Tales of an Engineer

Harrison T. Loeser



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Preface

My father, somewhat of a philosopher, took time in his senior years to reflect back on his life and his years as a marine architect and naval engineer. He began penning stories of events that happened to him over the course of his career. It did not follow a straight trajectory, few do. But it was affected by his temperament and in turn, it affected the development of the man he became. At 97, he now is beyond editing his writing. I have taken on the task, and added some information which provide some continuity to the tales.

I want to say a few words about my father. His surname is German and I have always tried to find out what it means in that language. Upon asking native Germans I have gotten several possible answers - "to loosen", to "unknot", "a problem solver." I am drawn to that last translation, because I feel my father is indeed a problem solver - he's an engineer, an inventor and he was also an inveterate crossword puzzle solver.

He has always told me that life is "one problem after another." The first time I heard him say that I was a little dismayed, because it sounded somewhat discouraging, perhaps a little overwhelming. But from the point of view of a problem solver, it is more like a challenge. It is a realistic perception of life, and if adopted it makes it easier to bear the "slings and arrows of misfortune" that come along with the joys and wonder of discovery and exploration of this world.

I have learned a lot from my father, not just about the field of engineering and naval architecture. I have published his "Tales" not just as a charming family record, but also to share his observations and perceptions and his philosophy of a layman. Further, I would hope the efforts he made to preserve the lessons of his experience might encourage others to do the same.

For those pursuing the same line of work, it serves, in a specific sense, as a window on the world of a marine engineer In a broader sense, it serves to elucidate how life is at the mercy of the winds of change, how we all must adjust our sails to these forces and expect the unexpected.

August 15, 2017

Jane Loeser Clukay

Author's note: None of the following tales are true. However, something like them did occur.

On the Sea to Rio

I received my Seaman's Certificate of Identification from the U. S. Department of Commerce on May 27, 1940 out of the port of New York.

Two days later in Baltimore, I met up with Joe, my classmate from Webb Institute of Naval Architecture, and we took a trolley down to the piers in Newport News where the freighter, the *U.S.S. McKenney*, was docked. As a friendly gesture to the college, the freighter owners had made space on the ship for us sophomores to get real first-hand knowledge of the ship's operations during our 13-week winter term work program. In return, we would help with the day-to-day operation of the ship. We could only imagine what we would experience.

It was an old, well-kept ship capable of carrying 10,000 tons. Going to sea was not a novelty for me because I had been to sea before, however, this was the first freighter I had ever been on.

We headed out down the Chesapeake Bay to the open sea. Seagulls followed us as we steamed down the U.S. coast line setting our sights for the island of Tortola in the British Virgin Islands where we were to pick up a hold-full of coal and then head down to Rio de Janeiro, Brazil - our delivery destination.

We were considered "engineering cadets" and assigned to the boiler room. We were to learn all there was to know about the powering and running of the ship. We chipped paint from generators, painted with the red lead, shined brass in the fire room, and did work in the machine shop. We did get "state rooms" (10' x 15') with one bunk and a private bath below the wheelhouse. We were lucky not to experience any bad weather.

In Tortola, Joe and I were on board out of the harbor as 10,000 tons of coal were loaded into the ship, one car-load at a time.

Later we stopped at St. Thomas, in the U. S. Virgin Islands to take on fuel. Joe and I waded ashore, then wandered around the town. We were amused by the "do-it-yourself-style" prison for people who committed a minor crime. The "prisoners" would be lounging around on the beach with the door while the door was open to their cells! We figured that it was such a small, isolated island, their jailers thought there was little escape risk.

Joe stepped on an sea urchin. There was no doctor on board, but the captain did his best to handle the medical situation. It took Joe two days to recover. Joe and I had a half a day there before we carried on towards Rio.

On board there was the captain and first mate, the chief engineer ,the first engineer, the second engineer ,and third engineer and 10 seamen. When we would get to port, they would take on board a pilot who knew the local waters for "guides pay".

On June 24th we cited a light from keep Frio off of Rio at 8:00 in the evening.

That day France surrendered officially to Germany! This was sobering news.

I was anxious to make port.

Despite the momentous world situation swirling around us, we waited to see what is often called the most beautiful harbor in the world with great expectation. I had also heard of the lowness and flagrant immorality prevalent in the city. It spread to the seamen and the officers, as well even some of them with wives and families.

At dawn on June 25th, after a sleepless night, we sighted the actual harbor. It was a cold misty morning. The clouds hung low over the distant mountains. Pas do Assucra (Sugar Loaf) jutted up before us as we passed close by to two forts and fortified rock. Soon we could see the great city, laid out for mile. Many tall buildings in the city, couched by the sharp, sloping mountain ranges which one sees in all directions

In port was the *U.S.S. Wichita*, an American cruiser carrying three planes. They flew overhead in formation on morning patrol as we entered. It was a joy to see the fine, large, powerful *Wichita* completely overshadowing everything else in the harbor. The Brazilian Navy consisted of a cluster of old secondhand man-of-wars painted a dark gray, one double-hulled auxiliary, two destroyers, two cutters, two tenders, two auxiliary cruisers. The *Wichita* was twice as large as any of those of Brazil.

The modern Swedish freighter, *Danaholm*, lay at anchor. She had been in Newport News when we were there. Also in the harbor was the Swedish *Tieja*,. The following Brazilian merchant ships were in port: *Raul Soares*, *Duque de Caxia*, *Cantuaria*, *Fiete Ayaga*, *Taquary*, *D. Pedro II*.

Campos, a Norwegian vessel, and an old, entirely black, collier, the *Sabara*, flying no flags were also there.

A large floating dry dock was anchored in the middle of the harbor marked *Dique Flutnante*, *Affonso*.

The *Teresa* from Trieste Italy was flying all its flags in celebration of the French surrender to the Germans!

On June 25 we dropped anchor near shore. That day we worked on the circulating pumps. After supper we went ashore with the captain and the "Channeller" in the power launch. Joe and I set out by ourselves. The city was very modern in some places - streamlined buildings alongside old Portuguese architecture. There was heavy traffic on the roads with many new cars, mostly American.

Rio was a neutral city in the war.

When we had arrived in Rio there was a British cruiser and a German battleship in the harbor. The battleship was not really large, but it appeared powerful. The British ships were keeping watch on the German battleship though. We saw British cruisers hovering. The battleship was closer to port.

Either the British or the Germans would remain in port. Which one we wondered?

Our freighter maneuvered through the harbor, by the cruiser and past the battleship. Additional ships were lurking on the outskirts.

It was if the British were holding a battle in the port. The Germans were standing their ground. The British held the upper hand due to numbers and position. They had the German ship trapped. We found out later that the German commander loaded his men in boats and sent them ashore and then sunk the ship to make sure British wouldn't get it.

The *McKenney* went past them to the pier to unload the coal. The captain told the helmsman and crew what to do while coordinating with the harbormaster. The first mate needs to determine how much coal to unload by monitoring the draft mark on the waterline on the ship

They brought up cranes on the pier next to the ship. Our seamen uncovered the hatches. They they began to load coal into 4-foot long, waist-high buckets. One man would be in the hold. The crane operator got the hook onto the bucket and then he'd wave to the man on the deck. The crane operator would then lift the bucket out of the hold onto the pier. (It would have used the same procedure to transfer the coal to another ship or a railroad car.)

They kept at it for four days, around the clock, until the hold was empty.

During this time, the chief engineer fixed a couple of the pumps. He supervised the cleaning and polishing. The first engineer cleaned the Scotch boiler? I inquired about a task. The first engineer said I could climb into the boiler. It had been closed for a day. It was so hot, I nearly got heat exhaustion.

The power generator had to be kept going because there was no power supply on the pier.

After more than four or so days, we moved to another pier to load on bauxite for the return trip. It was used to make the aluminum used on the planes. We had to be very careful and watch for sabotage.

It took a lot less time to load the freighter, then to unload it.

Note: They would keep track of the draft marks on the side of the ship. As the freighter unloaded, they would get lower and lower, then the reverse as it was loaded up again.

I went ashore with the second and third engineer to a bar for a drink. You never went ashore alone and you always notified the on-duty person if you were going to shore.

We met Colbert and Bennett in the *Florida Bar* begin drinking beer called Brahma chopp. The beer was 1400 reis (about 7 cents) a quart! It was very good beer apparently mild. After several bottles, I began to feel it. Joe had even more.

Bennett who was feeling pretty, good thanks to the liquor, suggested we go out to a place and see if we could find this girl that he had been with on his last trip to Rio. I knew we were going to go to a better-class whorehouse and wanted to find out what they were like. There was a garden of many paths and dark byways, abutting bedrooms and tables and drinking were inside. Painted sluts wandered about provocatively. after a while the beer made Joe sick - a new experience for him. Several scantily-dressed women sat down at our table. The third engineer thought he'd be funny and took my hand under the table and slighted a long one girl's leg in the vain effort to arouse me. I turned every color with embarrassment.

Mr. Colbert left. Joe and I saw us to a dinghy. I don't know what happened to Colbert and Bennett.

The next day we prepared to leave Rio.

We made it back to the Baltimore on July 26, 1940.

Upon returning home to Flushing, New York, it sunk in how wide the world was beyond my home town.

Drilling Holes

I was called into the office "Get up to the prototype right away. They and we have a problem," I was told.

"What is it?" I asked.

"They will tell you when you get there."

I dutifully made out my visit request, had it signed by my boss, walked it down to security, told them I was leaving immediately, called my wife, whom I had married six months ago, got into my car, gassed up and took off.

When I arrived I was immediately passed through security and I was guided to one of the smaller conference rooms where I recognized most of the people.

"The reactor runs erratically and we must find the reason and solve it. It runs fine for about two hours and then it shuts itself down. We can't get it started for another two hours and it repeats the process," said the reactor engineer.

After about five hours of work, it was finally decided that it was necessary to vent several pockets of air in the shield tank. At the prototype, it could easily be done by drilling through the hull and inserting vent pipes.

However, it was impossible for the real ship where the hull was located because sea water would flood in. They would have to drill four holes in the foundation for the reactor to provide necessary venting.

There was only one problem. That whole section of the ship had been assembled and the reactor room was nearing completion. Fabricating the reactor foundation was a precise operation, each piece had to be welded in a prescribed sequence or the welder could not reach the welds to make them.

To try to rebuild that foundation would mean tearing and rebuilding the entire section of the ship. The cost and delay would be tremendous.

My fellow engineers and designers and I pulled out all the plans of the area. There was no possible way that a man could get to within five feet of the place where those holes had to be drilled. In addition, it was an absolute requirement, because of unbendable cleanliness standards, that no metal chips of any kind be left in the area.

This could be a disaster!

Not ready to give up, I asked around if anyone had an idea of how it could be done. Lew Vincent remarked, "If anyone can do it, Georgio Cragoni, one of the outside machinists, can figure out some way."

I went down to the yard and asked the leading man of outside machinists if I could consult with Georgio about a tough problem. I conveyed the importance of the situation.

"Georgio is our smallest man. He can get into places no one else can get near. He's on the "83 boat" right now. Go on down and tell him, I said it's okay."

I walked out on the pier and spotted some outside machinists working with a boring bar on the bow plane bearing.

"Where can I find Georgio?"

The fellow turned and called out, "Hey, Georgio, this guy wants you!"

A small cheerful, dungaree-clad figure looked up, dusted his hands and came over to me.

"I'm an engineer on the project and we have a tough problem. Can I talk to you about it for a few minutes? Joe D. told me to tell you it's okay."

"Hold on a minute, I'll be right back," he said.

When he returned, I told him the problem, I saw his face light up slightly, but I received no encouraging reaction. He said he would have to think it over and look at the situation. I gave Georgio my telephone number.

"I'll call you tomorrow about ten o'clock," said Georgio.

"You have to remember," I said, "you can't leave even one chip in there."

By the next day, Georgio had figured out a way to do it by inventing a new kind of a drill, he thought would work. Three days later, the drill was complete and they tried it out on a mockup of the area.

Two weeks later, the four holes were drilled and the area was resealed.

I never lost my respect for outside machinists.

Going Critical

There is something about a shipyard at night when the lights shine in the darkness and ripple over the water, when the cool, slightly acrid, odor of the waterfront tinges one's nostrils, when the sudden sharp, brief clatter of an air-hammer shatters the murmurings. A few workers moved over the wooden catwalks quietly, but purposefully.

