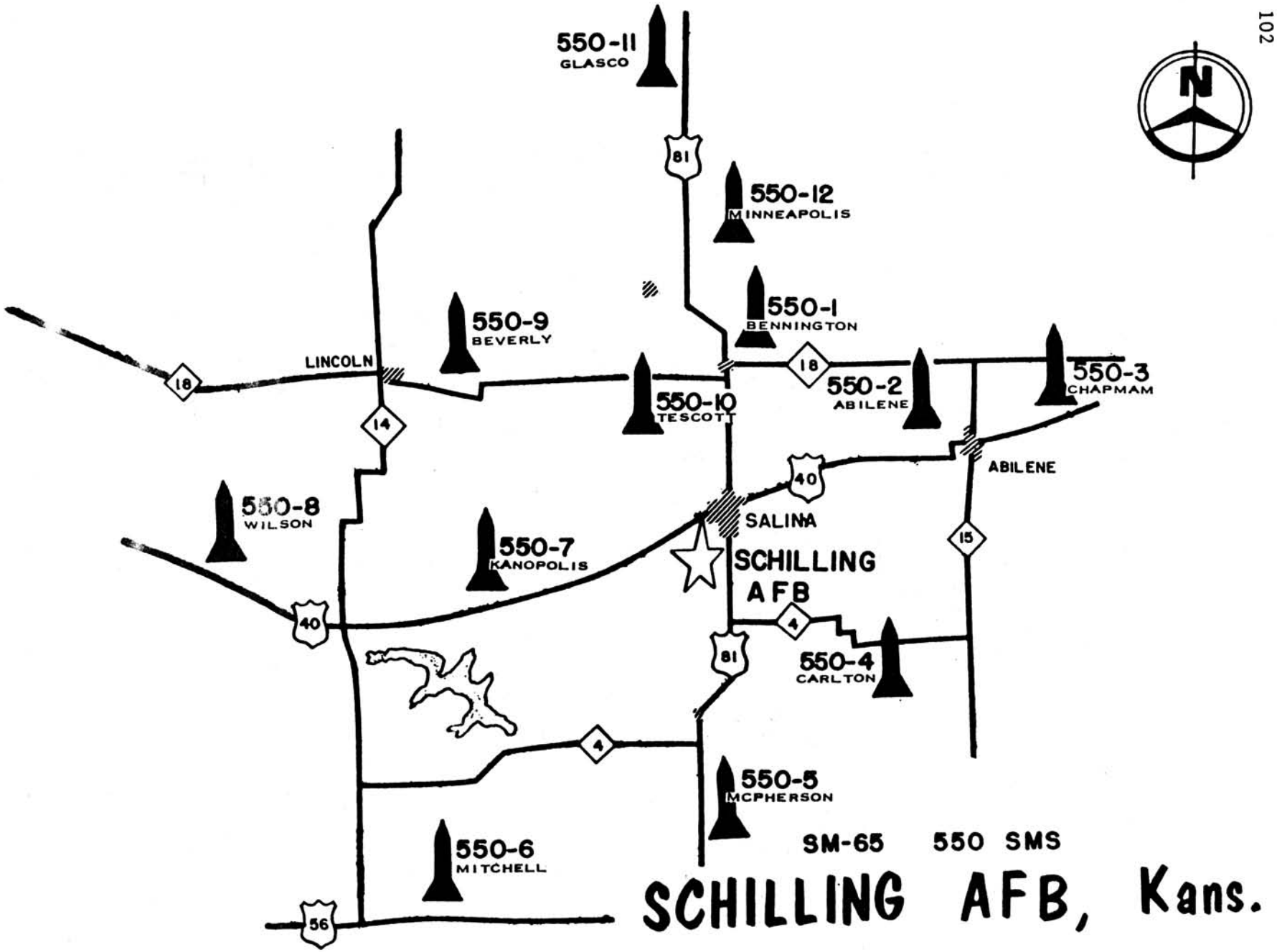
SM-65 549 SMS

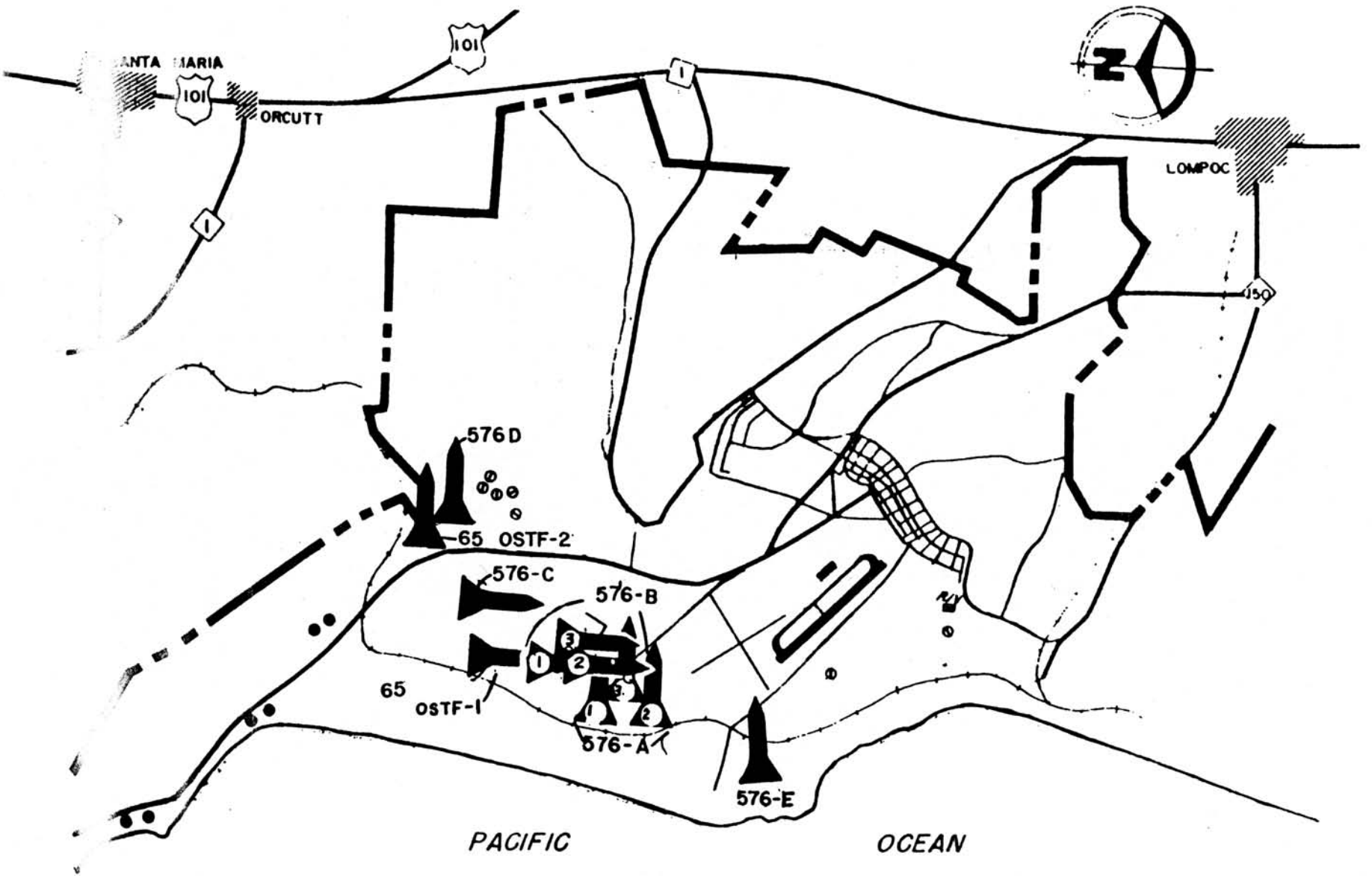
OFFUTT AFB, Nebr.



SM-65 556 SMS

PLATTSBURGH AFB, N.Y.

