


# The Snorkel Exhaust

SMOKY MOUNTAIN BASE, TN USSVI



**“To Honor Those Who Serve, Past, Present, and Future”.**  
**“The USSVI Submariner’s Creed”**

To perpetuate the memory of our shipmates who gave their lives in the pursuit of their duties while serving their country. That their dedication, deeds, and supreme sacrifice be a constant source of motivation toward greater accomplishments. We pledge loyalty and patriotism to the **United States of America and its Constitution.**



**OUR ORGANIZATION**

**OUR FOUNDERS**

**OUR BROTHERHOOD**

**Our Mission**  
 The organization will engage in various projects that will bring about the perpetual remembrance of those shipmates who have given the supreme sacrifice. The organization will also endeavor to educate all third parties it comes in contact with about the services our submarine brothers performed and how their sacrifices made possible the freedom and lifestyles we enjoy today.

**Scheduled Meetings**  
 Base meetings are scheduled on the 3<sup>rd</sup> Thursday of each month at:  
**MIMI’S CAFÉ,**  
**10945 PARKSIDE DRIVE**  
**KNOXVILLE, TENNESSEE**  
**Dinner & Social Hour @ 1800**  
**Meeting @ 1900**  
 (Guests are Invited)

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# SMOKY MOUNTAIN BASE OFFICERS



**BASE COMMANDER**  
 Marlin E. Helms, Jr.  
 Holland Club Chairman



MM1(SS) USS Spadefish SSN-668 '74



**BASE VICE COMMANDER**  
 Robert (Bob) Childs



MMC(SS) USS Nautilus SSN-571 '67



**BASE SECRETARY**  
 Ernie Ball



MMC(SS) USS LaFayette (SSBN-616) '75



**BASE TREASURER**  
 Jim Rock



MM1(SS) USS Andrew Jackson SSBN-619 '76

## Smoky Mountain Base Committee Chairmen

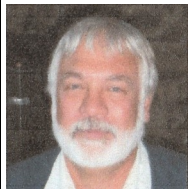


**BASE CHIEF OF THE BOAT**  
 Terry McBride



MMC(SS) USS Woodrow Wilson (SSBN-624) '93

**SOCIAL PROGRAMS**



**BASE STOREKEEPER**  
 Marlin E. Helms, Jr.



MM1(SS) USS Spadefish SSN-668 '74



**MEMBERSHIP / RECRUITER**  
 Marlin E. Helms, Jr.



MM1(SS) USS Spadefish SSN-668 '74



**WEBMASTER**  
 Marlin E. Helms, Jr.



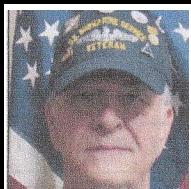
MM1(SS) USS Spadefish SSN-668 '74



**BASE NEWSLETTER**  
 Max Gildner



ET1(SS) USS Tullibee (SSN-597) '71



**BASE PHOTOGRAPHER**  
 Bruce Eitzroth  
 Associate Member

ET1(SU) USS Sculpin (SSN-590)



**BASE CHAPLIN**  
 David Pope, EAWS  
 Associate Member

OMSUBGRU-9, FP DET. 2



**SMOKY MOUNTAIN BASE, USSVI**  
Meetings, Greetings, Gatherings & Calendar

**APRIL - 2026**

# Calendar of Upcoming Events

## Scheduled Meetings:

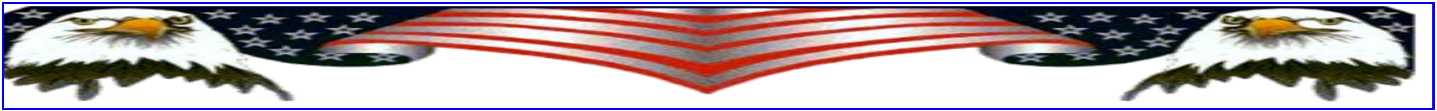
Base meetings are  
on the 3<sup>rd</sup> Thursday of each month  
at  
**MIMI'S CAFÉ, 10945 PARKSIDE DRIVE**  
located in **Turkey Creek,**  
**Knoxville, TN**



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<http://www.facebook.com/pages/Smoky-Mountain-Submarine-Veterans/273222054302>

05/10—MOTHER'S DAY      05/21—SMB MEETING      05/25—MEMORIAL DAY

MAY 2026						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
<b>10</b>	11	12	13	14	15	16
17	18	19	20	<b>21</b>	22	23
24/31	<b>25</b>	26	27	28	29	30



## VETERANS ASSISTANCE & RESOURCES



### Operation Vet Rescue

Rescuing & Rebuilding Lives of Homeless Veterans



(865) 284-3188

info@ovrtn.org

P.O. Box 23, Greenback, N 37742

VA Regional Office Benefits Assistance on every 4th Friday at 1557 Downtown West Blvd. Units 20-21 Knoxville, TN 0900-1400 Hours

East TN Military Assistance Council Calendar of Events web site: [www.etmac.org/calendar](http://www.etmac.org/calendar)

### U.S. Military Veterans Discounts

#### Tennessee State Discounted Fees and Taxes

- \$10 one-time fee for hunting and fishing license for eligible disabled veterans.
- Distinctive motorcycle and vehicle license plates; no fee for currently enlisted personnel.
- Exemption from motor vehicle privilege tax for eligible permanently and totally disabled veteran or former POW.
- Reduced fee state park lodging, camping, and golf.
- Veterans Designation on drivers license.