Dutch and I, the physicist on Electric Boat's nuclear reactor project, moved down the hill past the machine ship where a few rush jobs were squealing on the lathes, past the paint shop with its turpentine aroma, out on to the wooden pier and over to the ship. The nuclear reactor enclosure of the USS Skate was sitting on the main deck covering the intricate shiny, stainless-steel gem that was the reactor head. The last check was being made to make sure that all was in readiness. The source was in place and readings were being taken on the radiation meters.

We showed our badges and the radiometers to the guard, who checked our names against his list and we were admitted. We sat down at a plywood table rigged up in the far corner of the enclosure, opened our brief cases, and pulled out our slide rules, graph paper and reactor data. The Westinghouse Electric engineers and physicists were also arriving and long, check-off lists were being laid out where they could be seen. The lengthy start-up procedure commenced.

Hours later, the order as given to pull out the nuclear reactor's control rods one inch. The change in the radiation meter was hardly noticeable, but the data was taken and the inverse count rate (the reciprocal of the count rate) was plotted. Then the control rods were pulled out another inch. Again the count rate was measured. This continued as the count rate increased and the inverse count rate went down. When it reached zero, the reactor would be *critical*. As the control rods was gradually pulled out, it was evident that the inverse count rate was a straight line and the point where the reactor went *critical* could be readily calculated. The process continued as the plotted inverse count rate headed toward zero.

Tension mounted as the moment approached. "It's critical," said Dutch quietly. The order was given to re-insert the rods. The tension dissipated. A low laugh of relief could be heard.

"How to go!!" rang out. Cheerful conversation became general.

A milestone had been passed.

Devotion to Duty

At Electric Boat, I took my job very seriously.

While working on modifications on one of the nuclear submarines, I needed some information from the nuclear steam plant prototype at Knolls Operating Power Laboratory (KOPL) to complete my report on the temperature variation in steam pipes. KOPL was located between Schenectady and Ballston Spa in New York.

I prepared the proper papers for a trip to the prototype, obtaining my supervisor's signature on my visit request and sent it to the security department, who are tasked to forward it with my security clearance to the security department at the KOPL, who would then admit me when I arrived and proved I was myself. I had been up there several times before and I was known by the guards and operating personnel. I left after lunch and drove there in my five-year old Volkswagen.

It so happened that upon arriving at six o'clock in the evening, I found out the security people at Electric Boat had been slow in sending my clearance to LOPL. This is no uncommon thing. What usually happens is that I would request the KOPL security people to call Electric Boat security and they would give the clearance over the phone.

However, I arrived after the security people at Electric Boat had gone home. I only had a short job to do which I could accomplish in a half hour and then drive dome that evening. If I could not get to the work that night, I would have had to rent a motel room and come back after the start of work the next day. I fussed and fumed and asked the guard to give me a pass since he knew who I was. The guard, quite rightly, refused. Each visit requires a separate security clearance.

The guard, however, was distracted for a few seconds with another visitor arriving and I slipped by the gate and went on about my business.

All would have been fine, except the officer-in-charge of the site came by as I was reading the gauges and said hello to me. He noticed I did not have my pass and pointed out that I must have lost it. Then calling the guard, he asked if the guard would help look for it.

That night while entertaining friends at home, my supervisor received a call informing him that his employee, myself, was in the jail at Ballston Spa, New York!

The Eager Beaver

John was a smart, young, recent graduate who had practical experience in a large machine shop in Detroit. I felt he would be a strong addition to my group. After reaching a salary arrangement with John, I hired him. I set him up designing small mechanical interlocks for special valves, a job he performed well.

Part of the job was to follow the early prototype interlocks through the machine shop to see if any glitches arose and to see if the interlocks works as they were supposed to work.

When John saw the machine shop, he was appalled.

"Do you know that most of that machinery is older than I am?" he exclaimed to me. "With digitally-controlled tape machines, we could double or triple the output of that shop and the interlocks would be machined even better than they are now!"

John felt that he should make the shop foreman aware of these new opportunities. He talked to each leadingman and quarterman and most of the individual machinists.

One day, I had a call from the shop foreman. "Keep that f---ing kid out of my shop or I'll have his ass!" he said. "He's screw'in up the whole place. The f---ing management won't give us a decent machine to work and he's rilin' up the men for nothing!" I don't want to see him again."

John was warned, but he persisted and had to be fired.

Now some while later, the machine shop is probably the best-equipped in the business.

The Admiral's Letter

My mother lived on Connecticut Avenue in the District of Columbia. I liked to visit her when I could. I decided I would visit her during the first week in August. I asked my supervisor if he had any objections to me taking the week off to visit my mother in Washington, D.C. My supervisor said he no problem with my plan, so I gave him notice and made train reservations on the Owl (overnight train) for Friday night. Friday afternoon, having wound up work a little early, I walked past the General Manager's office to say goodbye to the secretary who I was friendly with.

In the course of the conversation I mentioned that I was going to D.C. to visit my mother. It happened my mother lived only about three blocks from the Admiral's apartment on Connecticut Avenue. The secretary had a letter for the Admiral which needed to get to him as soon as possible. Trusting me, she asked if I could deliver it when I got to Washington. I agreed and promptly delivered the letter on Saturday morning.

I enjoyed a visit to the Washington Zoo, a get-together with old friends and my mother's company for a week and then returned to New London and reported to work on Monday morning. I had the usual chit-chat with my friends about what happened at work while I was gone and what I did on my vacation, then I went to my desk and did my expense account for my trip.

Needless to say, my supervisor was dumbstruck to hear that one of his men was attempting to charge the company for his vacation. (This was even before the public had learned about the NASA employee who charged the government for the price of a kennel for his poodle – the idea was unthinkable!) The excuse that I had hand-delivered a letter to the Admiral made no difference, since I was going anyway and it was only a favor to the secretary.

Despite receiving such an absolute negative, I persisted and went up one echelon higher. My department head consulted with the supervisor and agreed that the idea was laughable. He had never heard of anyone with the effrontery to attempt to charge the company for a vacation before in all the years he had been working. No money.

Two rejections did not deter me. I went directly to the manager of Engineering. Such gall was unprecedented! Someone that thought in those terms should watch their step because this company took a dim view of fraud and diversion of funds.

I then took my expense account to the General Manager and got it signed.

The Coffee Incident

I was a familiar in the "rabbit warren" which served as the nuclear design section of the Electric Boat shipyard. In the early stages of a design, it was still considered good draftsmanship to use India ink on starched linen for preparing drawings. Since then, pencil on linen (vellum) or mylar had become in vogue, although now we are preparing drawings with the use of computers. However, at that time, a draftsman who could skillfully and beautifully execute an engineering drawing with India ink on line was considered "top drawer".

I had such a man - John. He was an excellent draftsman, although somewhat touched, having little quirks, like checking the bottom of the Coca-Cola bottles to see if they said New London on them. If they did not, he would carefully line them up atop the Coke machine and insert a nickel for another.

He guarded his fine drawing with great care. Each night, he made sure that it was covered completely with an intact oil cloth to prevent inadvertent damage.

I had to interface with John in that the location of some of the pipes that he had laid out had to fit around the structure that I was designing. John's drawing had by now become a maze of lines depicting all the piping in that part of the ship. It was not only a work of art, it was a great piece of ingenuity. John worked nights with each change and spent hours erasing lines and redrawing them. He became testy with his fellow workers and kept more to himself. You could see that the strain was telling on him.

I came down on a Thursday morning to make a small change to the arrangement and tied to break the ice by pouring him a cup of coffee from his thermos and offering it to him. John, anticipating the extra work required for the change, became rather worked up and flat out refused. I set his cup down on the drawing board well to the right of the drawing and explained the problem.

John, looking in great concentration at the intricate drawing, reached to his right, grasped his T-square and pulled it towards him. This tipped the full cup of coffee over his drawing. Vellum paper, when wet, becomes a piece of laundry, especially when the water is hot.

By the time, the male nurses from the hospital arrived, John was sitting dumbly in an arm chair. They took him off quietly.

Hearing From All Parties

My buddy and I from General Dynamics Electric Boat Division were shipbuilder's representatives at a meeting at Westinghouse Electric Corporation in Schenectady, New York, regarding the prototype for the first nuclear-powered submarine.

Because of the number of attendees, their corporate meeting room was used with the projection room at the rear and a large horseshoe-shaped table facing the screen. The U.S. Naval Officer in charge of the nuclear project for the submarine, up from Washington, was pacing the floor. Representatives of Westinghouse's Steam Division, Metallurgy Division, Turbine Division, Condenser Division, Mechanical Stress Engineering Division, Chemical Engineering group and Boiler Group were there. Their nuclear project was very well represented by their shielding people, their reactor control people, their core engineers and a very worried, Chief Project Manager.

Their project manager rose first and in very polished tones pointed out that the operation of the prototype had shown that a peculiar reaction was taking place that had not been planned on. He further went on to say that we were all gathered there to solve it.

The Naval Officer pointed out the need for this particular ship to join the fleet on its scheduled commission date since not only did the fate of the nation depend on that ship changing the balanced of power in the world, but that the funding from Congress for future nuclear power plants would hang on the performance these engineers displayed in the coming months.

He then called for lights to be dimmed and started to describe the problem in great detail using the slides and the slide projector. The dilemma he outlined was that if the boiler water achieved a high chemical level, it would cause the steam to carry over excessive amounts of water to the steam turbine. This, in turn, would damage the turbine blades through erosion, thereby shortening the life of the turbine.

The only way that a satisfactory level could be maintained was to inject boiler "treatment" into the boiler water. The procedure was to "blow down", that is to say, discharge overboard, the water from the boilers on each watch and replace the water while adding more boiler treatment.

Each involved party had a strong argument for their formula and the dangers of not doing it their way. The battle swayed first in favor of the boiler men and then in favor of the turbine men. The chemical experts had their say and the stress people expounded on the impact on stresses in both the boiler and the turbine. At that point, it was time to break for lunch.

After lunch, the acceptable level of boiler treatment was set at 250 parts per million. The Naval Officer looked around the table and congratulated everyone on the fine work they had done and asked if anyone had anything further to add.

Our engineering team had not had been heard from.

I raised my hand. The Naval Officer asked me what was on my mind.

I referred to some curves I had drawn on graph paper and I said, "Well, if we are going to keep that level, we will have to discharge 500 gallons of water each watch which will carry 25 pounds

of boiler treatment with it which will have to be carried by the submarine. In addition, we will have to carry add another distilling plant to provide "make-up" for the water which is discharged overboard. To carry this boiler water treatment and add the distilling plant will require lengthening the ship by five feet and a delay in delivery of six months."

For us to deliver the ship on time the maximum amount of boiler treatment we can carry is six tons. This means that if we do not add additional stills, the chemical level in the boilers must go as high as 750 parts per million.

The room remained in compete silence for two minutes before the Naval Officer spoke.

"Is there any objection to 750 parts per million? No? Well, let the minutes read that we all agreed on 750 parts per million as acceptable for the boiler ware. Meeting adjourned!"

Drawing the Line

I had been flying all around the country. I was Electric Boat's representative for reactor rod control mechanisms. They were, of course, extremely important. However, they were designed by Westinghouse and were being built by very capable manufacturers in different locations. My function was to go to meetings having to do with the design and manufacture of those mechanisms and to make sure that nothing about them would prevent EB from being able to install them properly.

I also added additional weight to the urgency of producing them and testing them and retesting them properly. I reported back to my boss the situation with each design, how well it was coming along, and when it was likely to be delivered to EB.

Christmas was coming up, so I worked my trips to arrive home the Friday before Christmas, so I could be with my family for the holiday.

As I reported in, I was informed my boss of my holiday intentions. My boss looked worried

I was called in and informed that the Admiral Rickover wanted me to spend the holidays at the manufacturing plants following the tests and that was that. I was flabbergasted. Miss out on Christmas just to sit around watch a mechanic look at a machine going up and down ad infinitum! Something was wrong.

Even though I was exhausted, it did not take me long to make my decision. I was going to have Christmas with my family!

The deleterious results of my actions were laid before me. I was told that I most certainly would never work on the Admiral's projects again and that I would be lucky to stay with the company.

I enjoyed Christmas immensely!

A New Kind of Submarine

I was in my office one day in May. Ed, a fellow engineer, walked in and engaged me in conversation. After a little small talk, he broached his subject.

"Would you like to build a submarine?" he queried.

"I build enough submarines around this place," I said. "I see them every day and I think about them every night. You don't have to ask me if I would like to build a submarine!"

"I mean would you like to get in on an outside project, a couple of us are getting together to build a one-man submarine...."

I thought a moment, considering all that would go into even a small submarine. When I added it up in my mind, I realized the cost would be well beyond what I or my group could meet.

