COMMANDERS DIGEST

VOL. 15, NO. 5/JANUARY 31, 1974

MINUTEMAN II operational test program

A Safe Demonstration With Maximum Realism

Secretary of Defense James R. Schlesinger has directed the Air Force to plan to conduct safe demonstration launches of four Minuteman II missiles, without their warheads, from operational silos in Montana during the winter of 1974-75. The nickname for this project is Giant Patriot.

Shortly after launch, the missiles would enter space and their trajectory would carry them high (up to 350 miles) over portions of Montana, Idaho, Washington, Oregon and California enroute to an ocean target in the Phoenix Islands, southwest of the Hawaiian Islands, approximately 5,000 miles down range.

Site surveys, preparatory to real estate easement and leasing negotiations, are scheduled to begin in early 1974. Concurrently, state and local officials concerned and individuals residing in the vicinity of the launch area and space trajectory will receive detailed briefings on the planned launches and extensive safety precautions.

Air Force Strategic Air Command (SAC) combat missile crews from Malmstrom Air Force Base, Montana, would conduct the launches to demonstrate the reliability and performance of the missiles and associated launch equipment following extended periods of strategic alert.

Realistic Test

Minuteman missile flight tests previously conducted at Vandenberg Air Force Base, California, have yielded valuable data on weapons system performance, but test conditions there do not exactly duplicate those found at inland operational facilities. The planned launch program would expand information gained at Vandenberg by demonstrating the performance of the missile, its ground equipment and launch procedures in an operational, rather than test, environment.

James R. Schlesinger

No nuclear components would be carried on these flights. A safety destruct package would be carried in place of the normal warhead.

The missiles would be launched from silos located in open country about 50 miles west of Great Falls, Montana. The major factor in launch site and target selection has been the desire to ensure maximum public safety.

The spent first-stage and four protective covers for the second stage would be jettisoned over land. The empty 28-foot first stage would fall on uninhabited land just west of the Montana-Idaho border. Four 4x5-foot metal engine covers will return to earth near the intersection of the Idaho, Washington, and Oregon borders. There is a high probability that these planned impact points would be on Federal land. Monitoring of this portion of the demonstration would be conducted by Federal safety personnel. The second and third stage boosters and the test re-entry vehicle would impact in the Pacific Ocean.

Radar sites along the ground path of the space trajectory would monitor closely the missiles over the U.S. land mass. Missiles used in this program would have the capability of being destroyed instantly if they malfunctioned in any dangerous way.

The higher soil and wood moisture content found during the winter would reduce any likelihood of fire on the ground, should a missile have to be destroyed in flight, and Federal safety personnel and equipment would be on standby nearby.

The provisions and all other applicable issues will be discussed fully in the draft impact statement to be filed prior to discussion of this project during the FY 75 budget request.

In summary, these demonstrations would provide the United States with important additional test data and would demonstrate the effectiveness and reliability of the Minuteman strategic deterrent force. The planned program has been carefully designed to provide maximum operational realism with minimum inconvenience to residents in the launch area and along the space trajectory track.

The nickname is 'Giant Patriot' but officially it's the operational testing program for the Nation's Intercontinental Ballistic Missile. . . .

MINUTEMAN II

The Air Force has been authorized to begin preparation to conduct demonstration launches of the Minuteman II missile system during the winter of 1974-75. The nickname for this launch program is "Giant Patriot."

Overview

Why does the Department of Defense believe the U.S. should accomplish an operational demonstration of the Minuteman system? Currently, Minuteman flight testing is conducted from Vandenberg Air Force Base, California. An overview of this testing concept will be presented later for comparative purposes with the operational base testing concept. Also, a thorough treatment of the stringent safety considerations and requirements will be included during the discussion of location and launch time selection. Program schedules and costs will then provide the final information necessary to fully assess the requirement to conduct Minuteman test launches from an operational base and the Air Force's capability to meet that requirement.

