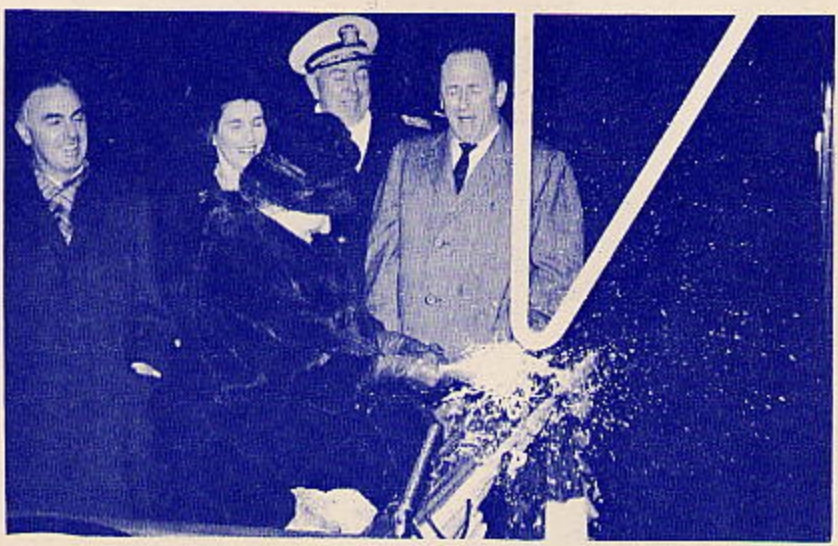

NATHAN HALE
SSB N 623
VIS UNITA FORTIOR

KEEL LAYING



CHRISTENING

The ship's insignia, reproduced on the cover of this booklet, has been adapted from the Hale family coat-of-arms.

Commander Joseph W. Russel, USN
Commanding Officer, Blue Crew

Commander Joseph W. Russel was born in Los Lunas, New Mexico, and graduated from the U. S. Naval Academy in June 1945. He has served on USS DIODON (SS 349), USS TILEFISH (SS 307), and USS STICKLEBACK. He served as Commanding Officer of USS DOGFISH (SS 350). He then served as Executive Officer USS THEODORE ROOSEVELT (SSBN 600). In December 1962 he reported to USS NATHAN HALE as PCO (Blue) crew.

COMMANDING OFFICERS

Commander Samuel S. Ellis was born in Spring City, Tennessee, and graduated from the U. S. Naval Academy in June 1946, Class of 1947. He has served on USS TARAWA (CV40), USS CLAMAGORE (SS343), USS K-3, and USS GRAYBACK. He served as Commanding Officer of USS PICKEREL and then as Executive Officer of USS PATRICK HENRY (SSBN-599). In March 1963, he reported to USS NATHAN HALE as PCO (Gold) crew.

Commander Samuel S. Ellis, USN
Commanding Officer, Gold Crew

Mrs. George W. Anderson, Jr.
Sponsor

USS NATHAN HALE was launched on 12 January 1963 at the Electric Boat Division of General Dynamics Corporation, Groton, Conn. The sponsor was Mrs. George W. Anderson, Jr.

