



# **Danger From The Deep**

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**Game Manual  
(Version 0.3.0)**



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## 1. Introduction

Danger From The Deep is a tactical submarine simulation game that puts you in command of German WWII U-boats. The game has been developed as an Open Source project and is available for free under the GNU GPLv2 license. The artwork is licensed under a Attribution/NonDerivative/NonCommercial Creative Commons license, CC At/Nd/Nc 2.5.

## 2. Gameplay

The current release of the game supports only single player missions. Following are the missions available:

- 2.1. Warship Engagement
- 2.2. Convoy Battle
- 2.3. Historical Mission

### 2.1 Warship Engagement

Not yet implemented.

### 2.2 Convoy Battle

This mission set in the time period of 1939-45 puts you in command of a U-Boat in the North Atlantic theatre with an objective to stalk and hunt Allied merchant vessels. You can choose between various submarine types and engage convoys and escorts of varying sizes at different times of the day. Currently implemented uboat types, are the type VIIC, the type IIA, IIB, IIC, IID, and the proxy models type IX and XXI. All other uboat types and "Turm" modifications will be implemented in the future versions.

### 2.3 Historical Mission

Intended to contain submarine battles based on historical WWII scenarios. Currently it only contains few training missions. (Note that you can use the mission editor to create your own missions, although that's primarily intended for developers, and some text editing would still be required, for more complex missions, but since the missions files are XML based, that shouldn't be hard.).

## 3. Game Objects

The following type of objects have been implemented in the game:

- 3.1 Submarines
- 3.2 Ships
- 3.3 Aircrafts
- 3.4 Torpedoes
- 3.5 Sonar

### 3.1 Submarines (U-Boats)

There are currently 4 main uboat types that you can command. There are the type VIIC, the type II with the IIA,



IIB, IIC and IID variants, and the "placeholders" type IX and XXI uboats. Notice that "placeholders" models are just that - a temporary model, used for development purposes, until final models are ready to be committed.

Each uboat type has different characteristics, such as maximum submerged and surfaced speed, maximum operational depth (and crush depth), as well different types of sensors and weapons, particularly passive sonar (hydrophones arrays) and torpedos / torpedo tubes.

For more details refer to table <TODO> in section x.y.z for details on each type of uboat.

Notice that more uboat types will be implemented in future versions.

### 3.2 Ships

Although there are several types of ships, freighters and warships available at the moment, more ships are being added, as the new models replace the old proxy models. The new models are the Tribal class destroyer, in five Royal Navy and Canadian Navy schemes, and the Flower class corvette, also in Royal Navy and Royal Canadian Navy versions. There are 3 major versions of the Flower class corvette, the 1940, 1941, 1942 model, and these have several schemes, according to their theater of operations and period of war, but there are versions for both the Royal Navy and Canadian Navy as well. As for freighters, currently implemented are the Liberty ship, in several schemes, the North Sands class ships (a.k.a. the "Forts" ships), in several versions, early and late war, and a special civilian early version of a North Sands class. Also, a CAM ship (Catapult Armed Merchant), with an Hawker Sea Hurricane aircraft, catapult launched built to counter the threat of the FockeWulf Fw200 Condor, in the "Atlantic gap". There's also a Kennebak class oil tanker. More models will be implemented later on.

### 3.3 Aircrafts

Not yet implemented, although there's an Heinkel He115A seaplane already built for some missions (Note that this version was a minelayer version, although the mission isn't done yet, there will be basic operations with some aircraft types, particularly seaplanes, such as the Dornier Do18/24, Blohm&Voss Bv138, etc., but this is work in progress.)

### 3.4 Torpedoes

Torpedo is the primary weapon of a submarine. Various types of torpedoes are available in the game, each depicted by a color code. Currently implemented torpedoes are the G7a TI, TI LuTI, LuTII, TII, G7e TIII, TIIa, TIIa FaTII & LuTII, TIV, TV, TVb, TVI LuTI, LuTII and TXI. (Refer table <TODO> in section i.j.k for characteristics of each type of torpedo.)

Note: you can consult each torpedo type's characteristics in the torpedo management screen (by default, binded to the F6 key). Clicking in a torpedo will show its characteristics in the notebook. Torpedo types were available in specific periods of war, and they're introduced as the game progresses. Learn the torpedo's characteristics, because they vary greatly, as well as the tactics in employing each type. You can find more detailed information on operational use by clicking the torpedo(s) in the torpedo management screen (default keybind F6).

### 3.5 Sonar

Sonar is the main eyes and ears of the submarine, especially when the sub is submerged. The different types of sonar implemented in the game are passive types GHG (aka Gruppenhorchgeräte), the KDB (aka Kristalldrehbasisgerät), and the BG (aka Balkongerät). Note: read the appendix for some information on each sonar device's characteristics. Also note that active sonar was available later in the war, in the Type XXI uboat. This type will be implemented at a later stage.



The actual sonar/signal simulation is work in progress.

## 4. Submarine Operation

A WWII U-Boat (Unterwasser Boot) had a typical crew size of x members to man and run the boat. The Kapitan or Captain would command the sub from the control room below the conning tower. The control room contained the periscope and all other controls and gauges for driving the sub. It also had all the pumps that controlled the ballasts and trim tanks, to control the uboat boyancy. Controlling ballasts and trim tanks will be implemented later, pending the completion of the physics&boyancy code, scheduled for the 0.4 release.

### 4.1 Display and Control keys

Within the game you can access different control screens which will allow you easy operation of the submarine by showing various controls and settings. The table below lists the various in-game display and control keys:

Keys	Controls
F1	Control screen
F2	Periscope screen (Only when sub is at or above periscope level)
F3	UZO (targetting binoculars - only when surfaced)
F4	Bridge view (only when surfaced)
F5	Map
F6	Torpedo management
F7	Damage control
F8	Captain's cabin (provides access to ship's log, career info, etc..)
F9	Sonar control (varies with sonar type carried by specific uboat type)
F10	Free view (exterior view)
F11	TDC (Torpedo data computer)
F12	Torpedo settings





Note: This is the preliminary layout, meaning that some stations might change in the future, as more features are introduced, such as radar, radio room, and manning of deck gun and AA guns, etc...

