Dear Students, Alumni, and Friends,

Seasons greetings from the Westlawn crew. We hope your holiday is filled with warm friendships and wonderful memories....and for the new year, fair winds and following seas.

Norm

Norman Nudelman, Editor
nnudelman@abycinc.org

Starting in January 2007, The Westlawn Institute of Marine Technology is pleased to announce that it has arranged to provide financial aid to students enrolled in Westlawn programs. The financial-aid package offers students two options for tuition financing. With interest rates from 3% to 9%, students now have the flexibility to choose the payment plan that best meets their needs. U.S. students can now enroll for as little as $395, with monthly payments as low as $141.60. Students moving on from Module 1 to further modules can continue to use TFC financing, rolling over any balance due as they progress in their study.

This tuition-financing program is available through TFC Credit Corporation, www.tfccredit.com, which has been financing student tuition for over 35 years. In that time, TFC has financed over 250,000 students at over 1,500 schools. With full-service operation centers in both New York and San Francisco, TFC Credit Corporation is a leader in education-financing.

Westlawn director Dave Gerr stated, “Our goal is to keep Westlawn education as affordable as possible. Using TFC tuition financing, we are able to reduce our students' payments to levels that were last offered in 1980s. Though Westlawn—like any reputable school—never guarantees jobs, we have consistently had many more positions listed on our job board than our graduates are able to fill. We need to encourage more students to enroll and complete the course to satisfy industry demand.”

Download, Westlawn’s catalog and enrollment forms, from the Westlawn website, to read complete details of the tuition financing through TFC Credit, at Westlawn. Click here for enrollment forms. Click here for the Westlawn catalog.

Do You . . . Know it All?

Want to see how much you know? Want to show everyone else how much you know? The first three people to submit the correct answer to the following question will win a Westlawn T-shirt and cap, and will also receive a Know It All certificate. The answer and winners to be published in the next issue of The Masthead:

If you're not already a subscriber, Click Here to Sign up for our Free Email Newsletter and receive your very own copy next time.
We are pleased to announce that Island Packet Yachts has funded a new scholarship for current Westlawn students. Having also sponsored the Westlawn/Cruising World design competition, Island Packet’s president, Bob Johnson, has offered additional support for Westlawn students to help them along in their studies.

The Island Packet Scholarship will be awarded to all Westlawn students who move on to enroll in Module 2 of the four-module Yacht Design Program. Students moving from Yacht Design Lite into Module 2 also qualify. Students will receive $250 tuition credit when they enroll in Module 2, and must have maintained an 85% grade-point average or higher. The scholarship becomes available for students enrolling after September 1, 2007. It cannot be applied retroactively. The Island Packet Scholarship will remain available to all qualifying Westlawn students, until the sponsorship funds are expended.

Bob Johnson, of Island Packet said, “We really look forward to being able to assist Westlawn students who are doing well in the course. Having had a Westlawn graduate on our design team for many years, we know how important it is to encourage students to stick with their work and continue on to get their Westlawn diploma.”

“Island Packet’s generous support for Westlawn students is invaluable,” stated Westlawn director Dave Gerr, “This kind of encouragement and additional recognition from the industry, makes a huge difference.”

Students wanting more information on career training loans and Island Packet Scholarships, should contact Westlawn student services coordinator, Patti Schulte, email: pschulte@abycinc.org.

Westlawn Grad Builds His Final Exam

Westlawn Graduate, Scott McClintock, built the sailboat that he designed for his final exam design thesis. It is an interesting and innovative design and his comments and photos of the completed boat make interesting and instructive reading. We’ll be looking forward to new developments from Scott.

“This boat was inspired by the permanent need for me to own a trailerable boat and the desire to have a truly capable vessel. I started Westlawn in 1992 and immediately began thinking of the ultimate trailerable sailboat. The design gradually grew in length and was once 42 foot overall but with additional consideration, 40 feet seemed more appropriate. In 1993, I began a corporate tour of the country, traveling to LA, Detroit, and Chicago during which time I participated in a lot of keelboat racing and will never forget our NA40 being overtaken once on a close spinnaker reach by a J105 on an even hotter wind angle. When I realized this boat displaced less than 8,000 lb., it became an inspiration in my work toward the ultimate trailerable sailboat. This much weight could be towed behind a pick-up truck, and J105’s are transported this way from time to time. However, with a fixed keel, 11.5-ft. beam and a keel-stepped mast, this is no small operation requiring cranes and travel-lifts and permits for every state transited. I was after non-permit towing and ramp-launching without outside mechanical help.

The result is what you see in the photos. The beam is 8 ft. 5 in. and with the keel up she ramp launches like a 40-ft. cigarette. A couple of taps on the brakes and she rolls right off. The keel is powered down via a 1-in. dia. stainless screw jack with 5:1 gearing. I use my 1/2-in. drive DeWalt drill and the inverter but one could set up a permanent gear motor with limit switches, etc. It takes about 3 amp hours to lower and about 8 amp hours to raise the keel. The mast can be stepped by one person and I have done it several times now alone and it is set up with complete redundancy. It’s better done with an assistant for maximum safety. The mast weighs about 200 lb. and remains bolted to the mast-step with all halyards, rigging, and wiring still attached even during transport. Upon hoisting, all the shrouds re-tension just as the mast comes fully upright. This permits the boat to be rigged for launching very easily and quickly. We are doing this in about 20 minutes and I think we can get this down to about 10 minutes with practice. I have applied for patent for parts of the mast raising system.

I tow this boat with a 1/2-ton Chevy truck but 3/4-ton would be better as the whole rig weighs in excess of 10,000 lb. The gooseneck trailer really makes towing nice. There is

(continued on page 3)
Grad. Builds his Final Exam  (continued from page 2)

absolutely no sway and no being blown off the road by semis. With the narrow beam, my normal mirrors provide visibility aft just over the trailer fenders and under the bilge. It does not really seem that big in the rear-view mirror but it is long—almost 65 ft. overall—and you have to stay aware of the mast overhang in city driving. So, with a boat like this you can go anywhere in the country and launch and sail where there is an adequate ramp and depth. When done sailing, you can tow the vessel home and park it in any RV space. I store Heat Wave on my own property for free.