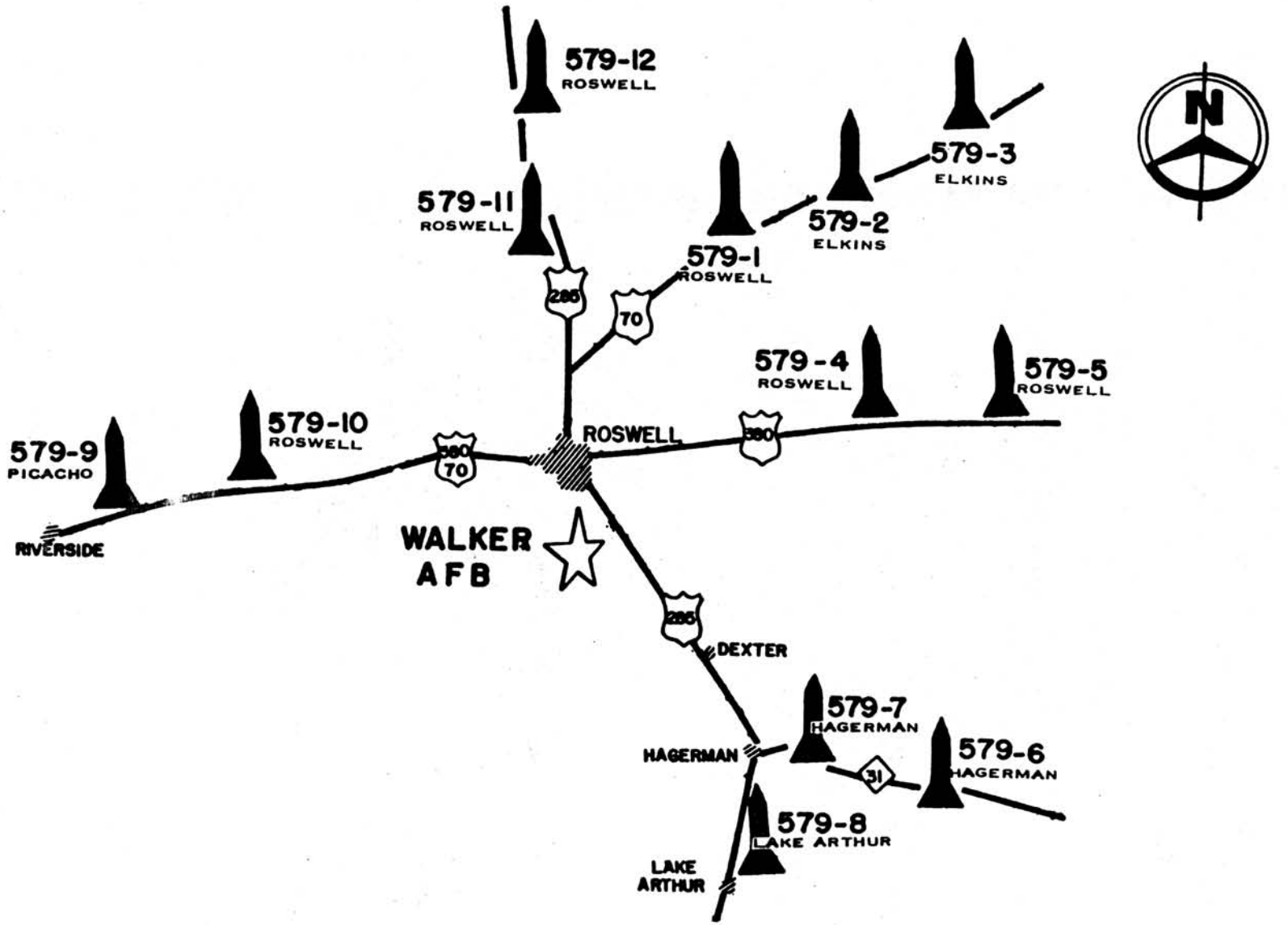

550-11
GLASCO
81
550-12
MINNEAPOLIS
550-1
BENNINGTON
550-9
BEVERLY
LINCOLN
18
550-10
TESCOTT
18
550-2
ABILENE
550-3
CHAPMAM
14
ABILENE
40
550-8
WILSON
SALINA
550-7
KANOPOLIS
SCHILLING
AFB
15
40
4
81
550-4
CARLTON
4
550-5
MCPHERSON
550-6
MITCHELL
56
SM-65 550 SMS
SCHILLING AFB, Kans.



NOTE: DESIGNATIONS INDICATED ARE THE ONLY ONES ASSIGNED TO THESE ON BASE SQUADRONS AND LAUNCHERS.

SM-65 576 SMS

VANDENBERG AFB, CALIF.



SM-65 579 SMS

WALKER AFB, N. M.

