

U-jagd tools mod 1.3 January 13th 2008

Features of U-jagd 1.1

- Fixed range scale for target height 18m added to the range page of the notepad
- Zielkurswinkel (Zikuwi) Rad – AOB finder – added to AOB page of notepad
- Angriffsscheibe (A-scheibe) – Attack disc – added to the rudder dial select button
- U-jagd Stoppuhr – U-jagd chronometer – added as a draggable chronometer
- The bearing readout in the attack scope has been lowered to avoid clashes with the AOB finder when it is deployed.
- Added <ctrl-t> shortcut to automatically turn on or off the TDC. This is needed to manually turn the Angriffsscheibe indicator arm.
- Replaced standard <enter> to fire torpedoes with <ctrl-enter> for safety reasons.

1.2 Changelog

- Replaced the fixed range scale with a more historical version, courtesy of Hitman.
- Added transparent indicator to the Lage wheel of the Angriffsscheibe/Attack Disk
- Changes to the manual

1.3 Changelog

- Added a three wheel circular slide rule, modeled on the speed omnimeter of the American SACF converted for metric distances, and coloured to keep the Kriegsmarine flavour. This is a slideout tool attached to the weapon officer.
- Added a Vorhalt arm to the attack disk.
- Some other minor graphical improvements to the attack disk.
- Bearing indicator arm on attack disk may now be used directly, so side panel of U-jagd1.1 and 1.2 has been removed as obsolete.
- Attack disk moved to new location on the Navigation officer for reduced intrusiveness. Thanks to The Bad Wolf for the idea!
- New AOB finder with increased accuracy, precision and a wider field of vision through it.
- Added AOB finder to the Observation scope.
- Added marks on AOB finders for alternative target speed measurement, thanks to Pisces for the idea.
- moved the compass bearing indicator in the scope to take advantage of the greater field of vision.
- New U-jagd Stoppuhr with increased accuracy, and a new background courtesy of Dimitrius07.
- Optional new Stoppuhr to include scale for 75m targets.
- New reticule markings to permit manual height measurement.
- Reduced the brightness of the periscope reticule markings to avoid dazzle at night.
- Included Pdf guide to attack disk and circular slide rule by klh. Many thanks.
- Included guide to Lead Angle (vorhalt) slide rule calculation by Hitman.
- Updated manual.

Installation

Make sure you have downloaded the correct version of the mod for the version of SH3 that you use. We will support versions for Stock SH3, GWX2.0, NYGM and a DIY kit for users with other mods, or who have other significant modifications that use the menu_1024_768 and dials.cfg files.

Unless you are using the DIY kit, all versions should be installed using JSGME obtainable here: <http://www.users.on.net/~jscones/software/products.html>

If you are using the DIY kit follow the instructions in the readme to correctly install the mod.

Acknowledgements

This mod has been the work of joegrundman, Hitman and from about halfway through the project Onelifecrisis. Hitman has an encyclopaedic knowledge of all things U-boat and it was his interest that led me to the idea of trying to incorporate the tools in-game. Onelifecrisis' distinctly superior understanding of how the menu file works and remarkable propensity for lateral thinking enabled this product to reach you in a far more polished state than it otherwise would have. Thanks U-jagd team!

We also thank Kpt. Lehmann for permission and support with elements involving adaptation to GWX. Neil Stevens for running the fantastic Subsim.com that has provided a perfect space for such a fertile and friendly community to develop. Teddy Bar and Stiebler for permission for NYGM. We'd also like to thank Ubisoft and the Silent Hunter developers for building such a fantastic product and making it so moddable that the simulation has become a hobby rather than a game.

Additionally I'd like to thank the forerunners in modding the menu and dials files, Jonz with his ubiquitous draggable chrono which we have taken the liberty of adapting for this game, and also FLB Sale U-99 whose work on producing periscope TDC dials helped me to understand the workings of the files enough to get going.

I'd also like to thank all those who downloaded and enjoyed the previous versions of U-jagd tools and for providing such positive feedback.

Finally I'd like to thank my wife, Abigail, for her aesthetic judgement, trigonometrical assistance and patience beyond human endurance.

About U-jagd tools and how they work

The aim of this mod is to introduce some historical tools that facilitate manual data gathering the way that the U-boats usually did.

The tools work by copying existing dials, giving them new images, and layering them on top of each other. This is important to note. I was unable to have the tools free-spinning without effect on the rest of the game. However I have tried to find the least invasive way of doing this.

The AOB finder, the target course on the attack disk, and the zeit/time wheel on the circular slide rule are all copies of the AOB notepad tool. You move one of these, all the others will move too. However you will soon get used to it, and this particular tool causes no change to your torpedo settings.

The Vorhalt arm on the attack disk and the Range/speed/Entfernung/Geschwindigkeit wheel on the circular slide rule are attached to the set torpedo depth dial. **If you use any of these tools, the depth will be reset to 5m**, on your currently active torpedo tube. Also unless there is a torpedo in the tube, these dials **will not work**. By being aware of this, problems can be easily averted. For the most part, once you are ready to fire, the time for using attack disks and slide rules should be long past.

The bearing indicator arm on the attack disk is attached to the Bearing to target dial in the TDC. With the TDC on auto update, the only way to move this arm is by moving the scope view. In fact 90% of the time, this is the best way to use the tool as it will then always show the correct bearing to target. However, you can use this tool manually with TDC auto update off <ctrl t> to set the bearing of your choice. This will change your current torpedo fire solution. Again you should not be doing this once you have programmed your TDC for firing.

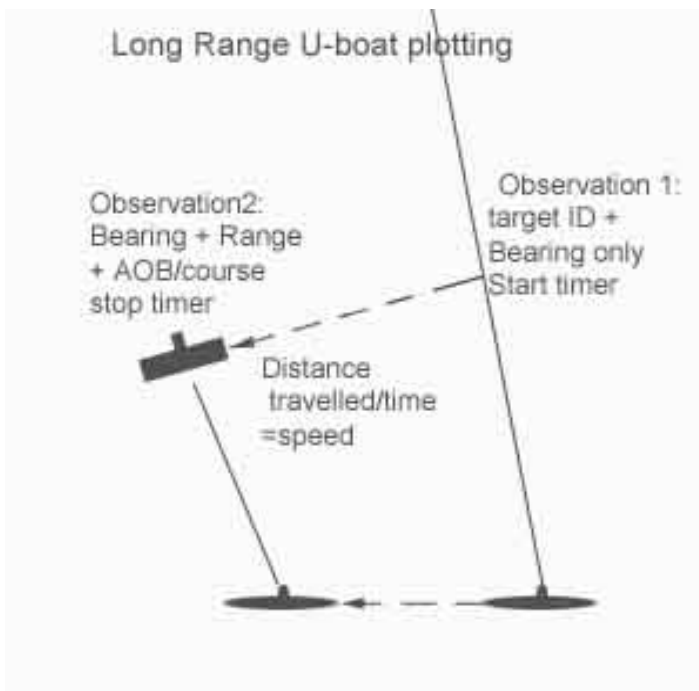
Long Range U-boat Plotting

There were several ways to obtain data. At long range either an overhaul maneuver was conducted to determine course and speed, or a simple plot.

On the first observation, all that was noted was the bearing to the target, very approximate AOB, type of target and the time.

The submarine would then follow a converging course with the target, keeping the target at say the 90 degree relative bearing from the submarine.

