ALUMNI NEWSLETTER March 2009 Issue 1

POMFLANT Remembered

The POMFLANT Alumni was organized about 16 years ago.

Special Interest Items:

Breakfast Club - The POMFLANT Alumni Breakfast Club meets in the back room at the Perkins Family Restaurant, on Rivers Avenue adjacent to Ashley Phosphate Road, every Wednesday at 0930 for a breakfast gathering. See all of you there!

Website Addition - I have added a link to a downloadable and or printable version of the newsletter. It is located at the top of the website newsletter and under the title "POMFLANT Alumni Newsletter." It is in Acrobat format and will require the free version of Adobe Acrobat Reader. Which can be downloaded from:

http://get.adobe.com/reader/?promoid=BUIGO

Strategic Systems Programs (SSP) – SSP now has a public website with all programmatic history and facts about SSP, the Fleet Ballistic Missile Program and current initiatives. http://www.ssp.navy.mil

Follow-On Commander Evaluation Test (FCET) – 25 August 2008 The US Navy conducted FCET 39 of the Trident II (D5) Fleet Ballistic Missile (FBM) system on the Western Range, off the California coast. Two D5 missiles were successfully launched fro the USS Louisiana (SSBN 743) followed by successful deployment of the reentry bodies. This represents 124 successful test launches in a row. This performance not only demonstrates D5's reliability, but also the commitment and expertise of the entire Fleet Ballistic Missile team. Thank you for achieving 100% mission success. Congratulations and well done! This came from the Vice President, Fleet Ballistic Missile Programs at Lockheed Martin Space System Company.

POMFLANT Patches – I will be notifying those individuals who have requested patches shortly on where to send the monies for the patches requested. Thank you for your patience.

Website Hosting – I have had some problems with my web hosting company that hosts my websites. As these problems were complicated by the merger with another company X7 hosting and could not be resolved to my satisfaction. I have changed hosting companies and will be transferring my websites as time allows. Hopefully, this will work out well for me. Sorry for any inconvenience that this may have caused.

Requests - We have been getting a lot of E-Mail returned from the domain mailing list as undeliverable for numerous reasons. We have lost touch with some of our friends. So, I would like to request the following things of you.

1. Please verify that the following E-Mail addresses are in your allow list and not blocked by your E-Mail Program or Internet service provider: thunderer@windstream.net, multiwebs@windstream.net and pomflant@multiwebs.net.

2. I would like all of your snail mail addresses, if you have not already sent them to me. This will allow us to keep in touch with you if your E-Mail address changes or has other problems. We do not release this information to anyone outside of this association. Thank you for your support.

3. For those members using their work E-Mail address from Lockheed Martin. Lockheed Martin is rejecting E-mails from the mailing list, with an error message of "556 5.7.1 Message refused by Lockheed Martin due to content or security policy violation." I will need another non-LMCO e-mail address or a snail mail address if you wish further updates from the POMFLANT Remembered Website. Please respond with your name and alternate E-Mail address to thunderer@windstream.net. I am sorry for this inconvenience.

4. AOL and CompuServe (cs.com) have now started blocking my mailing list as SPAM on some AOL and CompuServe accounts. For those AOL and CompuServe members please read item 1 above. Your names will be removed from the e-mail list. You may try contacting AOL customer service and see if they will unblock the e-mails from my domain. I am sorry for this inconvenience.

5. Comcast is now blocking the POMFLANT update e-mails as SPAM. Please resolve this issue with your provider or I will be forced to remove your address from the e-mail update lists. I might suggest that you get a Hotmail, Yahoo, or Gmail account for the newsletter and website update E-Mails.

News from our Members:

Jimmie Bartee - I just want to bring you up to date on my email address. Thanks for doing such a great job on the newsletter. I have since retired back in December of 2007 and have really missed getting it. I retired from NAS Whiting Field in Milton, Florida after 28 years of federal service as a GS-12, Environmental Protection Specialist. It was a great ride, but I have to say that POMFLANT had to be the best place ever to work and, with such great people. Keep up the good work. My home address is 3104 Cameron Blvd.; Isle of Palms, SC 29451 and my new e-mail is jimmieabartee@bellsouth.net

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Joel Singletary - Libby and I are enjoying retirement near our son, daughter-in-law and three grandchildren here in the Sumter, SC area. My photography hobby keeps me occupied when I'm not fishing or hunting. We travel frequently and perhaps will get to the next gathering or the Breakfast Club soon.