With the continuing loss of marina space, I believe there will quickly develop a real growth market for trailerable keelboats like this, provided they are easy to tow and launch and are capable on the water. We have engineered the towing, rigging, launching part so the other question is how does she sail. Well, in early sea trials she is sailing very close to her VPP and has outstanding manners. The helm is very light and in a gust she just heels over and accelerates without much weather helm at all. We've had drifting conditions to about 12 knots and she'll reach at just less than wind speed up to about 8 knots and goes to weather at about 35 degrees true. This is very preliminary but quite encouraging. The beating wind angle is better than VPP but some improvement here was expected given the LPP/VPP limitations on predicting keel lift efficiency. The jib is self-tacking and we are developing a mast-head genny to be flown from the spinnaker gear. This will be a big improvement over the blade in light-air beating and I am told will be good for reaching as well. I can't wait!

The plan now is to tow Heat Wave to various point to point races around the country to generate interest in the concept by showing that she can be towed, rigged and launched easily, really quite easily and that she performs nicely on the water. I would really like to get someone like Gerry Douglas on board for a sail as I think he will be surprised at how well she performs and he may see the potential for a line of Catalina boats that are trailerable. Once again, they would need to be truly trailerable and I think I can help them with that area. This design will be followed with a blue water boat of similar proportions but heavier and shoal draft. Then I plan a racer that will be like a 40-ft. TP52 but narrow enough to be fully trailerable. The taller rig on this design will require new engineering for the mast system, but nothing else should be that challenging.

For more information on Heat Wave, contact Scott McClintock at rohondo@aol.com.

Boat U.S. offers advice on ethanol fuel, winterizing

Most boaters now know that E-10 gasoline contains 10% ethanol and that this fuel can cause several serious problems to engines and fuel tanks. One problem is that E-10 fuel is hydrophilic and thus attracts more water than gasoline blends that contained non-alcohol oxygenating agents such as MTBE (Methyl Tertiary-Butyl Ether) which is now illegal. E-10 fuel increases the risk of phase separation in which the fuel and the absorbed water separate into two layers with the water layer lodging at the bottom of the tank where it can be sucked into the engine through the fuel line. Once this happens, the engine might not run and internal damage can occur.

Boat U.S. advises that when winterizing a boat it is best to top off a boat's fuel tanks to about 95 percent full, thus limiting the flow of air in and out of the vent holes in the fuel cap. This will limit the possibility of condensation adding water to the fuel.

The other serious problem caused by E-10 is that ethanol reacts with fiberglass. This can cause fiberglass tanks deteriorate and fail. The only remedy for this is to replace the tank with a non reactive material such as aluminum. This tank failure problem is most common in boats built before the mid 1980s.

Source: Soundings Trade Only Today 10/18/07
Continuing Ed. - Boat Interior Design Course
Distance Ed. Course for Marine Industry Pros

Newly Revised and expanded…..
Interior Design Methods for Yacht Design and the Boatbuilding Industry (ID 201)

Interiors Design Methods (ID 201) meets a critical need within the marine industry for de-tailed, updated instruction on the disciplines of boat interior design. Among key design is-sues cited are physical access, storage, stairway and lighting design, berth, galley, dining and head layouts. What distinguishes the accompanying text from others is that the course writer never loses sight of physical imperatives—wave motion, heeling, drainage, ventilation and vessel structure—as factors in determining a boat’s interior spaces.

This course offers a comprehensive review of ergonomic and aesthetic considerations in boat interior design, general arrangement, and layout, with a specific focus on design implic-a-tions of the latest manufacturing materials, methods and structures.

Click Here for more details and enrollment information on Westlawn’s many continuing-education courses.
Click Here to learn about Corporate Multiple-Enrollment Discounts.

ABYC Courses and Schedule for 2008

The ABYC Education Department has been providing industry certifications, factory training, high school and college curriculum and industry seminars for over 15 years. They are providing the marine industry with the skilled workers required to build and maintain modern recreational water craft.

ABYC is currently scheduling on-site factory training for 2008. Please call ABYC for custom tailored, flat rate, instruction by top industry trainers at your facility (410-990-4460, Ext. 31).

The Marine Certification Program developed by ABYC with “NOCTI Certification” has proven to be the industry standard. We continue to provide the “Standard” of marine education and training throughout the country and throughout the year.

For course dates and descriptions Click Here

We Get E-Mail
Letters to the Editor……

We received this E-Mail from Robert Johnson, President of Island Packet Yachts, with regard to Dave Gerr’s technical article on stability in the September 2007 issue of The Masthead

August 29, 2007

Hi Dave,
I enjoyed issue 3 of The Masthead…very “slick” (in the best sense).

I’d like to comment on some of your excellent discussion on stability. I’ve had a long running personal “mission” to make sure that anyone using the Capsize Screen Number (CSN) to evaluate any vessel’s stability characteristics understands, as you have stated, that “it doesn’t mean much by itself”. It is my considered opinion that “it doesn’t mean much”, period, and in fact is, at best, a meaningless stability evaluation, and, at worst, a MISLEADING sta-bility assessment. As you know, the CSN does not consider any aspect of a vessel’s VCG location, yielding identical values for any variety of vessels with the same beam and displacement. The best example of this shortcoming is imagining two versions of a given de-sign, identical otherwise than one has a deep fin keel with all ballast in a bulb at the bottom of the keel and the other has the same amount of ballast all in-tegral in the canoe body hull (with a daggerboard, for example). Both would have an identical CSN but with a very different AVS. In fact, the ballast could be mounted at the masthead and the CSN would not change.

I am sensitive to the use of the CSN for stability evaluation as we (IPY) have been unfairly criticized by “informed judges” in years past for some of our designs having a CSN of around 2.0

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The Masthead

(continued from Page 4)“dangerously high” as stated by one “expert” who I shall not mention, when, in fact, all had an AVS well over 130 degrees.

The CSN method of stability “screening” was created by a USYRU and SNAME 1983 joint report on “Safety From Capsizing” in response to the Fastnet race disaster of 1979. It was NEVER intended to be an assessment of a yacht’s stability qualities, but rather a quick method of SCREENING designs that warranted further stability analysis for an IOR offshore racing certificate. Also, it should be remembered that this CSN threshold of 2.0 was empirically determined for a group of boats ALL designed to the late 1970’s IOR rule which was notorious for having created a variety of rather unwieldy hull shapes that were prone to broaching and, as a consequence, capsizing. If the same analysis was applied to a more “conventional” body of designs, I suspect that a CSN of 2.0 would NOT be the value above which a design’s stability would be suspect (it would almost certainly be a higher number).

Regardless, I see no value whatsoever in the use of a screening number in naval architecture for ANY stability evaluation. In the hands of the “great unwashed”, it is a relatively easily calculated number that can be misleading one into believing that a design’s stability is suitable or not for offshore sailing...and be dead wrong on either count. I strongly urge that Westlawn instruction material NOT include the CSN as part of its tutorial, and that you relegate it to a historical footnote in RACING RULE development, which is where it belongs.

