



The MidWatch

April 2012
Volume 18 - Issue 4

The Monthly Newsletter, Perch Base, USSVI Phoenix, Arizona

WWW.PERCH-BASE.ORG



April 14
Perch Base Annual Picnic
White Tanks Regional Park



Featured Article

SOUND NAVIGATION AND RANGING

Guaranteed to tell you something you didn't know . . .

USSVI CREED

Our organization's purpose is . . .

"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 and its Constitution.

In addition to perpetuating the memory of departed shipmates, we shall provide a way for all Submariners to gather for the mutual benefit and enjoyment. Our common heritage as Submariners shall be strengthened by camaraderie. We support a strong U.S. Submarine Force.

The organization will engage in various projects and deeds 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 lifestyle we enjoy today."

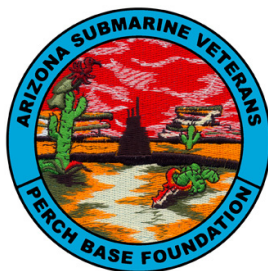


2012 Perch Base Foundation Supporters

These are the Base members and friends who donate monies or efforts to allow for Base operation while keeping our dues low and avoid raising money through member labor as most other organizations do.

Remember, if you contribute by check, it must be made out to the "Perch Base Foundation."

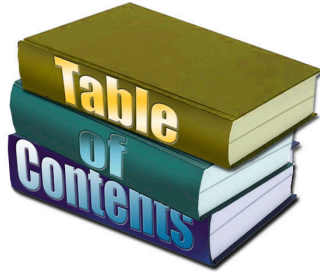
These are the 2012 Foundation Donors



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Sailing Orders



*** April 14 ***

“Annual Perch Base Picnic”

White Tanks Regional Park.

(This will take the place of the April Base

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Next regular meeting will be MAY 12 at noon (social hour at 11 a.m.)
 Dillon's Restaurant at Arrowhead
 20585 N. 59th Avenue
 Glendale, AZ 85308-6821

Flagstaff, AZ Armed Forces Day Parade and Static Display May 19



MAY 30 MEMORIAL DAY” PHOENIX NATIONAL CEMETARY



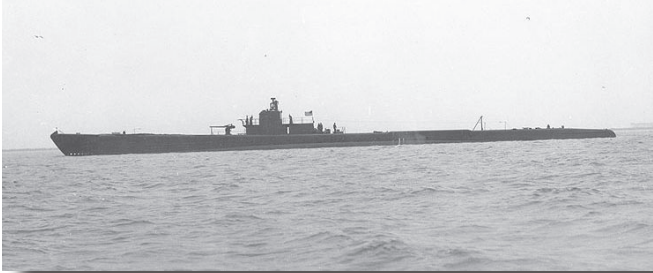


**Free Hot Dog at the picnic
 to anyone who knows
 what this is.**

LEST WE FORGET THOSE STILL ON PATROL

APRIL ETERNAL PATROLS

April 3, 1943 USS Pickerel (SS-177) 74 men lost



Reports on her loss are conflicting but probably sunk near Honshu (Japan) by Japanese ASW ships.

April 22, 1943 USS Grenadier (SS-210) 4 lost as POWs



She was attacked by Japanese aircraft near the Strait of Malacca, survived but was damaged beyond repair. The crew abandoned ship, were taken prisoner, and all but four (4) survived the war.

April 8, 1945 USS Snook (SS-279) 84 men lost



Snook was lost while conducting her ninth war patrol, in the South China Sea and Luzon Strait. It is believed that she was sunk by kaibokans Okinawa, CD-8, CD-32 and CD-52. It has also been suggested that Snook may have been lost due to one of five Japanese submarines which were also lost in April–May 1945. One candidate is Japanese submarine I-56.

April 10, 1963 USS Thresher (SSN-593) 129 men lost



It is believed a brazed pipe-joint ruptures in the engine room. The crew would have attempted to stop the leak; at the same time, the engine room would be filling with a cloud of mist. Water leaking from the broken pipe most likely causes short circuits leading to an automatic shutdown of the ship's reactor, causing a loss of propulsion. Procedures at the time would have shutdown steam propulsion. Loss of sufficient motive power and added weight (flooding) caused the ship to sink past crush depth.

April 24, 1988 USS Bonefish (SS-582) 3 men lost



On 24 April 1988, Bonefish was exercising with the guided missile frigate Carr 160 mi (260 km) off the coast of Florida. While the sub was submerged, seawater began leaking onto cables and electrical buses in a battery supply cableway. Electrical arcing between cables caused an explosion which flashed into a fire within minutes. Bonefish was surfaced and its crew ordered to abandon ship. Eighty-nine crew members were rescued by whaleboat and helicopter crews from Carr and the aircraft carrier John F. Kennedy. Three sailors were killed. The damage to Bonefish was deemed too extensive to warrant repair, and a decision was made to decommission her and dispose of her via scrapping.

Lost Harbor

by Leslie Nelson Jennings

**There is a port of no return, where ships
May ride at anchor for a little space
And then, some starless night, the cable slips,
Leaving an eddy at the mooring place . . .
Gulls, veer no longer. Sailor, rest your oar.
No tangled wreckage will be washed ashore.**

PERCH BASE OFFICERS



BASE COMMANDER
Jim Denzien
(623) 547-7945
commander@perch-base.org



BASE VICE-COMMANDER
Howard Doyle
(623) 935-3830
vice-commander@perch-base.org



SECRETARY
John Schlag
(623) 872-8224
secretary@perch-base.org



TREASURER
Bob Warner
(623) 825-7042
treasurer@perch-base.org



COMMUNICATIONS OFFICER
Chuck Emmett
(623) 466-9569
communications@perch-base.org



MEMBERSHIP
Rick Simmons
(623) 583-4235
membership@perch-base.org



CHIEF OF THE BOAT
Rich Kunze
(623) 932-3068
cob@perch-base.org



EVENT COORDINATOR
Joe "Wanderer" Varese
(623) 388-6749
events@perch-base.org



CHAPLAIN
Walt Blomgren
(602) 309-4407
chaplain@perch-base.org



STOREKEEPER
De Wayne Lober
(602) 944-4200
storekeeper@perch-base.org



HISTORIAN
Jim Newman
(602) 840-7788
historian@perch-base.org



PAST-COMMANDER
Stan Reinhold
past-commander@perch-base.org

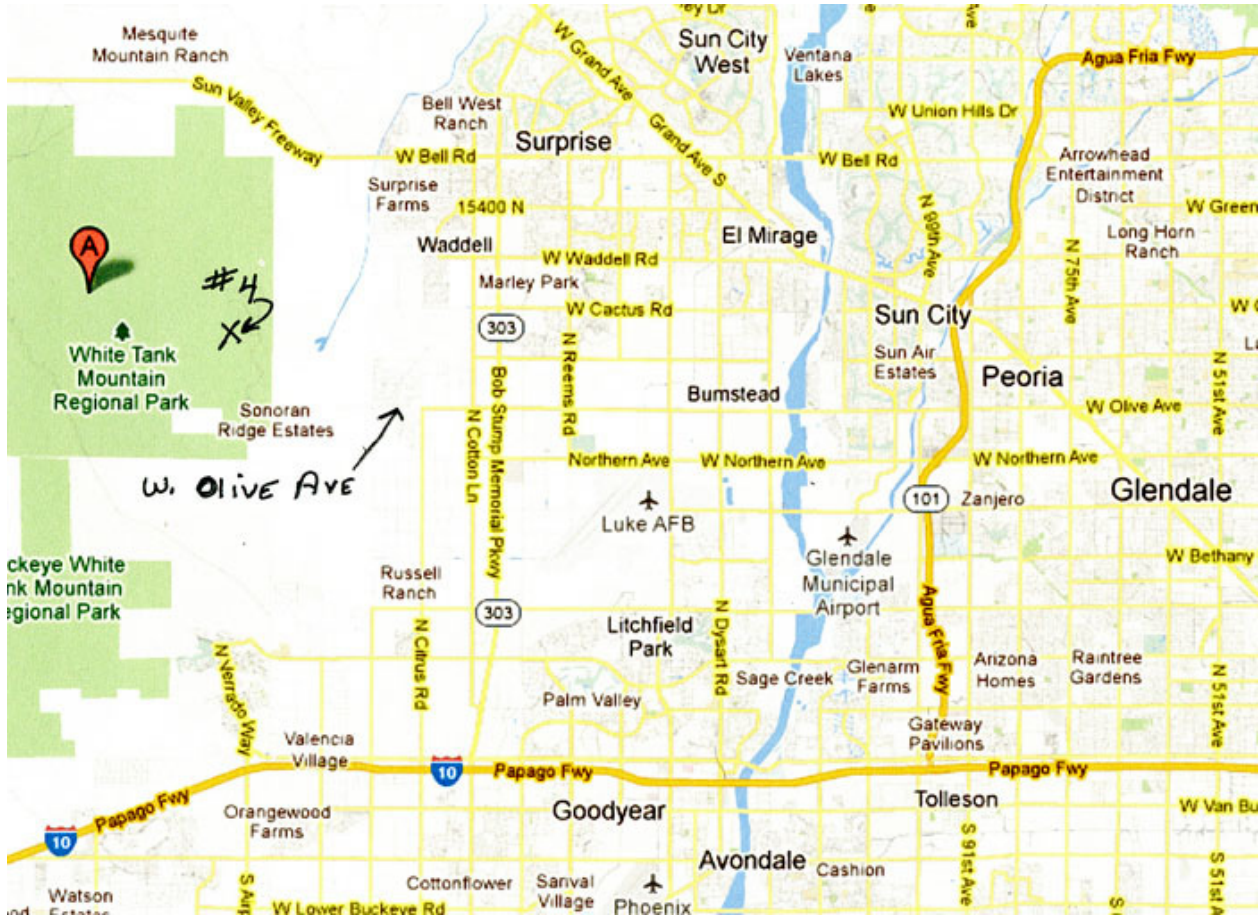
Perch Base Annual Picnic

(and ALL Arizona Subvets Are Invited)