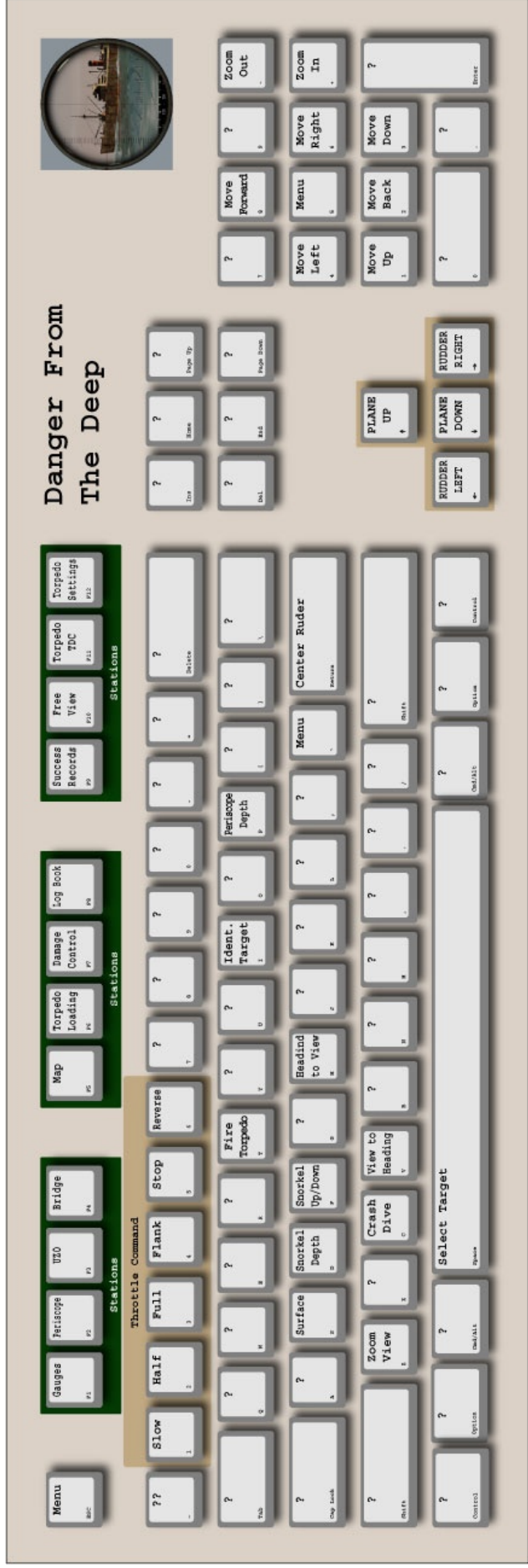
Also note that some stations have secondary screens, or cyclable "popups". You can cycle these by pressing the TAB key, or clicking the right mouse button, which will display the list of stations and respective substations. An example of this, is the TDC station, which has its functionality split in 2 screens. As usual, this is work in progress, and some things might change in the future.

For convenience, you can redefine the key bindings under Options, in the main GUI menu.

An keyboard layout image follows, courtesy of Olivier from <http://www.theplan-z.com> . An full size version is included at the end of this section, in case the user wants to print it, for reference purposes.

Keys	Controls
Left / Right Arrow	Rudder left/right 15°, up to 30°
Up / Down Arrow	Depth Planes up/down 10°, up to 30°
Shift + Left / Right Arrow	Full left/right rudder
Shift + Up / Down Arrow	Depth planes up/down 20°
Return / Enter	Center rudder
1	Engine ahead, listen speed
2	Engine ahead, slow speed
3	Engine ahead, half speed
4	Engine ahead, full speed
5	Engine ahead, flank speed
6	Engine stop
7	Engine reverse, slow speed
8	Engine reverse, half speed
9	Engine reverse, full speed
Space	Select target
i	Identify target
Shift + 1...6	Fire torpedo tube 1...6 (Number depends on uboat type)
t	Fire torpedo (automatic selection of bow/stern tubes)
c	Crash dive (varies with uboat type, 150m on Type VIIC)
p	Periscope depth
0 (zero)	Periscope up/down
d	Snorkel depth
f	Snorkel up/down
s	Surface
h	Set heading to view
v	Set view to heading
z/ mouse wheel	Zoom view (UZO, Periscope, Bridge views)
+/-	Map zoom-in/out
Shift + ,	Exterior view fast left turn
Shift + .	Exterior view fast right turn
Keypad +/-	Time compression faster / slower
Pause	Pause/Resume game
Esc	Game menu
PrtScr	Capture screenshot (saves as *.bmp in installation directory)







## 4.2 Engine Controls

A submarine engine has 9 modes of throttle:

- Ahead listen
- Ahead slow
- Ahead half
- Ahead full
- Ahead flank
- Ahead stop
- Reverse slow
- Reverse half
- Reverse full.

These modes control the direction and RPM of the propellers. Use the first five modes to drive your sub forward in increasing magnitudes of speed, and the last 3 modes to drive your sub backwards. The engine telegraph in the F1 - Gauges screen shows the current throttle mode of the engine (Refer Section 4.6 Control and Gauges Screen.).

Remember that when surfaced, the speed of an uboat is far greater than when submerged, since when surfaced, diesel engines were used, instead of electric engines. The only exception to this were the "electric uboats", the type XXI, type XXIII, and type XXVI uboats, as well as the "Walter uboats", that used hydrogen peroxide turbines. Also have in mind that range also depended on the engines being used. The electric engines could only be used as long as there was enough battery charge. When batteries were depleted, the uboat was forced to surface and use its diesel engines and recharge the batteries. As with other details in the simulation, engine characteristics, performance and range, depend on the uboat type. This aspect of the simulation, as pretty much everything else, is work in progress.

## 4.3 Navigation Controls

### 4.3.1 Rudder

Use the rudder to control left / right turning movement, pressing the SHIFT key while using the rudder indicates a hard turn. The rudder gauge in the F1 screen indicates the degree of turn in left / right direction. Although rudder turn radius would have small variations with the uboat type, at the moment, you can turn the rudder up to 30° port or starboard, in 10° increments, while as mentioned, pressing SHIFT + Left/Right arrow, would cause a full port/starboard turn.

### 4.3.2 Compass

The current course and heading of the submarine is indicated by the compass in the control screen (F1). Alterations to the course can be made by changing the bearings in the compass.

<TODO: Put in more details about reading / setting the bearings on the compass, also about determining the current location and course from the Map screen>

## 4.4 Diving and Surfacing Controls

Use the depth planes to surface or submerge the uboat. Depth planes turn up/down up to 30°, in 15° increments.



