

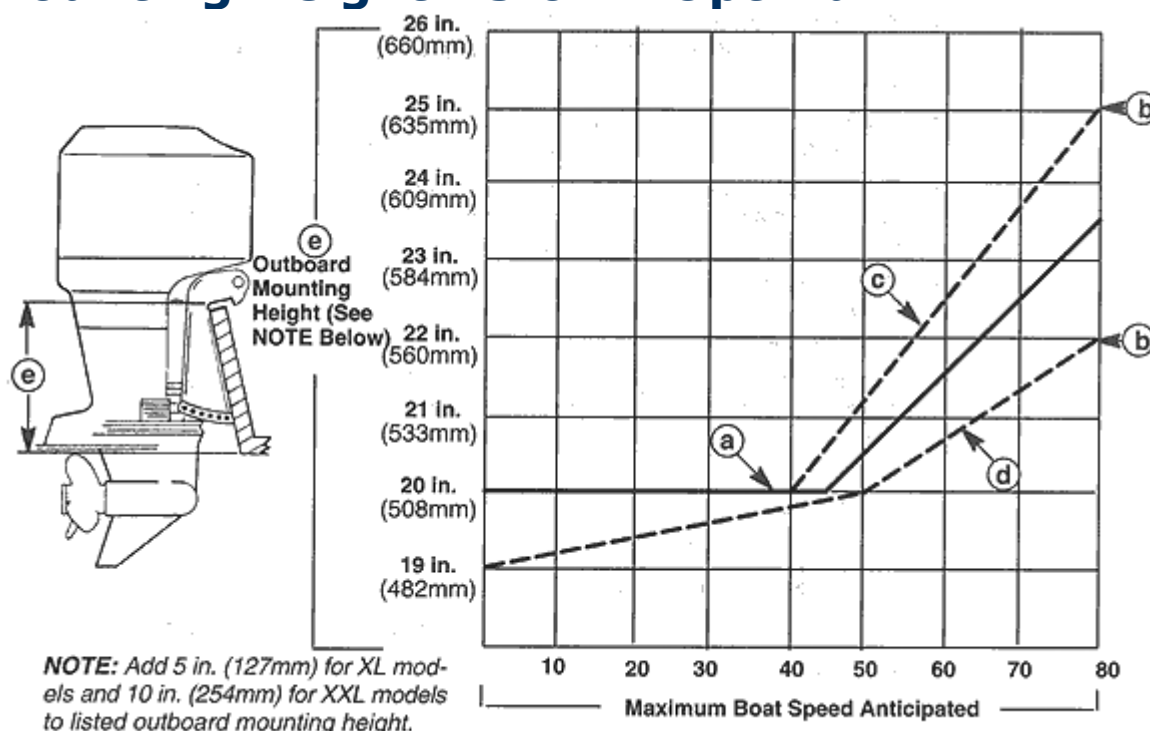
Installing an Outboard to the Boat Transom, and Motor Shaft Lengths from

Mercury Outboard Rigging technical manual 3rd edition

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5. [3.0 Litre Mounting Height Advisory Bulletin](#), includes changes in design for 2000 and up, locating centerline of boat transom, laser alignment, and drilling outboard mounting holes, securing outboard to transom, and hardware parts numbers diagram.

Determining the Recommended Outboard Mounting Height - 3.01 L OptiMax



NOTICE TO INSTALLER:

1. The outboard should be mounted high enough on the transom so that the exhaust relief hole will stay at least 1 in. (25.4 mm) above the water line when the engine is running at idle speed. This will prevent exhaust restriction.
2. The mounting height (e) of the outboard must not exceed 25in. (635 mm) for L models, 30 in. (762 mm) for XL models and 35 in. (889 mm) for XXL models. Mounting the outboard higher may cause damage to the gear case components.

