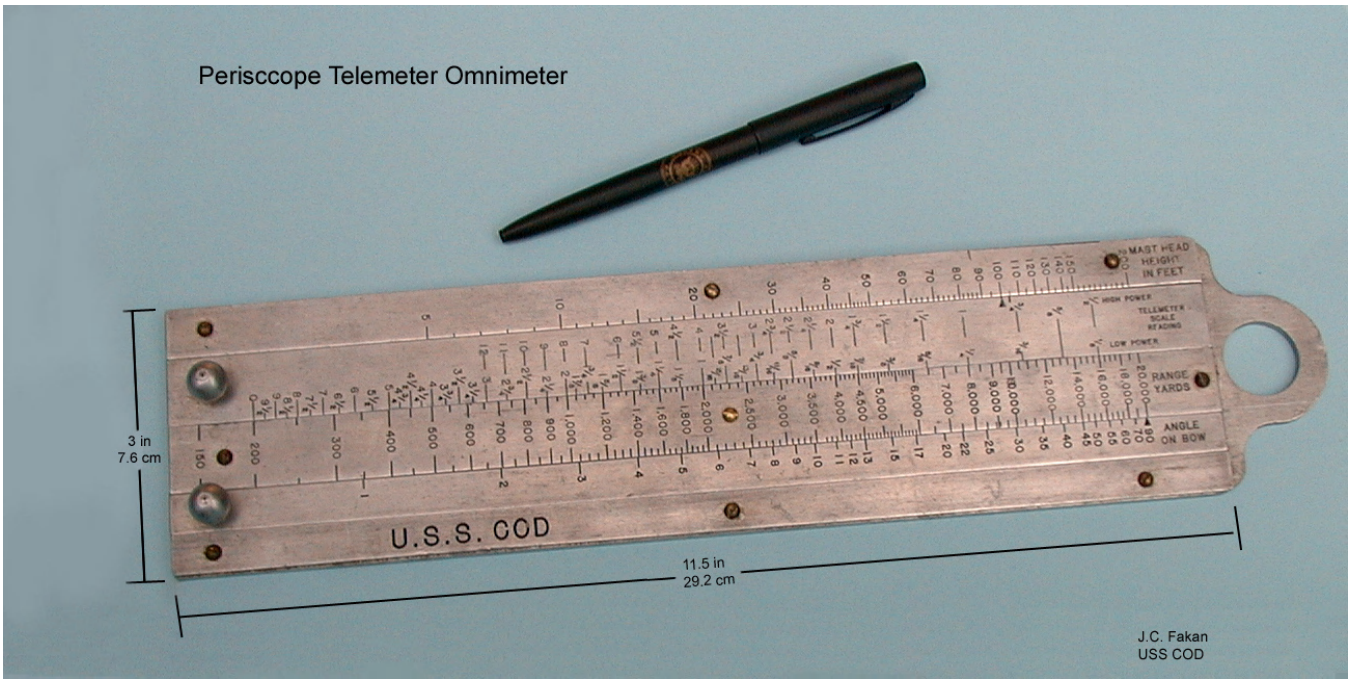
Using the Omnimeter

Contents

Introduction

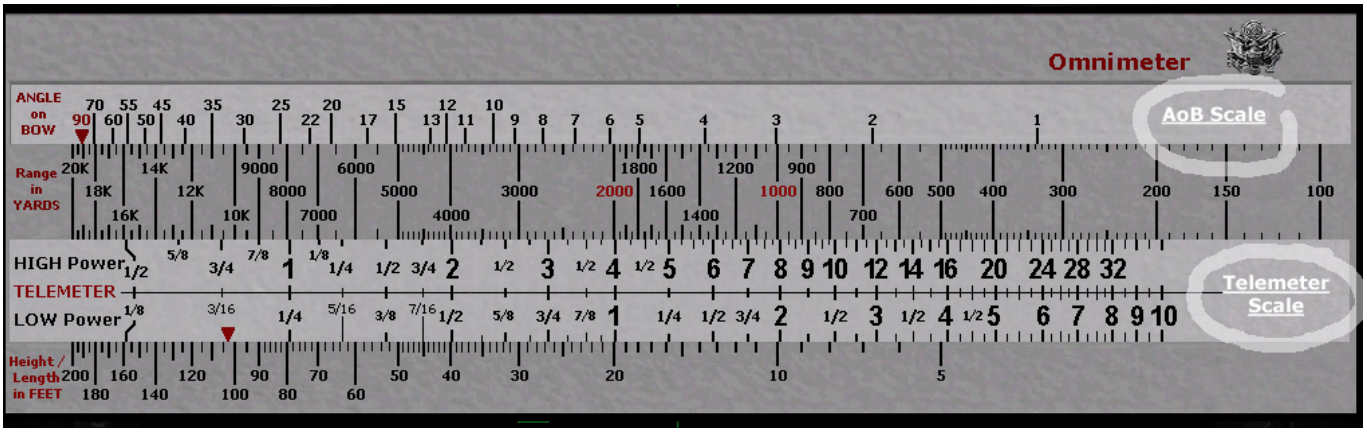
A hand held (and often times hand made) tool called the Omnimeter was used by many submarine officers in helping to calculate range to target, and target Angle on Bow (AoB). The Telemeter division marks found in the optics of the periscopes were counted and used to set the Omnimeter to calculate a solution for these problems. An original from the USS Cod is pictured below.



The Omnimeter has two sliding scales. One is for relating the targets height (counted through the use of the Telemeter division marks), to find range to target. This is the Telemeter Scale slider.

The second slider is used to relate a targets known length, subtracted by the difference in length when the target is at an angle (again counted through the reading of Telemeter division marks), which will provide the targets AoB. This is called the AoB Scale.

The following image is the in-game Optical Targeting Correction (OTC) Omnimeter illustrating the two sliders.