Peggy and Dean VanDeLeest – Hi there, we got the snail mail version of the newsletter for Pomflant. We use Comcast normally but also have a yahoo account. For now, we can be sent the newsletter to dandpvan@yahoo.com.

Congratulations on being Grandparents again. Sounds like retirement is a good fit for you. We stay busy here. I am working 3 days a week as a hearing aid specialist for a local practice here....days off are full of everything else. Dean is working at the IRS as a customer service information specialist. He spent 2 weeks in Oakland this summer and also 3 weeks in Fresno....lots of training. I should have gone to visit in Oakland but they didn't give enough notice for decent air fare. Maybe next time. They stay busy with tax questions.

One of our sons, Matthew, just graduated from college with a degree for radiology technologist and is seeking employment. He wants to stay in this area but will move if necessary.

Summer weather has been really nice....we were able to get several motorcycle rides in and our local chapter had a rally for a children's respite facility. Newsletter says you're traveling....if you guys ever want to see the Pacific Northwest, give us a call. The Seattle area has higher and prettier mountains but we have some great areas too.

David Swarner - I just wanted to let everyone who remembers me know where I am and that my door is always open. Tonia (wife) and I reside in Hereford, AZ. Approx 75 miles southeast of Tucson. Settled here in 2002 after 5 years of on the road fulltime RVing. We have an acre of land with water and electric RV hookup for any friends blowing through the area. Address as follows: 5692 Camino Del Amor, Hereford, AZ, 85615. Telephone 520-803-7695. This is about 7 miles from historic Fort Huachuca, 5 miles from Sierra Vista, 15 miles from Tombstone and Bisbee. Surrounded by mountains and at an elevation of 4600 feet. Mountains go up to 10000 ft. So, if you're in the neighborhood give us a call. Always have some wine and a cold beer available.

Doris Landreth – Thanks you so much for all that you two have given to us. I just received the most recent copy of the newsletter a few days ago. I am a 1993 retiree from POMFLANT, I had the option of transferring to the Submarine Base in Georgia, but decided to I would just retire. I enjoy the newsletter. After my retirement I started a resume service. I have traveled extensively. In fact, I have visited all but three states. I never made it to Alaska. I have made two trips to the Hawaiian Islands. Maui is my favorite. It is so quiet and absolutely beautiful. I plan to join the alumni breakfast club again for a breakfast gathering soon. I have been limited in being able to drive recently because of a fractured ankle. I am an avid golfer and I have really missed being able to play. I am still working on that "hole in one." I have two Grandsons and two Granddaughters. I am enjoying my retirement everyday. Take care and thanks again.

SaBra W. Duncan – William "Bill" G. Duncan, died after a brief illness in July 2007. He was employed by Lockheed for 37 years. He retired as a Senior Design Engineer in Charleston, SC. He and his wife SaBra were married 53 years. They have one daughter Dana and one Granddaughter Amy, all of Summerville, SC.

H. Charles Wright - I am so indebted to you that I find it hard to express my gratitude. I thank god that you devote your time to promote the memory of POMFLANT.

I was there in early 1960 when the base was in the early stages of construction, I remember it well. Since there was not much I could contribute at the time, I went to Sunnyvale to work in the Lockheed plant, specifically to

study the guidance system and its calibration and test methods. GEOS was the prime contractor for the guidance system and it was our job to establish the procedures that would be used at POMFLANT for the first submarine loading.

I have one of the original 17 inch A3 missile models that Lockheed made for key personnel. It is on my living room mantle. Engraved on its base are the words: "Polaris, Roaming the Oceans of the World." I look at it every day and realize that what we did there at POMFLANT was of world wide significance. With the advent of Polaris, we trumped everything that the Russians had.