At the second observation, the Kaleun determined range and AOB, by use of the AOB finder. AOB was then converted to target course, perhaps using the Attack Disk, and the resulting plot was drawn in and extended back to the bearing line from the first observation. The target speed was then calculated from this plot.

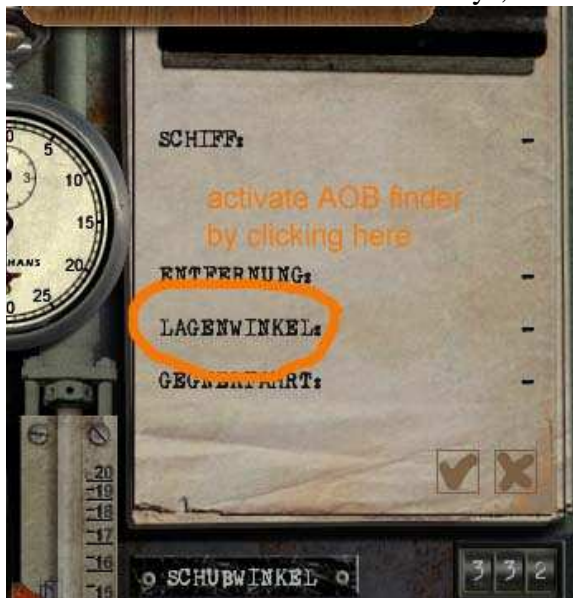


The speed – distance – time problem can be solved using a nomograph, such as Wazoo's downloadable nomograph, which is packaged into GWX2.0, or else it can be solved with the circular slide rule.

Finally the speed estimate was verified using the fixed wire method just prior to shooting.

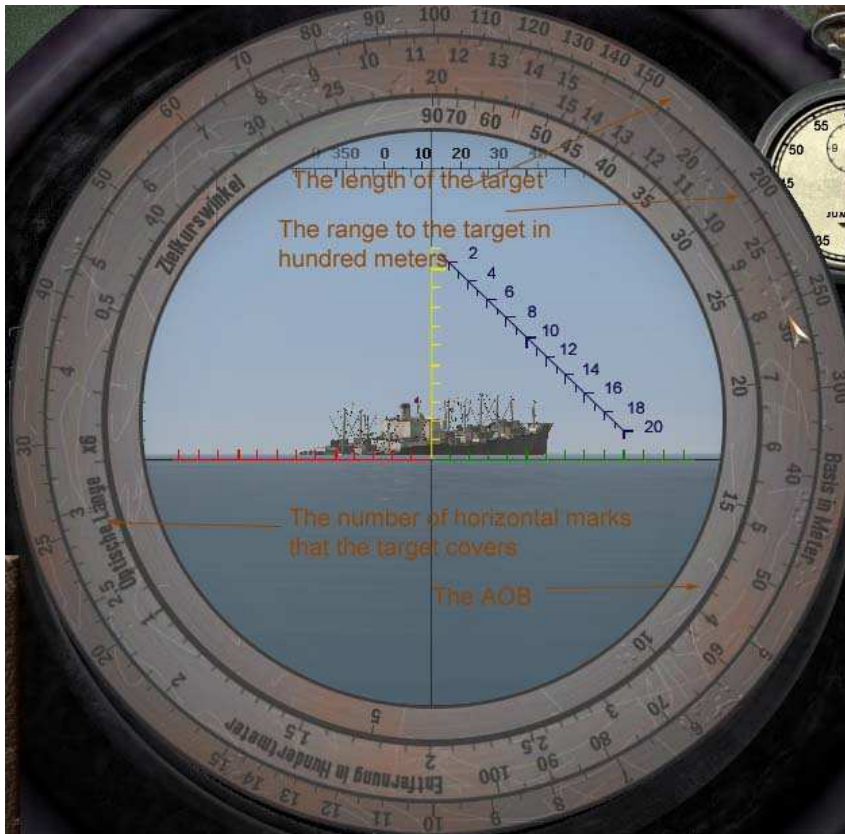
Using the AOB finder to get AOB

This tool is located on the AOB/Lagewinkel page of the notepad in either periscope screen. NOTE: While this tool is active, you cannot use the mouse to move the periscope view. You can still use the cursor keys, however.



It is a circular slide rule with 4 scales and one freely rotating disk. The outermost scale, labeled Basis in m, is for the length (or height) of the target ship. The next scale in, on the rotatable wheel, is labeled Entfernung in Hundertmeter. Entfernung means range in English. The next scale is the Optische Laenge scale. This is the apparent subtended angle that the target presents in the periscope view, in terms of the number of measurement marks that the target covers. The innermost scale is the Zielkurswinkel, or target course angle – the AOB.

Note the AOB can only go up to 90, and gives no indication of starboard or port side showing. You have to determine that visually. If the target is moving away from you, you have to subtract the given angle from 180.



IMPORTANT: THIS TOOL IS FOR USE AT HIGH POWER MAGNIFICATION!

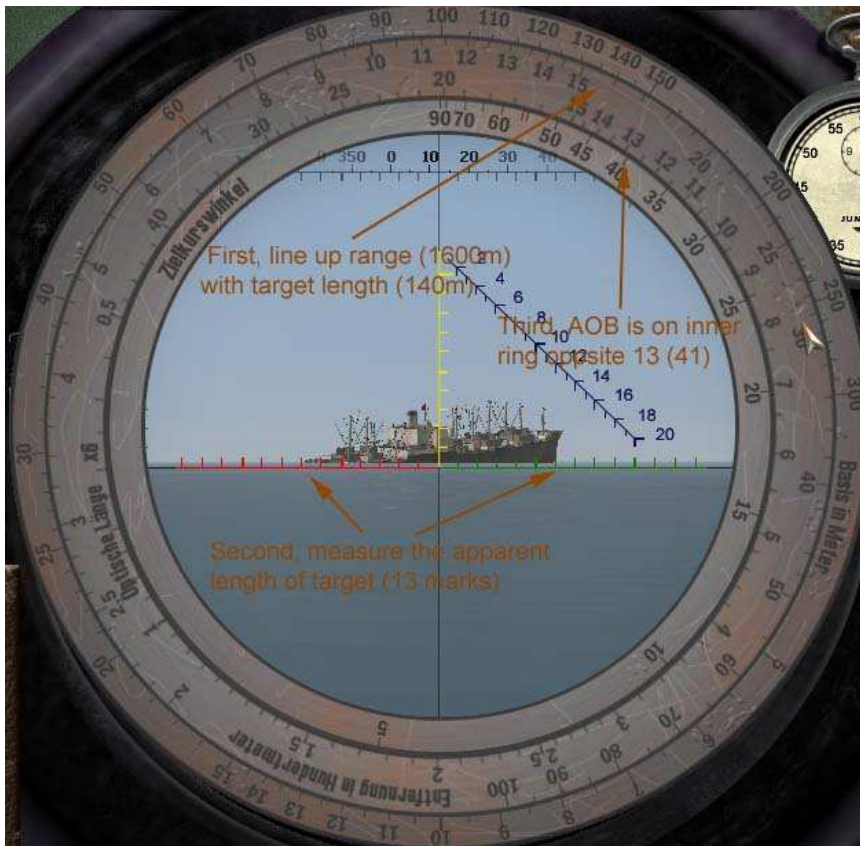
To use the AOB finder, first identify the target, get range to target and note the length of target as written in the recognition manual. Then you can make the AOB measurement.