(SS) CHALLENGE COINS LLC

[www.SSChallengeCoins.com](http://www.SSChallengeCoins.com)

31889 Marshall Rd  
Jacksonville, Missouri  
65260-2011  
816.261.7784



Shelly Saxton

CEO/Owner

[SubmarineCoins@gmail.com](mailto:SubmarineCoins@gmail.com)



In Service to America

The Vietnam Veterans of America, Chapter 1078 meets at **The Redemption Church** located at **3550 Pleasant Ridge Road, Knoxville, TN** on the **2nd Tuesday** of



The Honor and Remember Flag has been designated as the official TN state symbol of remembrance to honor fallen military service members for their service.

For information on obtaining one refer to:  
<http://www.honorandremember.org/the-flag/flag-presentation>.

# VETERAN'S HOTLINE

## 988#1

## OR

## (844) 647-1354

## SUBVEST

Serving those  
Who Already Have.

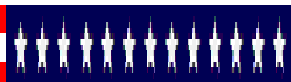
**The only place to get  
CUSTOM SEWN**

**Submarine Vests, Hats,  
Jackets, Shirts & MORE!**

**A Base Storekeepers Dream...  
Discounts & No Stock to order  
Call to set up an account!**

**[www.SUBVEST.com](http://www.SUBVEST.com)**

Jenny Dugan - Sewing Wench  
**757-318-0138 B4 8pm**





**Base Commander's Report**  
Marlin E. Helms, Jr. - MM1(SS)



May is our annual election of officers. Nominations are open until the beginning of voting. I submitted a nomination for our base newsletter and just received notice that the nomination has been accepted. Winners are announced at the annual USSVI convention.



**BASE VICE-COMMANDER'S REPORT**

Robert (Bob) Childs, EMC(SS)



No report submitted.



**SMB Treasurer's Report - Jim Rock MM1(SS)**



April 16th, we had a balance of **\$4,516.66**



**Social Program Chairman's Report**



Dick Love has tentatively reserved the Concord Yacht Club on Saturday, June 13th at 1:00pm (1300) for the base picnic. Further details need to be worked out and will be forthcoming.



**Newsletter Editor's Report**  
Max Gildner ET1(SS) & Bruce Eltzroth ET1(SU)



Please let us know if there are any suggestions for improvements to the newsletter form or contents. Photos of base activities are always appreciated.



**Storekeepers Report**  
Marlin E. Helms, Jr. - MM1(SS)



**We currently have the following items on hand for sale:**

The 2026 USSVI Calendars - \$8.00 at the meeting, but if mailed postage will be added. Baseball caps w/SMB patch (White or Blue) - \$14.00. SMB Iron on Patches - \$7.00. SMB Logo Magnetic Car Plates - \$12.00. SMB Window Stickers - \$3.00. The "Nuke, I am your father" coins. —\$20.00 each or 6 coins for \$100.00.

Remember, all purchases go to support your Smoky Mountain Base



## USSVI SMOKY MOUNTAIN BASE MEETING MINUTES



**Date: April 16, 2026**

Presiding: Marlin Helms Base Commander

Meeting called to Order at 1902 hours Dove the boat.

The Base Chaplain presented the Invocation.

The Base Commander led the group in the Pledge of Allegiance and Vice Commander read the USSVI Creed.

COB and Vice Commander. led the Tolling of the Boats.

COB hosted member/guest introductions.

Number of Attendees: 12 members, 6 guest/wife's

February minutes read and approved

Base Treasurer reported - \$4516.66 in the account.

Correspondence / Discussion - None

Committees -

- Newsletter – Man Gildner- need officer inputs
- Library – Marlin Helms - new book End 1942
- Storekeeper – Marlin Helms Need Base Coins.
- Membership –Marlin Helms stable
- Scouting – Marlin Helms- still no contacts
- Media Manager – Marlin Helms- nothing new
- Social Committee - Need new volunteer Andy is in home hospice

Old business –

Marlin Helms- Nominating and vote next month

New Business –

June 13- Picnic need a main course.

Voted to buy flag and stands that will be on the table.

