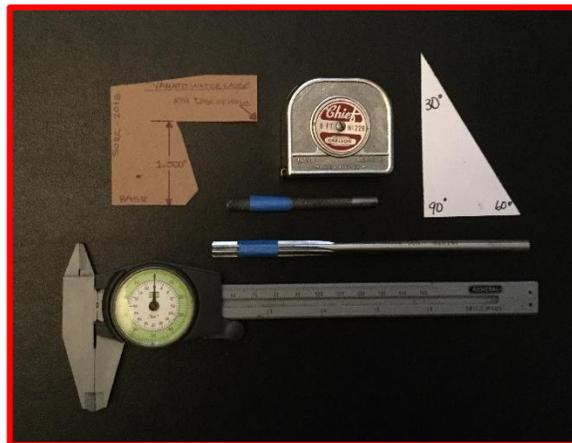


# Yamato Enhanced Drill Guide



This guide is a supplement to the Stock Outboard Technical Manual. This is a suggested guide on how to enhance the water inlet hole of the Yamato engines.

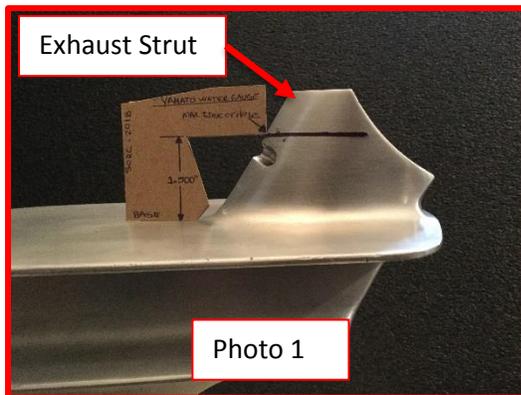
## 1. Tools Required



- a. Hand drill, corded or cordless
- b. ¼" (.250") chainsaw file, fine cut, round, shortened to 3" (\$17)
- c. Up to 9/32", Letter "K", .281" chucking reamer (\$10 Amazon)
- d. Emery paper, 240-grit sandpaper
- e. Scotch-brite, red medium grit
- f. Sharpie, fine point
- g. Solvent, acetone or lacquer thinner
- h. Ruler, 6" recommended
- i. Protractor
- j. Business card

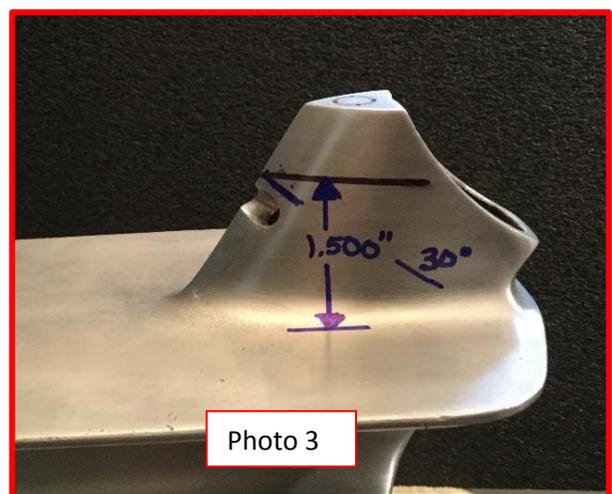
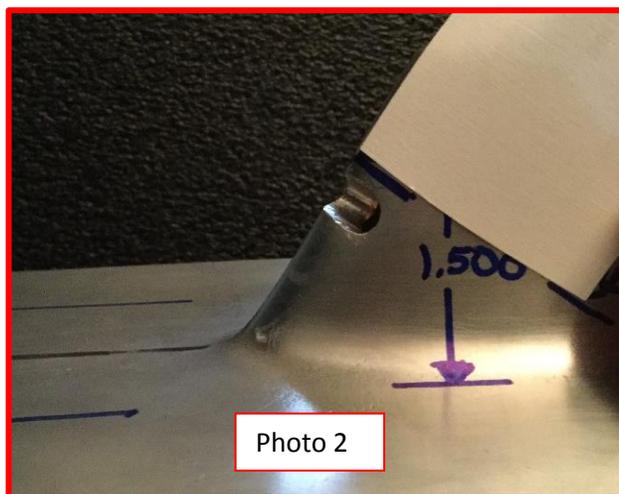
## 2. Layout

It is easiest to layout your work while the tower is upside down, on a steady tabletop or workbench.