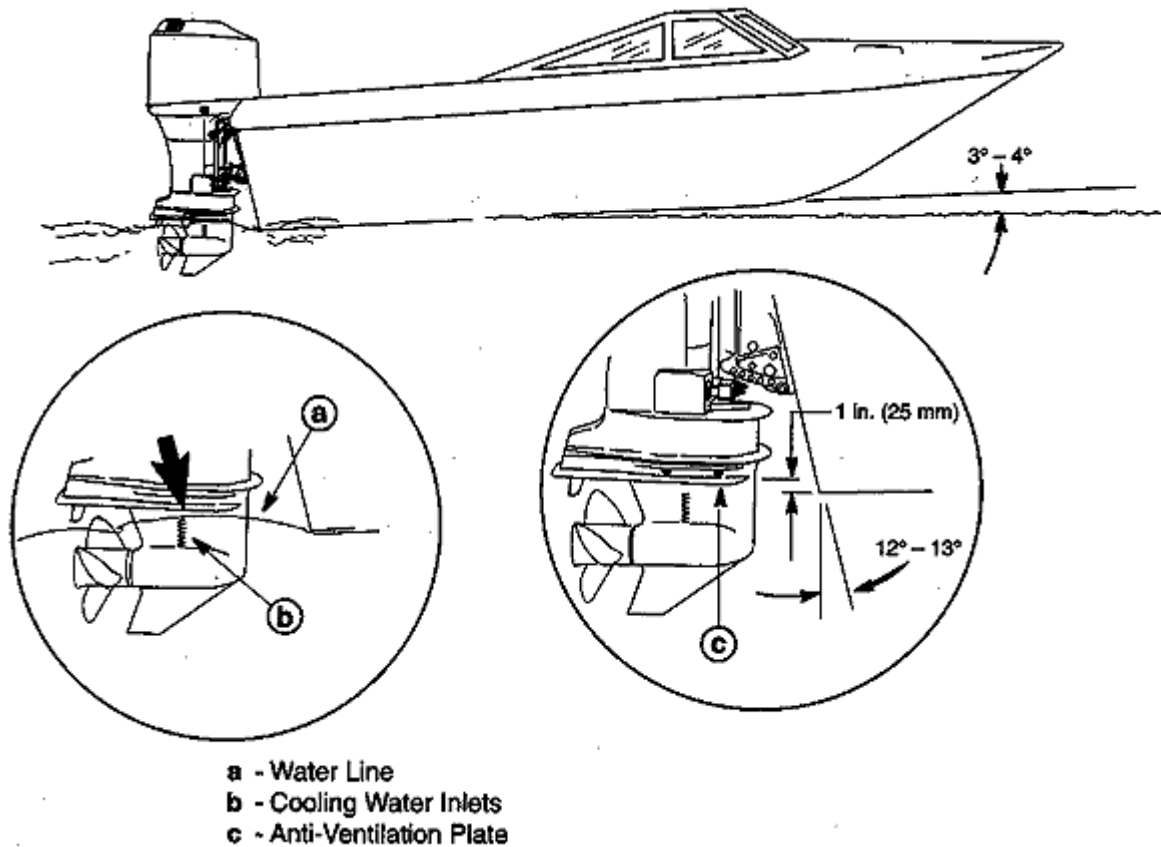
- a. The solid line (a) in the diagram above is recommended to determine the outboard mounting height, Increasing the height of the outboard generally will provide the following: 1) Less steering torque, 2) more top speed, 3) greater boat stability, but 4) will cause more prop "break loose" which may be particularly noticeable when planing off or with a heavy load.
- b. The broken line (b) in the diagram above represent the extremes of known successful outboard mounting height dimensions.
- c. The broken line (c) in the diagram above may be preferred to determine outboard mounting height dimension if maximum speed is the only objective.
- d. This broken line (d) in the above diagram may be preferred to determine outboard mounting height dimension for dual outboard installation.
- e. Height measurements (e) in the diagram above represent outboard mounting height (height of outboard transom brackets from bottom of boat transom). For heights over 22 in. (560 mm), a propeller that is designed for surfacing operation is usually preferred.

The following are general rules for the mounting of large outboards on planing type boats, **NOT for displacement type hulls**. Rules are general in nature and may vary slightly for style/type of boat and application. Anti-ventilation plate even with the bottom of the boat will be referred to as standard engine height.

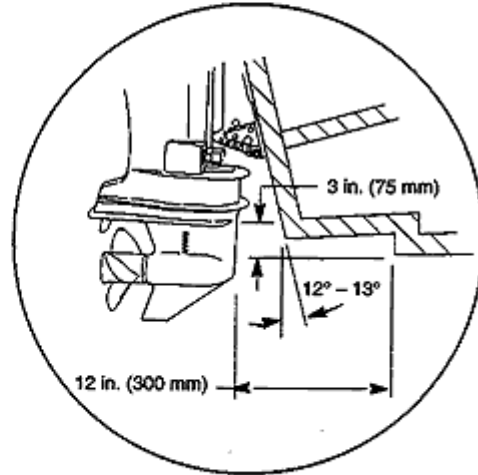
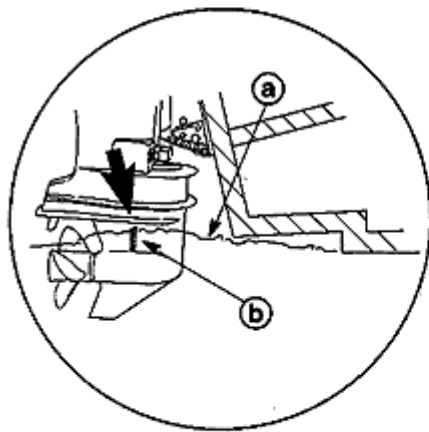
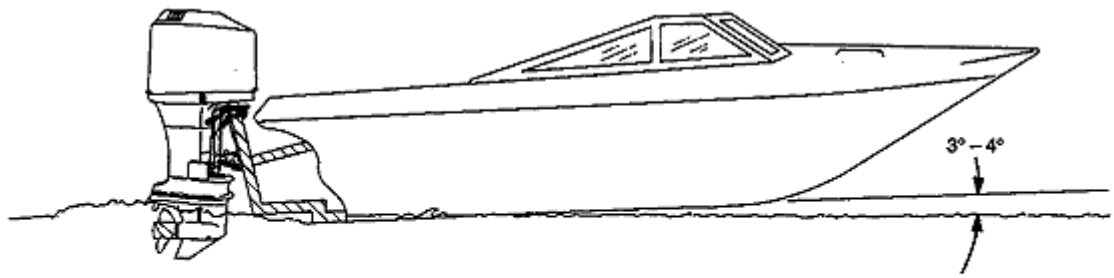
- The engine can be raised 1 in. (25 mm) above standard, for every 10 MPH (17 km/h) above 40 MPH (64 km/h) that the boat can achieve, not to exceed 5 in. (127 mm) above standard.
- For every 12 in. (305 mm) the outboard is behind the transom, or a notch in the transom, the engine can be raised 1 in. (25 mm) above standard.
- Engines using standard production gear cases should NOT be mounted with the anti-ventilation plate higher than 5 in. (127 mm) above the bottom of the boat. Refer to the Operation and Installation Manuals.
- Check and relocate hull attachments if they are the cause of air-ventilated water or if they deflect the supply of cooling water from the gear case. It is necessary to check for the problem in various degrees of turns as well as straight ahead.
- Trimming the engine beyond the point where boat attitude (bow lift) permits the maximum, wide-open-throttle speed normally has no benefit, and can cause overheating of the engine and exhaust system. See the Operations and Maintenance Manual for proper power trim operation.
- Raising the engine height may result in the following:
 - Increase the boat speed
 - Decrease in steering torque
 - Expose the lower unit water inlet holes to air causing engine overheating
 - Decrease bow lift
 - Increase time to plane boat.