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Currently you can't select the bow or stern planes exclusively. Pressing the Up/Down arrow turns both the bow and stern planes, the bow plane up, and stern plane down, or bow plane down, and stern plane up. Individual control of bow and stern planes will be added later, since this together with ballasts and trim tanks, allowed the captain to take emergency surface actions, or faster dives.

Using the SHIFT key in combination with the Up/Down arrow, turns the depth planes up/down in 20° increments, up to 30°. A more refined control, 5° increments, and full up/down depth planes, will be added later, pending completion of the physics and buoyancy code, as well as implementation of station to control the ballasts and trim tanks.

You can use the C key to crash dive. At this point, it dives to 150 meters, but the emergency dive depth will be uboat specific. Use the S key to surface the uboat. The P key is used to go to periscope depth. Note that when in periscope depth, you need to raise/lower the periscope (O key) in order to see anything, otherwise you'll see a big black nothing.

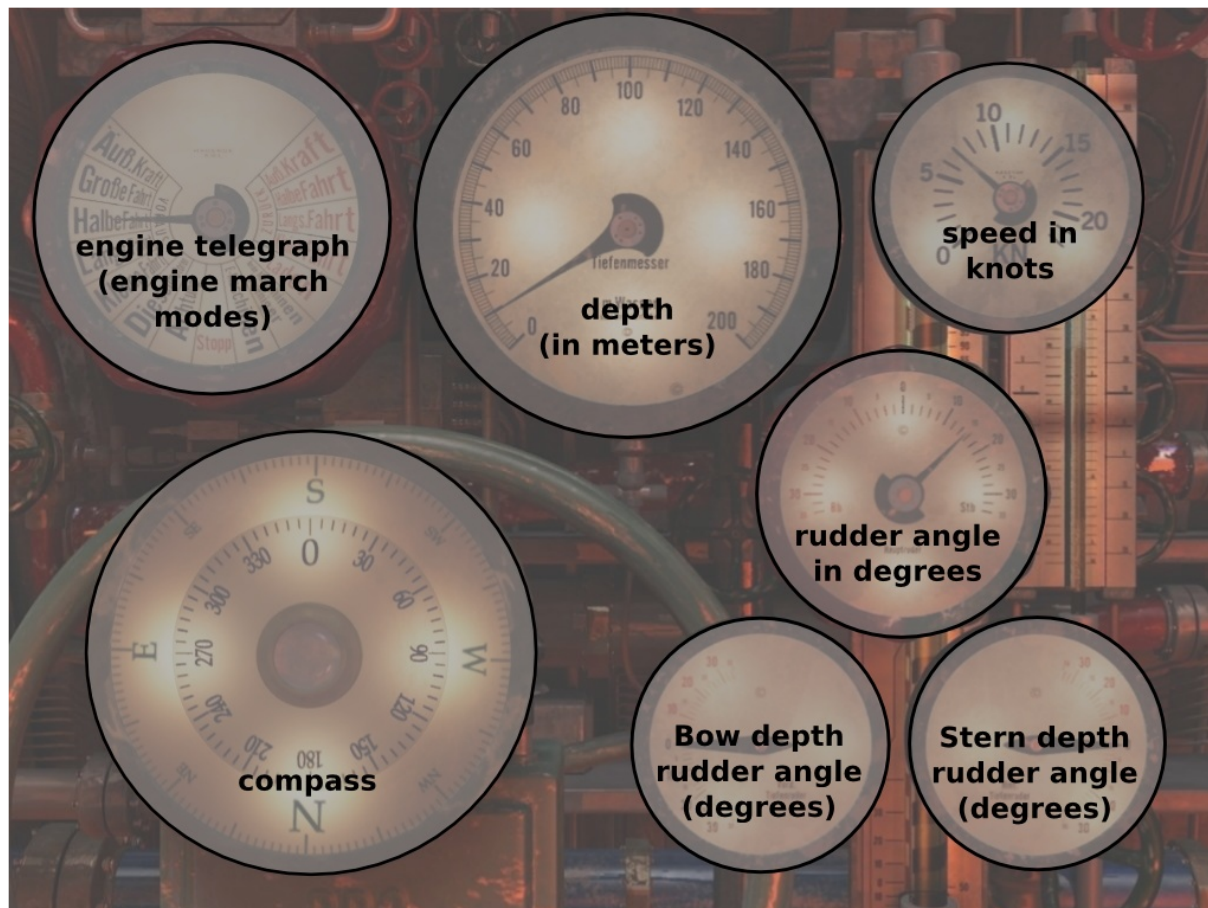
#### **4.5 Snorkel Controls**

A Snorkel was a device fitted on U-Boats that allowed running of its diesel engines while submerged at periscope depth. This helped conserve electrical power from its batteries. Within the game use the 'd' key to first bring your uboat to Snorkel depth. Then raise or lower the Snorkel by toggling the 'f' key. One point worth mentioning is that not all uboats had snorkels, in fact, they only appeared later in the war, as a "countermeasure" to the allied air superiority in the North Atlantic. First tests were made on U-58, and type IIC uboat, but operational use came with the retrofitting of type VIIC and type IX uboats. The type XXI, XXIII and later, had snorkels already planned at design stage.



## 4.6 Control and Gauges Screen

Use the 'F1' key to bring up the control screen. The following screenshot illustrates the various controls on the screen:



*Fig.1 - Control and gauges screen*

In future versions, you'll be able to access, from the control screen, the pumps subscreen, which will allow you to control the uboat boyancy in detail (the ballasts and the several trim tanks).

## 5. Hunting Targets

A U-Boat has different types of equipment that are used for locating, identifying and tracking targets. This section will describe in detail the usage of each of these equipments:

### 5.1 Using the UZO

The UZO, abbreviation for Uboot-ZielOptik was a surface use, target aiming binoculars, with a graticulae, that automatically fed target line of sight bearing and range to the TDC. Currently we have implemented the Siemens S3 Vorhaltrechner as TDC, an electromechanical deflection calculator in the uboat conning tower, that fed attack headings into the gyrocompass steering mechanism of the torpedos in the torpedos room via the Torpedo-



Schuss-Empfänger, aka T-Schu, the torpedo launch receiver, located in the fore and aft torpedo rooms of the uboat (depending on uboat type).

Use the F3 to call the UZO screen. Within the UZO screen, use the ',' key to turn the view to the left, and the '.' key to turn the view to the right. Pressing the SHIFT key while using ',' or '.' increases the turn speed. Alternatively you can also press the left mouse button and use the mouse to turn the view. Pressing the 'y' key, or the middle mouse button, zooms the view in/out.

