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**PART  
ONE**

**I**n 1956, I elected to fulfill my military service obligation and do my two years of active duty. In making this decision, I was certainly influenced by my brother, who knowing my interest in submarines introduced me to the Commanding Officer of the Newark, New Jersey, Submarine Reserve

New York as possible and I was subsequently ordered to the USS *TUNNY* (SSG-282) located in Port Hueneme, California. At this point I did not really comprehend what the "G" in the ship's designator meant, except that *TUNNY* must have an offensive or defensive missile launching capability.

# EARLY MISSILE SUBMARINE ADVENTURES WITH THE USS *TUNNY* AND THE *REGULUS I*

*The recollections of  
a crewman highlight*

*a trio of pioneering fleet-  
type diesel submarines*

*which were the first to  
prove the practicality  
of submarine launched  
missiles in the  
atomic age.*

**BY STEPHEN  
EDDS**

unit. With the Commanders' help I transferred to this unit from an electronics reserve unit in Summit, New Jersey. I soon found myself in New London, Connecticut, attending Submarine ("Potential") school. After successfully passing a series of psychological, physical and other relative examinations, I returned to New Jersey and immediately applied for active duty. After "extending" for three months, I was accepted for Submarine School and reporting for duty in July 1956.

Submarine school seemed rather easy, of course it helped if one studied a little, and it most assuredly provided the student with the basics necessary in understanding the nomenclature of the "Fleet Type" submarine, particularly the basic air, water, electrical and hydraulic systems. Prior to graduation I had applied for a "Home Port" as far away from

After graduation and a short leave, I flew to Los Angeles and found my way to Port Hueneme. The bus left me off at the main gate of the Naval Construction Battalion Center and the duty sentry called Guided Missile Unit 90, located on the base, for instructions as to what to do with me since *TUNNY* was at Mare Island for routine maintenance. In time I was picked up and taken to the GMU 90's building and upon arrival, was told that the unit's van would be going to Mare Island in the morning and that I would be a passenger.

The next morning I was directed to this van and was quite surprised at its looks and content. It was the standard gray Navy van except a small antenna stuck up through the roof and the inside contained a radio transmitter/receiver and was further equipped with control devices for the missile. In essence the van was a

replica, electronically, of the missile. The purpose of this arrangement was to give the missilemen practice in "flying" the missile and this could be accomplished as the vehicle was moved from one location to another and the controlling submarine, or any other source having compatible control and guidance equipment,