Rotate the middle wheel until the range is lined up with the known length of target on the outer ring. In this example there is a crippled C2 ahead. The C2 has a length of 140m according to the recognition manual. An earlier range estimate gave me a range of around 1600m, so I rotate the middle wheel until 16 (1600m in hundred meter units) is in line with 140 on the outer ring.

Now I measure the apparent length of the target by counting the marks on the red/green horizontal scale in the middle of the scope view. In this case, I count 13.

Without further moving the AOB finder tool, I observe the AOB on the inner ring, labeled Zielkurswinkel, opposite the number 13 on the Optische Laenge scale.

In this case it is about 41 degrees.



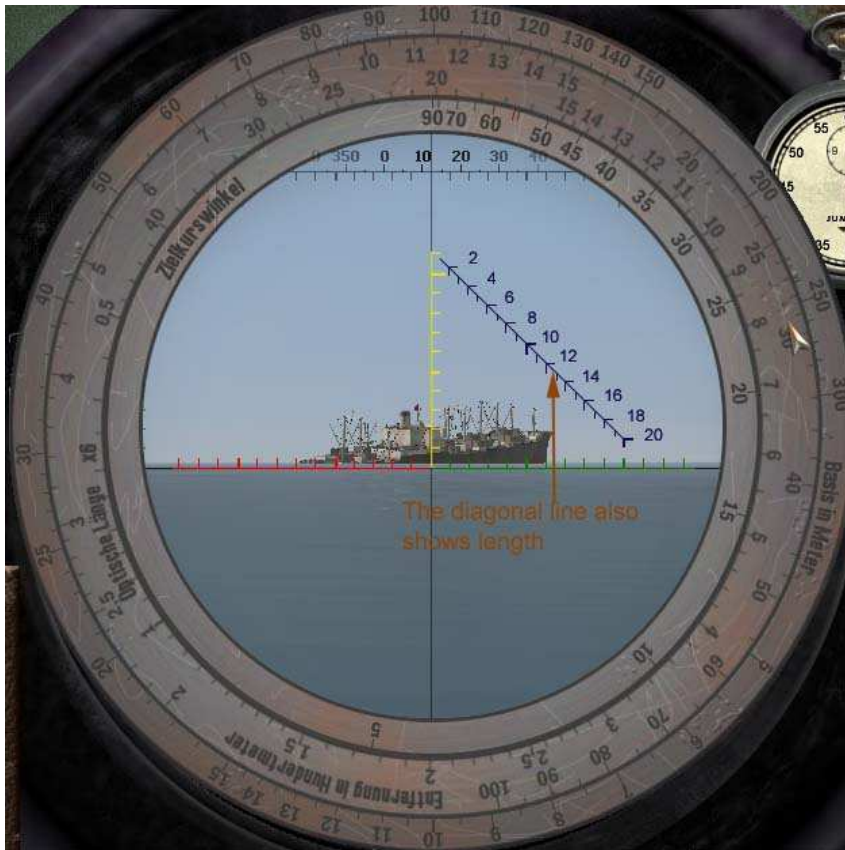
BUT! You observe that the ship is pointed away from you. In this case you must subtract the calculated AOB from 180. Also you observe that it is the starboard of the target, so the final and correct AOB to be sent to the TDC is:

Starboard $180 - 41 =$ Starboard 139

You can then program this into the AOB tool on the notepad and check to send to TDC.

The **diagonal line** also shows the apparent length.

With the target locked, instead of counting the marks, you can simply use the up/down cursor until the bow or stern of the target touches the diagonal line. The number you read off is the apparent length. In the example shown here, it of course also reads 13.



Measuring Range with U-jagd tools

There are several possible ways for measuring range, including using the automated stadimeter that SH3 has always used.

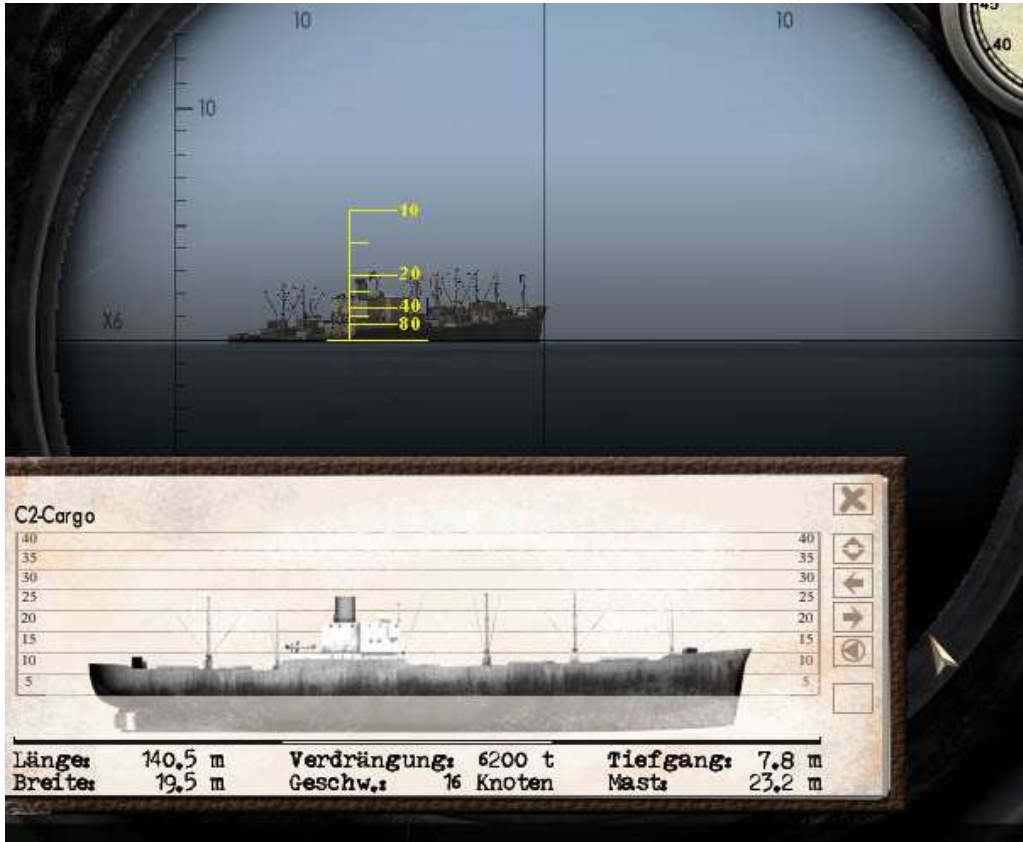
U-jagd Method 1

The fixed yellow markings that appear when you select Range/Entfernung on the notepad allow rapid range tracking. The accuracy is not great, but it will do for situations where you have a well planned attack. You can use it for quick estimates without the trouble of using the stadimeter.

This scale is set for LOW POWER magnification. You can use it on high power, but you must then multiply the result by the difference in magnification power. In stock SH3, this is an easy multiplication of 4. In GWX it's 6.666 (6.5 for ease of use) for the attack scope and 4.5 for the observations scope.

To use it, line up the waterline of the target with the bottom line. Read off the number that corresponds to the top of the mast. This number multiplied by the mast height = range.

E.g. Look in the image below. There is the same crippled C2 ahead.