Secondly, I’d like to once again defend the methodology and value of the STIX stability assessment. While it can be a complex calculation, default values for individual STIX elements allow a potentially simpler and quicker path to determining a “conservative” (i.e., lower than what would be determined by a more rigorous calculation) STIX value, which may be entirely acceptable for a particular design’s intended use. Secondly, and most importantly in my view, the STIX method, created under the authority of the ISO (not the EU...it is currently only USED by the EU (and was developed at the request of the EU by a number of international ISO work groups, of which I was a member of the Stability Work Group), is part of a comprehensive vessel certification process approved by the ISO. As a result, STIX and any other ISO design or construction certification methodology provides a strong LEGAL position for the defense of designers and builders in a court of law. This is of HUGE value in today’s legal climate, especially with EU nations becoming more litigious than the U.S.!

Having said this, I was an outspoken critic in our ISO work group’s development work that STIX was unnecessarily complex for “conservative” designs and that we should allow using a minimum AVS for a given vessel displacement to earn a specific CE Category rating in lieu of a STIX calculation downflooding, etc. notwithstanding). Even the folks at the Wolfson Unit agreed with this, but it was tabled for “later consideration” L. Dudley Dawson labeled the whole process the “Naval Architect’s Job Preservation Act” J...if we had another year or two (we were late as it was), I’m sure that we could have made it much simpler for non-marginal designs. I maintain, however, that it is a comprehensive and valid method for stability assessment, albeit complex, and that it has been thoroughly validated with a wide variety of real boats that have experienced a variety of capsize events.

All the best,
Bob

Dave Gerr’s reply to Bob Johnson’s E-Mail

Bob
I was pretty sure I’d be hearing from you about the STIX number. I know it is the result of a bunch of really good people trying to make something worthwhile. My own experience using it was disappointing. I was designing a motorsailer for an British client. The durn thing was rather shallow but had a large superstructure and pilothouse. Since STIX includes the buoyancy in the superstructure, this boat easily met Category A, even though—in my opinion—it was really properly a Category-B boat and not suited for extreme ocean storms. I've never liked including the superstructure in the reserve stability calculation. It means you're assuming it maintains watertight integrity—not usually the case. For example, the first roll-over test of the then new USC 47-ft. MLB—which were specifically designed to use the superstructure for self righting—blew out several big win-

dows (this during a controlled test at the dock). Of course, they corrected this weakness, but counting on the superstructure buoyancy for an average yacht seems quite optimistic. Then, the complexity of all the ISO standards is rather off-putting. Personally I think most of them are preposterously convoluted. It's a credit to the Stability Work Group that STIX is one of the simpler and more sensible ISO standards. (If you want to really get me wound up, mention ISO structure standards! ) Anyway, these are strictly my personal opinions. A category A boat is certainly going to be reasonably safe seaboat, so it is a good indicator as I noted in the article. You are definitely right about having a standard to use when it comes to warding off litigation.

About the Capsize Screening Number, I agree completely. It’s worthless by itself. I do find it is worthwhile in con-

junction with all the other factors I mentioned—and only then. I think, in future, I should make it clear that a capsize screening number over 2 should NEVER indicate a boat is unsafe regarding stability if it meets the other criteria of a suitable AVS and down-flood angle, etc. In such cases, a high capsize screening number should have no bearing at all on the suitability of the boat for offshore work. I'll be sure to do this in future. You can quote me.

I have to agree with Dudley's characterisation as it applies to all of ISO standards for boats. But, hey, it's nice to have work!

Thanks for the feedback. Always appreciated!

Cheers,
Dave
Douglas Zurn was born in Erie, Pennsylvania in 1963 and grew up boating on Lake Erie aboard his family sailboats and a 17' Boston Whaler. By the age of 17 he had absorbed Skene’s Elements of Yacht Design; eventually making his own drawings and boat models in his high school architecture class. Zurn received his professional diploma in yacht design with honors from The Westlawn Institute of Marine Technology in 1993. He is a member of the Society of Naval Architects and Marine Engineers (SNAME), as well as the American Boat and Yacht Council (ABYC) and the Yacht Brokers Association of America.

Zurn Yacht Design of Marblehead was founded in 1993. The firm is adept at all facets of the design process: conceptualization, job costing, design and production engineering, project management, and marketing. With over 200 power and sailboats built in the last 10 years it’s difficult not to recognize a Zurn Design as she passes in the water. New and future launches include: The Shelter Island 30; Lyman-Morse Custom 62; Inland Sound 48 and the Samoset 30 Center Console, to name a few.

**PHILOSOPHY:**
Designing yachts is about bringing peoples’ ideas to fruition. At ZYD, they are simply liaisons between the client and the builder. In simple form, they translate the client’s wishes through two and three-dimensional drawings such that the selected builder can efficiently do his job. Doing this in a fashion that the end result is good looking, efficient, and safe is the challenge they face each day. It is very clear that form and function need to work in stride when designing a yacht. One without the other could lead to disaster. The attention spent on each detail, several times throughout the design spiral, is the number-one key element of any successful design. Not a single detail can be left alone. This is what ZYD strives for.

To learn more about Doug Zurn and his designs, [Click Here](#) to visit his website. While visiting the website, make sure to click on “See What Others Have to Say” for a great story about Doug’s career which was published in the April/May 2006 edition of Professional Boatbuilder Magazine. The story continues on pages 43, 44, 46, 48, & 50 of Proboat. To read these pages, click on “Pages” at the top of page 42 of the article.

**PropTalk Magazine on Westlawn**

“The thing about Westlawn is that it’s focused on just small- craft design”, says Paul Miller, a licensed naval architect who teaches vessel design at the U.S. Naval Academy.

The article goes on to say in part,... Industry analysts credit three major factors for Westlawn’s success. First, the number of recreational boats in the United States surged during the early 1960s and again in the final three decades of the 20th Century, heightening the demand for boat designers of every stripe.

Second, and most surprising, there aren't many alternatives to Westlawn for aspiring yacht designers. Schools of naval architecture at large U.S. universities typically gear their curricula toward training naval architects for the design work of large, seagoing vessels, whose structural characteristics are far different from those of private yachts and small boats. By contrast, Westlawn specializes in designing vessels under 60 meters (about 200 ft.) long, including planing hulls and sailboats, which traditional schools don't cover. “Westlawn is very good at teaching you how to design small boats according to the industry's standards,” says Miller.