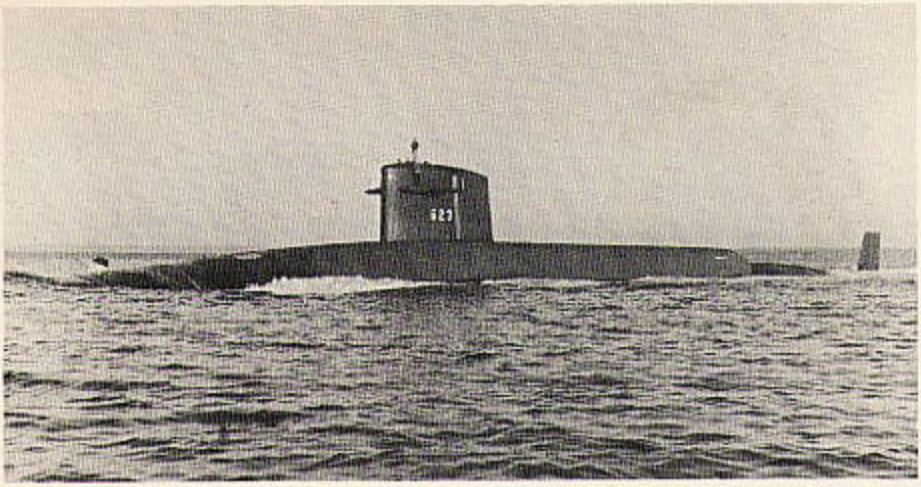
NATHAN HALE

Born in Coventry, Connecticut, on June 6, 1755, Hale attended Yale where he was outstanding in scholarship and in athletics. After his graduation, in 1773, he taught school for two years. He was appointed a lieutenant by the Connecticut General Assembly on July 1, 1775, and fought with the Continental Army in the siege of Boston.

Hale was later chosen by Lieutenant Colonel Thomas Knowlton as one of the captains of the "Knowlton Rangers." The teacher-turned-soldier volunteered as a spy for General Washington and, disguised as a Dutch school teacher, went to Long Island.

On the night of September 21, 1776, he was captured by British General William Howe's forces and ordered executed without a trial. The next day, at the age of 21, Nathan Hale was hanged after defiantly uttering: "I only regret that I have but one life to lose for my country."

Nathan Hale's birthplace in Coventry, in the hills of Tolland County is now a museum. The submarine was built less than a mile from the site in New London where Nathan Hale taught school before the Revolutionary War.

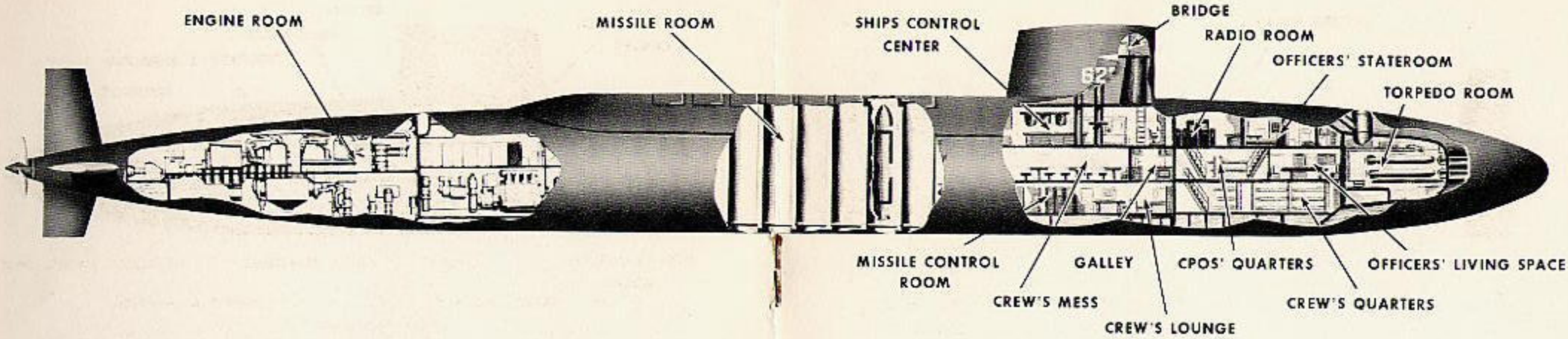


USS NATHAN HALE

(SSBN 623)