You can see in this picture that the top of the mast is at the line that corresponds to just under 20.

I multiply this by the mast height to get range.

$$20 \times 23.2 = 464\text{m}$$

BUT! Note that it is on high power of x6, so I multiply this by 4 to get an estimated range of around 1800m.

The main advantage of this method is that it means you can avoid flicking through the notepad for the correct data needed to use the stadimeter IF you already know, or can guess, the mastheight.

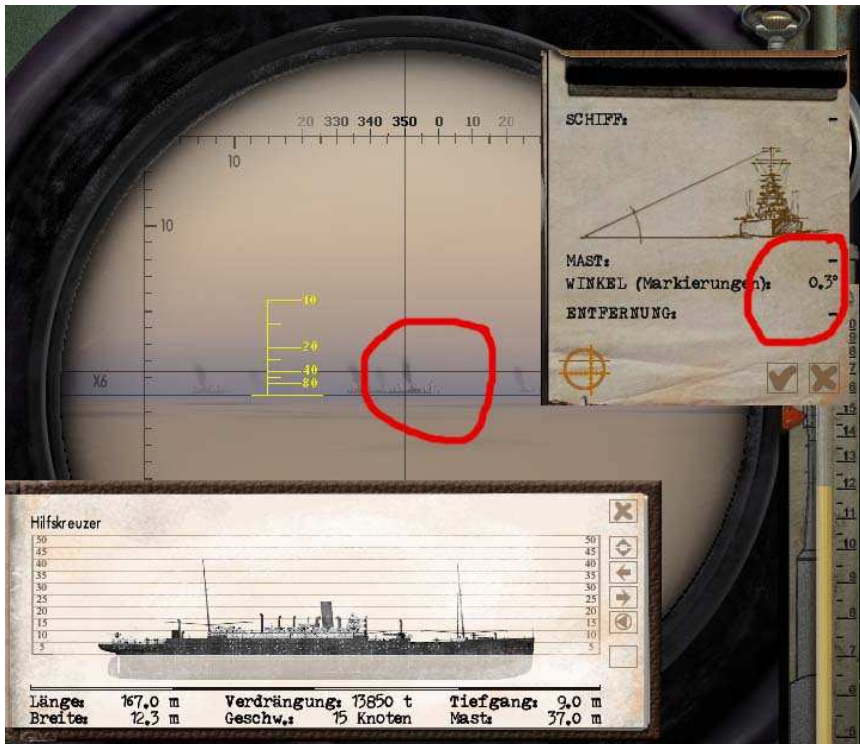
U-jagd range method 2

I hear some of you asking, could I use the AOB finder to measure range? Of course! Historically, it was in fact used also for just that.

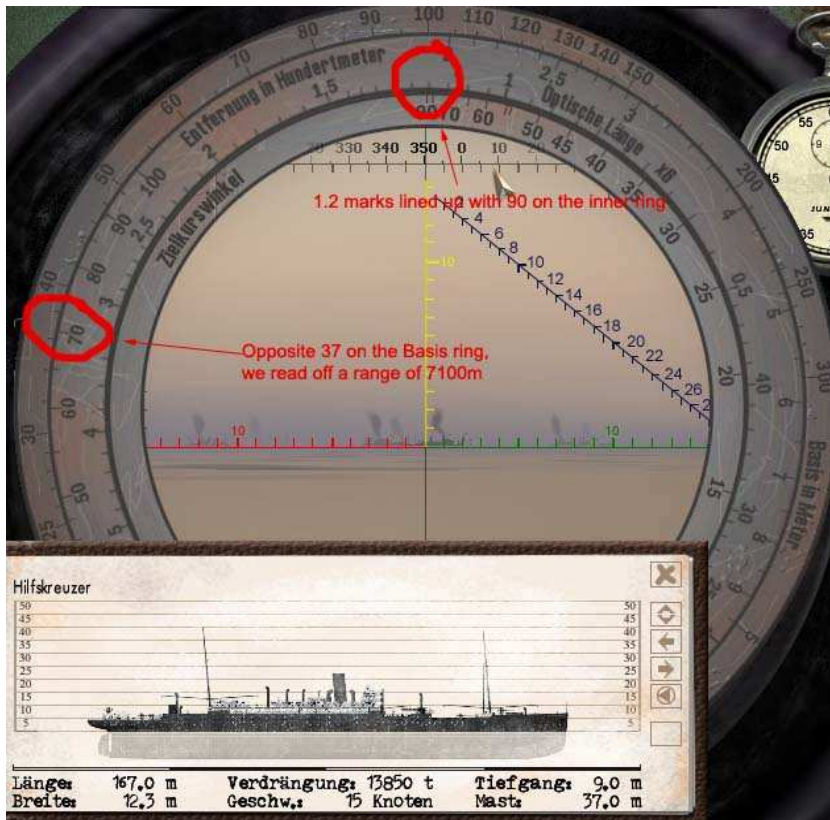
Although U-jagd tools does not affect the standard SH3 range measuring equipment, it is possible to take advantage of the AOB finder to simulate the historical range gathering method.

If you don't check the unit in the notepad, then all you get in the range field of the notepad is the angle subtended. This angle is in degrees. In order to obtain the equivalent in marks on the AOB finder, you need to scale this number. In stock SH3, at low power, x1.5 for attack scope/x1 for obs scope, one mark = 1 degree. At high power, 1 mark = 0.25 degrees. Therefore, the number of degrees given by the stadimeter needs to be multiplied by 4 in stock SH3.

In GWX, for the attack scope, the number of degrees needs to be multiplied by 6.66 for the attack scope and 4.5 for the obs scope. In fact the slide rule of the AOB finder can be used to perform this calculation for you, as will be shown in the appendix to this manual. As an alternative to using the stadimeter at all, you can just count the number of vertical marks on the yellow scale in the periscope view.



In this picture you can see that there is an Auxiliary cruiser at medium distance. The mast height is 37m. Using the fixed yellow scale, we see the mast height is at the 40 line and we are at high power, so that range estimate is $37 \times 40 \times 4 = 5950\text{m}$ approx. Using the stadimeter we see that it subtends an angle of 0.3 degrees.



After converting degrees into marks, you line up $(0.3 \times 4 = 1.2)$ the vertical marks against the 90 point on the inner ring. You then look at the range on the range/entfernung ring (7100m in the above example) against the ships mast height (37m above) on the Basis ring. Klar?