**Good of the Order**

- 50/50 - \$95/47

Next Meeting: 1900 hrs. Thursday, May 21, 2026, at **MiMi's Café, 10945 Parkside Dr., Knoxville, TN 37934.**

Meeting adjourned at 1932 hrs. Boat surfaced.

Ernie Ball  
Secretary

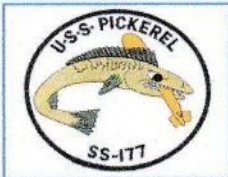


# Lost Boats of April



## USS PICKEREL (SS-177) - 3 Apr. 1943

SS-177 Battle Stars



78 MEN LOST

On March 18, 1943, the *Pickerel*, captained by Lieutenant Commander Augustus H. Alston, Jr., sailed from Pearl Harbor on her seventh and final war patrol. On March 22, 1943, she stopped at Midway Island to refuel, and then headed to her assigned patrol area along the eastern coast of northern Honshu. She was never heard from again. The *Pickerel* was possibly lost on April 3, 1943, off Aomori Prefecture, south of the Hachinohe Sea and near the Shiranuka Lighthouse, on the eastern coast of northern Honshu. At 0020 hours that day, *Pickerel* had sunk the 460-ton Japanese submarine chaser *Ch 13* at 41° 2' 60.000" N, 141° 58' 0.000" E. Later that day a Japanese patrol plane from Ominato spotted an oil patch on the sea near the Shiranuka Lighthouse. The patrol plane summoned the IJN Minelayer *Shirakami*, the submarine chaser *Bunzan Maru*, and additional aircraft to the spot. A total of 53 depth charges and 23 aerial bombs were dropped at the location causing a larger quantity of oil to rise to the surface. No other American submarine was operating in or near the area of the attacks. The *Pickerel* received three battle stars for World War II service.

ETERNAL



PATROL

## USS SNOOK (SS-279) 8 Apr. 1945

SS-279 Battle Stars



88 MEN LOST

On March 25, 1945, the *Snook* left the submarine base at Guam for her ninth and final war patrol with Commander John F. Walling at the helm. She departed Guam in company with USS *Burrfish* (SS-312) and USS *Bang* (SS-385), all part of the wolf pack *WHALERS* under Commander Walling's leadership. On March 27th *Snook* returned to Guam for emergency repairs. She left to rejoin the group the following day. The group was under orders to conduct a coordinated patrol in the Luzon Strait area and to perform lifeguard duty if so directed by dispatch. On April 1, 1945, *Snook* was ordered to disband the *Whalers* pack and join a new group, *HIRAM'S HECKLERS*, under Commander Hiram Cassidy in USS *Tigrone* (SS-419). On April 8th *Tigrone* had been fired at by an unseen opponent and had dodged two torpedoes. He suspected that the *Snook* might have fired the torpedoes at him. Cassidy raised the *Snook* by radio that night and Walling said he had not yet fired any torpedoes. Cassidy cautioned Walling to be on guard for the enemy submarine that had fired the torpedoes at *Tigrone*. The next day Cassidy could not raise the *Snook* by radio. She was never heard from again. There are two possible causes for the *Snook's* loss, neither with sufficient evidence to be deemed conclusive. The first possibility is that on April 14, 1945, she was detected by enemy patrol planes off the Chusan Archipelago and attacked with depth charges. Surface vessels were called in and attacked the submarine with depth charges over the next two hours until a widening oil slick was sighted. The second possibility is that on April 14, 1945, while the *Snook* was on lifeguard duty near the Sakishima Islands, she was torpedoed and sunk by Japanese submarine *I-56*. The *Snook* earned seven battle stars for World War II service.



# Lost Boats of April



## USS GRENADIER (SS-210) - 22 Apr. 1943

SS-210 Battle Stars



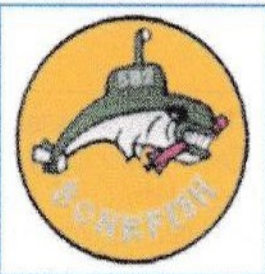
4 MEN LOST

On March 20, 1943, *Grenadier* departed Fremantle for her sixth and final war patrol with Lieutenant Commander John A. Fitzgerald at the helm. On April 21, 1943, while on station in the Strait of Malacca, between the Malay Peninsula and Sumatra *Grenadier's* lookouts spotted a twin-engine enemy bomber on her port quarter. Fitzgerald gave the order to crash dive. As *Grenadier* passed 120 feet, a bomb exploded directly above the boat near the bulkhead between the maneuvering room and the after torpedo room. *Grenadier* sank until she hit the bottom at around 270 feet. After thirteen hours on the bottom, the crew managed to coax the heavily damaged submarine to the surface. With the deck gun inoperable, and only the bridge machine guns available, Fitzgerald knew fighting was not an option. He gave the order to scuttle the boat. The radio, radar, sound and TDC gear, and decoding machines were destroyed, and the codebooks were weighted and sunk. A Japanese merchant vessel with a small escort came into sight headed for *Grenadier*. As the IJN ships came closer, Fitzgerald lined his men up on the deck in their life jackets, the vents were opened and *Grenadier* sank by the stern, at the approximate geographic position 5° 30' 60.000" N, 98° 45' 0.000" E. They were taken aboard the Japanese merchant ship and transported to Penang, Malaysia. There the Japanese captors tortured them for many weeks in an unsuccessful effort to extract intelligence information. Next they would be sent to Singapore. Eventually, all of the men were transferred to the prison camps in Japan, where they underwent additional relentless interrogation. Four of *Grenadier's* men died while prisoners. The rest were freed following Japan's surrender more than two years later. The *Grenadier* received four battle stars for her World War II service.