Saturday
April 14

11 a.m. - 3 p.m.

Saturday
April 14



To get to the White Tanks Regional Park, take Olive Avenue as far west as you can from the Loop 101. Our location is Ramada (Site) #4. Just follow the main road within the Park.

IT'S FREE!!
(but we'll take donations!)

You MAY bring your own beer, but no glass containers

- Menu
- Hamburgers
- Hot dogs
- Potato Salad
- Beans
- Fixin's
- Soft Drinks

You MAY bring your own beer, but no glass containers

From the Wardroom Base Commander's Message

Shipmates:

Planning is proceeding for our annual picnic at the White Tank Mountain regional park. We have invited all of the other bases in Arizona to participate with us. In addition, we will be conducting the final Holland Club induction for the year. The date: April 14th; the time 1100-1500. If you haven't already let us know that you are going to attend, please do so now.

All of the State Centennial events have been completed. All of them successful! Hard to believe that Arizona is 100 years old!

Congratulations to Howard Doyle who was reelected as Vice Commander!

See you at the picnic/meeting on the 14th of April.

Fraternally,

Jim Denzien, Base Commander

March 2011 Minutes of the Regular Base Meeting

The regular monthly meeting of the Arizona Submarine Veterans Perch Base was convened at Dillon's Restaurant at Arrowhead, in Glendale, AZ at 12:00 hours, 10 March, 2012. The meeting was called to order by Jim Denzien, Base Commander.

The "Call to Order" was followed by a prayer of invocation by Walt Blomgren, Base Chaplain, the Pledge of Allegiance and the Reciting of our Purpose. The tolling ceremony was conducted for all boats lost in the month of March, a moment of silence was observed for our shipmates on eternal patrol, "Sailor's rest your oars".

Jim started the meeting by introducing new members and the guests present.

- Michael Hinderliter – Has now joined Perch Base
- Joe Errante – He has returned to the fold.
- George Woods – Was a member previously and is reestablishing his membership with Perch Base.

According to the Sailing List there were 31 members and guest present. The complete sailing list included:

Jim Denzien	Howard Doyle	Bob Warner	Chuck Emmett
Walt Blomgren	Richard Kunze	Rick Simmons	DeWayne Lober
John Schlag	Tim Moore	Richard Bernier	Dan Moss
Herb Coulter	Dottie Reed	Dewey Reed	Davy Jones
Robie Robinson	Michael Hinderliter	Milton McNeill	Tim Gregory
Herb Herman	Bill Woolcott	Tom Clonts	Jerry Pittman
Douglas M LaRock	Steven Balthazor	Jim Nelson	Royce Pettit
Joe Errante	Dick Sinclair	George Woods	

The minutes from the February, 2012 regular meeting needed to be approved as published in the "Mid Watch". A motion was made and seconded. The motion was carried by unanimous voice vote.

Bob Warner reported on the base's financial status as of 29 February, 2012. Beginning Balance \$4525.21 with various disbursements gives a balance of \$4154.63. The Base Foundation Balance is \$10,777.72. We plan on adding some of that to different CD's to try to grow our money. A motion was made and seconded to accept the Treasurer's Report as read. The motion carried by unanimous voice vote.

Base Commander's Board of Directors Meeting Report

Jim reported on the Board of Directors meeting held last Wednesday March 7th.

Jim stated that we had deferred the discussion on the Treasurer's Report until today as Bob was unable to attend that Meeting. We talked about some of our upcoming events. The St. Patrick's Day event, Spring Training, Navy Week, Armed Forces Day, Memorial Day and went out as far as July which is the Frontier Days Parade in Prescott.

We will be supporting Bill Woolcott with activities for St. Patrick's Day by providing him with signs and things like that for their activities.

We have scheduled the participation with the Navy Recruiting District at the Peoria Sports Complex on the 27th of March. Jim has been in contact with Commander Alex Ortiz who is the Executive Officer at NRD Phoenix. He indicated to Jim that as soon as the Navy Recruiting District has a releasable schedule for Navy Week activities he would contact Jim and send him a copy of the schedule. Then He would get together with Jim and Howard if he is available, to discuss what Perch Base's participation would be to support the Navy during this week.

We are looking again at doing the Armed Forces Day Parade in Flagstaff. We do not have any specific information at this time. The Parade is followed by a Static Display at the Flagstaff Airport. Joe Varese is in contact to obtain the information.

We have not received information on the Memorial Day Ceremony at the National Cemetery. Generally what we do is provide and make a presentation of a wreath on behalf of Perch Base at this ceremony. We also present a wreath on behalf of our WWII veterans. The date is Monday the 28th of May. The service starts at 8 AM.

We do not have any information on Frontier Days. We have relied on Gudgeon Base to do that for us, because they are the folks that live in the Prescott area. They provide the application for us and we participate in that parade. A lot of us went up last year and actually went to the Rodeo. For those of you that enjoy Rodeo's it is a good Rodeo.

We talked about the upcoming picnic. There is a specific item in Old Business that will cover this.

We have a Base Election; we'll be doing that shortly.

We discussed the issue of the assistance of the women with our group. Due to the issues caused by such things as collecting dues and electing officers within this group. We decided to try a different approach and tentatively we decided to call the group Perch Base Volunteers. It doesn't have to be wives only or women only it could be kids. Jim mentioned that Stan Reinhold's grand kids have helped out at events on an informal basis. Right now we are investigating how we do that. Most of the people that are in that arena are not interested in a highly structured organization. About the only thing we would need from people there would be one or two people as points of contact so that information could be gotten out.

Jim attended last Saturday the United Arizona on Veterans monthly meeting. The biggest thing that came out was a presentation by an Air Force Veteran and a Silver Star recipient. They asked the groups there to participate in another Memorial Day Service. It is going to be the inaugural event to be held at the Surprise Baseball Stadium which is the home of the Rangers and the Royals. It will be on Saturday 26th of May. The discussion and the presentation that was available there at the meeting on Saturday was such that a lot of the events around Memorial Day and Veterans Day have become way to commercialized instead of having people think about and deliberate on why we are having the commemoration. You know we've got clowns and everything else out there instead of think about what we are truly trying to commemorate. We seem to be getting away from what these days are for. The Board decided to participate in this; again it is on Saturday 26th of May. It looks like among other people the Governor will be there. It looks like they have really done their homework. We will be putting out more information on that. The Float will be on display. There will be a breakfast up there.

Tim Moore has made a partial contact with the people at Children's Hospital here in Phoenix and he has passed that information on to Bob Gilmore, who is going to be the Kap(SS)4Kid(SS) Program Coordinator. It looks like we will be putting something together for this summer. We are still in the Flu Season and that is one of the things the people at the hospital are concerned about.

Five members of the base attended the presentation by the Naval Order Group at Macayo's on the subject of "Things that you didn't know about Submarines", the presenter was retired Army and Submariner want-a-be, and he likes the stories and things like that. He did a real good job on the presentation. We kept tong in cheek until he was finished. There were a few things when he first started talking about some of the escapades from the Halibut with the big door on the front. He mentioned that they carried Pegasus Missiles, after the presentation we gently reminded him that they were Regulus Missiles. All in all he did a real good job. As a result we are looking at making another presentation and we are going to make the presentation in front of this Naval Order group in the fall. It will

most probably be on the history of the Submarine as far as the United States Navy is concerned going back to the beginning of US Naval Submarines.