When the first successful launch of Polaris from a submarine took place, Admiral Raborn gave a picture of the launch to Captain Levering Smith, on the picture Raborn wrote some appreciative greetings to Smith and added the words, "Polaris. From out of the deep into history." When Levering died, that picture with Raborn's handwriting on it was sent to me. I treasure it. Without Levering Smith, Polaris might have been delayed for a decade; his knowledge of solid rocket fuels was a key ingredient in our remarkable success. He was probably our greatest uniformed scientist, and he was an exceptionally accomplished manager. He later took Raborn's job as director of the Special Projects organization. I have an excellent writing about him. I will send it to you if you wish.

It is interesting to note that the success of our nation's Apollo program, where I worked after Polaris, was dependent on the rocket fuel and guidance system technology that was developed in the Polaris program.

I have one of the tactical Polaris gyro units, disassembled and a model of the guidance system, that I use for lectures to explain Inertial Guidance concepts to engineers and students. Thanks again for your kindness and devotion.

My children wanted to know what I did when I went to work each day while we lived at Huntington Woods, Charleston, SC. I was an engineer with General Electric Ordnance Systems (GEOS) at the time. Here is the story that I wrote for them. See letter attached to the end of this newsletter.

Rosalie and Jim Lawrence - We have had a busy year in 2008. We managed two back-to-back trips, a 13 day bus trip entitled "Mostly Maine", where we saw beautiful fall foliage, and ate a lot of lobster. Had 1-day at home to do laundry, then off to Honolulu, boarding the Carnival "Spirit" for a 12 day cruise to all 4 Hawaiian Islands.

Rosalie is in her 7th year of volunteering 1 day each week at Trident Hospital, and she stays active in church activities, and her hobby of Rubber Stamping. Jim is commencing his 26th year (with a concealed weapons permit) riding on patrol weekly with Berkeley County Sheriff's Department. He also volunteers l day each week at the Retired Affairs Office at the Naval Weapons Station, and has for 8 years now. Our daughter, Kimberly Steele, who is married to the son of former POMFLANT employee Leon Steele, teaches dance full time at two of the Arts Infused Magnet Schools here in Goose Creek. They have 2 daughters, Gracy, age 7, and Karson Rose, l8 months old. Kim's husband, Mike, is in charge of all mechanical operations, for South Carolina Public Railroad.

Our son, Jimmy, is currently the Math Lead Coach, at the same elementary school where he once went. He has been teaching 10 years now. His wife, the former Kimberly Pippin, is also an elementary school teacher, and they have two sons from her previous marriage, Ed, age 15, and Cooper, age 13.

On a sad note, in April of this year we had to have our beloved dachshund, Razzle, put to sleep. We had him for 12 of his 15 years, and we certainly miss him a lot.

In July we went to Rosalie's 50th High School reunion in upstate New York, and in June we went to the 30th reunion of the USS Whitehurst (DE-634) in Knoxville TN. Jim served aboard the ship in 1961, in Seattle, and this was the 21st straight year we have gone to the reunion.

Allen W. Holmes - I retired in June 2007 and Kris and I opened the Dixie Supply Bakery & Cafe in August 2007. It is located at 62 State St. in downtown Charleston, SC 29401, Phone (843) 722-5650. Robert Moss wrote this review. Something' Special: Dixie Supply's food isn't fancy, but it sure is tasty. Kris and Allen Holmes' little cafe makes it fresh and fast. Dixie Supply Bakery & Café, American/Breakfast,
62 State St. Downtown Charleston, SC 29401, (843) 722-5650, Entree Prices: Inexpensive ($5-$9), Serving: Breakfast & Lunch .

Dixie Supply is my kind of place. It's in a small storefront next to the Li'l Cricket on State Street, a block off the Market, and it doesn't have an ounce of pretension. Dixie does a lot of take-out business, and the tight dining area has linoleum floors and just six small tables. The food is served on plastic plates with plastic utensils and Styrofoam cups. For some reason, there's a sink with a paper towel dispenser right there in the dining room.

But, with food like Dixie's, you don't need fancy decor.

Everything is made fresh, and they take those extra two or three steps to take what might be just solid down-home cooking and make it exceptional.

Take the grits, for instance. They are the real stone-ground kind, and they are cooked with so much butter and cream that you could eat them alone (8 oz. for $2.25) and have a rich, satisfying breakfast. Or, as part of the Dixie Breakfast Special ($5), they come alongside two eggs, bacon, sausage, or ham, and toast or biscuit. I would recommend going with the biscuit, which is fluffy and chewy and one of the best to be found in Charleston.

