TRIGGER MARU – OVERHAULED VERSION 2.5

A player made modmodification for Silent Hunter 4 version 1.5

"Pulling the Trigger" on Silent hunter 4 since May 2007.

THE GALLOPING GHOST OF THE JAPANESE COAST
I'm the galloping ghost of the Japanese coast.
You don't hear of me and my crew
But just ask any man off the coast of Japan.
If he knows of the Trigger Maru.

I look sleek and slender alongside my tender.
With others like me at my side,
But we'll tell you a story of battle and glory,
As enemy waters we ride.

I've been stuck on a rock, felt the depth charge's shock,
Been north to a place called Attu,
and I've sunk me two freighters atop the equator
Hot work, but the sea was cold blue.

I've cruised close inshore and carried the war
to the Empire Island Honshu,
While they wire Yokahama I could see Fujiyama,
So I stayed, to admire the view.

When we rigged to run silently, deeply I dived,
And within me the heat was terrific.
My men pouring sweat, silent and yet
Cursed me and the whole damned Pacific.

Then destroyers came sounding and depth charges pounding
My submarine crew took the test.
Far in that far off land there are no friends on hand,
To answer a call of distress.

I was blasted and shaken (some damage I be taken),
my hull bleeds and pipe lines do, too
I've come in from out there for machinery repair,
And a rest for me and my crew.

I got by on cool nerve and in silence I served,
Though I took some hard knocks in return,
One propeller shaft sprung and my battery's done,
But the enemy ships I saw burn.

I'm the galloping ghost of the Japanese coast,
You don't hear of me and my crew.
But just ask any man off the coast of Japan,
If he knows of the Trigger Maru.

By Constantine Guiness, MOMM 1/C, USN

TABLE OF CONTENTS

Forward

Wow, where to begin? While I'm not one to go with long windbaggy speech's, it's occurred to me that having been at this since 2007, I should permit myself to stand on the soap box for this, the final version of TMO. What you have here is the culmination of three years worth of modding silent hunter 4, and a long road finally reaching it's conclusion, at least for me. I certainly did not set out to make a "super mod", in fact originally I was intent on not modding at all! When Silent hunter 4 was launched, I was ecstatic. Finally after eleven years of waiting, a pacific submarine simulation was finally here. Was the wait worth it? Unfortunately, it was not. Silent Hunter 4's state at release was nothing short of appalling, if not an outright travesty. But after eleven years, I was not about to toss up my hands and cry foul. The reason was simple, a long time love affair that started when I was a kid in grammar school reading books about the exploits of US submarines in the pacific. Here, finally, was the (modern) game I was waiting for – such as it was. So, Instead of complaining, I squared my shoulders and set about to fix things as best I could.

The irony here is that, I had no intent on modding. Well, we see how that turned out don't we? I came to Silent hunter 4 from the silent hunter 3 community, with a couple years worth of modding and submarine sim's under my belt. Starting sometime in 2005 I developed what I call, "Compulsive Tweaking Disorder" or CTD for short. Try as I might, I couldn't keep myself out of the game files. In Silent hunter 3 I helped developed some of the first understandings of how the AI works, introduced a couple fixes to SH3 of my own, and ended up neck deep in the whole modding scene in Sh3, and was involved in things both good and bad. So when I came to Silent hunter 4, I had a little bit of a head start knowledge wise when it comes to adjusting the game. Since most of the experienced modders I knew of at the time were sticking with SH3, I was left with a feeling like I had to do something.

So it was, that my original intent was to work out some basic fixes and work arounds to make the game playable. It was my hope that in time, like SH3, a modding team or two would form to create supermods, and then I would be able to sit back and play. As thing things turned out, I ended up being one of those supermod "teams". When TMO first started out, it was originally known as "SH4 Flavored to Taste" or FTT for short. As FTT grew, I had finally conceded that what I didn't want to have happened had happened. I was making a supermod, and decided that I should finally give this thing some name and character. I could think of no name better then "Trigger Maru", in reference to the many [Edward L Beach](#) books I had read. Later on, with the release of patch 1.5 that was bundled with the Uboat Mission expansion, "Trigger Maru" (or Tmaru for short) was renamed into it's next incarnation, "Trigger Maru Overhauled".

I can't tell you how many hours have gone into this mod. Or the number of ideas researched, prototyped, and later scraped because of unwanted side effects. The number of hours I have put into this work is absolutely ridiculous. At times, working on this mod became physically due to the prolonged ours of sitting at a char when combined with my normal job. Personally I view the amount of time and commitment I have given this mod out of my real life, is an embarrassment and exemplifies not having ones priorities in life in the proper order.
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Looking back on it now, I cannot believe how obsessed I was with working on this mod, and I am somewhat embarrassed to admit the lengths I went though. Many people believe that there is a team of modders behind TMO. There is in fact no team behind this mod, nor was any official "TMO team" ever formed or named. Such is the price when you want direct creative control, and don't like asking people to do things for you. I must say though, right now, I wish I could delegate writing this manual to someone else!

Now having said all that, while much of the research, work , and documentation that went into TMO I did by myself, I did not do it all, as the credit list in this manual amply illustrates. Among the names in the credit list, three stand out and worth honorable mentioning and a special thank you.

The first two are **Captain America** and **Vickers03**. More then anyone, these two have contributed work to TMO that really gives it that polished touch and sense of immersion. They have contributed so much to TMO, that I have no hesitation in saying that if there was ever an official "TMO team" these guys were on it.

The last name I'd like to mention is **Skwasjer**. Without his swiss army knife of modding tools, S3D, much of TMO would not have been possible.

Lastly, I'd like to thank Ubisoft Romania for making a Pacific submarine sim. It was a long time in coming, I wish it could have been better, but I am appreciative of the game none the less. In fact, in working on TMO, I believe I developed an understanding of what the devs go through, how and why some things get prioritized, and why some things fall through the cracks. To sum, I've developed an appreciation of their efforts in making a Silent Hunter game..

Well, there you have it, I think that's a wrap as I'm all out of hot air.. I won't say TMO is perfect, entirely bug free, nor that everything in the game is fixed. In fact, *I consider this mod unfinished, because there is still **much** to do.* But I am at the ends of my patience and endurance, and can do no more. However, what I will say is that I addressed everything that I could, I always tried to make reasonable design decisions, and I gave it all my best effort. In the end, I hope TMO makes Silent hunter 4 the enjoyable experience it was supposed to be at launch.

INSTALLATION:

Installation of this mod is designed with Jonesoft Generic Mod Enabler in mind.
URL: (http://www.users.on.net/~jscones/software/products-jsgme.html)

Download that program, and read the installation guide found here:
(http://www.users.on.net/~jscones/software/documentation/JSGMEUG.pdf)

Please note, that this mod is designed Silent Hunter 4 version 1.5. In other words, you must have the U-Boat Missions expansion, or Silent Hunter 4 gold edition. There is no stand alone patch 1.5 as it came bundled with the U Boat Mission expansion.

TMO for Sh4 version 1.4, withou the UBM add on, is no longer supported in any capacity.

MOD COMPATIBILITY:

Generally speaking, no mod is officially endorsed by TMO. The file changes in TMO are many, and many files often have subtle relationships with other files, causing effects you might not have intended. This is especially true with any large mod similar to TMO in size and scope.

There one lone exception
The "Run Silent, Run Deep" campaign mod by Lurker_hib3. It is an excellent campaign mod, and Lurker has been maintaining a TMO compatible version. I make one caveat here, I have not looked at this work to ensure there are no problems with the files. I mention RSRD as compatible out of good faith and respect for the the mods author. If lurker says his mods compatible, then it's compatible. So if you don't like the campaign that comes with TMO, give his a try.

TMO'S OBJECTIVE & REALISM

The objective of this mod is to make the pacific theater as immersive as possible, offer an increased level of challenge, and to make the player behave more realistically. TMO defines realism as encouraging the player to make the same decisions, and have the same fears that a real WW2 submarine captain would have.

Historical accuracy and realism in the traditional sense of the word (sometimes achieved by abstract means) is adhered to as much as possible, but some elements may be taken with creative license in order to achieve the overall objective. Trigger Maru also leans more toward the "seasoned" submarine simulation fan, and some elements may appear to be too daunting at first for your rookie player.

A PRECARIOUS BALANCING ACT
- OF CONTENTIOUS RIVET COUNTING, AND ARTISTIC LICENSE

There are many misconceptions about TMO when it comes to realism. Some will cite the mod is 100% historically accurate in every detail. Others will cite it totally unrealistic, and yet others will cite it as existing solely for increased challenge with impossible destroyers. TMO, is all of the above, and none of the above.

Some aspects, such as submarine statistics, behavior, equipment, and the like are interpreted in the strictest since, or "rivet counting" . A term used to describe an obsession with making sure everything in an object is as exactly as it was, right down to the number of rivets that held it together. Other aspects, are interpreted a little more loosely. TMO recognizes two major things. First, that this is a simulation. Second, that this is a video game. In other words, TMO is a balance of opposites. For example:

- Searching fruitlessly for traffic for weeks on end and having sighted nothing is not very fun, if not outright boring. And yet, having so much traffic that you shoot most of your torpedos before you arrive at your patrol area is an unrealistic shooting gallery.

- Attacking a convoy and receiving little to no "payback" from the escorts is dull, and anti climatic. And yet, making the escorts "allied smart" is unrealistic for the theater.

- The deck gun is overpowered. And yet, having a slow firing deck gun can be a teeth gnashing annoyance.

- Textbooks cite a fleet submarine having so much diving ability. And yet first hand unofficial accounts from the veterans who served on them cite something else.

Balancing these polar opposites, can probably be likened to walking a circus high wire tight rope. It is a precarious balance, and one hard to maintain. Opinions will always vary.. However, properly maintained, this balance, combined with TMO's overall objective, I feel delivers the best overall submarine submarine sim experience.

REALISM SETTINGS

The realism settings in TMO were derived from the belief that the external camera gives away too much information, and yet, eye candy is so hard to give up. The external camera comes in two forms, and is arguably the biggest cheat in the game. The first form of the external camera is the "unit cam". This camera allows you to view whatever is visible to the player by any sensory means. The second form of the external camera is the "free cam" which allows you to view the area around the outside of your submarine. While most players may not realize it, the use of these camera's offer a situational awareness that no submarine captain would ever have.

Yes, these camera's are very difficult to give up. TMO encourages the player away from these camera's by a means compromise. By default, the unit camera is disabled in TMO, leaving only the free camera available. This allows you to view the area outside of your sub, and with a little work, see other things. But no longer is It possible to visually identify and asses targets 20 kilometers away, while submerged, without ever raising a periscope. **The new realism settings under TMO are as follows:**

By default the following is always on regardless of skill level selected:
 – limited battery
 – limited compressed air
 – limited oxygen
 – limited fuel
 – realistic repair time
 – realistic sensors
 – dud torpedos on
 – realistic reload times

The following varies based on selected skill level:

Easy:
 – Auto TDC enabled (or in other words, Manual targeting is off)
 – External Camera is enabled

Normal:
 – Auto TDC is enabled (again, manual targeting is off)
 – External camera is disabled and replaced with the event camera being enabled. The event camera gives you eye candy, without giving away as much information that the external camera gives.

Hard:
 – Manual targeting is enabled
 – Event camera is enabled. External camera disabled.

Realistic:
 – Manual targeting is enabled
 – event camera and external view disabled.
 – Map contacts are disabled.

GAMEPLAY CHANGES

There are many changes, but these are the ones you need to be most aware of.

Improved, yet reduced, Japanese Air power

What this mod has done to Japanese planes is arguably its most noted gameplay change. In sum, aircraft:

 – Spawn at a *much* lower frequency then the stock game.
 – Simulated Magnetic Anomaly Detection after October 1944 (allows detection of submerged submarines under ideal conditions.)
 – carry two types of ordinance. An aerial bomb set to explode at a relatively shallow depth, and an air dropped depth charge set to go off a bit deeper then the aerial bomb.
 – have been made much harder to shoot down.

