PONTOON HYDROFOIL APPLICATIONS INC.

VARA®

FOIL-STRUT-PLATE

VARA® Plate

INSTRUCTIONAL AND INSTALLATION MANUAL

Patent Pending

Version 1.10

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1.0 Introduction

Thank you for your purchase.

Your new VARA® Plate will provide a new and better way to enjoy your boat. The VARA® Plate is mounted on the outboard motor and acts like the horizontal stabilizer on an airplane. It helps control the attitude of the bow of the boat using the motor's trim/tilt switch when wave conditions or weight distribution (i.e., passengers walk forward or back while underway) change. The new VARA® Plate assists with improved pitch control and better handling which results in a more enjoyable boating experience. Boating with a VARA® Plate can be done safely, but you must be willing to take the time to learn about piloting a boat with a VARA® Plate addition.

The purpose of these instructions is to assist the installer with a step-by-step guide for properly installing the new VARA® Plate. Read the instructions completely and carefully as PHA, Inc. desires HAPPY and SAFE customers. If you have questions, contact our Support Team before proceeding with the installation or use.

It is highly recommended that the installer watches the YouTube video which explains the basic theory behind the VARA® Plate technology, Center of Lift, and Center of Gravity to learn more before proceeding.

Link: https://www.youtube.com/watch?v=LUT2by9QhNM

DO NOT ASSUME THIS IS THE MOST CURRENT INSTALLATION MANUAL.

You must verify the latest version on the website at pontoonhydrofoil.com/manuals.

Read the entire manual before getting started.

The intended audience of this manual should understand ALL the basic terms, definitions, tools, and methods described herein. Additionally, if you do not understand something in this manual, **STOP** and verify the installation method and procedures by contacting the PHA, Inc. Support Team by phone, email, or text with the questions or concerns **prior** to moving forward with any additional steps. **WAIT** for written answers before continuing to avoid proceeding with what may be improper and/or create an unsafe boating situation.

Ensuring all boaters have a safe boating experience is our highest priority.

IMPORTANT NOTES:

YOU ARE RESPONSIBLE FOR PROPER INSTALLATION AND YOUR INSTALL WORK.

READ THE ENTIRE MANUAL BEFORE PROCEEDING WITH THE INSTALLATION.

If you do not understand or are unable to install the VARA® Plate as a do-it-yourself project, paid marine professionals are available and should be hired to perform the install rather than proceeding with an improper VARA® Plate installation. Contact the PHA, Inc. Support Team with any questions or concerns.

Pre-installation checks must be performed to ensure optimal results and may affect stated product guarantee, if applicable. These include but are not limited to:

1. Make sure the bottoms of the pontoon and motor pod are free from growth, barnacles, algae, hairy growth, and all types of parasites. Bottoms should be as clean as from the factory whether painted or not. This will affect performance accordingly.
2. Inspect the hulls/pontoons for dents, cracks, or other damage.
3. The boat should be dry and ready for boating. This includes checking for water inside the toons, storage compartments, and all areas or items in boat that may hold water. Extra water weight is not only dangerous for the boater but will affect the VARA® Plate performance accordingly.

2.0 Getting Started

2.1 Material and Tool Checklist

Examine shipping box and document any damage with pictures before opening.

Open box, unwrap, inspect, and inventory all contents. Document any damage with pictures.

Content List:

- VARA® Plate (1) with VARA® Plate Mounting Hardware Kit (1)
- #10-24 stainless steel carriage bolts (10)
- ¼" stainless steel fender washers (10)
- #10-24 stainless steel nuts (10)
- Thread locker

Gather Minimum Tools Needed for Installation:

- Pencil or Temporary Marker
- Battery Drill with 3/16" metal drill bit
- 1-3/8" Closed or /Open End Wrench
- Small Grinder
- Sealant **[NOTE: DO NOT USE SILICONE]**
- Hammer
- Visegrips ®

It is highly recommended the installer watch the basic installation help videos on our YouTube Channel @pontoonhydrofoil prior to proceeding.