APPENDIX J

TITAN I ICBM BASE MAPS

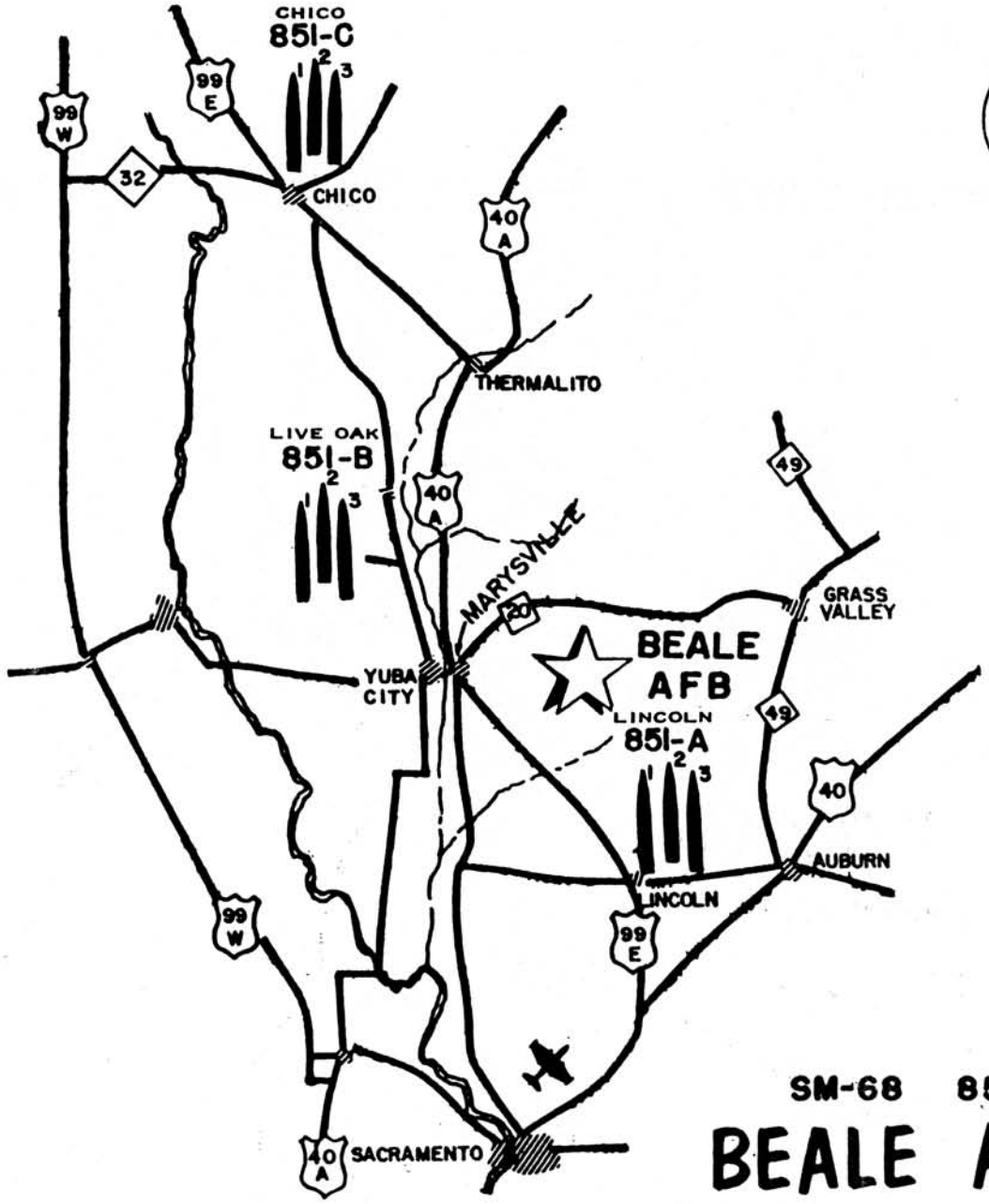
Beale AFB, California

Ellsworth AFB, South Dakota

Larson AFB, Washington

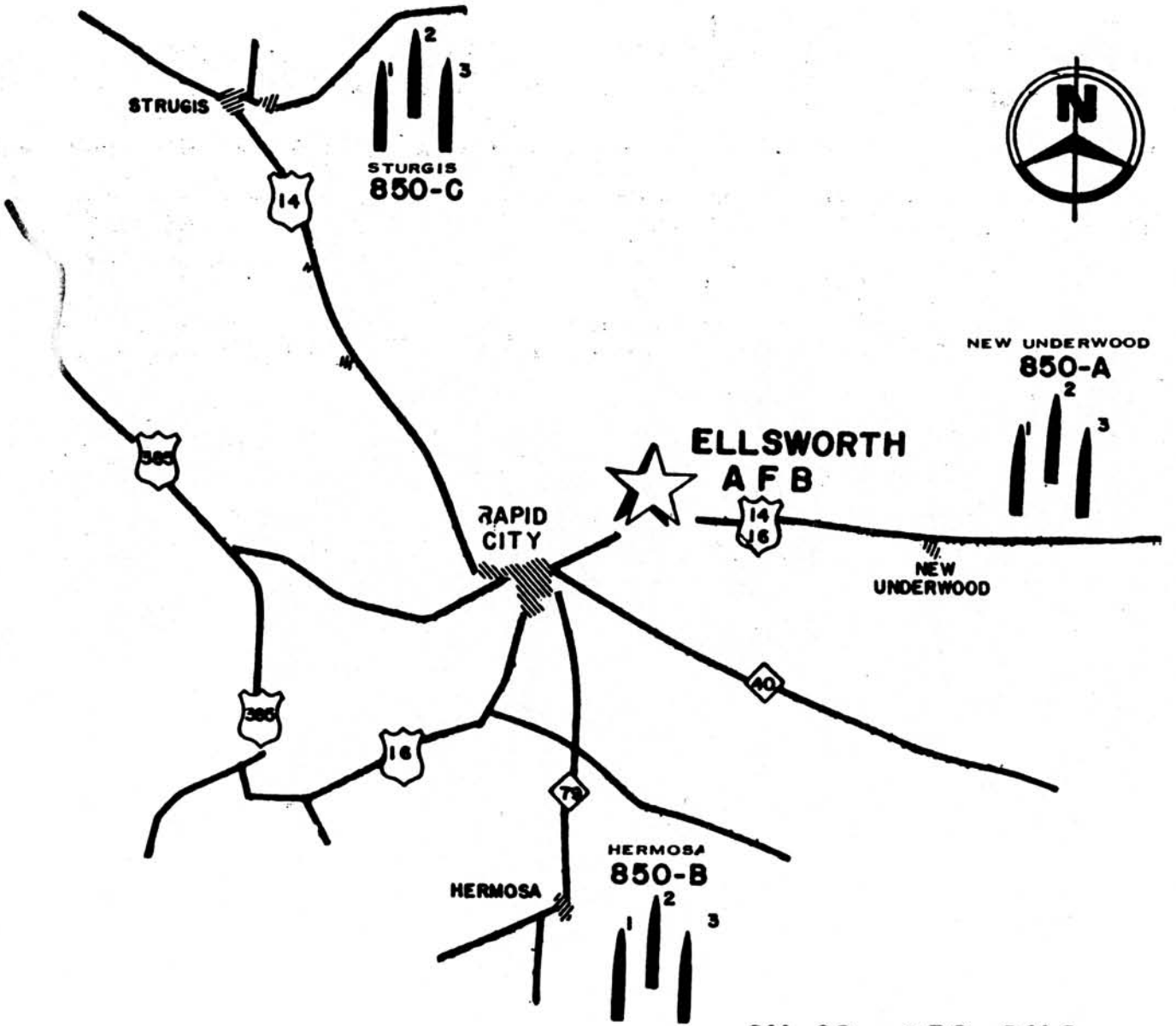
Lowry AFB, Colorado

Mountain Home AFB, Idaho



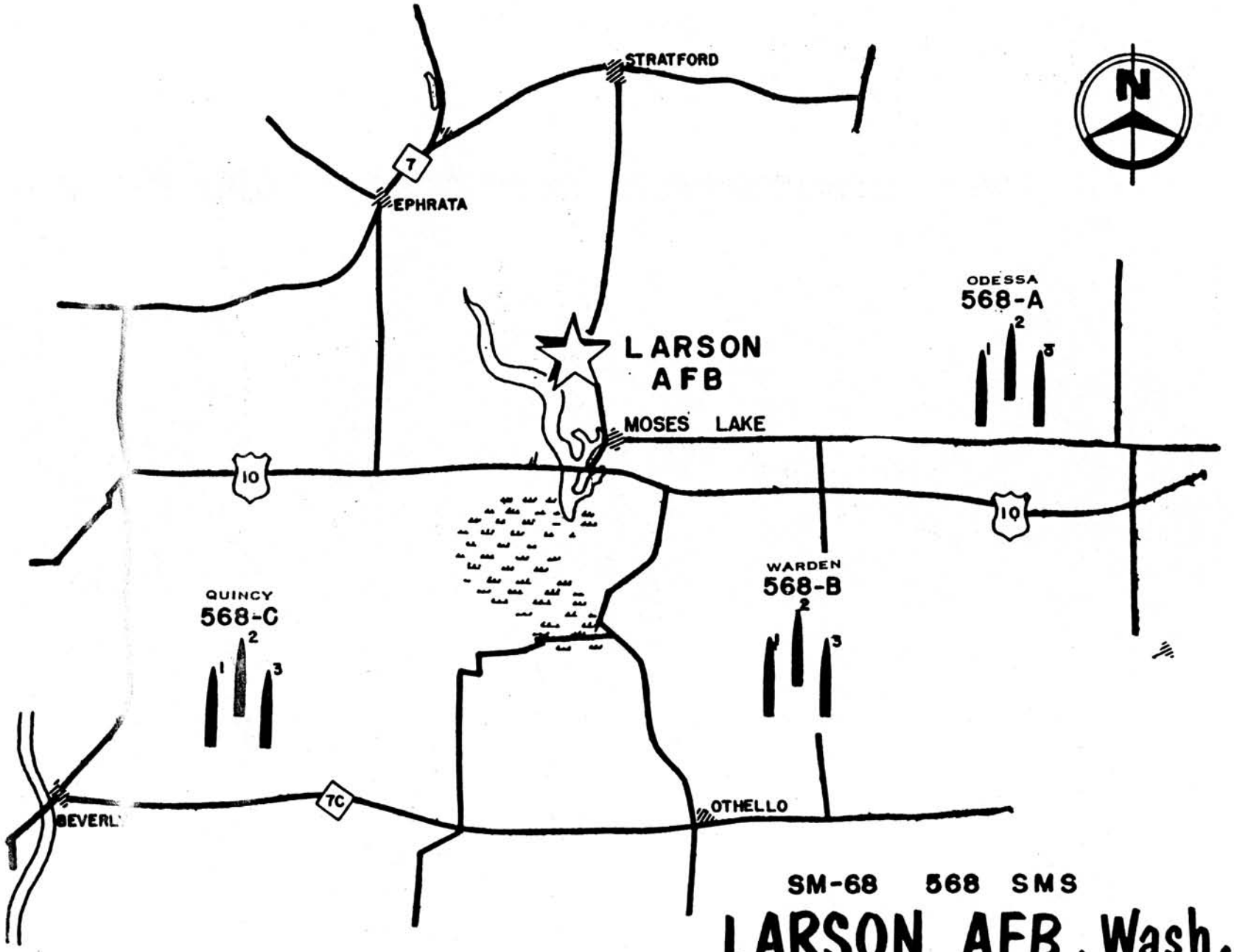
SM-68 851 SMS

BEALE AFB, Calif.



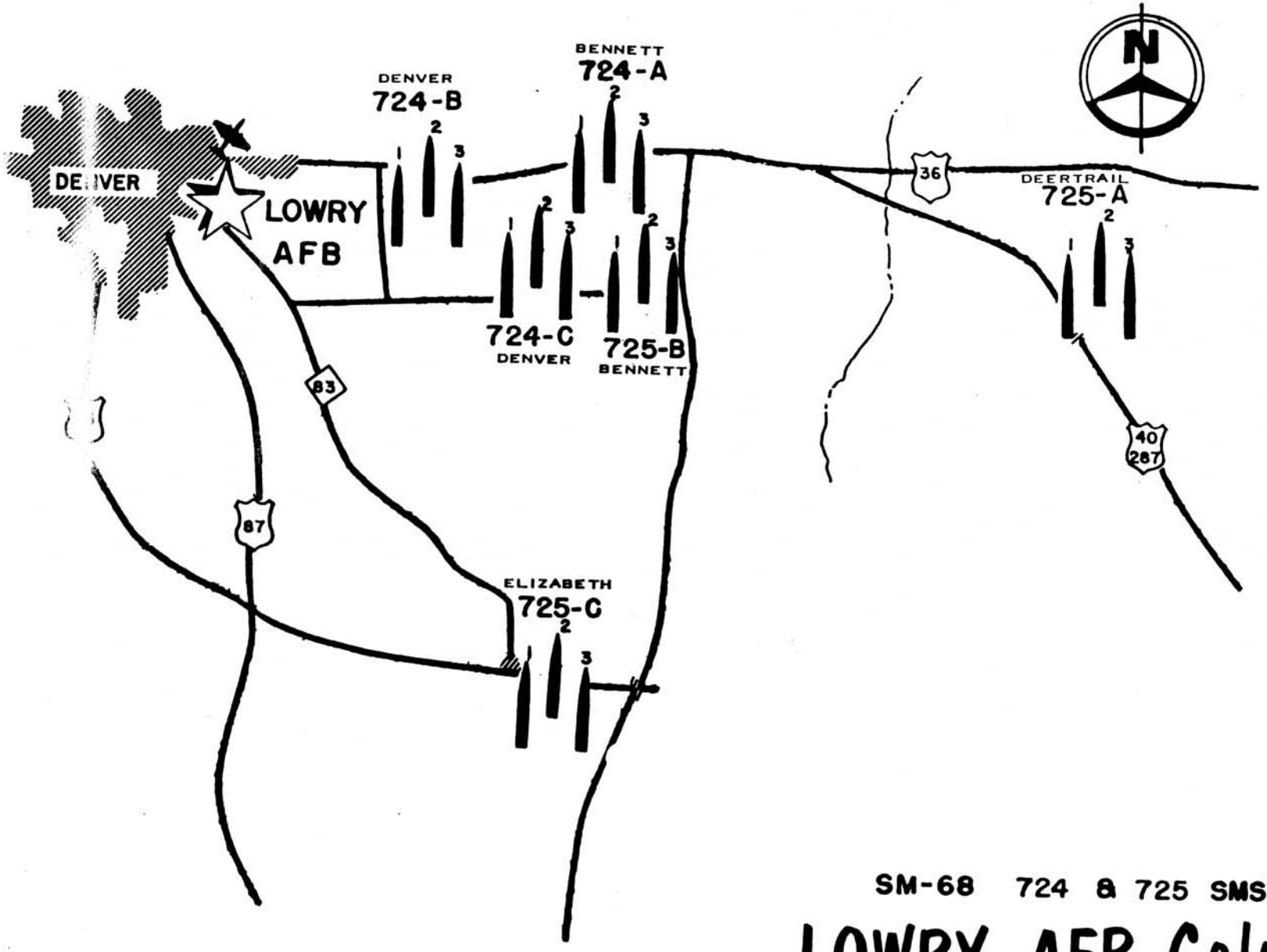
SM-68 850 SMS

ELLSWORTH AFB, S.D.



