

# U.S. SUBMARINE DECK GUNS

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United States Navy submarines have been equipped with a variety of weapons and weapons systems over the history of the force. Torpedoes, divers, missiles and small arms have been used. In addition to these, on submarines from just before World War One through the period immediately following World War Two one such weapon was the deck gun. This consisted of a breech loading rifle of varying sizes, with varied ammunition storage schemes, and in some latter cases a fire control system. This essay will be a brief description of the deck guns used, the submarines on which they were used and some limited related subjects.

## Origins

A case could be made that the deck gun started with the Zalinski dynamite gun installed on the USS Holland as it was configured in 1900. Although not mounted on the deck, it was a gun type weapon and installed on a naval submarine. However, the deck gun, as such, was devised for installation on submarines in several other navies at nearly the same time. The German Imperial Navy first mounted deck guns on SMS U-19 built during the period 1910 to 1913. It was equipped with (sources vary) either a 105 mm(4.1in) or an 88 mm (3.46in).

The US Navy first considered deck guns as standard installations as a result of input from the board of submarine officers convened by the Secretary of the Navy in 1912. The officers did not recommend a deck gun, but it was included in the request for bids published by the Bureau of Construction and Repair (C&R) in January 1913. The submarines built under this program were L-class. The class was split between Electric Boat (EB) (building L-1 to L-4) and the Lake Torpedo Boat Company (Lake) (L-5 to L-7). L-8 would be built from Lake plans at Portsmouth Navy Yard. Some of the money allotted for L class boats was used to build the M-1 built by EB. The first group of L class boats did not have a deck gun even though one was designed into the class. The second group of EB boats (L-9 to L-11) did have deck guns installed. However, the M-1, with a 3"/23 caliber (76.2mm) gun installed was launched and commissioned first. Thus, the M-1 was the first US submarine with a deck gun installed. The remaining L-class boats had the 3"/23 installed as a backfit (with the possible exception of L-8).

## Nomenclature Note

A deck gun type is defined by its bore diameter and bore length. Further refinement of the gun type is by the Mark and Modification number. The bore diameter is normally given in inches and the bore length is given in calibers. A caliber is one bore diameter. Thus for a 3"/50 gun, the

bore diameter, measured land to land is 3 inches. The length of the bore is 50 calibers or 150 inches. Each major type also was given a Mark number by the Bureau of Ordnance (BuOrd). A gun could have the same bore size and length and be a different Mark. When discussing the entire range of 5" guns in the Navy, it is useful to use the Mark number. For submarine guns only, it is normally not necessary.

Modifications to a particular Mark were also numbered. Thus, a gun was fully described with its bore diameter, bore length, Mark and Mod numbers.

The 3"/23 is the Navy's early attempt at creating a dual purpose gun. That is a single weapon that would be used both as an anti-surface and anti-aircraft gun, the diminutive 3"/23 caliber Mark IX. It fired a projectile of about 13 pounds to a range of about 4.5 miles. Used on submarines it had no remote fire control system and was used in line of sight only. The mount was retractable, in that the barrel assembly could be rotated to 90 degrees in elevation and the whole thing lowered into a containment cylinder. What appears to be a splinter shield was the watertight cover that fitted snugly to the top of the containment cylinder. The gun's drawbacks were that it had a fairly short range and it was prone to retracting when fired or at other inopportune times. This was dangerous and could cause injuries. The gun also lacked hitting power and thus was unpopular with the crews.

### **Between The Wars**

After World War One the entire submarine force underwent significant changes in design, ship acquisition, purpose, and weapons. The subject of deck guns was visited over and over as force personnel debated what weapons should be installed, where and how they should be used. The 3"/23 was deemed too small to be useful in the future. The two follow-on T class boats had the 4"/50 installed.

In 1919 the design proposal for a fleet submarine called for the 5"/51 to be mounted forward of the bridge. These were mounted on the first of the new fleet submarines, the V-1, V-2, and V-3 (Barracuda, Bass, and Bonita). However, these boats were overweight with stability issues so the guns were replaced after some time by 3"/50s in the late 1920s.

The newly designed cruiser submarines (Argonaut, Narwhal and Nautilus) were to use two 6 inch/53 guns. The 4 inch/50 (used as standard guns on the S-class) was still called for in the designs of the follow-on boats, but SecNav changed this to the 3"/50 for Cuttlefish and Cachalot.

In 1937 Congress passed the 20% Naval Expansion Act. Captain Thomas C. Hart on the General Board (tasked with overall ship design responsibility) directed the Submarine Officers Conference to work on a new submarine design. Captain Hart wanted smaller submarines that could be built quickly and were well suited for multiple short missions.

The Submarine Officers Conference was headed by Commander Charles A. Lockwood who, coming from years of fleet experience, had other ideas about submarine design. In designing a new boat the deck gun was cause for serious differences in opinion. The debate generally fell into two camps. One, espoused by Captain Hart wanted nothing larger than the 3"/50. The other, advocated by Commander Lockwood wanted the 5 inch gun, either single or dual purpose.