Watch PART 1 located at https://www.youtube.com/watch?v=TG9aJ3Kz4_Y

Watch PART 2 located at https://www.yutube.com/watch?v=ba5PLY8miAc

2.2 Cautions and Warnings Before Proceeding

1. Remove battery cables and ignition key prior to beginning any work around the motor including pre-fit process and installation.
2. Check and double check that ALL nuts, bolts and drain plugs are tightened before use or putting boat in water.
3. Do not cross thread screws or bolts.
4. Starting bolts and screws by hand before using tool for tightening is recommended. Install thread-locker on bolts before final tighten.
5. DO NOT USE A POWERED NUT DRIVER. Do not overtighten bolts and/or nuts during installation as it risks compromising the bolt integrity.
6. Check VARA® Plate recess for proper fit tolerances on the motor prior to drilling any holes – refer to the "dry fit" procedure noted in installation steps.

3.0 Installing the VARA® Plate

Experience Level: Easy

The estimated time of VARA® Plate assembly with tools ready is 40-45 minutes.

The VARA® Plate mounts onto the outboard motor's anti-ventilation plate (AVP). The object of the VARA® Plate installation is to mount the VARA® Plate on the machine-recess on the bottom part of the VARA® Plate as far forward and on top of the outboard AVP as possible. The structural integrity will be maintained while keeping the front edge width tightly against the lower unit wall. The tighter the fit on the front edge, the less debris that will catch in between the VARA® Plate and the lower unit wall.

Sometimes you may need to slide the leading edge of VARA® Plate aft to ensure a tight fit at the leading edge that won't collect weeds. [NOTE: This may leave small gap at the back end.]

NOTE: Review drawings included in Figures 1 and 2 to determine the proper bolt pattern for your specific boat's maximum speed (40 MPH vs 60 MPH). Each motor lower unit is different, and each VARA® Plate model is unique to specific engine models.

Review Figures 3, 4 and 5 as an example reference to see the proper bolt placement and alignment pattern. If something doesn't seem correct in the dry-fit step, **STOP!** Light sanding or grinding may be required and is not unusual. However, there is a chance that the wrong item may have been ordered for your specific motor. Call the PHA, Inc. Support Team for assistance or send an email with an explanation and include pictures for reference.

3.1 Get Tools Ready:

1. Locate VARA® Plate and set it aside.
2. Place the 3/16" drill bit into the drill and have ready for installation.
3. Locate hardware (#10-24 x 1" carriage bolts, ¼" fender washers, and #10-24 standard nuts).
4. Put carriage bolts into fender washers and set aside so they are ready for final insertion from the top of the VARA® Plate after drilling all holes.

NOTE: There MUST be a fender washer at the forward-most hole on each side.

3.2 Dry-Fit Procedure:

The dry-fit procedure may need to be repeated several times to ensure a proper fit. [TIP: While dry fitting, we recommend placing a removable cloth protector between the VARA® Plate and the lower unit for scratch resistance].

The process of achieving a proper fit may include sanding/grinding of the front of the VARA® Plate where it meets the lower unit wall as shown on Figure 1 and Figure 2 (indicated by the red line).

This is normal as the VARA® Plate is made to be sanded to achieve a tight fit. It is recommended to use a small disc grinder or 40-grit on a hand block or board file when sanding.

IMPORTANT: Do NOT sand the motor or lower unit!

1. Place the VARA® Plate onto the outboard motor AVP by slightly bending the left side higher or lower than right side and tilting the plate will allow for easier placement while going on and removal. If you are not sure which lower unit plate this is, it is usually the horizontal plate on lower unit directly above the propellor. If unsure, **STOP!** Consult with a professional or contact our Support Team for assistance before proceeding.
2. The opening at the front of the VARA® Plate needs to match the front curvature of the lower unit wall. Use a marker to mark the lower unit wall shape onto the VARA® Plate while it is located properly at back-end recess (watch the videos again) if needed. If it seems like you have sanded the front end too much and there is movement as you slide it side-to-side, squeeze the front end tighter to close any gaps. Radius the lower side of the VARA® Plate wherever it touches the lower unit side wall which is very important for a proper fit.
3. As a final check, lay the VARA® Plate on the AVP again. If the fit is tight on the front, sides and back, you are now ready to move forward with drilling of holes in lower unit for mounting. **If not, STOP! DO NOT drill any holes.** Consult with a professional or contact our support team for assistance before proceeding.