"No way, don't count on me. If you want to go broke building a submarine, be my guest," I said. I thought that was the end of it, unless they decided to spend some money on some steel which would end up in a back yard as a pile of rust.

Much to my surprise, that fall, on one of Ed's visits to my office, he said, "We launched the submarine last Saturday and it works great."

I thought it was some sort of elaborate joke and answered cagily, "Well, sail it around to the pier next week and you can take me out for a dive."

"We can't. It's in Gorton Lake."

"You mean to say you really built it?"

"Sure, Bob, Jim and I spent all summer working on it. It was a lot of work, but we finished it last week and moved it on a trailer to the lake and tested it. It works great", he said.

They sold the tiny, one-man submarine to the Electric Boat Company and it formed the basis for an extended program of small submarines which led to some trail-blazing innovations in the small submarine world. One of the submarines ended up as a monument at the San Diego Sea World.

A Submarine Rescue Submarine

At one point while working at Electric Boat, my job was to run the Marine Development Section. In 1963, the *USS Thresher* sank and submarine safety became front and center. Electric Boat could see possible business in designing and building rescue submarines. We could make the whole idea seem logical if we could somehow demonstrate a simulated rescue.

To this end Electric Boat purchased the little one-man submarine, named it STAR I, (Submarine Test and Research) fitted it out with a skirt which simulated a bottom rescue hatch and trunk, built an aluminum structure to act like a section of a submarine and took the whole lot out to a small bay off the Mystic River.

We tried maneuvering the sub on to the structure to show that a sub-to-sub connection could be made. We were successful and brought Navy project personnel who could dive out to see the actual mate-up take place.

The DSRV (Deep Submergence Rescue Vehicle) project was born.

Disaster Strikes

One day, I went out to the launching ramp with my project members, Dave and Smokey, to test out the new clear-acrylic dome for the one-man submarine. It had been built to take the place of the original heavy steel hatch cover. The transparent dome was a godsend on the surface because it permitted the pilot to see where he was going without opening the hatch which would immediately have swamped the submarine, because it was only an inch or so above the water line.

It also helped underwater, since the small downward-looking ports gave a very limited view of the bottom.

The new hatch cover did what it was supposed to do. Smokey, the pilot, had very good visibility and started to maneuver in close to the dock where I was standing. The submarine was greatly under-powered and very sluggish in its response. It looked like it was going to collide with the underpinnings of the pier. I ran over and fended it off by pushing it with my foot.

Catastrophe! The force of my foot dislodged the latch on the dome and the internal pressure which had built up in the sub, popped it off. The surprised Smokey felt the sea water pouring over the hatch and he ejected like a Polaris missile.

The pride of the program was lying full of water in the mud at the bottom of Long Island Sound.

Smokey, Dave and I lashed a heavy manila line to the sub, used the launching winch to pull it to the launching ramp, moved the winch back to the head of the ramp and pulled it out. Then we drained all the water out.

The next morning, I mentioned to my boss that we had inadvertently let some water into the sub, but it would be dried out by the following day.

Although it required some unofficial repairs after it dried out, it ran as good as new or better and you can believe the hatch cover was well-secured in the future.

Cover Boy

I sometimes had the job of entertaining visiting salesmen pushing products they felt would be the making of the submarine world or at least make life for a submariner much better.

A couple of "visiting firemen" from Allis-Chalmers arrived one day and I met with them in a small conference room near my office. They all took a cup of coffee from the office coffee-maker and sat down to show me pictures of Allis-Chalmer's latest fuel cell.

"Could you use one of these in a one-man submarine?" said one of the Allis-Chalmers' salesmen.

They salesmen went on to cover the pros and cons of the fuel cell. How much room did it use per kilowatt of power? How was the fuel stored? What happened to the waste products? What were they composed of? What voltage did it generate?

It only generated 12 volts, no more than a car battery. But that's what the little one-man submarine ran on – car batteries.

I'll give you a chance to put your money where your mouth is," I said. "If you will provide a fuel cell that will fit in the small space available, we'll put it aboard our one-man submarine."

The terms of the understanding were made clear. I went to Milwaukee to look at the actual unit on test. Modifications were made to our one-man submarine to take the cell and the job was finished. I even got in the one-man sub with the new acrylic bubble-dome hatch and had pictures taken in the water – "under way on fuel cell power".

That photo of me in the one-man submarine was featured in the Allis-Chalmers advertisements in the trade magazines!

Flying Submarine

At the same time, a Sea Lab project was going on at *Argus Island*, an offshore platform a few miles from Bermuda. It was felt that operations with these people would help advertise our capabilities. Through various means, we arranged to have the submarine flown down to Bermuda by the Minneapolis Air National Guard in a C-119.

I went along on the flight. During the flight, I opened the hatch on the little sub, got in and checked out the propulsion motors and other equipment.

It occurred to me that I was operating a submarine at about 10,000 feet in the air.

I am sure that was an altitude record.

Delegation

I had a lovely office at the Sound Lab overlooking the Thames River. I could look out and see the sailboats part the blue waters, their sails filled with a strong breeze and their hulls heeled, showing their bottom paint. They reminded me of saucy sirens lifting their skirts to flirt with me. The ferries proudly moved up and down the river, important with their cargo of men, women and machines. A lobsterman, in the traditional local lobster boat with a cuddy (cabin) and a snatch block (pulley block), hauled pots each morning. I envied him his independence, his ruggedness and his smooth skill. I shared the office with my deputy project manager, Phil. The job consisted of designing a replacement for an inadequate hydraulic system which was plaguing the ships in the Navy's fleet.

The Sound Lab had been tasked to do the job because the ships were needed by the fleet and the years required to pursue normal contracting procedures would force the fleet to make do with inadequate combat capability for an undesirably long period of time.

The job was going well. The novel approach to overcoming the corrosion problem had worked out well. The design was on the right track and watching the boats on the river had given me vacation fever.

"I have arranged to take two weeks of vacation, Phil. The project is all yours. Take care of it until I get back," I said as I left on Friday afternoon.

I had a beautiful, relaxed, eventful sail for two weeks, visiting Greenport, Montauk, Block Island, Point Judith, Newport, Westport, Cuttyhunk and home again.

"It's great to go away, but it's great to get back," I said on Monday as I entered the office. "How did things go?"

"Hi," said Phil. "We accomplished a lot of redesign while you were gone. We came up with a unit that saves 10% of the weight of the old one and has an optimized electric motor and some improved interlocks."

I was stunned. I had carefully gone over all those things with designers before I left and they were to my satisfaction.

"Let me see these improvements," I said. When Phil showed me the new plans, I grew weak.

"That motor may be smaller for the horsepower, but do you realized that the suppliers will have to retool for it, that it will have to be tested and approved and that extra spares will have to be bought, since it is not a stock motor, that operation and maintenance manuals will have to be written for it and the operating personnel will have to become familiar with a new motor! The motor we had picked out was identical to one already in use on those ships, existing spares could be used for backup. No new manuals are needed. The personnel already are familiar with them. Besides, by the time we get that new motor of yours, the ships will be in the scrap yard!"

I went over the other changes and found some good and some bad. The good news made me feel that the new design work and the two weeks were not completely wasted.

Moral: Don't give carte blanche and don't look at too many sailboats on the river!

Entertained by a Salesman

I usually attended the Society of Naval Architecture and Marine Engineering meetings each year. They were held at the Hilton Hotel in New York City and, due to the high price of everything there, cost a bundle.

I took it in stride, however, since it gave me a chance to meet my old buddies and keep up with where they were working and what they were doing, as well as getting an idea of how salaries where moving. I also occasionally learned something useful from the papers that were presented.

Five friends and I left the last morning session and decided to have lunch in the restaurant on the first floor. The menu was on, what appeared to be, fancy, sheepskin vellum and was done in embossed, hand-lettered script. The prices were in keeping with the deluxe presentation.

The six of us sat down in a spacious booth, three on each side of the table, and accepted the ministrations of the busboy who filled our glasses and brought us warm, unsliced bread on a cutting board. While this was underway, a salesman from one of the machinery vendors came over and asked if he could join us and sit at the end of our table. The convivial spirit of the gathering precluded any negative reply and he was seated at the end.

As expected, the meal was delicious, but expensive, especially when the drinks were included. We were all in great spirits and enjoying ourselves immensely. We laughed at old stories about one another and the latest posturings of the "high and mighty".

At the end of the meal, the salesman offered to put the meal on his credit card. We could not permit that and we agreed to each pay our own share as we always did. The salesman said he was short on cash and could we each pay him, and then he would put it all on his card.

The bill came. The salesman added a generous tip and divided the total by six and we all paid one-sixth of the bill. We left the salesman to pay the bill, and headed off to our separate destinations in good spirits.

Thirty minutes later, I said "Damn!! We just paid for our lunches and his!"

But I remembered....

Mother Me

"Smokey, can you hear me?"

"Loud and clear," said Smokey.

Smokey was in the tiny submarine, smaller that the inside of a Volkswagen Beetle, called the *STAR-I*, maneuvering around the pier near the surface of the water. We were talking back and forth on the underwater telephone. Things appeared to be in good shape. I decided we were ready for a free exercise test.

Although the little submarine had demonstrated its capabilities by maneuvering around the docks, we had not yet hoisted her aboard the tender and taken her out to the Long Island Sound for an operation where the sub could dive deeply and run free along the bottom.

It was a crisp fall day. The leaves on the maple leaning over the river bank were turning red and yellow. The water reflected the blue of the sky. A mild breeze was blowing. My blood was running free and fast. It was the day of the trial. Any dive with a submarine was hazardous. This dive was being done for the first time with a crew and a ship that had never put a small submarine overboard in open water. Could it be done safely?

The 60 foot-long old Army "T" boat (a transport tug), the *Fargo*, which was tied up to the pier, had a mast and a crane on its forward deck. We had just checked it out by lowering the *STAR-I* into the water for its last check before the operation. Now we would see if the *Fargo* could raise it out of the water and into its secure cradle on the deck.

Dave Gibson, in his wet suit and snorkel, jumped into the water. The hoisting hook was lowered and he snapped it into the hoisting ring on *STAR-I*. He raised his right arm with his thumb up. Bill Fraser, then threw the switch on the winch and the hoist slowly took up the slack in the tackle. The weight of the sub started to list the "T" boat and she rubbed against the pilings. The STAR-I slowly came out of the water and rose high enough to clear the gunwale. The vangs (piston system) on the boom were now tightened to swing the sub inboard. She moved in beautifully and was lowered onto the cradle. She was lashed down in preparation for the sortie into deep water.

"Any problems?" I asked Smokey as he opened the hatch and stuck his head out.

"None at all, let's go," he said.

"Great! Let's hope things go as good out on the Sound," I thought.

The *Fargo* moved away from the pier and down the river as the shore watchers guessed at our mission. She was painted blue on the hull and brown on her topsides.

She glided through the smooth water of the river proudly bearing her burden. Her crew was alive with anticipation.

After clearing the harbor, I directed the boat to the center of Fishers Island Sound where the water was the deepest. We had prepared a light auxiliary anchor on a long cable so that the *Fargo* could hold position in the deep water during the exercise.

Then we lowered the chase boat, a 14-foot outboard motorboat on which I had placed the underwater phone. It was tied to the stern.

"Things still look good, Smokey. Do you have any problems?" I asked.

"Let's move out," he said.

The hook from the hoist was again snapped into the hoisting ring. The slack was taken out. Smokey in his wet suit, looking like a small gladiator, mounted the STAR-I, opened the hatch and lowered himself in. He paused, smiling while the photographer took several pictures.

Smokey then checked out the motors and controls, raised his right thumb, pulled the hatch tight and dogged it.

The gang then released the tie-downs and the sub was raised clear of the chocks.

Out on the Sound, the *Fargo* had a slight roll and when the sub lifted clear, it started to swing with the roll of the ship. The *STAR-1* looked like a huge wrecking ball ready to destroy the rigging on the *Fargo*.

Everybody rushed to stop it. The tag line on the hook was then supplemented by a long boat hook which Dave used to prevent it from swinging inboard. With the load under control, the vangs were again hauled to swing the boom outboard, the ship again listed, rolling as it did. As soon as the submarine cleared the ship by a comfortable margin, I ordered the hoist to pay out and the little sub surged into the water. While they held if off with the boat hook, Dave again went in and unhooked the hoist.

The little *STAR-I* was free in the briny!

Smokey, who had been waiting for this moment, looked up through the plastic dome, waved, started up the motors and moved slowly away.

Without looking back, he flooded his ballast tanks and disappeared below the surface.