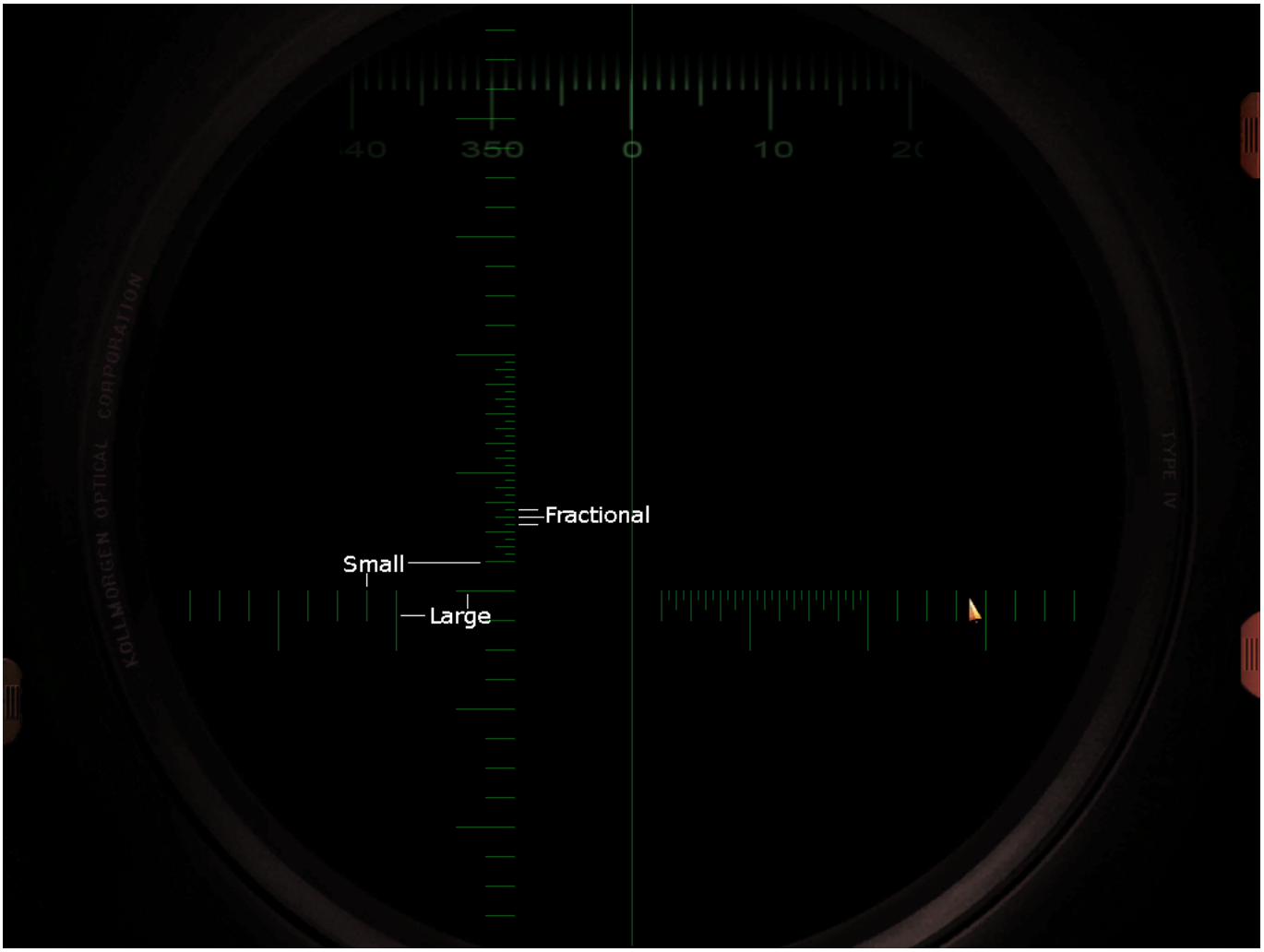


You will note both scales have a “red pointer” (towards the left of the sliders) which is used to set, or gain, particular information when calculating the problems.

The sliders are moved by holding down the left mouse button and dragging the individual sliders left or right. The Omnimeter is associated with the Message Log box and is dragged about the screen when the mouse pointer turns into the below icon. Clicking anywhere on the Message box, or the top left corner of the Omnimeter, will move the two objects in unison.

The scopes (both periscope and TBT/UZO) are divided with Telemeter division marks to correspond to the Field of View for which the lens specifications were made. The FoV of the American periscope is 8 degrees from edge to edge when at the High Power magnification of 6x. At Low Power the magnification is 1.5x resulting in a 32 degree FoV. Both magnification and Field of View are exactly a multiple of 4. The Telemeter divisions were also representative of a specific distance or “Range” when an object was positioned at a certain distance from the viewer. It’s a known fact that 1 degree of measurement (the distance between each small Telemeter mark at Low Power Magnification) subtends (covers) 52.356 feet, at a range distance of 1000 yards (or 104.7 ft at 2000 yards, and so on). This calculation when added to the variance of range to target is how the Omnimeter works. To achieve accurate results, the optical view of the real world and the Telemeter divisions must be in sync with each other. This is what the OTC modification does, corrects the world view to match the authentic tools the submarine used.

The following image shows the lens for the Attack Periscope with the small divisions counting to 32, and the larger divisions numbering 8. Whether you use the Low Power or High Power magnification, the "Small" Telemeter divisions will be the ones you count for inputing onto the Omnimeter for calculating either Height of Length of a target. The "Large" Telemeter divisions are mainly for setting a group of 4 "small" divisions together, they are not used on the Omnimeter. Only count the "Small" divisions and the "Fractional" points in between them.

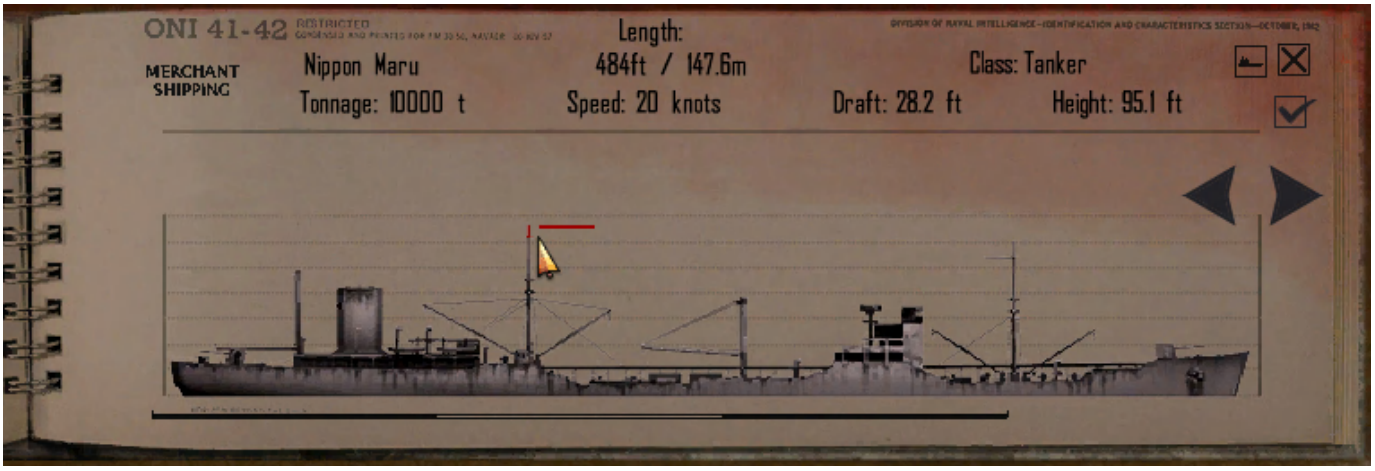


The OTC mod default scopes have colored (green) Telemeter marks for easier viewing at night, and additional "fractional marks" to subdivide these divisions even further for greater accuracy. To use a more realistic scope, activate the "OTC Realistic Scopes" after loading Optical Targeting Correction in JSGME.