The vanilla French toast ($5) is made from sliced croissants that are battered, cooked till crispy and golden brown, and sprinkled with plenty of powdered sugar. The plate-sized pancakes ($5 for two) are equally fluffy and rich, and are served chock-full of your choice of blueberries, chocolate chips, or pecans.

If you're looking for just a quick take-out bite, you can get a dense, chewy croissant or a bagel ($2), both of which are baked right there in the small kitchen behind the front counter. The blueberry muffins ($3) are thick and sweet and topped with a sugar glaze that's downright addictive.

For lunch, Dixie offers an array of salads, sandwiches, and wraps.

The Dixie Patty Melt ($7) is served on marbled rye with grilled onions, lots of gooey Swiss cheese, and a zippy horseradish sauce. It's served with Dixie's housemade pickles (you got to try some of these), and the homemade potato chips are sliced into long, thin ovals that fluff up when fried so they're crispy around the edges and still chewy in the middle.

There's a regular selection of larger entrees, including fried chicken ($8), shrimp and grits ($9), and a tasty tomato pie ($6) that has fresh tomatoes layered with basil, onion, and cheese. The daily blue plate special offers up selections like a crispy fried pork cutlet or a shrimp BLT.

For dessert, check out the small glass display filled with baked treats like Charleston chews, bar cookies, brownies, and muffins, and there's always a towering chocolate cake or carrot cake, too.

Dixie Supply has been open about 18 months now, and it has kept a pretty low profile so far. But, I suspect that word is starting to get around, and it's gradually gaining a lot of local fans. The general quality of the fresh-made food, plus the little extra touches — like the horseradish sauce on the patty melt, the two or three homemade pickles served alongside the sandwiches, and the fact that the French toast is made from a croissant — make Dixie something special. The next time you're downtown and looking for a quick bite for breakfast, or maybe just a little mid-morning sweet bite, drop in and give it a try.

Ron and Nancy Thomas - Our side business, Southeastern Synthetics, will continue to sponsor the website and the newsletter at no cost whatsoever to the Alumni Association. This includes the web, newsletter materials and any applicable postage costs. Our side business, Southeastern Synthetics, will continue to sponsor the website and the newsletter at no cost whatsoever to the Alumni Association. This includes the web, newsletter materials and any applicable postage costs.

New Members:

Welborn, Jr., James H. - welbornz@bellsouth.net	**Flowers, Harry W. - hwflowers@yahoo.com**
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Bad E-Mail Addresses:

If you know any of these folks and have either their new e-mail or home addresses, please forward it to Ron Thomas, E-Mail: thunderer@alltel.net

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Snail Mail Address Changes:

If you know any of these folks and have either their new e-mail or home addresses, please forward it to Ron Thomas, E-Mail: thunderer@alltel.net

Dailey, Glenda W. 147 Koinonia Drive, Leesville, SC 29070-7163	Landreth, Doris 120 S. Cranford Road Apt 1L, Goose Creek, SC 29445

Bad Snail Mail Addresses:

Lamar, Romell 35D Appaloosa Court, Havelock, NC 28532	

Our Sad News:

Since our last newsletter, I have received information that the following co-workers, co-workers family members and or friends that have passed on:

Gayl Mino – Civilian, Passed August 1987
James E. Trick – Military, Passed 30 December 2002
William "Bill" G. Duncan – Lockheed, Passed July 2007
Herbert "Herb" G. Thylin – Lockheed, Passed 11 May 2008
Luther E. Cowart - Civilian, Passed 03 June 2008
Frederick Boyd Taylor – Lockheed, Passed 10 August 2008
Robert M. Gilbert – Civilian, Passed 19 August 2008
Thelbert O. "Bud" Grantham – Lockheed, Passed 24 August 2008
Narvie Lee Bilbray, Sr. – Civilian, Passed 05 September 2008
John P. Dailey – Lockheed, Passed 18 September 2008
Haskett Wilburn - Civilian, Passed 22 October 2008
Murphy Cochran – Civilian, Passed 01 November 2008
Harry "Happy" R. Holseberg – Lockheed, Passed 02 December 2008
Robert W. Chinn – Military, Passed 09 December 2008
Arvel Freneau Dixon – Civilian, Passed 14 December 2008
Pauline L. Dube' Deschenes – Former Military Wife, Passed 14 December 2008
Bobby L. Peele – Civilian, Passed 03 January 2009
Llwyn L. Howland – Civilian, Passed 15 January 2009
Calvin Cumbee – Civilian, Passed 19 January 2009
Wilbert Ramirez – Civilian, Passed April 2009
Our Deepest Sympathy goes to those and their families who have lost their loved ones.