An anticlimactic hush fell over the scene. The vangs were lashed with the boom outboard ready to bring the sub back at the end of the run.

"Okay, Bill," I said. "Let's get in the chase boat and follow him."

Bill and I went aft to the chase boat, got in and untied the painter. We started up the motor, but since Smokey and the sub were nowhere in sight, we had no direction to go, so we shut it off again and drifted.

I set up the underwater telephone and spoke into it.

"Smokey, are you there?" No answer.

Maybe the telephone was pointed in the wrong direction. I rotated it slowly and continued to talk into it. Still no answer. Smokey could not have gotten very far yet. The phone should reach him. I tried some more. Still no answer.

Dave climbed to the top of the deckhouse and searched the horizon. The little sub was nowhere to be seen. The wind was beginning to rise slightly. It meant that the sub would be harder to find when it surfaced and it would be harder to hoist aboard.

I began to be seriously worried. What if the hatch had leaked and Smokey was trying to bring the boat to the surface but couldn't? Smokey was certainly brave enough, but was he foolhardy? I tried again with the telephone in all directions, with pauses for Smokey to answer. No response.

The tide was coming in, creating a westward current. The little sub was very ungainly. It probably was drifting with the tide. I started up the motor and went slowly west. Bill and I kept a sharp eye out for any object which could be the sub.

Suddenly I felt as if a fist had socked me in the gut. If Smokey were lost, how could I ever face Smokey's wife. The thought was enough to crush my spirits. Smokey had a great family with two boys and a girl.

How could I tell my boss? How could I ever continue with the project if anything bad happened to Smokey. I could feel my stomach tie itself into knots. I composed myself and forced myself to sit quietly on the thwart.

"There he is! Over toward North Dumpling Island!" yelled Dave.

I lost no time in motoring over to the sub. Smokey was all right. I could see through the dome that he was smiling. Bill tied a line to the bow of the sub and we towed it back to the "T" boat.

The retrieval was managed well, and when the sub was lashed down and Smokey got to work, he opened the hatch like a conquering hero.

I felt differently, however.

"Where were you?" I blurted out. "We thought we lost you! Do you realize you were down there a whole hour? Didn't you hear us on the telephone? You might have been stuck on an old anchor in seaweed. You could have drifted with the current out of sight. We were scared as hell!"

"Come on, Harry. There was no trouble. It was a piece of cake. You sound like my mother!"

"I know how she must have felt! Much more of that and I'll be an old man," I said.

"Smokey was unabashed, "That submerged run was great! Let's do it again tomorrow!"

File Folders

I was young and inexperienced in the ways of the government.

I needed some file folders that were 14" wide to fit the plots and diagrams I was generating for my job.

"Judy, do you have some 14 inch file folders?" I asked the secretary.

"No, we never use them. You will have to order them yourself. Here is the catalog we use. Find what you want, fill out a requisition and we will send it to purchasing."

I looked up the folder in the catalog. When filling out the form, I placed "12" in the column for *Quantity* and "Each" for *Unit of Order*.

Two weeks later, I received a call from the riggers.

"Hello. Where do you want these crates?"

"What crates?" I asked.

"These twelve crates of folders that were trucked in here this morning."

The Sound Lab still has 14 inch folders for whoever wants them.

Free World Frigate

Lt. Poulos, U.S.N. called me. "Can you do a favor for me?" he asked.

"Sure, Lino. What is it?" I said.

"I met some foreign naval officers who are here in Newport, attending the Naval War College. Their course advisor says they need some naval architect support on a project they are working on called the *Free World Frigate*. I told them we here at NUSC (Naval Underwater Sound Center) had the best naval architect in the world. Could you give them a hand?" asked Lino.

"Flattery will get you anywhere," I said. "But, I have projects to get out and other things I have to do. I can't spend much time working on it."

"Don't worry, this is just a class project. They only meet only once a week on Thursdays. Besides, when I mentioned it to the CO, he was gung ho. It should raise the reputation of the Lab. You know that half the foreign officers who attend the War College go on to be flag rank."

"Okay," I said, now a bit worried. "Whom do I see?"

"Commander John Bath. He is a gentleman and a scholar. Can you get to my office in Newport, next Thursday around ten in the morning? I'll take you down and introduce you to the group."

"Very well," I said. I was not only concerned that this would take away time from my urgent projects, but that some fiery, but difficult to understand foreign naval officer might make the job difficult and counter-productive to my reputation.

I showed up at Lino's office and he took me down to the War College. There I met Commander John "Deacon" Bath, USN, the course advisor for the project. He was the one who had asked Lino for help. This was before the new, impressive huge buildings had been built. The place where the officers met on their project was a dingy poorly-lit wooden loft with some table and chairs scattered almost randomly.

The officers were sitting around a wooden table on which were spread manuals on gas turbines, specifications for weapons, pictures and brochures on various destroyer and patrol boats. A lively discussion was going on about the merits of one point or another.

Commander Bath introduced me. There were five officers, the most senior and head of the project was Captain Schtock of the Belgian Navy. He was a friendly, corpulent impressive person. The other officers were Captain Hazuri, Japanese Maritime Self Defense Force, polite, intelligent and smiling; Commander Fleisher, Federal German Navy, pleasant, but business-like; Commander Utirbe, Colombian Navy, urbane and self-composed; Commander Jackson, Royal Australian Navy, large, ruddy out-going and loquacious.

I realized I was going to deal with some strong personalities. I even wondered if they would be able to agree on anything.

However, things went far more smoothly than I thought they would. Captain Schtock described the project. The offices were developing a plan for a multi-purpose patrol ship which could be

used widely throughout the world. They wanted it to be small, so that it would not be expensive, but heavily armed so that it would be effective. It had to have at least one helicopter.

The ship would have long-range capabilities and the ability to go at high speed. The construction would be such that it could be built in many Western countries and, in addition, the equipment would be selected from different nations of the Free World.

My role in the project would be to take the desires of the officer and incorporate them in a ship which would be built in a wide variety of shipyards and which would have the necessary naval architectural characteristics, such as stability, low drag and seaworthiness to do its job.

I sketched out a freehand profile of a ship, indicating where the various armaments and radars would be placed. Then I showed where the engine would be and the CIC (Combat Information Center) and the living quarters. I followed the general layout of most combatant ships.

The officers made changes to the arrangement and comments on the power plant selection. They gave me some of the brochures showing armaments and gas turbine plants. They discussed at some length, the question of whether the helicopter should be on the air deck or the first platform.

At the end of an hour of rapid fire discussion, I was mentally saturated. They parted. I walked out with Deacon.

"Well, said Deacon, "how does it look?"

"I have never tried to take in so much information and ideas at one time," I said. "I'll bring all this information back to the Lab and try to make something out of it. Their next session is next Thursday?"

"Right. Would you like a drink at the club?"

Deacon and I relaxed on a pair of bar stools and shot the breeze for a half hour as I decompressed.

The next day, I looked over all the pictures and the data I had accumulated. It looked like they wanted a ship about the size of the Pendleton Class of destroyers. I took out all the data, line drawings, arrangement drawings, power requirements, weights and stability that we had on that class of ship.

I then laid a piece of vellum over the arrangement drawing and sketched in the locations for the new armament and radar and the helicopter hangar deck.

I forgot my other work and studied how the power plant could fit into the new engine room and how much fuel oil the ship would have to carry and how fast it would go with the powerful gas turbine engines.

When I added up the weights and found the center of gravity of the new design, I learned that to remain stable, the ship would have to be three feet beamier (wider) that the Pendleton class ships.

After two days of solid work on the new frigate, I had a respectable design sketched out. I then caught up on my other work. The next Thursday, I presented the sketches and design data to the group. A spirited discussion of all the points ensued, mainly between the officers.

I was, by now, becoming friendly with the officers. Captain Schtock was the "father" of the group and Commander Jackson was more and more the spokesman. The group at the bar after the sessions grew to about four and the topics of conversation became very varied covering all parts of the world and inevitably included discussions of the fairer sex.

One of Captain Schtock's contentions was that his wife Mimi could make the best lamb chops in the world.

I made my fourth weekly trip and found everyone very satisfied with the rough preliminary design. Deacon, who was an amateur artist, made a sketch of the ship retrieving its helicopter in a stiff breeze. The writing up of the project was well under way and the officers were feeling the glow of a successfully-accomplished job.

Deacon, who was ever one to push onward, said they needed a small scale model to illustrate the qualities of the design. I suggested I would ask Lt. Poulos for money to get it built by the model makers at the Lab. Lino came through and I had a 18-inch model build to reasonably good detail.

I was ready to part company with the *Free World Frigate* group when Deacon told me that it had been arranged for the officers to present their project to NAVSEA (Naval Sea Systems Command). Admiral Carlisle was running a project to acquire a somewhat larger ship for the U.S. Navy and was interested in hearing the rationale of these officers for the *Free World Frigate*.

I was invited along and went to Washington where we met Admiral Carlisle in his conference room in the Pentagon. After an introduction by Captain Schtock, Commander Jackson in his forthright Australian style expounded on about the many and marvelous capabilities of the *Free World Frigate*. His claims made me blush, but I was certain of what I said and during the discussion that followed I would not give an inch on any aspect of the design.

The meeting from the point of view of the Naval War College students could not have gone off better. They were thanked for their efforts and had a good time at dinner before leaving for home.

Two more events were yet to occur.

I was informed that the CNO was coming to the War College and wanted to hear a presentation on the *Free World Frigate* and would I please be present.

This, thank goodness, was another stellar presentation. The model was located on a stand slightly below and to the right of the podium with a baby spotlight on it. Captain Schtock and Commander Jackson with the others participating briefly, gave a sparkling description of the project and its astounding outcome. By now, I felt that things were just a little overblown, but I enjoyed the enthusiasm of the moment.

The CNO was greatly impressed and shook the hands of each participant, including myself. I felt as if I had just received a medal.

Since the class project was such a huge success, Captain Schtock promised a dinner party for all at which Mimi would serve her famous lamb chops. I brought my wife, Grace, to the dinner party which was a splendid affair with the officers in their various uniforms and an elegantly set table.

Before dinner, cocktails were served and a friendly self-congratulatory aura permeated the group. Then came dinner with the most deliciously-spiced lamb chops I had ever eaten. The repast was a masterpiece that only a European could accomplish.

After dinner, we sat around in the living room and the family room sipping cordials. In that polylinguistic group the subject of languages came up in a pause in the conversation, I felt the urge to show off my high school French.

I went to the fireplace where a bouquet of chrysanthemums were placed, picked the flowers up, turned to Mimi and said, "Je prend votre fleur" (meaning to say "I take your flowers"). Its actual translation was, "I take your flower".

I expected at least a token of comment for my little act. However, no one appeared to acknowledge my sally and I felt that something was wrong. Even Mimi, the perfect hostess had turned to her right and was talking to Commander Fleisher.

I went out to the kitchen where I found Captain Schtock, who had left immediately after my act.

"What is the matter? I said.

"In colloquial French, Harry," the somewhat perturbed Captain said. "To take a woman's flower is to take her virginity".

My evening spoiled, I realized that evening that the longest winning streak has to end some time.

However, the *Free World Frigate* model was put in a case at the Naval Museum at the College and sits there still.

Moral: When speaking to a multi-lingual group, speak your own language!

Command Authority

I was called into a meeting at the Naval Underwater System Center (NUSC). The purpose: a project to determine the variation in sound speed and sound direction at different depths in Block Island Sound. For the uninitiated, this sound could be caused by wave action or from turbulence due to passing ships.

The discussion led to the conclusion that what was needed was an underwater structure with a vertical mast about as tall as a 10-story building with guy wires to hold it vertical, like a radio-transmitting tower. An array of hydrophones (which were essentially underwater sound receivers) would be attached to the mast.

The decision was made to get an old barge, construct the mast in the horizontal position with the hydrophones on its deck, check it out electrically, swing it up vertically with the aid of a crane to its final upright position on the barge, check it out again, then tow the barge into position in the Sound, and sink it to the seabed.

My job was to honcho the placement of the array in the water.

I found an old barge from the Navy's inventory that was located in Trinidad of all places. I arranged to get it sea-worthy and towed up the eastern seaboard to the NUSC.

Meanwhile, at NUSC other facets of the project moved forward. When the refurbished barge arrived at NUSC, the 100-foot vertical mast with the hydrophones was installed. The barge with its central tower and its guy wires angling downward looked like a skeleton Christmas tree like the ones sometimes erected on the roofs of department stores. Electric cables attached to the barge would transmit data from the barge back to the mainland. The whole system was tested out. Everything was ship-shape – ready to move into place.