Following are examples of outboard to boat mounting combinations. These, along with the general rules for mounting large outboards on planing type boat hulls, can be used as a guideline to assure adequate water supply to the engine and gearcase/powerhead durability.

Example #1 - Boat with 12-13 degree transom angle (typical of most boats) provides good bow lift when outboard is trimmed out and a top speed in the low 50 MPH (80 km/h) range. With this combination, the anti-ventilation plate runs parallel to the water line and can be mounted 1 in. (25 mm) above the boat bottom.

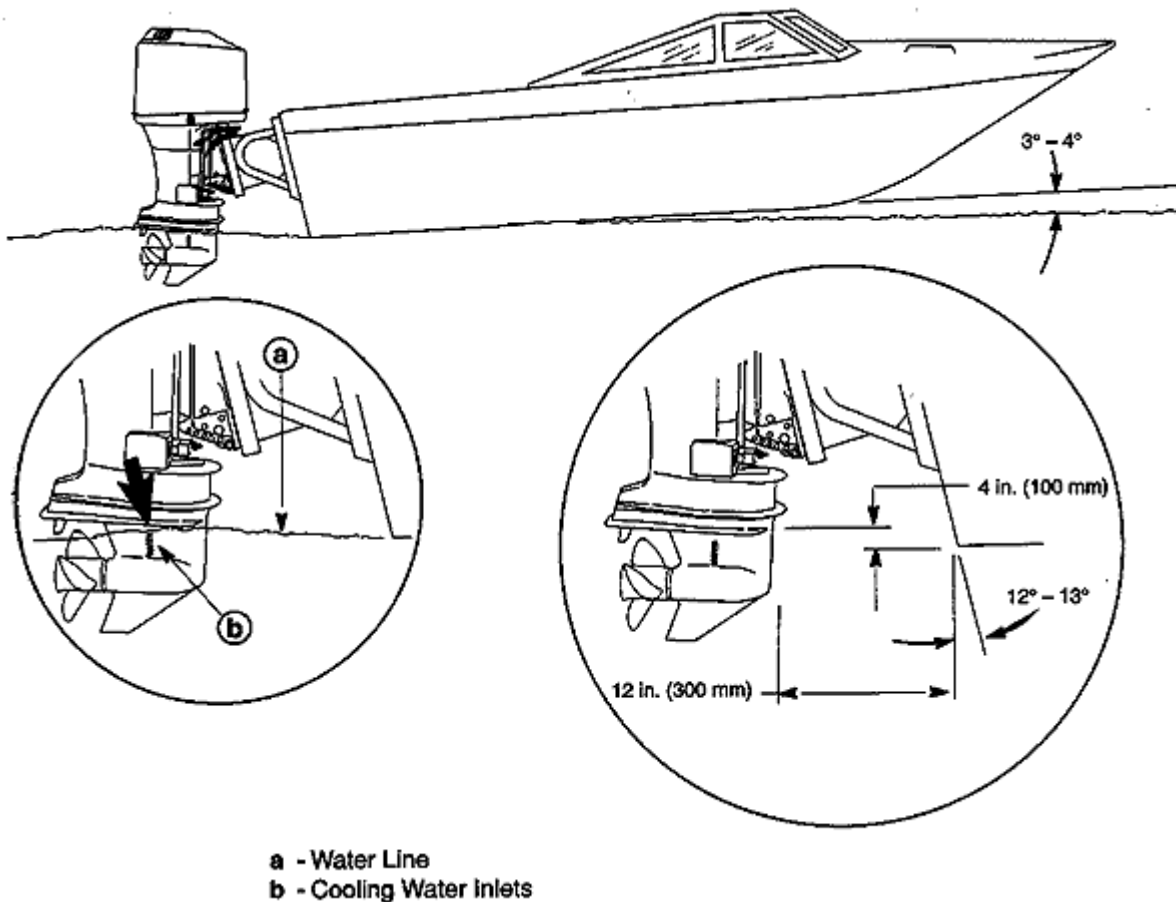


Example #2 - Boat with notched transom provides good bow lift and is capable of running in the low 60 MPH (96 km/h) range. Boat speed, along with the notched transom, allows the engine to be mounted with the anti-ventilation plate 3 in. (75 mm) above the boat bottom.