As is usual in these issues a compromise was reached. Hart would get his wish for nothing larger than the 3"/50 in the new design, but Lockwood got the installation of a gun foundation that was capable of carrying the 5"/51 if later experience deemed it desirable. However, the standard design of the Gato class of 1941 only had a foundation capable of carrying the 4 inch gun. This was later beefed up to carry the 5 inch/51 and the foundation was installed in new construction both fore and aft of the bridge.

### **Forward or Aft?**

The standard installation of the deck gun was aft of the bridge in Gato class boats. The ammunition stowage was in the forward end of the after battery and access to the gun was both through the watertight door in the aft end of the conning tower and through the after battery hatch. Shortly after World War Two started the Chief of Naval Operations, Admiral E. J. King signed an order that authorized the gun's mounting forward of the bridge. (This order may have been signed by then CNO Admiral Stark if it was done prior to March 1942). The decision to move the gun was left to local area commanders and to the boat's Commanding Officer. The limiting factors were parts, time, and personnel availability.

As the war progressed it was determined that the superstructure around the bridge needed to be reduced to lower the boat's silhouette. As the boats made their first major overhaul at Mare Island, the Gato class lost its pilot house to make way for a 20mm mounting forward of the bridge and the after portion of the conning tower fairing was cut down for another 20mm mounting. At this time the door in the aft end of the conning tower was removed (with a welded patch or a completely replaced barrel aft end). The access to the deck gun was then through the after battery hatch only, although some may have used the torpedo room for gun crew access. The Balao class had a major change with the introduction of a gun access trunk and hatch in the forward end of control room. This design element was continued in the Tench class.

The question of which gun was mounted on what boat, where it was mounted, and when is not clearly answered as yet. There has been no BuOrd (Bureau of Ordnance) nor BuShips (Bureau of Ships) gun applicability record as yet uncovered and published. Nor have the Mare Island after overhaul reports been located. These are either at the National Archives in College Park, Maryland or have been destroyed.

### **The 3"/50 Deck Gun**

This gun consists of several Marks and Mods of a gun devised prior to the US entry into World War One generally as an lightweight single purpose (anti-surface) or dual purpose (anti-surface and anti-aircraft) gun. Called on as a weight saving replacement for the 5 inch/51 and the 4 inch/50 in submarine designs starting in 1919, it was the standard gun used in the early set of follow-on designs to the latter V-boats, the Gato class, and early Balao class submarines of World War II.

These weapons did not have a fire control system but were used either over open telescopic sights or bore sighted. Fusing was percussion or manually set timed. It is unclear whether the VT fuse was issued to submarines during WWII. The gun itself was a sliding breech block and the gun

tube was built up vice solid forging. Most, if not all were of “wet” design where the gun tube and some external parts were chrome plated to be resistant to sea water corrosion.

### **The 4”/50 Deck Gun**

The General Board in 1917, looking at the deck guns aboard the German submarines suggested a two or three gun battery aboard the new S-class design. However, there was only weight and space for a single gun, so the 4”/50 was chosen. The 3”/50 was chosen as the gun of choice to replace the 3”/23 aboard O and R classes.

The war in the Pacific proved the worth of deck guns. The 3 inch gun was considered not powerful enough and many CO’s wanted a 4 or 5 inch gun instead. The 4 inch guns on S-class were made available for installation on boats on the patrol line as the former were withdrawn from patrol duties.

The 4”/50 was the Mark 12 with a variety of Modifications most visible of which was the muzzle and breach closure. Most had a muzzle plug. The Mod 6, Mod 11 and Mod 43 had a breach enclosure that had to be removed before firing. The Mods 21, 38 and 41 did not. Other variations included changes to the sighting telescopes.

### **The 5”/51 Deck Gun**

The 5 inch deck gun comes in two major varieties and with two different stories. The first variety is the 5”/51. This gun was a standard anti torpedo boat gun (secondary armament) for capital ships and cruisers. It was big enough to do damage to destroyers trying to make torpedo attacks and could be rapidly fired by a trained crew. Designed before World War I it was a very useful weapon and widely installed.

There was opposition to the installation of a gun of this size on submarines. A case before the war was made that a large gun would cause some aggressive commanding officers to take on targets on the surface that they should not and would endanger the boat. An opposing view was that a larger gun would allow the CO to use the gun instead of more expensive torpedoes against smaller targets and would be a better defense for a boat which was unable to dive. The compromise that was reached was that the submarines from the Perch Class onward would have a foundation strong enough to take a 5 inch gun installed forward and aft of the conning tower. Some sources and some drawings indicate the foundation was actually sized for a 4 inch gun.

Designation: 5inch/51 (12.7 cm) Mark 15

Ammunition Weight: Common Mark 15 Mods 1 through 14 - 50 lbs. (22.7 kg)

Bursting Charge: Common Mark 15 Mods 1 through 14 - 1.73 lbs. (0.78 kg)

Muzzle Velocity: 3,150 fps (960 mps)

Range: Maximum Elevation: 18,800 yards (17,190 m) [ 9.5 nmi]

The ammunition was termed “semi-detached” where the projectile and cartridge were separate, the projectile being loaded then the cartridge with the propellant inserted.