The National Organization has put out calls for all of the National and Regional Elections. Every office in the national hierarchy is up for grabs; National Commander, Sr. Vice, Jr. Vice, Secretary, Treasurer and all of the Regional Directors including our own. Jim Dunn is not going to be running for reelection of Western Region. We have put this out before in a Flash Traffic. Which means that all of the requirements for these offices are out there; what people have to have to do that. If you wanted to nominate someone you would have to do it prior to the 30th of April of this year. Those positions are going to be voted on at the National Convention in Norfolk.

There are also nominations for National Awards and that will also be at the National Convention. Other than the Newsletter nomination is due by the 30th of April. The Newsletter is due by May 15th. We will be putting our Newsletter in for nomination, we think it is outstanding and we think everyone else should recognize that.

Jim asked for questions about anything from the Board of Directors Meeting. Herb asked. How would a person know or who votes on these National offices? Jim replied on the National Officers "Everybody". Herb then asked; how do you know these individuals? Jim replied that they publish bios on line or through the American Submariner Magazine they have done it both ways. Chuck puts them out as a Flash Traffic so that people get it. It's important that you know. Jim then asked if that answered the question.

Herb replied yes, thank you for that. Herb then stated that he did not know the stats on any of these people, so how would he know who to vote for and how do I make my vote meaningful? Jim replied there is one other way that you can get information on some of these people. It takes a little bit of investigating on your own. The National web site is a good place to start.

There was more discussion and Jim stated that for western region director he would vote for Jack Messerschmidt he is going to be on the ballot. Other than that you can see one of us after the meeting.

There was a question of why we started the history of Submarines with the Holland. Because there are some documented records of submarines prior. The answer is that the US Submarine Service came into existence when we bought the first one from Holland, that's where we pound the stake in the ground. By the way the Hunley sank three times and they have three different crews buried in Charleston SC. If you looked at the history of submarines completely you could go back to Alexander the Great. That was a good point.

Jim asked if there were any other questions about elections or any thing else like that.

Howard made a comment that we have a bunch of things coming up here, specifically on the 17th, the 27th and Memorial Day. We are going to have two services on Memorial Day. Howard felt that Memorial Day is the most important event we do in the year followed by Veterans Day in the fall. We would like to see as many members show up with your vest at these events. Howard was out with Chuck and Walt yesterday and only had his hat. A lady came up to them out of the blue and told them "Thank you for your service". That is part of what our creed is carrying on and letting people know we are out there.

Base Officers and Board of Directors Reports

Membership Chairman – Rick Simmons nothing additional to report.

Vice Commander – Howard Doyle stated that he had already had his say.

Secretary – John Schlag had nothing additional to report.

Chaplain – Walt Blomgren had nothing additional to report.

Treasurer – Bob Warner had nothing additional to report.

Communications Officer – Chuck Emmett had nothing additional to report.

Base Storekeeper – DeWayne Lober was not present at today's meeting.

Chief of the Boat – Richard Kunze had nothing additional to report.

Event Coordinator – Joe Varese was not present at today's meeting.

Base Historian – Jim Newman was not present at today's meeting

Past Base Commander – Stan Reinhold was not present at today's meeting.

Save our Sail Co-Chair - Dan Moss stated that we had Approval from NavSea to give us the Sail the Fairwater Planes and the Rudder of the Phoenix. They were in the process of answering the City of Phoenix and putting together a proposal for the people at Indian School Steel Park. Jim then described what has happened thus far in the process.

Most of this is described on page 16 of this months Newsletter. Chuck stated that there will be an ongoing column in the Newsletter with up dated status of the project. If there is nothing new, it will say there is nothing new to report.

Election of vice –Commander

Jim stated that at present we have one nomination for the position of Vice Commander, which is Howard Doyle. Jim asked for additional nominations from the floor. Having none there was a motion to close the nominations and accept Howard Doyle as vice commander by acclamation for the next year. The motion was seconded. The motion was carried by a unanimous voice vote. Jim reminded everyone that there are only two elected officers in this base. That was changed a year or so ago. The Base Commander is a two year tour and the Vice Commander is a one year tour.

Old Business

Base Picnic is the 14th of April at White Tanks Regional Park instead of having the meeting here. We need to find out how many people intend to come. There will be Flash Traffic. We will need some assistance with prep work. Flipping burgers at a beer ballgame previously counts as experience for volunteers. Tau-Taug Base in Case Grande has ten people coming and Gudgeon has some folks planning to bring their RV's and spend the evening. There will be a Holland Club induction for the five people that were unable to attend in January.

New Business

The National Convention will be in Norfolk Virginia. It will be from Sunday the 2nd thru Sunday the 9th of September. Applications are in the American Submariner. Let Jim know if you plan to attend he will not be able to this year and he wants someone to represent Perch Base for him. Howard reminded all that the National Awards are part of the National Convention. So get on the website look at the Awards Manual and check out the categories, anyone can make a nomination. It was in the Flash Traffic sent out on the 5th of March.

Good of the Order

The Binnacle List has no one new. A couple of our members are under the weather. Walt keeps in touch with them.

Ed Hawkins was in the hospital he is now home.

Davy Jones is doing well.

Billy Grieves is doing well he is about back to normal.

Stan Reinhold is doing real well.

Jim added that he will be having surgery on his knee on the 20th of March.

Tim Moore Shared that of the Perch Survivors there are two left both are members of Perch base.

50/50 Drawing

The 50/50 drawing was \$64.00 won by Steve Balthazor.

Adjournment

The benediction was offered by Walt Blomgren.

All outstanding business having been concluded, it was moved and seconded that the meeting be adjourned. The motion carried by unanimous voice vote and the meeting was adjourned at 13:01PM.

John Schlag

Secretary, Perch Base USSVI



JAMES CAMERON ON EARTH'S DEEPEST SPOT: DESOLATE, LUNAR-LIKE

The Mariana Trench's Challenger Deep—the deepest point on Earth—looks as bleak and barren as the moon, according to James Cameron, who successfully returned just hours ago from the first solo dive to the ocean abyss.

At noon, local time Monday (10 p.m. ET Sunday), the National Geographic explorer and filmmaker's "vertical torpedo" sub broke the surface of the western Pacific, some 200 miles (322 kilometers) southwest of Guam. After a descent that took roughly two and a half hours, Cameron spent about three hours conducting the first manned scientific exploration of Challenger Deep.

For his return trip, Cameron experienced a faster-than-expected, roughly 70-minute ascent, which he described as a "heckuva ride." Bobbing in the open ocean, his custom-designed sub, the DEEPSEA CHALLENGER, was spotted by helicopter and plucked from the Pacific by a research ship's crane.

The expedition was designed so that Cameron could spend up to six hours collecting samples and video at the bottom of the trench. But his mission was cut short due in part to a hydraulic fluid leak that coated the window of the sub's "pilot sphere," obscuring his view.

"I lost hydraulics toward the latter part of dive, and I was unable to use the manipulator arm," Cameron said this morning during a post-dive press conference held aboard the Octopus, a yacht owned by Microsoft co-founder Paul Allen, a longtime Cameron friend. (Allen was on the scene for the historic dive and posted live updates of the event on Twitter from aboard his yacht, which provided backup support for the mission.)

Considering the daunting task of sending humans into the deep, such technical glitches are to be expected, Cameron emphasized: "It's a prototype vehicle, so it's gonna take time to iron out the bugs. The important thing is that we have a vehicle that's a robust platform—it gets us there safely, the lights work, the cameras work, and hopefully next time the hydraulics will work."

And although he wasn't able to capture as many samples on this first dive as science teams might have been hoping for, "that just means I gotta go back and get some more," said Cameron, also a National Geographic Society explorer-in-residence.

In fact, he and sub co-designer Ron Allum, managing director of the Australia-based Acheron Project research and design company, already have more dives planned in the coming weeks as part of the DEEPSEA CHALLENGE project, a partnership with the National Geographic Society and Rolex. (The Society owns National Geographic News.)

"I see this as the beginning ... of opening up this frontier to science and really understanding these deep places," Cameron said.

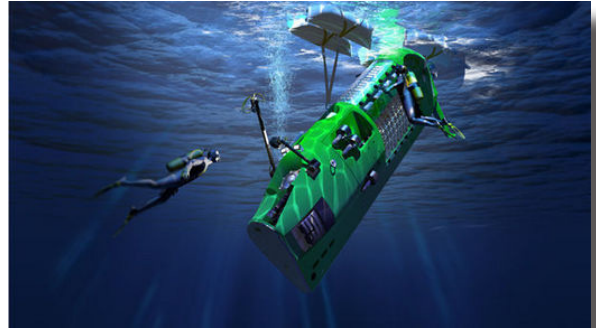
Little Life Found in the Deepest Place on Earth

Aboard the DEEPSEA CHALLENGER, Cameron had a host of tools at his disposal, including a sediment sampler, a robotic claw, and temperature, salinity, and pressure gauges. (See pictures of Cameron's sub.) The sub is also outfitted with multiple 3-D cameras and an 8-foot (2.5-meter) tower of LEDs. But in part due to the hydraulics leak and a host of lost thrusters, Cameron wasn't able to capture any biological samples, and an attempted sediment core sample was only partially retrieved.