Reasons Why

The Minuteman system makes a unique and critical contribution to our strategic posture. This system provides the Nation with its largest number of alert missiles. The advantages of a land-based Intercontinental Ballistic Missile (ICBM) force are fully recognized by the Soviet Union. Their (the Soviets) extensive deployment and their aggressive research and development programs directed toward major techno'ogical

improvement testify to this.

With any weapons system, it is important to demonstrate its capabilities under the most realistic condition possible. For this reason, Defense has developed a comprehensive program to conduct simulated launches of Minuteman missiles in their operational silos. In addition to this, a primary goal of the Vandenberg launch program has been the duplication of the operational environment. The Air Force has been successful in accomplishing this objective. Through these tests it has been established that the Minuteman force is highly effective. However, the U.S. has yet to demonstrate the deterrent capability of the Minuteman force by launches from operational silos. The Soviets have accomplished many such launches.

Minuteman Deployment

Concerning Minuteman II/III force deployment, Minuteman II has been selected for the initial operational launches. This system is deployed at three locations: Malmstrom Air Force Base, Montana; Ellsworth Air Force Base, South Dakota; and Whiteman Air Force Base, Missouri. Minuteman II was chosen because the U.S. Air Force has developed and verified through Vandenberg flight tests an operational base launch capability for this system.

Minuteman II is a solid propellant, three-stage rocket, 55 feet in length. The basic ground elements of the system are the hardened launch control facilities where the combat missile crews and control equipment are located, and the hardened launch facilities that house the individual Minuteman II missiles. Each launch control facility is directly responsible for 10 launch facilities. This grouping is designated as a missile flight. Five missile flights are then interconnected to form a missile squadron. The Minuteman missile squadron is configured so that any launch control facility can monitor all 50 of the missiles in the squadron.

During day-to-day alert posture, each launch control facility is directly responsible for its 10 missiles, and has a backup responsibility for another flight of 10 missiles.

Under the current Minuteman testing concept, a missile is randomly selected at one of the operational bases, and then is taken from alert, at which time the nuclear warhead is removed. The missile is then transported to Vandenberg Air Force Base. Once at Vandenberg, the missile is emplaced, and a telemetry and destruct system and a test reentry vehicle are added. The missile is then brought to alert by a task force of personnel from the operational base. Then, after receipt of an execution order from Headquarters, Strategic Air Command (SAC), the missile is launched by an alert qualified combat crew. Operational realism is a major goal of the test program, and there is high confidence in the reliability and accuracy of Minuteman II and Minuteman III, through the tests that have been conducted in this manner.

Once a missile has been launched, it is monitored by sensors from Vandenberg to the target area. There are several target areas in the South Pacific including, Canton in the Phoenix Islands. The missile is closely monitored in the uprange, midcourse and terminal areas during its trajectory to fulfill both performance data and safety requirements.

LAUNCH CREW—The Minuteman II launch crew consists of two officers who work 12 feet apart. A missile can be launched only by order of the President and then only when each man turns a key simultaneously after having received a similar key "vote" from another launch control center.

Operational Base Testing Concept

Under the operational base testing concept, the missile remains in its silo with the physical and electrical environment undistributed. The reentry vehicle containing the nuclear warhead is removed and replaced by one having identical aerodynamic characteristics but containing a range safety tracking and destruct mechanism. A range safety countdown is conducted, during which an evaluation is made of the safety criteria in the flight corridors and the "go" status of the destruct device. Once cleared by flight safety, an execution order from SAC headquarters directs the combat missile crew to launch the missile to the Pacific target area.