When the target is in sight, press space to select the target. Data will immediately start being sent to the TDC, and to the selected torpedo tube. You can check the torpedo type in the torpedo management screen (F6), and modify other torpedo settings in the individual torpedo settings screen (F12), such as run depth, run speed, secondary runs (if you're using FaT/LuT torpedos, etc...).

Still in the UZO screen, pressing the 'i' key, "identifies" the target. A ship's recognition manual will be later added as a subscreen of the captain's cabin screen (F8), as well as a popup on the UZO and Periscope screens. There's one more detail, if you press the TAB key while in the UZO or Periscope view, the Erkennungskarte is displayed. At the moment its fields are static, but some target values will be entered, in a future version.

The UZO could also be used to take navigational and manouvering sightings, as a navigation aid.

Torpedo simulation, as pretty much everything else in-game, is work in progress, and refinements to this functionality will be added in future versions.

Below is a screenshot of the UZO with a target selected.

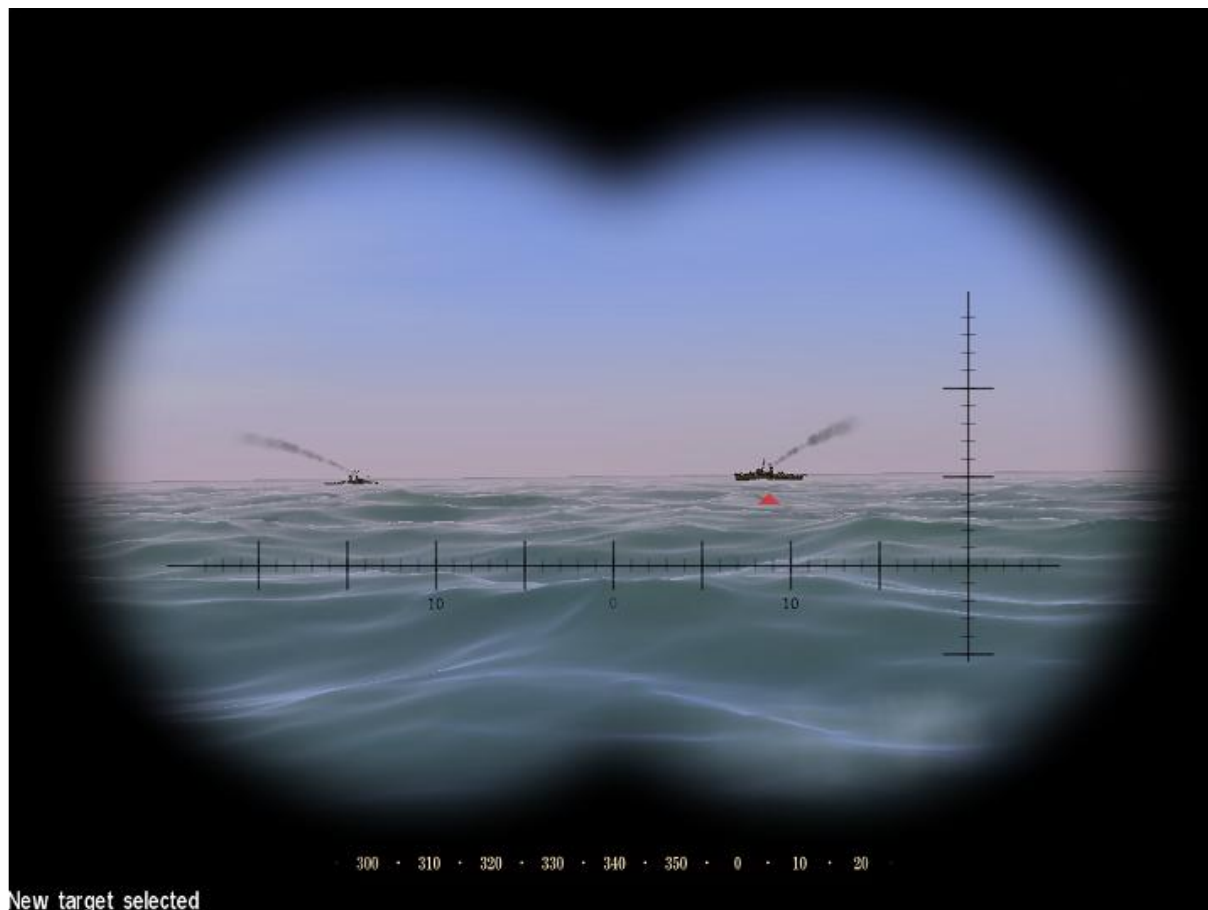


Fig.2 - UZO screen





## 5.2 Using the Periscope

Periscope is the primary visual aid when the submarine is submerged. For the periscope to work the sub should not be more than 12 metres below the water surface. Use the 'P' key to take the sub to periscope depth. At periscope depth use the 'O' key to toggle raising or lowering the scope. A periscope has a 360 degree field of view, use the ',' key to turn the view towards the left, use the '.' key to turn the view towards the right. Pressing the Shift key along with ',' or '.' keys increases the turn speed. Alternatively you can also press the left mouse button and use the mouse to turn the view. The 'y' key or the middle mouse button can be used to toggle the zoom of view. When the target is in-sight press the 'Space' key to select the target, a small red triangle should appear at the base of the target, showing the selected status.

After the target is selected use the 'i' key to identify the target. The target can now be attacked using torpedoes (as long as the target was within attack range to begin with).

Note: The TAB key, in some stations, cycles between subscreen/popups. In the periscope/UZO case, pressing the TAB key calls the "E-card", and the control+TDC popups. The engine and TDC popups aren't fully implemented yet. They're implemented only as a reference. As for the "E-card", it's implemented as a distance calculation helper. It might show some values updated in realtime in some of its fields, but that will be done at a later stage. For the time being, it works only as a target identification, tonnage, and distance helper.