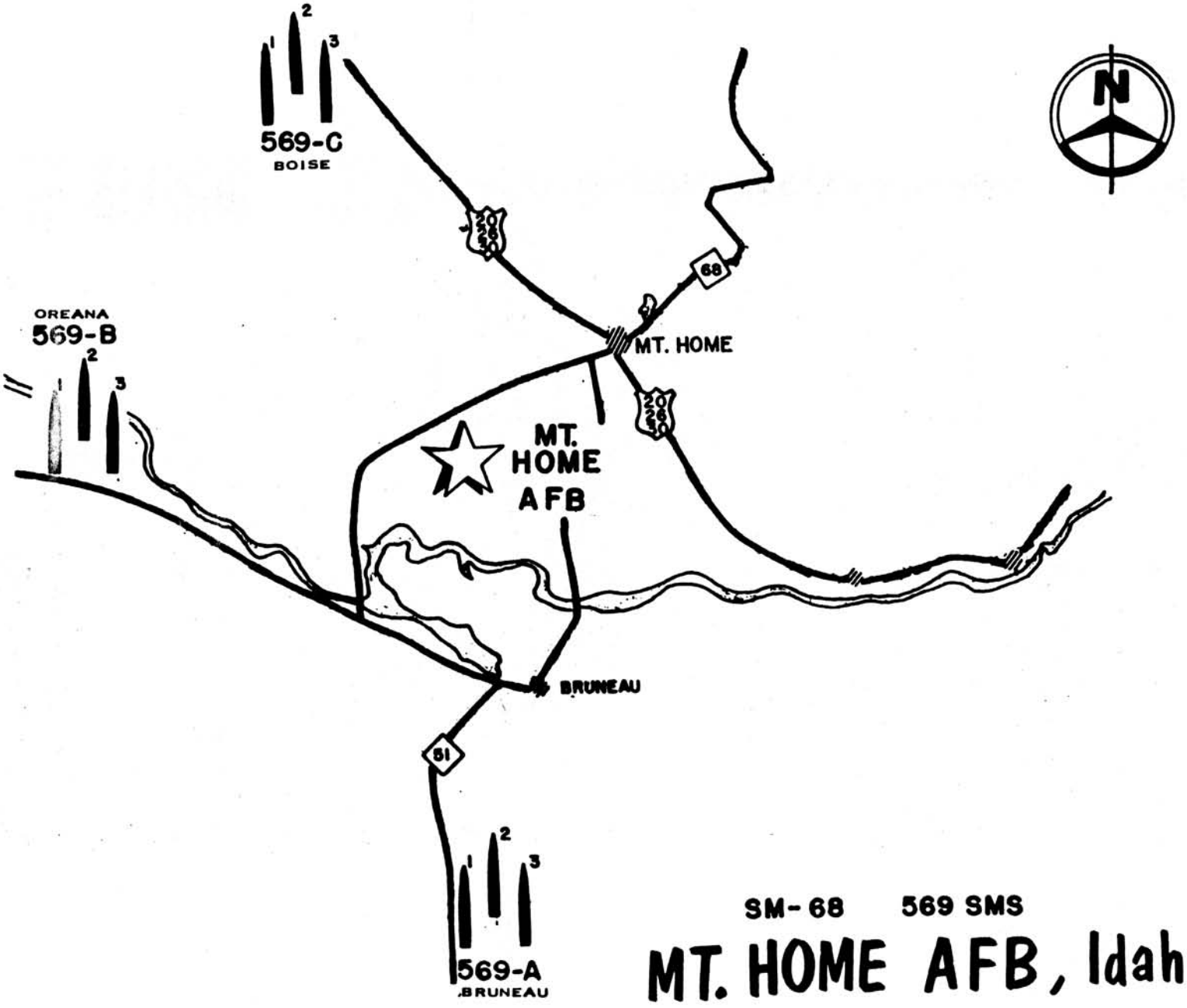
SM-68 568 SMS

LARSON AFB, Wash.



SM-68 724 & 725 SMS'S

LOWRY AFB, Colo.