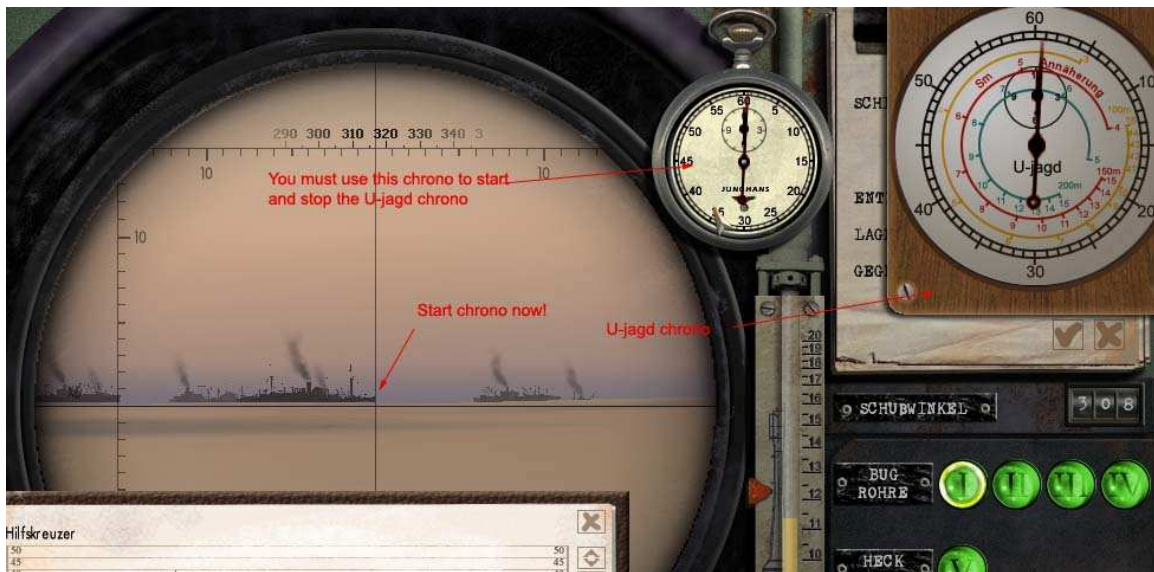
Clearly this is a more accurate method than using the fixed yellow scale, which is intended only for getting a quick picture of the situation and is not to be used for plotting.

Measuring speed with U-jagd tools

The U-jagd Stoppuhr or chronometer is a conventional chronometer with scales on it that give the speed at which targets of varying length are traveling. It is used to obtain a speed estimate based on the fixed wire method.

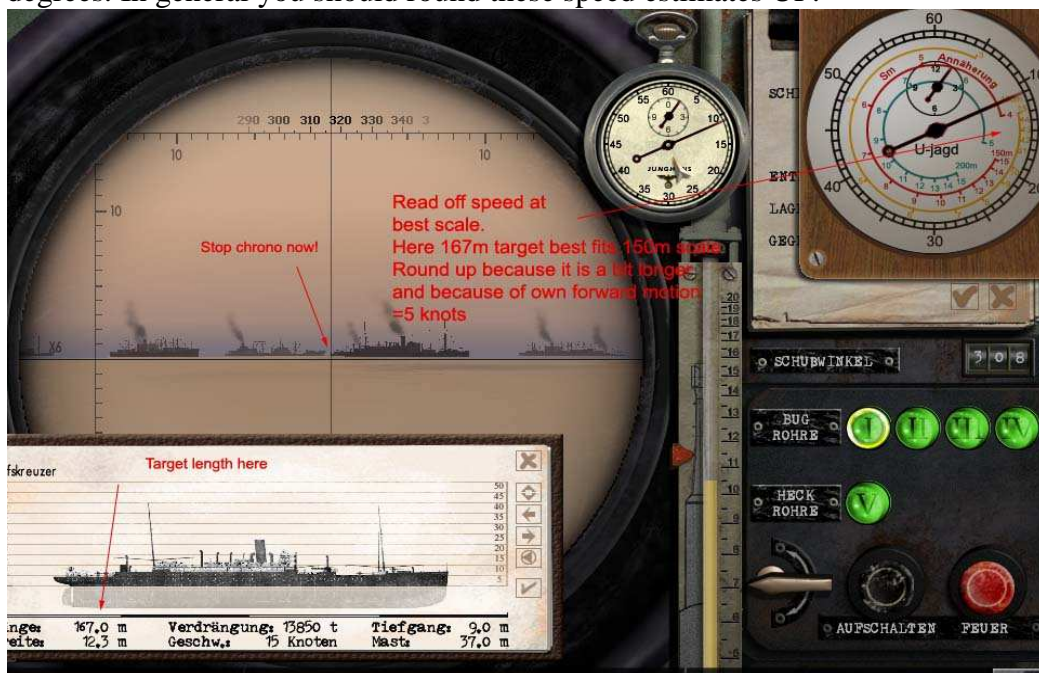
The chronometer is draggable and located in the top right corner of the screen. There are two versions of the chronometer, one with a 75m scale, and the other more historical version, without a 75m scale. If you use the historical scale, for targets of approx. 75m length, you can halve the result from the 150m scale. The chrono is not directly activated. To start and stop this chrono, you must use the original chrono on the periscope screen.

To use it, you start the chrono as the bow of the target touches centre line of your scope. Until the procedure is over, **DO NOT MOVE YOUR SCOPE HORIZONTALLY**. Vertical movement using cursor keys is fine.



Stop the chrono the second the target's stern meets the centre line of the scope. The speed of the target is given where the second hand rests against the scale for the appropriate target's length.

For best results, you should be traveling slowly and pointing directly at the target. If the target is moving at a slow speed, even if your U-boat is crawling at a speed of 2 knots, this will yield a lower speed estimate than is correct even if there is an angle of just 30 degrees. In general you should round these speed estimates UP.



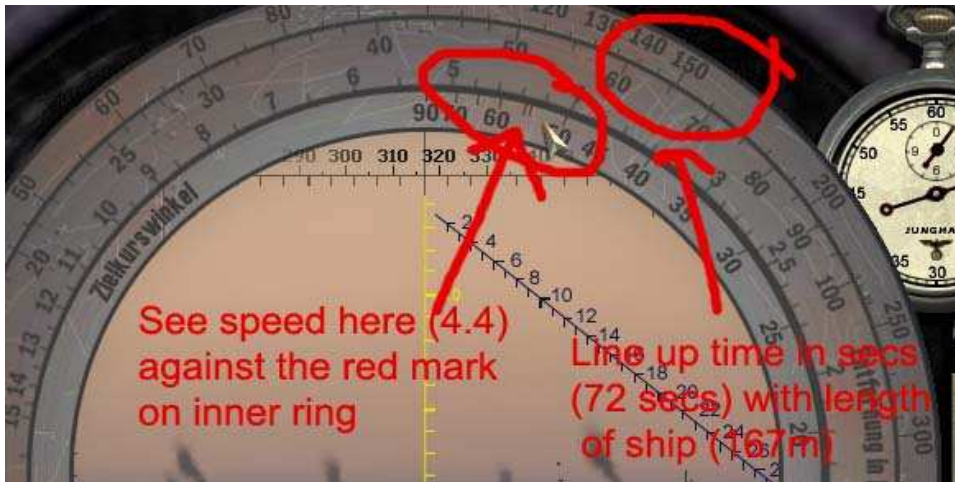
Here is the picture of the alternative chrono with the extra 75m scale. See the readme in the documentation folder for instructions to install. To uninstall, simply reverse the procedure.



Using the AOB finder for the speed calculation

This too is possible, if you find you want more precision for the exact length of the target than the chrono can afford.

In this case you line up the time in seconds on the Entfernung ring against the ship's length on the Basis ring. Then the speed is given on the optische lange ring opposite the small red mark on the inner ring. It's easy once you know how ;)



Don't forget to round up to take into account the effect of own speed, which is often a significant factor with slow moving targets such as this one.