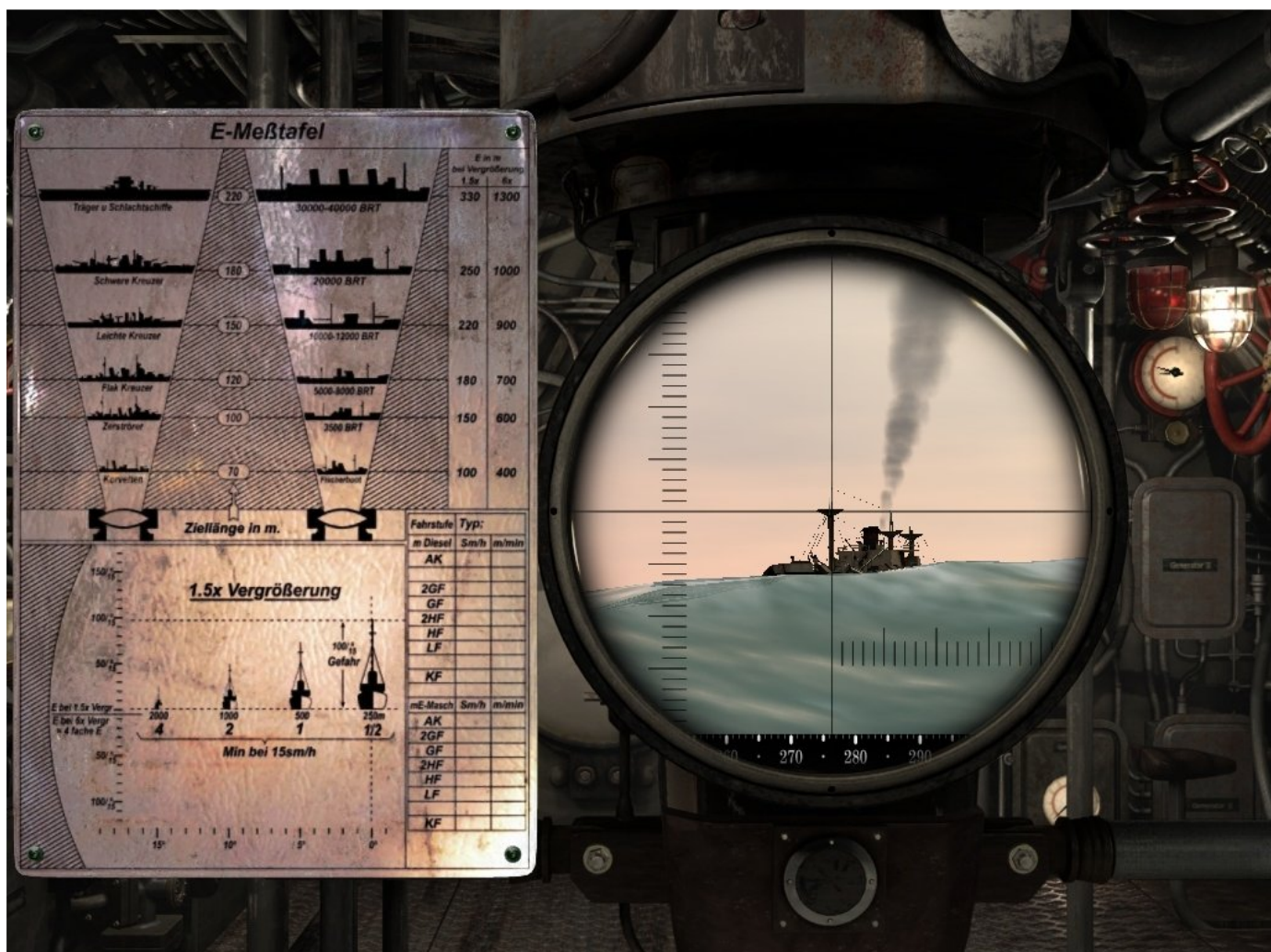


Fig.3 - Periscope screen with Erkennungskarte up.



### 5.3 Using the Sonar

Note: As of game version 0.3.0, sonar functionality is not fully implemented and is work in progress. Content of this section is mostly informational.

Sonar is the primary hunting aid on a submarine. Its range is well beyond that of visual sight and it is the only option available when the sub is submerged deep within the water. Sonar equipment consists of a set of hydrophones that are mounted on the exterior of the sub. A sonar operator works the sonar by turning dials and wheels that rotate the hydrophones which have been set to capture sound waves at different frequency bands. The Sonar then assimilates and outputs the captured signals as audible sounds that the Sonar operator listens to using a pair of headphones. Sound captured by sonar can range from propellers of a ship, other closeby submarines, torpedoes running in the water, fish and other sea animals, ocean noise etc. By determining the direction and intensity of the sound the sonar operator can determine the range and position of the target object. At the moment, we have already implemented the stations for the KDB (Kristalldrehbasisgerät), the GHG (Gruppenhorchgerät), and BG (Balkongerät) devices. All these devices are passive sonar types, the GHG and BG being of the fixed hydrophones arrays types. Active sonar, for type XXI will be implemented later.

When fully implemented, complete sound contact simulation will be functional, and player will be able to select the various options in the sonar devices (cutoff frequency, etc...). Contacts will appear on the small notepad that can be seen in the top right corner of the screenshot below, representing the BG station.

<TODO - Add more complete documentation regarding the sonar types, and their characteristics, as well as basic operational use>



Fig.4 - Balkongerät screen



## 5.4 Using the Map Screen

The in-game Map screen serves as the real-time chart for the U-Boat. It shows the position and current course of the sub. It also shows all the objects located and tracked by the Sonar. Use the 'F5' key to display the Map screen. You can use MMB (middle mouse button) + drag, to pan the map, always with the uboat centered. The mouse scroll wheel zooms in/out. Clicking on a target allows you to see some target data in the small notepad,

