

Minuteman

The nation's ICBM workhorse is still going strong.

Turns 40

LIKE the B-52 bomber, C-130 transport, and precious few other weapons, the Minuteman missile legitimately can be called a workhorse. Forty years have passed since its flawless first test flight. Even so, it remains in active service, having outlasted all rival ICBMs and most aircraft.

Minuteman is special. How long has it been around? John F. Kennedy had been President for all of 12 days when the first test missile, on Feb. 1, 1961, blasted off from Cape Canaveral, Fla., and flew successfully to a target 4,600 miles downrange.

Over the next 40 years, three versions of Minuteman logged millions of hours of operational duty. (The Minuteman III reached 100 million hours in 1995.) To achieve that record, the venerable ICBM had to survive budget cuts, arms negotiations, drawdowns, ban-the-bomb campaigns, and numerous Air Force reorganizations.

Already, Minuteman has lasted years beyond its projected service life. It has gone from having a single warhead, up to two and three, and now back down to one. And it is programmed to be America's premier ICBM for another 20 years, minimum.

Minuteman was a child of the Cold War. By the time its development began in the late 1950s, the Soviet Union already had acquired atomic weapons, put a satellite into orbit, and fielded its own formidable ICBM.

US efforts had suffered serious setbacks, spectacular failures, and spiraling cost. The US had deployed two generations of ICBMs, but the Air Force still was looking for one that could be built, operated, and maintained at a reasonable cost. Those early weapons were liquid-fueled missiles. The Air Force wanted

By Bruce D. Callander



a system that would be safer to handle and based more securely.

In February 1958, the Defense Department approved an Air Force plan to develop a more-effective and more-survivable solid-fueled ICBM. USAF settled on the Minuteman design, a three-stage, rocket-powered missile with a 6,000-mile range. It was equipped with a single nuclear warhead.

Minuteman was to have an all-inertial guidance system and be launched from hardened, widely dispersed underground silos.

Working on the Railroad

In the program's earliest days, Strategic Air Command declared that it wanted to deploy up to 150 Minuteman missiles on railroad cars, but the corporate Air Force opted to emphasize deployment in silos. Defense Secretary Robert S. McNamara later canceled the mobile Minuteman. (The idea would be resurrected with the Peacekeeper (MX) program during an ICBM controversy in the 1970s.)

The development and test program proceeded briskly. The initial flight of Minuteman marked the first time that a test missile was launched with all systems and stages functioning. Procurement and deployment came right away.

In December 1961, SAC deployed the first Minuteman I (Model A) squadron at Malmstrom AFB, Mont. It would later add two more units. The next 13 squadrons to be deployed received the more advanced Model B Minuteman. On Feb. 28, 1963, the first unit—the 10th Strategic Missile Squadron—was declared operational.

Each missile was housed in an underground, unmanned bunker. It was controlled by a two-officer crew in a separate hardened launch control center set up to monitor 10 missiles.

In 1966, the Air Force began a nine-year modernization program to replace all Minuteman Is and early IIs with more advanced weapons. The last Minuteman I was deactivated in 1972.

The new missile, the Minuteman II, had been in the works since 1963. This F model had a larger second stage and improved guidance. Its range was extended, but it still carried a single nuclear warhead.

In all, 450 Minuteman IIs were fielded. To accommodate them, the

Air Force retrofitted the original Minuteman I launch and control facilities, making them more survivable.

By the time the last Minuteman II was in place, the Air Force already was well on the way toward developing an even more advanced Model G. This Minuteman III would have a still better guidance system.

Even more importantly, the new missile would feature, for the first time, a so-called Multiple Independently Targetable Re-entry Vehicle system, which would permit the Air Force to equip each missile with two or three thermonuclear warheads.

In April 1970, the first Minuteman III was placed in a silo at Minot AFB, N.D. Hundreds more followed, and nearly 15 years later SAC launched a massive upgrade and modification program called Rivet MILE, for Minuteman Integrated Life Extension program, to carry the ICBM well into the next century.

The prime contractor for Minuteman III was Boeing, with Thiokol providing the first stage rocketry, Aerojet-General the second, and United Technologies the third. The missile is almost 60 feet long, has a range of more than 7,000 miles, a

speed of 15,000 mph, and a ceiling of 700 miles.