## USS BONEFISH (SS-210) Fire At Sea - April 24, 1988

1 OFFICER AND 2 MEN LOST



On April 24th, 1988, the Charleston based **USS BONEFISH SS-532** experienced a fire so intense that the ship had to be abandoned and subsequently towed back to port. **BONEFISH** was providing ASW services to the **USS CARR, FFG-52** and to the **USS JOHN F. KENNEDY, CVA-67** off the east coast of Florida. As part of the exercise **CARR** requested that **BONEFISH** go to 250 feet. After securing the battery charge, **BONEFISH** began diving to 250 feet. Investigators later determined that a sea water leak in the TDU allowed sea water into the battery compartment, followed by a loud bang. Instantly the boat filled with smoke. The order to abandon ship was given and Eighty-nine crew members were rescued by whaleboat and helicopter crews from **CARR** and the aircraft carrier **JOHN F. KENNEDY**. One Search and Rescue Swimmer from **HS-7, Anti-Submarine Warfare Operator Third Class (AW3) Larry Grossman** spent over three hours in the ocean and was credited with saving 19 lives. He later received the Navy and Marine Corps Medal for Heroism. Three crewmen: **Lieutenant Ray E. Everts, Jr., Robert W. Bordelon RM2(SS), and Marshal Todd Lindgren YN3(SS)** were overcome by smoke and were killed. The investigation that followed the incident determined that the **BONEFISH** was damaged beyond repair and she was decommissioned on September 28, 1988 and scrapped on August 17, 1989.



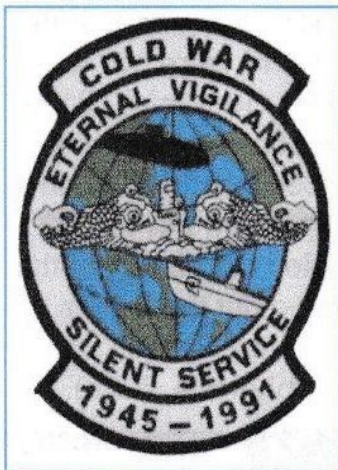
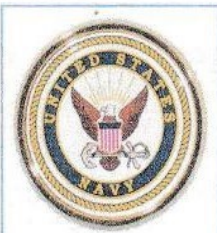
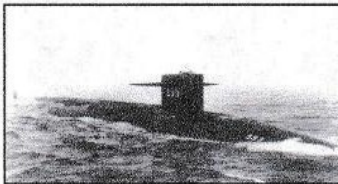