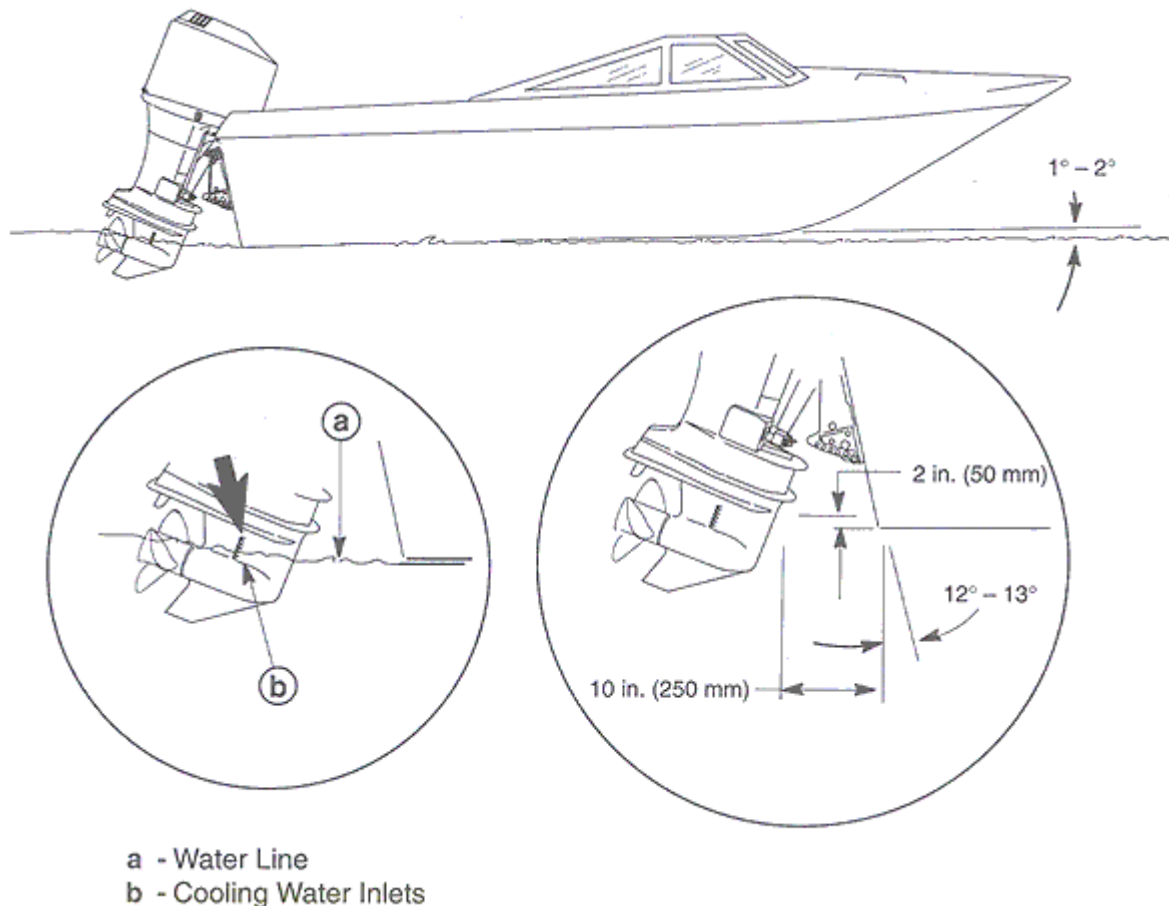


a - Water Line
b - Cooling Water Inlets

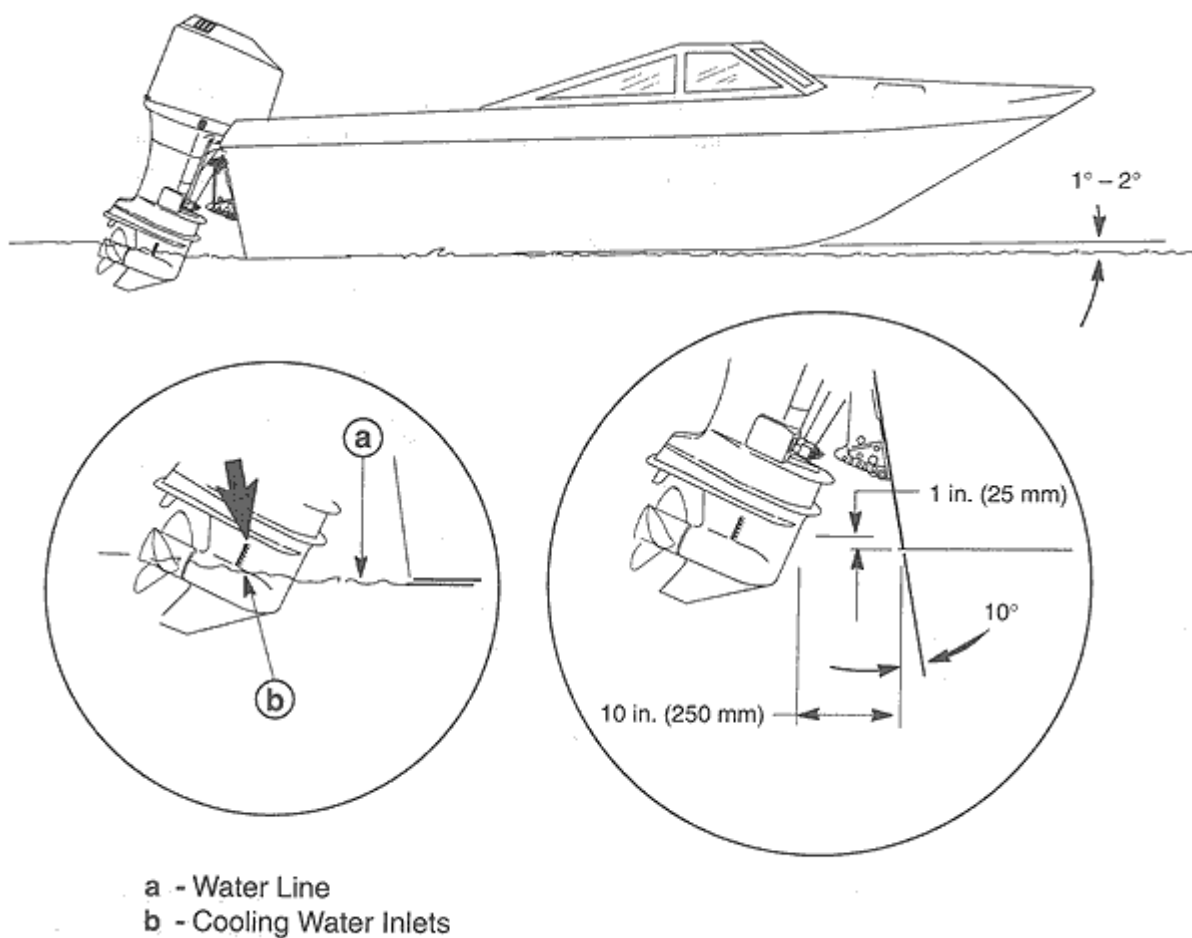
Example #3 - Boat using 12 in. (300 mm) set back plate, provides good bow lift and a top boat speed in the mid 70 MPH (113 km/h) range. In this application, the boat speed allows us to raise the engine 3 in. (75 mm). The 12 in. (300 mm) set back plate gives us another 1 additional in. (25 mm) for a total of 4 in. (100 mm) above standard height.