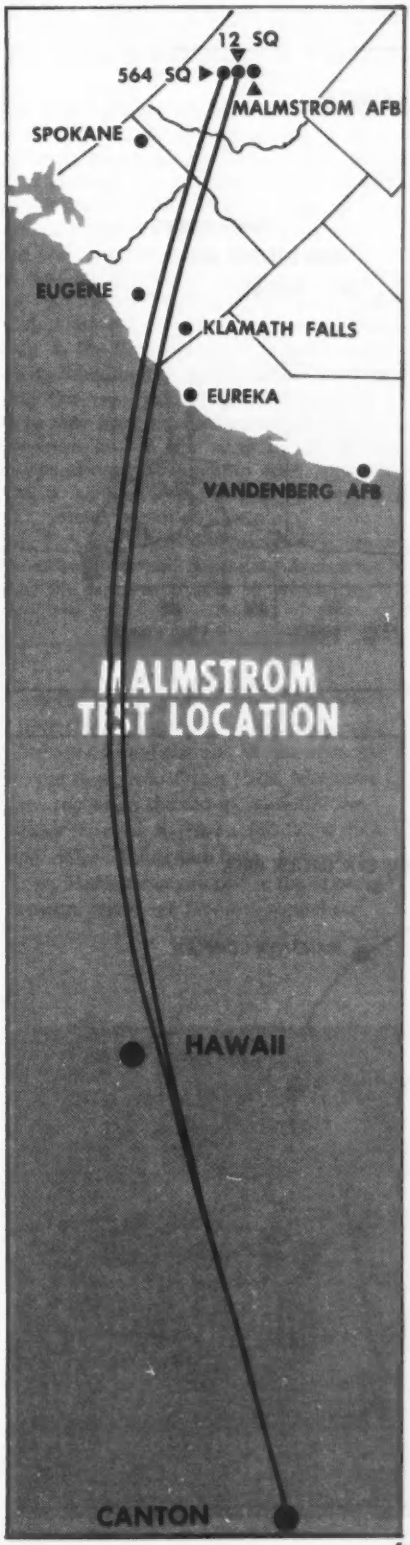
Since the beginning of Minuteman deployment, it has been realized that the ideal testing concept involves a minimum departure from the operational environment. The Air Force has continually worked toward the goal of operational realism in testing.

During the 1965 through 1968 time frame, a series of four limited-range test launches were conducted which involved specifically modified missiles containing only seven seconds of propellant and capable of less than one mile of flight. This program yielded valuable data on system performance and proved unquestionably that tests involving actual missile launches could be safely conducted in the operational base environment.

In 1968, the development of a comprehensive ground test for use at the operational bases was begun. The goal of this test was a complete end-to-end checkout of the ground system under realistic operational conditions. The initial concept, designated Modified Operational Missile System (MOMS), was developed and successfully accomplished on five flights of 10 missiles each. A follow-on to the MOMS has now been developed and will be implemented soon. This test is called Simulated Electronic Launch Minuteman (SELM).

After some preliminary development work on the hardware for support of an operational base launch, a proposal for conduct of a full-range launch was presented to Congress in 1970. Funds were approved for completion of the hardware development effort and for exercise of the system from Vandenberg Air Force Base. However, the funds for actual conduct of launches from the operational base were deleted in an appropriations committee conference with the "conferees in agreement that, if a firm decision is made that such firings are required, and will be conducted, consideration will be given to a budget request in a future fiscal year." Now that a recommendation to conduct operational base launches has been made, the Air Force would proceed with "Giant Patriot" surely and safely by drawing on experience gained from past programs, and from the lessons that have been learned.

The "Giant Patriot" concept involves a series of eight Minuteman II launches,



four during the winter of 1974-75 and four the following winter, preferably from a different location than the initial launches. For the initial four launch test sequence, two Minuteman squadrons would be involved. The first squadron would be postured and two Operational Base Launch (OBL) missiles would be launched. The squadron would then be returned to normal configuration concurrently with the posturing of the second OBL squadron. When posturing has been completed in the second squadron, two more OBL missiles would be launched. The time between the first two launches and the second two launches would be approximately two months.