"I didn't see big jellyfish and big anemones like I saw [during test dives] at the New Britain Trench," off Papua New Guinea, Cameron said. "At Challenger Deep, I landed on a very soft, almost gelatinous flat plain. Once I got my bearings, I drove across it for quite a distance ... and finally worked my way up the slope."

The whole time, Cameron said, he didn't see any fish, or any living creatures more than an inch (2.5 centimeters) long: "The only free swimmers I saw were small amphipods"—shrimplike bottom-feeders that appear to be common across most marine environments.

"When I was in the New Britain Trench a couple weeks ago, the bottom was covered in the tracks of small animals, which gave it an eggshell appearance," he added. "But when I came to Challenger Deep, the bottom was



completely featureless. I had this idea that life would adapt to the deep ... but I don't think we're seeing that."

Still, the science team is hopeful that the small sample Cameron took of the trench's sediments, along with the sub's constantly whirring cameras, will provide some new insight into the remote underwater realm. The mud, they say, could contain exotic species of microbial life that may not only advance our understanding of the deep ocean but also help in the search for extraterrestrial life.

For instance, scientists think Jupiter's moon Europa could harbor a global ocean beneath its thick shell of ice—an ocean that, like Challenger Deep, would be lightless, near freezing, and home to areas of intense pressure. (See "Could Jupiter Moon Harbor Fish-Size Life?")

Deep Dive was Like a Trip to Another Planet

Until Cameron's dive, the only manned Challenger Deep expedition was a mission that took place in 1960, when retired U.S. Navy Capt. Don Walsh and late Swiss engineer Jacques Piccard descended in the Navy submersible Trieste.



Climbing into the cockpit of DEEPSEA CHALLENGER, Cameron said he was "intimately aware of the design of the vehicle ... and I felt we'd done the engineering right.

"When the hatch closed, I felt the vehicle around me was able to withstand the pressure. There may be butterflies in your stomach beforehand, but once you're inside the sub, the excitement of going someplace [few have] been before takes over ... the adrenaline takes over, and the fear really goes away."

Cameron also had to overcome the sheer physical experience of the dive—the 57-year-old explorer was

crammed into the sub's 43-inch-wide (109-centimeter-wide) pilot sphere, which itself was loaded up with navigation controls, cameras, and other electronics.

"I wind up packed in like a Mercury astronaut, if you will," Cameron said. "When you first close the hatch, all these electronics are dumping heat into the sphere." Since the Mariana Trench lies near the Equator, surface temperatures are high, and the inside of the sub's cockpit "gets very hot right away—it's like a sauna inside.

"But as you start descending, the sub goes very fast. I'm screaming down, and in just a few minutes I'm in water that's 36 degrees Fahrenheit [2.2 degrees Celsius]. All of sudden my feet are freezing, the back of my head is freezing, but the middle part of my body is still warm," he said.

Then, "literally within a minute or two I'm out of sunlight, and you're in total darkness for most of this dive, so the sub gets very cold, and you have to put on warm clothing. The walls have condensation all over them and I'm constantly getting dripped on by cold water."

Despite the physical challenges, Cameron seemed in awe of what he'd experienced in the remote ocean depths.

"This is a vast frontier down there that's going to take us a while to understand," he said. "The impression to me was it's very lunar, very isolated. I felt as if, in the space of one day, I'd gone to another planet and come back."

Hoping for Gifts From the Ocean

According to biological oceanographer Lisa Levin, of the Scripps Institution of Oceanography in San Diego, California, the DEEPSEA CHALLENGE program's potential for generating public interest in deep-ocean science is just as important as anything Cameron might have discovered.

"I consider Cameron to be doing for the trenches what Jacques Cousteau did for the ocean many decades ago," Levin, who's part of the team but didn't participate in the seagoing expedition, said in a previous interview with National Geographic News.

"At a time of fast-shrinking funds for undersea research," Levin said, "what scientists need is the public support to be able to continue exploration and research of the deep ocean."

Perhaps referring to his friend's most recent movie, expedition physician Joe MacInnis called Cameron a real-world "avatar."

Cameron was "down there on behalf of everybody else on this planet," MacInnis said. "There are seven billion

people who can't go, and he can. And he's aware of that.”

Camron added, “Every time you dive, you hope you'll see something new—some new species. Sometimes the ocean gives you a gift, sometimes it doesn't.

“But I call this dive just the first phase. We prove that the vehicle works, and hopefully bring some real science back.”



**SHIPMATE TO SHIPMATE
STORIES THAT ARE
“ABSOLUTLY, POSITIVELY, THE TRUTH!”**

In June 1976, I was the Weapons Officer (as a LT), on the USS WAHOO (SS-565) returning from a deployment to WESTPAC. This my first non-SSBN boat in almost 16 years in the Navy and it felt good. Eleven deterrent patrols were enough and the Wahoo was a great change. In my unbridled joy, I had let my wardroom mates know, in no uncertain terms, that I NEVER wanted to go back to a boomer.

One day, on the transit home to San Diego, the XO called me to his stateroom and handed me a message that had just come in on the broadcast. It was from the Chief of Naval Personnel with a set of orders for ME.

I was being ordered to the SSBN Navigators course at the Guided Missiles School in Dam Neck VA as soon as we hit Diego! Worse still, it was for further transfer as Navigator to the USS ULYSSES S. GRANT (SSBN-631.)

I couldn't believe it. I checked all the accounting data, the school dates, etc. and all of the information looked legit. I would have kicked my dog if I had had one. The crew avoided me and the wardroom couldn't talk to me!

Just when I was beginning to think the Army Infantry and Destroyer-duty both looked great, the XO gave in and told me the truth: I had been so loud-mouthed about never returning to an SSBN, that ALL the members of the Wardroom — CO included — had conspired in an elaborate hoax and practical joke. The orders were fake! The gods of smoke boats and fast attacks had smiled on me after all but my mouth wasn't quite as loose after that.

- Submitted by Jim Denzien

NATIONAL USSVI NEWS

National USSVI news is routed to members by **FleasA Traffic** messages. The allows information to be shared almost immediately to ensure it's timely.





A Message from the Membership Chairman



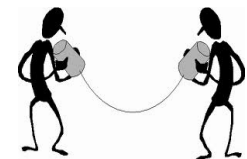
During this past month 3 new shipmates have joined our ranks.

- Michael C. Hinderliter is a new member to USSVI and Perch Base who qualified on the USS Tecumseh (SSBN- 628) in 1996.
- George C. Woods is a life member of USSVI and a former member of Perch Base who is returning to Perch after being a member at large. George qualified on the USS George Washington (SSBN-598) in 1968.
- Richard A. Sincler is a winter visitor who is a member of the Polaris Base in Rapid City, SD. Richard qualified on the USS Baya (AGSS-318) in 1952.

As our weather here in Arizona starts getting warmer the thoughts of our members who are winter visitors turn to heading back home for the summer. It is very important that they remember to change their address in the USSVI database to reflect their location. They can do this themselves by logging into the USSVI database at ussvi.org and updating their profile. It is also important to remember that even if you enter a timeframe for your addresses the database is NOT automatically updated to reflect the changes. An incorrect address results in your copy of the "American Submariner" and other correspondence not reaching you.



COMMUNICATIONS OFFICER'S REPORT





“SAVE-OUR-SAIL” UPDATE ON PERCH BASE’S EFFORT TO MAKE THE USS PHOENIX (SS-702) SAIL AND RUDDER A CITY MONUMENT

In November 2011, Perch Base received approval from NAVSEA for the acquisition of the Phoenix sail, fairwater planes and rudder. The boat is currently scheduled for deconstruction in the Fall of 2014 with the parts being available in 2015. Pending approval by the city, the sail will become a permanent display at Steele Indian School Park.

SOS UPDATE

On Wednesday, March 28, 2012, a meeting was held with the Mayor’s Veteran’s Affairs representative to discuss the Memo of Understanding (MOU) between the City of Phoenix and SOS/Perch Base. This document once approved by both parties will be the basis for locating the USS Phoenix sail/rudder in Steele Indian School Park. Currently, there are 12 Los Angeles Class submarines in Bremerton shipyard scheduled to be “deconstructed” before the Phoenix has its turn. Present plans call for deconstruction of the Phoenix in the Fall of 2014 with the sail/rudder becoming available in 2015. Additionally, there are five aircraft carriers in Bremerton which need to be deconstructed. Deconstruction of USS Phoenix could be advanced/delayed depending upon the needs of the service and workload of the Bremerton shipyard.

