

## *"My Story"*

By Bill Brown

### Education

I was educated at the University of California, Berkeley. I began in 1953 in Physics, and took the standard curriculum with two significant exceptions.

(1) I had not quite committed myself to Physics, so I also studied Astronomy, for 1 year, taking the full professional level course.

(2) All students at that time were required to take 4 years of ROTC, (Reserve Officers' Training Corps). I took a two-day comprehensive test on everything under the sun. Soon, I was summoned to the ROTC office to sign a paper that swore that I had no pre-knowledge of the test, did not cheat or collaborate with anyone else etc. When I asked why I alone, had to sign this letter, it was explained that I had a perfect score! They then offered me a four-year scholarship, including books, all the materials I might need, and a stipend of \$50 per month, a lot of money at that time.

I was surprised, elated, and excited, all at the same time! I was especially enthusiastic, because there was a sea-going history in my family: My grandfather Anderson had been captain of his own ship, and I had joined the Sea Scouts, and we owned a small landing ship from the World War which we kept in the Berkeley Yacht Harbor.

I ought to have explained that when my brother and I were younger, it was clear to my parents that we were both quite bright, and my father had deliberately moved the family to the small, wealthy, city of Piedmont, California. My father had to stretch financially to do this, but my scholarship carried part of the increased burden. My tuition was paid for by the Navy also. My father moved us to Piedmont where the schools were known to be excellent. Each year almost all the graduating class went directly to the University, as I did.

### Navy Days

After graduating in 1954, and receiving a membership in the Honor Society, Phi Beta Kappa, I entered the Navy. I soon found that my ship, the U.S. Boyd, "DD-544", was just entering dry dock for several months of overhaul! That was the signal to Kitty and me to get married. The dry dock, Mare Island, was just north of San Francisco. In the meantime, Kitty's father, a retired naval officer and extremely competent at whatever he did, scheduled the church ceremony in Piedmont, and arranged to hold the reception immediately after, at the Naval Officers' Club at the Alameda Naval Air Station. (Alameda is a city next to Oakland and Piedmont.) Kitty's mother rushed to get the announcements printed and sent all within a week!

When I reported to my ship at Mare Island, the Executive Officer asked, "Aren't you the young fellow who just got married?" I said, "Yes", and he said, "We have no duties for you yet, so why don't you take a honeymoon for a few weeks?" After being assigned to a Quonset hut in the officers' section, we left for the Russian River country, (north of San Francisco), and had a truly wonderful honeymoon.

After graduation, marriage, reporting to my ship in Mare Island, and going on our honeymoon, we returned to our little Quonset hut (QH 459 A), and I reported to my ship in the dry dock. I found that I was the Electronics Officer, and that I had managerial duties. I was the leader of the Electronics Division, of about 15 men, and I oversaw replenishment of the ship's electronic spare parts while we were in dry dock. Later, when we went back to sea, these same men were responsible for repairing faulty electronics, and serving as radarmen.

After a total of about three months in dry dock, we went back to sea on our "shakedown cruise", during which everything on board the ship is tested, and if necessary, repaired. This done, we headed for our permanent home in San Diego Harbor. Kitty and I moved into a nice apartment, ending up in Imperial Beach on the waterfront. We had a sandy beach right in front of us! We soon bought a car, and explored the countryside when duties permitted. At that time, San Diego was a relatively small, uncrowded city.

We took the ship on exercises outside the harbor. Later, on one of the exercises, we had a collision with a tanker at night, and very nearly sank! We were towed back to dry dock in San Diego with a hundred pumps shooting water out of our poor damaged ship. No one was killed, but one of our two engine rooms was flooded, and extensive repairs were necessary. While our ship was being repaired, the three other ships in our squadron returned to our base in Japan. When our repairs were completed, we joined them in our base south of Yokohama.

### At Sea

We cruised from our base south of Yokohama, on the main island of Honshu, to our southern base in Sasebo, on the southern island of Kyushu. There, we had shore leave while a few minor repairs were made to the Boyd. When ready, we headed for the Philippines, stopping at the US base in Subic Bay, then on down to Manila, where we stayed for several days. Next stop, Hong Kong: a port bustling with commerce. I bought two custom made and fitted coats for Kitty for a pittance, which were ready overnight. It was an exciting port with many excellent restaurants. I vividly remember Baked Alaska for dessert and a delicious seafood dinner.