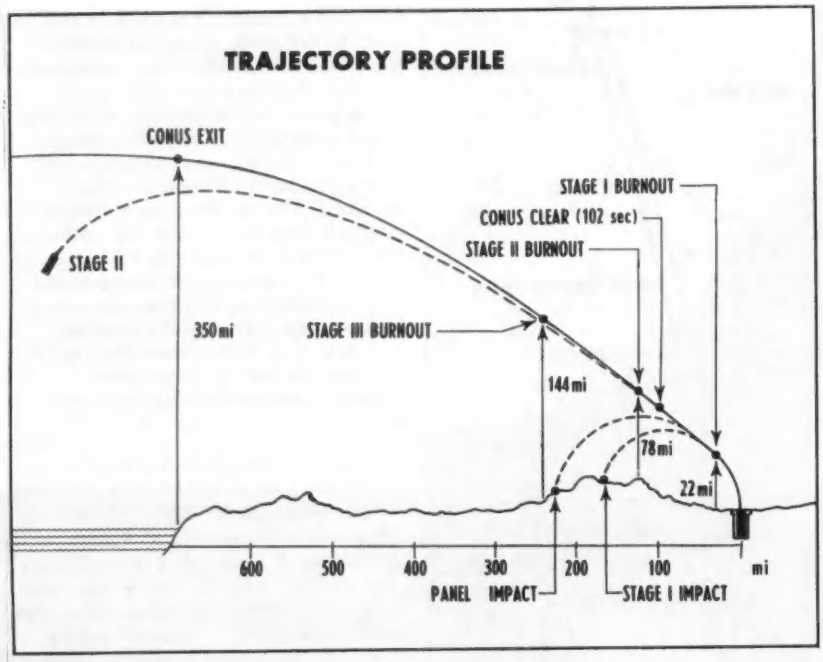
Squadron configuration under the current OBL plan would be with the three missiles postured for OBL and the remaining seven missiles configured for the Simulated Electronic Launch Minuteman (SELM) test. This test would allow data to be gathered on the seven missiles as they completed a simulated countdown. The remaining 40 missiles in the test squadron will not participate in the test.

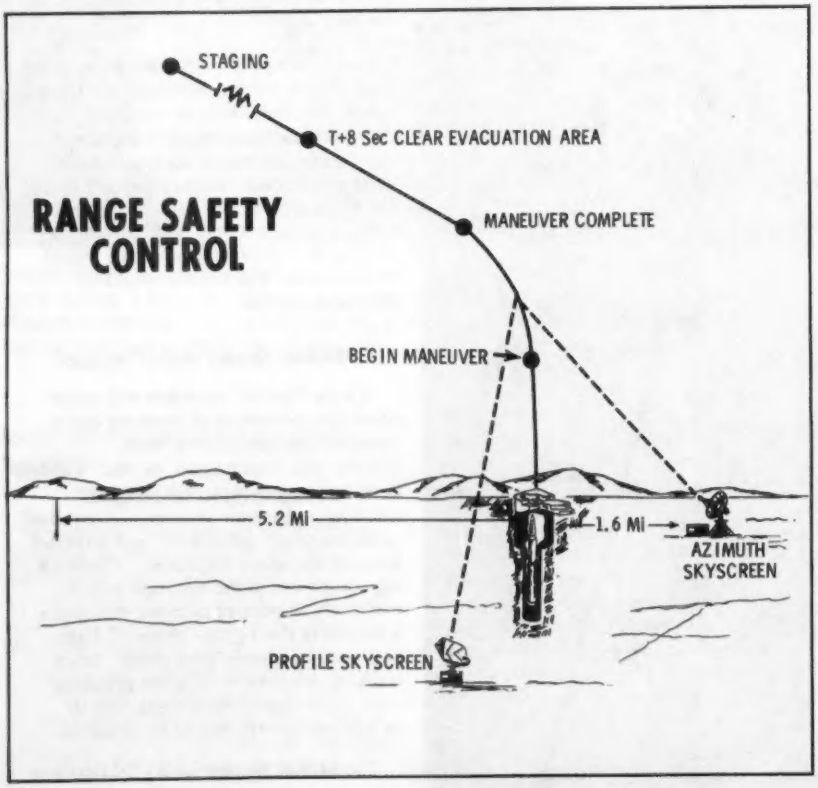
Upon receipt of a test execution order from Headquarters Strategic Air Command, one OBL missile would be launched and the seven SELM configured missiles would complete a simulated countdown. Then, once SELM test results have been gathered, inspections have been made, and the test range cleared, the second OBL missile would be launched. The second would be several days later.