**Questions on Save-Our-Sail or to find out
how you can help, contact one of our
Project Co-Managers by clicking on their
name:**

**Dan Moss
Layne Moss**

Submarine Recycling Program

Before SRP can begin, the ship or submarine must have her nuclear fuel removed. Defueling usually coincides with decommissioning. Prior to that event, the vessel is referred to as “USS Name,” but afterward the “USS” is dropped and it is referred to as “ex-Name.” Defueling of submarines is carried out at five ship repair facilities on the West Coast, and the hulls are then towed to PSNS. Reusable equipment is removed at the same time as the fuel.

Spent nuclear fuel is shipped by rail to the Naval Reactor Facility in the Idaho National Laboratory (INL), located 42 miles (67 km) northwest of Idaho Falls, Idaho, where it is stored.

At PSNS the SRP proper begins. A submarine is cut into three or four pieces: the aft section, the reactor compartment, the missile compartment if one exists, and the forward section. Missile compartments are dismantled according to the provisions of the Strategic Arms Reductions Treaty. Reactor compartments are sealed at both ends and shipped by barge and multiple-wheel high-capacity trailers to the Department of Energy’s Hanford Nuclear Reservation in Washington state, where they are currently in open dry storage and slated to be eventually buried. The burial trenches have been evaluated to be secure for at least 600 years before the first pinhole penetration of some lead containment areas of the reactor compartment packages occurs, and several thousand years before leakage becomes possible.

Until 1991, the forward and aft sections of the submarines were rejoined and placed in floating storage. Various proposals for disposal of those hulls were considered, including sinking them at sea, but none were economically practical. All required removal of the numerous polychlorinated biphenyl products (PCBs) on board, which are considered hazardous materials by the Environmental Protection Agency and United States Coast Guard. Since then, and to help reduce costs, the remaining submarine sections are recycled, returning reusable materials to production. In the process of submarine recycling, all hazardous and toxic wastes are identified and removed, reusable equipment is removed and put into inventory. Scrap metals and all other materials are sold to private companies or reused. The overall process is not profitable, but does provide some cost relief. Disposal of submarines by the SRP costs the US\$25-50 million per submarine.

Shipmates, for Your “Out of This World” Support at Base Functions, We Salute You

This a a list of our latest Base events and the shipmates who participated. Thank you, shipmates. We need your support.



Peoria “Navy Week” Celebration Peoria Sports Complex March 27

TIM MOORE
DON DEMARTE
RICK SIMMONS
DEWAYNE LOBER
RICHARD KUNZE
JOE VARESE
STEVEN STANGER
LAYNE MOSS
DAN MOSS

Akimel Al-a Middle School 19th Annual Patriotic Festival Phoenix, AZ March 30

DOUG LAROCK
JIM DENZIEN
RICK SIMMONS
RICHARD KUNZE
DEWAYNE LOBER



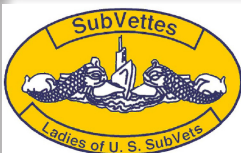
Holland Club

No special activities were conducted by the Perch Base Holland Club. Members continue to support the Base in the regular activities.



Need a Ride to a Base Meeting or Other Function?

Contact Base vice-Commander, [Howard Doyle \(602\) 228-2445](tel:6022282445) or any other Base Officer. All officers are listed near the front of every copy of the MidWatch.



THE WOMEN OF PERCH BASE

At their October 2009 meeting, Perch Base SubVettes voted to disband. Low Participation and finances made this a logical action. Since then, interested and sponsored women have been incorporated in Perch Base as Associate Members with all rights therein where they are vigorous participants. Activities of Base ladies is, therefor, activities of the Base. Other former SubVettes are part of the Perch Base Volunteer Auxiliary.



CHAPLAIN'S COLUMN



IMPORTANT

Shipmates, you should ensure that your next of kin is aware of the information in the box, right.

In the case of my death, please immediately notify the U.S. Submarine Veterans Inc., (USSVI) at 877-542-3483 or 360-337-2978 and give the person on duty the information regarding my death, funeral, and burial arrangements, plus who they can contact for follow-up and support.

Please ask them to contact my local chapter's Base Commander with this information as well (they can look it up in their membership records).

This information can alternatively be E-Mailed to the National Office at office@ussvi.org.



SHIPMATES RUNNING ON LESS THAN A FULL BATTERY CHARGE

The chaplain is pleased to report that there have been no members departing on eternal patrol nor do we have anyone on the binnacle list for the past month.

April Base Birthdays



Jerome F. Becker	April 2
Robert "Dick" Caraker	April 3
Ernie Plantz	April 3
Barry Bowers	April 5
Jim Thomson	April 7
George L. Crider	April 12
James L. Wall	April 13
Richard H "Rick" Simmons	April 14
Richard Kunze	April 16
James N. Edwards	April 16
David Carpenter	April 20
Tim Moore	April 22
Adrian M. Stuke	April 30
Davy Jones	April 30

Eternal Patrol

April 10, 1963


Editors Note: Less we forget, each month, one boat on eternal patrol will be highlighted in this newsletter. Sailors, rest your oars.

The Final Patrol

Lord, this departed shipmate with dolphins on his chest
Is part of an outfit known as the best.
Make him welcome and take him by the hand.
You'll find without a doubt he was the best in all the land.
So, heavenly Father add his name to the roll
Of our departed shipmates still on patrol
Let them know that we who survive
Will always keep their memories alive.



USS Thresher (SSN-593) **March 20, 1943** **129 men lost**



Class and type: Thresher-class submarine
Displacement: 3,540 tons light, 3,770 tons sub
Length: 279'; **Beam:** 32'; **Draft:** 26'
Propulsion: 1 Westinghouse S5W PWR,
Westinghouse Geared Turbines 15,000 shp (11 MW)
Speed: 20+ kts
Complement: 16 officers, 96 men
Armament: 4 × 21" torpedo tubes amidships

This account is from Wikipedia, the free encyclopedia, and some of the material is disputed by other accounts.

The second USS Thresher (SSN-593) was the lead ship of her class of nuclear-powered attack submarines in the United States Navy. Her loss at sea during deep-diving tests in 1963 is often considered a watershed event in the implementation of the rigorous submarine safety program SUBSAFE.

The contract to build Thresher was awarded to Portsmouth Naval Shipyard on 15 January 1958, and her keel was laid on 28 May 1958. She was launched on 9 July 1960, was sponsored by Mrs. Frederick B. Warder (wife of the famous Pacific War skipper), and was commissioned on 3 August 1961, Commander Dean L. Axene commanding.

Thresher conducted lengthy sea trials in the western Atlantic and Caribbean Sea areas in 1961–1962. These tests provided a thorough evaluation of her many new and complex technological features and weapons. She took part in Nuclear Submarine Exercise (NUSUBEX) 3–61 off the northeastern coast of the United States from 18–24 September 1961.

On 18 October 1961, Thresher headed south along the East Coast. While in port at San Juan, Puerto Rico on 2 November 1961, her reactor was shut down and the diesel generator was used to carry the "hotel" electrical loads. Several hours later the generator broke down, and the electrical load was then carried by the battery. The generator could not be quickly repaired, so the captain ordered the reactor restarted. However, the battery charge was depleted before the reactor went critical. With no electrical power for ventilation, temperatures in the machinery spaces reached 140°F, and the boat was partially evacuated. Cavalla arrived the next morning and provided power from her diesels, enabling Thresher to restart her reactor.

Thresher conducted further trials and fired test torpedoes before returning to Portsmouth on 29 November 1961. The boat remained in port through the end of the year, and spent the first two months of 1962 evaluating her sonar and Submarine Rocket (SUBROC) systems. In March, the submarine participated in NUSUBEX 2–62 (an exercise designed to improve the tactical capabilities of nuclear submarines) and in antisubmarine warfare training with Task Group ALPHA.

Off Charleston, SC, Thresher undertook operations observed by the Naval Antisubmarine Warfare Council before

she returned briefly to New England waters, after which she proceeded to Florida for more SUBROC tests. However, while moored at Port Canaveral, Florida, 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, Thresher went south for more tests and trials off Key West, Florida, then returned northward and remained in dockyard for refurbishment through the early spring of 1963.

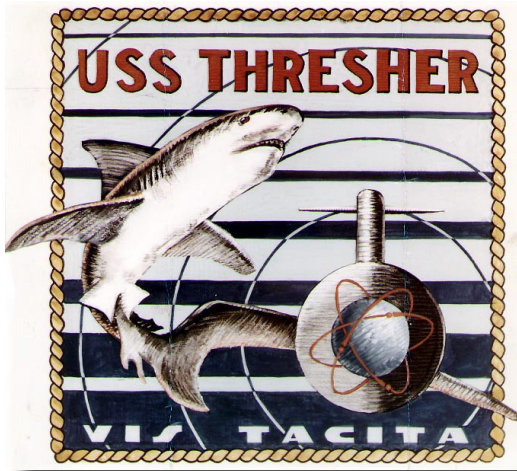
The Loss

On 9 April 1963, after the completion of this work, Thresher, now commanded by Lieutenant Commander John Wesley Harvey, began post-overhaul trials. Accompanied by the submarine rescue ship Skylark, she sailed to an area some 190 nmi; 350 km) east of Cape Cod, Massachusetts, and on the morning of 10 April started deep-diving tests. As Thresher neared her test depth, Skylark received garbled communications over underwater telephone indicating "... minor difficulties, have positive up-angle, attempting to blow."