Finally, Westlawn has upgraded itself from an old-fashioned correspondence school offering mail-order lessons to a "distance learning" institution featuring Internet-based study techniques that enable students to use state-of-the-art, computer-assisted design programs that give them the same hands-on training they would get if they attended classes.”

To read the complete PropTalk article, [Click Here](#)
Recreational Boating Act Introduced to the Senate

In September 2006, a U.S. District Court ruling nullified EPA regulation 40 CFR 122.3(a) under the Clean Water Act exempting effluent discharges incidental to the normal operation of vessels, including recreational boats.

The ruling resulted from a lawsuit brought by environmentalists and states to halt the introduction in U.S. waters of invasive species through commercial ballast water. Included under the exemption for recreational boats are such items as engine cooling water and deck runoff.

The court ruled EPA didn’t have the authority to enact this exemption. Therefore, by September 2008 every boater in America will be required to obtain a NPDES (National Pollutant Discharge Elimination System) permit from the Environmental Protection Agency unless Congress passes legislation exempting recreational boats.

We are encouraged by the introduction of H.R. 2550 titled “The Recreational Boating Act of 2007” last May by Congressman Gene Taylor and Congresswoman Candice Miller. If passed the new law would exempt the nation’s recreational boats from the requirement to obtain a NPDES permit for non-harmful, incidental discharges associated with the usual operation of pleasure boats including deck runoff (from washing boats), engine cooling water, and uncontaminated bilge water. However, if Congress does not act, all boaters will have to apply for NPDES permits beginning next Sept. 8.

So, right now, while this is fresh in your mind, while you’re online, go to http://www.boatblue.org/takeaction.aspx, find your Congressman’s (Representative and two Senators) e-mail addresses and send a short message asking them to support and co-sponsor "The Recreational Boating Act of 2007" (House Bill #2550 and Senate Bill #2067).


NMMA Praises Work by Legislators and Manufacturers to Combat Illegal Logging and Protect U.S. Boat and Accessory Manufacturers

The National Marine Manufacturers Association (NMMA) today praised legislators for their decision last week to toughen U.S. standards to combat illegal global logging in a way that will also protect U.S. manufacturers and small businesses. The Legal Timber Protection Act is aimed at stopping illegal timber harvesting by amending the Lacey Act—a law originally designed for illegal hunting and fishing. Despite the good intentions behind the proposed legislation, the recreational boating industry was concerned about uncertainty in terms of enforcement and ambiguous documentation requirements in wood products that would have been placed on manufacturers.

The U.S. House of Representatives Natural Resources Committee voted on November 7 to approve H.R. 1497, the Legal Timber Protection Act, after an ‘innocent owner’ provision was included to protect U.S. small businesses and manufacturers from misdirected provisions that would have held companies responsible for policing foreign timber laws.


COMITT 2008 — Registration Now Open!

The 2008 Conference on Marine Industry Technical Training (COMITT) will be held on February 18 - 20, 2008 at the Gallery One Fort Lauderdale, a Doubletree Guest Suites Hotel in Fort Lauderdale, Florida. Sponsored by the American Boat & Yacht Council (ABYC), the National Marine Manufacturers Association (NMMA) and Professional Boatbuilder magazine (PBB), COMITT will examine key workforce-development and technical-training issues in the marine industry.

To download a COMITT 2008 brochure, to register online, or to sign on as a conference sponsor, visit the conference web site at www.comitt.org.
Basic Criteria for Powerboat Stability
By Dave Gerr, © 2007 Dave Gerr

In the preceding two issues of The Masthead, we took a look at the fundamental considerations regarding sailboat stability. The heeling moment from a sailboat’s rig is so large that ensuring adequate sail-carrying power tends to be an overriding consideration. Powerboats stability is equally important, though governed by factors other than the need to stand up to an adequate rig. We’ll look at some of the basic criteria for proper powerboat stability here.

Roll Time
One useful indicator of powerboat stability is roll time (the natural roll period of a boat). This is the time in seconds it takes a boat to complete a roll: all the way to starboard, all the way to port, and then back all the way to starboard again. The critical thing here is that long roll times indicate a boat with a center of gravity (CG) located too high, which is both uncomfortable and potentially dangerous.

Optimum Roll-Time
The optimum roll time in seconds for any powerboat is between 1.0 and 1.1 times the boat’s beam overall in meters. If the boat’s beam is in feet, divide feet by 3.28 to get beam in meters.

Long Roll Times are Dangerous
A roll time greater than 1.1 times beam in meters is a clear danger signal. A vessel with such a roll time should be considered to have suspect stability characteristics, and—unless exhaustive further stability analysis proves otherwise—such a boat should not be used in anything but protected waters inshore and with minimum passenger or other weights high up.

A further drawback to such long roll times is that the deep slow roll is quite uncomfortable, leading to seasickness and reduced crew performance.

Short Roll Times are Uncomfortable but Common and Often Unavoidable
While long roll times are dangerous, short roll times are uncomfortable. A vessel with a roll time well under one times the beam in meters will have a quick snappy motion that will be jarring to the crew. Nevertheless, a quick roll time is an indicator of a low center of gravity and a large metacentric height or GM (see The Masthead, June 2007 for a definition of metacentric height) and is not a cause of concern in terms of the boat safety with regard to stability. Indeed, most planing powerboats can’t avoid having quite short roll times because of their heavy engines, and usually fairly wide, hard-chine hulls (high waterplane moment of inertia relative to their weight).

Where a boat with a roll time greater than 1.1 times the beam in meters is a safety problem, shorter roll times indicate less comfort in rough conditions but are acceptable. On displacement boats, the snap in the roll can be damped out effectively with a quite small steadying sail. In fact, on my voyaging motorcruiser designs, I tend to design for roll times just under 1 (between 0.9 and 1), and install a steadying sail. In this way, I can be sure of a stiff, safe boat—even after weight and gear are added over the boat’s operational life—and still keep the motion comfortable.

Planing boats will often have roll times less than 0.8 times beam in meters. This is unavoidable and acceptable. The nature of the dynamic lift under a planing hull changes the apparent roll period in any case, and makes them more comfortable in this regard when on plane.

Calculating or Measuring Roll Time
The roll time for an existing boat can be measured simply by slacking the lines at a dock well off and allowing the boat to roll freely. Get one or two people to rhythmically press down on the sheer from the dock until the boat is rolling deeply enough to be timed. Let go and—using a stopwatch—time the complete roll. That’s it.