Finding Range using U. S. Customary unit of measurements (Imperial)

To use the Omnimeter, you must first identify the target by finding the ship in the Recognition Manual. For this tutorial the ship is a Japanese large tanker, the Nippon Maru. The ship has a marked "red" reference point at the rear mast showing a height of 95.1 ft. Other ships will use the ships funnel (smoke stack); top of a structure like the Bridge roof (super structure); or the top of the ships flag (where it attaches to the mast)

for their reference point. Like the Nippon Maru, each ship in the Recognition Manual has a red mark, or has its flag displaying its "height reference point" for determining Range with the Stadimeter or Telemeter lens.



With the scopes magnification at <u>High Power</u>, place a Telemeter division line at the target waterline and count the number of small division marks up to the "reference height" the Recognition Manual displays for that particular ship. The following image shows 5 small Telemeter divisions to the top of the rear mast. Since this document is a .PDF feel free to zoom in on an image to see it more clearly.

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Here's a hint on getting precise measurements when moving the Telemeter divisions into position.

Use the Control Key along with the "left mouse drag" function to "slow down" the movement of your mouse when dragging the periscope image into position. This will give you better accuracy in setting the Telemeter division mark at the targets water line. As a matter of fact, using the Ctrl key with the mouse drag feature will slow down any optical view requiring a bit of accuracy (like using the Deck Gun). To speed things up, use the Shift Key.

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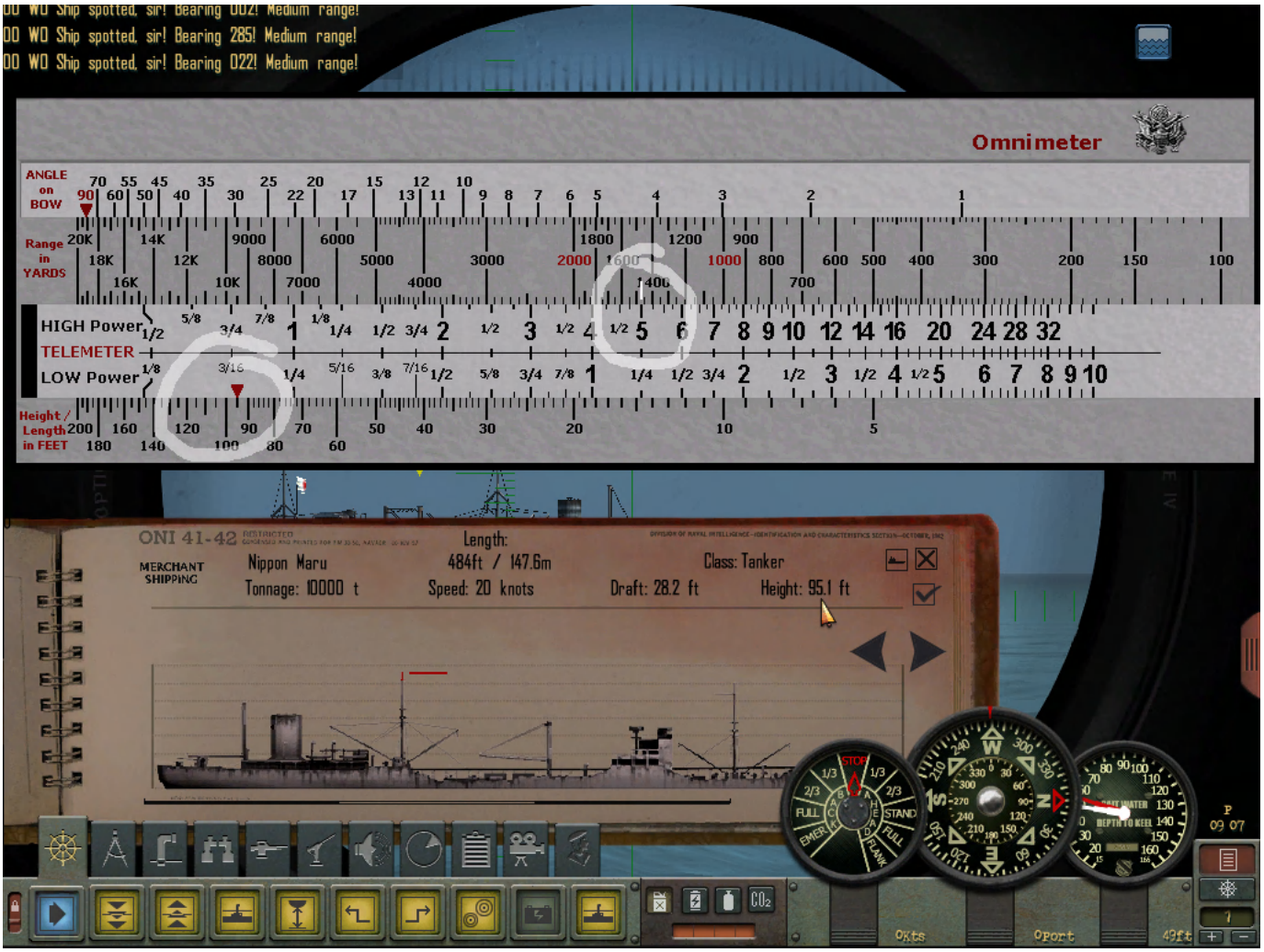
Move the Omnimeter to a convenient location, and set the lower Telemeter Scale "red pointer" to the Nippon Maru's height of 95.1 ft. Now read the range at the Telemeter Scale High Power setting of 5. It's about the 1460 to 1475 yard range.