SM-68 569 SMS

MT. HOME AFB, Idaho

APPENDIX K

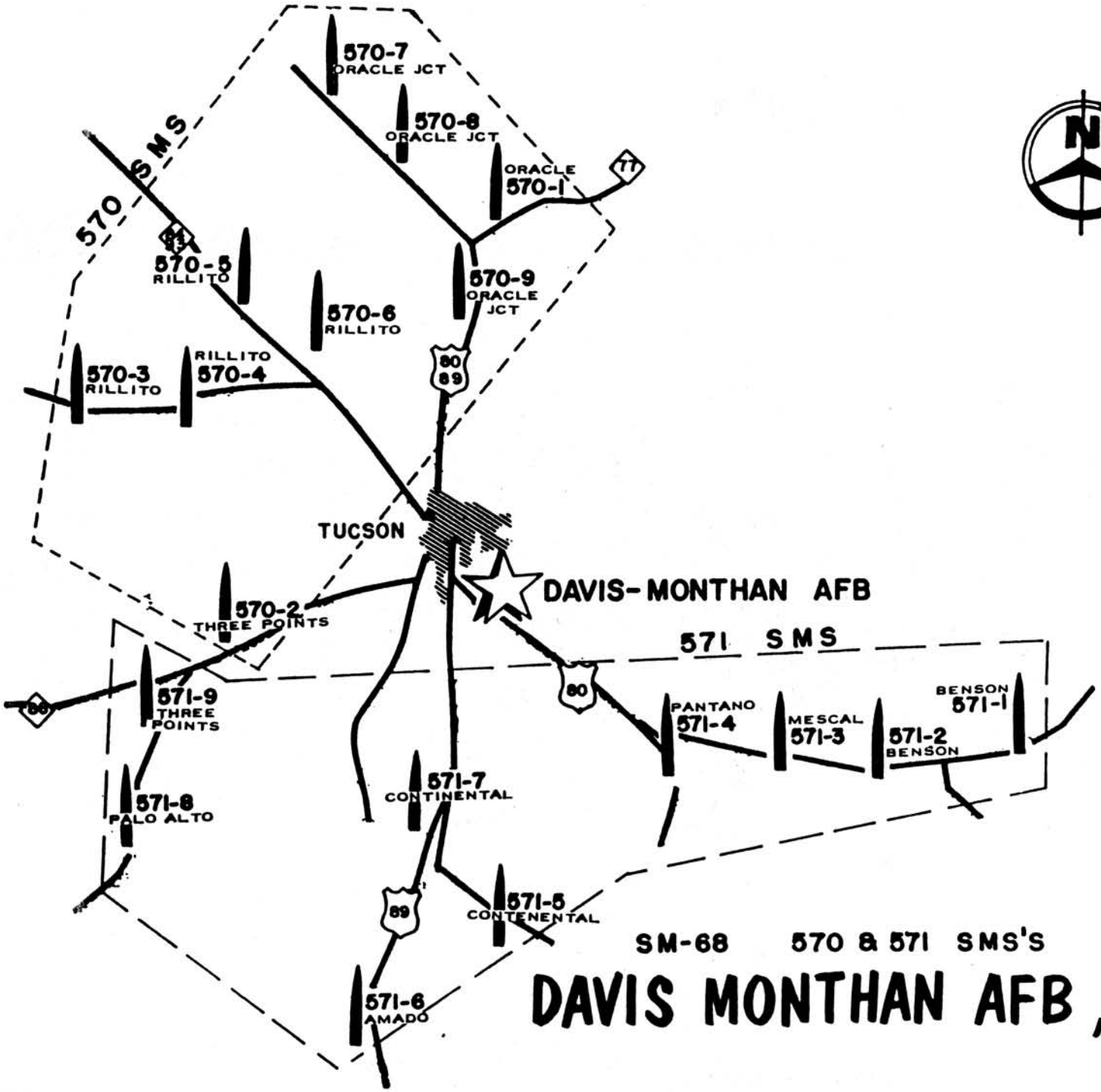
TITAN II ICBM BASE MAPS

Davis-Monthan AFB, Arizona

Little Rock AFB, Arkansas

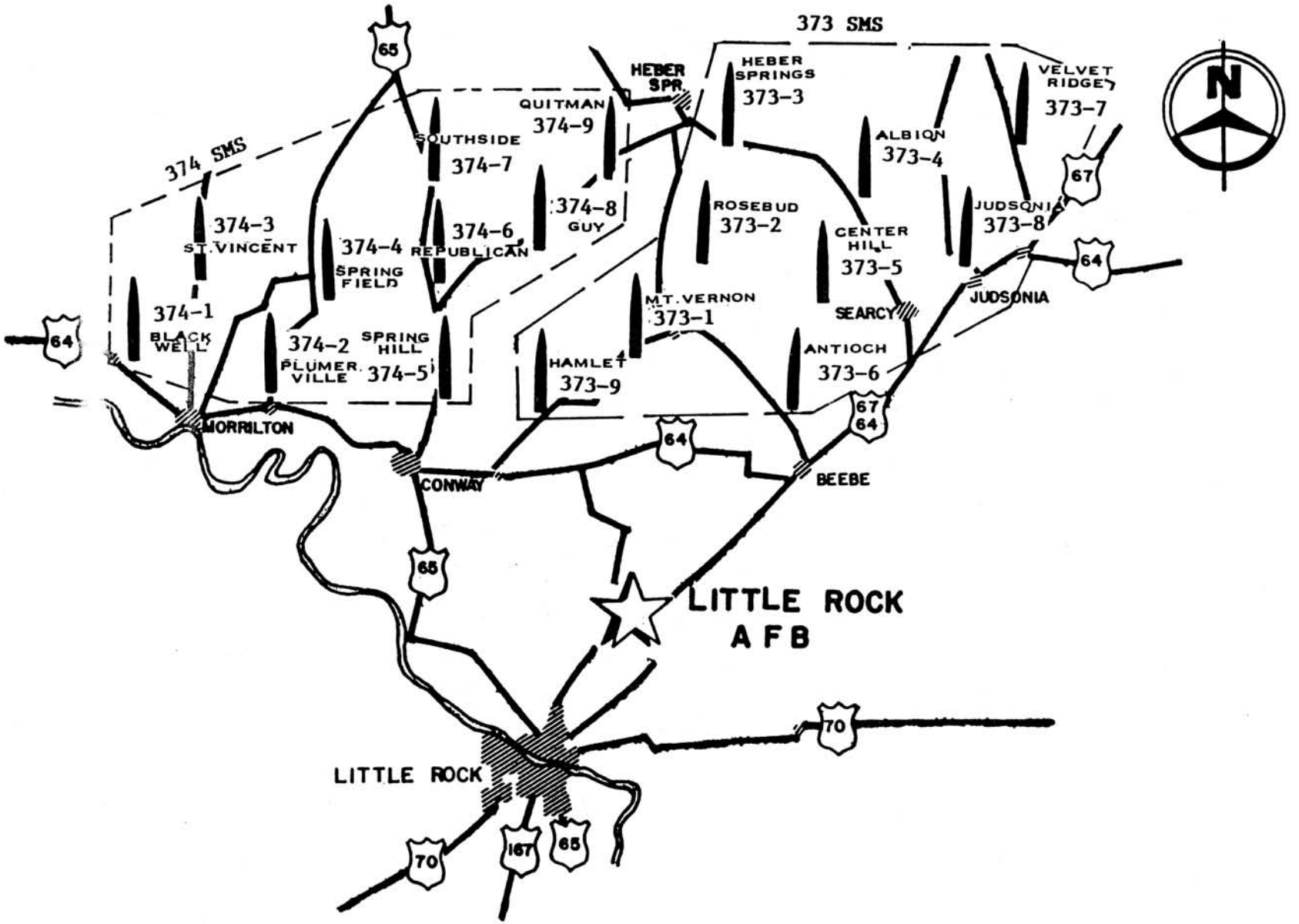
McConnell AFB, Kansas

Vandenberg AFB, California



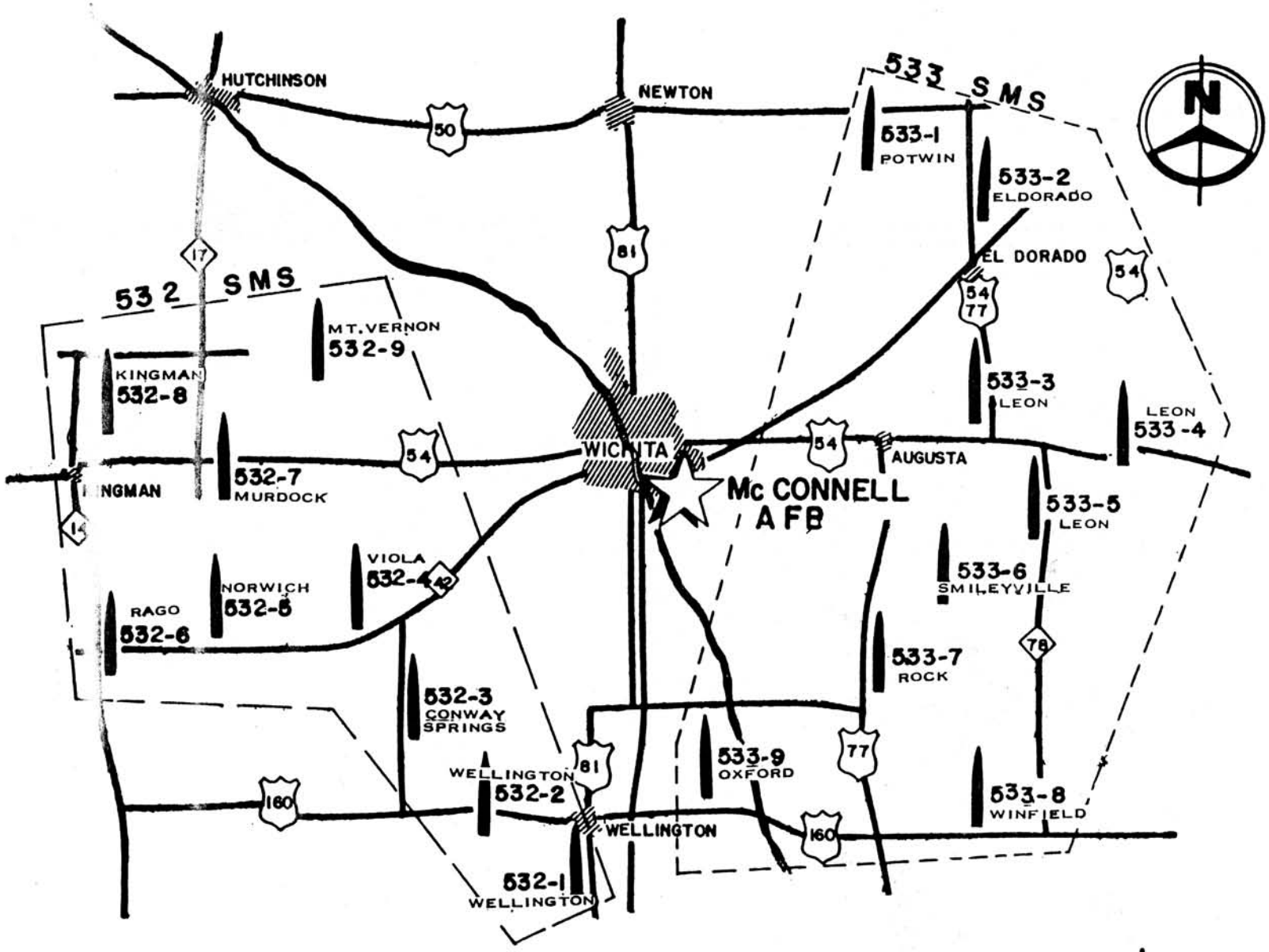
SM-68 570 & 571 SMS'S

DAVIS MONTHAN AFB, Ariz.