Example #4 - Boat with poor bow lift, in the full trim position, will allow the anti-ventilation plate to be above and at an angle to the water line. The upper water inlets are likely to draw in air causing overheating of the power head and/or exhaust system. Options would be to lower the engine, add high speed pick-up plates, limit the use of the power trim, or, where possible, move weight in the boat further aft (moving boat center of gravity further aft) to aid bow lift.

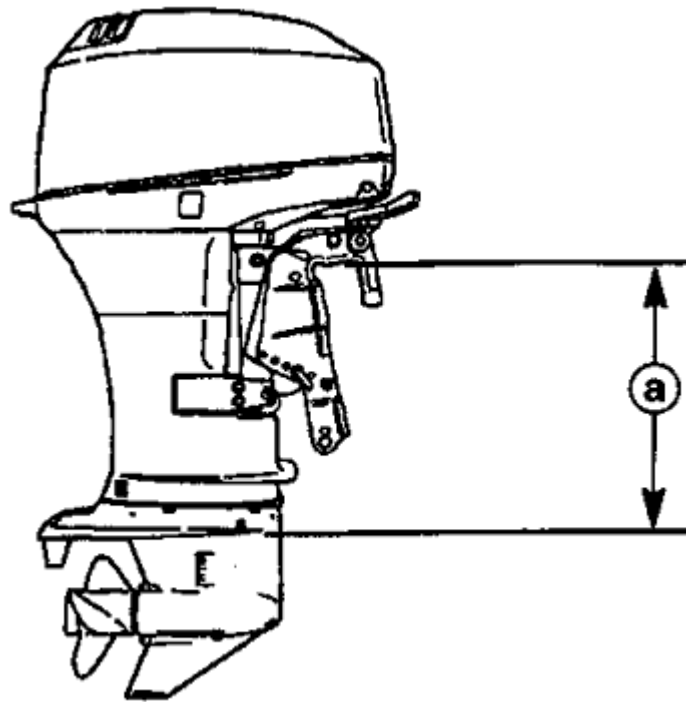


Example #5 - Boat has top speed in the low 50 MPH (80 km/h) range, with poor bow lift and low transom angle. Due to the low transom angle and poor bow lift, when the engine is fully trimmed out, the anti-ventilation plate is running above and at an extreme angle to the water line. The water inlet holes are almost completely out of the water. On this type of boat, even with the engine mounted all the way down on the transom, the engine may not receive adequate cooling. Options would be to install the high speed pick-up plates, limit the use of the trim, or, where possible, move weight in the boat further aft (moving boat center of gravity further aft) to aid bow lift. In addition, a set-back plate or jack plate may aid in the hull "lift" by changing the boat's center of gravity.



About Motor Shaft Length

- Most fresh water boats to 125 hp use 20 inch shaft length engines.
- Single V-6 bass boats use 20 inch engines.
- Single outboard salt water boats normally use 25 to 30 inch engines.
- Most dual outboard salt water boats require 25 inch engines, extended transom models use 30 inch engines.
- Boats designed for single or dual outboards need 30 inch engines when running a single engine.
- Boats using three and four outboards usually have specific requirements involved and the motor manufacture should be involved during designs, rigging and testing. Bottom design, transom angles, and load placement all play roles here.



Real Mercury/Mariner Motor Shaft Lengths

Mercury marine outboards are advertised as 15 inch (s), 20 inch (L), 22 1/2 inch (LL), 25 inch (XL), and 30 inch (XXL) shaft lengths, measured from the cavitation plate to the transom bracket.