USS NATHAN HALE SSBN623 is the first ship of the United States Navy to bear the name and is the sixth in a series of Lafayette class Fleet Ballistic Missile submarines. The HALE is the fourteenth Polaris type submarine and the thirty-second nuclear powered submarine to go to sea. NATHAN HALE is the first FBM submarine to utilize the new gas generator method to launch missiles. She is approximately 425 feet in length, 33 feet wide, displaces about 7,000 tons and carries 16 POLARIS missiles stowed in eight pairs of vertical launching tubes in the space immediately aft of the sail. In addition to the many facilities provided to insure the habitability of the ship, there is an ample air conditioning system for the benefit of the personnel and machines. Special atmosphere control equipment is provided to maintain standard atmospheric conditions. Electrolytic oxygen generators permit the submarine to manufacture an unlimited supply of oxygen from the sea water. Other specialized equipment provides for removal of irritants, elimination of carbon dioxide and maintenance and proper balance of other atmospheric elements during prolonged submerged periods.

The HALE has two crews, designated the Blue and Gold. Each crew consists of 12 officers and about 125 enlisted men. These crews alternate as on-ship crews for the deterrent patrols. The off-ship crew enjoys scheduled leave periods and benefits from refresher training prior to their redeployment.



NAVIGATION SYSTEM

Two positions must be known for success in missile launching — target and launcher. This places great importance on navigation since the position of the launcher is the position of the ship and is continuously changing. Several navigational methods complement each other in the FBM submarine to provide a very high order of accuracy in determining ship's position. At the heart of the system is the Ship's Inertial Navigation System (SINS) which integrates ship motion, speed, and headings to give a continuous report of ship's position.

The ship has three SINS, each checking on the others. Similar systems guided NAUTILUS and SKATE on their historic voyages beneath the polar ice in 1958, TRITON on her 84 day underwater cruise around the world, and more recently, SEADRAGON and SKATE in their rendezvous at the North Pole in the summer of 1962.

FIRE CONTROL

The fire control system feeds a wealth of coordinated information to the missile guidance system. Ship location, local vertical, true north heading, target location and trajectory to be flown are continuously supplied until the very instant of firing.

COMMUNICATIONS

Radio communications with submerged submarines have been possible for a number of years. The systems used have been devised with special care to protect the locations of the submarines and leave the advantage of concealment unimpaired. Recent tests have again demonstrated that the Navy's world-wide communication system has the power and coverage necessary to exercise command of the always-submerged Fleet Ballistic Missile submarine.

TRAINING

The average pre-commissioning training period of Fleet Ballistic Missile personnel is about 18 months. Of this period, about nine months are devoted to formal study at the U. S. Naval Guided Missile School, Dam Neck, Virginia. After a thorough grounding in transistors, electronic circuitry, Boolean logic, and digital computer theory, HALE personnel receive intensive training in the maintenance of advanced systems.

Personnel not intimately connected with the Navigation or Weapons Departments also participate in rigorous training programs to permit the full support of the tactical systems at all times. The training programs continue at sea and, on shore, off-crews are provided with training facilities in the home ports of the various SSBN Squadrons.

VITAL STATISTICS

Keel Laid	2 October 1961	Length	425 Feet
Launched	12 January 1963	Width	33 Feet

Commissioned ..... 23 November 1963

Built by ..... General Dynamics/Electric Boat
Displacement surfaced ..... about 7000 tons
Displacement submerged ..... about 8200 tons
Speed submerged ..... over 20 knots
Diving depth ..... over 400 feet

FBM

FLEET BALLISTIC MISSILE

The Fleet Ballistic Missile Weapon System, better known by the name of its missile, POLARIS, has been operational since November, 1960. The USS GEORGE WASHINGTON (SSBN-598) was the first POLARIS submarine to deploy an operational patrol. The next four to join her were of the same class and carried the 1,200 nautical mile range A-1 missiles. The later construction submarines carry the A-2 missile which has a range of 1,500 nautical miles and will be modified to carry the 2,500 nautical mile A-3 missile when available.

THE MISSILE

POLARIS, named for the North Star, is a two-stage ballistic missile powered by solid rocket motors.