NOTE: Your motor may also require an oil drain access for the lower unit oil. The oil level nut does not normally need to be completely removable to perform a visual inspection of the oil level. This is achieved by cutting a small opening (square hole) on the VARA® Plate using a hacksaw. Refer to appropriate Figure 1 or Figure 2.

3.3 Measuring and Drilling Holes in the Lower Unit:

1. Remove the VARA® Plate and set it aside.
2. On the outside forward edge of the AVP, place a yardstick or measuring tape and measure 3” back from where the AVP meets the outside walls of the lower unit. Mark this location. From this mark forward is the front bolt mounting zone. Make sure the area is wide enough for a fender washer. If it is not for some reason, slide this area back by no more than 3.25 inches. NOTE: Fender washers may need to be filed to fit.
3. Then, measure in 3/8” from where the edge of AVP joins the sidewall of the lower unit. Mark this location. [**NOTE:** The first hole on each side must be drilled as far forward as possible within this 3” zone.]
4. Repeat Step #2 above for the opposite side of the AVP.
5. Drill holes at marked location in ¼” from the AVP edge or outside diameter as shown on Figure 1. [TIP: Drill from the top wherever possible. Drilling from the bottom with a 3/16” drill may be inhibited as there may be another plate that will restrict the drill angle when drilling from above.
6. Locate the aft holes on the aft corners of each side in back end of the AVP. Remember the hole centers must be at least ¼” in from outboard edge of plate with 3/8” as the maximum. Measure distance from front to back holes with yardstick pressed on outside edge of AVP. Divide this distance by 3 and mark the location.
7. Drill in from edge ¼” from AVP edge of each hole minimum with 3/8” as the maximum. [TIP: The front hole is the hardest to drill. Watch the angle of the drill and try to keep as upright (vertical) as possible while drilling. A 90-degree right angle drill may benefit some installs for front bolt drilling.] **NOTE: There must be enough room to include a washer on the forward-most front bolt on each side, and you may need to file the washer to fit.**
8. Locate and drill the final hole on center point on the back edge of the plate 1/4" in.

3.4 Drilling Holes in the VARA® Plate

NOTE: ALL holes must be drilled in the AVP before drilling holes in the VARA® Plate.

1. Once all holes are drilled in AVP, place the VARA® Plate onto the motor and ensure a tight fit. Slide the VARA® Plate as far forward as the rear end of AVP will allow. Re-check fit at front and adjust accordingly.
2. If the fit is tight, drill the back holes first – **drilling upward** from the bottom of the AVP. Put carriage bolt thru fender washer and push down through each drilled hole on center from the top. Carriage bolts should be facing downward from VARA® Plate so that the bolt head and fender washer are seen on top of plate with nut on the bottom side.

3. Then, drill the two (2) holes forward on each side. [**TIP:** Make sure to press the forward edge of VARA® Plate tight against lower unit wall on each side as you drill.
4. Be careful to keep the VARA® Plate snug against the wall. The top of AVP meets the wall of lower unit with a radius on the bottom, so the VARA® Plate must have a radius for proper fit.]
5. Put #10-24 carriage bolt, fender washer, and #10-24 nut on loosely. Once the front and back are properly aligned, drill and pre-fit ALL bolts.

3.5 Final Mounting and Sealing

1. Before final mounting, remove the drilled VARA® Plate and set aside.
2. Clean the two mating surfaces.
3. Apply a sufficient bead of sealant around the perimeter of the AVP to ensure a tight seal. **REMINDER: DO NOT USE SILICONE.**
4. Carefully replace the VARA® Plate back on the AVP to seal it to the AVP joint.
5. Install ALL carriage bolts with fender washers from the top. REMINDER: There must be a fender washer at the forward-most hole and ALL other bolt locations on each side of plate. File washers if needed to fit.
6. Apply thread locker onto nut threads for each nut from underneath the AVP**. DO NOT FORGET THIS STEP!**
7. Tighten all nuts using a 3/8” wrench. Snug bolts in a pattern while going around 2-3 times to allow VARA® Plate material time to compress under pressure. Be careful not to over tighten.
8. Check each nut for even tightness and ensure the gap between the AVP and VARA® Plate is closed.
9. Use Visegrips ® to snap off each excess bolt thread. Do **NOT** put Visegrips® tight against the nut for risk of bending the bolt. Leave a 1/32” gap while snapping.
10. Once all bolts are snapped flush or close to it, lightly tap each snapped bolt over the nut with a hammer to knock down any sharp edges and help lock the nut into place. You may use a file to finish off sharp edges if preferred.