Please keep us informed of any news about our POMFLANT family. We welcome any and all inputs for upcoming newsletters. Any inputs can be sent to the below E-Mail address at anytime and will get into the latest newsletter. Without your inputs we have little to write about. The POMFLANT web Site is located at:

www.multiwebs.net/pr/index.html

Please keep Ron Thomas: thunderer@windstream.net and/or John Maney: jmaney@sc.rr.com up to date, with your current e-mail addresses and or current snail mail address and telephone number changes.
Take Care,

Ron & Nancy Thomas

20 July 2008

Polaris – Poseidon –Trident
An Awesome Concept

Sea-Launched Ballistic Missile Systems
General Electric Ordnance System United States Navy

========== A Tutorial Adventure in High Technology ==========

A story about General Electric, Charles Wright and ICBM (Missile) Systems

At Charleston SC, during the Cold War era, the most terrible weapon that had ever been devised came into existence, General Electric helped develop and build it. It was the submarine-based InterContinental Ballistic Missile System or just Polaris (named in honor of the North Star). It was the single most important national venture at the time, even above Apollo. Because the capability for hiding mobile nuclear missiles in the vast oceans of the world was absolutely guarantee our nation's supremacy. As an engineer, I consider myself fortunate to have taken part in this major state of the art military venture. Each missile was about 32 feet long (weight 32,000 LB). Most of it was made up of a solid fuel rocket engine, about 5 feet in diameter. The guidance system of each missile was about the size of the average commode, the computer being the tank and the rest of the commode being the gyro portion (call it the Analog portion). The Analog portion had three gyros and three accelerometers mounted in a chunk of metal (about the size of a half gallon milk carton, with cutouts to hold these 6 cylindrical devices). Each gyro and each accelerometer was about the size of a small can of soup. The chunk of metal was mounted via ball bearings inside of a square frame (about like a square, deep picture frame). And that frame was mounted at right angles inside another slightly bigger square frame via bearings. This bigger frame was connected to the outside body of the guidance system by more ball bearings. This arrangement allowed the inner chunk of metal to rotate around in any angular position imaginable (but, in use, it actually remained "fixed", angularly, and the rest of the missile revolved about it). These frames were called gimbals and the inner chunk of metal (holding the gyros and accelerometers) was called an inertial platform (it was called "inertial", which means "fixed" because it never moved angularly in space after it was initially positioned, even though the entire missile might be making various angular movements around it while traveling to a target). The whole Analog portion (with gyros and accelerometers on the inertial platform, and the gimbals) was about twice the size of a basketball. Of course, the guidance system (the whole "commode") was bolted to the overall missile frame. GE built these guidance systems at its Pittsfield, Mass. Plant, a technical wonderland of electro-mechanical engineering. It was a vast operation and it had an additional 400 engineers and technicians out in the field.

The way the missile system worked was as follows. When the rocket engine burns, it blows hot gasses out of the back of the missile, pushing the rocket up through the sky and space to its target. These gasses are forced to go out through 4 short pipes (nozzles) called "jetavators." In flight, the jetavators can be turned slightly by the guidance system computer in any direction so that the back of the missile can be turned (guided, steered) toward the target. In order for the guidance system to "keep its balance" the gyros must keep the inertial platform (the inner chunk of metal) from moving angularly as the missile is maneuvered through the sky (something like the little sensors in your head help you keep your balance). Before the missile is launched, the inertial platform is set to a given angular position, then, as the missile maneuvers, after launch, the gyros sense if the platform starts to tilt from its preset position, and, by electric motors (operating in servomechanism loops), forces the gimbals to turn back, to keep the platform where it was originally set. Transformer-like electronic devices (called resolvers) that measure angles are located at each of the gimbal bearings, to tell the computer how much the missile has turned in every direction around the fixed inner inertial platform. This allows the computer to know exactly how the missile is pointed. As stated, the inner platform also has three accelerometers mounted on it to keep the computer informed (by sensing motion) as to just how far (and how fast) in every direction the missile has traveled since it was launched. So the computer "knows" exactly where the missile is at all times, and how it is pointed. Since the computer was "told" where the missile is intended to go, the computer can actuate the jetavators to keep the missile on the course that was mathematically programmed into the computer before launch. When the computer decides that the missile is going at the correct speed and is pointed in the right direction so that the warhead (like a rock being thrown) will hit the target, the computer cuts the warhead loose and allows it to hurtle through the sky to hit the target. At that time, the rocket engine is shut off and it and the guidance system fall to earth as expensive junk.