NOTE: There are several models that are longer than the actual advertised dimension, they are:

- Mercury/Mariner 6 - 15 and Sea Pro: 15 inch is 17 3/4 inches, 20 inch is 23 1/4 inches.
- Mercury/Mariner 20 - 25 and Sea Pro: 15 inch is 17 inches, 20 inch is 22 inches.
- Mercury/Mariner 40, Mercury Classic 20: 15 inch is 16 3/4 inches.
- Mercury/Mariner 75 through 125: 20 inch (L) is 21 11/16 inches, 22 1/2 (LL) is 24 1/6 inches, 25 inch (XL) is 26 11/16 inches.

Jet Outboards

The height of the jet drive intake is **very critical** and must be mounted carefully as far as transom height for proper performance. As little as 1/8 inch can make a performance difference, especially on a non-trim model.

3.0 Litre Mounting Height Advisory Bulletin

Models Affected

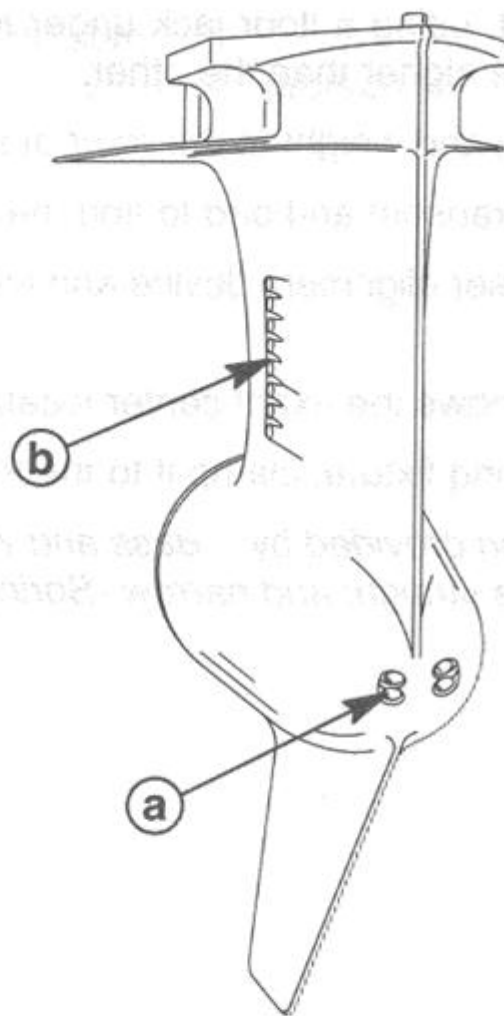
Mercury/Mariner

225/250 HP Carb/EFI S/N 0G960500 and Above

200/225 HP Optimax S/N 0G960500 and Above

The 2000 model year 3.0 Litre product will have a new lower unit with dual water inlets. This new gear case will have water inlets on the front/leading end of the torpedo, in addition to the standard side water inlets. The new design will allow for better water flow to the engine when used on stepped bottom boats, which generally create a high amount of air-ventilated water.

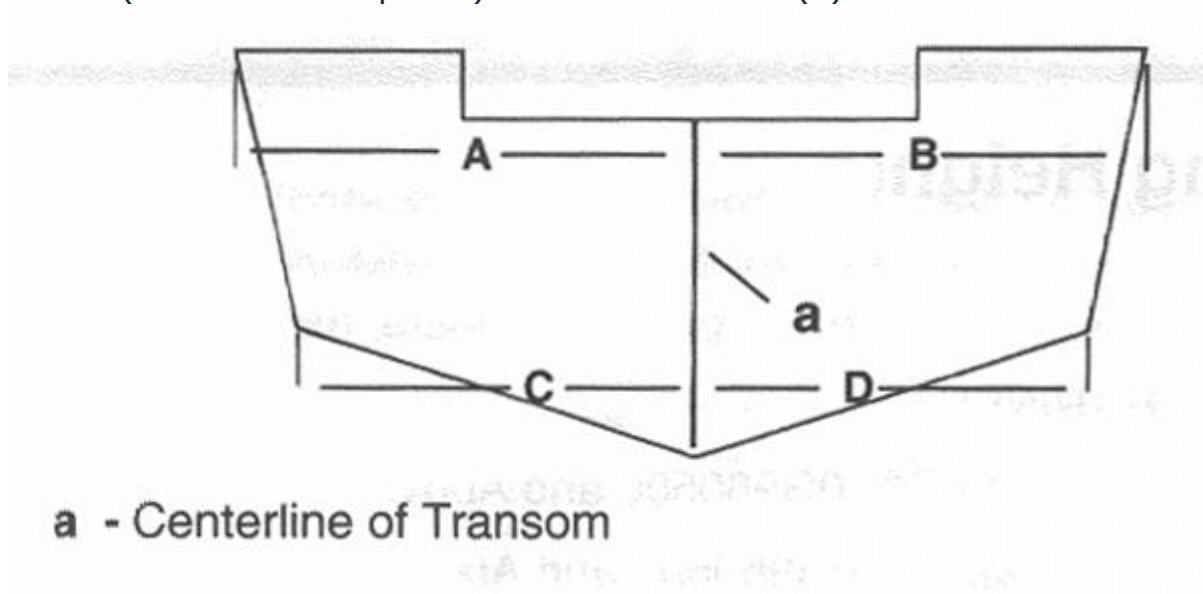
The change in gear case design does NOT change the mounting height requirements for the engine. Mounting the engine above the recommended height could cause the engine to overheat, damage to the propeller shaft and bearing carrier, and premature product failure. Damage due to mounting heights above recommendations will NOT be covered under warranty. See engine installation manual for correct mounting height.