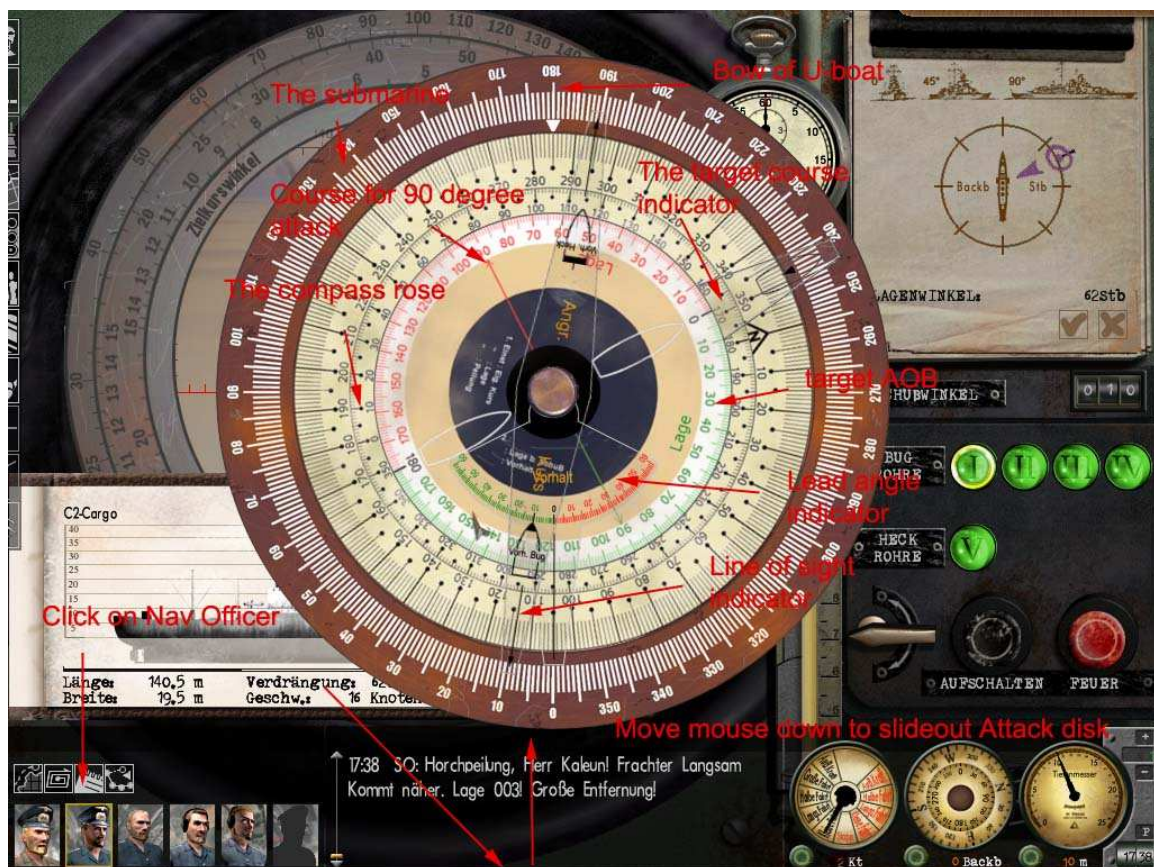
Conclusion, speed is 5 knots.

Using the Angriffscheibe (Attack Disk) and Slide Rule

This was really a tool from WW1 days, but it included here because it looks great, has some uses for everyday attack planning, and can be used in the full ww1 manner to simulate the effects of TDC failure.

We will go through a complete WW1 style attack using the Attack Disk, AOB finder, U-jagd Chrono and Slide Rule here.

The attack disk is attached to the Navigation Officer and is then located at the bottom of the screen. Move the mouse down to slide out the attack disk



The parts of the attack disk.

The outermost ring, Peilung, or Azimuth, represents the U-boat. The white triangle just under the 180 mark represents the bow of the U-boat. This wheel is fixed, it cannot move. The next wheel in, the yellow coloured wheel, is the Compass rose, or Kurs wheel. This is linked to the Compass and will automatically update the U-boats heading so that the U-boat heading is indicated on this wheel by the white triangle. On this wheel is shown also the true bearing to target and the target course.

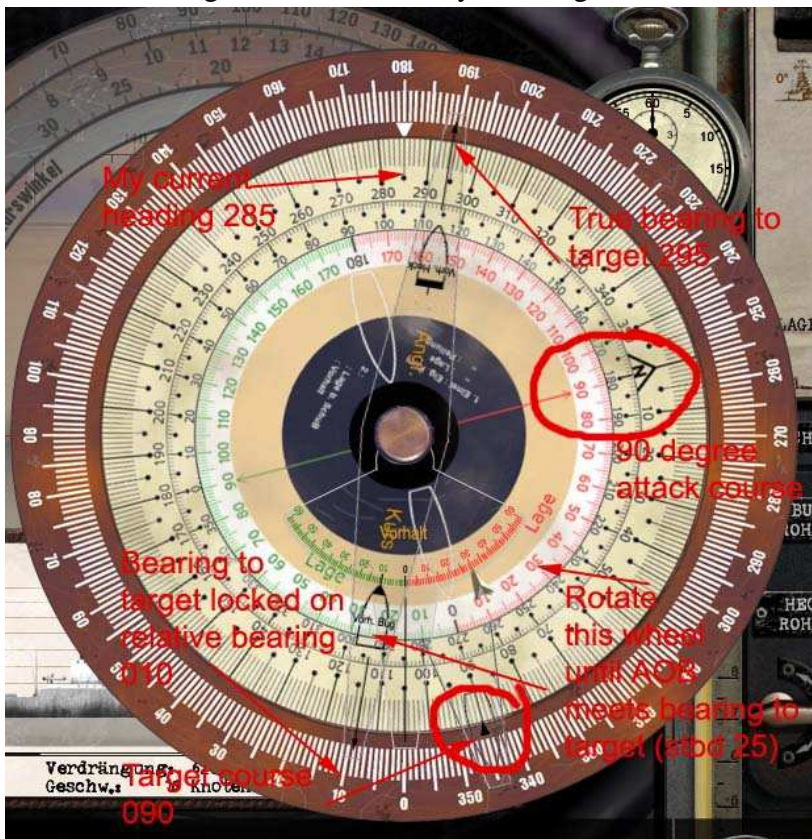
The next wheel in, the Lage rad, or target course wheel, has red and green scales from 0-180 representing angle on bow and an indicator projecting forwards which will indicate the target course on the Compass rose.

The smallest, funny-shaped, indicator is the Vorhalt, or Lead-angle, indicator. This is used for planning your attack course when not using the TDC.

The long, thin indicator is the bearing to target indicator. This is linked to the TDC bearing dial. When the TDC is on auto-update, this will always show the correct angle for what the scope is currently looking at. With the TDC off, it is directly controllable as you please.

The primary function of the disk is to convert from an AOB reading to a target course reading.