Makes you glad you have SD radar doesn't it?

Increased torpedo malfunctions:
They're going to happen, a lot.. The torpedo fiasco in the pacific submarine war is of such monumental stupidity, that any good sim modification, would make sure it was reproduced to some degree. For those unfamiliar with this bit of history, I offer this link and a couple of quotes:

"America entered the war with torpedoes far inferior to those of the enemy, and the fault lay squarely with the United States Bureau of Ordnance. It was ineffectual in research and development, inept in testing. It was inadequate in manufacturing, and feeble in its supervision of Newport. It was wanting in collegiality with the rest of the Navy, and it failed to trust those fighting under the Pacific surface."
        -Robert Gannon, Hellions of the Deep: The Development of American Torpedoes in World War II

"That…desk-bound staffers refused to listen to suggestions and criticisms from those they had sent into combat with this weapon seems, in retrospect, incomprehensibly stubborn and stupid…. The torpedo scandal of the U.S. submarine force in World War II was one of the worst in the history of any kind of warfare."
        -Clay Blair, Jr., Silent Victory: The U.S. Submarine War Against Japan

Fuel efficiency
Has been made variable depending on what you want to accomplish. "Ahead standard" is the fastest and most fuel efficient telegraph setting when transiting from your base to your patrol area. "Ahead two thirds" is the ideal speed to use while patrolling enemy waters.

(Special Note: How long your batteries take to recharge depends upon how fast your surface speed is. A Fleet type Submarine had 4 engines. The faster you go, the more engines you put on propulsion, and the fewer on battery recharge. Conversely the slower you go, the fewer engines on propulsion and the more on the battery charge. An Example being At 1/3rd telegraph setting, you have 3 engines on the charge and 1 on propulsion.)

Sub Crew
The crew has been adjusted to be more realistic then stock. In appearance, position, composition, and rank, and all skills have been redone to not only be more realistic, but also desirable. Additionally, various crew animations and vocalizations have been fixed or enhanced.

Sub Damage:
You will find your boat much more vulnerable to damage in TMO, and be less inclined for surface shootouts. Furthermore, reaching crush depth, means just that, your boat is crushed. In sum, player submarines are much more vulnerable then in the vanilla game.

Ship Damage:
The damage model is a modified version of the stock one, altered so ships sink at a more realistic rate then the default. Many ships have had their armament increased, making them deadly to approach on the surface.

Artificial Intelligence
The games AI has more sensitive sensor settings then in the stock game, and has one philosophy in mind. That being, attacking a convoy, and not getting depth charged to some degree, is anti climatic, and boring. The adjustments to the AI, are aimed to address that shortcoming in the stock game.

Be warned, newer players may find evasion in TMO a daunting task, while the seasoned submarine simulation fan may find things too easy. Opinions on the AI in TMO will vary greatly, depending on the users experience level.

Side note: night surface attacks which weren't very feasible in the stock game, are now a very good option to consider.

How far an AI unit can visually see depends on the unit type. Merchants are on the lower end of the scale, followed by warships such as destroyers, followed by capitol warships, which are followed by aircraft, which see the farthest.

Less God's eye info on Nav map:
The information given by the navigation map is greatly reduced. It now functions more as a position plot. Sensory information on ships is no longer displayed, and ships themselves are represented by a black dot. This leaves you having to figure out which direction they're heading rather the then have the game tell you everything, as well as not automatically identifying nationality or ship type. You'll have to figure that out on your own too. Optics are wonderful things.

Deck guns
In sum, deck guns, and the crews that man them, have been redone to behave more realistically. Deck gun shells have been redone to better represent their relative power compared to one another. The rate of fire of guns was lowered somewhat, but not substantially. Overall, how many shells you'll have to put downrange to sink a target is much greater then stock.

Additionally, the deck gun crew is now rendered in 3D, and has gone from 2 men, to a more realistic number of 7 men. Historically, a deck gun crew had 7 types of tasks associated with firing the weapon, those are:
  – pointer
  – trainer
  – sight-setter
  – fuse-setter
  – hot shellman
  – loader
  – gun captain

All 7 of those positions are now represented as best as the game will allow. Which is to say, you wont see hot brass being kicked over the side, or shells carried chain-ganged from their storage compartments to the breach of the gun. *Note: By default, only bow deck guns are available. To use stern mounted deck guns, you must use the optional mod "TMO_Stern_DeckGuns"*

Periscopes
Fleet type submarines had two periscopes. An attack periscope, and a "night" periscope. The attack periscope had a smaller aperture at its head, to minimize it's visibility to unwanted observers, and could rotate its view upwards a short distance to spot any possible aircraft. .The "night" periscope, had a larger aperture, and thus could allow more light into the optics enhancing visibility in low light conditions, but did not have the vertical range of motion that the attack periscope did. The periscopes in TM were adjusted and re textured to mimic this behavior.

Random messages
During the course of your patrols you will receive random messages. Some of these messages are very terse situation reports from other boats at sea.

Others messages are eulogies, and a small in game tribute to the actual boats that were lost during the war. These boats then were considered, *"Overdue, Presumed lost"*. Today, they are considered *"On Eternal Patrol"*. These messages will be received, around the time period that boat was considered overdue. For a list of boats, time periods, and causes, click here.

The default Campaign
This is a reworking of the stock campaign, the goal being to make the stock campaign behave more realistically. This was done in a number of ways:
  – Traffic spawn rates were greatly reduced.
  – Single merchants will stay near the coastlines and convoys will now zig zag at regular intervals, with the exact interval being randomized a little bit to make it less predictable.
  – Convoy composition was changed so that convoys start small and lightly protected, to being larger and more heavily protected as the time goes on.
  – Some areas that were devoid of traffic in stock, have new traffic layers added. (Hint: sometime after the Wahoo is lost, might be a good time to investigate the "Emperor's wading pool")
  – Minefields greatly increased in density. Your likely hood of striking a mine is much greater in some areas. (The stock game had 1 mine per sq/km. TMO increases this to 9 or 15 mines per sq/km)
  – you will not receive any radio contact reports tell late 1942 when the "Maru code" was broken.
  – At the beginning of the war you will hardly see any convoys., with mostly singles. Towards the end this reverses itself.

Enemy Submarines
In your travels it is possible for you to encounter Japanese submarines while on the surface, albeit these encounters will be very rare. If your in the Asiatic Fleet, you might also encounter German U-boats participating in the German Monsun Operations later in the war.

Illustration 1: German U Boat

Illustration 2: Japanese Submarine

Addition of two missing submarine classes:

- Narwhal Class:. This is a "Psuedo" design uing existing sub models, I cobbled together a new boat to correct the lack of the Narwhal class sub being represented in Sh4. While it may not look like, or have the dimensions of a Narwhal, it should perform like one. Complete with two deck guns with rendered crew.

Originally known as "V-boats", the Narwhal class of submarine appeared in the 1930's, and could be thought of as the physical embodiment of the German U-cruiser concept. Considered too large and ungainly for normal submarine operations (though this didn't stop their determined skippers), the two boats of this submarine type participated in various supply drops, commando operations, and an occasional shore bombardment. It was these boats that ferried Carlson's 2d Marine Raider Battalion to and from the famous Makin Island raid.

– Tench class. This sub becomes available in late 44, early 45, and is an upgrade to the Balao class. It carries the latest in allied radar (to include ST periscope radar, and is the only boat in TMO to come so equipped), carries a few more torpedo's and, if forced, can survive at slightly deeper depths then any sub in the game.

As an improvement over the Gato and Balao, the Tench class was the ultimate expression of the fleet type submarine during the second world war. More strongly built then its predecessors with an improved internal layout, these boats continued to serve well into the cold war, with the last one being decommissioned in 1975.

Two special units to watch out for:
"Bungo Pete"
The [nemesis](#) from the movie "Run silent Run Deep" makes an appearance in Trigger Maru. He's the only Akikaze Destroyer in the game, and can usually only be found in one place. Although he may make an appearance from time to time as a convoy escort later in the war.

"PB102"
IJN Patrol Boat 102 will sometimes make an apperance.. Formerly known as the USS Stewart (DD-224). A clemson class destroyer captured by the Imperial Japanese Navy, and put into service as an escort. This boat was credited in the attack that sunk the USS harder, commanded by "destroyer killer" Sam Dealy.

Environmental effects
Trigger Maru has incorporated the core aspects of "Environmental mod version 5.0", some elements of the "Real Environments mod.", and some of it's own tweaks to come up with a someone unique environment.   This have been done to ensure that other core aspects of TMO work properly.

Installing another Environmental mod over TMO is not recommended.

Sounds
Many sounds have been included that enhance the overall game experience or adds some flavor or character to the game.

USER INTERFACE

The keymapping in TMO are remapped to resemble the layout of SH3's. The reason this was done in the earliest days of the mod to ease the transition from SH3 to Sh4 . For your convenience , the in game help menu was redone to reflect this. There are however additional commands that you should be aware of.

Tab or the mouse wheel brings up the binocular view.
B – calls battle stations
Q – opens tube doors
W – cycles forward tubes
E – cycles aft tubes (emergency surface is located only on the orders bar now)
D – dives the sub to its safety depth.
T – Raise/lower SD radar antenna

Important note about depth controls.
The red line on your depth gauge denotes the submarines historical, tested safety depth. It does not indicate your crush depth. A number of boats in TMO can go then what the 450 depth gauge allows. To allow deeper dives you'll have to click on the 600 foot depth gauge in the conning tower near the helmsman. The exception is the Balao and Tench class boats. By pressing the D key they will not stop their decent until it crushes from pressure, or until you issue the command to maintain current depth. At which point the dive will cease, and the boat will continue on at the depth you decided to maintain.

Side note:
crush depth varies per boat, and hull condition. As your hull condition deteriorates, so does your maximum crush depth. Reaching your crush depth, means just that, you are crushed. So while you can dive deeper, do so with extreme caution. Once you find your crush depth, chances are your not going to live to tell about it.

THE SILENT SERVICE

The US submarine force, was man for man and ship for ship the most effective submarine force in world war 2. Comprising of approximately 1.6% of all US navy personnel deployed in the pacific, yet accounting for more then half of all enemy tonnage sunk. Approximately 244 submarines were commissioned between 1930 and 1945, and served during WW2. Of that, 52 of those boats would be lost, with 1 in 5 submariners losing their lives.
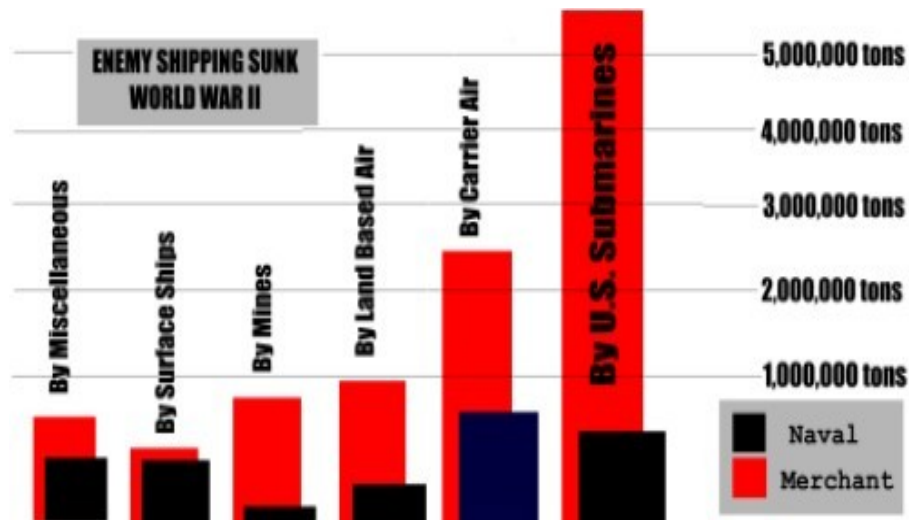
Historians have stated that a major factor contributing to Japan's surrender was this island nation's recognition of the fact that she was unable to sustain the war effort due to the severe shortages of raw materials and basic essentials. By eliminating their ability to import vital goods and supplies, American submarines were able to do to Japan what Hitler's U-Boat force failed to doing to England.