For a new design or new construction, you can calculate the roll time exactly from:

\[
\text{Roll, sec.} = 2\pi \sqrt{\frac{\sum \text{Ir}}{\text{GM} \times \text{Disp.}, \text{lb.}}} \]
Where:
Roll, sec. = natural roll period, sec.
GM = metacentic height, ft.
Disp. = displacement, lb.
π \approx 3.14
Σlr = m x k²
m = the mass of each individual component or part of the boat
k = the distance of the component from the roll axis of the boat
(The roll axis is considered to be a straight fore-n-aft line longitudinally through the center of gravity of the boat.)

Though the above is accurate, the extensive calculations required are laborious and seldom undertaken. Happily, there is greatly simplified method which will provide a close estimate of roll time for any vessel of normal form. It is:

\[
\text{Roll, sec.} \approx \frac{0.44 \times \text{Beam, ft.}}{\sqrt{\text{GM, ft.}}}
\]

Where:
Roll, sec. = natural roll period, sec.
Beam = beam overall, ft.
GM = metacentric height, ft.

Let’s take a 57-foot voyaging motorcruiser from my drawing board, Imagine, 14.17-foot beam, with a GM of 2.16 ft., we’d find:

\[
\frac{0.44 \times 14.17 \text{ ft. Beam}}{\sqrt{2.16 \text{ ft. GM}}} \approx 4.24 \text{ sec. roll time}
\]

14.17 ft. beam ÷ 3.28 = 4.3 m beam
4.24 sec. roll time ÷ 4.3 m beam = 0.98

This is very close to the ideal of 1, just a tad under, and so indicates good stability characteristics for a voyaging motorcruiser of this type. Any roll-time-to-beam between 1 and 1.1 would be excellent, but not over 1.1.

Finding GM
Back in issue 2 of *The Masthead* (June 2007), starting on page 5, we described how to estimate GM closely using the waterplane area and the coefficient of the waterplane to find the moment of inertia of the waterplane. We then used this to find BM from the moment of inertia of the waterplane and displacement. Finally—estimating (or calculating) the location of the vertical center of gravity (VCG)—we determined GM. Refer back to this issue to see how this is done. Though this procedure was explained in regard to sailboats, exactly the same procedure and principles apply to powerboats.

A few estimates are somewhat different for powerboats, however:

For powerboats the waterplane coefficient can be estimated as:

Displacement powerboats = 0.68
Semi-displacement powerboats = 0.74
Planing powerboats = 0.80
Vertical Center of Gravity (VCG) estimate for powerboats:

Typical motorcruisers = 4.5% of WL length above the WL
Voyaging motorcruisers = 5% of WL length above the WL
Planing powerboats = 5.5% of WL length above the WL

Another way to estimate the VCG for powerboats is to measure the height from the bottom of the keel to the top of the highest structural deckhouse or cabin roof. Take 40% of that distance and measure up from the lowest point of the keel. Mark how high this is above the waterline and that is the VCG estimate above the DWL. If you use both methods, use the highest CG location result.

(Note: Heavy, steel voyaging motorcruisers, with steel superstructures can have high VCGs, as high as 8% or 10% of WL length above the WL, possibly higher.)

As described in the June '07 issue of The Masthead, these are just estimates of VCG and—for final accurate results—a comprehensive and detailed weight calculation must be done or an inclining experiment conducted. You will also find that keeping weight low (to lower the center of gravity) is important to getting adequate stability.

Powerboat Stability Criteria For Pleasure Craft

In addition to checking that roll-time is in the correct range for powerboat stability, you need to ensure two primary things:

1) Wind Heel:
   That the boat will not heel more than between one-quarter to one-half of freeboard (see below), but never more than 14 degrees in the strongest average beam wind it is likely to experience. This is based on CFR (Code of Federal Regulations) 170.170, often termed GM Weather.

2) Passenger Heel:
   That the boat will not heel more than between one-quarter to one-half of freeboard (see below), but never more than 14 degrees with two thirds of the normal passengers and crew usually aboard standing on one side deck or along the rail on one side of the boat. This is based on, CFR 171.050, often called passenger heel.

Wind Heel

Wind heel is checked exactly as you check Dellenbaugh angle as discussed in the June 2007 issue of The Masthead; however, the sailboat-Dellenbaugh-angle formula is set to find the heel angle in 14 knots of wind. For powerboats—since you can’t reef the boat’s structure itself—you use a multiplier in pounds per square foot of wind pressure for the appropriate maximum average wind speed the boat is likely to experience. Also, instead of sail area, you take the complete area of the profile of the boat. Draw this in outline including all: stanchions, rails, lee cloths, davits, radar masts, and so on. Find the area and the center of the area (CE) above the waterline.

Again—just as with a sailboat—find the center of the lateral plane (CLP) of the hull underbody. Measure the distance it is down from the waterline. This can be estimated as 50% of draft on powerboats.

Add the distance WL to CLP to the distance WL to CE to find the total heeling arm HA.

You now enter this in the powerboat wind-heel formula just as with a sailboat Dellenbaugh-angle formula. The answer should be one quarter to one half freeboard or 14 degrees or less (see below regarding cockpit size) depending on whether it’s an open boat, or a boat with a cockpit, or a flush-deck boat with no cockpit at all. If the resulting heel angle is greater, you must either reduce the “sail” area of the boat’s profile, increase beam, or lower the center of gravity, or some combination of these.

We can work though the wind heel for an actual design, a 27-foot, sterndrive cruiser designed by Westlawn graduate Joe Speight. Dimensions are:

LOA: 27.5 ft.
DWL: 23.25 ft.
BOA: 8.5 ft.
BWL: 7.75 ft.
Draft to propeller: 3.08 ft.
Draft, hull: 1.41 ft.
Disp.: 6,900 lb.

**Maximum Allowable Heel Angle**

For a flush-deck boat with no cockpit or well deck, the maximum heel is 1/2 the freeboard or 14 degrees, whichever is less.

For a completely open boat with a "cockpit" the full length, the maximum heel is 1/4 the freeboard or 14 degrees, whichever is less.

Most contemporary boats are largely flush decked but have a cockpit (or a well deck) of some form. For such craft, the maximum heel is somewhere between 1/2 and 1/4 freeboard, or 14 degrees, whichever is less. The amount of heeled freeboard allowed is determined by the following formula (from CFR 178.330):

For exposed waters:

\[
\text{immersion} = \frac{f \times ((2 \times \text{LOD}) - (1.5 \times \text{cl}))}{4 \times \text{LOD}}
\]

For protected waters:

\[
\text{immersion} = \frac{f \times ((2 \times \text{LOD}) - \text{cl})}{4 \times \text{LOD}}
\]

Where:
- immersion = maximum allowable immersion due to heel, ft.
- f = lowest or minimum freeboard, ft.
- LOD = length on deck, ft.
- cl = cockpit length, ft.