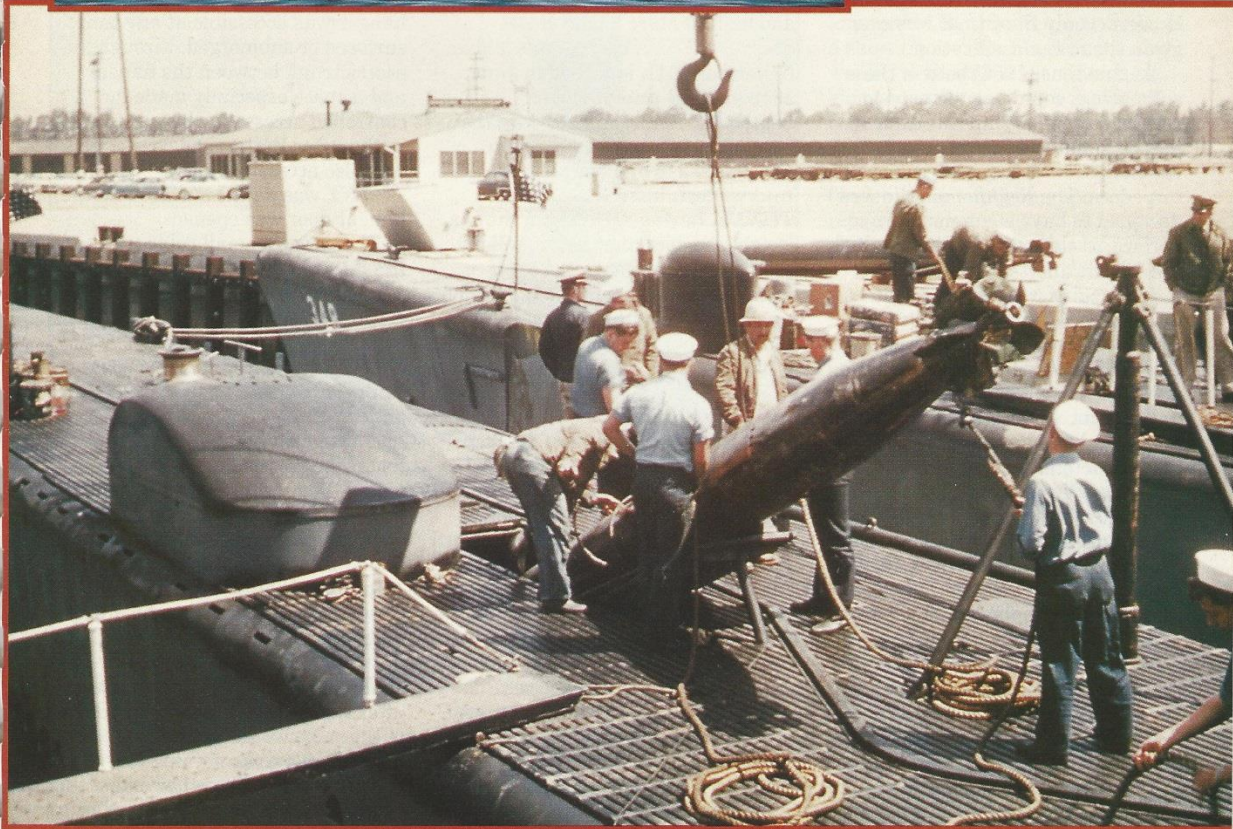
remained in another place. My next surprise was when the driver gave me a web belt and a .45 automatic and told me to wear it. So off we went merrily on our way to Mare Island. At this point I began to wonder what I had gotten myself into.

One thing about this trip was that it afforded me the opportunity to

learn a great deal about the history of America's, particularly the Navy's, development of various missiles and the application of a particular missile to a given defensive or offensive purpose. This history "lesson" went back to the days of the German missiles and in particular the adoption of their "V1" and the creation of our "Loon" missile.

The Germans had also developed the idea of adapting submarines as a delivery vehicle for missiles and in 1942 successfully launched a missile from a submarine, the *U-511*, but at this point further development ceased. It would be interesting to know what might have evolved if development had been continued.

**USS *TUNNY* (SSG-282) seen with her watertight *Regulus I* hangar abaft her sail. The missile's wings were folded when stowed in the hangar. *TUNNY* was a much acclaimed warbuilt *Gato*-class which won two Presidential Unit Citations and nine battle stars in WWII service; plus five battle stars for service during the Vietnam War.**



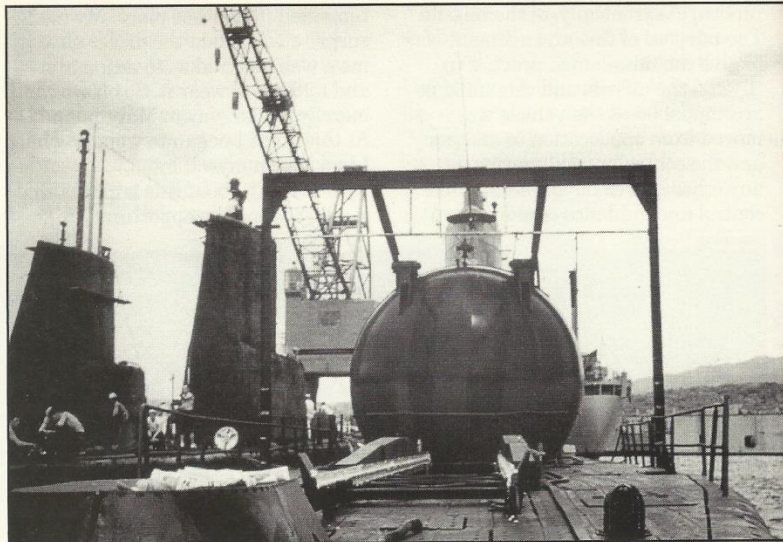
Crewmen carefully load a torpedo aboard the *TUNNY* (SSG-282) at Port Hueneme, California, in 1956.