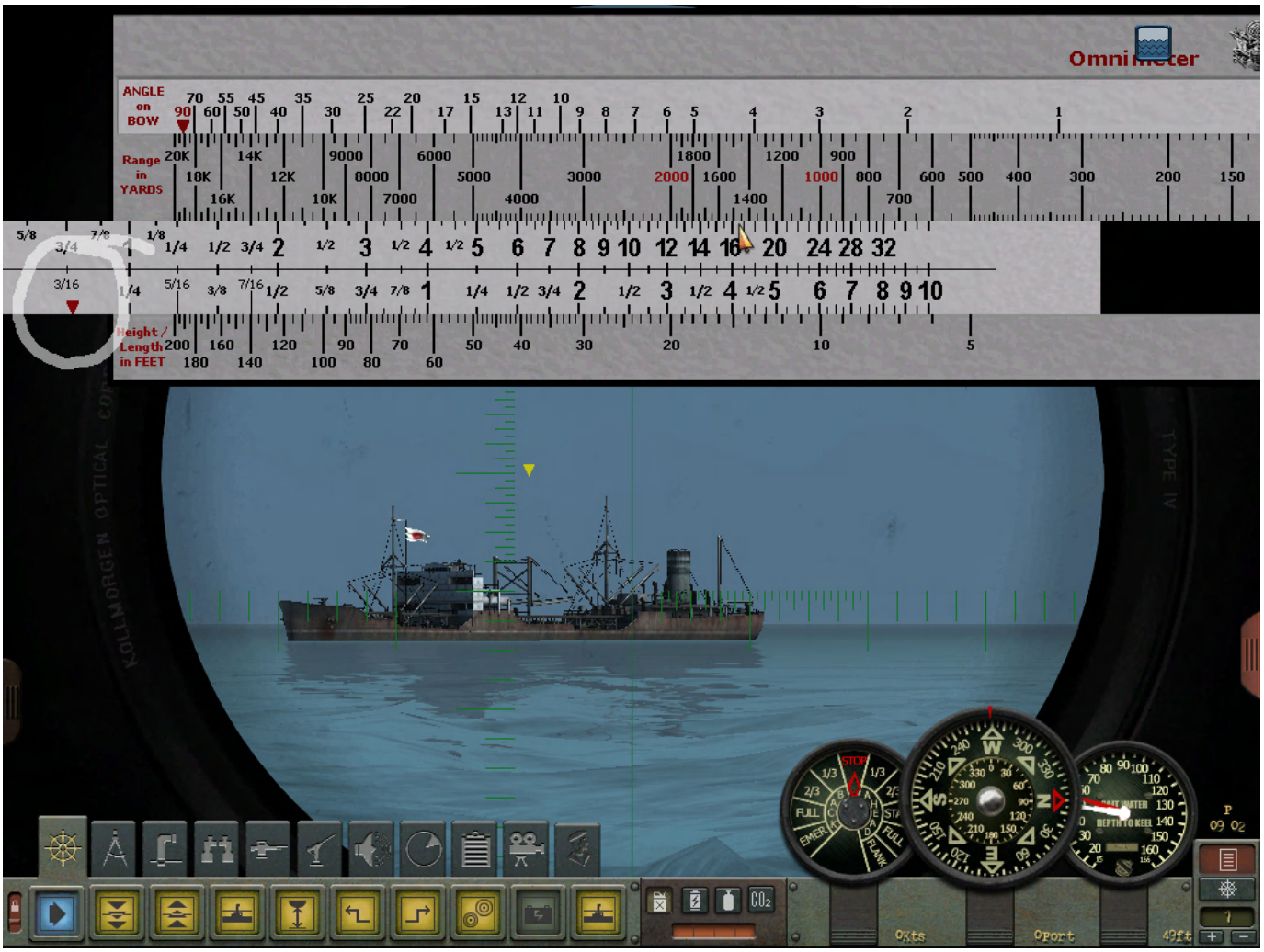
To check this, I'm running the game with the computer finding the range for me (that's why the yellow triangle is showing near the target). The computer found range in the Position Keeper is 1468 yards to target. That's reasonably accurate! You have just found your first accurate range using an authentic tool and doing it using the periscopes lens Telemeter divisions. Your next step would be to "send" the range to the TDC which I'll get to further in this tutorial.

You will notice the Omnimeter has a maximum height/length setting of 200 feet along the bottom set scale. The Range in Yards scale has a minimum of 100 yards. This limitation is not apparent when using the imperial unit of measurement when finding range to target (neither is it a problem using the metric system for finding range). However, it does pose a problem when finding AoB for some ships. I will show you this next.

Finding AoB using U.S. Customary unit of measurements (Imperial)

In order to find Angle on Bow of a positively identified target (in this case the same Nippon Maru) you must know or estimate the range to target. In the last exercise we found the range to target was 1468 yards. Using the horizontal Telemeter divisions count the number of small divisions at High Power magnification the target subtends. In the following image the target is 16 ½ divisions long.

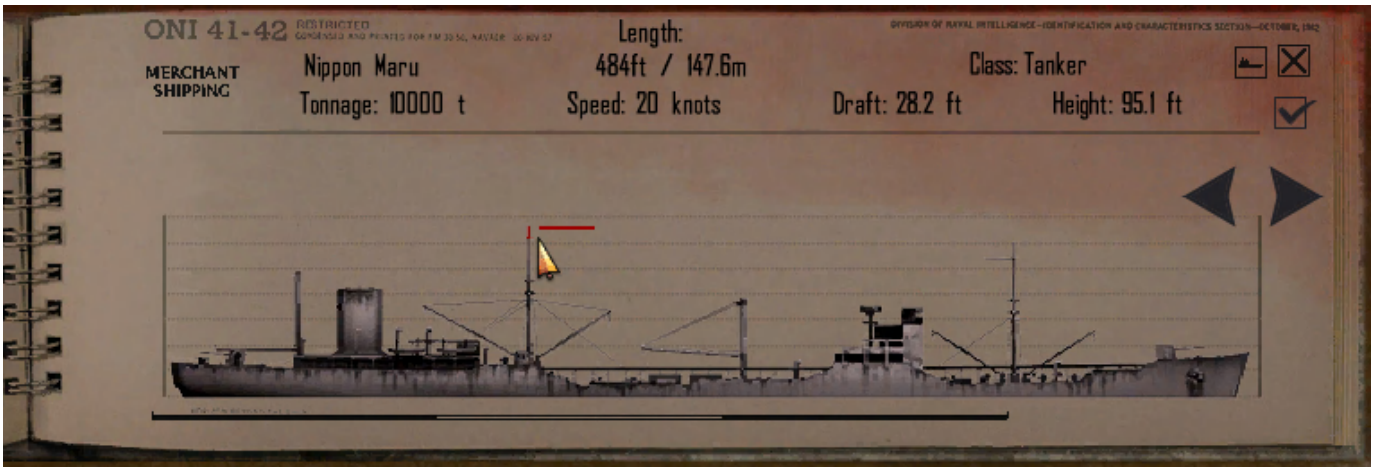
Next, moving the High Power Telemeter Scale figure of 16 ½ to line up with approximately the 1470 yard range figure and…… HOLD ON THERE!! The red pointer is off the height/length scale!!



This is a good example of the limitations of the Omnimeter. What you will need to do is divide in half the range to a figure that keeps the red pointer within the 200 foot height/length scale. Half of 1470 is 735, so move the same Telemeter division figure of 16 ½ to 735.

Once the 16 ½ Telemeter Scale is adjacent the 735 range scale the following image has the red pointer adjacent approximately the 158 ft length mark. OK, we can use this figure now.

Now, find the targets length in the Recognition Manual. The Nippon Maru's total length is 484ft.



Move the top AoB Scales “red pointer” to the targets length of 484 ft found on the center Range in Yards scale. Pay no attention to the fact that this scale is read in yards when finding range. In this case the figure of 484 is all that is necessary to set the Omnimeter for the correct calculation.

Because we had to divide in half the range in order to keep the Telemeter Scale red pointer within the 200 ft limitation, you must now double the length figure of 158 to read the correct AoB. 158x2 = 316. Finding 316 at the corresponding AoB Scale of just fewer than 40 the AoB is determined to be about 38 or 39 degrees port.

To check this calculation with the computer found AoB, have the “Option” for Manual Targeting turned “Off”. The following image shows the Attack Data Tool reading the same degree of Angle on Bow, a bit less than 40 Degrees Port.

Again the Omnimeter, along with the Optical Targeting Corrections, proved to be very accurate.

You <u>won’t</u> need to divide in half the range on all targets to keep the length figure less than 200, but some you will. There are others that will require you to divide the range a <u>second</u> time, or even a <u>third</u>, in order to keep a usable figure under 200.