LOD is not the same as LOA. LOD is the length of the deck itself and is almost always less than LOA. For our 27-foot cruiser it is 26.8 feet, not the LOA of 27.5 feet, see drawing.

Using the formula for maximum allowable immersion, for our 27-foot motor-cruiser, which will operate on exposed waters:

**Finding the Heeled Waterline**

You need to find the 14-degree heeled waterline to determine both if it is at less than half or one quarter the freeboard (as appropriate) and that the allowable immersion isn’t exceeded. Note that the boat will "roll out" as it heels. If you are using a hull-fairing program, it should allow you to heel the boat and exactly determine the heeled waterline. If you don’t have the lines in such a program, you can estimate the heeled waterline quite well by drawing the a full midships section of the boat, and then drawing a first-trial heeled waterline at 14 degrees through the centerline at the waterline (see illustration next page). Measure the area under the upright waterline and then measure the area under this first-trial heeled waterline. You'll find the area under the first-trial heeled waterline will be greater than under the upright waterline. By trial and error, lower the 14-degree waterline until the area under the heeled waterline is the same as under the upright waterline. This will be very close to the actual heeled waterline. Now, you can check to see if the 14-degree heeled waterline meets the requirements.

Note: On boats with bulwarks, the deck edge is the edge of the watertight deck extended out to the hullside, not the edge or top of the bulwark caprail.
We see from the sections that the lowest freeboard happens to be at the transom on this boat. This is 3 feet minimum freeboard. The immersion to the 14-degree heeled waterline is 0.9 feet, which is well under half the lowest freeboard and also is under the maximum allowable immersion for this boat of 1.1 feet allowing for the cockpit. Accordingly, we can use the 14-degree heel angle as maximum allowable. If we'd found the heeled waterline at 14 degrees was higher than half the freeboard or if the immersion depth had been greater than 1.1 feet for this boat, we would have had to find a lower heel angle (using the same method) until we had a heel angle that met all criteria.

**Calculating the Heel Angle from Wind Pressure**

The heel angle from the wind pressure can be found from:

\[
\text{Heel angle, degrees} = \frac{P \times 57.3 \times \text{Profile Area} \times \text{Heeling Arm}}{\text{GM} \times \text{Disp.}}
\]

Where:

- **Heel angle** = degrees of heel
- **P** = wind pressure for the selected wind speed, lb./sq.ft.
- **Profile Area** = area of the profile of the boat above the waterline, sq.ft.
- **Heeling Arm** = distance from center of lateral plane of the underbody to the center of effort of the profile area, ft.
- **GM** = metacentric height, ft.
- **Disp.** = displacement, lb.

Use wind pressures (P) as follow for the intended boat use:

- **Ocean crossing (50 knots wind)** = 13.2 lb./sq.ft.
- **Coastwise ocean (45 knots wind)** = 10.7 lb./sq.ft.
- **Partially protected waters such as lakes, bays, and harbors (40 knots wind)** = 8.5 lb./sq.ft.
- **Protected waters such as rivers, inland lakes, and sheltered harbors (35 knots wind)** = 6.5 lb./sq.ft.

Note: For the U.S. Great Lakes, use coastwise ocean for summer service and ocean crossing for winter service.

To find the GM of our 27-foot cruiser, first we need to find the moment of inertia of the waterplane. Estimating the waterplane coefficient at 0.80 for a planing hull, and using the formula from the June 2007 issue of *The Masthead*, we find:

\[
\text{ItWP} = \frac{0.80^2}{11.7} \times 23.25 \text{ ft. WL} \times (7.75 \text{ ft. BWL})^3 = 592 \text{ ft.}^4
\]

We can estimate the location of VCG for this planing hull as about 5% (or 0.05) of DWL above the DWL, or:
0.05 x 23.25 ft. DWL = 1.16 ft. above DWL

Referring to *The Masthead*, June 2007, we find BM:

\[
\text{BM, ft.} = \frac{\text{ItWP}}{\text{Disp., cu.ft.}}
\]

\[
592 \text{ ft.}^4 \div 107.8 \text{ ft.}^3 = 5.49 \text{ ft. BM}
\]

Using the Morrish formula to find VCB (see *The Masthead*, June 2007):

\[
\text{Waterplane area} = 23.25 \text{ ft. DWL} \times 7.75 \text{ ft. BWL} \times 0.80 \text{ waterplane coefficient} = 144.1 \text{ sq.ft. WPA}
\]

\[
\frac{1}{3} \left( 1.41 \text{ ft. Hull Draft} + \frac{107.8 \text{ cu.ft. Disp.}}{144.1 \text{ sq.ft. WPA}} \right) = 0.48 \text{ ft. VCB, below DWL}
\]

Then, referring again to *The Masthead*, June 2007, we can find an estimated GM:

\[
\text{GM} = \text{BM} - (\text{VCG} + \text{VCB})
\]

\[
5.49 \text{ ft. BM} - (1.16 \text{ ft. VCG} + 0.48 \text{ ft. VCB}) = 3.85 \text{ ft. GM}
\]

From the drawings of our 27-foot sterndrive cruiser, we find the CLP is 0.66 ft. below the DWL and the CE of the profile area (of 125.3 sq.ft.) of the boat above the DWL, is 2.63 ft. above the DWL. The heeling arm is then:

\[
2.63 \text{ ft.} + 0.66 \text{ ft.} = 3.29 \text{ ft. HA (heeling arm)}
\]

This is rugged little cruiser intended for venturing anywhere along the coast and possibly some offshore fishing, so the wind pressure (P) should be based on 45 knots wind, or 10.7 lb./sq.ft. Accordingly:

\[
\text{Heel angle} = \frac{10.7 \text{ lb./sq.ft.} \times 57.3 \times 125.3 \text{ sq.ft. Profile Area} \times 3.29 \text{ ft. HA}}{3.85 \text{ ft. GM} \times 6,900 \text{ Disp.}}
\]

\[
\text{Heel angle} = 9.5 \text{ degrees}
\]

This is well under the 14 degrees we found earlier was allowable and indicates that this boat is well suited to its intended use with regard to wind-heel stability.