    DO NOT FORGET THIS STEP!

    TIP: You should also use hole punch on the thread and nut seam so the nut cannot vibrate off. As part of regular maintenance plan, check the VARA® Plate nuts.

4.0 Final Checks Before Using the VARA® Plate

1. Double check all installation steps are complete.
2. Check that ALL fittings and bolts are tight.
3. Check VARA® Plate for proper fit and clearance on propellor. The VARA® Plate should NOT be hitting prop or be any closer than the bottom of AVP distance before the VARA® Plate installation.
4. With motor in the down position, lift up on the VARA® Plate with both hands to test the install strength. This mimics the lift the VARA® Plate creates while underway at speed.
5. Replace battery cables and ignition key once ALL checks are complete and everyone is safely clear from the area.

5.0 Using The VARA® Plate for the First Time

1. Launch the boat if installation was not performed while in the water.
2. Start engine after ensuring all is clear around the boat.
3. Switch engine into forward gear.
4. Once in gear, make sure the motor is trimmed all the way down to start.
5. Slowly speed up to get onto a plane. [NOTE: You will notice that the boat will plane faster than before.]
6. Use short presses, bumps or taps on the trim/tilt switch to learn how the boat responds to the VARA® Plate. There is no need to hold the switch for long lengths of time unless depth changes are large and/or sudden.
7. The VARA® Plate creates lift and allows for smoother water flow over the prop.
8. Practice changing the bow attitude using the trim/tilt switch to feel the difference in changing conditions (i.e., passengers and/or coolers sitting forward vs aft and cutting through waves, etc.).
9. You are encouraged to spend amount of time to sufficiently learn how to pilot your boat with the newly installed VARA® Plate.
10. When used in conjunction with the VARA® Foil Hydrofoil System, you can control the amount of lift, adjust the bow attitude, and the boat's speed. Avoid following in the white-wash wake (aerated water) of other boats and excessive weeds when possible as this reduces performance.

6.0 Maintenance and Care

PHA, Inc. highly recommends each boat owner routinely perform regular maintenance and safety checks on all VARA® Plate and VARA® Foil Hydrofoil System components. Contact PHA, Inc. for any replacement parts required.

At a minimum, complete the following monthly including:

- Ensure all nuts, bolts and washers are intact. Replace any missing.
- Inspect all nuts/bolts and washers to ensure they are tight, but not over-tightened. Tighten any loose hardware. Replace any missing or worn hardware.
- Visually inspect the VARA® Plate for unexpected cracks or dents.
- Manually lift on the back of the VARA® Plate to ensure it does not move up/down or side-to-side. Tighten bolts or replace as needed.

7.0 Troubleshooting and Support

1. **Weeds are collecting in front edge of the VARA® Plate.**

   Some weeds are normal in front end especially going thru large clumps of Turtle Grass or thin strands of grass. However, check to make sure that the gap in front of plate is not oversized. The VARA® Plate should be tightly mounted against the lower unit wall. In some cases, gaps may be filled with an adhesive of your choice.

2. **My VARA® Plate is loose and/or moving back and forth.**

   The VARA® Plate should have **NO** movement and should be tightly attached. Ensure all bolts are tightened to a proper tension without breaking. Check to make sure there is sealant between VARA® Plate and Anti-Ventilation Plate**.** Also, check to see if any bolts have broken off or may be missing.

3. Please email, call, or text contact our Support Team with any questions or concerns.

PHA, Inc. Contact Information

Phone: 727-455-5576

Website: www.pontoonhydrofoil.com

Founder: mike@pontoonhydrofoil.com

Support Team: support@pontoonhydrofoil.com

You are now ready to start enjoying the VARA® Life!

Check out our complete line-up of VARA® products
when upgrading your pontoon, tritoon or power catamaran
including the patent-pending VARA® Foil Hydrofoil Kit and VARA® Skin

Follow us on YouTube and visit our website for complete details.