Mobile Range Safety System

"Giant Patriot" launches will necessitate the movement of tracking equipment to the operational base. During the exploration of the Vandenberg testing concept, test range tracking and sensor systems are required in the uprange, midcourse, and terminal areas of the space trajectory. The tracking equipment in the uprange area is extremely important because the missile is thrusting during this phase of flight and must be closely monitored. Since tracking equipment does not presently exist at the operational bases, special mobile equipment had to be designed.

The Mobile Range Safety System was





developed specifically for support of operational base launches. The system contains all of the necessary elements of fixed installations found at Vandenberg Air Force Base for support of a missile launched from that location. These elements, which include countdown control, optical observation, radar tracking and command-destruct, were simply redesigned to combine, condense and make them transportable to an inland test site.

The most important elements are the tracking radars, which will obtain precise position and velocity data on the missile, and the monitor and control vans, where the path and performance of the missile will be continuously monitored to insure safety. It is from those vans that the command to destroy the missile would be issued, if necessary, to avoid hazard to the population. In the earliest portion of the flight, an optical device called a "Sky Screen" is used to augment the radar data in insuring the missile is performing properly.

The launch control facility is where the command will be issued to launch the missile from the launch facility.

When a missile is test-launched from Vandenberg Air Force Base, a telemetry wafer is installed between the guidance system and the reentry vehicle spacer. Additionally, explosives are placed along the length of the missile to effect destruction, should it deviate from the planned flight path. To use this concept at the operational base would necessitate removal of the missile from its silo. Since the Air Force wanted to maintain the existing mechanical and electrical interface between the missile and the ground environment, a new tracking and range destruct system was designed.

This system can be placed on the missile as it sits in the silo. The system contains a beacon for tracking purposes and shaped charges that, if required, will be initiated to cause a high-order detonation of the missile third stage, destroying the entire missile. This design was chosen to reduce the possibility of burning propellant reaching the earth should the missile have to be destroyed in flight.

An Ability to Respond During Crisis

A central element of the deterrent value of any strategic offensive system is the demonstrated ability of the system to respond in time of crisis. The Soviets have recognized this need to demonstrate the capabilities of their land-based missile systems through an extensive testing program. Since the opening of the Strategic Arms Limitation Talks (SALT) negotiation in November 1969, they have routinely conducted scores of test launches from operational silos.

The U.S. recognizes the importance of demonstrating the capability and reliability of its land-based systems through actual launches by Strategic Air Command (SAC) crews. An active program within our operational Minuteman units exists to conduct simulated launches which, to the extent possible, exercise the entire launch control system up to the time of actual launch. Actual launch experience has been gained in regularly scheduled firings from a test site at Vandenberg Air Force Base, California. During the past year the U.S. launched 12 Minuteman missiles from that site. Tests to date have established a high degree of confidence in the state of Minuteman effectiveness and in the accuracy of the system. However, not yet conducted are fully operational Minuteman tests such as the Soviets have for their land-based system, or such as both we and the Soviets are able to do with submarine-launched missile systems deployed at sea.

This U.S. demonstration program is important not only for us but also so that all our friends, allies and potential adversaries may perceive the unquestioned effectiveness of the deterrent forces by which the U.S. seeks to prevent nuclear war.

Location and Launch Time Selection

The methods used in selecting a suitable launch location and launch time are of the upmost importance. Safety has been the paramount consideration.