When Skylark received no further communication, surface observers gradually realized Thresher had sunk. Publicly it took some days to announce that all 129 officers, crewmen, and military and civilian technicians aboard were presumed dead.

After an extensive underwater search using the bathyscaphe Trieste, oceanographic ship Mizar and other ships, Thresher's remains were located on the sea floor, some 8,400 ft below the surface, in six major sections. The majority of the debris had spread over an area of about 134,000 m² (160,000 sq yd). The major sections were the sail, sonar dome, bow section, engineering spaces section, operations spaces section, and the stern planes.

Deep sea photography, recovered artifacts, and an evaluation of her design and operational history permitted a Court of Inquiry to conclude Thresher had probably suffered the failure of a joint in a salt water piping system, which relied heavily on silver brazing instead of welding; earlier tests using ultrasound equipment found potential problems with about 14% of the tested brazed joints, most of which were determined not to pose a risk significant enough to require a repair. High-pressure water spraying from a broken pipe joint may have shorted out one of the many electrical panels, which in turn caused a shutdown ("scram") of the reactor, with a subsequent loss of propulsion. The inability to blow the ballast tanks was later attributed to excessive moisture in the ship's high-pressure air flasks, which froze and plugged the flasks' flowpaths while passing through the valves. This was later simulated in dock-side tests on Thresher's sister ship, Tinosa. During a test to simulate blowing ballast at or near test depth, ice formed on strainers installed in valves; the flow of air lasted only a few seconds. Air driers were later retrofitted to the high pressure air compressors, beginning with Tinosa, to permit the emergency blow system to operate properly.



Unlike diesel submarines, nuclear submarines rely on speed and deck angle rather than immediately blowing ballast to surface; they are "driven" at an angle towards the surface. Ballast tanks were almost never blown at depth, and to do so could cause the ship to rocket to the surface out of control. Normal procedure was to drive the ship to periscope depth, raise the periscope to verify the area was clear, then blow the tanks and surface the ship.

At the time, reactor-plant operating procedures precluded a rapid reactor restart following a scram, or even the ability to use steam remaining in the secondary system to "drive" the ship to the surface. After a scram, standard procedure was to isolate the main-steam system, cutting off the flow of steam to the turbines providing propulsion and electricity. This was done to prevent an over-rapid cool-down of the reactor. Thresher's Reactor Control Officer, Lieutenant Raymond McCoolle, was not at his station in the maneuvering room, or indeed

on the ship, during the fatal dive. McCoolle was at home caring for his wife who had been injured in a household accident—he had been all but ordered ashore by a sympathetic Commander Harvey.

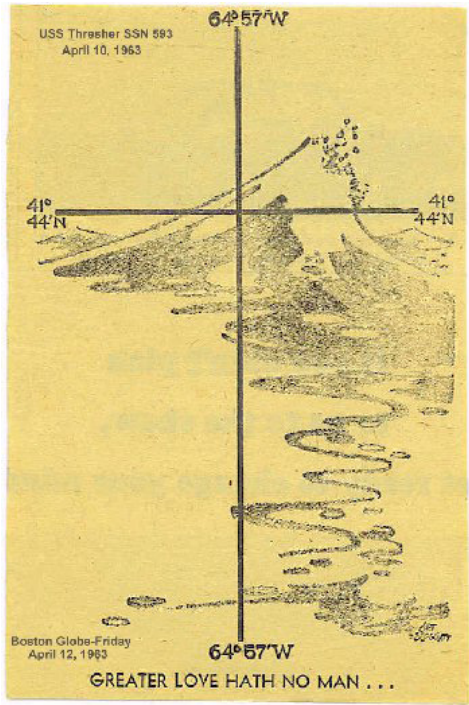
McCoolle's trainee, Jim Henry, fresh from nuclear power school, probably followed standard operating procedures and gave the order to isolate the steam system after the scram, even though Thresher was at or slightly below her maximum depth and was taking on water. Once closed, the large steam system isolation valves could not be reopened quickly. Reflecting on the situation in later life, McCoolle was sure he would have delayed shutting the valves, thus allowing the ship to "answer bells" and drive herself to the surface, despite the flooding in the engineering spaces. Admiral Rickover later changed the procedure, allowing steam to be withdrawn from the secondary system in limited quantities for several minutes following a scram.

In a dockside simulation of flooding in the engine room, held before Thresher sailed, it took the watch in charge 20 minutes to isolate a simulated leak in the auxiliary seawater system. At test depth, taking on water, and with the reactor shut down, Thresher would not have had 20 minutes to recover. Even after isolating a short-circuit in the reactor controls it would have taken nearly 10 minutes to restart the plant.

Thresher likely imploded at a depth of 1,300–2,000 ft.

The Navy has periodically monitored the environmental conditions of the site since the sinking and has reported the results in an annual public report on environmental monitoring for U.S. Naval nuclear-powered ships. These reports

provide specifics on the environmental sampling of sediment, water, and marine life which were taken to ascertain whether Thresher's nuclear reactor has had a significant effect on the deep ocean environment. The reports also explain the methodology for conducting deep sea monitoring from both surface vessels and submersibles. The monitoring data confirms that there has been no significant effect on the environment. Nuclear fuel in the submarine remains intact.



According to newly declassified information, the Navy sent Commander (Dr.) Robert Ballard, the oceanographer credited with locating the wreck of RMS Titanic, on a secret mission to map and collect visual data on both Thresher and Scorpion wrecks. The Navy used Ballard's search for Titanic as a screen to hide the mission. Ballard approached the Navy in 1982 for funding to find Titanic with his new deep-diving robot submersible. The Navy saw the opportunity and granted him the money on the condition he first inspect the two submarine wrecks. Ballard's robotic survey discovered that Thresher had sunk so deep it imploded, turning into thousands of pieces. The only recoverable piece was a foot of marled pipe. His 1985 search for Scorpion, which was thought to be a victim of a Soviet attack, revealed such a large debris field that it looked "as though it had been put through a shredding machine." Once the two wrecks had been visited, and the radioactive threat from both was established as small, Ballard was able to search for Titanic. Due to dwindling funds, he had just 12 days to do so, but he used the same debris-field search techniques he had used for the two subs, which worked, and Titanic was found.

U.S. submarine classes are generally known by the hull number of the lead ship of the class—for instance, Los Angeles-class boats are called "688s" because the hull number of USS Los Angeles was SSN-688. The Thresher-class boats should thus be called "593s", but since Thresher's sinking they have been referred to as "594s" (Permit class.)

On 11 April, at a news conference at 10:30, the Navy officially declared the USS Thresher as lost.

Below is a Detailed Timeline of the Thresher's Loss

<u>Time</u>	<u>Event</u>
07:47	Thresher begins its descent to the test depth of 1,000 ft (300 m).
07:52	Thresher levels off at 400 ft (120 m), contacts the surface, and the crew inspects the ship for leaks. None are found.
08:09	Commander Harvey reports reaching half the test depth.
08:25	Thresher reaches 1,000 ft (300 m).
09:02	Thresher is cruising at just a few knots (subs normally moved slowly and cautiously at great depths, lest a sudden jam of the diving planes send the ship below test depth in a matter of seconds.) The boat is descending in slow circles, and announces to Skylark she is turning to "Corpen [course] 090." At this point, transmission quality from Thresher begins to noticeably degrade, possibly as a result of thermoclines.

09:09 It is believed a brazed pipe-joint ruptures in the engine room. The crew would have attempted to stop the leak; at the same time, the engine room would be filling with a cloud of mist. Under the circumstances, Commander Harvey's likely decision would have been to order full speed, full rise on the fairwater planes, and blowing main ballast in order to surface. The pressurized air rapidly expanding in the pipes cools down, condensing moisture and depositing it on strainers installed in the system to protect the moving parts of the valves; in only a few seconds the moisture freezes, clogging the strainers and blocking the air flow, halting the effort to blow ballast. Water leaking from the broken pipe most likely causes short circuits leading to an automatic shutdown of the ship's reactor, causing a loss of propulsion. The logical action at this point would have been for Harvey to order propulsion shifted to a battery-powered backup system. As soon as the flooding was contained, the engine room crew would have begun to restart the reactor, an operation that would be expected to take at least 7 minutes.

