

The Classic Yacht Symposium 2010



Restoration of Herreshoff Steam Launch #227 VAPOR

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Louchard Yacht Restoration – Hull Reconstruction

Photos by author unless otherwise noted

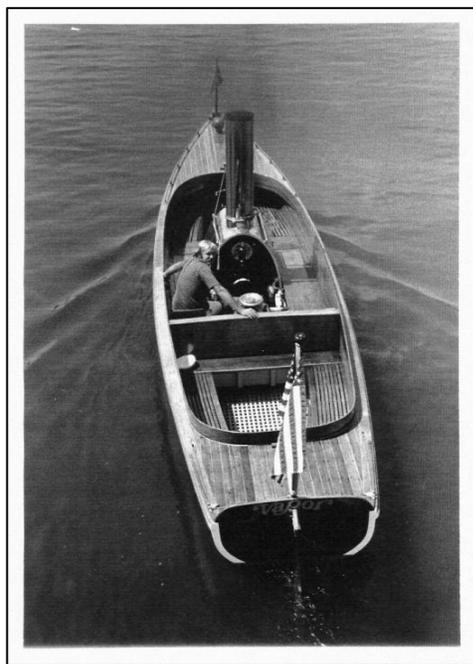


Figure 1 - Jon Martin and VAPOR, ca. 1973. Photo by Richard Buffum.

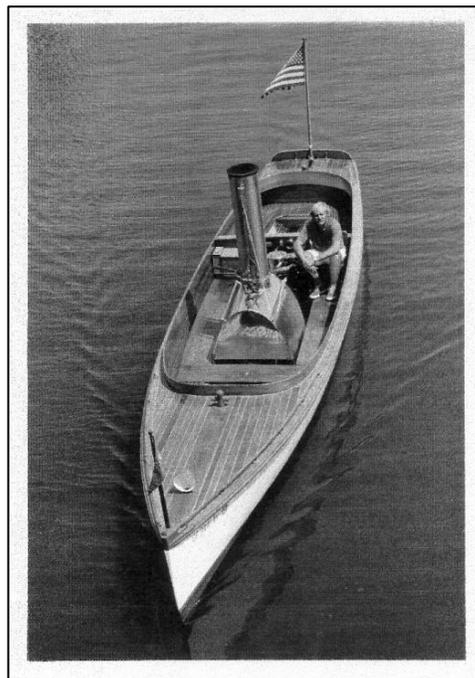


Figure 2 - In Bristol Condition. Photo by Richard Buffum.

ABSTRACT

Built by the Herreshoff Manufacturing Co. in 1902, the 30-foot steam launch VAPOR has been in the care of the owner's family for over fifty years. In 1994 VAPOR was sunk at her dock by an errant powerboat, and is now undergoing a major multi-year restoration. In this first report of the project the author discusses the boat's long history; the extensive pre-restoration research to document the boat and differentiate between the VAPOR as designed and as she exists today; the restoration plan that was developed based upon that research; and the restoration progress through 2009.

INTRODUCTION

VAPOR is Herreshoff Mfg. Co. Hull #227. Her owner is Jon Martin of Costa Mesa, California. Jon kept VAPOR in Bristol Condition for many years, until she was sunk in 1994 by a power boat at her dock in Newport Harbor. VAPOR is now in Port Townsend, WA, undergoing restoration by Ed Louchard of Louchard Yacht Restoration. Jon Martin is restoring the engine, boiler and associated machinery at his home in Costa Mesa, adjacent to Newport Harbor. VAPOR has been part of Jon's family since 1950.

HISTORY

Built in 1902, VAPOR was designed to be the "starboard launch" for the large steam yacht YACONA, owned by Henry Clay Pierce, of Mexican oil fame.

It seems that in 1902, Henry Clay Pierce had a conversation with J.P. Morgan as follows:

HCP "How much does it cost to run a yacht?"

JPM "You can't afford to run a yacht"

HCP "Why, I'm pretty warm, you know"

JPM "Yes, but anyone who has to ask how much it costs to run a yacht can't afford to keep one."¹

Pierce had originally ordered a larger yacht, AZTEC, but later did not accept this yacht and bought YACONA, a somewhat smaller ship. Whether or not the famous conversation had anything to do with his change of heart, I doubt we will ever know.

Jon took over care of VAPOR when his father, Elwood Cecil "Wimpy" Martin, left it to him. Jon remembers when his dad acquired VAPOR, gifted to him by a Mr. Fred Lewis. She was in a concrete block storage warehouse, in the back, against a wall. Since a mountain of storage blocked in the boat, Wimpy deemed it easier to go through the wall than the usual route through the front door. He did repair the wall after removing VAPOR.

Jon ran VAPOR from his dock on Harbor Island in Newport Harbor for many years. His experience with the boat includes many runs up to about 16 knots. This is corroborated by L Francis Herreshoff (LFH), in a letter to Jon dated July of 1970. "I remember very well going on some of these launches on their trial trips and steered the last of them myself. When new, as I remember it, they went between 14 and 16 knots an hour and were very quiet and pleasant." (Figure 4).

LFH guesses that there were 10 or so of these launches with "this size of triple expansion steam engine, and many more with smaller compound and single cylinder engines". (See note #1)

He further states that the Herreshoff steam launches were "so advanced and refined that they were not understood in their day" and that "you have a very valuable specimen in this launch for many of the others were junked when the internal combustion engine came in vogue". (Figure 4).