Now on to planning how to sink the barge successfully. This problem took a lot of thought because, without the proper positioning of buoyancy, the barge was almost certainly going to end up on its side with the array in shambles on the bottom. The whole process the team came up with was sequenced with care. The barge was fitted with buoyant pontoons along two opposite sides. In this way, when it sank, it would be held suspended from them until they were slightly deflated and then a second set with longer wire rope pennants would take up the load, easing it to the bottom.

A tugboat was needed to tow the barge to the site in the Sound and to serve as an operational control for the job. NUSC called on the Navy again and it authorized the use of one of its tug boats.

In conferences with the "blue-suiters", the uniformed Navy, the whole procedure was outlined. However, the Navy warrant officer in charge of the tug boat wanted to sink the barge near the Block Island shore, and then skid it out to position. Our NUSC team objected. We insisted that the barge should be sunk once it was towed to the desired location offshore. However, it was decided to sink the barge in shallow water, skid it over the bottom to its final resting place.

The warrant office in charge of the tug boat insisted that he must be in command of the operation. No one objected.

On the day the barge was to be sunk, the divers were sent out to sweep seabed along the path where the barge would be skidded and time was spent selecting the exact site of the sinking. As a result, it was late afternoon before the barge was brought over to the site. The tug was moored to the barge and portable gasoline-powered pumps were placed on the barge deck and started up to pump water into the hatches on the barge. The full moon came out and the stars pierced the deep blue sky. The throbbing pumps created a peaceful background for the scene.

The NUSC plan called for first filling the end compartments of the barge, then sealing them by bolting down their steel covers, then filling the main compartments in turn. This would maintain the barge's stability until one end went under to hang on the pontoon. Continued pumping would put the other end under and the barge would gracefully submerge to be further eased down by deflating some of the pontoons.

The warrant officer ordered all the tanks to be filled simultaneously to save time. Our carefully-controlled procedure was being ignored!

I hurried over to the warrant officer and said, "The procedure calls for the end compartments to filled and sealed first!"

The officer looked at me scathingly and replied, "I'm in charge!"

Seamen in the vicinity saw and heard the exchange and the suspense began to build as the confrontation escalated. My team and I held a brief discussion. The upshot was that nothing could be done since the officer was in command and we could not overrule him.

Darkness fell and the floodlights of the tug were lit and illuminated the scene. The sea surface was almost glassy. Only small surges from distant shipping disturbed the smoothness of the sea. The drone of the pumps continued.

The diving boat with its diving gear was tied to the barge and made a bridge between it and the tug. The divers in their wet suits, scuba gear and face masks looked like sea monsters moving in and out of the water. Their underwater lights created eerie luminescence around the barge as they inspected the bottom. The tall tower stretched upward and disappeared into the dark night sky. The movement on the deck and pump engines created a sense of action and purpose.

I walked around the barge deck and shined a flashlight down the hatches and I could see the tanks filling. I could sense the "free surface" of the water in the tanks as the barge move from one side to the other. I could see the easy surge of the seas coming towards the barge. I noticed the water in one tank splash out as the "free water" in the tank surged to one side. Ship's stability is an odd thing. A ship will stop rolling from wave action just before it capsizes.

I realized it was time.

I walked over to the warrant officer in formal fashion. I got his attention and in a loud, formal voice said, "I request permission to leave this barge because it is about to tip over."

He looked at the barge which appeared steady as a rock. "If you want to get off, don't bother me, get off," retorted the officer.

I went over to the diving boat and said again in a loud voice, "That barge is about to tip over!" I had been on the diving boat about three minutes when the sea rolled over the gunwale of the

barge. It listed slightly. Water started flowing out of the hatches on the low side of the barge. It did not come upright before the next sea rolled over it. The barge listed even more. Sailors raced for the diving boat. The warrant officer barely made it off in time. They cast off the lines to the barge.

The barge continued to roll and with gargantuan deliberation finally turned on its side. Its huge tower angled toward the horizon. The remaining crew on the barge tumbled into the water and got soaked. The gasoline pumps on deck all skidded down the deck into the water and stopped. A huge ponderous silence took over the busy scene.

One of the sailor said in a loud voice, "That engineer sure knew what he was talking about!"

Due to the careful placement of the pontoon, the roll of the barge was checked in time and no damage to the barge or the array occurred. However, there was some explaining to be done about the salt water-logged gasoline engines, and unfortunately, one diver who was underneath the barge when the barge tipped, suffered a broken arm.

The Media is the Message

I was appointed Science Advisor to the Second Fleet which made me officially a member of the Admiral's staff. I rated a GS-15 which was a Navy civilian rank right up there with the Admiral's.

At the time there was a problem with the fleet's ability to get to sea. Too many ships were found unable to pass power plant examinations which tested both the propulsion equipment and the crew's ability to operate it. Without passing those tests the ship could not put to sea. We, on staff, were asked to encourage improvements. Since I had experience in both navy and civilian ships engineering, I felt I could help with this situation.

I took the schedule for PEB's (Propulsion exams) and LOE's (light off exams) and arranged to attend the next PEB on a destroyer. A PEB is real-life drama. A ship's crew members, are continually being assigned, promoted, re-assigned. However, they must meld to work together and become a team to meet the demands of the examining officers who will test them on their ability to correct any problem the examiners cause. The crew is continually in a crisis mode during the examination. To watch them is real-life drama. I have watched as they shouted orders and ran about the engine room and the fire room meeting the problems thrown at them. I attended a few of these examinations to emphasize their importance.

As the engineering spaces are oily and dirty, crew being visited wears dungarees and the visitors wear coveralls. On my inspections, I would arrive at the ship with my clean coveralls under my arm, the captain would take me to his cabin where we would both change into our work clothes and then proceed to the engine spaces for the inspection. I would insist on climbing down the dirty propeller shaft alley and around the oily boilers. My coveralls would be filthy at the conclusion of the inspection.

The proficiency of the fleet did improve because of the attention being given to the problem. The word got around about the inspections. I found a surprise when I boarded a destroyer on my schedule.

The captain of the ship himself greeted me at the gangway. He was dressed in his "dress whites" with medals (not just ribbons). He saluted me smartly as I came down the gangway and I returned the salute. He suggested that I might not need to change into my coveralls. His ship was immaculate, I could not get dirty in the engine spaces if I tried. I went down and inspected the shaft alley. It was as clean as a hospital room.

The Navy knows how to communicate. When I left I decided that my inspections were no longer needed and that was the last.

Hard Ball

The following tale is absolutely fiction. I can say that with certainty because no one involved will say otherwise.

I was nominated to attend the Naval War College in Newport, Rhode Island. It was their Senior Course in their Professional Military Education program, so I was among men my own age and maturity. Luckily my long separation from scholastic work proved to be no problem as I settled into this very mature course of study.

I found the courses fascinating. The students were, except for a sprinkling of government civilians like myself, all professional military officers. There were so many Army officers, Air Force officers and Marine officers that the Naval Blue "suiters" were barely in the majority.

The buildings are located on Costers Island which abuts Narragansett Bay. The cold winter winds sweep down the open water in the winter and take the warmth from every bone of anyone foolish enough to step out of the building. The college, when I went there, was using old buildings. They stood in majesty overlooking the choppy waters. Their disdain for the weather, however, did not extend to the people who had to inhabit their drafty rooms and fight the damp, chill wind to visit the Officer's Mess on the point. This ambiance lent a realistic feeling to the studies which were all about one man's struggle against another.

In addition to studies of strategy, tactics and the theory of war, the students were given a course in management. The training was intended to equip these possible Pentagoners with the skills and know-how to fit into the Washington environment. Since most of the officers had spent their careers in military jobs, this was valuable training because very few people in Washington will respond to a direct order. Persuasion and political savvy must replace the straightforward and direct approach these officers were used to.

They learned about planning documents, the entire planning cycle of the military budget, discounting for future costs, and a host of other details that are necessary to know and understand if an officer is to function in the budget process of the nation's capital.

One professor, who will remain nameless, had his own brand of management which he felt was necessary for an officer to practice, if he were to survive in that dog-eat-dog world. He called it "Hard Ball".

He was a small, feisty man with a pleasant, cheerful appearance who gave you the impression that he had grown up on the streets of Boston, surviving by his wits. However, he had very respectable credentials in the teaching and management profession. The point he made was that, in addition to doing your job right, you had to be able to throw your competition off stride.

"For example," he said, "you are a vice president in a bank and the president is retiring. You and John Busby are the prime candidates for the job. You find that John is anxious about what you are doing and walks by your desk occasionally to glimpse what you are working on."

"One day you leave a memo written by you, purportedly to the president, on your desk where he can see it. It explains unconvincingly why John should not be sent to a distant branch office."

"Later, have your secretary get John on the line. After you have picked up the phone and before you address him, speak, as if you were talking to the president, about how just because John has fouled up his latest assignment, it does not mean that he is all washed up. Then appear embarrassed, when you realize it is John on the phone. Next, before John goes into an important meeting on the job, tell him that you are pushing for him and that he should be firm with the boss because the boss likes strong people around him. Naturally, the boss gets into an argument with John and you get the job!"

The professor outlined a few other ploys to use in rattling the competition so that the students would get the idea.

This was only a small part of the course, but the professor did such a good job with it that he acquired the nickname, Hard Ball. The term also applied to his examinations which were very tough. Statistically, more students failed his course than any other course in the college. The statistic was a source of great pride for him as he pictured himself as the epitome of the "Hard Ball" ethic.

The students in my class felt they owed Hard Ball a tribute. They knew that he intended to give them an exceptionally tough exam, since they had argued the ethics of his favorite tactic.

A well-known management professor from the Harvard Business School was coming for a guest lecture, so we circulated the rumor that Keith was about to be replaced by that professor. The ringleaders, also found that the worst student in the class, who also will remain nameless, was the son of the CEO of a large company. They got him to discuss with Hard Ball, over coffee, the problems his father was having with the management of his company and how he needed someone like Hard Ball to put backbone into his organization.

A few days later, he told Hard Ball how much passing the management course meant to him and how it would prove to his father that he was capable of taking over the company and how crucial it was to his career.

One of the other students mentioned, within Hard Ball's hearing, that the failing student was arranging a meeting between Hard Ball and his father, after the course was over, to push him for this very high-paying job.

When the Harvard professor gave his seminar, they made sure the applause was enthusiastic and that many students crowded around the professor to absorb the words of wisdom that dropped from his lips. They mentioned, where Hard Ball could overhear, that the Harvard professor would bring much prestige to the school when he came.

Hard Ball was beginning to feel the pressure. He thought he was in danger of losing his job and if he gave the class his tough exam, the CEO's son might fail and his hopes for the new big job would disappear.

He compromised with his conscience and gave the class an easy exam. The class did better in that course than any class in recent memory. The class had made their statement. Of course Hard Ball found out about the deception, but was nevertheless proud of his boys who really learned how to play "Hard Ball".

"They deserved it," was all he would say.

Inspector General

It was a rainy Monday in March when I went to see George, my project manager.

"George, the project is going very well. It looks like the prototype tests will prove out the system. We have budgeted money for buying the parts and material for the forty systems we will have to build. Since this is a high priority job, why don't we start the ordering process now, so that when we get the go-ahead we can put in the requisitions and get the purchasing department started immediately?"

George said, "I was planning to do just that. Can you get the materials people to go through all the parts and material lists and start writing the DD 526s?"

I got them started that afternoon. They all realized how badly the Navy's fleet wanted the new systems. When the first prototype worked well on trials, the word went through the fleet, so the ship's officers were already pinging on their squadrons to line up their ships for the new hardware.

The requisition writing went well and within two weeks we were all ready. The biggest purchase was for electric motors. Their procurement was going to cost over a half million dollars and this put it into a special procurement category.

George received authorization to procure material for the production units on the first of April and requisitions were ready to be signed off by Wednesday.

I called the Procurement Department to let them know that the orders were priority - especially the motor procurement. This procurement was simplified because the motor was a standard Navy motor which was in continuous production. Each order cited the document from NAVSEA which gave it top priority and each requisition had to be signed by the hierarchy of my department and George's department. This signing-out procedure lasted a week and a half, because half the time the required signer was off on travel or for other reasons.

As the requisitions were signed off, they were sent by mail to the procurement department at the Lab where the smaller items which the Lab had authority to purchase were sorted out and the larger procurements were then sent to the Naval Regional Contracting Office (NRCO) in the center's headquarters.

George and I followed them every other day. About the middle of May, I called George and asked how the procurement was going.