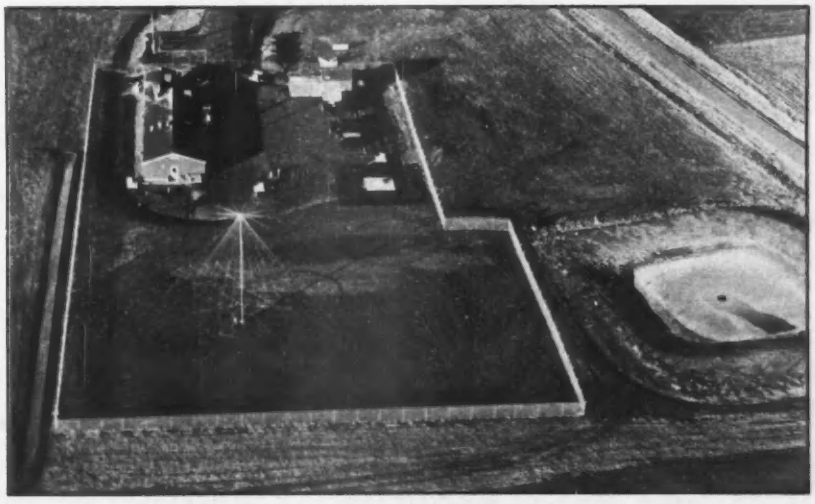
The primary criteria were:

- Minimum launch and space trajectory over land; and
- Minimum population in the area of the missile launcher and along the ground path of the space trajectory.

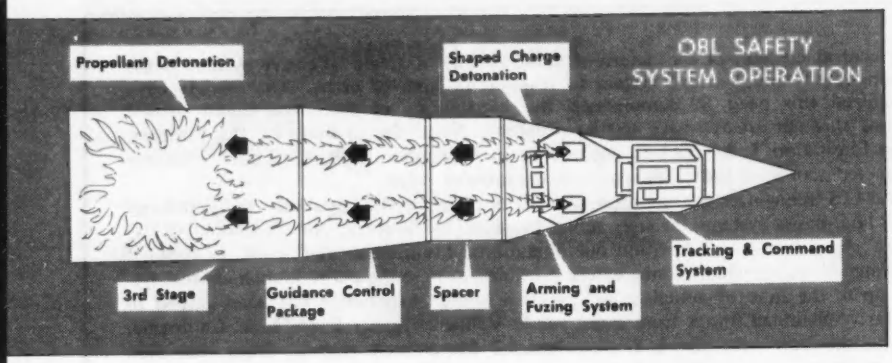
Also, it was desired to gain maximum benefit from the program and, if possible, exercise the two different Minuteman ground systems (WS 133A-M/WS 133B), and gather all possible tracking data for post-flight performance analysis.

After an exhaustive study that was driven by the previously discussed safety and operational criteria, Malmstrom Air Force Base, near Great Falls, Montana, was chosen as the test location. Malmstrom is nearer to the Pacific Coast than any other Minuteman base. Launches from Malmstrom can utilize the existing western test range facilities to include Canton in the Phoenix Islands target area.

This is an important consideration because this target complex is currently utilized for Minuteman III test launches conducted from Vandenberg Air Force Base and is configured with the necessary tracking radars to provide detailed flight information. Additionally, the population along the ground path of the



CONTROL FACILITIES—Ground-based control of Minuteman missiles is directed from a launch control facility. The facility has three major areas—support building, an underground launch crew capsule and support capsules. The antennae "farm" (left foreground) links the site with dispersed launch facilities.



space trajectory is less dense than that of any other candidate location.

It will be useful now to review the flight characteristics of the Minuteman II missile. (See top chart, Page 6).

After missile stage I burnout would occur on a normal flight from the Malmstrom OBL site, the empty stage I, which is 28 feet in length and has a weight of approximately 4,800 pounds, would land approximately 172 miles downrange. The four stage I/II interstage panels, each approximately 60 pounds in weight, would land some 50 miles further downrange.