**Comparing Wind-Heel Criteria With Roll Time**

Using the roll-time formula from page 9, we can find the roll time for our 27-foot motorcruiser as:
8.5 ft. beam ÷ 3.28 = 2.59 m beam
1.9 sec. roll time ÷ 2.59 m beam = 0.73

Since this is well under a roll-time-to-beam of 1, this boat will have a rather quick snappy roll. As noted earlier, this is nearly unavoidable in most planing hulls of normal form. Luckily, the dynamic lift under a planing hull damps out some of the snap from this quick roll at speed. This is not the case at low speed, drifting, or at anchor, however.

For displacement, voyaging motorcruisers, getting the roll time in the ideal range (between 1 and 1.1 time beam in meters) is more critical. These boats should offer crew comfort over long passages. It pays in early design to work out the relationship of beam and CG to optimize roll time for comfort. Keep in mind, though, that meeting the wind-heel criteria is even more important. In some instances—particularly for voyaging cruisers with high topsides and superstructures—you may have no choice to settle for a quicker roll time than ideal for crew comfort to obtain sufficient wild-heel stability. In these cases, a steadying sail can help take the snap out.

Pleasure-Craft Passenger Heel
The angle of heel resulting from moving weights already aboard a boat a given distance is found from:

\[
\text{Heel angle, degrees} = \arcsin\left(\frac{W \text{ lb. } \times d \text{ ft.}}{\text{Disp. lb. } \times GM \text{ ft.}}\right)
\]

Where:
\(W\) = weight moved, lb.
\(d\) = distance moved, ft.
\(\text{Disp.}\) = boat displacement, lb.
\(GM\) = metacentric height, ft.
\(\arcsin\) = The arcsin of X is an angle whose sine is X, often notated as \(\sin^{-1}\). It is not the same as \(1/\text{sine}\). The arsin or arc sine can be found quickly on any inexpensive scientific calculator or in any standard spreadsheet program.

Our weights, in this case, are people and the U.S. Coast Guard formula for passenger heel uses 140 pounds per person, assuming a mix of men, women, and children. (Other rules from the CFR use as much as 165 pounds.) These weights were settled on decades ago when the U.S. population was smaller. Over the last few years, there have been a few capsizing incidents where it became apparent that the average weight of the passengers aboard was well over 140 pound (though, interestingly, passenger-heel itself was not the cause of these capsizes). As I write this, the Coast Guard is evaluating whether to increase the assumed weight per person. In fact—with all adult male passengers—it wouldn’t unlikely for the average weight to be close to 200 pounds.

We know of one yacht that capsized, with an all male crew on the flybridge, with an average weight approaching 250 pounds each! For Westlawn work, we recommend using a passenger weight of 175 pounds, which is also what the FAA uses for average passenger weight, including clothes and a few personal items.

We can see how this works out for our 27-foot cruiser.

Say we have total crew of 8. Two thirds of this is 5.28, say, 6. Six times
175 pounds equals 1,050 pounds shifted to the rail. Then, for our 27-ft. cruiser passenger heel would be:

\[
\text{arcsin} \left( \frac{1,050 \text{ lb.} \times 2.8 \text{ ft.}}{6,900 \text{ lb. Disp.} \times 3.85 \text{ ft. GM}} \right) = 6.3 \text{ degrees passenger heel}
\]

Referring back to our earlier calculations for wind heel, we already found that the maximum 14-degree heel was acceptable and so this vessel easily meets passenger-heel criteria.

**Commercial-Boat Wind-Heel Criteria**

The pleasure-craft heel criteria we’ve discussed so far are based on U.S. Coast Guard requirements for commercial passenger vessels, but don’t follow these rules exactly. Still, they will generally be very close to the USCG rules or even—in the case of passenger heel—slightly exceed them. Nevertheless, the USCG rules must be followed precisely for commercial vessels. They set the minimum metacentric height a boat must have for various operating services. This is CFR 170.170, often termed GM Weather. The formula for this rule (really a regulation with the force of law) for commercial vessels is:

\[
\text{GM} \geq \frac{P \times A \times h}{W \times \tan T}
\]

Where:

- **GM** = metacentric height, ft.
- **P** = wind pressure in long tons per square foot, tons/ft.²
  - \( P = 0.005 + \left( \frac{L}{14,200} \right)^2 \), tons/ft.²
    - for ocean and coastwise service.
  - \( P = 0.0033 + \left( \frac{L}{14,200} \right)^2 \), tons/ft.²
    - for partially protected waters such as lakes, bays, and harbors
  - \( P = 0.0025 + \left( \frac{L}{14,200} \right)^2 \), tons/ft.²
    - for protected waters such as rivers and harbors
- **L** = length between perpendiculars (waterline length for most ordinary boats), ft.
- **A** = projected lateral area of boat profile above the waterline, sq.ft.
- **h** = vertical distance from center of “A” down to center of underwater area (center of lateral plane), ft.
- **W** = weight of vessel (displacement), long tons (tons of 2,240 lb.)
- **T** = heel angle = Heel not greater than between one-quarter to one-half of freeboard (as explained earlier regarding cockpit size), but never more than 14 degrees. The amount of heeled freeboard allowed is determined by the formula from CFR 178.330, exactly as described earlier.

The wind velocities in **P** for the factors 0.005, 0.0033, and 0.0025 are (using Martin’s formula):

- 46 knots for ocean and coastwise
- 37 knots for partially protected waters
- 33 knots for protected waters

The “\((L / 14,200)^2\)” factor in the wind-pressure calculation (P) is to increase the wind speed by 0.0458 knots for each foot of boat length.

**Commercial-Boat Passenger-Heel Criteria**

The U.S. Coast Guard requires that commercial passenger vessels comply with CFR 171.050, Intact Stability Requirements for a Mechanically Propelled or a Non Self-Propelled Vessel, often called Passenger Heel. Again, this is a legal requirement for commercial passenger vessels and is governed by the formula:

\[
\text{GM} \geq \frac{N \times b}{24 \text{ passengers/long ton} \times W \times \tan T}
\]

Where:

- **GM** = metacentric height, ft.
- **N** = number of passengers
- **b** = distance from the boat’s centerline to the geometric center of the passenger deck, ft.
- **W** = weight of vessel (displacement), long tons—tons of 2,240 lb.