- a** - Front water inlets
- b** - Side water inlets

Locating Centerline of Boat Transom

NOTE: Some boat manufacturers make this a simple task by scribing a centerline in the boat mold. This scribed centerline is transferred to the hull as the boat's first layer is sprayed into the mold. Locate (and mark with pencil) vertical centerline (a) of boat transom.



NOTE: Dimensions "A" & "B" and "C" & "D" are equal in length.

Laser Alignment

Laser alignment devices are similar to those used by building contractors to establish accurate measurements and guidelines for such things as ceiling installation, etc.

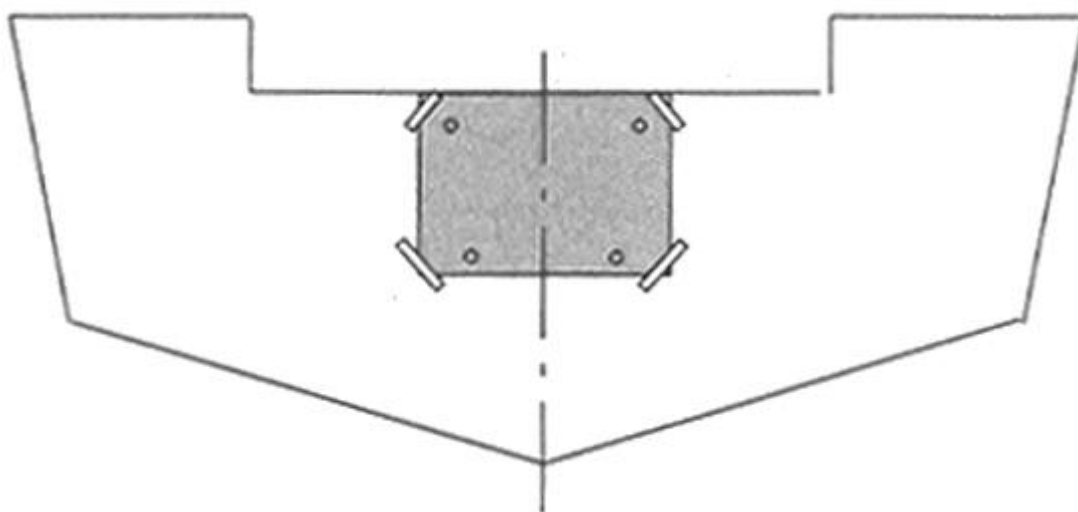
The system consists of a small portable laser unit that projects a red laser beam, which is used to find the exact center of the keel at the front of the boat, then to exact center of the pad and/or transom at the back of the boat in relation to the keel. The beam pinpoints the exact location of the engine. Typically the steps are:

1. Level the boat, using a floor jack under the trailer (to prevent getting one side of the mounting plate higher than the other).
2. Attach a string and weight to the front of the keel.
3. Measure the transom and pad to find the center line.
4. Turn on the laser alignment device and focus the beam on the string plumb at the front of the boat.
5. The red dot shows the exact center location at the rear.
6. Install the drilling fixture, clamp it to the transom, and mark/drill the motor bilt holes.

NOTE: Information provided by -- Bass and Walleye Boats, Dead Center, Lasers help fast boats keep on the straight and narrow (Spring 1994) by Monte Burch.

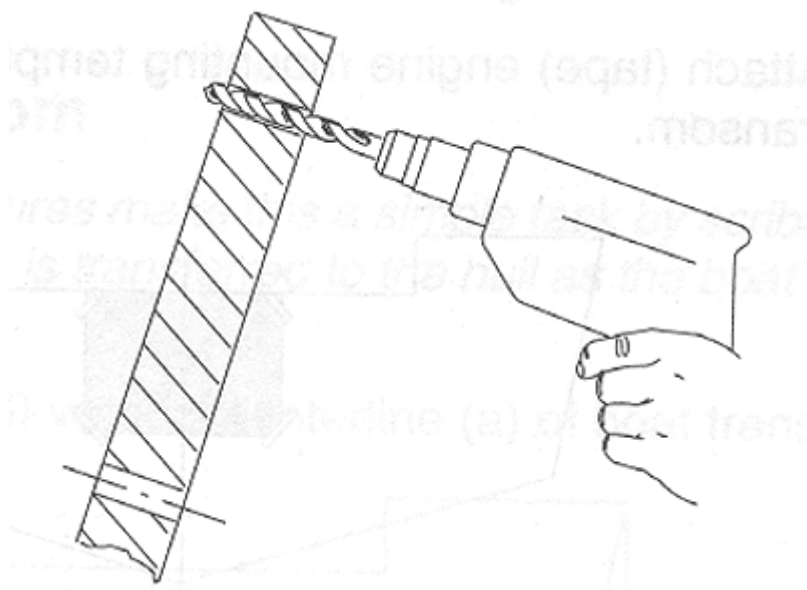
Drilling Outboard Mounting Holes

1. Attach (tape) engine mounting template (located with the installation manual) to boat transom.



IMPORTANT: If using "Transom Drilling Fixture" (part number 91-98234A2), use drill guide holes marked "A" when drilling outboard mounting holes.