The service started at humble beginnings being with submarines being viewed as a scout and screening force for the surface fleets, and not viewed as the merchant raider. After pearl harbor, with virtually no surface fleet of any consequence remained in the Pacific waters for which to scout or screen, the rules of submarine warfare had to be drastically changed. That change, came about via one simple and blunt order.

"*Execute unrestricted air and submarine warfare against Japan."*
- Admiral R. Stark, Chief of Naval Operations in Washington, December 1941.

The US submarine force had major "teething" problems. From an outdated attack doctrine, to most famously, the Mark 14 torpedo fiasco. Developed in complete secrecy was a new magnetic influence exploder warhead. It was test fired, only twice due to cost. The first test fire, under ran the target. The second test exploded as designed. In essence, the US went to war with a torpedo with a 50% failure rate, but it was indeed much higher then that. The torpedo had three primary problems.
- The magnetic exploder would premature or not explode at all
- the impact firing pin would bend on impact, thereby resulting in a dud.
- Erratic depth control, often running 10 to 12 feet deeper then set.

It wasn't until 1943 until all the problems were identified and solved by the submariners themselves. Until then, US submariners were going war, trusting their lives to a weapon that was unreliable, and could even turn against them by running erratically in a circular path. If you've ever heard the phrase, "Torpedo running hot straight and normal!", its because the hydrophone operator was listening for erratic movement in the torpedos!

Submarines in the pacific operated out of three primary ports. Pearl Harbor, Fremantle, and Brisbane. Submarines were divided by numbered squadron called SubRons. Each squadron had a submarine tender which was responsible for the upkeep and maintance of the subs assigned to it. The pacific theater itself was divided into two areas of operations, with each area headed by an admiral similar in position to the Germans Karl Donitz. These two operational heads were known as:

COMSUBPAC - short for commander submarines pacific
COMSUBSOWESPAC - short for Commander submarines South West Pacific

FLOTILLAS & OPERATIONAL AREAS

Trigger Maru has 8 career options available.

1. Pacific Fleet: Standard flotilla based in Pearl Harbor, Hawaii. Patrols the central pacific. Starting in harbor will place you in Pearl Harbor at the start of a war patrol. It is recommended to always stop by Midway Island on the way to your patrol area.. Midway island was the standard location for "pearl boats" to top off their fuel tanks before proceeding on patrol.

   Submarine availability dates:
   S-18 class: N/A
   S-42 class: N/A
   Narwhal class: always available
   Porpoise class: always available
   Salmon class: 01Oct42 – 1945 available as transfer from South West Pac.
   Sargo class: 01Apr43 – 1945 available as transfer from South West Pac.
   Gar class: always available
   Gato class: 05Apr42 - 1945
   Balao class: 05Apr43 - 1945
   Tench class: 01Jan45 - 1945

2. Task Force, Midway: Patrols the central pacific, and is a more "gamey" option for those tired of the usual routine. Your guaranteed to get a special operations mission of some sort every every other patrol. Starting in harbor will place you at Midway Island at the start of a war patrol Starting out of harbor will place you on the west side of international date line located west of Midway. Regardless of where you choose to start your patrol, it will always end at Midway Island.

   Submarine availability dates:
   S-18 class: N/A
   S-42 class: N/A
   Narwhal class: always available
   Porpoise class: always available
   Salmon class: 01Oct42 – 1945 available as transfer from South West Pac.
   Sargo class: 01Apr43 – 1945 available as transfer from South West Pac.
   Gar class: always available
   Gato class: 05Apr42 - 1945
   Balao class: 05Apr43 - 1945
   Tench class: 01Jan45 - 1945

3. <u>Asiatic Fleet:</u> Standard flotilla based in Fremantle, Australia. Patrols the south west Pacific. Starting in harbor will place you in Fremantle at the start of a war patrol. When the Tender at Exmouth Gulf becomes available, it is recommended to always stop there to refuel before going to your patrol area.. Exmouth Gulf was a standard location for Fremantle boats to top off their fuel tanks before proceeding on patrol.

    Submarine availability dates:
    S-18 class: 1941 – 15Apr42
    S-42 class: N/A
    Narwhal class: always available
    Porpoise class: always available
    Salmon class: always available
    Sargo class: always available
    Gar class: 01May42 - 1945
    Gato class: 01Jun43 - 1945
    Balao class: 01Jul43 - 1945
    Tench class: N/A

4. <u>Task Force, Fremantle:</u> Patrols the south west pacific, and is a more "gamey" option for those tired of the usual routine. Your guaranteed to get a special operations mission of some sort every every other patrol. Starting in harbor will place you in Fremantle at the start of a war patrol. Starting out of harbor will place you in Exmouth Gulf at the start of a war patrol. Exmouth Gulf was a standard location for Fremantle boats to top off their fuel tanks before proceeding on patrol.   Regardless of where you choose to start your patrol, it will always end at Fremantle.

    Submarine availability dates:
    S-18 class: 1941 – 15Apr42
    S-42 class: N/A
    Narwhal class: always available
    Porpoise class: always available
    Salmon class: always available
    Sargo class: always available
    Gar class: 01May42 - 1945
   Gato class: 01Jun43 - 1945
    Balao class: 01Jul43 - 1945
    Tench class: N/A

5. <u>Brisbane command</u>: (15Apr42 to 30Jan45) Standard flotilla based in Brisbane Australia. Patrols the southwest pacific.

   Submarine availability dates:
   S-18 class: 1941 - 01Nov43
   S-42 class: 1941 - 15Oct43
   Narwhal class: N/A
   Porpoise class: 01Jul42 - 1945
   Salmon class: 01Jul42 - 1945
   Sargo class: 01Jul42 – 1945
   Tambor class: N/A
   Gar class: 01Sept42 - 1945
   Gato class: 01Nov42 - 1945
   Balao class: 01Jul43 - 1945
   Tench class: N/A

6. <u>Alaska Command:</u> (01Jun42 – 31May43) This is small campaign focusing on S boats in the Aleutian islands during the time of the Japanese invasion of Kiska and Attu.

7. <u>New Construction, 42:</u> (14 Feb42) It was not uncommon for an executive officer on one submarine, to be detached from his current boat, and be sent back to the United States to commission a new boat as it's captain. This was more or less called, "being sent to new construction".   Selecting this option will start you off near Mare Island, California. Where your newly commissioned Gato class submarine is to undergo sea trials before transferring to the Pacific Fleet as a front line combat submarine.   If you absolutely must have a Gato class as early in the war as possible, this is an excellent option. *(NOTE: The missions, while playable, do not reflect changes made to various portions of the mods mechanics such as crush depth or battery recharge times.)*
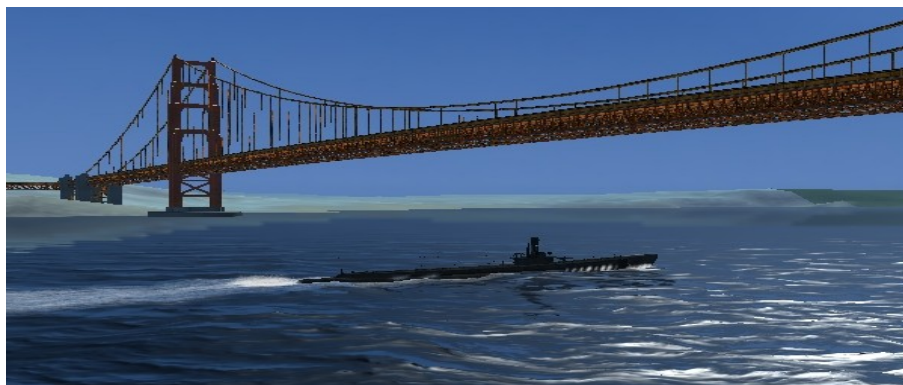
8. The Terrible T. (8Dec41) This is an entirely new campaign option with version 2.5 of TMO. It allows you to play just one boat, the entire length of the war, with refits being offered instead of new commands.

    This campaign option gets it's inspiration of the USS Tautog, a Tambor class that was present during the Pearl harbor attack, and sailed 13 war patrols before being retired to training duty in 1945,. She was the top ranked US submarine in number of ships sunk.

    (Further info on the Tautog's fate can be found here: http://pigboats.com/subs/199.html   )