I recommend you do this in all cases where the pointer is outside the 200 ft limit:

First divide in half the estimated range to keep the “red pointer” within the Height/Length 200 ft scale. If this doesn’t do it, <u>divide the range in half **again**</u>. Example: An 1850 yard range divided in half = 925, 925 divided in half a second time = 462.5 (so round it off to 463). Use 463 as the figure you match the number of Telemeter divisions to as long as the red pointer is within the scale limit of 200.

The next step is to take the "red pointer" height/length figure and use it on the AoB Scale (but, here's the kicker). If you divided the range in half, **twice**, you will need to multiply the height/length figure by 2, **twice**. Example: the height/length figure at the red pointer was 125. Multiply 125x2 = 250, Multiply 250x2 again = **500**. Do not multiply 125 by 3 = **375** thinking this will work, **it will not**. If you **divided** the original range **in half**, 3 times; you must **double** the figure the "red pointer" found **3 times** as well. Move the top AoB Scale "red pointer" to the target length found in the Recognition Manual, and then find the AoB adjacent the **500** figure of the center range scale. This is the correct Angle on Bow for the target. The AoB Scale is measured from 1 degree AoB (at the right most part of the scale) to 90 degrees at the red pointer.

Depending on whether the target is "approaching" your position or going "away" will determine what you do with the found AoB when manipulating the Attack Data Tool AoB Dial before "sending" the AoB to the TDC/Position Keeper. If the target is "approaching", simply move the Attack Data Tool AoB Dial to the found AoB and mouse click the "Send" button. If the target is moving "away", subtract the found AoB from 180 degrees, and use this figure to "Send" the AoB to the TDC/Position Keeper.

Think of it this way, the targets bow represents the 0 (zero) degree position of Angle on Bow. The targets stern represents 180 degrees. Either side (port or starboard) can have the same degree of AoB between 0 (zero) and 180 degrees, the only difference is the particular side that is facing you. If a target is "approaching", the bow (0 degree) is the most closest part of the target towards your position. If it's going "away" the stern (at 180 degrees) is the closest part. Either **add** the found AoB to the "approaching" targets 0 degree (bow) figure, or **subtract** the found AoB from the going "away" 180 degree (stern) position.

As an example:
You found the AoB to be 25 degrees with the target going "away", and the port side facing your sub. Subtracting 25 from 180 degrees gives you 155 degrees. Move the Attack Data Tool AoB Dial to have the 15.5 Port setting adjacent to the "red line" and "Send" this data to the TDC/Position Keeper.

If the same target were "approaching" your position, move the AoB Dial to have the 2.5 Port adjacent the "red line", and "Send" this data to the TDC/Position Keeper.

Keep in mind the AoB Dial of the Attack Data Tool has the degrees marked due to the limited space on the dial. The #1 marked position (either port or starboard) is really 10 degrees, 2 is equal to 20 degrees, the 12.8 mark is equal to 128 degrees, 16.2 is 162 degrees and so on.

How you determine the target is moving away, or towards you is your "best guess". One way is to look for the bow wake. Do you see two? Meaning the target is approaching, where you can see both port and starboard wakes. Check the masts or other structures that have both port and starboard twins. Try to tell which side is "leading" the other in the view. You can also take the relative bearing of the target (found through the scopes compass) **and** the found range to the Navigation Map and plot the position if you have the "Map Contacts Update" turned off. Mark the position with the pencil's "X", then do another after a bit of time. Drawing a line between the two marks will show the targets basic heading and position.

One more thing. Don't be afraid to use the games pause key while doing this stuff. The reality is in "real life" you had a whole team to do all these calculations with the Omnimeter and map plotting duties. Since you're the "one man team", take the time to stop play while you do the math and figure the different aspects of doing a complete torpedo firing solution. After all, where had you heard of the Captain of the boat stepping into the deck gun position and "blowing to smithereens" a foundering freighter? Not likely, but the game allows you to because it's "fun". Have "fun" learning manual targeting

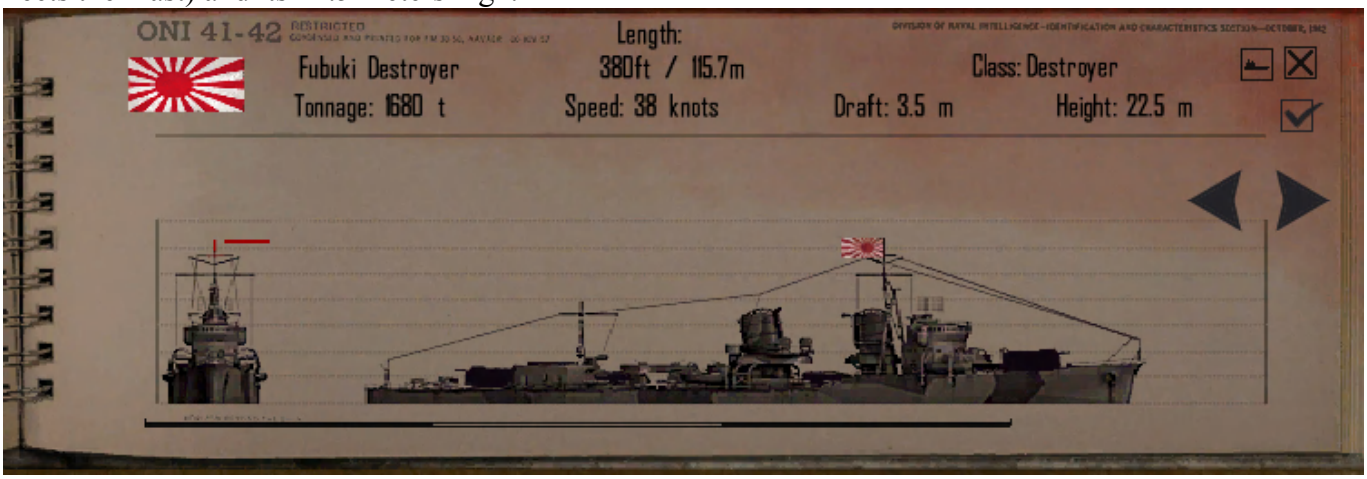
Finding Range using the Metric unit of measurement

I hope you have read the preceding information, even though you have no plans on using the U.S. Customary unit of measurement (we don't call our measurements Imperial. We got rid of those in a revolution over 200 years ago!). The process is the same, just some figures have changed.