On the same convoy above, using the AOB finder, I got an AOB of stbd 25. With the target still locked on I go to the navigator to open the attack disk. Because the TDC is on auto, the bearing indicator is already showing the correct bearing to target:

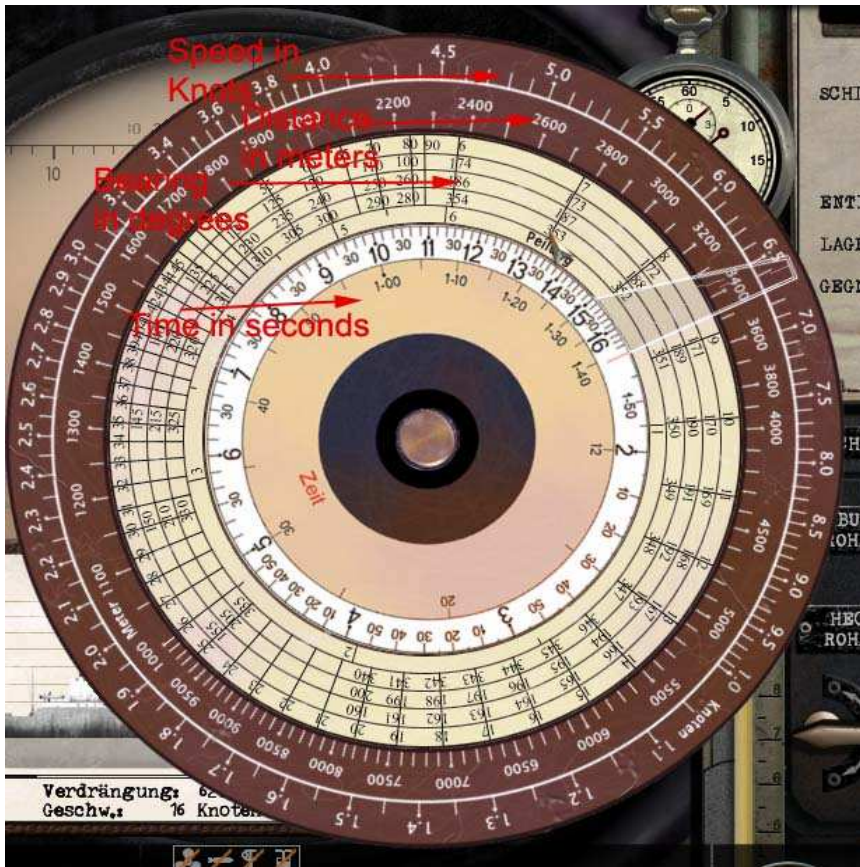


Now I rotate the Lage, or target course, wheel until the AOB I determined crosses the bearing to target indicator. I then read off from the target course indicator that the target course is 090, due east.

On this target course wheel there are two lines perpendicular to the attack course indicator. One is red and one is green. These show the course you should follow to be perpendicular to the target, in this case 000, due North.

I set for a course of 000.

I previously determined speed of the target convoy at 5 knots. I now need to calculate the lead angle assuming I am 90 degrees to the target at point of firing. To do this, I use the slide rule, which is kept by the weapon officer, in the same way the attack disk was kept by the nav officer:



In the above image you see the circular slide rule. There are three wheels, the middle one is fixed, the inner and outer are freely rotatable. It is modeled on the reverse side of the American Submarine Attack Course finder. This slide rule has many uses. K1h has written a great manual featuring many of the ways that this tool can be used to help you solve problems at sea.



For our current purpose we do not need the inner wheel at all. We wish to solve the following problem: how to get the torpedo and target to meet at the same point. Luckily we have all the information we need, our course, target course, target speed and torpedo speed. It is worth noting that for this kind of right angled/000gyro shot, range is irrelevant.

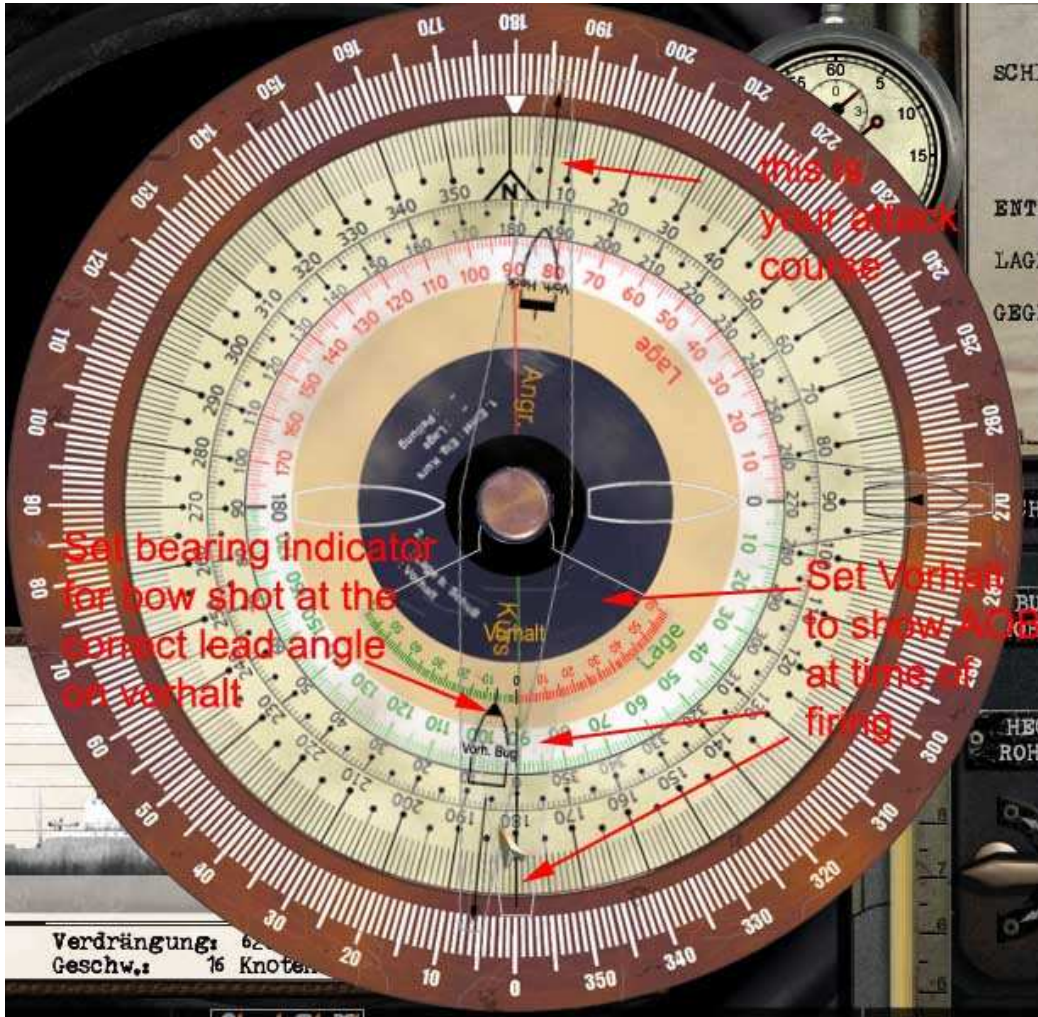
To get the lead angle, rotate the outer wheel until the torpedo speed (44knots) is against the intended angle on bow at time of firing (90). You then look at the angle that is against the speed of the target (5knots). There are a lot of possible angles and this is the weakness of sliderules in general. You must use your common sense/mathematical feel to pick the right one. In this case it is about 6.5 degrees.



Now we go back to the attack disk and restore the target course to what we had before. As we are planning a non TDC attack, it is also a good time to turn off the TDC.

At the attack disk we set the long arm of the Vorhalt (Lead Angle) indicator to project out along the AOB that we intend the target to show *at the moment of firing*. In our case, 90 degrees starboard.

We then set the bearing to target indicator to cross the vorhalt scale at the number of degrees (note whether starboard or port) that we just determined for Lead Angle. Pay attention to whether it is a Bow (Bug) shot or a Stern (Heck) shot. The bearing to target indicator now shows you the course you should set for your final attack with a gyro angle of 000 (in our case 007).