09:12 Skylark pages Thresher on the underwater telephone: "Gertrude check, K [over]." With no immediate response (although Skylark is still unaware of the conditions aboard Thresher), the signal "K" is repeated twice.

09:13 Harvey reports status via underwater telephone. The transmission is garbled, though some words are recognizable: "[We are] experiencing minor difficulty, have positive up-angle, attempting to blow." The submarine, growing heavier from water flooding the engine room, continues its descent, probably tail-first. Another attempt to empty the ballast tanks is performed, again failing due to the formation of ice. Officers on Skylark could hear the hiss of compressed air over the loudspeaker at this point.

09:14 Skylark acknowledges with a brisk, "Roger, out," awaiting further updates from the SSN. A follow-up message, "No contacts in area," is sent to reassure Thresher she can surface quickly, without fear of collision, if required.

09:15 Skylark queries Thresher about her intentions: "My course 270 degrees. Interrogative range and bearing from you." There is no response, and Skylark's captain, Lieutenant Commander Hecker, sends his own gertrude message to the submarine, "Are you in control?"

09:16 Skylark picks up a garbled transmission from Thresher, transcribed in the ship's log as "900 N." [The meaning of this message is unclear, and was not discussed at the enquiry; it may have indicated the submarine's depth and course, or it may have referred to a Navy "event number" (1000 indicating loss of submarine), with the "N" signifying a negative response to the query from Skylark, "Are you in control?"]

09:17 A second transmission is received, with the partially recognizable phrase "exceeding test depth...." The leak from the broken pipe grows with increased pressure.

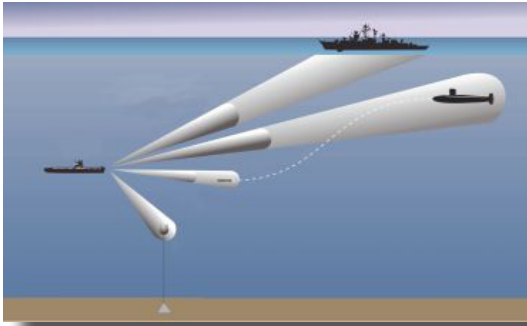
09:20 Skylark continues to page Thresher, repeatedly calling for a radio check, a smoke bomb, or some other indication of the boat's condition.

11:04 Skylark attempts to transmit a message to COMSUBLANT (Commander, Submarines, Atlantic Fleet): "Unable to communicate with Thresher since 0917R. Have been calling by UQC voice and CW, QHB, CW every minute. Explosive signals every 10 minutes with no success. Last transmission received was garbled. Indicated Thresher was approaching test depth.... Conducting expanding search." Radio problems meant that COMSUBLANT did not receive and respond to this message until 12:45. Hecker initiated "Event SUBMISS [loss of a submarine]" procedures at 11:21, and continued to repeatedly hail Thresher until after 17:00.



SOND NAVIGATION AND RANGING

EDITOR: *Even if this was your rating, I'll bet there is something in here that you didn't know.*



General

Sonar (originally an acronym for SOund NAavigation ANd RAnging) is a technique that uses sound propagation (usually underwater, as in submarine navigation) to navigate, communicate with or detect objects on or under the surface of the water, such as other vessels. Two types of technology share the name "sonar": passive sonar is essentially listening for the sound made by vessels; active sonar is emitting pulses of sounds and listening for echoes. Sonar may be used as a means of acoustic location and of measurement of the echo characteristics of "targets" in the water. The term sonar is also used for the equipment used to generate and receive the sound.

The acoustic frequencies used in sonar systems vary from very low (infrasonic) to extremely high (ultrasonic). The study of underwater sound is known as underwater acoustics or hydro acoustics.

History

The use of sound to 'echo locate' underwater in the same way as bats use sound for aerial navigation seems to have been prompted by the Titanic disaster of 1912. The world's first patent for an underwater echo ranging device was filed at the British Patent Office by English meteorologist Lewis Richardson a month after the sinking of the Titanic, and a German physicist Alexander Behm obtained a patent for an echo sounder in 1913.

The Canadian engineer Reginald Fessenden, while working for the Submarine Signal Company in Boston, built an experimental system beginning in 1912, a system later tested in Boston Harbor, and finally in 1914 from the U.S. Revenue (now Coast Guard) Cutter Miami on the Grand Banks off Newfoundland Canada. In that test, Fessenden demonstrated depth sounding, underwater communications (Morse Code) and echo ranging (detecting an iceberg at two miles (3 km) range). The so-called Fessenden oscillator, was unable to determine the bearing of the berg due to the 3 metre wavelength and the small dimension of the transducer's radiating face (less than 1 metre in diameter). The ten Montreal-built British H class submarines launched in 1915 were equipped with a Fessenden oscillator.

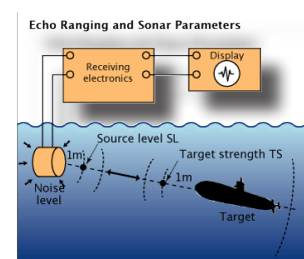
During World War I the need to detect submarines prompted more research into the use of sound. The British made early use of underwater hydrophones, while a French physicist, Paul Langevin, worked on the development of active sound devices for detecting submarines in 1915 using quartz.

ASDIC

In mid-1917, work for the Anti-Submarine Division of the British Naval Staff, was undertaken in utmost secrecy, and used quartz piezoelectric crystals to produce the world's first practical underwater active sound detection apparatus. To maintain secrecy no mention of sound experimentation or quartz was made - the word used to describe the early work ('supersonics') was changed to 'ASD'ics, and the quartz material to 'ASD'ivite: hence the British acronym ASDIC. In 1939, in response to a question from the Oxford English Dictionary, the Admiralty made up the story that it stood for 'Allied Submarine Detection Investigation Committee', and this is still widely believed, though no committee bearing this name has been found in the Admiralty archives.

By the outbreak of World War II, the Royal Navy had five sets for different surface ship classes, and others for submarines, incorporated into a complete anti-submarine attack system. The effectiveness of early ASDIC was hamstrung by the use of the depth charge as an anti-submarine weapon. This required an attacking vessel to pass over a submerged contact before dropping charges over the stern, resulting in a loss of ASDIC contact in the moments leading up to attack. The hunter was effectively firing blind, during which time a submarine commander could take evasive action. This situation was remedied by using several ships cooperating and by the adoption of "ahead throwing weapons", such as Hedgehog and later Squid, which projected warheads at a target ahead of the attacker and thus still in ASDIC contact. Developments during the war resulted in British ASDIC sets which used several different shapes of beam, continuously covering blind spots. Later, acoustic torpedoes were used.

At the start of World War II, British ASDIC technology was transferred for free to the United States. Research on ASDIC and underwater sound was expanded in the UK and in the US.. This work formed the basis for post war



developments related to countering the nuclear submarine. Work on sonar had also been carried out in the Axis countries, notably in Germany, which included countermeasures. At the end of World War II this German work was assimilated by Britain and the US. Sonars have continued to be developed by many countries, including Russia, for both military and civil uses. In recent years the major military development has been the increasing interest in low frequency active systems.

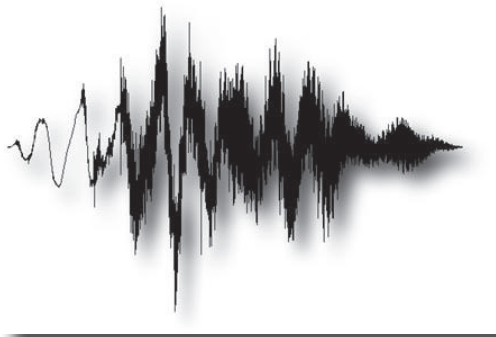
SONAR

During the 1930s American engineers developed their own underwater sound detection technology and important discoveries were made, such as thermoclines, that would help future development. After technical information was exchanged between the two countries during the Second World War, Americans began to use the term SONAR for their systems, coined as the equivalent of RADAR.

Performance factors

The detection, classification and localization performance of a sonar depends on the environment and the receiving equipment, as well as the transmitting equipment in an active sonar or the target radiated noise in a passive sonar.

Sonar operation is affected by variations in sound speed, particularly in the vertical plane. Sound travels more slowly in fresh water than in sea water, though the difference is small. The speed is determined by the water's bulk modulus and mass density.



Ocean temperature varies with depth, but at between 30 and 100 meters there is often a marked change, called the thermocline, dividing the warmer surface water from the cold, still waters that make up the rest of the ocean. This can frustrate sonar, because a sound originating on one side of the thermocline tends to be bent, or refracted, through the thermocline. The thermocline may be present in shallower coastal waters. However, wave action will often mix the water column and eliminate the thermocline. Water pressure also affects sound propagation: higher pressure increases the sound speed, which causes the sound waves to refract away from the area of higher sound speed.