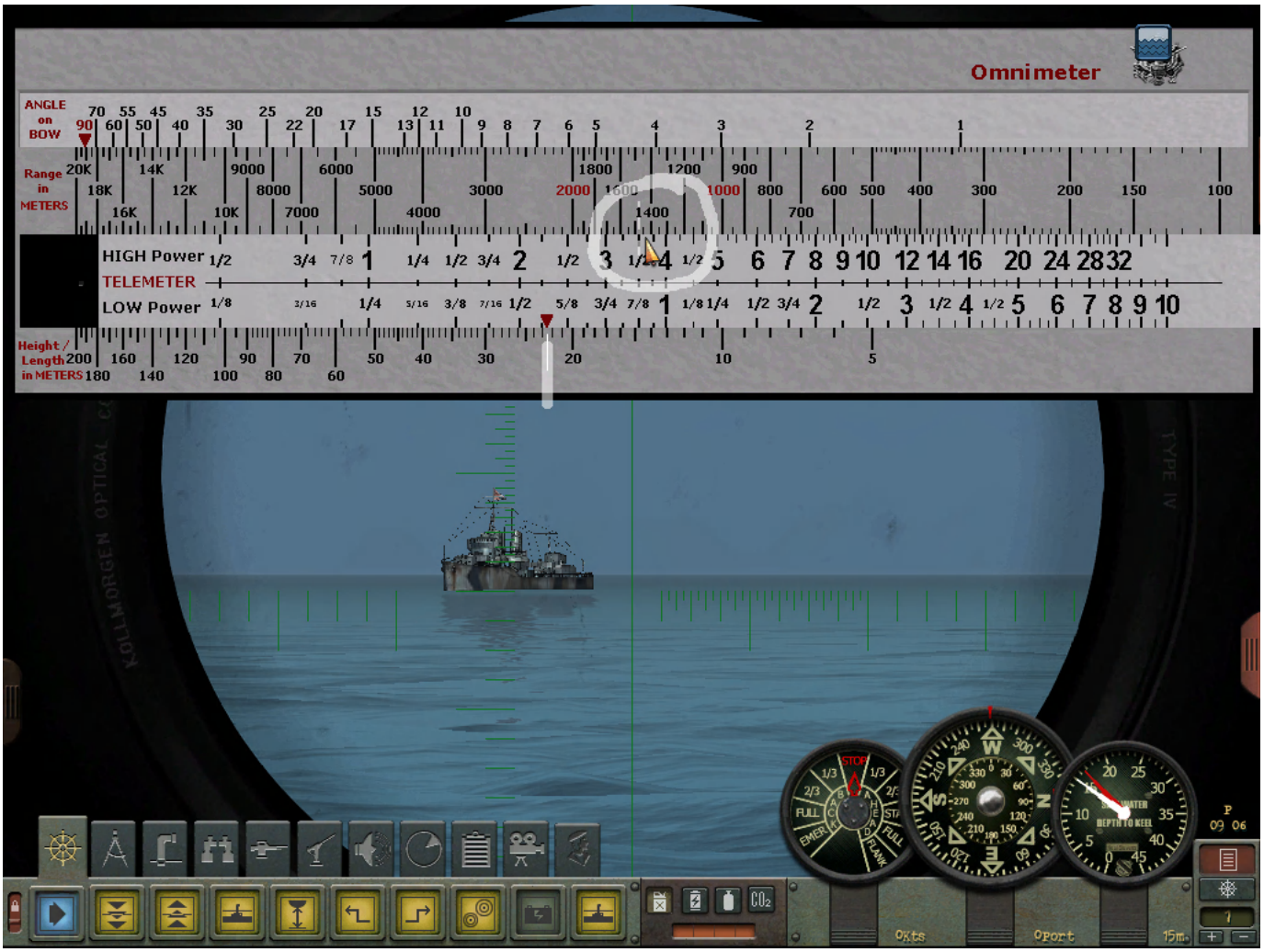
Please note, even though this exercise is using the American side of play, with Metric measurements enabled. The German side is just as capable of using the Omnimeter with the same function and accuracy.

I'm going to use another target ship. As before, you need to make a positive identification of the target. In this case it's a Fubuki destroyer.

I've opened the Recognition Manual and found the "height reference point" is the flag (that's why the flag is displayed on the Fubuki RM page). It tells you the "height reference point" is the top of the flag (where it meets the mast) and its 22.5 meters high.

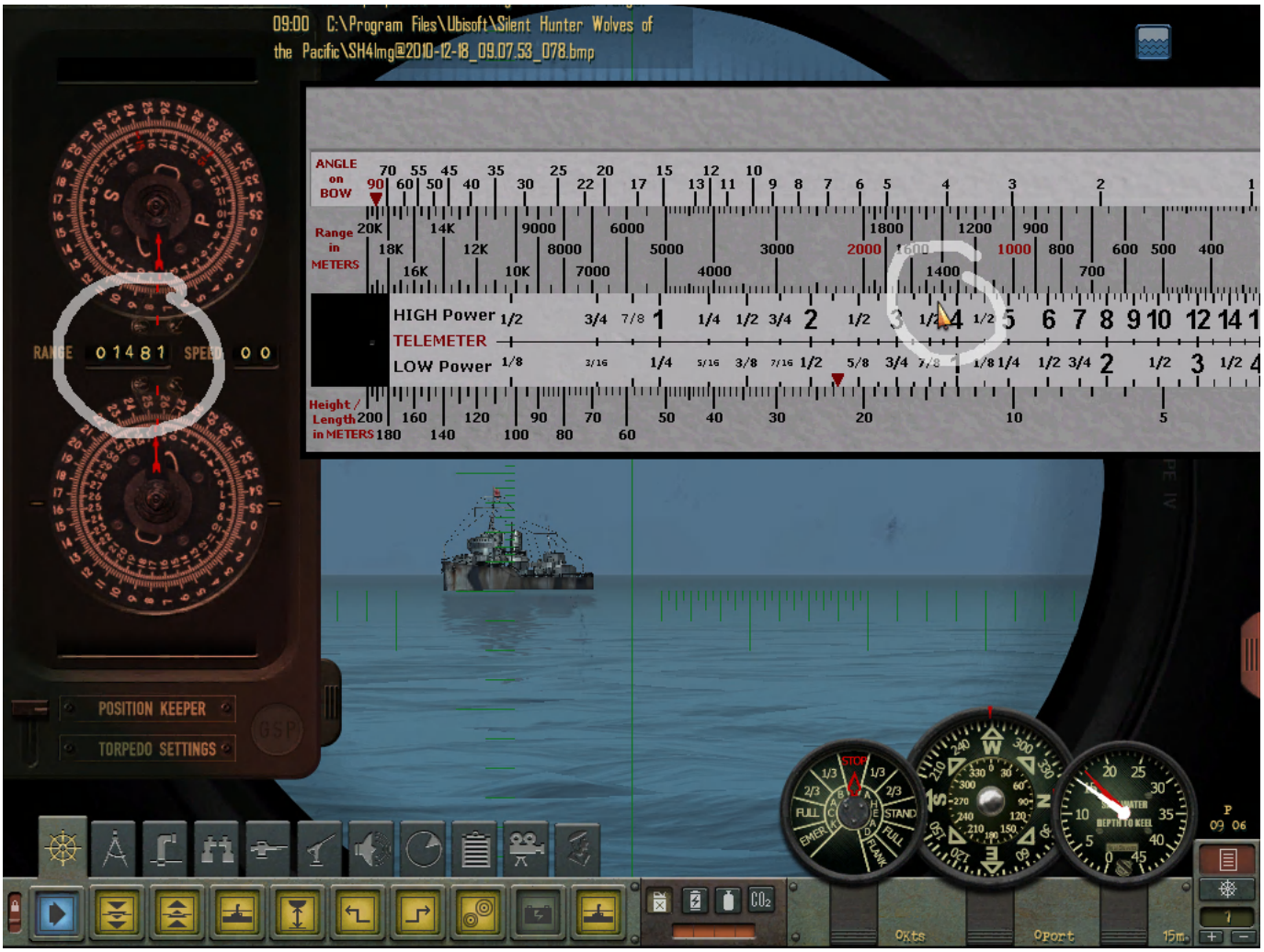


In the previous image on page 12, I've taken a reading at High Power magnification with the placement of a Telemeter division at the water line of the target and found the top of the flag to be 3 ½ divisions tall.