The “24 passengers/long ton” makes the following assumptions:

That the average weight of all passengers (a mix of men, women, and children) is 140 pounds each, and that 2/3rds of them move to the side of the vessel, so \( -2/3 \times 140 \text{ lb.} = 93.34 \text{ lb.} \), and \( 2,240 \text{ lb./long ton} \div 93.34 \text{ lb.} = 24 \text{ passenger/} \)}
long ton.  
T = heel angle = Heel not greater than between one-quarter to one-half of freeboard (as explained earlier regarding cockpit size), but never more than 14 degrees. The amount of heeled freeboard allowed is determined by the formula from CFR 178.330, exactly as described earlier.

**Note on Stabilizers and Steadying Sails**

It is vital to keep in mind that stabilizers (such as active fin stabilizers) *never* do anything to improve the actual stability of a boat. Stabilizers reduce roll motion and so enhance crew comfort, but if the boat’s CG is too high, the boat will be in just as much danger from capsize as it is without stabilizers. In fact, it may be *more* dangerous as the improved comfort from the stabilizers will conceal from the crew the seriously uncomfortable roll—a warning sign of too little stability (center of gravity too high)—until a particularly large wave rolls the boat too far and it keeps on going all the way over. You cannot correct or compensate for insufficient stability with stabilizers. Their sole function is to increase crew comfort.

Active fin stabilizers are the most effective means of stabilization available but they only work when a boat is underway. They will not function at anchor or at a mooring. Active fin stabilizers are also not ideal for damping out quick snap roll. For this reason, I often use a combination of a small steadying sail and active fins on displacement motorcruisers. This is highly effective and further provides some redundant stabilization should one of the two systems go offline.

**SPLASHES! Recent Launches of Boats Designed by Westlawn Alumni**

*Prinz 54, by Westlawn graduate Peter Neceda*

*Ocean 37, by Westlawn graduate Michael Hartline*
Jules Gompertz Fleder a naval architect who headed the Westlawn Institute of Marine Technology (1968-1988) and helped turn it into the world's foremost distance-study institution for small-craft design, died Wednesday, October 3, of cancer. He was 84 years old.

At a memorial service at the New York Yacht Club on October 29, Westlawn's Director Dave Gerr, made the following remarks to the gathering of family and friends attending the service:

“Well—unlike his family—I didn’t know Jules as Dody, but as Mr. Fleder. I knew him from work. He ran the school that trained me and gave me my career—the career I always wanted, as he did for so many others. Who would have thought, that thirty years later, I would have taken over what was his position.

It’s a particular privilege to have a chance to say a few words about Jules Fleder. I must say—as I considered what I might talk about—I was struck by how inadequate a few words or a few minutes are to encapsulate the life of a man.

I can say, what Jules, or Dody, or Mr. Fleder meant to me personally. I still remember the first time I met him. It was about thirty years ago, when I was a Westlawn student. I was attending one of the Westlawn design seminars at the New York Boat Show. These seminars were one of the many innovations that Jules pioneered. There hadn’t been anything like them before. I was awed by the truly august line-up of designers he’d arranged to give presentations, and after the seminar, I went up to introduce myself.

This was the 70s and—in my mid twenties—I wasn’t exactly the nattiest of dressers, but Jules was unmistakable from his photo—a very distinguished gentleman in blazer and tie, he was very definitely MR. Fleder. I approached him with some trepidation. Needless to say, he greeted me with such warmth I was immediately put at ease. He even knew some of the details of my Westlawn schoolwork.

I remember the last time I met Jules. It was in Westlawn’s old Stamford office just after I took over as director in 2003. He looked as distinguished as ever and had come over ostensibly to see about collecting a few personal items. The real reason, I think, was to assure himself that Westlawn would be in good hands. He had some pointed questions for me I can tell you. I found myself greatly relieved when my answers apparently passed muster. When we shook hands goodbye, I felt like it was an official passing of the torch and knew I had big shoes to fill.

This takes me to what I can say about Jules’s immense contributions to Westlawn and to the boating industry. When Jules took over the then Westlawn School of Yacht Design in 1968, it was an antiquated 12-lesson course only on wooden boat design. Within a few years, he had single-handedly guided the school to a totally revamped 38-lesson program that included fiberglass/composite and aluminum design with texts written by some of the foremost designers and engineers of the day.

This was the course I took and it remains the fundamentals of the program that the now Westlawn Institute of Marine Technology still offers. The program Jules developed has trained more practicing small-craft designers than any other several other schools in the worked combined. Many of the most prominent and successful designers in the industry are from Jules’s program. Designers form Bruce King, to Rod Johnstone, to Tom Fexas, to Doug Zurn, all came from Westlawn. At the recent IBEX boat show, I met the current senior designers for: . . . Knight & Carver, Huckins, Ocean Yachts, Sabre, Hargrave Custom Yachts, Glacier Bay Catamarans, Trinity Yachts, and more—all Westlawn alumni. If you’re not in boating and don’t recognize these names, they are some of the largest and most successful boatbuilders anywhere.

The most prominent design firm in New York and dominant throughout the world for decades is Sparkman & Stephens. There have been over two dozen Westlawn alumni working at Sparkman & Stephens alone, over the years, and there’ve been Westlawn alumni on 14 America’s Cup teams that we know of. And this is just the short list of the hundreds of Westlawn alumni that Jules’s program has trained.

It’s safe to say that through the new course Jules developed, he’s indirectly responsible for the design of literally hundreds of thousands of yachts, not only in the U.S. but throughout the world. You can’t go anywhere on the water and not see boats—boats everywhere—that Jules’s remarkable program isn’t responsible for. This is a deep and lasting legacy and one that has enriched the lives of all of us and will continue to do so for decades come.”
Two new books by Ed Sherman

ABYC senior instructor and curriculum designer Ed Sherman has just written two new books on boat electrical and electronic systems.


Advanced Marine Electronics Troubleshooting is written for electrical technicians as well as experienced boat owners who are looking for up to date techniques needed to tackle current onboard electrical problems.

Both books are available from the ABYC on-line book store (Click Here)

Know it All? (continued from page 1)

LCF at 57%. The waterplane coefficient is 0.71. Trim ’n Proper is powered by a 320-hp diesel and has a total fuel capacity of 1,700 U.S. gallons. The diesel tanks are arranged so their combined center of gravity is at station 4.7 at all fill levels. Trim ’n Proper floats precisely level on its DWL with the fuel tanks half full. What will the exact flotation of Trim ’n Proper be with the diesel tanks topped up? Give the answer in how many inches up or down Trim ’n Proper will be at station zero and at station 10. Answer to be in decimal inches to two decimal places.

Email answer to the editor: nnudelman@abycinc.org with the Subject Line of “Know it All Contest 1"