PATROL GRID

The US submarine service, much like the German Uboatwaffe, operated using code named ocean grids to denote patrol areas. A *pseudo representation* of the historical grid names has been added in TMO. For the curious, some low quality pictures of these incredibly hard to find grid maps have been added to the mods support directory for closer inspection.
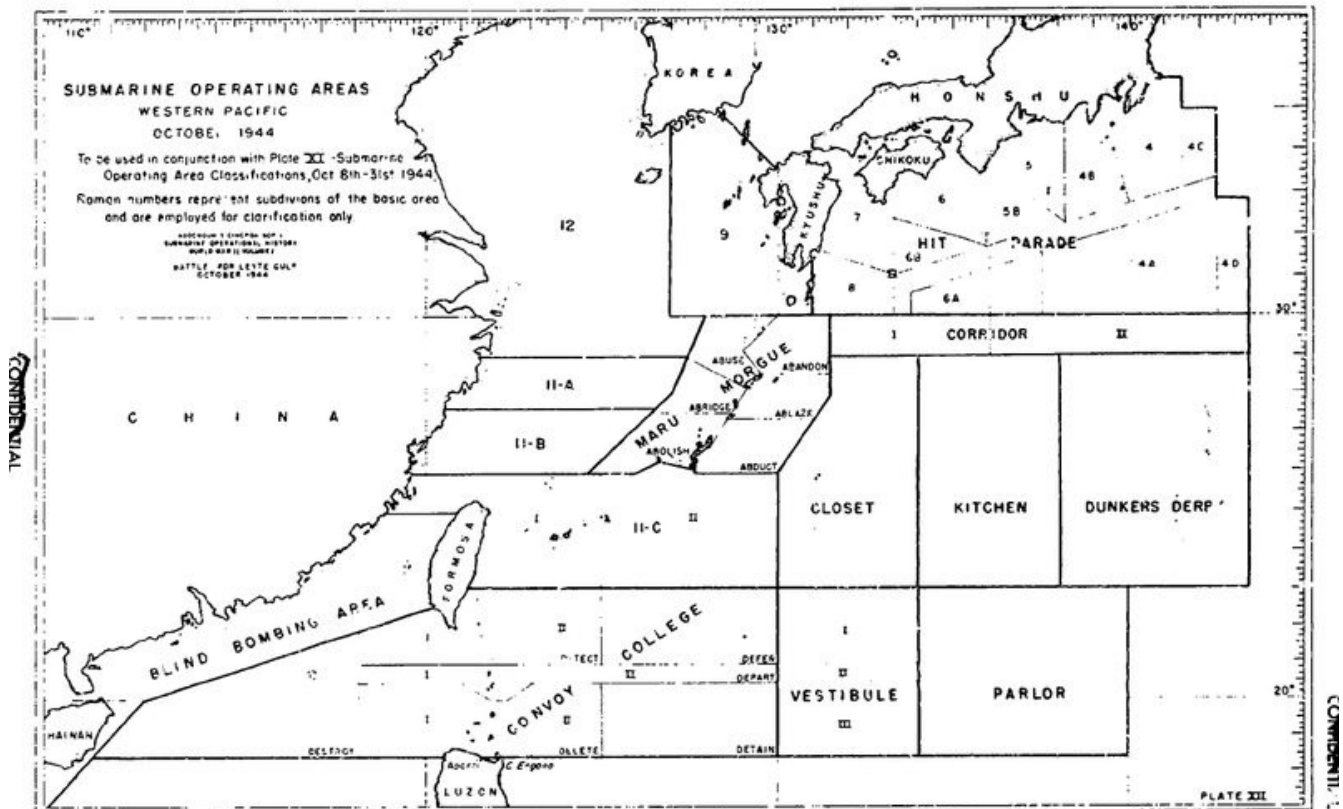
A patrol area map of the western Pacific, which was part of the Central Pacific Area of operations under the command of COMSUBPAC. This particular region was often referred to as "Empire" or "Empire waters". Of this region, Area 7 is the most "famous" due to the movie "Run Silent Run Deep".. This where the Bungo Straights are located, and is location of the infamous movie character, "Bungo Pete".
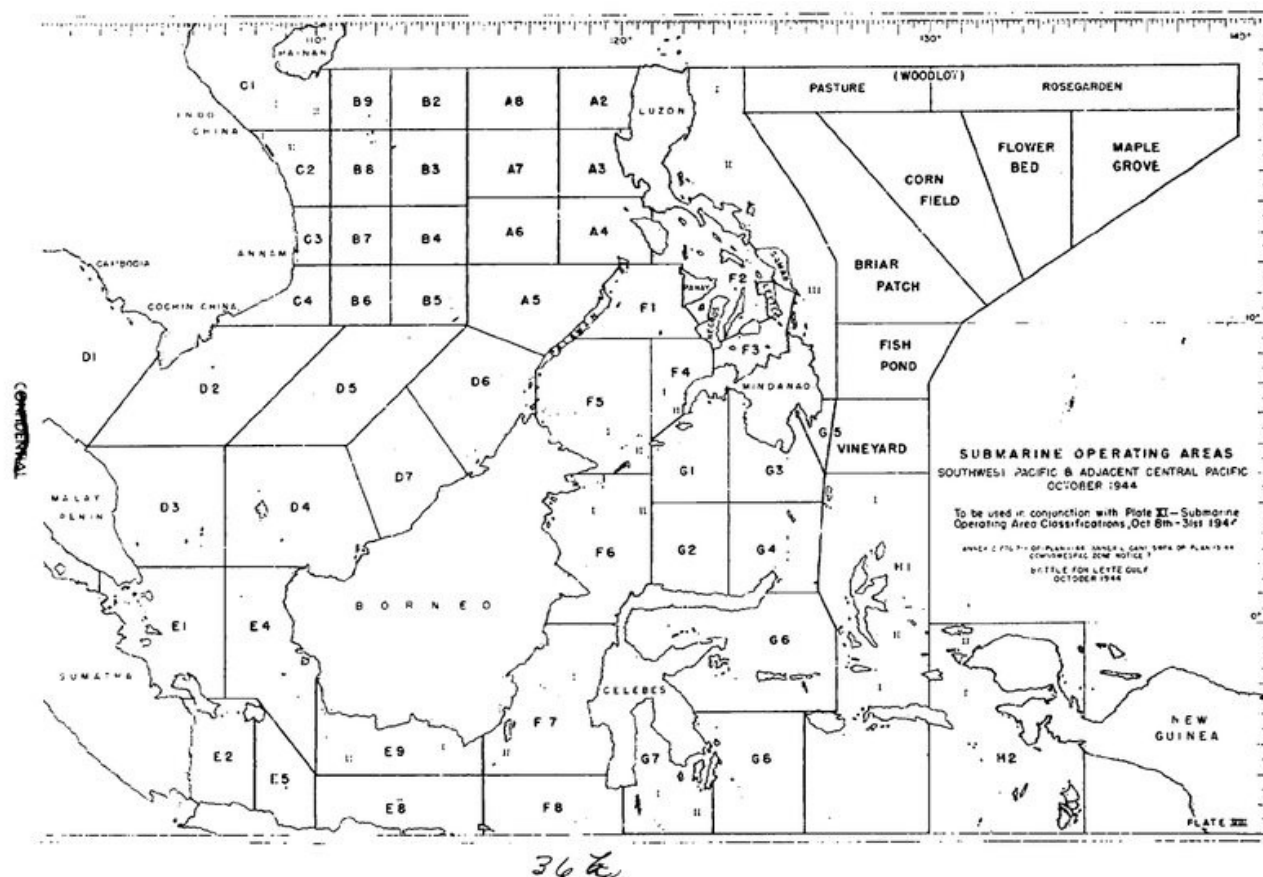
A patrol area map of the South West Pacific, which was under the command of COMSUBSOWESPAC.

PATROL RATINGS, RANKS, & REFITS

Patrol Ratings:
Your performance on patrol is rated, and that rating has a direct impact on if/when you get promoted, and weather or not your boat receives a refit, or if you are offered a new command.

Your rating is based on how much renown you earn. Not if you complete your mission or not. So if you receive a mission that you do not think you can complete, you can ignore it so long as you earn enough renown to obtain a decent patrol rating.

Chart of renown , ratings, and descriptions:

Min Renown	Max Renown	Rating	Description
MIN	-201	-3	Criminal
-200	-101	-2	Deplorable
-100	100	-1	Poor
101	600	0	Average
601	1300	1	Good
1301	2000	2	Excellent
2001	MAX	3	Outstanding

When you're done with a patrol, the game checks your renown and gives you rating according to the values in that table. This is also used to adjust your campaign rating. An internal rating the game uses which effects promotions. After each patrol a calculation takes place:

New_Campaign_Rating = Old_Campaign_Rating + Last_Patrol_Rating / 2

Player Ranks:

There are two ranks available for the US campaign, with the player starting at Lieutenant Commander .

To be promoted to Commander
-At least 5 months since last Promotion
- At least 4 successful patrols (rating 0 or more), including the last one
- Campaign rating 0 or more

To be promoted to Captain
- At least 6 months since last Promotion
- At least 5 patrols of rating 1 or more, including the last one
- Campaign rating 1 or more

Refits:

Your boat will undergo a refit, (or you'll be offered a new command) when:
 – you've done at least 4 patrols in your current boat.
 – have least 1 patrol rated as "good"
 – a conning tower upgrade, or newer command is available (based on date)

A problem with Rank, Refits, and New commands:
The game seems to throw, rank, refits, and new commands, into the same bucket. If available, the game will always give you a new command or new rank, instead of a refit.

THE FLEET TYPE SUBMARINE

During the later part of the 1930's, an escalation of tensions were indicating the possibility of war in the Pacific. This led the US navy to actively develop a submarine capable of support surface fleet operations. At the time, submarines were looked upon as scouts and screening force for the navy's capital warships. So the desired "fleet boat" would be required to posses the speed, the range, and the ability to maintain extended deployments in the worlds largest ocean. This design evolved during pre war years starting the the Porpoise class, and culminated with the Tambor and Gar class at the outbreak of war.. Three more designs were commissioned during the war, as the Gato, Balao, and Tench

 In essence, the Fleet type submarine is a long range attack boat, similar in purpose to the German's Type IX class Uboats. There are many types of Fleet boats, which can be confusing since they look very similar. The best way to explain Fleet boat types, is to state that they are an evolution of design, each design improving upon the last.

The fleet boat design evolution, and design improvement is as follows:

PORPOISE → SALMON → SARGO → TAMBOR → GAR → GATO → BALAO → TENCH

Note 1:
The Narwhal class predates the Porpoise, and was based on the U-cruiser concept.

Note 2:
Ranges for all boats are greater then their listed value. During the war ballast tanks were reworked to carry fuel when going out on patrol. As the fuel in the tanks was consumed, they were converted back to normal ballast tanks. This greatly increased the range of fleet boats, by as much as 20 percent. This wartime modification is reflected in the max range of all boats in TMO.

Note 3:
Armament listed represents the late war configuration of what the boat is capable of carrying in TMO.

Narwhal class:

(pseudo design added by mod)

Max speed:	17 knots surfaced 6.5 knots submerge	Test depth:	300 ft
Armament:	Four 21" bow torpedo tubes Two 21" aft Torpedo Tubes Two 6"/53 caliber deck guns One 20mm Oerlikon AA gun	Range:	9,000 nm @ 12.75 kts

The *Narwhals* were completed in 1930 and were the culmination of the cruiser sub concept in the U.S. They were big and roomy, which made them natural candidates for transport missions such as the raid on Makin. However, they could rarely mantain the design speed of 17 knots. Subsequent submarine designs would be considerably smaller than the *Narwhals*.

Porpoise Class:

Max speed:	17 knots surfaced 8 knots submerged	Test Depth:	250 feet
Armament:	Four 21" bow torpedo tubes Two 21" aft torpedo tubes One 4"/50 caliber deck gun Three 20mm Oerlikon AA guns	Range:	8,700 nm @ 13.5 kts

The *Porpoises* were completed in 1935-1937 and represented a trend away from the cruiser sub concept towards smaller, handier boats. However, they still had slow dive times, though they were capable of diving deep and were quite habitable (for submarines.)

Salmon Class:

Max speed:	21 knots surfaced	Test Depth:	250 feet
	9 knots submerged		
Armament:	Four 21" bow torpedo tubes	Range:	8,700nm @ 15 kts
	Four 21" aft Torpedo tubes		
	One 4"/50 caliber deck gun		
	Three 20mm Oerlikon AA guns		

The Salmons were completed in 1937-1939 and introduced important innovations. They boasted lightweight high-performance diesel engines designed by private firms, could dive in less than sixty seconds, and used diesel-elecric drive, which increased the flexibility of the powerplant. Any combination of engines could be used to either drive the boat or recharge its batteries. They continued the trend towards better habitability, heavier torpedo armament, and improved fire control. The improved batteries allowed a boat to move at two knots submerged for 48 hours. They were still fairly modern boats when war broke out. None were lost in combat.

Sargo Class:

Max speed:	21 knots surfaced	Test Depth:	250 feet
	8.75 knots submerged		
Armament:	Four 21" bow torpedo tubes	Range:	8,700nm @ 15 kts
	Four 21" aft Torpedo tubes		
	One 4"/50 caliber deck gun		
	Three 20mm Oerlikon AA guns		

The Sargos were completed in 1939 and were quite modern boats for the time. They were essentially slightly modified Salmons. They were required to be able to maintain 17 knots on three of their four diesel engines and to have 25 percent reserve buoyancy. They used a new Navy battery design (Sargo batteries) in place of the commercial batteries previously used. . Extra fuel could be carried in some of the ballast tanks at the cost of reducing dive capability. The class introduced the "down express" ballast tank, which was fitted under the forward torpedo room to reduce the dive time; this was flooded at the start of the dive, to pull the ship down, then blown as soon as the ship was underwater.
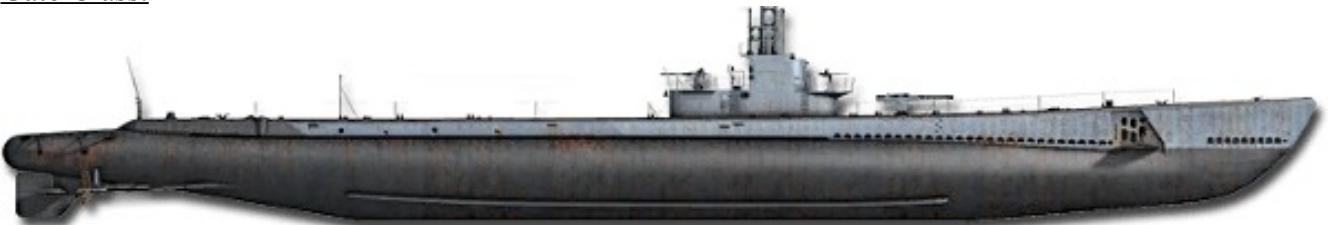
Tambor and Gar Class:

| Max speed: | 20.4 knots surfaced | Test Depth: | 250 feet |
| | 8.75 knots submerged | | |

Armament:	Six 21" bow torpedo tubes	Range:	8,700nm @ 15 kts
	Four 21" stern torpedo tubes		
	One 5"/51 Caliber deck gun		
	Two 40mm Bofors cannons		
	One 20mm Oerlikon AA gun		

The Tambor's and Gars were completed in 1940-1941 and were essentially improved Sargos. They established the configuration (six forward torpedo tubes, four rear torpedo tubes, and a total of 24 torpedoes) that characterized all American submarines built during the war, and were designed with gun foundations strong enough to carry a 5" deck gun at Lockwoods insistence. This would later prove to be a boon the succeeding classes.