Experiments with the "Loon" ultimately led to development of the "Regulus I." This missile was one of the first of the Navy's missiles capable of carrying a nuclear warhead and then for any appreciable distance. What I was told was terrifically interesting and I am sure, at the time, esoteric. At this time I was also advised about the confidentiality of what *TUNNY* was involved in and specifically its equipment, including the *Regulus I* missile, and the boat's operations in general since it was all highly classified.

In addition, it was explained to me the previous and current roles the other two submarines in GMU 90, the USS *CUSK* (SS-348) and USS *CARBONARO* (SS-337) played. It is interesting to note that beginning in 1948, *CUSK* and *CARBONARO* were converted to handle missiles but were initially only fitted out with a launching ramp. Subsequently a hangar was added that could hold two *Loon* missiles. Both boats received extensive modernization, ("Guppy" conversion), and modification to fit the needs as required by the missile. However, only the *CUSK* was ever given the SSG classification.

At this time (1956) both of these submarines could only be used to control a *Regulus I* missile after it had been launched. However, both retained their ability to fire torpedoes. The *Regulus* missile was designed to have a submarine surface, in this case *TUNNY*, launch the missile and then pass control to another submarine, for example *CUSK*. *CUSK*, in turn, would pass control to the third submarine, *CARBONARO*, who would then guide the missile to its "dump point" or the point where the missile would be allowed to go into a "free fall" prior to detonation.

Chance Vought built the airframe, approximately 32 feet in length, of the *Regulus* missile, the boosters (2) were made by Aerojet General (one on each side of the missile) and supplied 33,000 lbs. of thrust for approximately three seconds and then jettisoned. The guidance system, basically the PIX radar, was designed and built by Stavid Engineering in Plainfield, New Jersey. The powerplant was a conventional jet engine as opposed to a "ram" or "pulse" jet used by the Germans and in some of our early missiles. It should be noted that the



The jury-rigged arrangement to open the hangar door. In the foreground are the missile's launch rails.

missiles used in "practice" exercises were painted red and could be recycled, as they were equipped with a retractable landing gear.

The *TUNNY* (SS-282) was originally a *Gato*-class submarine and built at Mare Island Naval Shipyard. *TUNNY*'s keel was laid in November 1941, launched in June 1942 and was commissioned September 1942. After the war, the *TUNNY* was decommissioned in February 1946 and placed in the reserve fleet. In February 1952, *TUNNY*, having a "thin skin" hull (a weight consideration for the weight of the hangar that was to be installed) and being in good condition was taken out of the reserve fleet and received similar conversion as had *CUSK* and *CARBONARO*.

At this time *TUNNY* was recommissioned. In the following April she was decommissioned and then in July 1952 was reclassified as an "SSG." In March of 1953 *TUNNY* was again placed in commission. Subsequently *TUNNY* would be reclassified as (SS) in May 1965, APSS in October 1966 and reclassified again in January 1969 as LPSS. In June 1969 *TUNNY* was decommissioned for the last time and was stricken from the record. *TUNNY*'s illustrious service career came to an end on 19 June 1970 when the USS *VOLADOR* (SS-490) sank her as a torpedo target.

Basic to *TUNNY*'s conversion to an SSG from an SS was the installation of a large hangar,