The 1,200 nautical mile range operational missile is designated the POLARIS A-1. It is about 28 feet long, about four and one-half feet in diameter, and weighs about 30,000 pounds. Each motor exerts thrust through four nozzles in the motor base. Subsequent missile models have reflected design changes in improved propellants and flight ranges.

MISSILE GUIDANCE

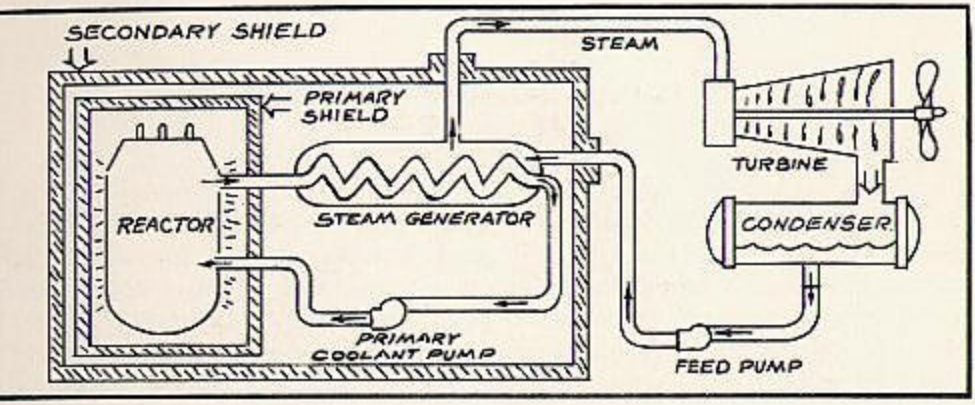
The inertial guidance system used in POLARIS is a refinement of earlier inertial systems and is the smallest in use in U. S. ballistic missiles. The guidance system puts the missile on correct course at the time of launch and automatically computes a new correct course should the missile deviate from its path. At the precise instant required, the guidance system shuts off the rocket motors and triggers separation of the re-entry body from the missile. The re-entry body then follows a ballistic trajectory to the target.

MISSILE LAUNCHING

POLARIS missiles are launched by an air-ejection system which forces the missile from its launching tube and propels it up through the water to the surface. At that point the rocket motor ignites and sends the missile on its way. The system takes advantage of the reliability of solid propellant fuel used in POLARIS. The result is increased safety for the submarine and crew. Each launching tube has its own air supply and is independent of the other 15 tubes. Vital parts of each missile are accessible for inspection and maintenance even when loaded in the launching tubes and while the submarine is underway at sea.

MISSILE CONCEPT

With almost unlimited cruising range and with endurance limited only by the crew, the Fleet Ballistic Missile Submarines capable of extended submerged operations in the international waters of the world which comprises about 70 percent of the earth's surface. Free of the need to surface or extend a snorkel above the surface for continuous operation, FBM nuclear submarines remain hidden by the ocean, their locations unknown to any potential enemy. The POLARIS missile, powered by solid propellant, is ready to launch within minutes of receiving the command without the need for a long countdown. Mobile, hidden, ready for instant action (or carefully considered delayed action), the Fleet Ballistic Missile system provides the United States with a powerful deterrent to those who might start a global war.