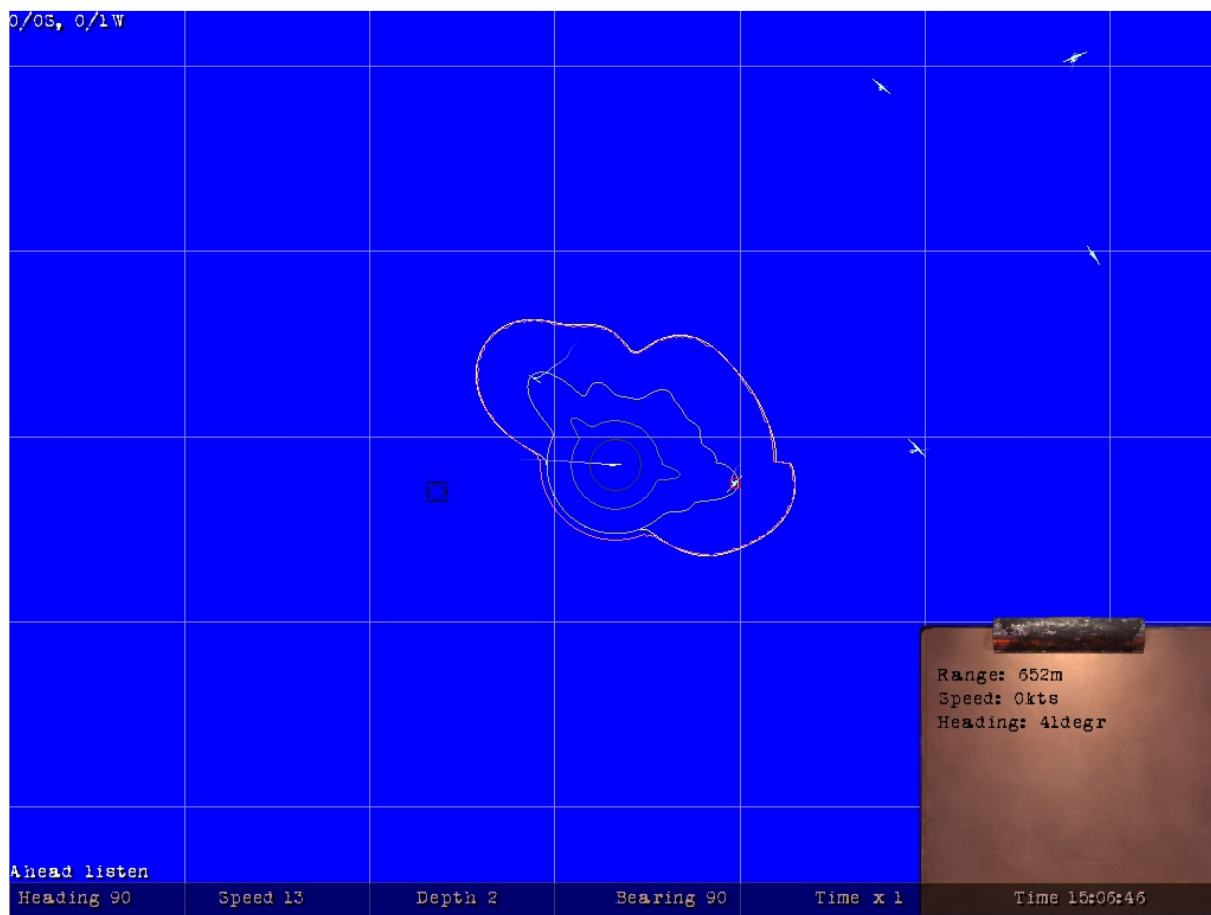


Fig.5 - Map screen

such as range, course, speed. Some uboat data is displayed at the bottom bar, such as heading, speed, depth, bearing, time compression, and time. Also worth mentioning is that at the moment you can see some graphs around the uboat. They represent the sonar contact signal intensities according to cutoff frequency, and they'll be removed in the future, once the sonar simulation is complete. As with other aspects of the game, this is work in progress, and there will be a new map screen, with other features, navigational charts, kriegsmarine grids overlay, navigational and target data acquisition aids, etc... Note that at the moment you have an "bird's eye" view of the ocean, you can basically zoomout to try and find the location of a convoy, this situation will also be corrected in the future, and target visibility will depend on a number of factors.

Note: The cutoff frequency graph illustrates the tradeoff between precision, and range. Basically, while cutting off some frequencies allows you to detect contacts at a greater range, the precision with which you can determine their bearing is much reduced. Similarly, at the other end of the cutoff range you reduce a lot the range at which





you can detect surface contacts, but you increase the precision with which you can determine their bearing. The graph display, as it is, is meant as a debugging help for developers, and will be removed later.

## **6. Attacking Targets**

A U-boat's main weapon is the torpedo. WWII U-boats carried a typical load of x torpedoes of various types. Apart from the torpedo, U-Boats have a deck gun that can be used when surfaced for close range targets. The conning tower also has a sub-machine gun for close range strafing (this is currently not implemented in the game.) Before you can attack you need to select a target and identify it. This can be done by using the UZO or the Periscope. When you have a target in sight use the 'Space' key to select the target. After the target is selected use the 'i' key to identify the target. Once you have identified the target and have decided to attack, you can use the Deck Gun and/or the Torpedoes to attack.

Note: full deck gun, and AA gun(s) stations with full control, will be implemented later, although we already have a preliminary deck gun implementation (to be replaced later). As for target identification, work is underway in the ship's recognition manual. As with other features, deck gun type, as well as AA gun(s), if available, will be uboat type specific.

### **6.1 Using the Deck Gun**

#### **6.1.1 Manning the Deck Gun**

The deck gun can only be used when surfaced. You need to man the deck gun before you can fire it. The manning process is akin to the gun crew coming out on deck of the U-boat and preparing the gun for engaging the target. To man / un-man the deck gun toggle the Shift + 'g' key. There is a time delay for the manning process, after the gun is manned the status message 'Deck gun is now manned and ready' is displayed on the screen. You can now start firing at the target.

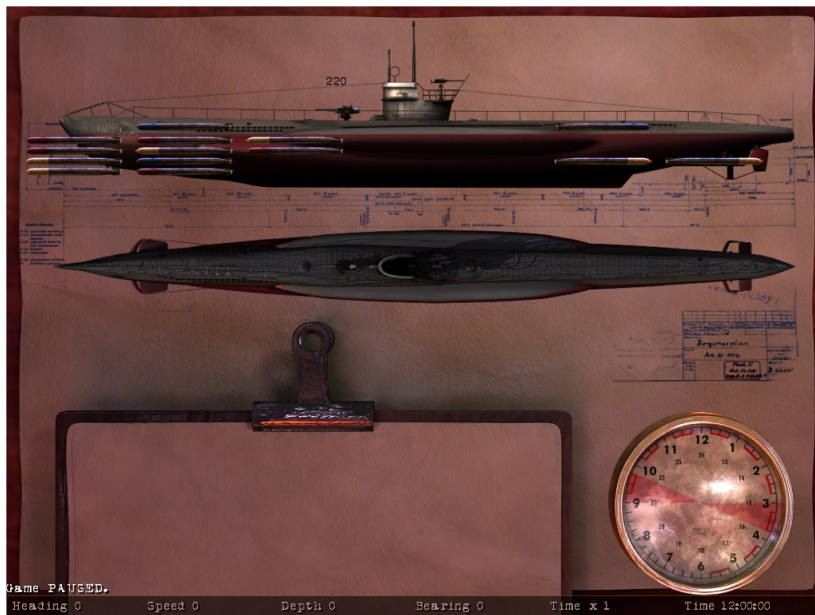
#### **6.1.2 Firing the Deck Gun**

Use the 'g' key to fire the deck gun. You can switch to the Bridge view display (use F4 key) when firing the deckgun, this view will offer a clear view of the target and you can make out the trajectory of the shells. The trajectory of the fired shell is parabolic, mark the water splashes made by the shell to determine any error in range and accordingly re-position your sub to get the best firing angle. In the current implementation you have to hit a target only once to sink it. Work is underway in a more realistic damage system.

