AeroMarine Research
TBPNews - Performance Report

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This month...

Mercury Racing 400Rs on Skater 32

Mercury Racing 400R outboards see their first re-power project.The first re-power project with Mercury Racing's 400R outboards has been completed by Grant's Signature Racing in Sarastoa, Florida.

The boat was a Skater 32 that had previously been running triple 300 hp outboards. After initial runs, the twin 400Rs matched the top speed of the former triple package with more dialing in to be done. The 6,500-pound cat topped out at 103 mph with 32-inch pitch modified Bravo I propellers... [more] [back to top]

Records tumble at Coniston Records Week

Coniston, UK - World records tumbled as the great and the good of powerboat racing descended on Coniston for one of the most special events in the sport's history.

Speed fanatics took to the water for 45th annual Coniston Powerboat Records Week, and it lived up to its billing, with 13 fastest times set on the first day alone.

The oldest racer involved, 76-year-old Brian Block, set a new national and world record of 71.34mph in his HR850 Catamaran Boat, but not before Alan Pickard set a world best time of his own, travelling at 87.06mph in his Runabout Superstock 1200 class.... [more] [back to top]

Attitude Adjustment

[How to Optimize Your Boat's Running Trim]

There are plenty of things that can affect the safe and optimum performance of your boat, and one that's often underutilized, or even misused, is correct trim.

Most outboards and stern drives now include a "power trim/tilt" feature that can change the angle of the engine (or drive unit) and propeller on the transom. Adjusting the running position of the engine/drive is called "trim adjustment", and can easily change the running attitude of the hull. Running at the best "trim" angle can improve fuel economy, increase speed, improve ride comfort, and maintain safe operation of your hull.

Weight Distribution First

Before explaining when and how to adjust the engine/drive trim angle, we should start with proper weight distribution of the boat. Prior to moving your boat from the dock/ramp or mooring, you should ensure that weight is distributed properly. Payloads such as passengers, fishing gear, coolers, extra fuel tanks, anchors, etc., should be evenly distributed laterally (side-to-side) so that the boat sits level. Any listing at rest will have an exaggerated affect on handling when the boat is at speed. You can consider moving other weights in the boat, such as batteries, permanent fuel tanks, fishing live-wells, etc. if your hull seems to lean to one side while at rest.

The same goes for fore/aft static balance. Any extreme static fore/aft balance is probably not going to work out well for you once your boat is under way. For example, a bow-down attitude can be unsafe, will steer poorly, and will take longer to plane. Stern-heavy attitude can also make it difficult for a boat to get onto plane.

How to Trim while underway

Adjusting the attitude of your hull means adjusting the trim angle of your engine/out-drive in or out from the transom. Small adjustments can have a big effect on performance and handling.

Trim adjustment is usually controlled by a switch on the console or built into the throttle control handle. Trim the engine/outdrive up (out from the transom) and the bow rises. Trim down (in to the transom) can lower the bow.

Due to the many influences on a planing hull at speed, it is often necessary to adjust trim constantly as conditions, direction or setup changes. A change in direction or locale can cause a difference in waves or wind, requiring trim readjustment. Something as simple as passengers changing position may require you to compensate by trim adjustment.

In general, trim adjustments will have the following affects on hull attitude:

Trimming In (Down) - Lowers the bow, results in quicker planing, increases wetted surface of hull, gives softer ride in rougher waves, increases steering torque to the right.

Trimming Out (Up) - Raises the bow, reduces wetted surface of

hull, increases top speed, allows more clearance in shallow waters, can cause initiation of porpoising, can cause 'harder' ride in rougher waves

Ideal or "neutral" trim means that the angle of the drive is such that the thrust generated from the propeller is parallel to the water surface – in other words, in the direction we want to go, with no lost energy.

How it Works

Small outboard motors adjust trim or "tilt" manually by relocating a pin in one of a series of holes in the mounting bracket. Power "Trim 'n' Tilt" on larger outboards and stern drives adjusts the angle of the engine or outdrive electrically or hydraulically at the touch of a switch.

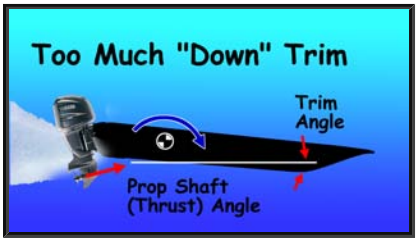
Altering the trim angle of the engine/out-drive changes the angle of propeller thrust which in turn affects the planing angle of the hull in the water. This change in propeller thrust angle causes a force or "moment" that rotates the bow up or down accordingly. Trimming "down", adjusting the propeller closer to the transom, pushes the *bows down* and raises the stern up. Trimming "up", adjusting the leg away from the transom, lowers the stern and raises the *bows up*.

Usually increasing trim angle will increase hull lift, reducing the hull's wetted surface and drag, improving efficiency and increasing speed. So, gentle adjustment of UP trim can increase speed. If the trim angle adjustment gets to the point where the hull has "too much UP trim", then propeller efficiency can reduce suddenly ("aeration", "cavitation" or "blow-out") and the resulting change in forces can require a quick reaction from the driver with DOWN trim to maintain safe control.