No other American submarine class suffered as high losses in proportion to its numbers in the Pacific. Seven of the twelve boats of these types were lost, all but two with all hands.

Gato Class:

| Max speed: | 21 knots surfaced | Test depth: | 300 feet |
| | 9 knots submerged | | |

Armament	Six 21" bow torpedo tubes	Range:	8,700nm @ 15.18 kts
	Four 21" stern torpedo tubes		
	One 5"/25 caliber deck gun		
	Two 40mm Bofors cannons		
	One 20mm Oerlikon AA gun		

The *Gato's* were just beginning to join the fleet at the start of the war. The last peacetime design, they were somewhat larger than their predecessors, improving stability and subdivision and allowing more powerful machinery. Their large engine rooms were subdivided by a pressure-proof bulkhead. They were a good design that was suitable for mass production, and they became the definitive US submarine model of the Pacific War. They set new standards of habitability and endurance, had sophisticated fire control computers (by the standards of the day), and were heavily armed. A couple of these boats continued to serve in the US navy as late as the 1950's and 1960's.

Balao Class:

Max Speed:	20 knots surfaced	Test depth:	400 feet
	8.75 knots submerged		
Armament:	Six 21" bow torpedo tubes	Range:	8,700nm @ 15.18 kts
	Four 21" bow torpedo tubes		
	One 5"/25 caliber deck gun		
	Two 40mm Bofors cannons		
	One 20mm Oerlikon AA gun		

The Balaos were completed in 1943-45 and were essentially Gatos with strengthened hulls. This allowed them to dive deeper, which was tactically important when evading Japanese depth charge attacks. The hull plate was increased in thickness from 0.5625" (14.3mm) to 0.875" (22.2mm) and the plate material was upgraded to high-tensile steel. It was calculated that this would increase the crush depth to 900 feet (270m) but other components, such as propeller shaft glands and the trim pump, could not be redesigned quickly to take the higher pressure and the maximum design operating depth was set to 400 feet (120m). A Gould centrifugal pump was adopted in 1944 that could operate at 600 feet (180m) depth or more, and the refitted Balaos were thereafter able to more fully exploit their thick skins. Many of these boats continued to serve in the US navy as late as the 1960's and 1970's.

Tench Class:

(Tench added by mod)

Max Speed:	20 knots surfaced	Test depth:	400 feet
	8.75 knots submerged		
Armament:	Six 21" bow torpedo tubes	Range:	8,700nm @ 15.18 kts
	Four 21" bow torpedo tubes		
	Two 5"/25 caliber deck gun		
	Two 40mm Bofors cannons		
	One 20mm Oerlikon AA gun		

The design dated to 1943, the *Tenches* were completed in 1945, with just two units ready in time to conduct war patrols. They were evolutionary improvement over the Gato and Balao classes, only about 35 to 40 tons larger, but more strongly built and with a slightly improved internal layout. Many of these boats continued to serve in the US navy as late as the 1960's and 1970's.

CONNING TOWER VARIATIONS

During the prewar era, US fleet submarines were designed with hydrodynamics in mind, spending a large portion of their time submerged to avoid detection according to prewar doctrine. However, at the outbreak of war, It was quickly discovered that subs were spending a larger amount of time on the surface then previously thought, and the hydrodynamic design of the conning tower lended itself to making the submarine easier to see on the surface. Thus, over the course of the war, the conning tower saw continual changes in order to minimize it's silhouette.

Note 1:
As previously mentioned in the "patrol ratings" section, Your boat will undergo a refit, (or you'll be offered a new command) when:
- you've done at least 4 patrols in your current boat.
- have least 1 patrol rated as "good"
- a conning tower upgrade, or newer command is available (based on date)

Note 2:
The following is a generalized depiction of conning tower upgrades, using the Gato class as an example.

VERSION 1

Description:
Prewar conning tower.

Deck Weaponry:
One 20MM Oerlikon
Availability:
Start of war to 1942-06-31

VERSION 2:

Description:
The aft bridge fairwater and periscope shear plating has been removed to reduce silhouette.

Deck Weaponry:
One 20MM Oerlikon
Availability:
1942-07-01 to1943-01-31

VERSION 3:

Description:
The forward bridge fairwater has been cut down to further reduce silhouette, and a second AA gun platform has been added.

Deck Weaponry:
One 20mm Oerlikon, one 40mm Bofors, and one additional deck mounted 20 mm Oerikon
Availability:
1943-02-01 to1944-01-31

VERSION 4:

Description:
Further removal was done to bridge fairwater (gato only) and your boat has been repainted to the MS/32 color scheme.

Deck Weaponry:
Two 40mm Bofors, and one deck mounted 20 mm Oerikon
Availability:
1944-02-01 to end of war

Note on MS/32 color scheme:
Throughout most of the war, US fleet boats were actually pained in the black MS/9 configuration. It wasn't until later that they adapted the well known gray paint scheme, known officially as Submarine Color Measure 32. Vertical surfaces were painted gray, horizontal surfaces painted a darker color. This coloring scheme was found to make the submarine harder to visually see, especially at night.

(note: The AI is not effected by any camouflage color, or pattern.)

HYDROPHONE & SONAR

Hydrophones

WCA Listening Gear
Max Range: 10,000 Yards
Availability: always available
An early war ultrasonic passive sonar that was combined with active sonar equipment into one set with the receiver mounted in the conning tower. Although the range isn't that great, it's chin mounted receivers allow the detection of sound contacts while surfaced.

JP Listening Gear
Max Range: 15,000 Yards
Availability: 1943-06-01
A sonic passive sonar that was installed in the forward torpedo room and used tandem with WCA listening gear. WCA sonar indicators were modified so they could display the JP sonar information as well as their own. The JP sonar head was a T bar mounted on the main deck. In SH4, this sonar is used in conjunction with the WCA listening gear allowing a detection range of 15,000 yards submerged and 10,000 yards while surfaced.

JT Listening Gear
Max Range: 21,000 Yards
Availability: 1945-01-01
An upgrade to the JP, The JT sonar was installed to replace the JP sonar in 1945. In SH4, this sonar replaces the JT, and is used in conjunction with the WCA listening gear allowing a detection range of 21,000 yards submerged and 10,000 yards while surfaced.

Note:
While battle stations is active, you will notice an additional sonar operator. This is because on fleet boats, one sonar man would track the current target, while the other would maintain a vigil of the surrounding area to maintain situational awareness. Due to game limitations with SH4, this additional sonar man is only aesthetic and not functional.

Sonar

WCA Sonar Gear
Max Range: 5,000 Yards
Availability: always available
Standard active sonar fitted on fleet boats throughout the war. It came packaged in combination with WCA listening gear, with the receiver mounted in the conning tower.

FM Sonar
Not available.
Due to limitations in the Sh4 game engine, it is not possible to add FM sonar.

RADAR

Air Search Radar

SD Radar
Max Range: 26400 yards
Availability: 1941-12-01
An omni directional radar that could provide range, but not bearing of airborne targets, on an A scope receiver. Due to limitations in SH4, this is not possible. SD radar contacts are not displayed on any radar screen. The only way to see SD radar contacts, is to have map contact updates enabled. Your radar man will notify you of SD radar contacts regardless.

Improved SD Radar
Max Range: 35200 yards
Availability: 1942-06-01
An improved version of the earlier SD Air search radar.

SV Radar
Max Range: 44000 yards
Availability: 1945-01-01
SD was later replaced by SV radar, which used a rotating directional antenna, and could give a range and bearing on the target.

Note:
You can raise your air search radar antennae while at periscope depth by pressing the " T "key. Doing this is always a good idea before surfacing.

Surface Search Radar

SJ Radar
Effective Range: 20,000 yards / variable
Availability: 1942-06-01
Early Surface search radar used for detecting ships.

SJ-1 Radar
Effective Range: 30,000 yards / variable
Availability: 1943-07-01
An improved Surface search radar touting better range then the first SJ unit.

ST Radar
Max Range: 6500 yards
Availability: 1944-10-06
Late war miniaturized radar fitted into the NO 1 periscope. It was primarily used for obtaining an accurate range on a target. In TMO, this is available on the Tench class only.

ALTERNATE SURFACE SEARCH RADAR BEHAVIOR

The effectiveness of surface search radar in TMO 2.0 is variable, if you choose to install this **optional mod**. How far away a ship is detected will depend on the radar's max range, size of target, and aspect to the player (bows on verses broadside) The following information was compiled during static testing, and should illustrate what to expect in effectiveness of SJ radar.

Approximate SJ radar detection ranges:

Target has 0 deg. AOB.
Battleship: 26.2KM or 28,652 yards
Merchant: 9200 Meters or 10,061 yards
Destroyer: 7300 meters or 7,983 yards

Target has 45 deg. AOB
Battleship: 3.4 KM or 37,620 yards
Merchant: 21.7 KM or 23,731 yards
Destroyer: 17.1 KM or 18,700 yards

Target has 90 deg. AOB
Battleship: 35 KM or 38,276 yards
Merchant: 25.7 KM or 28,105 yards
Destroyer: 19.5 KM or 21,325 yards

Approximate SJ-1 radar detection ranges:

Target has 0 deg. AOB.
Battleship: 34.8 KM or 38,057 yards
Merchant: 12 KM or 13,123 yards
Destroyer: 9000 meters or 9,842 yards

Target has 45 deg. AOB
Battleship: 34.8 KM or 38,057 yards
Merchant: 28.7 KM or 31,386 yards
Destroyer: 21.3 KM or 23,293 yards

Target has 90 deg. AOB
Battleship: 34.8 KM or 38,057 yards
Merchant: 34.2 KM or 37,401 yards
Destroyer: 26 KM or 28,433 yards

Note 1:
Approximate, on the above ranges, means just that.

Note 2:
If you do not agree with this model for radar performance, an optional mod with fixed radar detection ranges is available in the documentation directory of TMO 2.0

RADAR WARNING, DECOYS, & MISC EQUIP.

APR-1 & SPA-1 Radar Counter Measure
The allied version of a Radar Warning receiver. By late 44, many boats were equiped these units.
Research for this equipment has proven to be extremely difficult, and I've been unable to find exact
specifications as to how well it performed.   As implemented in TMO, it's able to detect Japanese radar
twice their maximum range.

Resources found:
http://www.maritime.org/radio-rcm.htm

   U.S. submarines through 1945: an illustrated design history. Page 240 Online through google.

Submarine Bubble Target
Lifetime: 13 Minutes
Quantity: 10 Canisters
Availability: 1944-07-01
More commonly known as "Decoys", or in uboat parlance, "BOLD". Ejects a canister that emits large
quantities of gas. The resulting bubble cloud could resemble a submerged submarine to an attackers
active sonar.

Measure 32 Paint scheme
This equipment option was made available to allow players who prefer the MS/32 color scheme over
the historically correct MS/9 paint scheme.

Conning Tower Emblems
TMO allows you to place conning tower emblems and kill flags.. However, this an external option, so
you'll have create or find your own emblems. Your emblems should be 256 X 256 in dimensions and
be in TGA format.   See the sample emblem mod in the documentation directory.