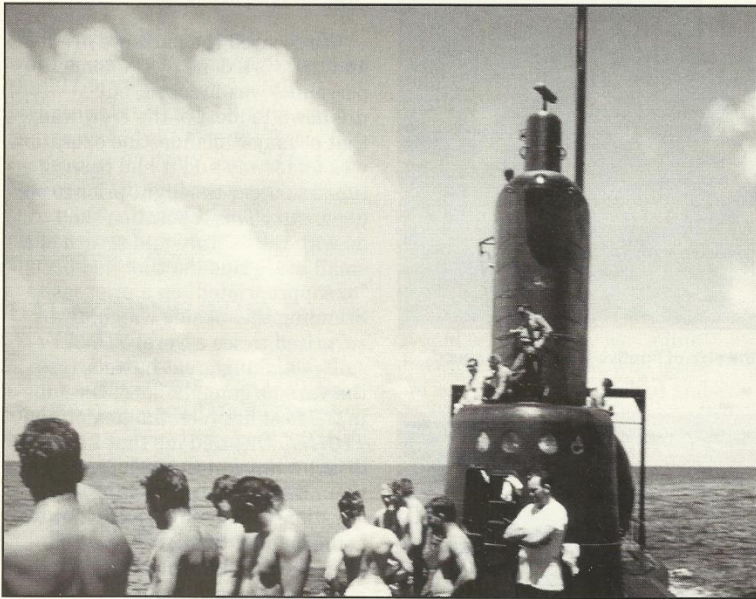
immediately aft of the "sail" area and retractable launching ramp topside aft of the hangar. The Hangar was big enough to hold two *Regulus* missiles, stored back to back, in a rotating "cage." The hangar was accessible at any time, surfaced or submerged, through an access trunk between the hangar and a space especially made for controlled access, starboard side aft, in the After Battery. Of course it was also accessible topside when *TUNNY* was on the surface and the hangar door was opened.

There was a small cable trunk in the Forward Engine Room, in the overhead above number one main engine, through which an "umbilical cord" to the missile passed. This opening, was fitted with a special "knife valve" that would permit the cutting of the cable after use and it had been ejected from the missile just prior to launch. This cable exited the pressure hull in an area between the rails of the launching ramp and in close proximity to the point of attachment to the missile. After use, when this valve was closed, it became watertight thusly maintaining the boat's watertight integrity. Should, in fact, the submarine submerge immediately after the launch, the severed portion of the cable would be "washed" away in the boat's wake sinking to the ocean's bottom. The other end of this cable was ultimately connected to the guidance and control equipment in the Missile Center.

When initially converted, *TUNNY* was fitted with a small fuel tank outside the pressure hull near the Forward Torpedo Room's torpedo-loading hatch. This tank held JP4 fuel for "topping off" the missile's fuel supply, however, it was subsequently removed along with the piping leading aft to the launching area.

The Missile Center was located in what had been the Pump Room. All of the equipment that was in this area had been moved into the Forward Engine Room and into the space once occupied by number two main engine. This engine was removed, as was the sub's auxiliary engine. Another major change was the conversion of the After Torpedo Room into space for spare parts for the missile and related equipment relative to the missile. The four torpedo tubes had been removed and

coming to an end, we spent most of the time cleaning up and re-installing equipment that had been removed for one reason or another. Since I was not "qualified," I was assigned various jobs topside, became one of the mess cooks and in my spare time got started with the "qualification" process. Not having attended a class "A" school, I was given rather wide latitude in selecting the area I wanted to pursue as far as job specialization. My principal objective at this point was to learn the as much about a submarine as possible in case, for one reason or another, I remained on active duty. Even only after a relatively short time aboard, it had become quite evident that the electricians and enginemen were those who really knew the boat and if I elected to go to nuclear school either one of these rates would be



Submariners relax in the sun as they answer 'Swim Call' during a break in *TUNNY*'s daily routine.

this compartment was now identified as the Stern Room.

Upon arrival at Mare Island, we were directed to the pier where *TUNNY* was tied up. I now met the "Chief of the Boat" and was shown to my bunk in the Stern Room. The Chief also imparted some sage advice — "don't touch anything unless you know exactly what it is you are doing" and then offered these words of wisdom, "don't make the same mistake the first time."

As the maintenance period was

transferable to the nuclear Navy. However, at this point I still had in the back of my mind the thought of returning to college.

The maintenance period completed, we left Mare Island, going through San Francisco Bay, under the "Richmond-San Rafael" and "Golden Gate" bridges, and finally into the Pacific Ocean. We then took up a southerly heading toward Port Hueneme. Soon we had cleared the coast and were in sufficiently deep enough water to make a "trim" dive.