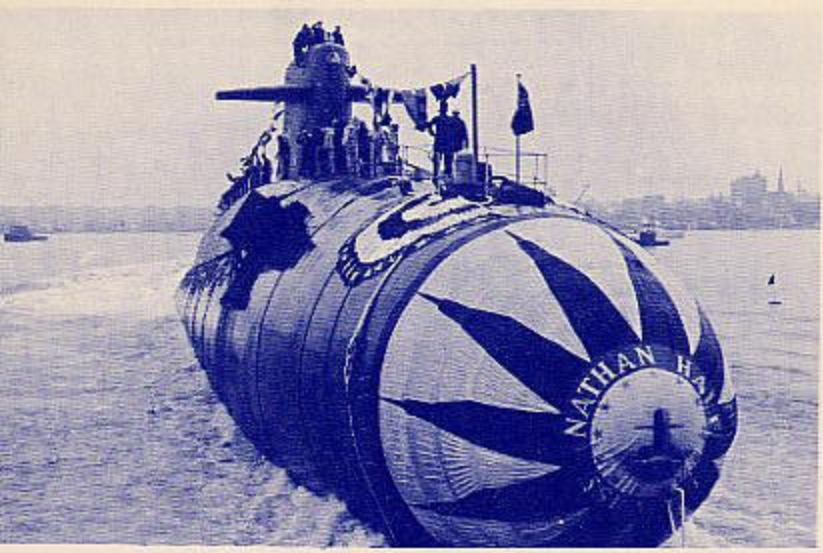


NATHAN HALE is powered by a nuclear power plant which consists of a nuclear reactor with its associated circulating water and steam cycles and auxiliary machinery.

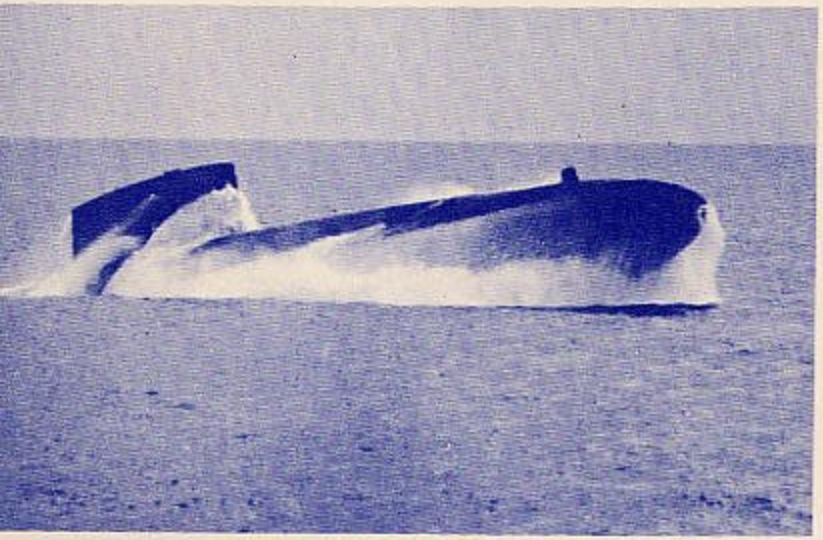
The primary system is a circulating water cycle and consists of the reactor, identical port and starboard loops of piping, primary coolant pumps and the tubes of the steam generators. Heat is produced in the reactor by nuclear fission and is transferred to the circulating primary coolant water which is pressurized to prevent boiling. This water is then pumped through the steam generator tubes where it transfers its heat to the shell or the secondary side of the steam generators where it boils water to form steam. It is then pumped back to the reactor by the primary coolant pumps where it is heated for the next cycle.

The secondary system is the steam producing cycle and is made up of the shell side of the steam generators, turbines, condensers, and steam generator feed pumps. It is completely isolated from the primary system since the primary water goes through the tubes of the steam generator while the water which is boiling to make steam is on the shell side of the steam generator. Steam rises from the steam generators, then flows to the engine room where it drives the ship's service turbo-generators which supply the ship with electricity and the main propulsion turbines which drive the propeller. After passing through the turbines, the steam is condensed and the water is fed back to the steam generators by the feed pumps. There is no step in the generation of this power which requires the presence of air oxygen. This fact alone allows the ship to operate completely divorced from the earth's atmosphere for extended periods of time.

During the operation of the nuclear power plant high levels of radiation exist around the reactor and personnel are not permitted entrance into the reactor compartment until a few minutes after the reactor is shutdown. Heavy shielding is used to protect the crew so that the average crew member receives less radiation than he would receive from natural sources ashore.



LAUNCHING



SEA TRIALS