"Duci's personal conning tower emblem" (TM) , all rights reserved, 2006.

DECK WEAPONRY

Anti-Aircraft guns

20MM Oerlikon
Max Range: 4700 Yrd
Magazine size: 60 rounds
Ammo: 1200 HE
Availability: Always
The smallest weapon in the American arsenal firing an explosive shell, the 20-mm was a close-in anti-aircraft machine-cannon.

Twin 20MM Oerlikon
Max Range: 4700 Yrd
Magazine size: 120 rounds
Ammo: 2400 HE
Availability: 1942-06-01
Two 20MM Oerlikons paired together for double the firepower.

40MM Bofors
Max Range: 10,000 Yard
Magazine size: 4 rounds
Ammo: 400 HP / 600 AA
Availability: 1943-02-01
Probably the best medium MG AA weapon of World War II, modernized Bofors are still in service even today.

Deck Guns

3"/50 Caliber Deck Gun
Max Range: 14,000 Yards
Ammo: 180 HE / 13 lb Shells
Availability: Always
This gun was original equipment on most of the early fleet boats. Originally developed for surface ships, it was adapted for submarine use with only minimal modifications.

4"/50 Caliber Deck Gun
Max Range: 16,000 Yards
Ammo: 150 HE / 33 lb Shells
Availability: 1942-06-01
A large number of fleet submarines were re-equipped with this deck gun. A former surface ship gun, it was better in regards to shell size and range.

5"/25 Caliber Deck Gun
|Max Range: 14,500 Yards
Ammo: 110 HE / 65 lb Shells
Availability: 1944-03-28
The first US deck gun designed specifically for submarines. The short barrel improved accuracy on a submarine's rolling deck, and the five-inch round was powerful enough to cause serious damage to a target.

Twin 5"/25 Caliber Deck Gun
|Max Range: 14,500 Yards
Ammo: 110 HE / 65 lb Shells
Availability: 1944-03-28
In TMO, this is only available on the Tench class.

5"/51 Cal Deck Gun
Max Range: 18,000 Yards
Ammo: 100 HE / 65 lb Shells
Availability: 1942-07-01, Tambor/Gar only
In July 1942, Admiral Lockwood, who was Commander Submarines Southwest Pacific, got permission from BuOrd to have the 5"/51 deck guns that were being removed from from the V-boats (Bass, Barracuda and Bonita) shipped to him. He had these installed on the USS Tambor (SS-198), USS Tautog (SS-199), USS Thresher (SS-200), USS Gar (SS-209), USS Tuna (SS-203), and the USS Grayling (SS-206) while these boats were in overhaul in Fremantle. These guns had a higher penetration power than the 5"/25 battleship gun. The gun was harder to handle than the 5"/25 because of its length and weight and had a slower rate of fire. In addition, its projectile and propellant charge were separate as a function of its being derived from a 'bagged charge' weapon.

SPECIAL NOTE ON DECK GUN PLACEMENT:

Due to a hardcoded bug in the SH4 game engine, it is not possible to switch locations of the deck gun once a game has been saved to file. Trying to move the deck gun from fore to aft, or vice versa will result in the crew member slots disappearing. In order to circumvent this bug and prevent it to happening during play, the deck guns have been "fixed" to a location. By default, TMO defaults to mounting deck guns forward of the conning tower, as this is the most popular placement.

The exception to this are the Tambor, and Gar, which ONLY have an aft mount due to the larger 5"/51 caliber deck gun they can equip. A bow mount for these two classes is not available.

If you prefer your deck gun mounted aft of the conning tower, enable the "TMO_Aft_deckguns" alternate mod found in the documentation directory.

EXTRA SPECIAL NOTE:
You must make your deck gun selection before you start your career game. If you prefer a bow mount, you need not do anything except start your game. If you prefer a stern mount, you must enable the alternate mod discussed above. Once you make this selection, you cannot change without causing the "deck gun crew bug" to appear, and you will not have crew slots for your deck gun crew.

So as far as the game is concerned, make your gun mount selection, and forever hold your peace!

CREW SKILLS

SH4 offers many crew skill,. most of them rather arcadish. TMO has reworked crew skills to be more realistic, and representative of an experienced crew. The goal here was to make crewman, and crew selection, valuable. It's also meant to provide a reason for the player to rotate crew once in awhile while in port to get the crewman with the skills you want

Here are the reworked skills in TMO:

MASTER ENGINEER
Required compartment: ENGINES ROOM, CONTROL ROOM
Description: When it comes to repairs, this barnacle encrusted Chief has rung more salt water from his socks then most sailors have sailed over. He can effect repairs faster, pump water out sooner, and make operational unserviceable equipment.
Effect: Repair and pump speed increased 38%, can repair destroyed items.

TIN CAN CROSSOVER
Required compartment: DECK GUN
Description: This man spent some time on destroyers as a Gunnery officer. His skill in naval gunnery will increase the accuracy of your deck gun.
Effect: Increases accuracy of deck gun by 50%

MASTER TORPEDOMAN
Required compartment: BOW TORPEDO ROOM, STERN TORPEDO ROOM
Description: This Chief knows how to run a torpedo room like a well oiled machine. His expertise makes for faster reloading of torpedoes.
Effect: Time it takes to reload torpedoes reduced by 40%.

TORPEDO EXPERT
Required compartment: BOW TORPEDO ROOM, STERN TORPEDO ROOM
Description: Defying orders from BuOrd not to touch anything, this Chief is constantly disassembling and maintaining the torpedoes. Torpedo malfunctions occur slightly less frequently as a result.
Effect: Torpedo malfunctions reduced by 25%.

PHARMACIST'S MATE
Required compartment: ANY
Description: Submarines were not large enough to merit physicians, so they had corpsman instead. Often called quack, voodoo man, pill pusher, or witch doctor by the crew. From lancing butt boils, killing crabs, or the rare appendectomy at sea, he is able to reduce the resting time and remove all the wounds of the crew.
Effect: Heal speed increased by 50%, fatigue reduced by 50%.

ENGINES EXPERT
Required compartment: ENGINES ROOM
Description: This Chief knows his job well enough to take a few unorthodoxed shortcuts on diving procedures, decreasing the time it takes to dive the boat.
Effect: Increases dive speed by 65.
Special note: I have tuned this so that with 3 of them, your fastest dive will be 35 seconds, which was obtainable by experienced crews. This skill is subject to diminishing returns.

MASTER ELECTRICIAN
Required compartment: ENGINES ROOM
Description: This Chief knows how best to maintain the batteries and draw the most amps, reducing battery consumption as a result.
Effect: Reduces battery consumption by 25%.

COMMAND PRESENCE
Required compartment: CONTROL ROOM
Description: This Officer has great courage and charisma. He inspires all around him, and seems destined for great things. While on board, the entire crew will receive a strong boost to experience gained. You as captain will benefit from his work by getting a major bonus to renown.
Effect: 15% bonus in renown.

AHEAD EMERGENCY
Required compartment: CONTROL ROOM
Description: Your officer orders the denizens of the engineering spaces to ignore safety protocols and push all four main engines to the absolute maximum power. Increases your maximum surface speed by 1 and 1/2 knots.|Duration: 6 hour|Available: 1 day
Effect: Maximum speed increased by 35%, which comes out to be 1.5 kts.

Note 1:
 The top speeds of subs in TMO were designed with the skill "Ahead emergency" in mind.. In all reality, the top speed listed on many resources is without consideration of how that speed was accomplished, and that the often touted 21 knot top speed, was not without putting abnormal strain on the boats propulsion system. This skill allows you to simulate that.

Note 2:
Subs in TMO dive at approximately 58 seconds. Wartime dives could be done in as little as 30 to 35 seconds with an experienced crew. The "Engine expert" crew skills was designed to simulate that.

UNDERSTANDING THE AI & EVASION

A common complaint that the AI is too hard . I really feel this is borne out of a lack of understanding how the AI works. I'm not going to bombard you with a lot of detailed information, just a basic gist of how it functions, so we don't have too many people going on "eternal patrol".

 (Authors note: This document was originally drafted for SH3, hence depth examples will be in meters and not to scale with US diving depths or Japanese Sonar capabilities)

The Tin can itself as it applies to detection:
That wily Jap tin can loitering above your head can only do one of two things. It can listen (passive), and it can ping (active). What it can't do, is both at once. Hence I feel its a safe assumption to say, if a Tin can is pinging, hes not listening, and if hes not pinging he's listening. Two important note's here to eliminate confusion:

A.) with multiple escorts on you, there is **always** somebody listening.

B.) The AI tends to key in on whichever sensor is receiving the biggest signature there is to pick up on. While it can only use passive or active at a singular moment in time, it can switch between the two quickly enough to make it appear that it is using both at once.

Active sonar, or being pinged:
- *something the AI wont do unless you allow it!*

There are several types of sonar, and they all differ in geometric statistics. Each one becoming a bit more effective then the previous version. From all I've been able to tell, the AI will not ping you unless:

A.) You are in his active sonar cone.
b.) You are presenting him a favorable aspect
c.) You are doing both A, and B for X number of seconds.

A common rookie mistake, and great example of this in action is a typical convoy attack where your sitting *directly ahead* (as opposed to just off to the side) of the convoy at a dead stop, bow pointing towards the projected convoy track at a extremely close distance, giving the lead escort your broadsides. In this scenario you did A, B, and C, and the lead escort will most likely always find you before you can execute your attack.

To understand the sonar cone you have understand three primary aspects as it pertains to its size and shape.

- They have a downward angle. The more downward angle they have, the deeper they can detect things. Naturally late war sonar has more downward angle then early war sonar.

- They have a maximum range.

- They have a maximum width or radius.

EARLY WAR SONAR:
- So easy to avoid, it feels like cheating

For illustration purposes, heres a picture of an early war sonar in action:
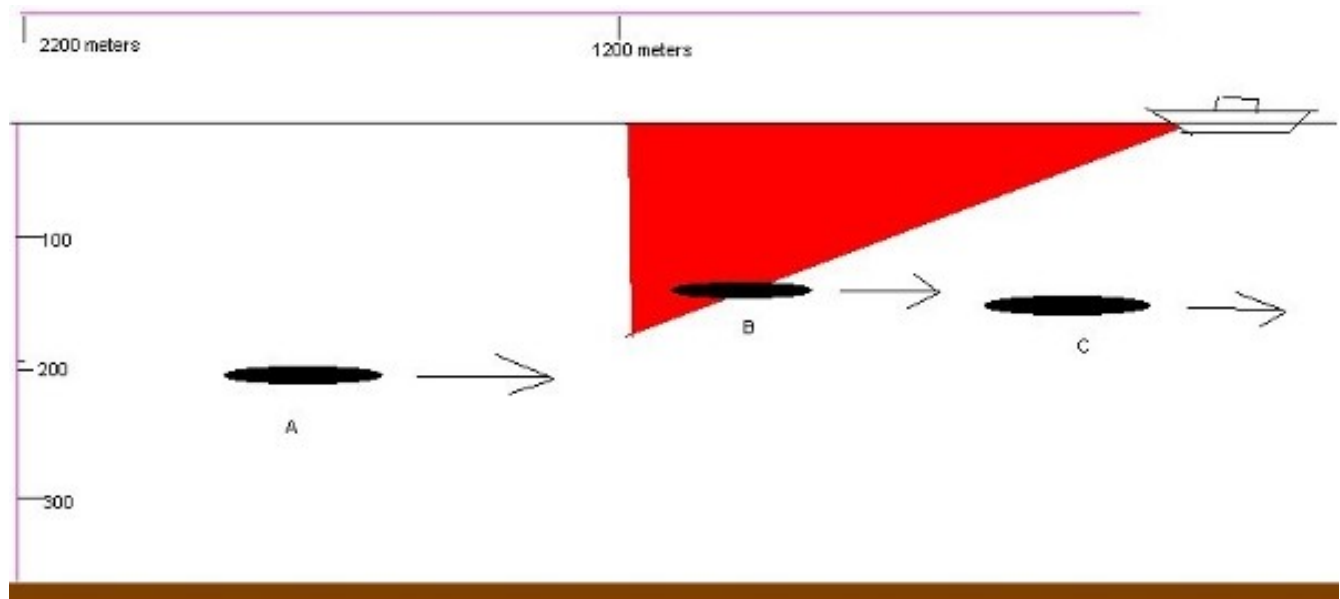
Note that its limited in range, and doesn't have much of a downward angle. Hence it doesn't go very deep.