# Lost Boats of April



## USS THRESHER (SSN-593) - 10 April, 1963

### 112 Crew and 17 Civilians LOST



The keel of the second **THRESHER** (SSN-593) was laid down on 28 May 1958 by the Portsmouth (N.H.) Naval Shipyard; launched on 9 July 1960; sponsored by Mrs. Frederick B. Warder; and commissioned on 3 August 1961, **Comdr. Dean W. Axene** in command. Following trials the nuclear attack submarine took part in Nuclear submarine Exercise (NUSUBEX) 3-61 off the northeastern coast of the United States from 18 to 24 September. On 18 October; the submarine headed south along the east coast. After calling at San Juan, Puerto Rico, she conducted further trials and test-fired her torpedo system before returning to Portsmouth on 29 November. The ship remained in port through the end of the year and spent the first two months of 1962 evaluating her sonar system and her Submarine Rocket (SUBROC) system. Off Charleston, the ship undertook operations observed by the Naval Antisubmarine Warfare Council, before she returned briefly to New England waters from whence she proceeded to Florida for SUBROC tests. However, while mooring at Port Canaveral, the submarine was accidentally struck by a tug which damaged one of her ballast tanks. After repairs at Groton, Connecticut, by the Electric Boat Company, the ship returned south for more tests and trials off Key West. **THRESHER** then returned northward and remained in dockyard hands through the early spring of 1963. In company with **SKYLARK** (ASR-20), **THRESHER** put to sea on 10 April 1963 for deep-diving exercises. In addition to her 16 officers and 96 enlisted men, the submarine carried 17 civilian technicians to observe her performance during the deep-diving tests. Fifteen minutes after reaching her assigned test depth, the submarine communicated with **SKYLARK** by underwater telephone, apprising the submarine rescue ship of difficulties. Garbled transmissions indicated that far below the surface things were going wrong. Suddenly, listeners in **SKYLARK** heard a noise "like air rushing into an air tank", then, silence. Efforts to reestablish contact with **THRESHER** failed, and a search group was formed in an attempt to locate the submarine. Rescue ship **RECOVERY** (ASR-43) subsequently recovered bits of debris, including gloves and bits of internal insulation. Eventually, photographs taken by bathyscaph **TRIESTE** proved that the submarine had broken up, taking all hands on board to their deaths in 5,500 feet of water, some 220 miles east of Boston. **THRESHER** was officially declared lost in April 1963. Subsequently, a Court of Inquiry was convened and, after studying pictures and other data, opined that the loss of **THRESHER** was in all probability due to a casting, piping, or welding failure that flooded the engine room with water. This water probably caused electrical failures that automatically shutdown the nuclear reactor, causing an initial power loss and the eventual loss of the boat. **THRESHER** is in six major sections on the ocean floor, with the majority in a single debris field about 400 yards square. The major sections are the sail, sonar dome, bow section, engineering spaces, operations spaces, and the tail section. The death toll was staggering; 16 officers, 96 enlisted men, and 17 civilian technicians died that day. **We submariners who followed them into the Silent Service owe a tremendous debt of gratitude to their memory because their death was the reason for the current "Sub-Safe" program.**

**SMOKY MOUNTAIN BASE MEMBERS ON ETERNAL PATROL**  
**"SHIPMATES, REST YOUR OARS. WE HAVE THE WATCH"**

**Edward Collins - April 5, 2015    Andrew Armbrust - April 23, 2026**  
**William Smith - April 24, 2019    Robert Kolb - April 25, 2014**





## **Andrew Jay Armbrust passed on April 23, 2026, at the age of 72 at his home.**

Andrew was born on July 21st, 1953 in Zanesville, Ohio, and graduated from Bishop Rosecrans High School in 1971. After he graduated, he joined the US Navy and proudly served until 1977. He then worked in radioactive waste management, and retired from working at Ecology Services in 2018. Andrew was a member of St. John Neumann Catholic Church, as well as the Smoky Mountain Submarine Veterans.

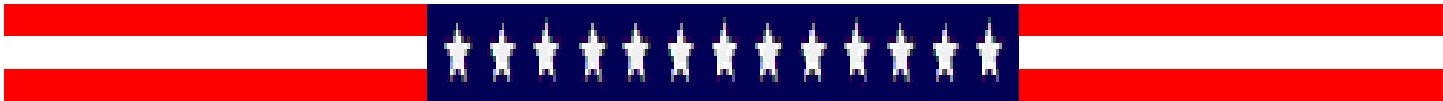
He is preceded in death by his father, James Armbrust; mother, Carolyn Williams Armbrust; and his brother, James Jeffrey Armbrust.

Andrew is survived by his wife of 53 years, Catherine Stackhouse Armbrust; his sons, Ryan (Angela) Armbrust, and Robert (Nicole) Armbrust; one step-grandson, Jackson Beam; as well as several nieces and nephews.

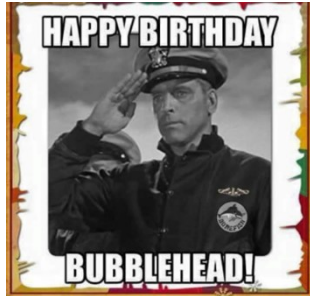
A receiving of Friends will be held on Saturday, June 6th, at 11:00 AM, at Berry Highland West Funeral Home - 9913 Sherrill Boulevard, Knoxville, TN, 37932. The Funeral Service will start at 12:00 PM, with a committal service to follow at 1:00 PM in the cemetery. A reception will be held after the committal service in the funeral home.

In lieu of flowers, please consider a donation in his memory to the Gentiva Foundation or The American Kidney Fund.





# 126th BIRTHDAY OF THE UNITED STATES NAVAL SUBMARINE SERVICE



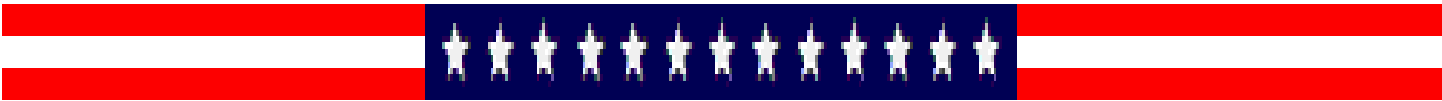
On April 11<sup>th</sup> of every year, we submariners celebrate the birthday of the United States Submarine Service as Submarine Day. This is based on the purchase of the US Navy's first practical submarine from John Holland on April 11, 1900

US history has earlier experiences with submersibles like Bushnell's *Turtle* during the revolutionary war and the USS *Alligator* and CSS *Hunley* during the civil war. In the 1892-93 time frame, US Congress authorized the Navy to request bids for a prototype submarine torpedo boat. The principal bidders were George Baker, Simon Lake, and John Holland. The contract was awarded to John Holland in 1895.