I set course for 007.

I now make sure that the TDC is set for a gyro angle of 000 (by setting all TDC dials to 000) and wait for the target to reach the firing point, 7 degrees to port of my centre.

If for whatever reason you do not reach your firing course when the time to fire has arrived, the difference between your present course and the track you should be on is your gyro angle. However, as the gyro angle grows, range becomes more of a factor, so this method is not recommended for gyro angles more than, say, 10 degrees.

And here's your money shot. Not bad considering he was nearly 2000m away at time of firing.



Appendix – Multiplication with the AOB Finder

Slide rules principal function is to perform multiplications, and the AOB finder is no exception to this.

I have made references in the text above to the necessity of multiplying by 4 or 6.66 in the event that you are not in the standard magnification power. For example use of the yellow range scale at high power necessitates multiplying the answer by 4 in SH3 or 6.666 in GWX and using the AOB finder in low power requires multiplying degrees by 4 in SH3 and 6.66 or 4.5 in GWX in order to get the number of marks that is the equivalent.

These multiplications can be done in the AOB finder. Let's show you using the GWX version, as it is the more complicated, mathematically speaking.

Lets' say the situation is that you wish to make a range measurement on an auxillary cruiser (mast height 37m) using the SH3 stadimeter, but without the target checked in the

notepad. You obtained an angle of 0.3 degrees. In GWX the multiplier is 6.66 for the attack scope.

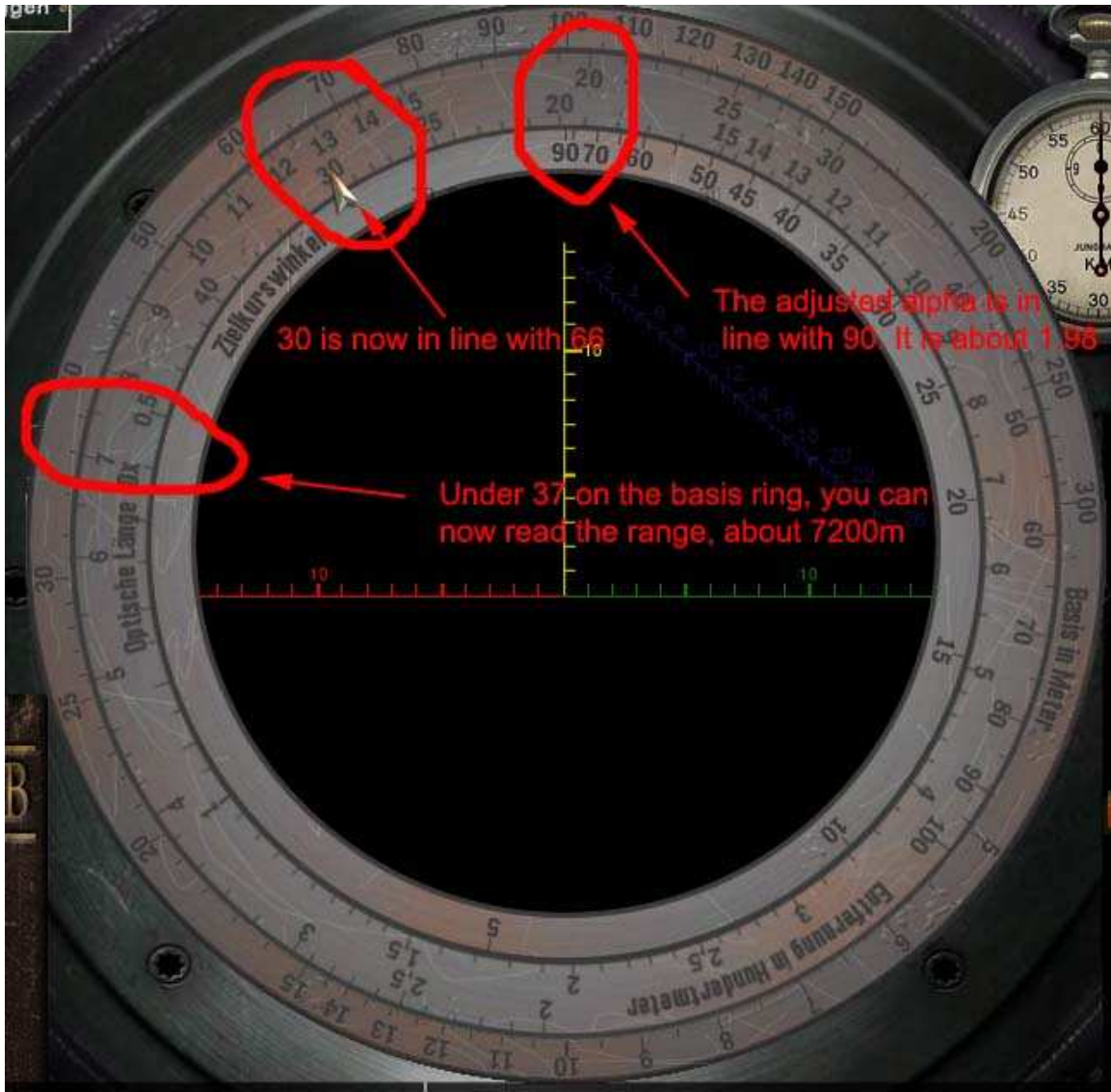
The first step is to line up 0.3 on the optische lange wheel with 90 on the AOB wheel, thus. You will see that it actually says 30. The scale on that wheel going anti-clockwise shows 30, 40, 0.5, ..., 1. This is how a circular slide rule works. 30 is equivalent to 0.3 and 0.003 and 3000 etc. You have to keep track of the decimal points in your head.



Now note that 30 is line with 100 on the Basis ring. 100 is equivalent to 1. Rotate the 30 until it is now inline with 66, which is equivalent to 6.66. (If playing stock rotate to 40, if the GWX observation scope, to 45)



Now the number above the 90 mark/below the 100 mark is the corrected angle alpha in units of marks. But you can ignore this and instead look straight at the point on the Basis ring which corresponds to the mast height. Under this is the correctly resolved range.



This resolved range of 7200 contrasts favourably with the calculated range of 7066 using a digital calculator. Historically there were no digital calculators, so you can see why long range bearing plots was not a favoured method, apart.

The observant among you will have noticed that the given range is now 720m , not 7200m. This is just an illustration of the problem of sliderules. You must keep a firm grasp of where the decimal point is in your head, as you cannot rely on the sliderule to do it for you. Just what everyone used to have to live with.

Joe Grundman
January 2008

There's a lot more you can do with these tools, but exploring is half the fun!

I strongly recommend the Submarine Attack Course Finder Manual 1922. This is the original guide to the US Navy equivalent tool.

<http://www.hnsa.org/doc/attackfinder/index.htm>

And the US Navy Submarine Torpedo Fire Control Manual 1950, which is the end product doctrine accumulated through US submarine experience in WW2.

<http://www.hnsa.org/doc/attack/index.htm>

klh's impressive guide to the Attack disk and sliderule is an excellent companion to these tools. Included in the documentation folder..

I also recommend Hitman's more detailed account of how to conduct a sliderule attack: Included in the documentation folder.

My own description of how to use the slide rules to do a passive sonar approach in poor weather conditions.

Included in documentation folder