Sub A:
Is not only out of the sonars range, but he's below the sonars cone, floating safely along at around 200 meters or maybe a touch deeper. (drawings are not to scale). Active sonar for him is a complete non factor. He will never hear not so much as a single ping out of the escort at all. Even if he falls within the sonars range, because he's below it, it will still not hear any pinging at all.

Sub B:
This fellow is probably around 170 meters or so, or even shallower. Note that if he went deeper, he'd be under the sonars cone, joining his comrade A in the saftey of the depths. Or likewise he could simply move towards the escort as it's coming at him, hence getting under the cone at a shallower depth then sub A.

Sub C:
At his depth he would be within the destroyers active sonar cone, but due to the angle of the beam, hes in effect, in the destroyers blind spot. This is standard to any sonar in any year of the war. A destroyer looses active sonar contact when hes about upon you. At this poin't he'll try and either regain contact on passive sonar, or launch an attack at your last known position - which is what they typically will do.

The obvious solution early war is to dive to around 200 meters or so and stay quiet as a mouse. Pretty simple no?

LATE WAR SONAR:
- Now we're in for it.

Now lets spice things up a little and look at a later war active sonar in relation to the previous example:
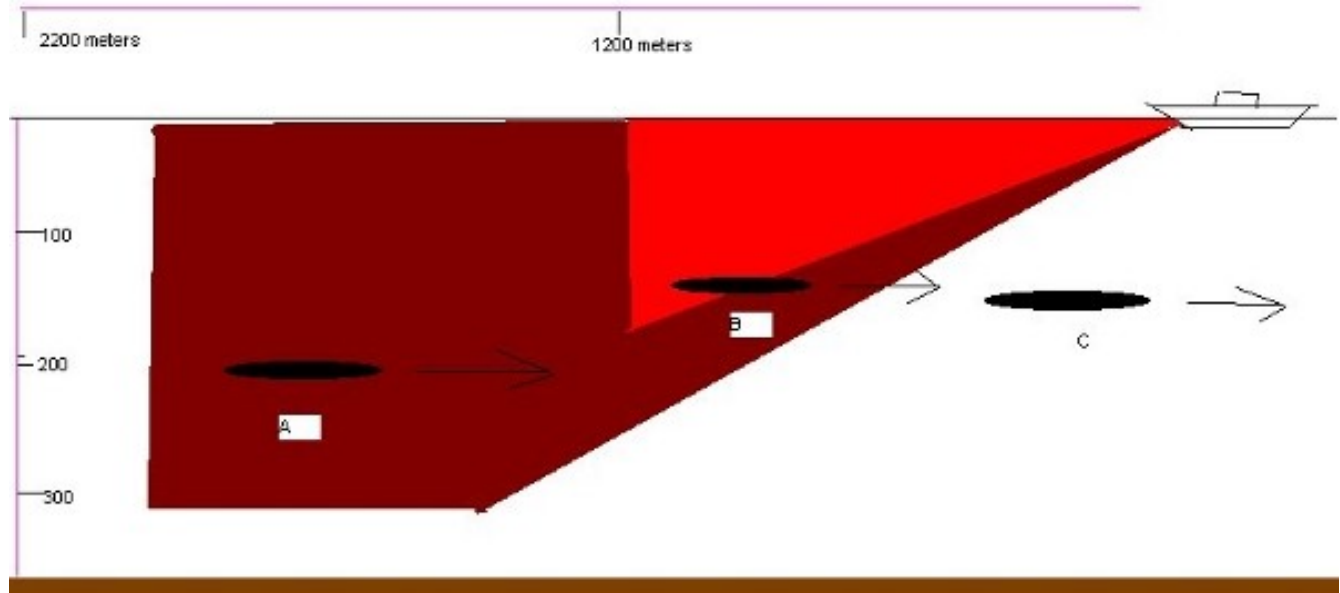
At this stage in the war, life has most certainly gotten complicated for you. In red you'll see the old early war sonar. The darker red represents the late war sonar.

Sub A:
Our smart fellow from the early war will now find that he is not only being detected, but is being detected from a fair distance. However, if he goes DEEPER, he'll find that as the tin can approaches him, he'll stopped being pinged much sooner then the other subs.

Sub B:
This fellow, didn't quite change his tactics from earlier in the war and is finding himself being pinged much sooner, for much longer.

Sub C:
Although hes in the tin cans blind spot, because he wasn't at the absolute maximum depth hes boat can obtain, the tin can's been pinging him for a good long time and probably has a pretty damn good fix on him.

Again, the obvious answer to late war sonar is,
"yes, Deeper still!"

Note:
Fleet boats in TMO can dive much deeper then you might expect. Indeed, in all reality, they dived much deeper then even I expected when researching crush depths. In late war, I would encourage you to go below your test depth. Be warned though! When you do find your crush depth, it will be fatal. Going deeper is going to be an answer to evasion, but it will be a white knuckle ride at first.

ASPECT
- Presenting yourself as a smaller target

The last item i should cover on active sonar his the width of the beam and aspect. Simply put:
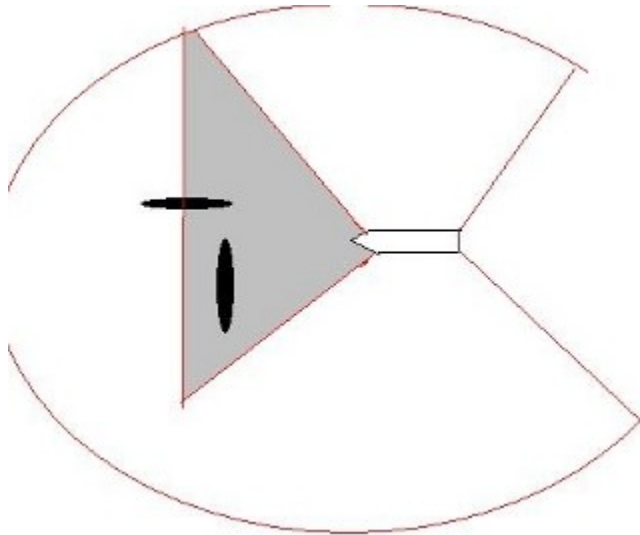
Aspect is simply how much of your boat your presenting to the AI to get a ping off of. Or in other words, your profile. Obviously pointing your bow or stern at an escort is give the escort less of your submarine to get an active sonar ping. Giving your broadsides to an escort is basically saying, "Please sir, can i have another?"

Active sonar out of the way, it's time to hear that pin drop.

PASSIVE SONAR
- pretending to be a big hole in the water

What could i possibly tell you about passive sonar, your probably wondering. Go to 1kt and go to silent running right? Well.... yeah, but theres a bit more to it then that.

The AI's ability to hear you depends on a few things:

A.) The state of the sea.
If the sea is calm, sonar conditions are greatly improved. If the sea is rough, sonar conditions are craptastic to say the least, and for you, this is good news.

b.) Engine RPMS.
It's not your speed per say that the AI zeros in on. Its your engines RPMs. When setting your speed, use the interior free cam and take a close look at your engines RPMS. 100 RPMs is usually the maximum i would go in a silent running scenario.

c.) Your position in relation to the escort. Looking back up at the picture of the aspect, you'll see a big semicircle around the destroyer. The area behind it, is its deaf spot, or its baffles. Its also deaf to anything DIRECTLY under it, at or around a radius of 10 meters. Depth charge attacks DO NOT mask your noise. Only when an escort is directly above you, or if you are directly behind an escort are you completely safe to use as many RPM's in your motors as your heart desires.

SHALLOW WATER AND WIND:
- Taking calculated risks, or why discretion is the better part of valor.

Remember, you have the element of surprise, and dictate the terms of when and where an attack will happen. Before executing an attack the first two things that should pop into your mind before you even begin open the outer torpedo tube doors is, how much water do i have under my keel and how rough is the sea?

A sad truth here is that shallow water can kill you no matter what year of the war it is, and no matter what AI settings the mod your using has. Even STOCK AI, is deadly in shallow water. Avoid it if possible.

Calm seas are also a concern. If you execute an attack on a well escorted target in calm seas in shallow water, you pretty much took an unnecessary risk.

Conversely, an attack in shallow waters in rough sea's could be an acceptable risk. It is up to you, the commander of that submarine to make that decision

CONTACT !
- Or, why you need to disappear for a little while.

In terms of Escort evasion, you need to be able to avoid letting the AI get a passive or active sonar contact on you for an X number of minutes, but usually an hour or two. **It is important to note that during this time the AI will be doing everything it can to reacquire contact!**

But thats not your only concern. Anytime an enemy unit makes contact with you. Either visually, on radar, sonar, what have you, it broadcasts your presence to any other unit in the area. This includes planes.

This means that any enemy war unit that is within an hour or so distance to your location will come looking for you. An example of this is say you have just attacked a convoy, 3 out of 4 escorts have given up and rejoined the convoy, but that persistent 4th escort is still looking for you, and gets a contact. What you'll see then is the other 3 escorts immediately start steaming to your location, but if your 35 minutes away, they'll turn around and go back to the convoy, even if only 5 minutes distance away - unless that 4th escort makes another contact.

SO WHAT THE HELL DO I DO IF I HAVE MULTIPLE ESCORTS CAMPING OUT UP TOP?

That i believe is completely situational, depending on year of war, number of escorts, and the state of the sea. More often then not, you may just have to wait them out, staying as deep and as silent as possible. I can say this though, with the knowledge of how AI detection works, ive been sunk by depth charges once.. maybe twice, in well over a year playing SH3.

KNOWN ISSUES WITH SILENT HUNTER 4

Silent hunter 4 was released in the most appalling state, with many bugs and graphical issues. Many were addressed by patch's from Ubisoft, many were addressed by player made modifications, and many persist to this day. Despite all that, SH4 is now in the most playable, and enjoyable state it has ever been. However, one needs to be made aware of the games more outstanding issues.

1. Incorrect dates listed in the patrol log in the in port office. Often, it will cite all the ships in a single patrol having been sunk on the same day.

2. Transparent crewman on the bridge. The work around for this is to not enable the "environmental effects" option in the graphics menu.

3. Deck gun crew bug. This occurs when the player moves their deck guns location. This has been worked around by limiting the players options to do so.

4. Buoyancy issues with deep diving. When the player meets or exceeds 600 feet, depth keeping is next to impossible. This primary effects the Balao, Tench, and U-boats.

5. Crew does not change to wet weather gear in heavy seas. They do so, only if it rains.

6. CO_2 not being vented while surfaced. It is my belief this bug is caused by alt tabbing SH4 while on patrol.

7. Deck and AA gun crewman being killed while submerged. This is due to a design flaw of the game. Place your crewman in "hogan's alley" (after battery crew berthing) when not in use.

FREQUENTLY ASKED QUESTIONS

1.) *I can't put people in the AA gun in crew management, it's obscured by the gauges! Is there a fix for this?*

With the num lock key enabled, press the "Period / delete" key on your numbered keypad. This will hide the UI (and the gauges) allowing you unobstructed access to the AA gun crew slots.