### **6.2 Using the Torpedo**

#### **6.2.1 Torpedo Loading**

Torpedoes need to be loaded into the firing tubes before firing. A U-boat typically had 4 firing tubes in the bow and 2 tubes in the stern. At the start of the game the torpedoes will already be loaded into the tubes. However you need to do the reloading once a torpedo has been fired, or you want to attack using a different type of torpedo. Use the 'F6' key to display the torpedo loading control. To reload, you can select any torpedo with the mouse and drag it onto an empty firing tube. Alternatively if you want to reload an already loaded tube with another type of torpedo, you first need to unload the tube by selecting the torpedo and dragging it onto the holding area, after this you can reload the tube with the other torpedo. The loading and un-loading steps have a time-delay that provides for a realistic game-play experience. You can click on the torpedo to find out the current



*Fig.5 - Torpedo Management Screen.*

time remaining status for loading / un-loading. The screenshot below depicts the Torpedo Loading Control display. The deck gun also displays the number of shells remaining. A more detailed implementation will be added later. As for the clock, it will show the remaining loading times for all tubes being reloaded. But for the moment, you can click on a torpedo to see the torpedo type details on the notepad, and/or reload times on a hovering small notepad.

## 6.2.2 Torpedo Settings

### 6.2.2.1 The TDC

As mentioned earlier in the UZO section, we tried to implement the Siemens S3 Vorhaltrechner as correctly as possible, with the gathered data. The TDC was an electromechanical deflection calculator in the uboat conning tower, that fed attack headings into the gyrocompass steering mechanism of the torpedos in the torpedos room, via the Torpedo-Schuss-Empfänger, aka T-Schu, the torpedo launch receiver, located in the fore and aft torpedo rooms of the uboat, depending on uboat type. Presently, the moment you select a target, all target data is fed to the TDC, in a semi-automatic way. The user can set the torpedo spread angle, but for the time being, that is it. A fully detailed control of the TDC will be implemented pending the completion of the torpedo simulation code, on which both the TDC and individual torpedo settings screen depends. The TDC is split in 2 screens, you can access them via the mouse right button. This will display a popup menu, with the available stations, as well as a "cycle substation" option. This will allow you to toggle the available screens in each station. When you toggle into the second TDC screen, you'll see the torpedo tubes status lights, with the torpedo tube number. When they're lit, the tube is loaded and ready to fire. When unlit, the tube is empty, being reloaded, or the torpedo isn't ready to fire (target might be out of range). Clicking on a torpedo tube indicator, whether lit or unlit, it doesn't matter, selects this torpedo tube. This means that the torpedo settings that you use in the individual torpedo setting screen (F12), are relative to the torpedo tube you just selected.



Fig.7 - Torpedo Data Computer (TDC) screen 1

To fire a torpedo, you can press SHIFT+1...6, or 't' for first available torpedo, or, you can click the torpedo fire button. Once you click a torpedo tube, if the tube is loaded and ready to fire, this torpedo fire button lights up (light blue color). Clicking on it, fires the torpedo.

As with other aspects of the game, this is work in progress.