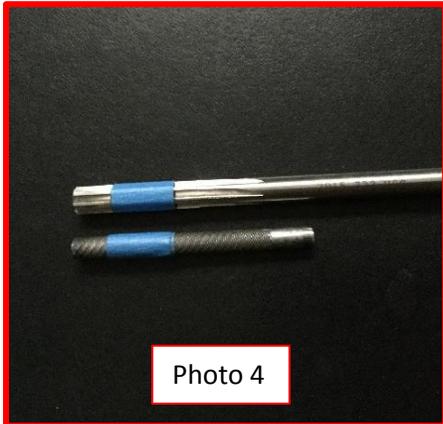
First, it is necessary to identify the lowest point of the allowable hole, which is 1.500" below the flat area of the cavitation plate. It is important to make sure you are measuring outside the radius at the bottom of the exhaust strut. Using your ruler, mark the leading edge of the strut and draw a line parallel to the cavitation plate. This line is the maximum limit of the hole. *See Photo 1.*

Using a business card, align the bottom edge of the card with the edge of the water inlet hole and the long edge of the card with the leading edge of the exhaust strut. Holding the card with one hand, use a Sharpie to draw a line from the edge of the exhaust strut, leading downward to the cavitation plate. This line represents the angle at which the water inlet hole will be enhanced. *See Photos 2 & 3.*



### 3. "Enhancing" Process, Parts A & B

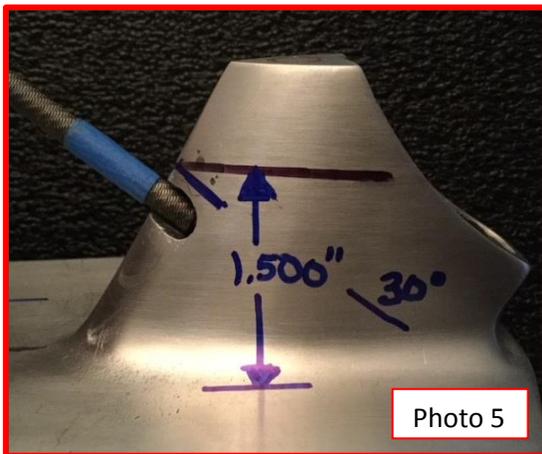
It is best to support and/or clamp the tower while you work to avoid any movement. If the tower is able to move, it can be difficult to correctly enhance the water inlet hole. A friend can be helpful!



A) Before you begin, it is helpful to establish a depth at which your tools will be working. Using some blue painters tape, or whatever is available and easy to see, wrap some tape one-half inch from the end of your chainsaw file and reamer. *See Photo 4.*

As a general warning, it is best not to be aggressive while enhancing the hole. The goal is to clean out (remove) the aluminum between the strut and the copper tube. Do not enter the copper tube with any tool larger than 9/32" or 0.281"

Begin by chucking your chainsaw file in the drill. Ensure the file is not wobbling or running-out BEFORE you begin the process. Using the line perpendicular to the leading edge of the exhaust strut, line up your file and set it just inside the outermost edge of the hole. Begin spinning the file, and maintain an attitude straight in. *See Photos 5 & 6.*