This would be the first dive after our maintenance period and, as always, was done slowly for the purpose of discovering any openings in the pressure hull or to find any other problem when the boat obtained negative buoyancy. In addition, it was prudent to check the boat's balance, or equilibrium, keeping it level, between the bow and stern. Any adjustments that needed to be made could usually be accomplished by using the submarine's trim and drain system. On this dive there were no major problems and we surfaced to continue on our way.

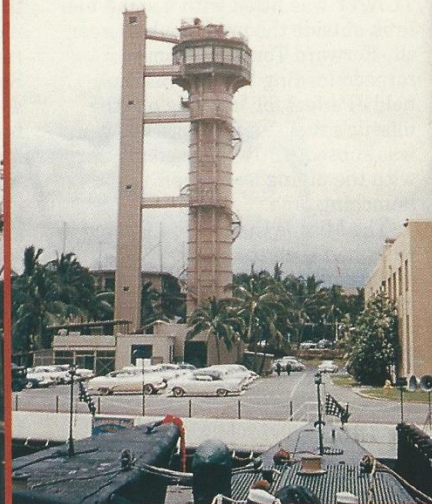
We arrived and tied up, "starboard side to," in Port Hueneme. The time we spent in port was good for me as it gave me the opportunity to spend a great deal of time working on my (SS) qualification. This now became a major concern of mine as it had become quite evident a non-qualified individual on a submarine was not worth much and I was certainly not interested in being a mess cook for the rest of my time on active duty.

At "quarters" one morning, it was announced that we would be making a short trip to San Diego and that we would "nest" with some other subs alongside the Submarine Tender *NEURUS* (AS-7). The purpose of this trip was to obtain additional spare parts and to get assistance from the tender in accomplishing some repairs that were beyond the crew's ability to accomplish without assistance. The trip would be short, less than two weeks. Also, while in San Diego, the *TUNNY* would be degaussed. This trip was welcomed news to most of the crew, excepting those who were married, as being tied up to a dock in Port Hueneme was not very interesting let alone being minoteous.

The cruise to San Diego was uneventful and we passed through the rather long entrance channel without any problem save being watchful for planes taking off and landing in a "runway" that transverses the main channel. We came around the tender and became the fourth or fifth submarine in the nest tied up to the port side of the *NEURUS*. San Diego provided a welcomed respite from the routine in Port Hueneme, but one had to remember that this was not Port Hueneme; there was "shore patrol" everywhere.



Drydocked at Pearl Harbor the *TUNNY* reveals the size of her five-bladed high speed propellers, stern diving planes and rudder.

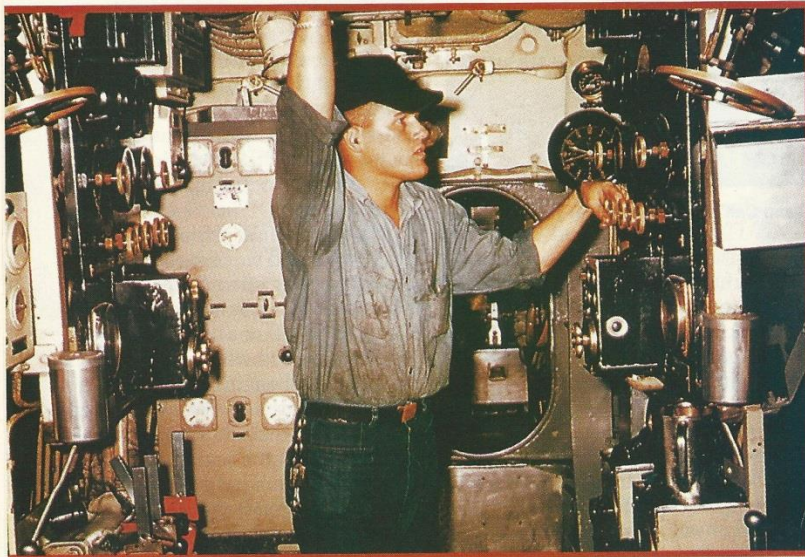


The escape tower at Pearl Harbor's submarine base. The author made several "free assents" in this tank.