She was completed in February of 1898 and made successful test runs off the coast of Staten Island, NY on March 17, 1898, (St. Patrick's Day). After further testing and some refinements, she was officially purchased by the US Navy on April 11, 1900. After Navy crew training, she was commissioned as the USS *Holland* on October 12, 1900.

Training initially was conducted by the Holland Torpedo Boat Co. since they knew how to operate their submarine most completely. By 1905, the Navy had taken over submarine training mostly by onboard experience. At the turn of the 20<sup>th</sup> century the Navy had a different weapon but were not sure what to do with it. At the outset of WW1, the envisioned role of the navy was to have a large flotilla that would meet their adversary on the open sea and set guns blazing until a victor emerged.

On October 18, 1915, submarines G-1, G-2 and G-4 arrived at the Groton Navy Yard along with the tender USS *Ozark*. In June 1916, the Groton Navy Yard became the newly designated Submarine Base and homeport of the New London Submarine Flotilla and the newly established Submarine School under the command of Commander Yeates Stirling. By the end of WW1, acknowledging the effective deployment of the German Submarine force, a better-defined role for the submarine service was envisioned.

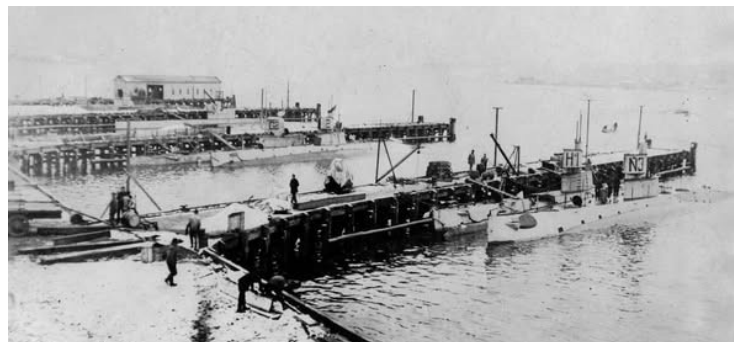
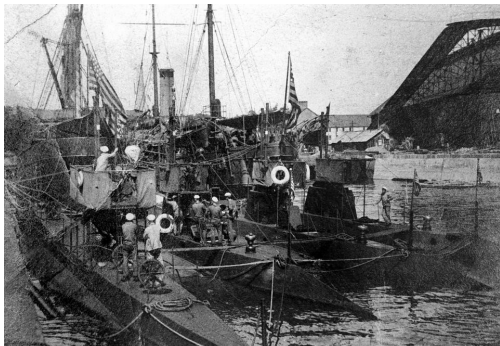


However, the heart of a submarine service is not the equipment, but the officers and crewmen who take that equipment and make it an effective fighting unit. It was determined that a special insignia was needed to recognize its officers and crewmen. In 1923, Capt. E.J. King submitted a sketch of what he thought the Submarine Force Insignia should look like. His drawing depicted a shield mounted on a submarine beam with two dolphins leaping toward the tower. Although the Commander Submarine Division Atlantic endorsed the design, the Bureau of Navigation chose to solicit more designs to choose from. Eventually, they landed on today's Submarine Force Insignia design: dolphins flanking the bow and conning tower of a submarine. The final design recommendation was accepted by then-Acting Secretary of the Navy Theodore Roosevelt Jr. in March 1924



On October 12, 2000, then President Bill Clinton proclaimed that day as the official 100th Anniversary of the US Navy Submarine Force. (Editor's Note: I guess he didn't get the memo that the Submarine Service had been celebrating April 11th as the service's birthday for decades.)

(Editor's Note: The Navy acquired the original 105 acre plot of land that would eventually become the US Naval Submarine Base Groton also on April 11. (1868).





## EVOLUTION OF SUBMARINE PROPULSION SYSTEMS



The earliest experiments in propelling a submarine vessel were using the established system of oars powered by sailors. This had worked for centuries by sailors around the world. This system worked, somewhat, for early inventors like Cornelius Drebbel in 1620, in the Thames River. The *Drebbel* successfully navigated at depths of 12 to 15 feet below the surface and stayed submerged for three hours, traveling from Westminster to Greenwich and back.

The next evolution was replacing the oars with an auger tuned by hand. In 1776, created by American Patriot, David Bushnell, in the *Turtle* The crewman powered system of submarine propulsion was the typical system used for the next century.