When I started working in the Polaris program, I was told that each guidance system cost a quarter of a million dollars. They were so valuable and secret that an engineer (courier) slept alongside each one (in a sleeping bag) on a cargo plane (I did it a few times) as the guidance system was being shipped from Massachusetts to the Lockheed plant in California. The guidance system had to be kept inside a sealed container at an exact temperature (the engineer had to

manually wire into the plane's electrical system to get power for the container). I was assigned as a courier a few times so that I could write detailed procedures for other couriers who would do it regularly. Even that was a small adventure.

This guidance system, conceived by MIT, with a digital computer and an inertial section was so complicated that very few people ever understood it. As a small example, consider that the tiny gyro rotors in the gyros and accelerometers were (each) turning at 16,000 RPM in a sphere (about the size of a golf ball) that was precisely suspended in a magnetic field, so that precession bearing friction would be eliminated. I was lucky enough to be the Guidance System Specialist at Charleston SC where about 40 GE engineers had an office on the Polaris missile base, officially named Polaris Missile Facility, Atlantic (POMFLANT). The massive office building also housed the base Commanding Officer, about 125 employees from Lockheed (the missile prime contractor) and about 10 from Aerojet-General (the rocket-engine supplier), along with a myriad of Civil Service engineers and Naval Officers. There were about 900 people, contractors, Civil Service and Military working at POMFLANT.

The guidance systems had to be tested and calibrated at this base before they were put into missiles and into the submarines at Charleston. Each guidance system was not perfect---it had errors in its gyros and accelerometers that could make the missile miss its long-range target. Therefore we had to determine exactly what these errors were (e.g., like the speedometer on your car being in error by a few miles per hour). We would carefully measure gyro and accelerometer errors so that the submarine could take them into account and offset them before the missile was launched.

As a vastly oversimplified example, if the guidance errors would cause the missile to hit 10 miles to the left of the target, the submarine would apply factors to aim it 10 miles to the right. Six to eight hours were required to calibrate and test each guidance system, the intricacies involved were staggering. GE also built all the large test/calibration consoles and nearly all other support equipment, including the main missile control consoles for the submarines.

There were 16 missiles on each submarine. It was stated that each submarine was more powerful than all the bombs dropped by everyone (both sides) during World War II, including the atomic bombs dropped on Japan. It was an awesome feeling to be there, working about a block from countless atomic bombs (stored in the warheads).

The base was about 5 miles in diameter and it had a highly secret inner base about a mile in diameter. The inner high security base is where the missiles, warheads and guidance systems were kept and tested. There were armed Marine guards everywhere, it was a bit scary. The inner base was surrounded by deep swamps (even swamp panthers prowled around the wild area. I have seen them at night when I had been working late). My job was to be an expert on the "brains" (the guidance system) of the missile and to keep track of and report on reliability problems and trends and (using all the metric data being recorded as guidance systems were processed) write secret missile statistical accuracy reports (CEP) for Admiral W. Raborn (later, Admiral L. Smith and Admiral I. Galantin) who was in Washington. He was in charge of the program nationwide for the Navy. The program was completely controlled by the Special Projects office in Washington DC. Key people were identified by codes, I was SPC91 (Special Projects Charleston #91). All contractors and civilians on the base were under the technical control and auspices of a Civil Service Chief Engineer and his supporting staff, this provided continuity and it prevented chaos.