I've moved the Telemeter Scale "red pointer" to match the lower height/length scale of 22.5 meters and find the range to target is about 1475 meters opposite the 3 ½ Telemeter division figure at High Power magnification.

To check this approximate1475 meter calculation I'm using the game computer to give me its results and find the Position Keeper is reading 1481 meters to target. Believe me, this is very accurate.

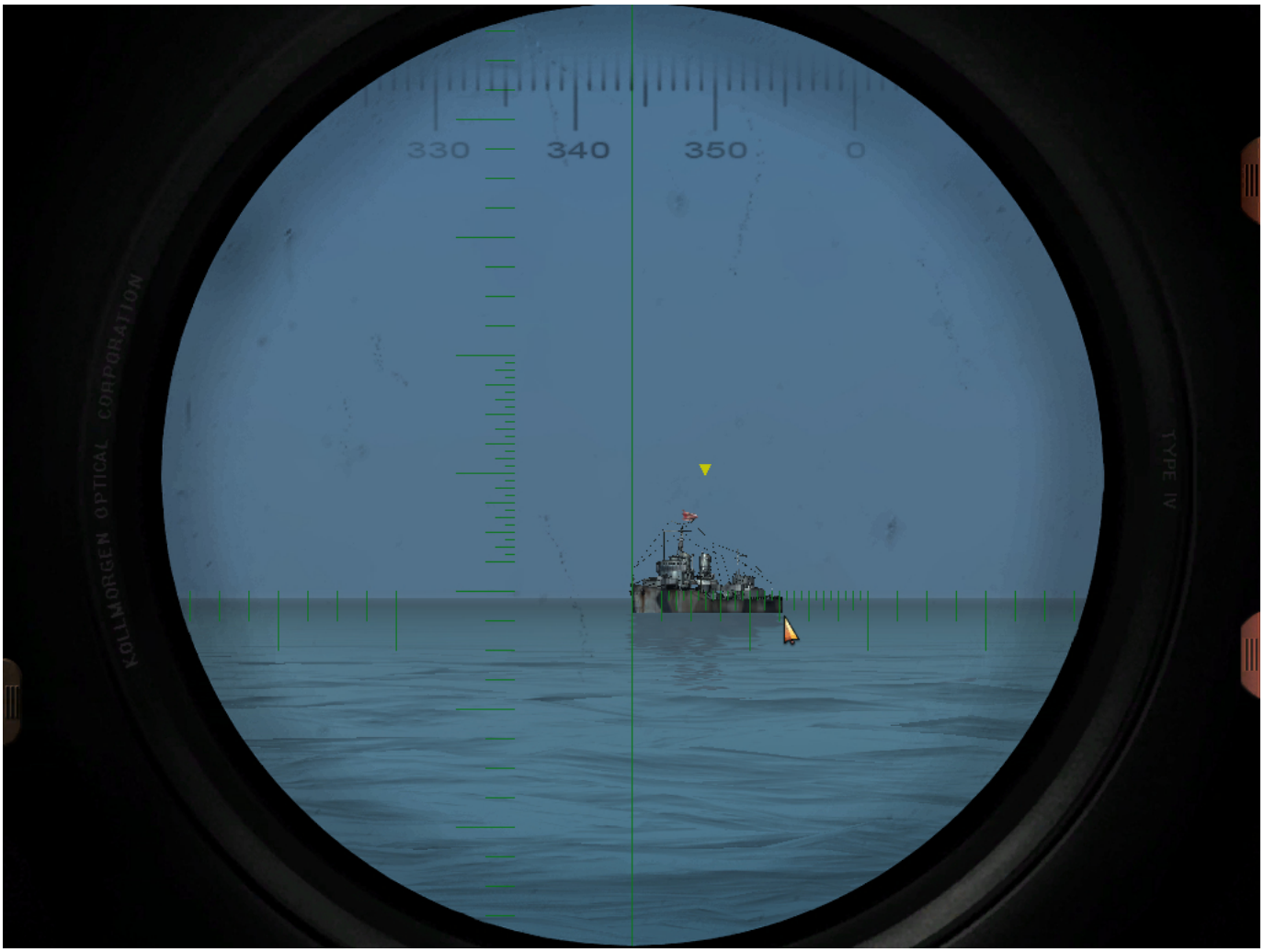


Please note, I consider an approximate reading of 25 meters, either plus or minus, to be accurate using the Omnimeter. Putting you in the "ballpark" is what it will do. However, like in this case, sometimes the figures are right on! If you have played this game long, you know you will need to make several adjustments and readings to get a more accurate solution. Don't just rely on the first reading to make a firing solution. Your next step is to input the range to the TDC, which I'll explain further in this tutorial.

Finding AoB using the Metric unit of measurement

As I pointed out earlier, there are limitations of the Omnimeter. The Imperial version is limited in not calculating beyond the 200 Height/Length Scale. The Metric version is limited to the reading of 100 on the center Range Scale. Both of these short comings are noticeable when finding a targets Angle on Bow.

Let's get started using the same Fubuki DD. As was the calculation with the Imperial Omnimeter process, you need to have a known or suspected range to target. In this case the Fubuki is about 1480 meters distance. Measure the horizontal Telemeter divisions of the Fubuki and you find it subtends a bit over 5, less than 5 ¼. So let's call it 5 1/8. Again, use the zoom feature of this .PDF to clearly see.



Moving the Telemeter Scale of 5 1/8 (at High Power) to the 1480 meter range, the “red pointer” is only at the 35 ½ length figure. We need to be over 100 to get a calculation.

You learned during the Imperial process, you will need to change the range figure to make it work. Unlike the Imperial procedure where we <u>divided</u> in half the range, we need to <u>double</u> the range to find a figure that’s over 100.

Taking 1480 and doubling it gives us 2960.

In the following image, moving the 5 1/8 Telemeter Scale to match 2960 on the range scale, we find the “red pointer” is at approximately 68. That's still not enough to calculate AoB (we need to be over 100 on the Range scale to get a reading). So, you will need to double 2960 again.