"I call NRCO almost every other day. They don't sound too sharp. They have spread the requisitions around their office and have, however made Janet the "honcho", so I guess we'll start to see some action," he said.

The middle of June came around and I was beginning to feel I should schedule the work in the shops. However, I was not going to alert the shops, if I could not come up with the materials. I called George again.

The answer was still the same. Some of the less expensive materials were being put on order, but the orders for the big items, especially the motors, had not gone out yet.

In any event, I obtained permission to have a large storage area set aside to marshal all the equipment when it did arrive.

By the middle of July, George and I were so frustrated with the slow procurement process, we set up a meeting with the head of procurement at headquarters.

This was a donnybrook. Tempers flared on both sides. The buyers pointed out all the regulations which had to be complied with. George and I pointed out the months which had gone by. George threatened to go to NAVSEA and talk to the Type Commander and ask him to talk to the boss of procurement in Washington.

That would not be necessary said NRCO. Things would start to move.

By the beginning of September, the request for procurement for the motors left NRCO after having been blessed by everyone including the Navy lawyers. The vendors had 30 days to respond so nothing could be done until the beginning of October. Finally, the contract was approved to start build the motors on October 26th. This was roughly seven months after the start of the procurement process. George and I were relieved and angry.

"H.T., I hear that a captain from the Inspector General's Office is going to visit the Lab next week, expressly to review procurement procedures. Let's get our stuff together and give him an earful. I'll bet he would love to get some ammunition on the procurement department, as well-documented as our motor buy," said George.

I made an appointment to see the captain who represented the Inspector General's office. The meeting took place in the Technical Director's office. Since the captain was making an investigation, the TD was not allowed in the office.

George and I took out our documents and described in painstaking detail all the frustration they had experienced in this lengthy procurement process.

After about a half hour of discussion, the captain cleared his throat and said, "This is one of the most remarkable examples that I have seen in some time. I am very impressed. I would not have believed you get it done in such a short time span. You two fellows are to be congratulated!"

Life at McDonald's

I was sent to the huge Navy Base in Norfolk, Virginia to make the latest modifications to one of their surface ships. I had a crew of men with me and they stayed at the Lake Wright Motor Inn. During the day, they all wore work clothes which consisted of dungarees or khakis and similar shirts.

Because it was so hot that summer, I had decided to shave my head. For some unknown reason, this prompted me to let my beard grow. By the time mid-summer rolled around, I had a full beard and presented a very buccaneering appearance.

The job was a big one and involved hydraulic oil and grease. My gang and I took on the appearance of a gang of ruffians. Generally, I was a very, fastidious person and despite appearance, I kept myself very clean and despised dirt and filth.

The gang, despite the extra overtime pay, wanted to get the job over with and get home to their wives and kids. As a result, no one objected to each day having a quick lunch at McDonalds. So each noon, we would hop into the rented car and pop over to the local franchise. When the six of us walked in, we usually made an impression even in that Navy town, where individuals with strong personalities were not a rarity.

The third day we ate there, I noticed that the flies were bothering us. They particularly like my bald head which drew them in for some reason.

I called the busboy over and told him to get the manager.

"Are you the manager?" I asked when the man approached our table.

"Yes. What can I do for you?" he said.

"Never mind what you can do for me, I said brusquely. "I happen to be the district McDonald's inspector undercover, and if you don't have the flies out of this concession by tomorrow at ten a.m., I'll yank your franchise!"

I then turned and discreetly winked at my crew.

We enjoyed fly-free dining for the rest of our stay.

The Ladder and the Governor

While I was in Norfolk, Virginia installing some new sonar equipment on the USS Glynn with a crew from the Sound Lab, I needed a wooden ladder for the electricians to run cable in the overhead. A metal ladder would conduct electricity and would be hazardous for that kind of work.

"Here is the account number for our job and the purchase authorization," I said to Randy, one of my crew members. "Pop over to the supply depot and stub a wooden step ladder out for us. Remember now, not a metal ladder."

Randy left and I and the gang kept working.

Noontime came around and Randy was not back yet, so we went out to lunch without him.

"You wouldn't believe that place" he said when he returned. "I didn't even get near a ladder, much less a wooden step ladder. It is nothing but gobbledygook and computers and the computers are down half the time!"

I figured that Randy did not use the right technique with the Supply Department personnel, so I gave Randy a job and went over to the Supply Building myself.

I entered and looked around. The building was four stories high and there were people going in and out, but there was no directory or receptionist to inquire the location to acquire a step ladder.

I stopped a civilian and asked where I could get a ladder. "That's probably Department 45 on the third floor," he told me.

I went to the elevator and got off at the third floor. I saw people looking at catalogs with pictures and descriptions of all sorts of items. I searched for about fifteen minutes, but I could not find any reference to ladders. People were queued up waiting for their turn to talk to the supply department workers.

I got on one of the lines. After about twenty minutes I had my chance to talk to a woman. In response to my query about ladders, she said that I should look up the ladder, I wanted in one of the catalogs on the shelves. When I said I hadn't been able to find it in the catalogs, she volunteered to hunt for one on her computer.

She first had to refer to a code book which gave the code for every class of material they carried in the supply department. Having trouble finding the class for a ladder, she called to another worker who suggested two or three codes to try.

She turned back to her keyboard and started to type. "Oops, the main frame is down," she said as the screen went bland. After waiting a few minutes for the computer to come up again, I left to try again to find the ladder I wanted in one of the books.

I consulted with one of the clients who looked as if he knew his way around. "I've never requisitioned a ladder," he said, 'but I'd think it should be over there in the 432.8s"

I looked in the 432.8s and found scaffolding and wooden walkways, but no ladders. I rummaged further and finally located the book I needed. I copied down the code, description and price of a

wooden step ladder which would do the job and started back to the woman I had spoken to before.

However, a bell clanged somewhere and I realized the afternoon had disappeared and the place was closing down.

I walked out, vowing to "storm the citadel" the next day. I went back to the ship and worked another three hours with my crew.

The next day, with much more confidence, I walked into the supply building and up to the third floor. I found that the woman I had talked to the day before was not at her station, so I stood online for another worker.

When my turn cam, I showed the description of the ladder to the worker and asked if I could be given one of those ladders.

"Let me see your I.D.," said the worker. I took out my Sound Lab I.D. and showed it. "This is not a local I.D., I can't check this out. You will have to go to the second floor and get them to certify your account."

I asked just where the office was and took the elevator to the second floor. I found the office and after a short wait, I told the young lady my problem. She looked at my I.D., and asked me for the charge number to which I wished to use to charge the ladder. I gave her the eight digit alphanumeric code for the project I was working on.

She said "Sit down, I'll be right with you." I sat down in one of the wooden arm chairs near the counter. After about ten minutes, I re-approached the counter. I caught her attention and asked if I was cleared.

She said, "I've been trying to call your facility to confirm the charge number, but I cannot locate the accounting department there, do you know their number?"

"Ask for Mary Lou Hutchings," I said.

A few minutes passed and the girl nodded, laughed and said "Okay, goodbye".

"Here's your chit. It's good for \$500. I've confirmed with Mary Lou. She said don't spend it all in one place."

I thanked her and left to go back to the third floor. It was past lunchtime by now, but I felt I should finish my business now.

The worker I had spoken to before was leaving for lunch, so I waited on line for another worker who had just come back.

When my turn came up, I presented my description of the ladder. The worked turned to the computer behind him and typed for about a minute, apparently having some trouble.

Finally, he turned back to me and said, "We are out of wooden ladders. We should have some more in by the middle of next week. If you want an aluminum ladder I can get you one of those."

"No. I need a wooden ladder," I said.

"If you give me your phone number, I'll call you when they come in."

"Never mind", I said. In a week, I hoped to be out at sea. I went back to the USS. Glynn. On the way back to the motel tonight, let's stop and buy a wooden ladder at a hardware store," I said to the guys. "I'll put it on my expense account!"

Several days later I asked to speak with the "Exec" to let him know all was ready and to find out the exact sailing time, to make sure my men would be aboard. The ship was scheduled to sail the next day with the rest of the fleet.

The "Exec" was busy at the time, but I was invited to sit in the wardroom and have some coffee while I waited. Joe Brooks, the "Exec" opened the hatch door and entered the room, walked over to the coffee stand and poured himself a cup of coffee and sat across from me.

"It doesn't look like we are going to make it. Our emergency diesel generator is out of commission. The governor shaft snapped yesterday when we were checking it out and without that generator we can't leave the pier."

"Stub one out from supply, I said immediately realizing what I had said.

"You must be kidding," said Joe. "We have been trying since yesterday."

After some commiseration, I left for the motel to give my gang the word. It created some additional concern for me because Harold from Naval Sea Systems Command (NAVSEA) was coming from Washington that night to ride the ship and witness the testing of the new system. In addition on the other end of the trip, the other civilians and I were to be taken off the USS Glynn to a tugboat out of Jacksonville. Florida on a rather tight schedule and this delay could foul up that arrangement.

The next day, the crew of the USS Glynn and I watched as the rest of the task force moved away from the piers and headed out to sea. The lonely Glynn looked sad and forlorn, deserted by her fellow ships. The crew felt the stigma as well.

That evening Joe called me at the motel. "We are sailing tomorrow, so be aboard and ready at 0800," said Joe.

"Great! Don't worry, we'll be ready," I said.

The next morning as we sailed down the harbor and out to sea, I climbed up to the bridge and saw Joe.

"How did you ever get the governor out of supply in such a short time?" I said.

"We didn't. The crew volunteered to take money out of the ship's recreation fund to buy it in town," said Joe.

I felt like I had a brother. We had both been beaten by the system.

What's In a Name?

When I was working at the Naval Underwater Sound Lab, I was called into Commander Jim Verkade's office. "You know something about ships, maybe you can help us get a new diving boat. We have been diving from what amounts to a raft and we want to put our decompression chamber on our diving boat, so we won't have to bring a casualty all the way home if we have a diver in trouble on station," he stated.

"We will be doing a lot of work off Cape Cod this summer and we will need it then. Maybe we can get an excess boat from somewhere else in the Navy and modify it for our use. It should be about 65 feet long and it needs to be a good sea boat. Something like those fishing trawlers which work out of Point Judith," he continued.

I agreed to help and started looking into how to locate such a boat. The boats in the Navy were administrated by the Small Boat Code at the Bureau of Ships (BuShips) at that time. All Navy boats had to be purchased and disposed of through them. I made a few calls to Washington and set up meeting with Small Boat Code people.

I took the Amtrak Owl to Washington and hailed a cab at Union Station the next morning, arriving at the "Main Navy" as it was called, in plenty of time for the meeting.

Main Navy had a very impressive entrance. It was here that the ships for the greatest Navy that had ever existed were conceived and procured. Billions of dollars were spent every year on purchasing new ships, overhauling them and maintaining them. It surely would be no problem finding a little 65 foot diesel-powered boat for the Sound Lab.

After passing through the entrance hall, up the grand staircase and down the hallway to the branch hallway which led to the Small Boat Code department, I found myself on a wooden bridge leading to a cluster of nondescript temporary wooden buildings which had been erected during World War I and still served the Navy as its Technical Center.

The Code was in a moderately-sized, dusty, poorly-ventilated office filled with various types of file cabinets and a variety of desks. The people appeared to be quite busy answering phones and working at their desks or drawing boards. The walls were of that soft fiberboard which is used in temporary buildings, but the many coats of paint made it look almost like textured plaster.

In a short while, I was invited into the office of my contact, Willard Hefner, and I sat down on a chair at the side of Hefner's desk which had folders and folded plans strewn about on it.

Willard was very busy and over-loaded with work. However, after searching through a loose-leaf binder which listed that status of all small boats in the Navy, he found that there were some Landing Craft (LCMs) which were being surveyed and they could be had for the taking. No other boats near our requirements could be had. In fact, the Navy did not have many boats of the size desired and those were all in high-priority slots.

These landing craft were barely large enough for our purpose and were notoriously bad actors out a sea where our divers wanted to use the boat. What's more, they would need extensive alterations.

My high hopes were beginning to dim. I had expected considerably more of a choice than just these LCMs.

Hefner said that the LCMs were it. They were practically new and in good shape. They were presently at the Amphibious Base in Norfolk, Virginia. He looked further checking back and forth through his book.

"Not that's the only candidates we have," he said.

Your only other alternative is to build a new boat," he said.

Hefner informed me that a new boat of the desired size, meeting all Navy requirements would cost about a million dollars. He referred to a recent boat of 60 feet which did not have any diving capability which had cost \$900,000 when built the previous year.

The shock of that figure rocked me. Where would the lab ever get that kind of money? It looked like that avenue was out of the question.