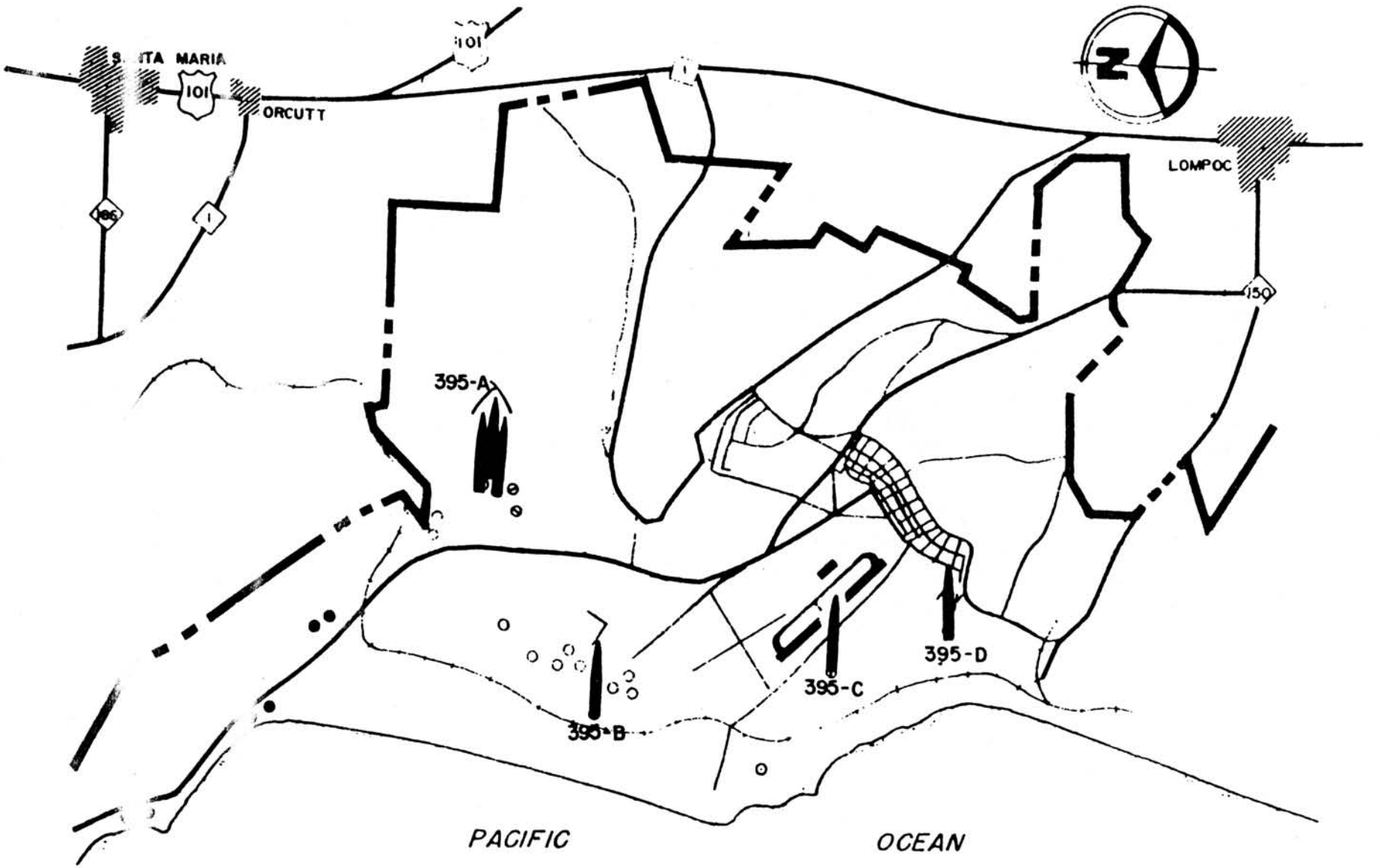
SM-68 373 & 374 SMS'S

LITTLE ROCK AFB, Ark.



SM-68 532 & 533 SMS'S

Mc CONNELL AFB, Kans.



NOTE: DESIGNATIONS INDICATED ARE THE ONLY ONES ASSIGNED TO THESE ON BASE SQUADRONS AND LAUNCHERS.

SM-68 395 SMS

VANDENBERG AFB, CALIF.