Not First

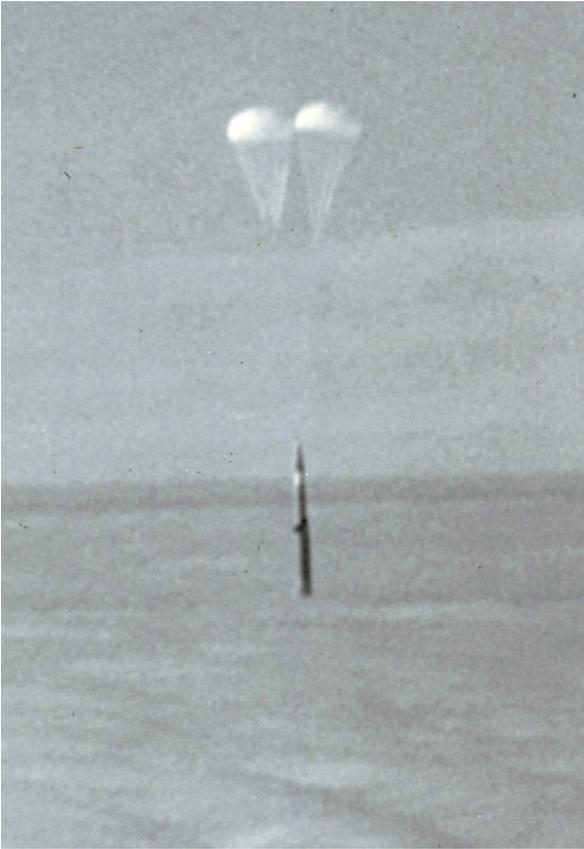
Minuteman was not the first American ICBM, but it was less difficult and dangerous than earlier liquid-fueled systems. It was a long time coming. The nation embarked on missile development following World War II but not with any great vigor.

If support for the ICBM effort lagged in the immediate postwar period, it picked up dramatically after 1949, when the Soviet Union detonated its first nuclear device. The Korean War and the discovery that the Soviets already were developing large long-range rockets further spurred US efforts.

Several factors had given the Soviets an edge. One was that they had not wasted time on winged vehicles, as the US had, and focused from the start on ballistic missiles. Another was that they hadn't worried that nuclear warheads were so large and heavy for the existing rocket engines. They just built bigger missiles to accommodate them. And, the Soviet Union had not divided its efforts between military missiles and the civilian space program to the extent the US did. By the early 1950s, the



Just 10 months after the successful test of the Minuteman ICBM in February 1961, Strategic Air Command deployed the first squadron. The squadron was declared operational in February 1963. This 1971 photo shows a Minuteman combat crew in the white crew uniform of the era.



At the Western Test Range off California in October 1974, a Minuteman I is lowered by parachutes before it ignites as part of an air mobile feasibility demonstration.

United States was playing catch-up. The election of President Dwight D. Eisenhower brought a new team to Washington, and modernizing the forces—especially long-range missiles—became a priority.

Among the new movers and shakers were Trevor Gardner, special assistant for Research and Development to the Secretary of the Air Force, and Donald A. Quarles, the DoD point man for R&D who soon would become Air Force Secretary. These two initiated crash studies of defense and service Research and Development programs, from which they learned that it was technically possible to develop a rocket-powered ICBM with a nuclear warhead but that doing it quickly would require a new, streamlined management approach.

The Air Force's answer was to form the Western Development Division of Air Research and Development Command (later Air Force Systems Command). It put Brig. Gen. Bernard A. Schriever in command and gave him broad powers over not only R&D but also procurement.

Schriever assembled the best available personnel and facilities and used the newly formed Ramo-Wooldridge Corp. to provide general systems

engineering and technical direction. He scrapped the traditional process of nursing weapons systems through a succession of evolutionary steps and pressed development on several fronts concurrently.

The first program to bear fruit was the Atlas missile. WDD gave Convair a development contract for it in January 1955, and the first A version was test launched in June 1957. This one had a relatively short range but later models reached distances of some 7,475 miles. The program led to deployment of Atlas D, E, and F missiles.

The last of these weapons had an all-inertial guidance and was fitted with improved 390,000-pound-thrust engines, which gave it a quicker launch time than earlier models. It also could be deployed vertically in hardened silos for greater protection.

In 1955, while the Atlas program was still taking shape, the Air Force began two other programs, one for the short-ranged Thor and the other for another ICBM, the Titan.

Service Competition

Meanwhile, the Army was working on missiles with various ranges, and the Navy was pursuing a number of projects, including a sea-launched

missile that would evolve into the Polaris.

Each service developed its own rationale for why it should be the agency to exploit missile technology. The Army considered missiles of any range to be a logical extension of artillery. The Navy saw missiles as another threat to its turf and moved to take a role in their use. The Air Force, still new and struggling for its place on the defense team, viewed ICBMs, like long-range bombers, as another form of airpower.

In 1956, Secretary of Defense Charles E. Wilson stepped in and defined roles and missions for each service regarding missiles and aircraft. Under these orders and later refinements, the Army and Navy were circumscribed, and the Air Force got sole authority to operate land-based intermediate-range ballistic missiles and ICBMs.

While the Air Force already had achieved intercontinental range with the Atlas and the Titan, both had serious limitations. Both were liquid fueled. This made them more powerful but also dangerous. It also took longer to get them ready for launch and thus made them more vulnerable.

Within the aerospace community, it had long been held that solid-fueled rockets promised greater reliability, readiness, and ease of handling in most military applications. The problem was they offered poor performance in terms of net payload weight for total missile weight. This was the difficulty the Soviets had overcome simply by building bigger missiles.