The other electronic equipment associated with the missile system at the Charleston base and on the submarine, would take one person two lifetimes to learn. I was closely involved with just one little part of it all, the guidance system (but that was the most complicated and most interesting part of the missile). The Guidance System Laboratory Building was 200 X 200 feet, 2 stories high, and was located on the inner security base.

In a (separate) Missile Assembly Building, each entire missile was laid horizontally in a berth and checked completely with a guidance system intact before being released to the Navy. GE, having a major role in the Polaris program, was involved in developing extensive documentation for myriad formal instructions, along with intricate quality control and troubleshooting measures. Everything had to be documented in great detail. Further, GE maintained a large school facility at Pittsfield for Navy personnel and GE engineers and technicians. Almost everything was in a state of cutting edge development. Sometimes I would need to interface directly with the scientists at MIT to resolve guidance system technical issues.

I would often travel to Massachusetts, Connecticut, and California on business associated with my job (being away sometimes for as long as three months). In all, it was a fantastic experience, actually breath taking. I felt at home as a civilian working on Naval bases because I understood the Navy way (I had spent many years in the active air Navy and I was still a reserve Naval Officer, going for air squadron duty each month and two weeks of every year), some people could not adapt and work well with Navy personnel.

I eventually became GE's Engineering Supervisor at Charleston, my group was responsible for everything technical associated with GE's role at the missile facility, including reliability reporting and special investigations, aforementioned statistical missile accuracy reports, training classes for our local engineers, technical requirements for new buildings and a vast amount of test and calibration equipment (and also for interfacing with other contractors who built the rest of the missile hardware). GE had two other groups of personnel at the base; one administrative group to help the Navy with logistics; and a technical group to melt-in with Civil Service and Navy people who were in long term training to eventually take over the test/calibration functions at the inner base.

While I worked at Charleston, the overall A1 Polaris system underwent 2 complete re-designs, A2 and A3 (with a smaller, lighter, improved guidance system) to increase the range from 1200 NM to 2500 NM. It then began being supplemented by a bigger and better missile system called Poseidon (God of the deep). Its guidance system actually tracked a distant star to help keep its inertial platform fixed more accurately all during flight. Poseidon was much more awesome and more powerful than Polaris. I worked in the Poseidon engineering program for a while, and then moved to Daytona Beach to embark on another adventure, the Apollo man on the moon project. A previous GE manager had transferred to that program and invited me to work with him in Florida. I'll tell you that Apollo story later.

After I left Charleston, the completely awesome Trident Missile submarines became the next generation, they are in use today. GE also played a role in their deployment. The Trident guidance system is really something!