"What would we have to do to get one of the LCMs modified," I asked.

Hefner said the plans for the alterations would have to be handled by BuShips. They would probably have a contractor do the actual plans, but they would oversee the work and the Sound Lab would have to fund both the contractor and the BuShips personnel doing the work.

This looked like a lot of time and money. My dream of going home with the boat problem solved began to evaporate.

The plans for installing the decompression chamber and its piping would have to be handles by the Salvage and the Machinery Codes, respectively.

The plans and specifications would have to be put out for bid, a shipyard selected, and the job put under the control of the local Superintendent of Shipbuilding, who would be responsible for the fabrication to Navy specifications and delivery of the completely converted vessel.

Already knowing that my trip was a failure, I asked if they could estimate the cost of the design and specifications. The response was far more money that was available at the Sound Lab.

I realized the situation. My hopes were shattered. I knew that even if the Lab had the money, I would be lucky if I got the LCMs modified and delivered within the year.

I thanked Hefner for his time and consideration, saying that I would discuss it further with the people at the Sound Lab and I left for home.

I got the Merchants Limited and went back to the lab with the unhappy news.

I set up a conference with the diving crew to break the bad news to them.

The older ones, having experienced bureaucracy before, could understand the situation. To the younger ones, it just didn't make sense.

They didn't know how they could do it, but they knew they needed a seaworthy diving boat.

"You can save money," they said. "We know enough about the chamber to install it ourselves and since it is our lives at stake, we would prefer to it, so we knew it was done right."

However, they knew the characteristics of the LCMs and refused to consider those boats.

"We just put a new building near the pier," said Commander Verkade, "and we did not have all this hassle about that. Why do we have such a problem with BuShips?"

A possible solution crossed my mind.

"Why don't we call this a diving facility?" I said. "Then since it is not a "boat", we could forget about BuShips. They are so busy, we would be doing them a favor."

"That will never work. Everybody knows a boat is a boat!" said the discouraged chief.

After some thought, Commander Verkade said, "Wait a minute, that's not a bad idea. We are not buying a boat. We are going to buy a diving facility. And don't you forget it! I'll see the Commanding Officer at "happy hour" tonight and if it's a go, I'll call you in the morning."

A simple set of specifications for a Coast Guard-approved stock fishing trawler was prepared and sent through the mill as a "diving facility". Although some straight-faced double-talk was needed to get it past some skeptical procurements analysts.

The boat was procured for less than it would cost to prepare the design and specifications to alter the LCMs.

In six months, the finished boat, having been inspected and approved by the Coast Guard and Commander Verkade, was under power on its way from Arkansas, where it was built. The divers installed their own chamber and other gear, used it that summer and for many years after that.

The Computer Purchase

I was finally home for a while.

I had spent a good deal of the last six months at sea on submarines. I, and the rest of the Sound Lab ship riders had nursed a set of computers, banks of amplifies, time signals, tape recorder and other assorted "black boxes" which were located in every nook and cranny we could find aboard the ships. I had taped data on every facet of the operations that could conceivable be of value.

I had spent weary hours sacked out on a torpedo storage rack, looking at the soft light of the lamps, at the polished brass and bronze of the operating gear and listening to the soft rush of the air vents, the only perceptible noise on the stealthy submarine. I had thought of my home and family and fresh, green grass and Sunday in the bright sun of the beach and the startling fall colors of the maples. However, the days dragged on one after the other in a weather-less monotone.

The progress of the exercise was of keen interest to me, however, I kept up-to-date on what was happening by discussing it with officers and chiefs, so life was not entirely boring. I kept logs of the happenings, so they could be correlated with the data on the recorders.

When I arrived in port, it was like coming out into the sunshine after a long spell of cloudy weather.

After each trip, I had boxed up all my tapes and shipped them back to the Sound Lab by secure Navy transportation. The Installation Group at the Sound Lab which had installed the equipment, now carefully removed it and trucked it back to the Sound Lab for future use on other exercises.

When I came back to work after the last cruise, I looked at the ton of tapes and realized I was in trouble.

The project had collected a huge amount of data. While out at sea, we had the recorders running 24 hours a day for days on end. Time, location, and 16 channels of data were packed on the reels of magnetic tape. There was not one box of tapes - there were eight for each four cruises. In each of the boxes, there must have been about 50 reels of tape.

I had to analyze the tapes and they had to be handled confidentially.

I obviously needed access to a computer. I checked with the central computer facility at the Sound Lab.

"Gene, in about three months, when I get this data sorted out and work up programs to pull the stuff I need off these tapes, I'm going to need about 12 hours a day of you main frame for about six months," I said to Eugene Mannion, who ran the Sound Lab's computer facilities.

"No way," said Gene, "I have those CPUs working 24 hours a day now. Last month I started the paperwork chain for another. It will be at least a year before I get delivery. By that time, the load will have doubled anyway!"

"Incidentally, how do you handle secret data?" I asked.

"Wait a minute, with all the users we have, there is no way we can guarantee secrecy."

"Thanks," I said.

I walked into my boss's office.

"Mike," I said, "I don't see how we are going to get the data analyzed by July when you have to go to the sponsors for more funding. The main frame not only can't handle our volume of business, but they will not guarantee secret handling of the information."

"Well, order a computer of our own that we can lock up in a vault. They cost about \$75,000, but we can come up with the money. We will use the A600342 account. It has funding for equipment with it," said Mike.

Remembering what Gene had said about delays in delivery caused by the need for justification at every level, I was a bit discouraged. I, however, went to the purchasing people.

I found that very tight controls had been set on all computer purchases. There was an initial justification which had to be signed by the project manager. Then there was an additional requirement for the department head to review all possible avenues of performing the work in his department without the need for additional facilities and then declare that none of these possible avenues would be feasible. Then it had to go to the head of the laboratory for similar justification. After passing these hurdles, the request had to go to a central laboratory committee on computer facilities which met three times a year.

On the assumption that this committee approved the request, it had to be signed by the Director of Navy Labs, after which it was returned to the Regional Purchasing Office which would then put it out for competitive bids - another lengthy process.

I added this process up in my mind and realized that it would be a year from next July before I would have the information that Mike needed to forward to the fleet to improve its effectiveness and, incidentally, to show my sponsors that the four cruises were worthwhile so they would continue the project.

I had an idea. I called Purchasing and asked if I could order spare parts for the small computer we were using.

"Spare parts do not require the usual approval. Your project manager's approval is sufficient," I was told.

Spare parts had another beautiful attribute. They did not have to go out for competitive bidding. I then called the salesman for the computer company.

"Paul, I need a lot of spare parts for your TDR-334. I am going on a long cruise and don't know what part might go down. We can't afford to abort the exercise for one part, so I would like to get a complete set of spare parts for the unit."

"Harry, that's a lot of money. You know that we charge a lot more for the parts when we sell them as spares than we do for the parts when we sell them as a completed unit," he said.

"Well, Paul, I don't mind if you send them to me as one unit. I do need them in a hurry, however."

Paul began to catch on to the ploy. "I tell you what we can do," he said. "I can give you a bulk rate and not charge you any more than for a new TDR-34."

"Beautiful, I will send through the P.O. for one complete set of spare parts and you send me the entire set as one complete operating unit."

"You got it".

I sent through the requisition for one set of spare parts and we had our computer in two months and I had most of the data ready by July 15th. The fleet was happy and Mike was happy.

And I was happy.

(P. S. Probably by now this ploy has been found out by the bureaucrats and they have it plugged!)

The MACS Install

The Mobile Acoustic Communications System (MACS) project was the mother of all acoustic at-sea experiments. The USS Nautilus portion of the project was one part of this extensive study of the transmission of sound in the ocean. A stationary acoustic range (AFAR) using reflecting dishes had been installed in the Azores. The project now needed information when underway on the oceans of the world. An atomic-powered submarine was needed to carry similar antennas throughout the oceans and power them. The USS Nautilus was selected for the job.

Alan Ellinthorpe of NUSC was in charge of the complete Acoustic Study reporting to DARPA and I was the Project Engineer for the USS Nautilus installation. NUSC had completed a preliminary study of the installation which was in principal accepted by Admiral Rickover.

The entire project installation was run by NUSC, i.e. me. We had NUSC support as needed. We had local engineering and drafting help and, of course, Electric Boat. We had to install on the main deck of the USS Nautilus a tiltable (through 45 degrees) acoustic antenna that was over 30 feet high and consisted of three circular acoustic sensors and projectors. We also had to install on the keel of the ship a downward pointing acoustic array ten feet in diameter. To power these projectors we had to install three 10KW power supplies.

I had the amplifier vendor modify the amplifiers such that they would fit through the submarine's hatch for quick movement into the forward torpedo room where they would be installed and from which they would be removed.

We needed to determine the hydrodynamic and hydro-elastic properties of the antenna so we had the antenna manufacturers build a scale model of the antenna for use in the David Taylor Model basin in Carderock, Virginia. Since it had to simulate the dynamic vibration of the antenna, it was made of brass and scaled to suite. The tests were run to give the drag on the ship of the array and we learned that we had a serious vibration problem which we cured by putting spoilers on the struts.

The Carderock people (some of which were Webb alumni) told us that the drag on our antenna model exceeded that of any previous test they had data on.

Since the ship was to be able to travel at maximum speed during the experiments the reduction gear had to be replaced with one having tougher teeth. In addition, we had to show that the ungainly projectors and other work performed did not make the ship less safe when she was under way.

To make the problem a little more difficult, the ship had to be configured so that when in the experimental mode it could be returned to battle condition within 48 hours. NUSC received the blessing of Admiral Rickover, so Al Ellinthorpe called a meeting at Electric Boat (EB) of the interested parties, EB, Supships (Superintendent of Ships) and myself. Bob Wilkinson (EB & Webb '51) was given the lead for the EB work. Frank Wood, (EB & Webb'40) as given the job of evaluating the safety of the ship, and calculating the re-ballasting. The shipboard work had to be accomplished during its overhaul period which was underway. I was the Sound Lab representative for the entire project, not only for the installation of the huge antennas and the downward pointing array but also for the shipboard work at EB, the installation of the 10 KW

power supplies, air conditioning and electronic equipment put aboard. I relied on Sound Lab Engineering Department local draftsmen and hired a local engineering firm to do the work that I could not ask EB to do. The ship's captain was Commander Ancony whose job included reporting on our progress to Admiral Rickover.

The coefficients for the new configuration of the ship were put into the EB crew training simulator so that the ships helmsmen could train for the navigation of the altered ship. The job was done by local contractors, EB engineers and NUSC engineers, EB provided the manpower and equipment to perform the work. The work was completed on time and within budget and the altered ship sailed down the Thames River.

After it was deployed, the removal time was clocked, it was found that it took only 36 hours to return the ship to battle condition.

The Boss Helps Out

The waves were about seven feet high and the *Two Aces* was rolling and pitching wildly. Tons of water was pouring over the low gunwales of the stern of the harbor tug, pulling at my legs as I was holding on to the stanchion. We were lying-to tending the noise survey buoy.

The *Two Aces* was out in the ocean off Long Island setting up to take sound measurements on the new nuclear submarine. The measurements were made by lowering a line of hydrophones into the water. To keep the tug's rolling and pitching motion from whipping the phones through the water and obscuring the noise from the submarine, they were hung from a thin, vertical buoy drifting behind the tug which was almost unaffected by the seaway. An electrical cable connected the buoy to the tug through which the power for the pinger and the hydrophone signals were conducted. The hydrophone array had a pinger on it which sent out sound signals so that the submarine could locate the array and head for it.

The buoy was inflated with air to make it buoyant. Cutting the air hose to the buoy would let it fill with water and sink it. This precaution was taken to avoid leaving a hazard to navigation on the surface in case it had to be abandoned in just such a precarious situation such as the Two Aces was experiencing at that particular time.

Communication with the submarine was sporadic and unsatisfactory. The captain of the tug, Mike Rossini, called me and yelled, "We're getting the hell out of here, cut your damn cables."

I was anxious to do just that. While Mike called the sub to abort the operation, I groped my way to the side holding on to the stanchions and cleats or whatever I could grasp, took out a pair of wire cutter pliers and sheared the wires and the hose. The buoy and its line of hydrophones quickly sank to the bottom. The *Two Aces* turned for home and the motion of the tug became purposeful, no longer rolling wildly, the afterdeck cleared of water and I could thankfully make my way into the wheelhouse where Jack Williams was at the wheel.

"We got out of there just in time," he said.

"You can tell your boss that he can God damn well forget his sound survey, if he expects us to go out in this kind of weather again," said Mike.

