

# AeroMarine Research

## TBPNews - Performance Report

### Tunnel Boat Performance News #181 - Nov 15, 2016

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#### Outerlimits Building First Outboard-Powered SL41



Outerlimits Offshore Powerboats is building its first outboard-powered version of its SL41 performance V-bottom for a longtime customer of the manufacturer, Dave Burgess of Michigan. It will have a trio of **Mercury Racing Verado 400R** outboards on the transom.

"We were thinking about it in-house, just putting together a rendering when Dave called," says Dan Kleitz, general manager at Outerlimits. "He didn't want a center console. He wanted a performance

boat, and we came together and built this thing."

The outboard version of the SL41 will take advantage of the absence of the sterndrives, creating a cockpit with seating for seven behind a low-profile wraparound windshield that will keep the elements from affecting the passengers....

Kleitz says the boat will have a "signature contemporary Outerlimits back end." He thinks that if the boat runs well, the company will get more interest in outboard-powered models. "A lot of the guys buying the center consoles are getting them because of the outboards," he explains. "These guys aren't fishing. If we can give them a cool-looking performance boat that runs on outboards, we think we'll have a home run."

As reported by speedonthewater.com, Waves and Wheels in Missouri will do the Burgess' SL41 interior, and Stephen Miles Design will handle the graphics.

"In addition to the elongated cockpit, it's going to have the really cool, contemporary back-end design that's an Outerlimits signature," says Kleitz, the company's production manager.

The boat runs 116 mph with Mercury Racing HP 700 SCis and NXT 6 drives, according to Kleitz. He expects it to top 100 mph with the trio of Verado 400R outboards. If you look at

power-to-weight ratios, the outboards have the advantage. The Mercury Racing website lists the sterndrive weight at 1,548 pounds each for a total of 3,096 pounds. Divide that by 1,400 hp and you get 2.2 pounds per horsepower. The Verado 400R's weight is 668 pounds. Triple that and you get 2,004 pounds. Divide that by 1,200 and you're down to 1.67 pounds per horsepower. Because of the SL41's 9-foot beam, going with four Verado 400Rs is not an option.

Kleitz hopes the boat will be finished in the time for the week of the Super Boat International Offshore World Championships in Key West, Florida, in November.better."

Read more at [BoatingMag.com](http://BoatingMag.com)  
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## Renato 'Sonny' Levi – Father of Modern Powerboat Design – Dies



The designs of Renato 'Sonny' Levi dominated powerboat sport both offshore and inshore circuit racing in the latter half of the 20th century.

The 90-year-old died peacefully at his home on the Isle of Wight on 12 November, 2016.

Born in Karachi in 1926, he studied in France and India before joining his father's boatyard in Bombay.

However, it was his victory in the Daily Express Cowes-Torquay offshore powerboat race in 1963 that brought his name to prominence as a successful designer.

While American Ray Hunt was developing the battened deep vee hull, Sonny was solving an entirely different problem. An approach had been made by the Indian Government Fisheries Department for a hull which could be launched and retrieved in surf on an open beach.

Sonny found his new vee hull would provide the answer. Little did he know that this configuration would last a lifetime in his career as a naval architect.



Vee hulls may have dominated his later designs, but the Levi brand without doubt launched what was to become known as the 'Delta' configuration.

His long relatively narrow hulls were often given the wedge shape of a delta dart and this was to become his trademark, particularly in the area of high performance racing craft.

This distinct shape is easily recognised in the 1966 36ft (10.97m) offshore contender, Surfury.

While the Levi brand can be seen in a huge number of designs perhaps Sonny will be best remembered for this particular racer – an example

of a perfect high speed monohull capable of performing well in both calm and rough sea conditions.

During the mid-sixties to early 70s his designs began dominating other areas of powerboat racing. His narrow monohulls built by Melly and Merryfield for circuit racing were virtually unbeatable, but success was further confirmed in 1965 when he designed the first monohull offshore racer for the smaller Class III sub-division – a growing group on the British offshore scene at that time.

Another less publicised area of development was his famous 'Step Drive' surface propeller

transmission system. The first Italian built Drago using the Step Drive proved a huge success. At 42ft (13m) and with only 500hp of diesel power, it achieved over 50 knots and hence at that time became the world's fastest production pleasure cruiser.