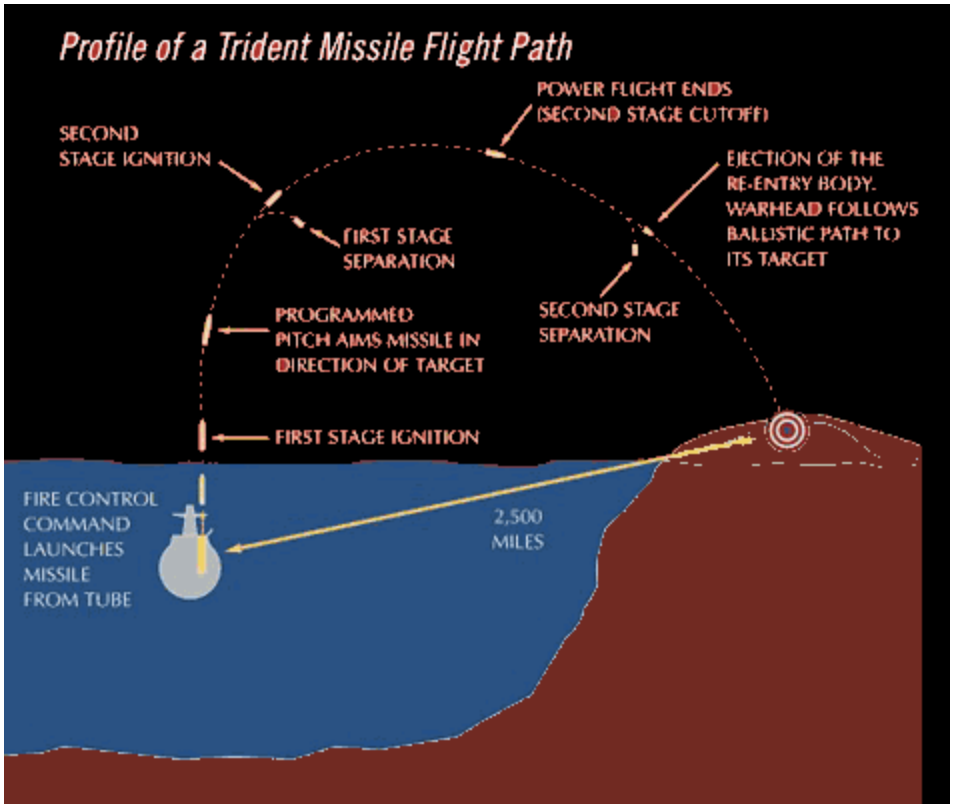
TRIDENT LAUNCH

It is interesting to note that the rocket engine of each of these submarine launched missiles Polaris, Poseidon and Trident is not ignited until it is above the sea surface. The missile is burped out of its submarine launch tube by compressed gasses, flinging it out of the water. Even though this jerks the missile around violently, the guidance system senses and records all movement and keeps its inertial platform fixed. Wow!

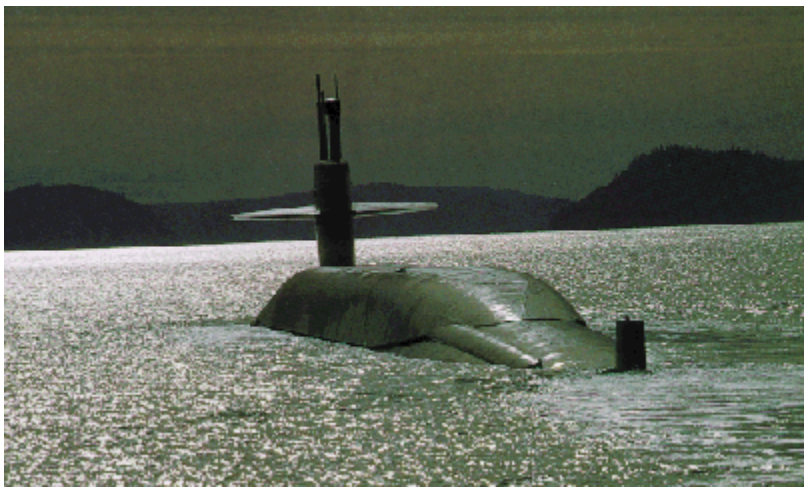
Polaris Missile Being Launched At Sea

As soon as we felt reasonably confident, we fired a tactical Polaris missile from the submerged SSBN Ethan Allen to a location 1700 miles away in the Pacific; it carried a live nuclear warhead that exploded exactly on target. This proved that the entire system worked well and it gave the USA a giant advantage in the cold war with Russia.

Polaris was an absolutely astonishing engineering accomplishment. Its progress was based on just in time technical developments. It all came together miraculously as if a divine hand were guiding it. Then Polaris set the stage for advancements to the Poseidon and Trident missile systems. I was there near the beginning phases of its development; it was an awesome fast moving adventure. It had top priority in expenditures for defense of the United States. Success of the Polaris program was due mainly to the managerial leadership of Admiral William Raborn and the nation's greatest uniformed scientist, Captain (later Admiral) Levering Smith. When the first successful Polaris was launched from the submerged SSBN George Washington, Raborn sent Smith a photograph of the rising A1 missile with his personal greetings written on the picture. After Admiral Smith died, that picture was sent to me by the manager of Smith's estate.



Trident Actually Has a Range Exceeding 4,000 Miles



A Ballistic Missile Submarine

========== POST SCRIPT==========

After we had just loaded the first Polaris submarine with 16 missiles, my colleague said, “Charlie; I know that you realize the omnipotent power of the weapon system that we have turned loose in the world. How can we justify having done such a thing?” I could only answer that I had genuine faith that my Government would never use that awesome power except as a deterrent, or as a weapon of last resort. Being a Naval Officer ready reserve at the time and knowing the men who manned these submarines, I also felt that I could trust them completely.

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