After 102 seconds of powered flight from a Malmstrom OBL site, the missile trajectory is such that, regardless of subsequent events, missile impact would occur in the Pacific Ocean. Stage II burns out when the missile is 123 miles down range and the empty stage II impacts in the Pacific Ocean, approximately 600 miles off the coast.

After Stage III burnout occurs, the reentry vehicle with the empty third stage exits the coastline at an altitude of approximately 350 miles.

Launch Facility Selection

Last summer, air reconnaissance of the launch area and the space trajectory ground path was conducted. The data gathered permitted the Air Force to tentatively identify candidate test launch facilities. Final selections must await authority to conduct detailed ground surveys; however, these tentative selections provide a vehicle for learning about the space trajectory ground path.

The candidate launch sites were selected so that the empty first stage and panels would impact in virtually unpopulated areas. By working back from safe impact areas for the first stage, a group of candidate launch sites were found.

The example ground path shown on the chart on page 6 is from a specified launch facility at Malmstrom selected by using the minimum risk process. The other candidate facilities would produce flight paths and impact areas to the north of the track shown. The entire area is remote and very sparsely populated. Once detailed surveys have been accomplished, there is a high probability that most impacts would be on Federally-owned land.

Range Safety Control

Safety control in the launch area would be accomplished through the use of optical vertical wire sky screens. A "Sky Screen" consists of a glass plate on which there is plotted a precomputed trajectory. (See bottom chart, Page 6). Safety officers will watch the actual trajectory of the launched missile through two screens. One is placed to the side and one behind the launch silo. The actual, observed trajectory will be compared to the precomputed trajectory by the safety officers. By making this comparison, the safety officers can verify that the missile is flying properly and is on azimuth.

Should termination be necessary during the initial eight seconds of flight, fragments of the missile generated by destruction would fall in a very dense pattern in the immediate area of the launch silo. For this reason, it is considered prudent to evacuate an area 5.2 miles downgrade and 1.6 miles radially about the silo. Once the missile has cleared the evacuated area and can no longer be seen optically by the "Sky Screens," flight progress will be monitored by means of the Instantaneous Impact Prediction System (IIPS).

The IIPS provides the range safety officer with a visual display of missile flight progress that is updated every one-tenth second. This system continuously computes the hypothetical missile ground impact point, that point where the missile would impact if thrust were terminated, throughout powered flight. If that impact point were predicted moving off the planned course, the range safety officer could destroy the missile.

Minuteman II OBL Costs

The total cost of the eight-launch OBL program is estimated in then-year dollars at $26.9 million in FY 1974 and FY 1975. $6.3 million is required in FY 1974 to initiate preparatory actions that are necessary to insure an option to conduct the OBL during the winter of FY 1974/1975. The FY 1974 funds can be made available from existing appropriations. The funds required in FY 1975 will be included in the FY 1975 budget request.

Summary

In summary, with any weapons system it is important to demonstrate its capabilities under the most realistic conditions possible. The U.S. can safely conduct these launches now. The necessary supporting systems have been funded, developed and tested. This will demonstrate to friends, allies, and potential adversaries that the system possesses the deterrent capability sought.

COMMANDERS DIGEST

Vol. 15, No. 5, Jan. 31, 1974

A publication of the Department of Defense to provide official and professional information to commanders and key personnel on matters related to Defense policies, programs and interests, and to create better understanding and teamwork within the Department of Defense.

Published weekly by the American Forces Press Service, 1117 N. 19th St., Arlington, Va. 22209, a unified activity of the Office of Information for the Armed Forces, OASD (M&RA). Reproduction of content is authorized.

Telephone: (202) OXford 4-4912
Autovon 224-4912

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
Subscription Price: $12.55 domestic per year; $3.15 additional for foreign mailing; 30 cents per single copy.
☆ U.S. GOVERNMENT PRINTING OFFICE 541/434/Z-36