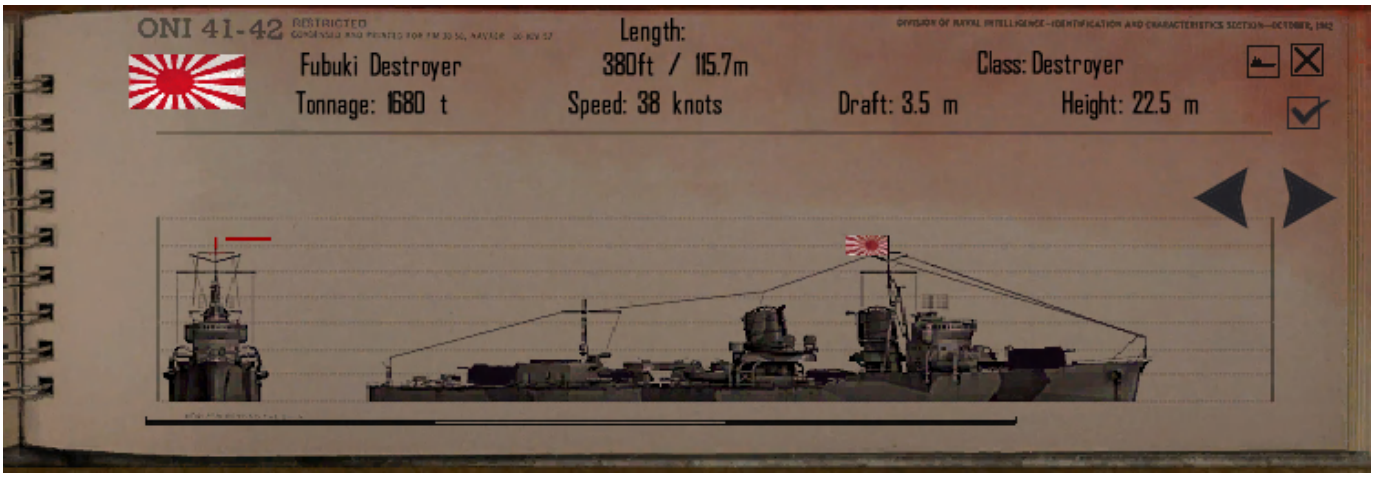
2960 x 2 = 5920

In the below image, 5 1/8 is adjacent approximately 5920 with the “red pointer” at a bit less than 135. Good, now we can work with this figure, it’s over the 100 limitation of the Range Scale.

Since we doubled the range **twice** to get the 135 length figure we will need to double the target ships length **twice** to set the “red pointer of the AoB Scale.

If you didn’t read “My Recommendations” on page 11 and page 12, please take the time to read them now. No matter which unit of measurement you use the recommendations and insight may prove helpful.

Looking at the Recognition Manual we find the Fubuki has a Length of 115.7 meters.



Doubling this gives us 231.4; doubling this again gives us 462.8. As on the image of the previous page, the AoB Scale "red pointer" is set to approximately 463 with a result of the 135 length matching about the 16 degree or 1.6 Angle on Bow.

To check our accuracy the Attack Data Tool dial shows the computer found AoB to be about the same 1.5-1.6, or so. If you are using the Manual Targeting feature, you would simply input the AoB by dragging the AoB dial of the Attack Data Tool and "send" the information to the TDC.

Using the Range Dial to Input Range to the TDC

The American side of play uses a Position Keeper to "track" targets once the three basic parts (Range, AoB, and target Speed) of the Firing Solution has been sent in the Torpedo Data Computer (TDC). The Attack Data Tool found in the top right corner of the Periscope and TBT screens will input Angle on Bow and target Speed through the use of its dials, and clicking on the red "Send" button in the top left corner. The target found Range can either be set through the use of the Stadimeter, or set by using the OTC Range Dial. If you have obtained a Range reading from the Omnimeter or Radar process, move the Range Dial Scale by mouse clicking and dragging the inner part of the dial. Line up the desired range figure to the "red" mark and click the "Send Button" on the Attack Data Tool. The Position Keeper will display the "sent" range figure. Depending on whether the Position Keeper is turned "on" or not (and whether the additional AoB and Speed has been sent to the TDC) the Position Keeper will track the target and keep its relative position throughout the pre firing phase. The specific order of inputting data should be target Range first, Speed, then AoB. It's critical to input all three before expecting to get anything close to a firing solution, and it's important to update the Range as soon as the first AoB is entered. This information once entered and updated by constantly checking its accuracy, will determine the accuracy of the firing solution. Once the target's track seems consistent with the information you have continued to gather, an accurate firing solution will be assured. The Range Dial does not interfere with the use of the Stadimeter nor does the Stadimeter interfere with the Range Dial. A firing solution does not need to have the Position Keeper turned "on" to be accurate, but it is noteworthy that the longer time has passed since an update of the three basic equations the less accurate the result.

The German side of play does not have a way of "tracking" a targets position like the American Position Keeper. Its firing solution is made up of the same basic equations (Speed, AoB, and Range) as the American side, but the solution is only as accurate as the latest information that is "sent", and the passage of time since the last update. The German Range Dial will be available linked with the Solution Notepad. The Notepad is found in the upper right hand corner of the periscopes and UZO screens. Dragging the inner part of the Range Dial to the desired range figure will change the "Range:" display on the Notepad (in the picture below the range is set to 1999m). To send the information to the TDC, click on the "Checkmark" at the bottom of the Notepad. Clicking on the "X" at the bottom of the Notepad will return you to the first Firing Solution page which should show the "Range:" you entered. You must still enter the AoB and target Speed to have a complete firing solution. Much like the American side the solution accuracy is determined by taking several readings of Range and AoB, plus checking the targets Speed. You should try keeping the length of time after the final update to a minimum before firing.

Known Issues

There are three known problems that I've encountered with the Omnimeter in-game.

1st
The Omnimeter will appear everywhere the Message Log box appears, which is in all screens of a playable game. For some reason, the mouse will freeze when at the Command Room screen and moving the Omnimeter sliders. It usually takes a couple of slides back and forth, but the mouse will become unresponsive. To correct this, jump to another station and the mouse function will return. This only happens when the Omnimeter is used while in the Command Room. Since you will more than likely use the Omnimeter at one of the periscope stations or the TBT/UZO (where this problem does not occur), I consider this to be of minor concern. Just don't use the Omnimeter while in the Command Room.

2nd
The starting position of the Message Log box is at the bottom of the screen. To move the Omnimeter into view simply mouse over the box, and drag it into position when the mouse captures the box. You will notice small double ended arrows appear around the outer edge of the box to expand the Message Log readable area. When you do this the "movable scale sliders" will move out of alignment with the Omnimeter base. Simply pull the arrows back to there original position to match up the scale sliders with the base.

3rd
As noted in the 2nd problem, the Omnimeter can be dragged over the screen. You should use caution in attempting to move the Omnimeter/Message Log off the screen entirely. This can be done by taking the devices to the edge too far and dropping them off. The mouse capture will not pick up the Omnimeter/Message box and the tools will be lost until you restart the game again. I've had luck in "expanding" the Message box with the double ended arrows to regain the drag feature. But, if these mouse features are not visible, the only way to get things back in order is to restart the game. I've looked at this problem and have found it to be a stock game issue. The stock game Message Log box can be drug out of sight and once you release the mouse drag feature you'll not find it again.

Best regards
CapnScurvy
[Leander Crawford]