However, among his personal achievements, and one which came about through his long history of milestones in design, has to be Richard Branson's Virgin Atlantic Challenger II which successfully broke the record for crossing the Atlantic Ocean in 1986.

Its success not only reflects Sonny's enormous ability as designer of revolutionary high speed craft it also proved his forward thinking with transmission systems. This was proved with the Levi Drive Unit, the next generation of the Step Drive, which powered the 37 ton monster across the Atlantic at a record average of 41.5 knots.

His great contribution to design and innovation was later recognised by his election as a Royal Designer for Industry, the highest Italian accolade in engineering, followed last September by an Honorary degree from the University of Genoa.

See more at: [Yachting & Boating World](#)

Read more about Sonny Levi's designs in ["Secrets of Tunnel Boat Design"](#) book.

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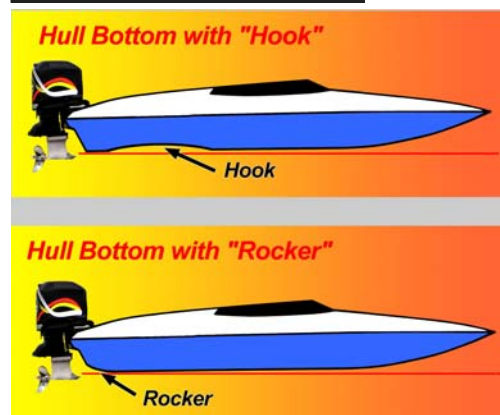
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## 'Hook & Rocker'

*by Jim Russell*

Sometimes a boat can "mature" over the years, developing undesirable hull lines that can really affect performance. Performance powerboat bottom conditions known as "hook" and "rocker" are examples that can scrub speed and cause handling issues such as "porpoising" and "chine walk". Let's have a closer look at hook and rocker, the problems they can cause and how to correct them.

### What is Hook and Rocker?



For maximum speed and optimum handling a performance boat bottom should normally be as smooth, straight and flat as possible - especially in the region where it has most contact with the water. It should be especially straight and true nearest to the transom and in the fore and aft direction.

It is worth noting that in a displacement or non-planing hulls, the bottom is often curved by design ("rocker") all the way from bow to stern, in order to minimize wave drag. This is not normally the case for high performance (planing) hulls that benefit from optimized lift and drag that comes from straight, flat planing surfaces.

**Bottom Hook** - a hull bottom is said to have a "hook" if it is concave in the fore and aft direction - that is, the bottom is "dished" up from the transom when viewed from below. When a boat is planing, this causes more lift on the bottom near the transom causing a 'bow-down' condition. This usually increases the wetted surface, increases drag and reduces boat speed and can lead to the onset of porpoising....

The effects of a "hook" are to cause the hull to run at a reduced (more flat) trim angle. This can cause running surfaces to be excessively wetted. In severe cases the boat can feel as though it is being sucked into the water. The "hook" can occur in any location on the bottom, but causes more noticeable symptoms when it is located further aftward. When located near the transom the "hook" can act like a large, inefficient trim tab. Any of these



conditions usually result in a loss of performance and irregular handling.

Bottom "hook" can be caused by warping or shrinking of laminate on fibreglass/carbon hulls, by distortion due to insufficient structural members in the original design, or by poor tooling/mould design/fabrication. A "hook" can be frequently caused by insufficient support of the boat or

support that is located too far forward during storage or while on a trailer.

**Bottom Rocker** - A boat has a rocker if the bottom immediately forward of the transom curves upward - that is, the bottom is convex in the fore/aft direction when viewed from below. Bottom "rocker" is the opposite condition of "hook", and undesirable "hook" usually occurs less frequently.

A boat with a "rocker" usually causes a "bow-up" condition and can demonstrate a strong tendency to initiate porpoise. A similar effect will result from "rounding" the trailing bottom edge at the transom. In more extreme cases or at high speed, this can be an unpredictable condition and even potentially dangerous.

Bottom "rocker" can be caused by poor manufacturing methods or by deterioration of the keel strength during storage or through time. Poor tooling/mold design/fabrication can also be a cause of unwanted "rocker".

**Straighten up** - Both "hook" and "rocker" are usually undesirable conditions in most performance powerboat applications. As speed increases, the condition becomes even more enhanced. Even very small conditions can have a dramatic effects on performance, but can be corrected.