We secured the parts we needed and the work done by the tenders' personnel was finished, but unknown to most of the crew was that a "major" clandestine operation was underway and it had been timed to occur the night prior to our departure. This "operation" had to do with the capture and return of a small brass Buddha that had been "misappropriated" on a prior visit. Standing the topside watch, I was surprised to see several *TUNNY* sailors making great haste across the various gangplanks of the subs in the nest between the tender and *TUNNY*. One told me that I should disavow any knowledge of seeing them if anyone came asking any questions. I had no idea of what was going on and, thankfully, no one came along asking any questions.

The next morning, in an interesting maneuver, we slipped out of the nest by passing the mooring lines of the boat on our portside over *TUNNY* to the boat on our starboard working forward aft. Answering bells on the battery, we slowly cleared the boats on our port and starboard and slipped out of the nest. As soon as we were out of the nest, we started to answer bells on the main engines. We made one stop on the way out and that was at the degaussing station.

When this process was completed we resumed our northerly heading for Port Hueneme. As soon as the



*TUNNY*'s aft engine room, looking forward. Little changed from its wartime appearance in the postwar decade, the aft engine room shared half of the sub's two 2,740 hp diesels.



A key player in the development and experimentation of submarine missiles was the converted seaplane tender USS *NORTON SOUND* (VM-1). She was in the missile business longer than any other naval ship.

“Maneuvering Watch” was secured, word began to filter through the boat that *TUNNY* had successfully recaptured the boat’s Buddha and that it was in the Control Room for inspection. *TUNNY* arrived in Port Hueneme with a broom attached to the boat’s number 1 Periscope, “a clean sweep,” marking the significance of this event.

### LAUNCHING THE MISSILE

Shortly after our return the Commanding Officer, Cmdr. Walter Dedrick, announced that we would be taking a short trip north, off the “Big Sur,” for the purpose of making a practice missile shot. In time a flatbed trailer arrived with the “bird” along with a crane. In short order the missile was lifted and

placed onto the rails of the launching ramp and then hydraulically pulled into the hangar and finally secured in the “cage.”

As a group all three submarines in GMU-90, *TUNNY*, *CUSK* and *CARBONARO*, departed Port Hueneme. Once at sea, we split up, with *CUSK* and *CARBONARO* heading in a westerly direction and *TUNNY* taking a northwesterly course. Eventually the three subs would be in more or less a line between the point at which the missile was to be launched and San Nicholas Island, west of Long Beach, in the Channel Islands, where it would be landed by one of the accompanying aircraft. Because the intended line of flight was relatively close to the populous areas of southern California, these practice

“shots” always had “shoot down” planes following the missile in case the missile strayed off course or became otherwise uncontrollable. At least one of these planes one had guidance equipment that allowed it to control the missile.

This trip proved to be uneventful and we soon arrived in the launch area. As it had been sometime since the last launch, we conducted several “dry runs” to make sure everyone involved was “up to speed.” There had been some personnel changes and one of these concerned me as I had been assigned the job of installing the small radar guidance “receiving” antenna to the missile as my “battle station missile.” Installation of this antenna was very easy and it took less than a

(continued on page 34)



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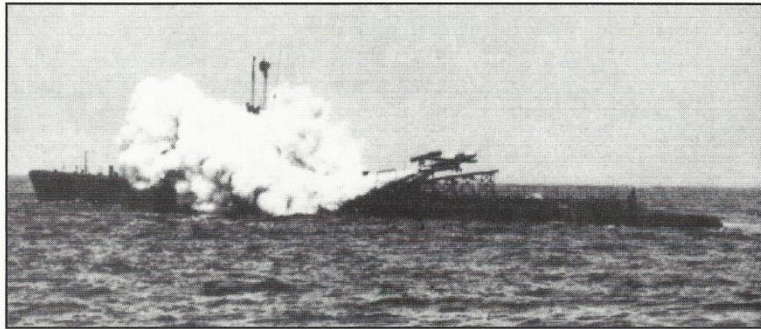
## EARLY MISSILE SUBMARINE ADVENTURES WITH THE USS *TUNNY* AND THE *REGULUS I*

(continued from page 25)

minute to accomplish the task.