Then it was south to Bangkok, Thailand on a goodwill tour in the harbor. The Thai government issued an invitation to a formal dinner party at the embassy, which called for us to wear our dress whites! We were all quite excited at the prospect. Then, our officious executive issued the order that our attendance was mandatory! Not enjoying being ordered about in such a way, I quickly arranged to be one of the "off duty" contingent, so as to stay on our ship. Those familiar with my psychological profile were not surprised. When most of the other officers came back drunk and half-sick, I just smiled inwardly.

Finally, we headed back to Sasebo where a different sort of adventure awaited Kitty and me. We became enamored of a light blue Austin-Healy "100", which was displayed prominently on a local car lot. After counting our pennies, we bought it outright. It was the most beautiful sports car I had ever seen. It featured a second, electrically-activated cone clutch, and when you were in high gear, by just flipping a dashboard switch, it caused the car to squirt ahead, adding about an extra 20 MPH! We loved that little car, and brought it back to the San Francisco bay area with us. Ultimately, we fulfilled our Korean War duties by patrolling the two islands, Quemoy and Matsu, off the coast of China. No one bothered us by attacking. We survived the war unscathed and returned to our home base in San Diego.

### Back in California

I remained in the Navy, but being of a rebellious nature, I did not like to take orders, and in the Navy, I found myself constantly being ordered to do things. I constantly heard, "Brown, write a letter to....." Orders came from the older officers of limited intellect. The younger officers left to pursue their civilian careers as soon as possible. I am not an elitist, but I did tire of the situation. I started, not disobeying orders, but avoiding them or doing them as I pleased. I began receiving poor "Fitness Reports" that foreordain your career in the Navy. This did not bother me, because I had no intention of remaining in the Navy. However, the constant stream of orders finally affected me psychologically. I fell into deep depression, and that was soon evident to everyone. I was transferred at sea, which is a hair-raising procedure, to a larger ship with suitable medical capability. Soon I was visited by a phalanx of priests, ministers, etc. from a polyglot of religious faiths. They asked me what my religion was, of course. I answered directly, "I have no religion". "You will be visited by a psychologist soon", they declared, and left. I found the psychologist to be fully educated and quite bright. The lady interviewed me for a couple of hours! When the interview ended, she declared, "It's too bad that I didn't get to interview you before your tour of duty started, I believe I would have screened you out!" I was assigned to the Corona Naval Hospital, and had several discussions with the staff psychiatrist. He at length informed me that my case was being reviewed by "BuPers", the Navy's Bureau of Personnel. I was apprehensive, but could only wait. One day, an unfamiliar officer requested that I answer a few questions. All were routine, but somewhere in the middle of our conversation, he casually asked, "If you were to have a chance, would you resume your duties?" I answered hesitantly, "Yes", but I had my misgivings. That single question and my assent cast the die, although I found that out only later. One fine day, orders came directly from BuPers, that I was to be given an Honorable Discharge, and released from duty! It was then that I realized the import of that key nonchalant question to which I had answered, "Yes".

### Graduate School

As a hedge, I had already applied for entry into graduate school at U.C. Berkeley, where my excellent undergraduate performance stood me in good stead, and was accepted. After some formalities, I was discharged, and because I had taken leave and traveled to Berkeley, registered, and begun the semester,

Kitty and I literally raced to Berkeley in our Austin-Healy and I entered normal classroom attendance seamlessly. I was on top of the world!

I was weary of the total focus on theory found in Physics courses and I found out that because of all the formerly secret information on nuclear matters had been released, a new course of study had been started in the School of Engineering that offered a one year Master's Degree in Nuclear Engineering. I changed from Physics to Nuclear Engineering. In those two semesters, (1956-1957), I learned how to design a nuclear reactor, (using a slide rule and pencil and paper!). However, I never used this knowledge because the "Three Mile Island" accident, and soon after, the Chernoble disaster, frightened the people so badly, that no new nuclear power plants were built during my career. Even today, when a new generation of inherently safe nuclear reactors has been designed, they are still shunned in the U.S., although not in some other countries.