Note that if your "hook" or "rocker" is a major deformation or is caused by structural damage or insufficient structural support of the bottom in the original hull design, then you may have a bigger job that your local boat repair shop might be best helping with.

**Here's what you can do to cure your "hook" or "rocker" conditions.**

- Inspect the hull surfaces for distortion. If you observe surface variations, check for structural damage inside the hull. Any low spots need to be filled and gel coated until completely smooth and true.
- Use a long metal straightedge, set lengthwise on the hull bottom, to look for 'light' between the edge and the hull surface. This will show you the variances that may have developed through aging or damage to your hull.
- If the "hook" or "rocker" is caused by structural failure, then you'll need to repair and straighten the faulty stringers, beams or other structural members properly. (This might sometimes require your local boat repair shop.)
- Every 'dip', 'hump', 'valley', hook, wave, or other imperfection should be faired out, filled and gel coated until you have a perfectly straight, true and perfectly flat running surface.

**Hook & Rocker by Design**

Be aware that some performance boats are designed and manufactured purposely with a "hook" (recessed area in the bottom); or a "rocker", (raised area on the aftward hull running surface). Contact the dealer or manufacturer to see if there are any design features that you shouldn't disturb.

High performance hulls usually have flat, straight bottom surfaces. However, sometimes bottom "hook" and "rocker" can also be used to affect trim when incorporated during design/construction by experienced designers. Most planing hulls are straight at the aftmost surfaces, but on some hulls, a slight curvature is present. If you look along the length of your hull bottom from amidships toward the stern, you may note a slight concavity (hook) or convexity (rocker), which create rise or drop at the stern respectively, enabling the use of smaller trim-control devices.

For example, hulls that require substantial 'bow lift' are sometimes compensated by adding



"rocker" near the transom - this will produce a bow lift force on the boat. Some boats that need 'stern-lift' can employ a "hook" at the trailing edge – this will produce an aft lift/bow down force on the boat.

Read more at [aeromarineresearch.com](http://aeromarineresearch.com)

[Note: Do you have any of your own questions on performance hull design? Send your question or story to <mailto:jimboat@aeromarineresearch.com?subject=TBPNews> ]

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## Video - High Speed ModVP Crash

...from [ScreamandFly.com](http://ScreamandFly.com) members.

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## NEW TBDP/VBDP Ver 8.6 software release!



See the newest Version 8.6 "[Tunnel Boat Design Program](#)" and "[Vee Boat Design Program](#)" software.

*"The best TBDP/VBDP release ever!" - Dozens of new features, enhanced results. Performance optimization, speed prediction, dynamic stability analysis, porpoising analysis, acceleration, elapsed time, and allot more!*

*"TBDP/VBDP software does not use 'factors' or 'estimates' - it analyzes each hull design & setup uniquely using first-principle algorithms build and*

*tested ONLY for high-performance tunnel boats and vee hulls."*



See your hull's performance results throughout the full operating velocity range. Easy [Auto 1-2-3 Performance Wizard](#). [see [demonstration video here](#)]. Now Vee hull and Tunnel hull design in same software package.

Version 8.6 has NEW screen layouts, NEW input variables, more performance analysis, output data/graphics, more reporting. Also includes the NEW 2016 Motor Wizard update with over 2250 OEM outboard and inboard engine choices. NEW input variables and NEW 5-screen input format. Performance results with 500+ performance data points and 50+ trending graphs showing full velocity range. Animated 3D Chart display for all Lift/Drag component contributions through Velocity range. And lot's more!!

See ALL the TBDP/VBDP [features](#), [screen samples](#) and '[how-it-works](#)'!

See some of the [new update features here](#), and all the high performance [TBDP/VBDP features here](#).

See more at [AeroMarine Research](http://AeroMarine Research)

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See 13th Edition ["Secrets of Tunnel Boat Design" book](#) (ISBN# 1-894933-30-3)

See 4th Edition ["Secrets of Propeller Design" book](#) (ISBN# ISBN# 0-9780586-0-7)

Review: [TBDP V8 at Scream & Fly magazine](#). [*"Tunnel Boat/Vee Boat Design Software is the very best and most comprehensive performance evaluation tool available. It has been evaluated by Scream And Fly, and has proven to be extremely accurate and easy to use. Version 8.4 is the most robust yet"* - [Scream and Fly mag, March 2015](#)]

Get the new [TBDP/VBDP software!](#)

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