Initially these guns were installed, one each, on the USS Barracuda (SS-163), USS Bass (SS-164), and USS Bonita (SS-165). These boats were re-gunned with 3”/50s and the 5”/51s along with others (the source has not yet been published) went to the Tambor Class boats. One of these, the USS Tautog (SS-199) made especially good use of her gun sinking schooners, trawlers and at least one coastal steamer with the gun.

### **5”/25 deck gun.**

Wartime experience showed the usefulness of a gun larger than a 4 inch/50 especially as large targets were becoming scarce. The 5”/38 twin mount was being used instead of the 5”/25 as a dual purpose anti-destroyer and anti-aircraft gun on battleships and new cruisers. The 5”/25 guns were adapted to submarine use by removing the rotating platform, railings, fuse setting equipment, and the power ramming device from the gun mount. A heavy shielding arrangement was built up over the more delicate aiming parts above the trunnions to help protect them against depth charging. The recoil mechanism was also changed.

Designation: 5 inch/25 (12.7 cm) Mark 40

Ammunition. Type: Fixed

Weight of Complete Round about 80 lbs. (36.3 kg)

Bursting Charge: AAC Mark 28 - 7.33 to 9.6 lbs

Range Maximum: 14,500 yards (13,259 m) 7.25 nmi

AA Ceiling: 27,400 feet (8,352 m)

Some submarines had their 3”/50 replaced by the 5”/25. It is not clear if any boat had a 4 inch/50 replaced. USS Spadefish was the first boat to be completed with a 5”/25 installed as standard equipment. Late in the war as more 5”/25s became available some boats had two guns installed, one forward and one abaft the conning tower. During the war several boats, starting with the USS Sennet (SS-408), were outfitted with two of these guns. As an improvement to the guns a rudimentary fire control system consisting of Mark 6 computer, a Mark 6 stable element (gyroscopically controlled stable vertical), and a Mark 2 Mod 1 gun order corrector that allowed the two guns to be operated with more accuracy. The USS Sea Cat (SS-399) was the first to have the full suite followed by the USS Flying Fish (SS-229), USS Entemedor (SS-340), USS Sea Dog (SS-401), USS Sea Poacher (SS-406), USS Sea Robin (SS-407) and USS Sennet (SS-408).

Post war submarines were all to be equipped with two of the 5 inch/25s with the fire control system. However, the submarine combat world changed from an anti-surface ship scenario toward an anti-submarine one and the usefulness of a deck gun reached an end.

## The 6"/53 Deck Gun

After World War One the Navy started to look at the wide spaces of the Pacific Ocean as a possible battleground. What type of war and how the submarine would fit into this war was debated with the result that the size of the submarine needed was greatly enlarged. No longer would small coastal defense submarines be capable of ranging from the US west coast to the US bases in the western Pacific. Along with the size of boat, the size, number and type of deck guns was studied. There were designs that had up to eight 8 inch guns down to no deck guns at all. The concept of the 'cruiser submarine' was revived from WWI studies. This concept was a combination of a submarine that could operate with the fleet Speed Of Advance (SOA) or operate independently hunting down enemy commercial shipping.

For the cruiser submarine design the deck gun of choice eventually settled on the 6 inch/53. This gun was commonly accepted as the largest that could be manually loaded thus was the largest that could be mounted on a submarine without complex hoists, rammers and other ammunition handling equipment. It should be noted that being manually loaded does not mean that one man can load the gun. The 6 inch gun was one step removed from the 5 inch gun in that it did not have integral projectile/propellant cartridge; they were separate.

Designation 6 inch/53 (15.2 cm) Mark 18

Gun Length OA 325.0 in (8.255 m)

Bore Length 318.0 in (8.077 m)

Rate Of Fire 6 - 7 rounds per minute (one round every 10 seconds)

Ammunition Type Bag

Projectile Weight: 105 pounds (47.6 kg)

Propellant Charge: 44 lbs. (20.0 kg) SPD

Muzzle Velocity: 3,000 fps (914 mps)

Range @ 20 degrees 21,100 yards (19,290 m) about 10 nmi

Range @ 25 degrees 23,300 yards (21,300 m) about 11 nmi

Range @ 30 degrees 25,300 yards (23,130 m) about 12.5 nmi

The gun was mounted fore and aft on the big V-boats USS Argonaut (SM-1), USS Narwhal (SC-1), and Nautilus (SC-2).

There are only two guns of this type still in existence. They are mounted on the south side of Morton Hall at the Submarine Base, Groton, CT. These guns are tentatively identified as being those of the USS Narwhal. However, some evidence exists at the National Archives that the guns were mounted on USS Nautilus. It should be noted that it was common that one set of guns or single mounts would be mounted on more than one submarine during the boat or gun's lifetime.