APPENDIX L

MINUTEMAN AND PEACEKEEPER ICBM BASE MAPS

Malmstrom AFB, Montana

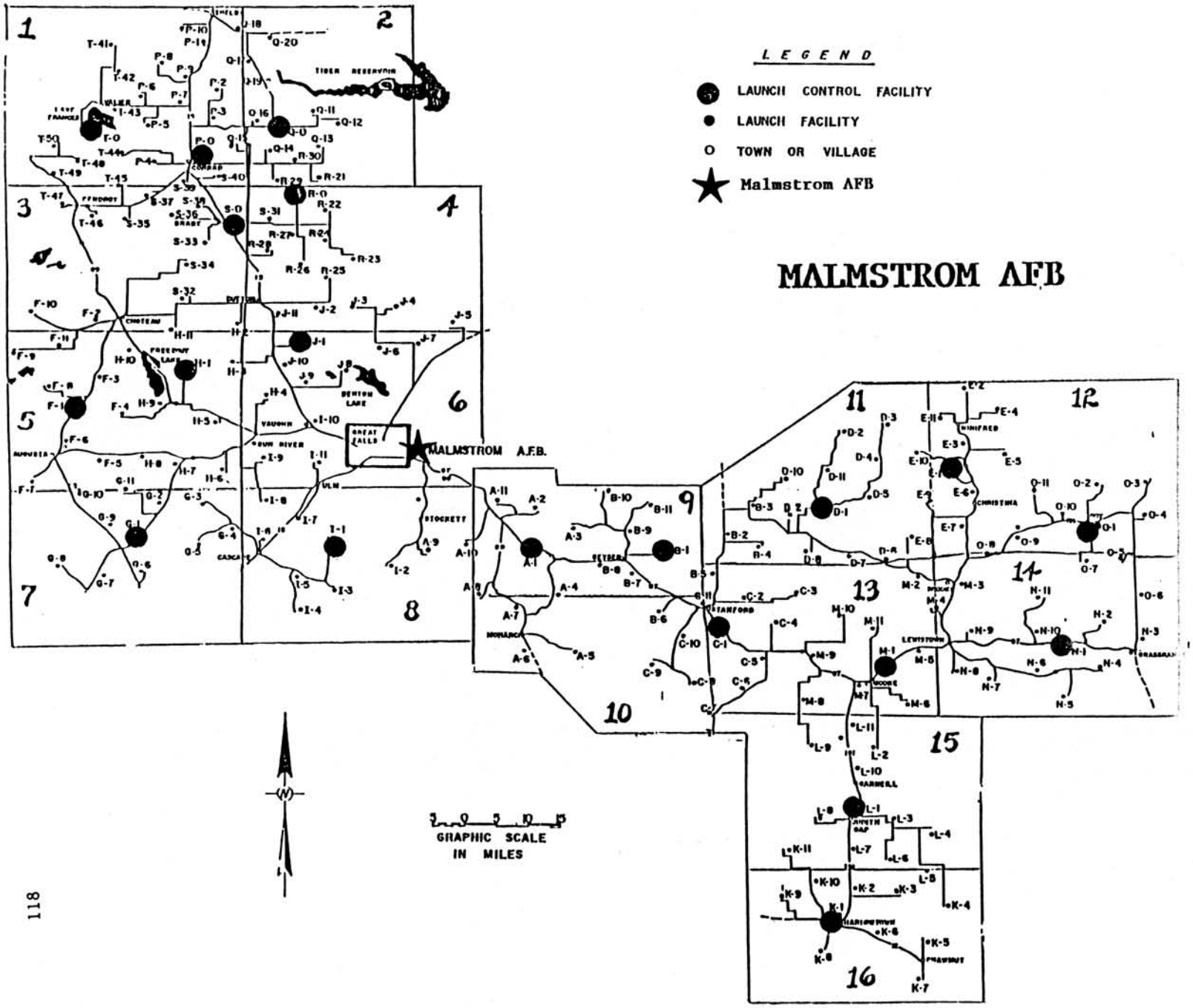
Ellsworth AFB, South Dakota

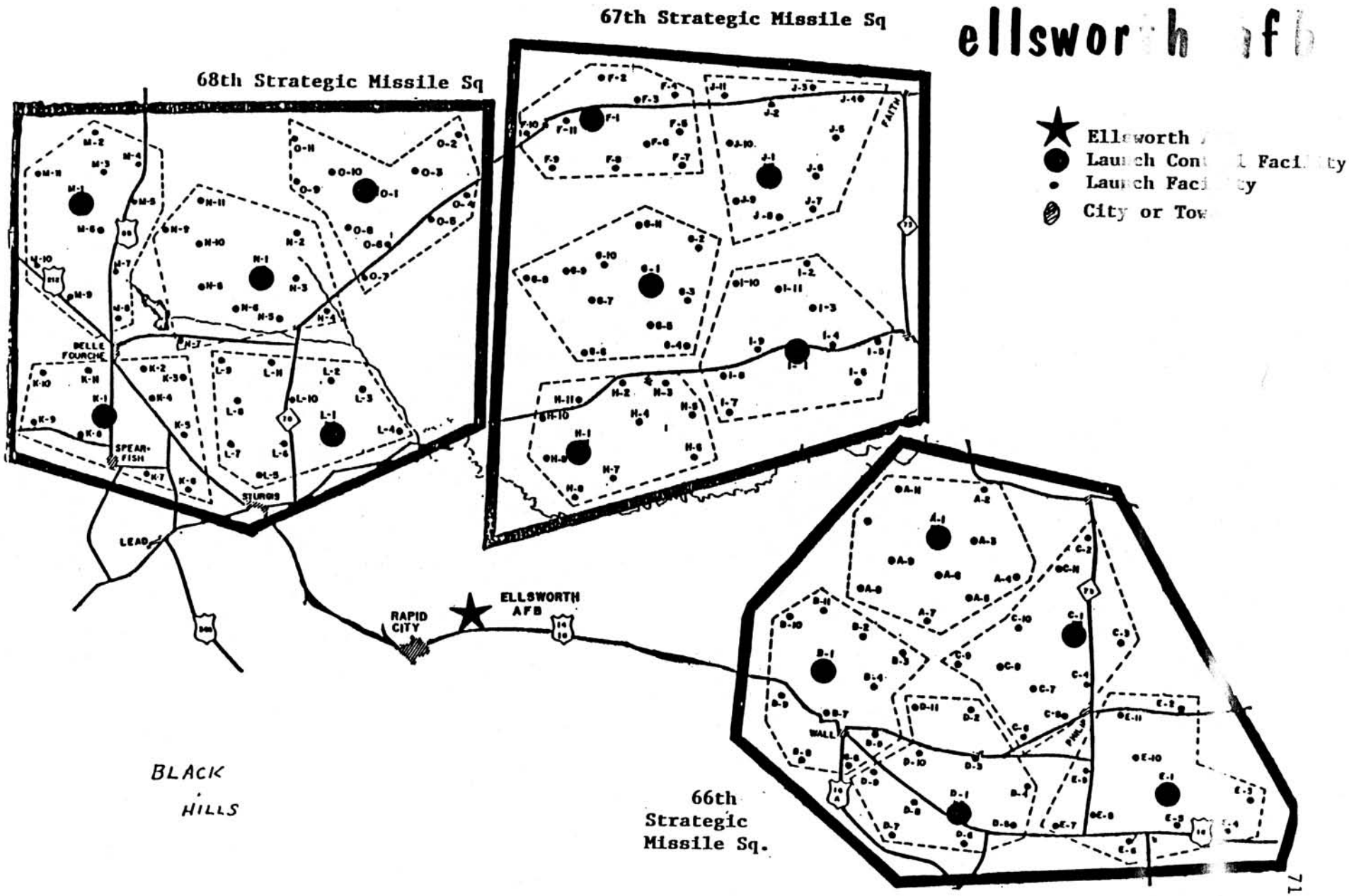
Minot AFB, North Dakota

Whiteman AFB, Missouri

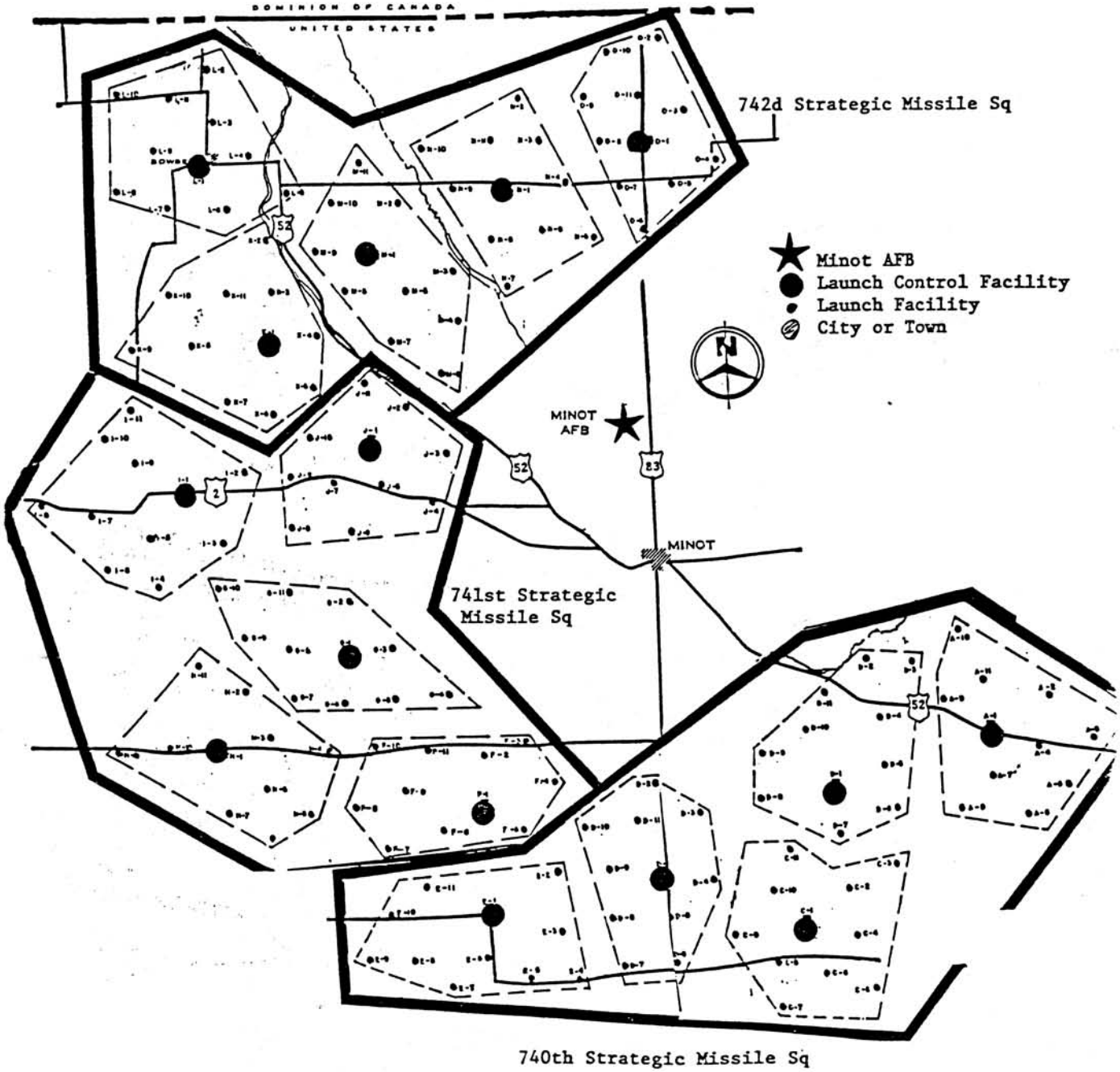
F.E. Warren AFB, Wyoming

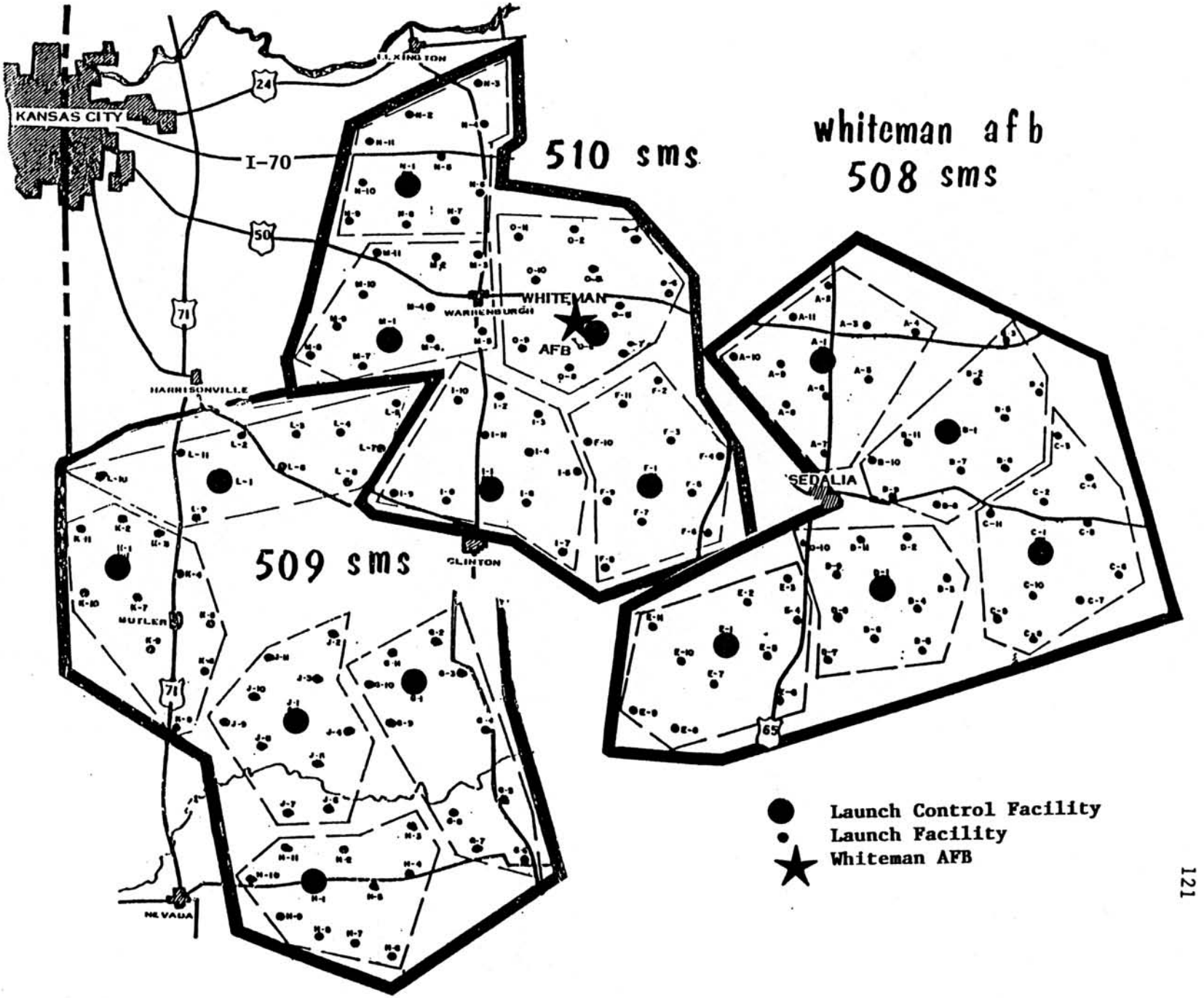
Grand Forks AFB, North Dakota

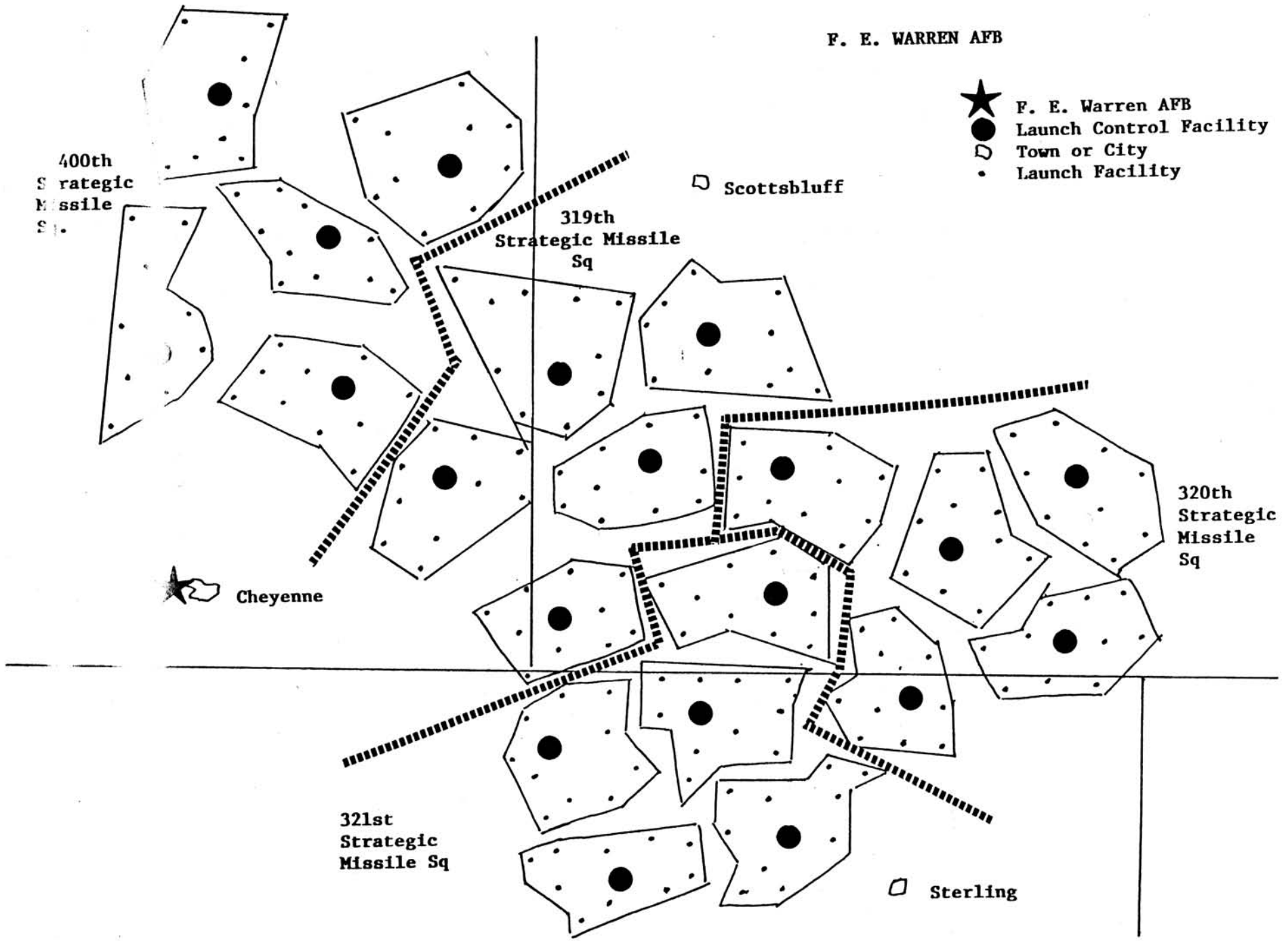

LEGEND
LAUNCH CONTROL FACILITY
LAUNCH FACILITY
TOWN OR VILLAGE
Malmstrom AFB
MALMSTROM AFB
MALMSTROM A.F.B.
GRAPHIC SCALE
IN MILES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

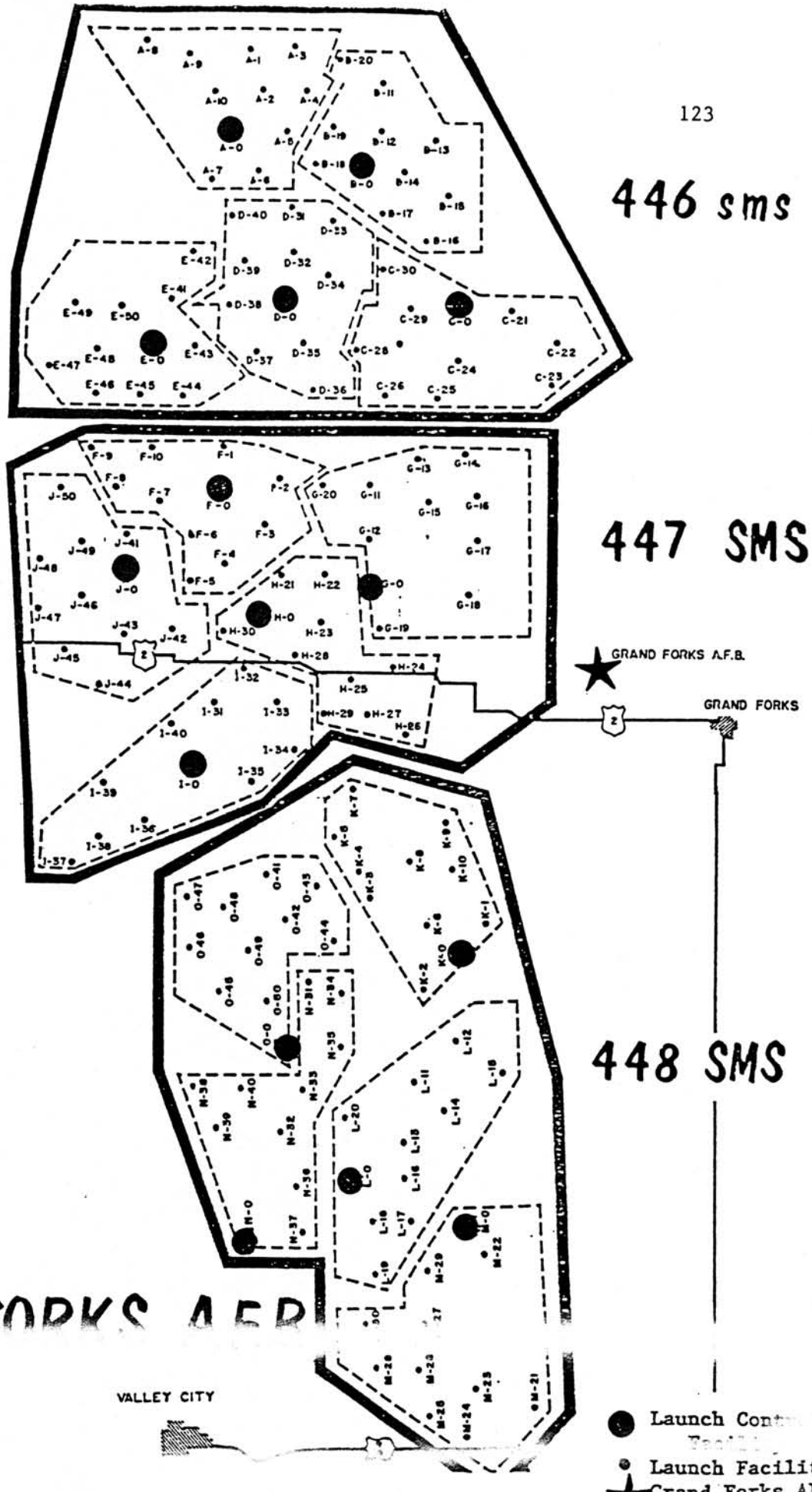

67th Strategic Missile Sq
ellsworth afb
68th Strategic Missile Sq
Ellsworth
Launch Control Facility
Launch Facility
City or Town
BELLE FOURCHE
SPEAR-FISH
STURGIS
LEAD
RAPID CITY
ELLSWORTH AFB
BLACK HILLS
66th Strategic Missile Sq.
WALL
FAITH

minot afb


DOMINION OF CANADA
UNITED STATES
742d Strategic Missile Sq
Minot AFB
Launch Control Facility
Launch Facility
City or Town
MINOT AFB
MINOT
741st Strategic Missile Sq
740th Strategic Missile Sq
52
83
2


KANSAS CITY
I-70
24
50
71
LEXINGTON
510 sms
whiteman afb
508 sms
WHITEMAN
AFB
WARRENSBURG
HARRISONVILLE
SEDALIA
509 sms
CLINTON
BUTLER
NEVADA
65
Launch Control Facility
Launch Facility
Whiteman AFB


F. E. WARREN AFB
F. E. Warren AFB
Launch Control Facility
Town or City
Launch Facility
400th
Strategic
Missile
Sq
319th
Strategic Missile
Sq
Scottsbluff
320th
Strategic
Missile
Sq
Cheyenne
321st
Strategic
Missile Sq
Sterling



GRAND FORKS AFB

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