The preparation process topside for launching the missile was not at all complicated and could be done quickly with three or four trained people. Once surfaced, the hangar door, or really the entire aft end of the hangar, would be opened and a visual inspection of the launching ramp would be made. At this point the missile would be hydraulically "rammed out" onto the launch ramp and those responsible for preparing the missile for launching would go out on deck and attend to their respective tasks. Specifically these jobs included: Attaching the guidance radar antenna, connecting the umbilical cord, unfolding the wings, installing the rudder and removing the hardened plastic covers that covered the boosters' exhaust nozzles. When these jobs were completed we would go back into the hangar. The missile officer would then visually check the missile for its launch readiness and make a "low voltage" check of the boosters.

When the above evolution was completed, the hangar door was shut and locked and the salt water flushing system activated. This system was used to cool off affected parts of the steel deck superstructure when the missile's jet engine was running and the deck area where the exhaust from the boosters would burn off paint. In addition to the sprinkler system, a deflection shield hydraulically raised and lowered, was in place to reduce damage from the missile's engine exhaust. This was interlocked with the same hydraulic system that raised and lowered the



USS *CUSK* (SSG-348), one of the Navy's pioneer trio of missile firing submarines, launches a *LOON* missile based on the German V-1 rocket early in 1947. The sub trio of *TUNNY*, *CUSK* and *CARBONARO* (SSG-337) were stop-gap pioneers

launching ramp so that the shield would tilt as the ramp increased its launching angle.

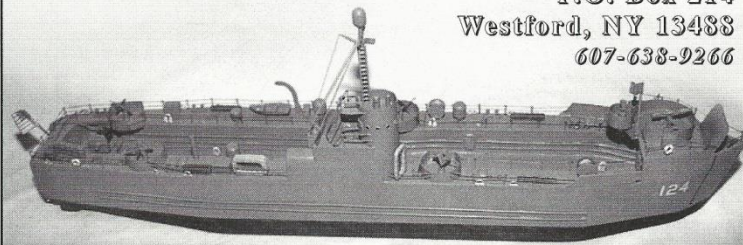
At this time we would wait while the missilemen in the Missile Center conducted a series of tests to make sure the "bird" would respond to commands and that communications with *CUSK* and *CARBONARO*, as well as the escorting planes were operating properly. Those of us in the hangar had access to these tests and communication checks, as the hangar was equipped with a speaker that was connected into the radio circuit being used in these transmissions. The process of making sure everything was a "go" included; passing guidance control from one sub to another and to the planes that would accompany the missile down range. Specific checks were made on the missile itself and included; testing the missiles' control surfaces, the ailerons and rudder, and then various engine speeds.

When everything "checked out," the missile's engine would be run up

to 100% and then all of a sudden, "WHAM" the boosters were ignited and the "bird" was on its way. The sound and concession these boosters delivered was amazing and would leave no doubt in one's mind that a very powerful "kick" had been provided to get the missile off the submarine and into its flight.

On the day and at the appropriate time of the scheduled launch, we surfaced at "Battle Stations Missile," and prepared for the "shot." Everything was checked and was ready. We could hear the jet engine running and being taken up to 100% and then the loud explosion when the boosters were ignited. The missile was on its way. As soon as possible we opened the hangar door and went would out on deck to see if any damage had been done as a result of the launch. In this case, as in all the others I witnessed, the only visible damage was in the areas where the boosters had burned the paint off the steel decking. It was nothing serious and was something the seamen could easily take care of when we got back to port. Despite opening the hangar door very soon after the launch, the only other evidence of the missile being launched was some smoke drifting with the wind off the starboard side. There was no sight of the missile or even the escorting aircraft. We returned to the hangar, learned it was a good "shot" and that *CARBONARO* would soon be assuming control. Except for the missile men in the Missile Center we secured from Battle Stations and *TUNNY* swung around to a heading toward Port Hueneme. **SC**

(TO BE CONTINUED)



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