Figure 1.

Proper Fitting and Drill Hole Placement Guide for 40 MPH Max Speed

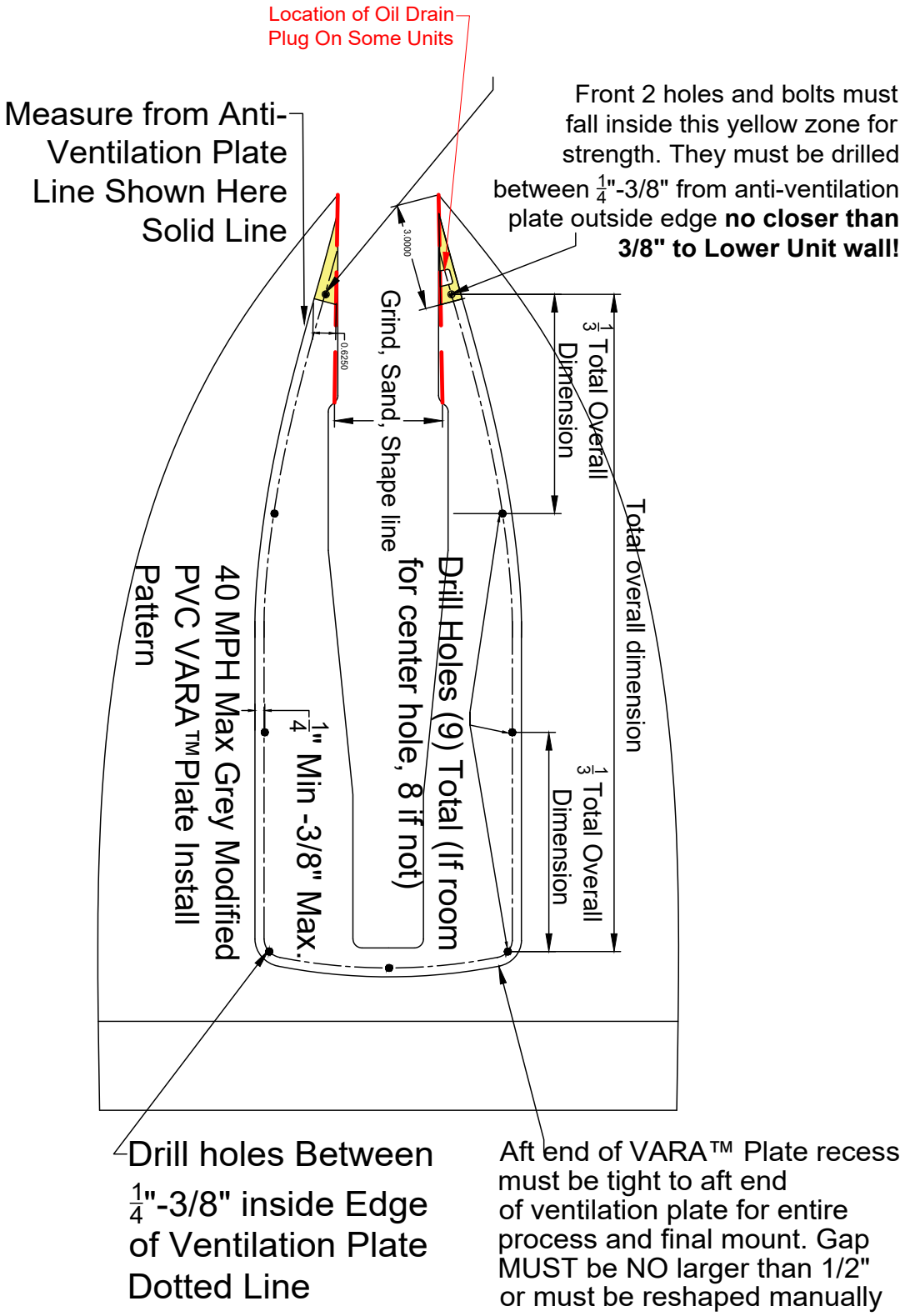
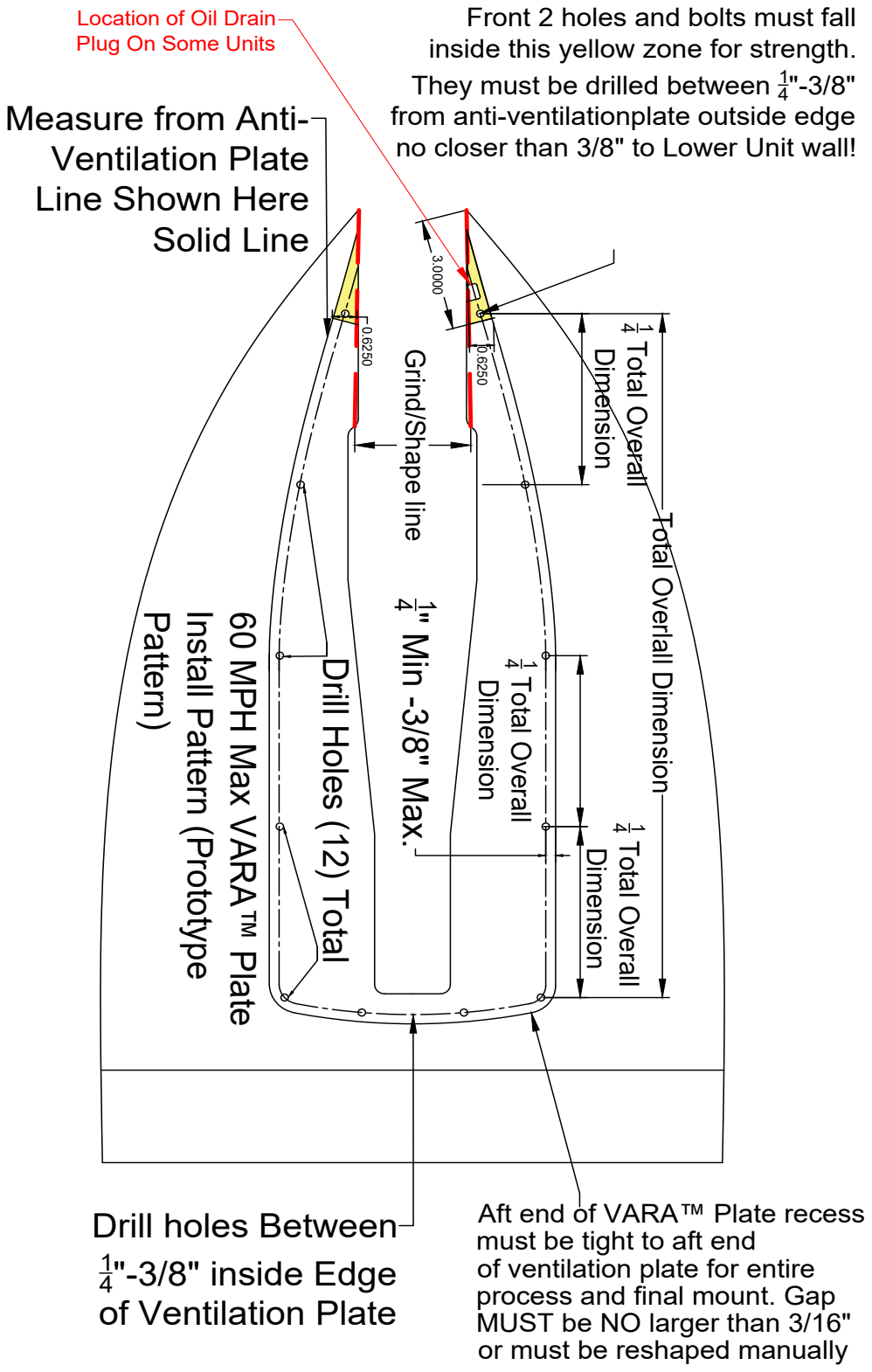