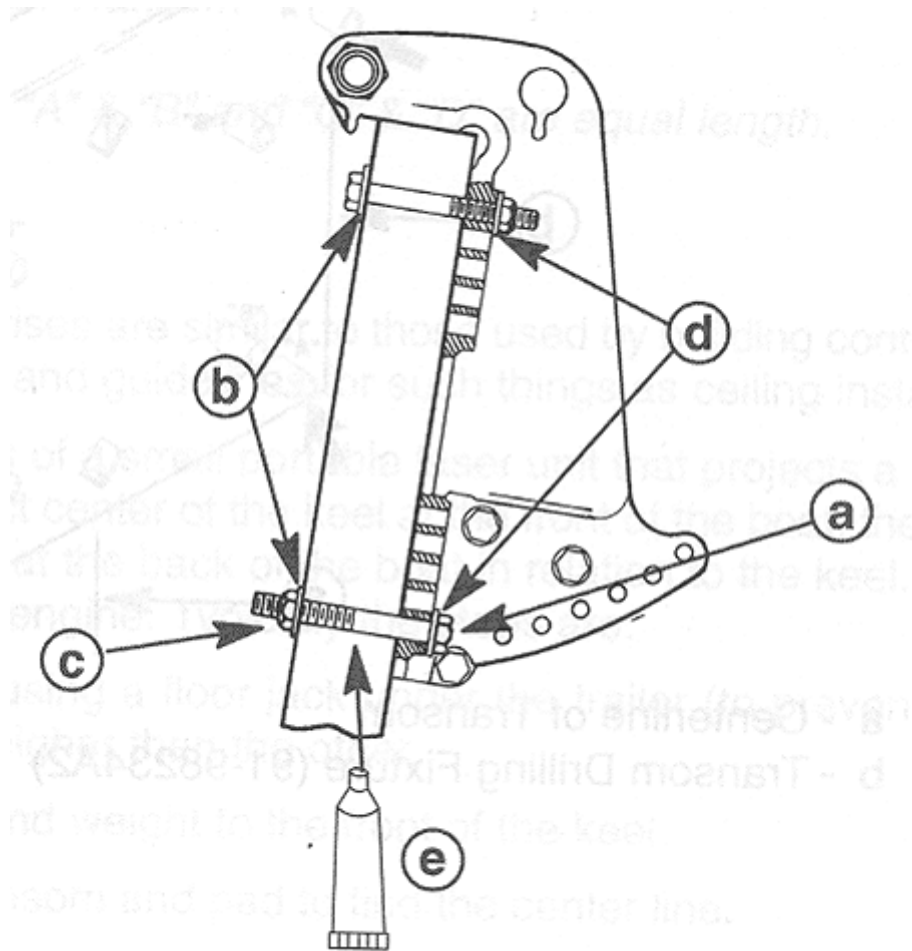
2. Mark and drill four 17/32 in. (13.5 mm) mounting holes.



Securing the Outboard to Your Transom

1. Refer to "Determining Recommended Outboard Motor Mounting Height", preceding and install outboard to the nearest recommended mounting height.

2. Fasten outboard with provided mounting hardware shown.

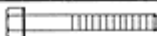


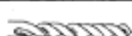



- a. - 1/2 in. Diameter Bolts (4)
- b. - Flat Washers (4)
- c. - Locknuts (4)
- d. - Flat Washers (4)
- e. - Marine Sealer - Apply to Shanks of Bolts, Not Threads



NOTE: To provide a good engine ground on aluminum boats with electric trolling motors, check with the boat manufacturer for marine grade all weather plywood use in transom. If marine grade all weather plywood is used, do not seal (insulate) upper transom bolts.


Stainless steel bolts are provided with the outboard. (Use stainless steel washers and brass self-locking nuts to retain.

NOTE: Do not use impact wrenches to tighten bolts as they can crush a transom.

Mounting Hardware Part Numbers					
Model	Mounting Bolts		Self Locking Hex Nuts	Flat Washers	Drill Size
					
6-25	10-814945	5/16x18 x 3-1/2 long	11-815848	12-67981	5/16 in. (7.9 mm)
25-40 (Short)	10-814259	1/2x20 x 4.0 long	11-91962	12-28421	17/32 in. (13.5 mm)
Top	10-826110	M10 x 100 mm long	11-40119-10	12-40023-19	3/8 in. (9.5 mm)
Bottom					
30-50 (Long)	10-814259	1/2x20 x 4.0 long	11-91962	12-28421	17/32 in. (13.5 mm)
55-60	10-814259	1/2x20 x 4.0 long	11-91962	12-28421	17/32 in. (13.5 mm)
75 and Higher	10-67755-1	1/2x20 x 4-1/2 long	11-91962	12-28421	17/32 in. (13.5 mm)

Additional Length Stainless Steel Mounting Bolts	
	
Part Number	Length
10-814259	4 in. long with 2-1/4 in. thread length
10-67755-1 (included with outboard)	4-1/2 in. long with 2-1/4 in. thread length
10-67755-2	6 in. long with 2-3/4 in. thread length

Self Locking Brass Hex Nuts (included with outboard)	Stainless Steel Flat Washers (included with outboard)
	
Part Number	Part Number
11-91962	12-28421

Waterproofing Sealant

QUICKSILVER offers P/N 92-91601-1 RTV sealer in 10 oz tube.