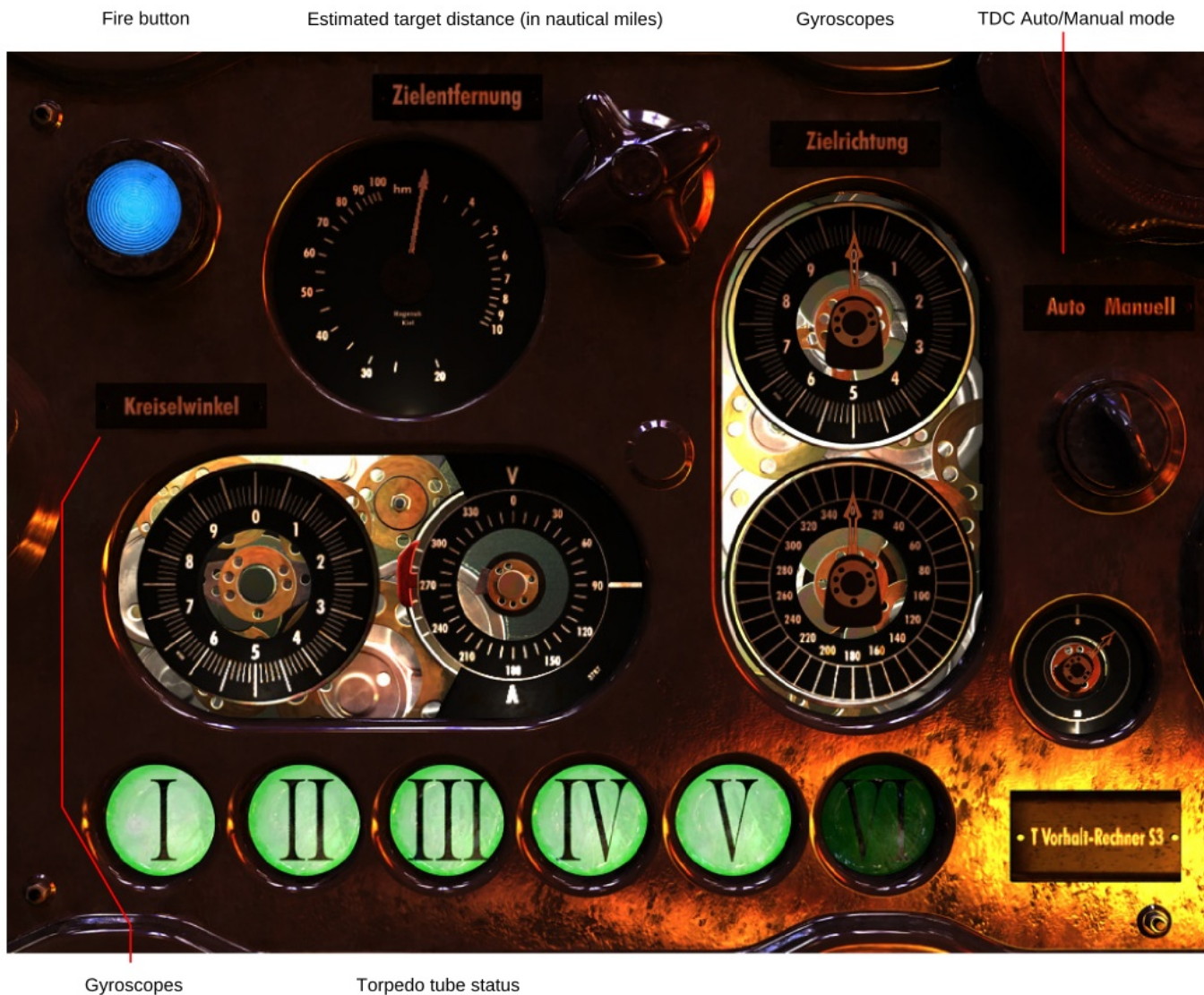


Fig.8 - Torpedo Data Computer (TDC) screen 2

#### 6.2.2.2 The torpedo settings

Next is the individual torpedo settings screen. Here you can set the torpedo run depth, the depth at which the torpedo travels. This will have a big impact later in the simulation, since torpedos with magnetic pistols can be made, and were in fact intended, to detonate below the target's keel. The resulting pressure wave raised then lowered the keep with a tremendous force, breaking it, which resulting almost always in a fast sinking of the target. In comparison, torpedos armed with impact pistols, could fail to detonate, if the angle at which the



torpedo hit the target, was too steep. The torpedo would be deflected off the target by the impact at pronounced angles.

Turning the run depth knob, updates the run depth dial information. In the inner dial of this, it's the selected torpedo speed (if the torpedo type allows this to be set, check the information in torpedo management (F6) for type characteristics). Another setting is the speed selector. This only applied to TI G7a ("Ato") torpedos, which were stream driven. The disadvantage of these torpedos was that they left a visible bubble trail that denounced



Fig.9 - Torpedo settings screen

the uboat's position, which makes them more suited to be used at night. There was a tradeoff between speed and range. Selecting a slower speed gave the torpedo a bigger range, while selecting a faster speed, gave the torpedo a smaller range.

The electric torpedos, TII G7e ("Eto"), TIII G7e, TIV G7e, TV G7e, etc... don't have a speed selector, they have a fixed speed. However, there was an option to "preheat" the torpedos. Since they had electric engines, and as such, batteries to power them, if you preheated the torpedo to 30°C, you would increase the battery charge. This resulted in gains in range of up to 60%, depending on the battery types relative to each of the G7e submodels (13T210, 17T210, etc...). If you click on a torpedo in the torpedo management screen (F6), you'll be able to see in the notepad, some characteristics of the selected torpedo type, as well as some information on operational use and tactics.

You can activate torpedo pre-heating in the individual torpedo settings screen. A scale will show the temperature.

#### 6.2.2.2.1 Torpedo settings - FaT and LuT

As for the other knobs, they're meant for FaT (Flächen-Absuch-Torpedo, or Federapparat-Torpedo), and LuT (Lageunabhängige Torpedo) pattern running torpedos. The main idea was that after the torpedo reaching a specific distance (a primary run), it would then turn 90° or 180° left or right, and proceed to make a secondary



run, for a preset distance, after which, it turned back, 180°, proceeded for that same preset distance, turned back again 180°, and so on, until it hit a target, or reached the end of range. This made it ideal to be fired against convoys, since the probabilities of hitting a target would be much greater in a concentrated "pack" of ships.

The FAT torpedo would however need to be fired with the uboat at 90° or 180° relative to the convoy. The LUT torpedo overcomes this limitation, allowing the uboat to fire the torpedo at any angle in relation to the convoy. It also allowed a more refined control of the secondary runs. Particularly, while the FAT torpedo's secondary runs could only be set to be in a value between 800 and 1600 meters (and the primary runs between 1600 and 3200 meters), the LuT torpedos could have secondary runs set in the range of 400 to 1600 meters. They also allowed the secondary run angles to be set, while in the FAT torpedo, these were fixed to 180°, the only angle that you could set was the "pattern insertion" angle, depending on uboat position to convoy.

The range dials in this screen, show the user set primary and secondary run lengths.

### 6.2.3 Torpedo Firing

To fire the torpedo use the 't' key. This will automatically select the bow or stern tube and fire the first available torpedo. To manually fire a particular torpedo, use the 'Shift' + '1, 2, 3, 4, 5, 6' keys to fire the particular torpedo. After you have fired a torpedo, you can track it in the Map screen. In the current implementation a single torpedo hit will sink the target. A more realistic damage system will follow, once the physics and buoyancy implementations are completed.

## 7. Tips & Tricks

<TODO: Mention game tips & tricks that assist users during game-play>

## 8. Operational tactics

<TODO: writing basic navigation, offensive and defensive tactics and manouvers>

## 9. Special thanks

The Danger from the Deep team would like to thank everyone that in one way or another contributed and/or continue to contribute to the project. Particularly Alex Paes, Sebastian Czech, Olivier, for the keyboard layout, Hiten Parmar for the base implementation of this manual, Matt Lawrence, for the sf.net page and OpenGL help. Martin Alberstadt, for the great soundtracks, Marco Sarolo, for the ongoing work with the sound effects, and even more soundtracks. Michael Kieser, for the win32 packages&installers, Claude Terrier for the Mac OS X port and documentation, Renato Golin, Christian Kola, Markus Petermann, Viktor Radnai, Andrew Rice, Giuseppe Borzi, Nico Sakschewski, Martin Butterweck, Bernhard Kaindl, Robert Obryk, Guiseppe Lipari, John Hopkin, Michael Wilkinson, Lee Close, Christopher Dean, Arthur Anker, Stefan Viljoen, Tony Becker, Frank Kaune, Paul Marks, Aaron Kulkis, everyone at subsim.com for all the ideas and suggestions for dftd development, as well as everyone at navalwarfare.net.

Special thanks go to Alexander W.Janssen, aka "Bug Hunting Yalla", for being the bug hunting yalla.

Some people's contributions haven't made it to this release yet, but they'll be included in the next release(s).

There are lots of other people, besides the regulars, we appreciate everyone's help. If you think we missed your entry, please inform us, we'll gladly include you in this list.

(No bockwursts were harmed in the making of this game).



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## 10. Appendix A

## 11. Reference

## 12. Bibliography

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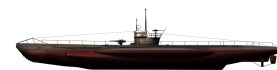
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