The Americans found another solution, however. By 1957, solid fuels had been improved and the weight of nuclear warheads had been reduced.

This set the stage for the solid-fueled Minuteman. It would be more economical to operate than its predecessors, more reliable, and because it could be launched from hardened and widely dispersed underground silos, better able to evade or survive a Soviet nuclear first strike.

In its early stages, the Minuteman project was viewed as somewhat marginal. However, the first Minuteman test was such a spectacular success that views changed. Gen. Curtis E. LeMay, Air Force Chief of Staff, approved plans to begin phasing out the Atlas. McNamara accel-

Forty Years of Minuteman

Feb. 1, 1961. The first Boeing LGM-30A Minuteman ICBM is launched from Cape Canaveral Missile Test Annex in Florida. It travels 4,600 miles and hits the target area. This is the first time a first-test missile is launched with all systems and stages functioning.

Feb. 28, 1963. The first Minuteman squadron, the 10th Strategic Missile Squadron at Malmstrom AFB, Mont., is declared operational.

April 11, 1963. The first successful launch of a fully operational Boeing Minuteman I from Vandenberg AFB, Calif., is conducted.

Oct. 17, 1963. The first SAC Minuteman I operational test launch is carried out at Vandenberg AFB by a crew from Malmstrom AFB. The shot is a partial success. The re-entry vehicle overshoots the target.

Feb. 1, 1965. The first Boeing LGM-30F Minuteman II unit, the 447th SMS at Grand Forks AFB, N.D., is activated.

March 1, 1965. An unarmed Boeing LGM-30B Minuteman I is successfully launched from an underground silo 10 miles north of Newell, S.D. It is the first time a site other than Vandenberg AFB or Cape Kennedy AFS, Fla., is used for an ICBM launch.

Aug. 16, 1968. The first test launch of a Boeing LGM-30G Minuteman III is carried out from Cape Kennedy AFS, Fla.

Oct. 24, 1974. The Air Force's Space and Missile Systems Organization carries out a midair launch of a Boeing LGM-30A Minuteman I from the hold of a Lockheed C-5A.

Jan. 26, 1975. The force modernization program, a nine-year effort to replace all Boeing LGM-30B Minuteman Is with either Minuteman IIs (LGM-30F) or Minuteman IIIs (LGM-30G), is completed, as the last 10 LGM-30Gs are turned over to SAC at F.E. Warren AFB, Wyo.

Nov. 30, 1978. The last Boeing LGM-30G Minuteman III is delivered to the Air Force at Hill AFB, Utah.

Jan. 1, 1988. SAC changes its missile crew assignment policy to permit mixed male/female crews in Minuteman and Peacekeeper launch facilities.

July 8, 1995. Minuteman III achieves 100 million hours of operational duty.

Feb. 1, 2001. Fortieth anniversary of Minuteman first flight.

Near F.E. Warren AFB, Wyo., in 1996, maintenance crew members help guide a missile section being lowered into a silo. The 90th Space Wing missileers control, maintain, and operate 150 Minuteman IIIs as well as 50 Peacekeepers.



Staff photo by Guy Acello

Minuteman

First flight: Feb. 1, 1961

Military designation: LGM-30A/B/F/G

Classification: ICBM

Diameter: 6 feet

Length: LGM-30A, 50 feet; B, 55 feet 9 inches; F, 59 feet

Weight at first stage interstage: A/B, 65,000 pounds; F, 70,000 pounds; G, 76,000 pounds

Top speed: More than 15,000 mph

Range: More than 7,000 miles

Payload: Nuclear warhead

Power: Three solid-fueled rocket engines

Launcher: 80 feet deep, 12 feet in diameter; each site surface area two–three acres

erated the phaseout, ordering retirement of the last Atlas Fs by the end of 1968. Minuteman III deployment was still under way in 1971. The last Minuteman was delivered to the Air Force on Nov. 30, 1978.

As a result of all these shifts, the collection of some 1,500 Minuteman weapons became SAC's prime ICBM force. Minuteman held that distinction until the first deployment in the 1980s of the 10-warhead Peacekeeper. However, only 50 of the new missiles were deployed, and under provisions of START II, they are soon to be removed and destroyed.

Under Start II, the Air Force also will "de-MIRV" the remaining 500 Minuteman IIIs now in service, changing them from three-warhead to single-warhead weapons, which are expected to remain operational in the American West until 2020.

If that scenario holds up, Minuteman may well go into retirement as the heavyweight champ, the longest-lived weapon in Air Force history. ■

Bruce D. Callander, a regular contributor to Air Force Magazine, served tours of active duty during World War II and the Korean War. In 1952, he joined Air Force Times, serving as editor from 1972 to 1986. His most recent story for Air Force Magazine, "The Anthrax Issue," appeared in the December 2000 issue.