The development of the screw propeller in 1837 was a big improvement in propulsion system efficiency for both mechanically and manually powered vessels.

Recognizing the limitations of manually powering submarines, especially as they grew in size and construction materials, mechanical propulsion was the next innovation. In 1863, the French submarine *Le Plongeur* is recognized as the first to be mechanically powered. She was 146 ft. in length and 12 ft.in beam displacing 420 tons. She was powered by a compressed air reciprocating engine. The air was stored in 23 tanks totaling 5,403 cubic feet compressed to 180psi. Her range was only 5 nautical miles at a speed of only 4 nautical miles per hour. In 1888, the French submarine *Gymnote* .is recognized as the first submarine to use a 55 hp electric motor propulsion with storage batteries. She was 58 ft in length, displacing 33 tons. Her surface speed 8.4 mph with a range of 65 nautical miles. Her submerged speed was 4.9 mph with a range of 25 nautical miles.

In 1865 Spanish inventor Narcis Estarriol built the *Ictineo* using a anaerobic steam engine that used a chemical reaction to create both heat and oxygen. In 1879 British Reverend George Garret built the submarine *Resurham* using a closed-cycle steam engine for propulsion. It provided enough steam to turn a single propeller for up to four hours. While under way to Portsmouth to demonstrate the submarine to the Royal Navy, it sunk in Liverpool Bay in 1880. In 1898 the French built the submarine *Narval* with an oil-fired steam engine for surface running and electric motors for submerged operations. The *Narval* had a surface speed of 11.4 mph with a range of 397 miles and a submerged speed of 5.25 mph with a range of 67 miles.

United States inventors John Holland and Simon Lake used gasoline engines and electric motors for their initial endeavors in submarine development. Gasoline engines were more dangerous due to their fuel's volatility. The diesel engine using fuel oil was considered safer and had been in use in surface shipping since the early 1900s. Simon Lakes G-3 was the first submarine to use diesel engines and his G-4 the last to use gasoline engines.

The diesels were directly connected to the propeller through a system of clutches with the electrical motors mounted directly on the propeller shafts. This system had some technical drawbacks. Noise was transmitted through the drive train that could be detected by their opposition. Additionally, the diesels and propellers each had optimum speeds which were never the same resulting in less drive train efficiency.

The answer to this was the diesel-electric drive. The diesel engines were run at their optimum speed coupled to a DC generator design to operate at that speed. This was the system used by both the German Type VII submarines and the US Gato and Balao class submarines. The German Type VII had two diesels while the US Gato and Balao had four diesels. The diesel-electric allowed for maximum variations in whether the diesels could be used for propulsion or battery charging or a combination of both. Additionally, this system de-coupled the propeller shafts from the noise of the engines and yielded a much quieter signature for the boat.

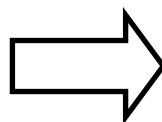
The next evolution was the adoption of a Dutch design for a snorkel where the diesels could be run with the boat submerged to periscope depth. This allowed for a much smaller radar target but made the interior of the boats very hot. In high seas the cycling of the snorkel head valve made rapid changes in the interior pressure of the boats and significant distress for the crew.

The innovation of nuclear power for submarine propulsion was a great leap forward in submarine capabilities. Submerged endurance was now only limited by the provision for the crew. The propulsion went back to steam, but steam turbines rather than reciprocating engines. The turbines were coupled to reduction gears to drive the propeller(s). Early nuke boats had the traditional two propellers but later went to a single propeller associated with the more tear drop hull design. This system used dedicated propulsion turbines and separate turbines for electrical generation. This combination is the major system in use today. Many variations in propeller design have been made to improve their efficiency and quietness. The current is a ducted propeller that functions like an inductor to increase thrust and are that used on the Seawolf and Virginia classes of boats.

The next evolution evolved slowly in efforts to reduce noise generated by the mechanical drive trains. In the early 1960s the USS *Tullibee* used a nuclear steam turbine system to drive both electrical generators for ship service and a direct current propulsion motor. All moving equipment were mounted on rubber mounts to reduce the vibrational noise transmitted through the hull. It was very quiet by the standards of the day but suffered from limited speed from a smaller than usual reactor system and a then state of the art electric motor.

In the early 1970s the USS *Glenard P. Lipscomb* used a similar turbine-electric drive system in a boat that generally was similar to the then Sturgeon Class fast attack. It had good performance due to a larger reactor system but suffered from much the same mechanical issues as the *Tullibee*.

The newest Columbia Class of SSBNs will feature an improved and even quieter turbine electric drive system. Stealth being paramount for the ballistic missile submarines.





# USSVI APPLICATION FOR MEMBERSHIP

Regular  Life  Associate

**OUR CREED:** "To perpetuate the memory of our shipmates who gave their lives in the pursuit of their duties while serving their country. That their dedication, deeds and supreme sacrifice be a constant source of motivation toward greater accomplishments. Pledge loyalty and patriotism to the United States of America & its Constitution."