### Denmark

Upon completion of my Master's Degree, I took one more year, mainly to study mathematics. I was offered the chance to do my Ph.D. thesis at the Livermore Laboratory. Kitty and I rented a small house within walking distance of the Livermore Laboratory, and Kitty took a job as a technical editor at nearby Aerojet General Nucleonics in San Ramon. We lived happily there for four years, while I completed my thesis. As the culmination of my thesis project approached, we planned to have our first child at the time of graduation. Walt Brown arrived on schedule February of 1962, and I undertook to find a job in Europe. I found an excellent job in the Physics department of the Danish Risoe Laboratory, within a short train ride of Copenhagen. Kitty and I had studied Danish for the last six months in California, and could speak passable Danish after about a half year in Denmark. I joined a Danish team measuring the half-life of the free neutron, at the "DR3" reactor. Our measurement proceeded slowly, as we fought for the lowest possible background, crucial to a precision measurement such as ours.

I also joined the Danish Chamber Chorus, and we rehearsed and performed in the Roskilde Cathedral. My most exciting performance was the Faure Requiem, my favorite requiem to this day.

During our stay in Denmark, we had planned on having more children. For one thing, having children in Denmark is quite inexpensive. Our second son, Craig, did not take advantage of this. He delayed his arrival until later, when it was expensive!

The day came, after two years, when it seemed like a good time for us to head back to the U.S. I had a cousin living in Los Alamos, who had showed me pictures of the pine forest surrounding the Los Alamos Laboratory there. I made application, and a Los Alamos Lab scientist was dispatched from England to interview me at Risoe. I got the job, and we sadly left the Denmark that we had come to love.

### Los Alamos

I joined a group in the Los Alamos Lab Physics Department measuring neutron cross sections, using time-of-flight techniques with neutrons produced in underground nuclear explosions. It was an exciting series of measurements, but soon the usual boredom, that was a curse to me, set in. I soon found out

that it was not easy to change jobs in the Lab, and I started my own project on the side; my idea for a model of solar system formation. Right from the outset, the model involved fragmentation, and I developed my interest in that subject.

### Lake Almanor

One thing that Kitty and I missed in New Mexico was water! There were precious few lakes, which we loved. In the summer, we vacationed at Lake Almanor in the California Sierra, were enchanted by it. We bought a waterfront lot, and planned to build on it someday.

Los Alamos offered a long summer vacation, and we always made our way to Lake Almanor each summer. We camped there on the beach in tents, cooked our dinners on a fire pit made of rocks, and read to our boys every night by the fire light. My largest effort was to read J.R.R. Tolkien's books from "The Hobbit" through the "Lord of the Rings" trilogy. Neither of us has forgotten those evenings reading to the children, nor have they. They are now over forty and far away. Eventually, enough people moved in around us so that camping was inconvenient. We took what money we had, and built the part of the house, designed by Kitty, that contained the needed bathroom.

### Sequential Fragmentation

During one summer we spent at Lake Almanor, in about 1980, my thoughts turned to fragmentation. Sitting at our kitchen counter, I wrote down the key equation of what has become "Sequential Fragmentation". I was so bemused with the simple equation that I had written down, that I just sat there stunned at its universality. But when I returned to Los Alamos, I had to put it aside and get on with my ordinary weapons work. I continued to work secretly on my "Solar System Formation" model, that contained fragmentation at the outset. These clandestine projects were kept hidden in my lower desk drawer, and whenever things got slow, I would bring them out and quietly work on them.

I had a series of weapons related jobs at Los Alamos, but by the time I reached retirement in 1987, I had the "Solar System" part of my own project nearly finished. After retirement, Kitty and I moved into the then finished house on the lake. I soon finished the final "Solar System" article, but continued working alone on my fragmentation theory. I was about tired of fragmentation.

Ken Wohletz, (who I had been sneaking off to see during the workdays, in order to pursue fragmentation), invited me to join him for a summer in his volcanic ash lab in the basement of the Physics building, in 1992. I got an education from Ken in measuring the mass distribution of volcanic ash. I tried the fragmentation theory on the mass distribution of the ash, and it worked well! So, soon he and I were routinely fitting his ash mass distributions to look for trends and patterns. Invited back the following year, I found that Ken was automating his analysis routine and I spent many hours in the library looking for fragmentation analysis candidates. I found many, some fanciful, but "Sequential Fragmentation" seemed to work well for almost all of them! I published what applications that I had, and, at Almanor continued to work on the comparison of the various, mostly empirical, other distributions that had been used over the years on correlation and analysis of particle mass distribution. This resulted in a published article by Ken and me.