Figure 2.

Proper Fitting and Drill Hole Placement Guide for 60 MPH Max Speed



Figures 3 - 5. Example Images for Reference

Figure 3.

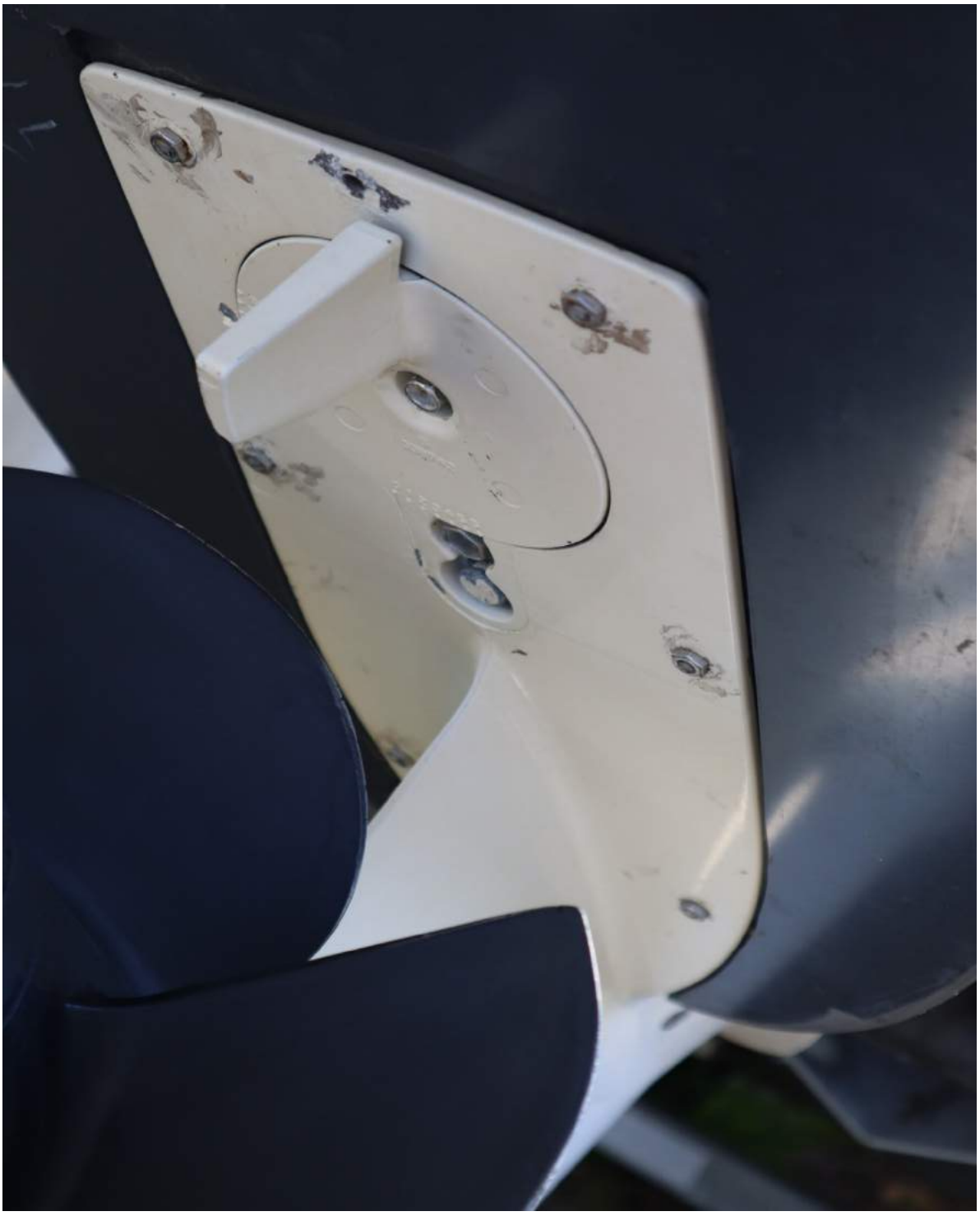
Top Side View:

The images shown depict an installation on 75 Hp E-tech motor. Note there are only six (6) bolts total. A middle aft bolt is not required but recommended if possible. For 90 Hp to 150 Hp motors, a total of nine (9) bolts is highly recommended as shown in Figure 1.

Figure 4.

Top View: Note proper bolt alignment and pattern.

Figure 5.



View from Underneath: Note all nuts and bolts are flattened and smooth. Remember to use hole punch on the thread and nut seam so the nut cannot vibrate off.