Sound propagation is affected by absorption in the water itself as well as at the surface and bottom. This absorption depends upon frequency, with several different mechanisms in sea water. Long-range sonar uses

low frequencies to minimize absorption effects.

The sea contains many sources of noise that interfere with the desired target echo or signature. The main noise sources are waves and shipping. The motion of the receiver through the water can also cause speed-dependent low frequency noise.

Scattering

When active sonar is used, scattering occurs from small objects in the sea as well as from the bottom and surface. This can be a major source of interference. This acoustic scattering is analogous to the scattering of the light from a car's headlights in fog: a high-intensity pencil beam will penetrate the fog to some extent, but broader-beam headlights emit much light in unwanted directions, much of which is scattered back to the observer, overwhelming that reflected from the target ("white-out"). For analogous reasons active sonar needs to transmit in a narrow beam to minimize scattering.

Target characteristics

The sound reflection characteristics of the target of an active sonar, such as a submarine, are known as its target strength. A complication is that echoes are also obtained from other objects in the sea such as whales, wakes, schools of fish and rocks.

Passive sonar detects the target's radiated noise characteristics. The radiated spectrum comprises a continuous spectrum of noise with peaks at certain frequencies which can be used for classification.

Countermeasures

Active (powered) countermeasures may be launched by a submarine under attack to raise the noise level, provide a large false target, and obscure the signature of the submarine itself.

Passive (i.e., non-powered) countermeasures include mounting noise-generating devices on isolating devices and

sound-absorbent coatings on the hulls of submarines, for example anechoic tiles.

Active sonar

Active sonar uses a sound transmitter and a receiver. Active sonar creates a pulse of sound, often called a “ping”, and then listens for reflections (echo) of the pulse. This pulse of sound is generally created electronically using a sonar projector consisting of a signal generator, power amplifier and electro-acoustic transducer/array.

To measure the distance to an object, the time from transmission of a pulse to reception is measured and converted into a range by knowing the speed of sound. To measure the bearing, several hydrophones are used, and the set measures the relative arrival time to each, or with an array of hydrophones, by measuring the relative amplitude in beams formed through a process called beam forming

Particularly when single frequency transmissions are used, the Doppler effect can be used to measure the radial speed of a target. The difference in frequency between the transmitted and received signal is measured and converted into a velocity. Since Doppler shifts can be introduced by either receiver or target motion, allowance has to be made for the radial speed of the searching platform.

When active sonar is used to measure the distance from the transducer to the bottom, it is known as echo sounding. Similar methods may be used looking upward for wave measurement.

In combat situations, an active pulse can be detected by an opponent and will reveal a submarine’s position.

Passive sonar

Passive sonar listens without transmitting. It is often employed in military settings, although it is also used in science applications, e.g., detecting fish for presence/absence studies in various aquatic environments - see also passive acoustics and passive radar. In the very broadest usage, this term can encompass virtually any analytical technique involving remotely generated sound, though it is usually restricted to techniques applied in an aquatic environment.

Passive sonar has a wide variety of techniques for identifying the source of a detected sound. For example, U.S. vessels usually operate 60 Hz alternating current power systems. If transformers or generators are mounted without proper vibration insulation from the hull or become flooded, the 60 Hz sound from the windings can be emitted from the submarine or ship. This can help to identify its nationality, as most European submarines have 50 Hz power systems. Intermittent sound sources (such as a wrench being dropped) may also be detectable to passive sonar. Until fairly recently, an experienced trained operator identified signals, but now computers may do this.

Passive sonar systems may have large sonic databases, but the sonar operator usually finally classifies the signals manually. A computer system frequently uses these databases to identify classes of ships, actions (i.e. the speed of a ship, or the type of weapon released), and even particular ships. Publications for classification of sounds are provided by and continually updated by the US Office of Naval Intelligence.

Noise limitations

Passive sonar on vehicles is usually severely limited because of noise generated by the vehicle. For this reason, many submarines operate nuclear reactors that can be cooled without pumps, using silent convection, or fuel cells or batteries, which can also run silently. Vehicles’ propellers are also designed and precisely machined to emit minimal noise. High-speed propellers often create tiny bubbles in the water, and this cavitation has a distinct sound.

The sonar hydrophones may be towed behind the ship or submarine in order to reduce the effect of noise generated by the watercraft itself. Towed units also combat the thermocline, as the unit may be towed above or below the thermocline.

Usage

Active sonar gives the exact bearing to a target, and sometimes the range. Active sonar works the same way as radar: a signal is emitted. The sound wave then travels in many directions from the emitting object. When it hits an object, the sound wave is then reflected in many other directions. Some of the energy will travel back to the emitting source. The echo will enable the sonar system or technician to calculate, with many factors such as the frequency, the energy of the received signal, the depth, the water temperature, the position of the reflecting object, etc.

Since active sonar reveals the presence and position of the operator, and does not allow exact classification of targets, it is used by fast (planes, helicopters) and by noisy platforms (most surface ships) but rarely by submarines. Consequently active sonar is normally considered a backup to passive sonar

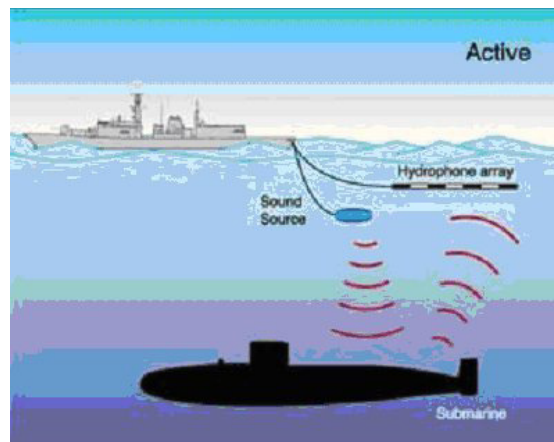
Passive sonar has several advantages. Most importantly, it is silent. If the target radiated noise level is high enough, it can have a greater range than active sonar, and allows the target to be identified. Since any motorized object makes

some noise, it may in principle be detected, depending on the level of noise emitted and the ambient noise level in the area, as well as the technology used. To simplify, passive sonar “sees” around the ship using it

Passive sonar is stealthy and very useful. However, it requires high-tech electronic components and is costly. It is generally deployed on expensive ships in the form of arrays to enhance detection. Surface ships use it to good effect; it is even better used by submarines, and it is also used by airplanes and helicopters, mostly to a “surprise effect”, since submarines can hide under thermal layers. If a submarine’s commander believes he is alone, he may bring his boat closer to the surface and be easier to detect, or go deeper and faster, and thus make more sound.



- **Variable Depth Sonar and its winch** - Until recently, ship sonar were usually with hull mounted arrays, either amidships or at the bow. It was soon found after their initial use that a means of reducing flow noise was required. The first were made of canvas on a framework, then steel ones.
- **Torpedoes** - Modern torpedoes are generally fitted with an active/passive sonar. This may be used to home directly on the target, but wake following torpedoes are also used. An early example of an acoustic homer was the Mark 37 torpedo.
- **Mines** - Mines may be fitted with a sonar to detect, localize and recognize the required target.
- **Mine countermeasures** - Mine Countermeasure (MCM) Sonar, sometimes called “Mine and Obstacle Avoidance Sonar (MOAS)”, is a specialised type of sonar used for detecting small objects. Most MCM sonars are hull mounted but a few types are VDS design.
- **Submarine navigation** - Submarines rely on sonar to a greater extent than surface ships as they cannot use radar at depth. The sonar arrays may be hull mounted or towed. On a submarine, nose-mounted passive sonar detects in directions of about 270°, centered on the ship’s alignment, the hull-mounted array of about 160° on each side, and the towed array of a full 360°. The invisible areas are due to the ship’s own interference. Once a signal is detected in a certain direction (which means that something makes sound in that direction, this is called broadband detection) it is possible to zoom in and analyze the signal received (narrowband analysis). Since every engine makes a specific sound, it is straightforward to identify the object. Databases of unique engine sounds are part of what is known as acoustic intelligence or ACINT.
- **Underwater communications** - Dedicated sonars can be fitted to ships and submarines for underwater communication. See also the section on the underwater acoustics page.
- **Ocean surveillance** - For many years, the United States operated a large set of passive sonar arrays at various points in the world’s oceans, collectively called Sound Surveillance System (SOSUS) and later Integrated Undersea Surveillance System (IUSS). A similar system is believed to have been operated by the Soviet Union. As permanently mounted arrays in the deep ocean were utilized, they were in very quiet conditions so long ranges could be achieved. Signal processing was carried out using powerful computers ashore. With the ending of the Cold War a SOSUS array has been turned over to scientific use.



Return To:

U. S. Submarine Veterans, Perch Base
7011 West Risner Road
Glendale, AZ 85308
E-Mail: communications@perch-base.org

<http://www.perch-base.org>



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**White Tanks Regional Park
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