How to Know when You've Got it Right

The optimum trim angle of you boat depends on several factors, including water/weather conditions, hull speed, etc. The trim angle will affect the efficiency of a planing hull (which means fuel economy, top speed) and also affects that safe handling of the boat, when going in a straight line and when turning or maneuvering.

Trim the engine/outdrive up and the bow rises - too much, and the hull can porpoise or the propeller can aerate or cavitate. Down trim can lower the forward entry of the hull into waves to soften the ride - but too much and the boat can plow through the water. Finding the "best" trim for your boat in each operating situation is an exercise of experience. On some boats, it's best to use DOWN trim when starting off to get the hull to plane, and then trim UP as speed increases.



When comfortable at initial acceleration, go to planing speed, progressively trimming UP (out). This will lift some more of the hull off the water, reducing drag and increasing speed. In calm water, you may notice that steering goes light as speed increases with more UP trim. With experience you will note these subtle changes easily in your hull's behavior. If you keep on trimming UP, the propeller may eventually reach an angle where it loses grip, RPMs climb and speed decreases. This can sometimes happen suddenly, so it's best to practice in calm open waters under well controlled and safe conditions. Getting to knowing where this happens is important when adjusting trim for different sea conditions. Practice in different conditions, with different maneuvers.

When optimizing your trim angle, it's easy to see the changes in hull wetted surface by watching the rooster tail and water spray from your hull. A long, low rooster tail is usually a good sign of properly set trim angle. Sometimes a high rooster tail is a symptom of over-trimming the hull. You can also observe the location of spray on your hull to make trim adjustments. If the spray is too far forward it may be that the bow is plowing through the water, causing bow steer and poor fuel economy. If the spray is too far aft, it could mean that your bow is getting too high and excessive thrust energy is being wasted. (Performance boats are, however, designed to run at high speed with only a small bit of wetted surface aftward).

Use your gauges

A trim indicator gauge can be the most useful instrument to keep close note of how your hull trim is set. Trim gauges are especially valuable in difficult circumstances where it's not easy to perceive trim angles by the seat of your pants.

Once you have established a safe and efficient cruising trim attitude, you can fine tune it using your RPM gauge, speedometer and fuel flow gauge. Adjusting trim for more speed should show similar changes in RPM, fuel flow, and velocity. When these measures get out-of-sync (e.g.: increasing RPM but no increase in speed) it's usually a sign that you're reaching the limit of your UP trim!

Conditions Change

Changes to weight distribution, weather, waves, winds, locale and even your direction can require an adjustment to trim angle. Trim settings that were great for travel in one direction may be unsuitable when changing course. For example, when you're running into a head sea, it's best to let the bow come down and to allow the hull to carve into each wave. In a following sea you may feel better with your bows high, out of the water, to avoid "stuffing" into a wave unexpectedly.

When navigating choppy water smaller boats can have a bumpy ride if still trimmed for calm water conditions. Improve ride quality by trimming DOWN, lowering the bows and using the sharpest part of the hull to break through rather than crashing into the waves.

When travelling upwind, trimming DOWN can help minimize the tendency for the bow to launch into the air as the boat crests a new wave. Travelling down a swell, trimming UP raises the bows to help the hull recover as it encounters the back of one wave after descending the previous one.

Other Trim Adjustment methods

Engine Height Jack Plates - Jack plates give the ability to raise or lower an outboard engine, fine-tuning the drive height for maximum performance. Adjusting engine height changes the location of the propeller thrust, resulting in a change in hull trim angle. If you have a power hydraulic jack plate you can adjust engine height while under way, for varying speed requirements, water conditions or shallow water runs.

Trim Tabs - Trim tabs are a pair of independently adjustable tabs or flaps mounted on the transom that can be lowered or raised to influence hull surface area and trim angle. Trim tabs work by adjusting (usually electric/hydraulically) the tab (UP) away from the water surface or DOWN further into the water. Adjust the tabs down and the stern lifts, bows lower. Adjust them up and the stern lowers, bows rise.

Be Safe!

Practicing the combinations of throttling, maneuvering and adjusting trim angles is best done in an open area, calm water, free of other traffic. When you've got the feel of your boat in easy conditions, try the best trim settings in heavier seas and tighter turns.

Too much UP Trim - Remember that sudden and extreme boat movements can occur if your setup gets over-trimmed in the wrong conditions. With high speed and changing wind/water conditions, sometimes high trim settings can accidently lead to higher trim settings!

Wheel mounted Trim Switches - Trim adjustments can take some attention and it's always best to have both hands on the steering wheel when driving in challenging conditions. Trim switches that are located on your steering wheel or on a floor-mounted footplate are the safest setup, since it doesn't require you to take your hands off the wheel to hit a switch on the throttle or on the console.
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Video - 2013 Bill Seebold His Racing Story

On October 2nd 2013 Bill Seebold was invited to be a guest speaker to a full house at the Sunset Country Club in St. Louis Missouri. MOTO Marketing Group was asked to come by and film it at the last minutes that day and this is the final product. The sound and quality is not the greatest, but Bill's Life Long Racing Story is, so please watch and enjoy! [click for video] [back to top]

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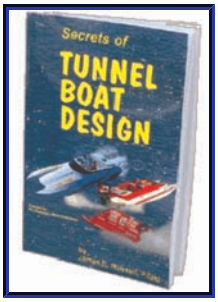

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