I, of course, had a problem. Wind to a desk-bound manager is something which rustles the leaves and waves the flag on the flagstaff. Its life-threatening potential is hard to understand, especially if it means the loss of valuable equipment. To Jim Keith, my boss, the weather had been pleasantly cool that day with a nice breeze.

Jim was almost apoplectic. "We only have one more survey rig left and that doesn't have a buoy on it. If we don't get this survey done the Navy will tell us to forget it and we will have to hunt for a new job instead of getting a raise."

Properly chastised, I promised to be more circumspect in the future. However, the Navy rescheduled the survey for the next week and I had to be ready.

Where was I going to get a long, thin, buoy from? The shipyard had built the one we lost and there was no time to build another. Working into the weekend, I, in desperation, took a fire hose

from the wall of the building, got the weekend shift in the machine ship to make me a fitting so I could inflate it from the air hose, and attached it to the spare line of hydrophones.

The air-filled hose might act like a long, thin buoy.

I was ready on time for the next noise survey. However, this time, Jim informed me, that he was going on the trip to make sure that things were done right.

The weather was quiet and calm as the *Two Aces* left the New London harbor. Everybody on board was relaxed. Things looked good. By the time we reached the rendezvous in the ocean, however, there was a State 2 sea which might be described as reasonably rough, but not bad.

I, with the aid of the crew deployed the array and the fully-inflated buoy overboard. The buoy, instead of riding vertically, lay on its side on the surface. It was too light and the hydrophones it supported were bouncing around underwater making quiet listening impossible.

Jim was again distraught However, when I reduced the air pressure in the hose, making it limp, it sank lower in the water and greatly reduced the hydrophones motion. Jim was happy. However the seaway was getting higher and conditions on board the tug, which was lying-to, were beginning to become uncomfortable.

Hank Kettle, who was the measurement survey liaison on the submarine, contacted the tug and said she was approaching the operating area and would we please activate the noise-making pinger so the sub could get a good bearing on the array.

The pinger, which had been operating perfectly, took this moment to stop working.

I took the microphone and said "Wait one, we are having temporary difficulty with the pinger."

I then checked over the pinger system as far as the cable into the water. All was fine. The fault must be in the cable underwater, probably an open circuit due to the earlier wild motions of the buoy.

I said to Jim, "The problem is at the array, we can't fix it out here on the station with all this rolling and pitching."

Jim, who was by this time feeling very queasy, said, "We will have to abort. Give me the microphone, I'll call hand and tell him we are calling it quits."

I, however, took the microphone and said, "Hank, our pinger has gone out. Ask the Officer of the Day to take a radar bearing on us from where you are now, and then heading in our direction, rig the ship for the survey condition and come as close as you can without the pinger. We will record the event and clue you in on how well we make out."

"Roger," said Hank.

The submarine passed the tug and buoy at a greater distance than usual, but the noise was recorded. I was happy. However, Jim was in the tug's pantry in great misery from seasickness.

The submarine continued making runs at the array until all the required ship conditions had been recorded. I was very satisfied with the day's work.

The tug's crew was happy because it meant they would not have to come out on the high seas in their harbor craft for another try at the ship. They hauled in the buoy and the hydrophone rig, stowed it securely, and headed for home.

The sea was rough until the tug passed through the Race into the Long Island Sound. The sky was clear and we started to pass sailboats taking advantage of the breeze. Jim felt somewhat better and came out on the deck to rid himself of his nausea. The clear air and the puffy clouds made him feel almost his old self again.

"It's a good thing I came out on this trip," he said. "We did much better this time."

A Philosophy for the Layman

One Engineer's View of the World by Harrison Loeser

Everyone lives his life according to some set of rules and reactions. These reactions spring from deep within his mind. They determine how he will react to a given set of circumstances at a given time. The chain of circumstance runs from back to his earliest childhood. Some trivial coincidence in one's early life could easily shape ones future. The person inherits certain characteristics from his parents and inquires certain mental attitudes from the way they treat him and how they treat other people. He comes into contact with his neighbors and other people. His outlook changes but he reviews and assesses all these new stimuli in the light of his past experiences.

It is the purpose of this tract to provide additional stimuli for its readers and to base it on his past experiences so that he will be encouraged to seek a solution to his problems. It is the purpose also to encourage the reader to a better understanding of his fellow man so that he may deal with them towards a greater mutual satisfaction. It is also an attempt to evaluate some of the great questions that arise in all men's minds.

The babe, in his mother's womb is encompassed by a tiny world. The extent of his knowledge is bounded by the membranes which feed him. He knows what little he must know of this world of which he is the sole inhabitant. At birth his life is vastly complicated by the introduction of many more people. His outlook will continue to increase for many years. As his universe expanded, he knows more and more about himself and his fellow man. As he grows, he becomes heir to much great learning passed down to him by his teachers and his religious advisers. He may roam the earth, as many men have, meeting princess and paupers. He may talk to many men and see many places, smell many odors, touch many textures, taste many foods and hear many sounds. He may look far into the reaches of outer space. In future years, he may even travel into these spaces and find many fascinating things. However much he may see, feel, hear, smell or taste, there will be things in this world of which he never could conceive.

Any man, even this almost omnivorous man, will be bound by the unknown. And Shakespeare says "there are more things in this world, Horatio, then your philosophy dreams of." This statement is an acceptance of the fact that man is man. This does not mean that he cannot guard against the unknown. He may guard against it by venturing out into it and trying it. He will venture into the desert and learn about thirst and aridness. He will try the waters and conquer them. It is our explorers and pioneers who by carrying the action into the unknown, removes its fears and dangers.

This concept brings us to the conception of God. He is envisioned by many people and thought of in many ways. Some people have split the one God into many Gods. One characteristic of most Gods is the knowledge of the unknown. God knows those things that as mortals will never know. His knowledge encompasses those things which our philosophy never dreamed of. God is universally beseeched for help by his believers, either directly or through the intermediary of a

priest. The priest himself may have knowledge beyond that of the petitioner and may immediately help that person.

The truest and most lasting help derives from the man's direct appeal to his God where he finds the sure powerful knowledge that this omniscient being is quietly imbuing him with the strength and knowledge to solve his problems by his own hand. In this, he is not alone. The human race is a multi-faced polyglot of people who have many conflicting aims and desires, but behind the race as a whole, is a powerful driving force which is like a flood crest, tumbling down the pages of history. Each man and woman contributes his share to the final result whether he be with the flood or against it. This energy is behind us all, helping solve the daily problems and freeing our minds for the constructive jobs ahead.

Much of the unhappiness in the world is caused by a lack of those basic personality requirements which are needed by all men. Men needs first, companionship. Without that he is like the unfertile bud that withers on the branch. Next, he needs recognition. He needs recognition that he is a personality infused with a soul and capable of many things. When the time comes in his life that he feels the need for a mate, he needs satisfaction of his sexual desires. Finally he needs the daily sight of his offspring growing up, carrying part of himself on into the infinite stretches of time.

The need for companionship was recognized when Eve came to Adam. This is the most basic and elementary solution to the problem, a man and a woman. However the gregariousness of humans is a well-known fact. We gather in cities. We go to conventions. I think even hermits would like to have conventions. Conventions would enable them to discuss how they would best avoid people and how to make their caves more comfortable. Companionship is essential, many times for reasons of safety. The need for someone to stand guard, while others sleep, for instance. It is essential for doing many jobs. This need for companionship leads to an organization, however primitive, which later develops into government. A person will seek companionship when changes threaten. A fellow human being gives one a sense of comfort and standing in the community in this manner. This need for companionship is basic to most in animal life.



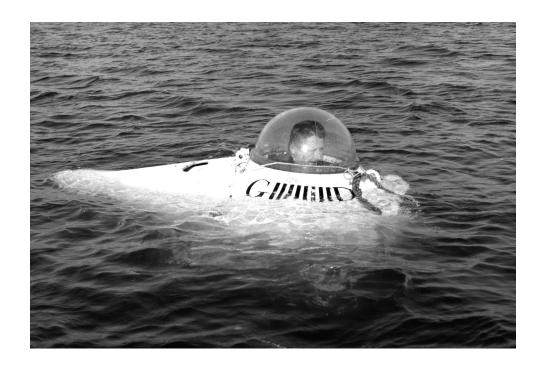
Original location of Webb Institute in the Bronx, NY



Current location of Webb Institute in Glen Cove, L.I.N.Y (Photo courtesy of Webb Institute of Naval Architecture)



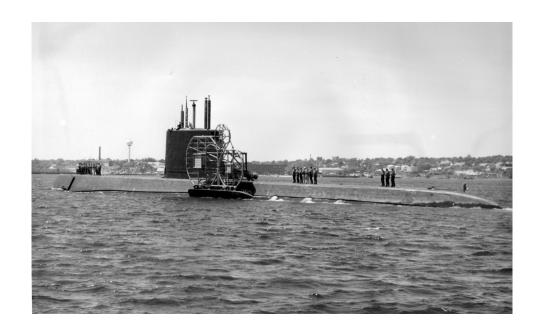
The USS Nautilus, the first nuclear-powered submarine in the U.S. Navy's fleet. Built at General Dynamic's Electric Boat Division in Groton, CT and launched in 1954.



In 1963 Electric Boat began developing its first attempt at a one-man submarine, the STAR-I (**S**ubmarine - **T**est **a**nd **R**esearch). This was the start of its GD-DSRV (Deep Submergence Rescue Vehicle) program. Here Loeser puts it through its paces.



The USS. Glynn was used to test sonar arrays developed by the Navy's Underwater Sound Center (NUSC) for underwater acoustic research.



The Naval Underwater Sound Lab adapted the USS Nautilus to support the Mobile Acoustic Communication System (MACS) which was used for acoustics research. (Photo courtesy of the U.S. Navy Submarine Force Library and Museum, Groton CT)

About the Author

Harrison T. Loeser began his career as a Naval Reserve Fireman Third Class on the U.S.S. Tillman, a ship headed for Cuba that found itself in the center of the Hurricane of 1938. The next year, he was accepted at Webb Institute of Naval Architecture, graduating in 1943 in the middle of World War II. As a Lieutenant in the U.S. Naval Reserve, Loeser then built submarines at the Portsmouth Naval Shipyard and later repaired them as Assistant Design Superintendent at the Pearl Harbor Naval Shipyard.

After the war, he joined Bethlehem Steel Corporation where worked on the design of naval and merchant ships, including supertankers, the C-4 Mariner Class cargo vessels, passenger liners, the S.S. Independence and S.S. Constitution, as well as dry docks and drill platforms.

In 1953, he joined the Electric Boat (EB) Division of General Dynamics, where he worked on the design of the containment shield for the first nuclear-powered submarine – the U.S.S. Nautilus. The company gave him the opportunity to earn his Masters in Naval Architecture and Marine Engineering at MIT, where he received training in nuclear engineering. Upon his return, he was made an engineer on several nuclear projects, including the USS Skate (the first watercraft to surface at the North Pole), the USS Triton and the USS Seawolf.

He became a supervisor in the new Research and Development Department where his projects included the Submarine - Test and Research (STAR) series of one-man submarines, as well as work on the General Dynamics-Deep Submergence Research Vessel (GD-DSRV) project. He went on to a position as Director of Marine Systems in the General Dynamics corporate building in Rockefeller Center, New York. Before leaving EB, he became the Chief Naval Architect of Advance Engineering and Program Development at Bethlehem Steel Shipyard in Quincy, Massachusetts. While working at EB, he was awarded several patents involving arrays and radiation processing.

In 1968, Loeser accepted a position at the Naval Underwater Systems Center in New London Connecticut (now the Naval Undersea Warfare Center in Newport, RI). While employed there, he helped select and locate acoustic arrays on the Trident-class submarines. He also attended the Naval War College in Newport and was appointed Science Advisor to the U.S. Navy's Second Fleet operating in the North Atlantic and Norwegian Sea. He worked again on the USS Nautilus, this time heading up the installation of the Marine Acoustic Sonar (MACS) arrays that tested long distance sonar transmission. He was also responsible for installing research equipment on submarines for polar research.

He retired in 1984, but continued his acoustics work, writing the *Sonar Engineering Handbook* (1992) and the *Fundamentals of Ship Acoustics* (1996), in addition to other books and publications.

In his retirement he enjoyed sailing the waters off of southeastern Connecticut. He volunteered in the community as a deacon, Sunday school teacher, Boy Scout commissioner, treasurer of the West Farms Land Trust, ethics commissioner, charter revision commissioner, and as a Friend of Harkness Memorial Park.



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