With my signature below I affirm that I subscribe to the Creed of the United States Submarine Veterans, Inc., and agree to abide by the Constitution, all Bylaws, Regulations and Procedures governing the U.S. Submarine Veterans, Inc., so long as they do not conflict with my military or civil obligations. I will furnish proof of my eligibility for Regular membership, including my discharge under honorable conditions, and proof of my U.S. Navy (SS) Designation, if required by the Base or the national Membership Chairman. If I am not discharged, the discharge requirement is waived. If I am not U.S.N. submarine qualified, I am applying as an Associate member and my sponsor is indicated below.

- I certify that I was designated qualified in USN Submarines aboard \_\_\_\_\_ in \_\_\_\_\_ (Year)  
(Honorary designations regardless of source do not apply under any circumstances.)
- I certify that I received a discharge under Honorable Conditions (if not currently in military service) in \_\_\_\_\_ (Year)

Name: (Print /Type) \_\_\_\_\_ Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_ - \_\_\_\_\_ Tel: (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Your E-Mail Address \_\_\_\_\_ Base/Chapter Desired: Smoky Mountain Base

Nat'l Member Dues year runs from Jan 1<sup>st</sup> thru Dec 31<sup>st</sup>. Please indicate your term preference: \_\_\_\_\_

Nat'l Dues: 5 Year term: \$ 140.00; 3 Year term: \$ 85.00; 1 year term (Jan thru Sep) \$ 30.00;

(Oct thru Dec adds the next year): \$ 35.00

National Life: 76+ yrs = \$120.00; 66 thru 75 yrs = \$240; 56 thru 65 yrs = \$ 360.00; 46 thru 55 = \$500.00; Thru 45 yrs = \$ 600.00

Smoky Mountain Base dues are \$ 15.00 (\$ 10.00 after Aug. 1<sup>st</sup>)

How did you find USSVI?  Friend,  Boat Assn,  Local Event/News,  Internet,  Other ( \_\_\_\_\_ )

Who is your sponsoring USSVI Regular Member?: (Mandatory for Assoc Members.) \_\_\_\_\_

Associate Applicant is:  Veteran  Spouse of Veteran  Other (specify) \_\_\_\_\_

## YOUR U.S. NAVY BIOGRAPHICAL DATA

Date Of Birth (MM/DD/YY) -- \_\_\_ / \_\_\_ / \_\_\_ If other military service, What Branch? \_\_\_\_\_

Highest Rate & Rank Attained: \_\_\_\_\_ Mil Retired (Y/N): \_\_\_\_\_ On Active Duty? (Y/N): \_\_\_\_\_

YR entered Mil Service: \_\_\_\_\_ YR left Mil Service \_\_\_\_\_ (Active/Inactive reserve time also counts.)

- Check if your Military Service falls within any of these time periods: Dec 7, 1941, thru Dec 31, 1946; June 27, 1950, thru Jan 31, 1955; Aug 5, 1964, thru May 7, 1975; and from August 2, 1990 to date.
- Check if you have been awarded an Expeditionary Medal.

**Submarines and ships served aboard as ship's company** (Use back if you need more space.)

1. \_\_\_\_\_ Hull# \_\_\_\_\_ Rank/Rate \_\_\_\_\_ From Yr. \_\_\_\_\_ to Yr. \_\_\_\_\_
2. \_\_\_\_\_ Hull# \_\_\_\_\_ Rank/Rate \_\_\_\_\_ From Yr. \_\_\_\_\_ to Yr. \_\_\_\_\_
3. \_\_\_\_\_ Hull# \_\_\_\_\_ Rank/Rate \_\_\_\_\_ From Yr. \_\_\_\_\_ to Yr. \_\_\_\_\_
4. \_\_\_\_\_ Hull# \_\_\_\_\_ Rank/Rate \_\_\_\_\_ From Yr. \_\_\_\_\_ to Yr. \_\_\_\_\_
5. \_\_\_\_\_ Hull# \_\_\_\_\_ Rank/Rate \_\_\_\_\_ From Yr. \_\_\_\_\_ to Yr. \_\_\_\_\_

Next of Kin: Name: \_\_\_\_\_ Relationship: \_\_\_\_\_ (Spouse, Partner, Son, Daughter, Parent, Other)

Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_ Tel: \_\_\_\_\_

(Leave this address line blank if the same as your home address)

home address.

Upon completion, please deliver to: Marlin Helms at the monthly meeting (on the third Thursday of each month) or, Applicants on active duty are requested to provide a permanent mail to:

Marlin Helms Smoky Mountain Base Commander, 732 Old Hen Valley Road Oliver Springs TN 37840 (865) 387-5625