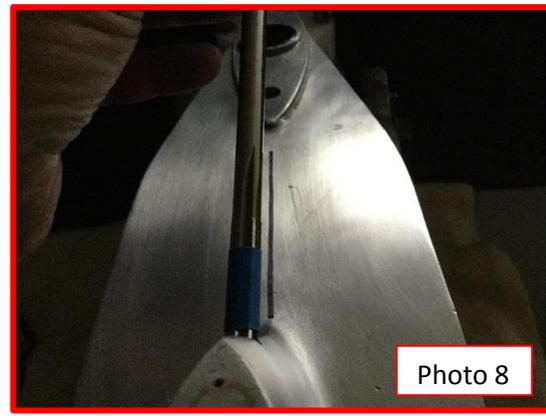
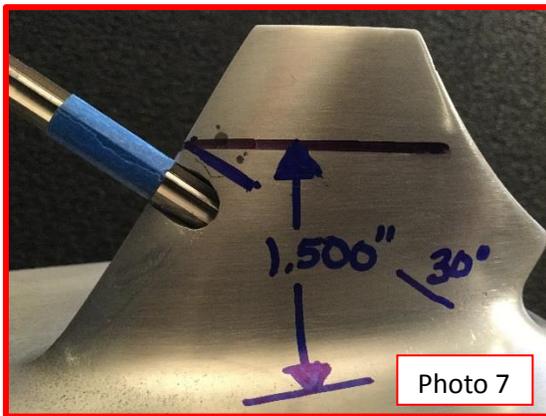


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As you drill, be sure you do NOT allow the file to go deeper than one-half inch. This is where the blue tape will be helpful. Also, avoid filing the top edge of the hole as the file is likely to gouge the other side of the hole. The goal here is to remove the aluminum and create a straight cut towards the center of the copper water inlet tube. Essentially, the hole is centered on the leading edge of the strut toward the center of hole in the copper tube. And remember, DO NOT go too far into the copper tube, this is where the blue tape again becomes helpful.

Once material has been removed, make sure the hole goes beyond the leading edge of the strut for maximum cooling. Although there is no specification, we found about 1/8" works well. It is helpful to leave enough material after filing to chase hole with a reamer. *See Photos 6 & 9.*

B) Chuck the reamer into the drill. Set the reamer directly on top of the area which the file was just used. Using medium pressure, allow the reamer to begin cutting the filed area. Remember to maintain a straight line toward the center of the copper tube. The goal with the reamer is to finalize the size of the enhanced hole. The reamer will also help remove any unevenness from the file. Again, do not use a reamer larger than 9/32" or .281". And do not enter the copper tube, ream only the aluminum surface. *See Photos 7 & 8.*

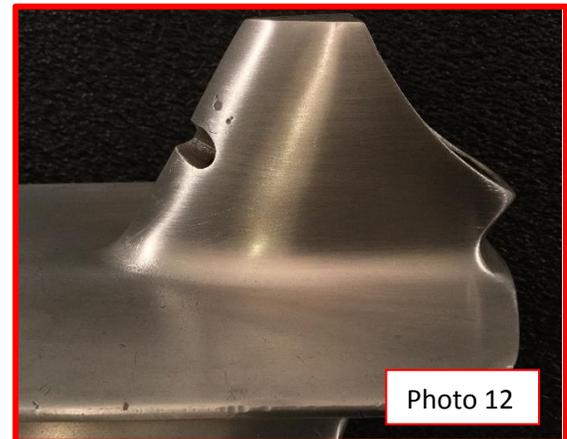
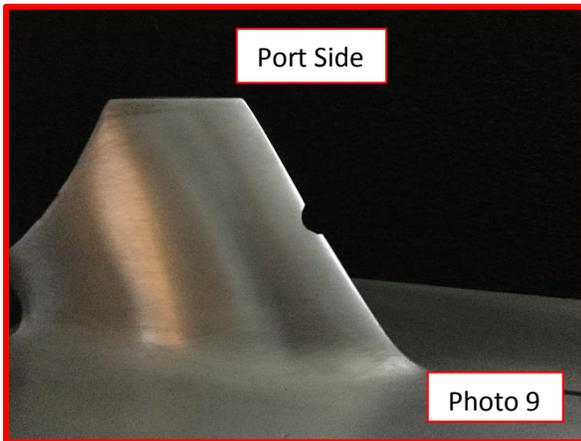


It is highly recommended to compare your work with pictures from this guide. You should also take several before, during and after pictures.

## 4. Clean-up

This is the easy part. Use the emery paper and sand the edges of the enhanced water inlet area. Once the edges have been broken, use the cotton swabs to remove any leftover material from inside the hole. Make sure the copper water tube is free of debris. An air hose would be best or squirt water down the tube.

## 5. General Photos



Email questions or concerns to: [stockoutboard@apba.org](mailto:stockoutboard@apba.org)