2.) *How do i get the next / previous camera back?*

The easiest way is to be a big cheater, is open the /data/cfg/commands.cfg in TMO. Search for " [Cmd50] " Your looking for these two blocks:

```
[Cmd50]
Name=Camera_on_next_unit
Ctxt=1
;Key0=0xBE,,">"
Page=0x34000000,3714

[Cmd51]
Name=Camera_on_prev_unit
Ctxt=1
;Key0=0xBC,,"<"
Page=0x34000000,3714
```

Simply remove the semicolon placed in front of the key assignment, and you have the next/previous cameras back. Note: this will restore the hot keys. It will not restore the buttons on the ordersbar.

3.) *How do i dive below 450 feet?*

In the conning tower of each boat is a 600 ft depth gauge near the helmsman, click on it, and set your desired depth. Alternately theres a clickable 600 ft depth gauge in the control room. In the Balao or Tench class, or just hit the D key, and the boat will keep diving until you order it to stop.

4.) *How do i cheat bigtime, and get back "tails" and sensor information on the navigation map?*

Disable TMO, and delete the following two files:
\Data\Menu\gui\ContLine.dds
\Data\Menu\gui\DashLine.dds

5.*) How do i get back the ship silhouettes on the contact map?*

Go to the /data/sea directory in TMO. There you will find a bunch subdirectories, one for each ship in the game. Located in each one of these subdirectories is a DDS file. This file will be named whatever the ships name is _shp.dds (*_ship.dds). Disable TMO, and delete each of these files from all subdiretories. Warning, not all ships are from the stock game, so deleting these particular ships means they wont show up on the map at all. I recommend you play with the ship silhouettes as is. The idea is to cut down the amount of unrealistic information the stock navigation map gives you, and to simulate markings that a tracking party member might have put down with a grease pencil.

6.) *Planes are detecting me at impossible depths! What gives?!*

This mod assigns additional visual sensors to unit types. One of these sensors goes to just aircraft. This visual sensor gives aircraft the ability to detect shallow submerged objects. However, there is a small problem. The radius of visual detection can be adjusted, just not the depth. There is a long drawn out explanation for the way things are set the way they are, but suffice to say, yes occasionally a plane will make a detection at a seemingly impossible depth. Such occurrences are by my experience however, rare. Submerged visual detection by aircraft, isnt a 100% thing. Several factors come into play such as, what angle your sub is to the viewing plane (bows on vs broadside), state of the sea, lighting level, fog level, etc. Every step has been made to ensure that submerged detection is as realistic as the game engine allows, and fair to the player. Visual detection was even made to be effected by thermal layers. So all that can be done, has been done. You may wonder why this was one at all. Simply because the positive aspects of this particular mod far outweigh the occasional scruple. In the end this is a MODIFCATION, a mod is really nothing more then a hack at a finished product. Its not like i have access to the source code to effect "real" changes.

As a general FYI, the ordinance that the planes in TM carry, are designed to detonate at 77 feet (20 meters), and 148 feet (45 meters), as well as when they come in direct contact with the players submarine. Something to keep in mind when patrolling areas with frequent air cover.

7.) I*'m getting entirely too many faulty torpedoes!!!*

Yes, TMO includes a modification to increase torpedo malfunctions, and having such abysmal torpedo failures is not only intentional, but historically correct. Furthermore, the modifications to torpedoes were done in such a way where you can't "game the game" and cheat your way around them with historical knowledge the skippers at the time didn't have. After 6/43, your issues will be solved. In the meantime your best bet is to use impact pistols in rough weather, and magnetic pistols in calm weather, and always set your torpedo depth to 0.

8.) I got a repeated mission in new construction, why?

I've scripted it as best i can so this doesn't happen, but the game doesn't always cooperate. It randomizes your time in port, as such the dates the game picks your next mission can sometimes overlap in scripting. If i could somehow control time in port from being a low number, i could stop this from happening. As it is, on occasion in new construction, you'll get a repeat

9.) *I didn't get transfered from new construction to Pearl Harbor, or transfer is unavailable, why?*

Transfer is not automatic. For various reasons, i ended up being unable to get the transfer to work automatically, so you have to do it yourself by "picking up the phone" and calling ahead. If the option is unavailable then you've completed sea trials before i thought was possible. So you'll have to edit the subs availablity date for the pearl harbor flotilla in the flotilla.upc file.
NOTE: If your next assignment isn't to Honshu, then you have a repeat of the 3rd sea trial. Sad to say, do it again. There is no point in forcing a transfer if your next assignment isn't to Japanese waters.

10.) *What about a metric (insert request here)?*

It's in the documentation directory, along with this manual.

11.) *What happened to my Gramophone?*

The gramophone has been altered to include a speed/range chart. Its a very handy tool for intercepting contacts. Unfortunately theres some monitor/display aspect ratio that does not like this modification (wide screen users i believe). For this reason, a stock gramophone modlet has been included in the support directory.

12.) *Is TMO compatible with WernerSobe's "realistic sinking's physics" mod?*

No.

13.) *Can i run this super cool environmental mod with TMO?*

An Environmental mod is now included in TMO, so you should not have to run anything extra. You may prefer one mod over another, i can only recommend that you try TMO by itself before adding mods of your own. A word of caution here with environmental mods in general: The authors of these mods have done fantastic work and have made great strides. Unfortunately these mods may have adverse effects on AI visual sensors, and possibly even AI underwater sensors. These ill effects will also effect your watch crews ability to spot targets, being unable to see things that you can see clearly. The environmental mod included in TM has been tweaked so this does not happen. So be advised that by running other mods, you run the risk of upsetting how well the AI can visually detect things

14.) *Can I run such and such mod with TMO?*

You can, thats your discretion, but i would advise not to unless your sure you know what your doing with the games files. All the files and mods contained within TMO were tuned and tweaked to interact as one cohesive entity. A single adjustment in one file, often enough required a small adjustment in 5 other files. Bottom line is, i absolve myself of ANY problems you may have with TMO if your running any other mod on top of it

15.) Can i run RSRD with TMO?

At Lurker_Hib3's say so. Just be careful of installation order (install after TM), and always uninstall RSRD before TMO. Regardless of what this manual cites, follow Lurkers install instructions carefully, and you should be ok.

16.) *I like X part of the mod, but i dont like Y part of the mod, can you get rid of the Y?*

You're free to reverse engineer, dissect, vivisect, and otherwise undo all my work at your own leisure, and do with it what you will, I really don't care. If you plan on using portions of TMO in your own mod work, either in part, or in whole, see the licensing and permissions section of this manual.

Credits:

(Special thanks to Captain America and Vickers03 for providing the level of support that they have)

Aanker
- Sofu Gan (lots wife) landmark

AntEater
– Aces roster mod with pre JANAC tonnage scores.

Anvart
– Submarine propeller fix
– Conning tower periscope fixes
– extendable SD radar antenna

AOTD|MadMax
– S- Boat and Narwhal engine sound fix

Captain America
– The TMO Hud mod you see today.
– historical prop rotation
– US Torpedo texture/ model overhaul
– Night Periscope texture
– Gato Interior Control Room overhaul

Captain Cox
– main menu background movie
– officers cap and crew uniforms
– smaller seabed rocks
– smaller seaplants (medium version)
– pull down speed chart mod

Capnscurvy
– US medals fix

Chomu
– mini chrono

CCIP
– initial commands.cfg development.

Danurve
- Extra messages from boats at sea

Developers@ubisoft
– For creating the game ive waited years to play.
– Providing help or insight and gnerally being available to occasionally help modders.

Dgrayson
– fixed the photo missions

Ducimus
– Too F'ing much. (insert 2 pages of self crediting here)

Foofighters
- Narwhal class skin texture.
- Submarine textures used by alternate mod.
- For Tambor/Gar/Gato skins I used as a base

Günther Hessler
- Sounds borrowed from his "ultimate sound" mod pack

Jace11
- Taihosan Maru Fix
- Enchanced map labels
- Akitsu Rudder fix
- Killer of Jawa's

Jhereg
- High rez gramaphone fix, located in optional mod directory.

jimimadrid
- Compass Lubber line mod

kapitan_zur_see
- historical 4 bladed propeller fix

Kriller
- Enviormental texture upgrades
- No grainy PPF mod. (new version)
- various row (Kriller2?)

Kriller2
- Scene.dat file, and misc ROW files.
- Various files originating from Real Environments mod.
- Various elements from Pacific Environments

Hildofr
- nomograph

LeoVampire
- improved smoke and fire effects
- submarine and tower reflects
- being the textbook definition of "awesome person"

LukeFF
- realistic crew config
- "Hull Classification Symbols and Numbers Mod"
- IJN Type 13 Radar Fix

lurker_hlb3
- P38J Lighting
- hydrophone RPM det level adjustments
- SV radar
- Truk Harbor location and traffic.
- Troop convoy traffic

Nbjackso
- Navigation map textures and base icons

nautilus42
– Original AI Jap Submarine
– Original AI Germain 9D2 submarine

Nisgeis
– Zombie eye crew fix.
– 3D TDC and radar range unit in gato interior

Nvdrifter
– Depth charge splash warning.

NYGM
– Additional AI visual nodes from an earlier version of the NYGM mod for SH3.
– Dolphin mod
– we had our disagreements, but i can't deny they had some awesome ideas, some of which I've used in TM.

Observer
– Conceptualized the new engine room configuration in fleet boats.

OakGroove
– Orders Bar gauges
– Orders bar HUD graphics
– TDC/ Torpedo/ bearing indicator interface graphics
– Submarine Interior graphics
– rec manual
– Flag textures

Othr
– 3d model used for conning tower emblems

Otto's
– manual range adjustment tweak

Pacific Aces Team
– misc crew sounds.

Payoff
– crash dive sound vocals
– Ahead 2/3rds sound vocals

Privateer
– Conning tower flag and flag pole models.

Ref
– Panama canal mod

Racerboy / TheDarkWraith
- PPF adjustment

Sergei
- Merchant skin pack

scoochy
– slower smoke effects mod

SteveTRM
– Interior sound fixes

skwasjer
– For the most outstanding mod development tool to ever grace the Silent Hunter modding community.

Somnus
– base Atk periscope texture used.

swdw
– Sub diving mechanics based on his original work.

Syxx_Killer
– Fixed Oakgrooves TDC panel

Tater
– Taihosan Maru Fix
– Type13 Radar fix
– DD Yagumo
– Misc ship eqp corrections
– IJN Type 13 radar fix.

Vickers03
– Conning tower Steering wheel 3d model.
– control room dive angle fix
– Radar depth sound files
– **massive** Interior overhaul to all sub interiors.

w_clear
– Environmental mod 5.0
– Various files originating from Real Environments mod.

WilhelmTell
– Submarine diesel engine sounds

Additional thanks, for providing helpful feedback during any beta release of TMO.

-AVGWarhawk
- Banjo
- dgrayson
- ElAurens
- epower
- RockinRobbins
- snakeyez77

Misc Credits:

(Works used in past versions of TMO, but are not present in current versions:)

castorp345
- Torpedo icon textures.

Captain Cox
- Nav tools
- periscope graphics.

Capnscurvy
- SCAF
- max optics

cdrake66
- developed new ordersbar icons specifically for TMaru (then FTT)

fullmetaledges
- medal changes/corrections mod

kapitan_zur_see
- No grainy PPF mod. (old version)

lethal
- Observation periscope texture

LeoVampire
- camera modfications X 2
- living breathing ocean mod
- Submarine pitch and roll mechanics
- airport/nav map mod.
- cloud fixes

ParaB
- Airstrike.cfg AI, skill level modifiers

Probex
- developed 9KM visibility scene.dat

Seeadler
- improved sky environmental effects mod
- Environmental mod version 1.0

u56_Dragon
- Fixed intro screen

WernerSobe
- Natural Sinkings Mechanics 3.1

zAmboni
- Smaller Nav tools

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