Jon recalls that he spent most of his sea time in VAPOR with his backside facing up, as there were so many chores to tend to while running the steam plant.

Jon put VAPOR into Bristol Condition and won the prize for Best Boat at Newport Opening Day in 1973.

In 1994, a 54ft Hatteras, whose skipper was in an "other than normal" condition, careened off a few boats in the harbor, then over Jon's dock and over VAPOR, sending her to the bottom. Fortunately, the steam plant was out of the boat for servicing at the time. But the damage was done. VAPOR came out of the water.

VAPOR has been in my yard since 2003, waiting for restoration to begin. That same year, I moved from my shop at Point Hudson Marina in Port Townsend, and built myself a shop at our property outside of town. Since I had VAPOR right there in my yard, I built my shop to accommodate her restoration. I built the shop big enough to fit the boat comfortably and installed an overhead rail to facilitate lifting and maneuvering the hull.

In February of 2008, I backed VAPOR into the shop for the first time. I lifted her on her bunks right off the trailer, and set her down very easily onto the shop floor; then lifted her again, got the bunks out, and set her up on her blocking. I was very happy indeed with that overhead rail.



Figure 3 - VAPOR going into my newly built shop, Feb. 2008.

¹ Drummond, Maldwin. *Salt Water Palaces*, p. 112.

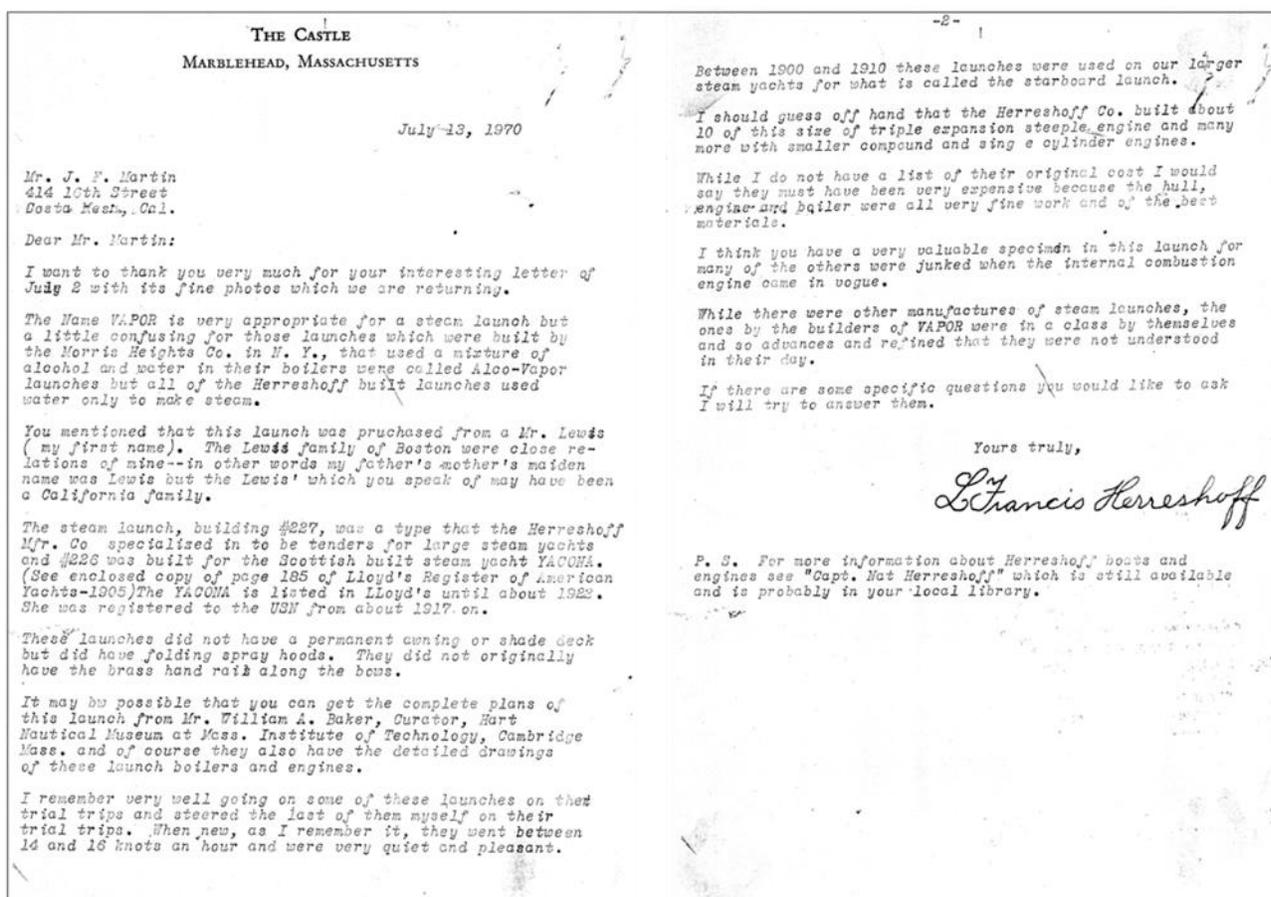


Figure 4 - Letter from LFH to Jon Martin, dated July 13, 1970. Reprinted with permission of Jon Martin

PRE-RESTORATION RESEARCH

With the boat in the shop and the project well and truly underway, I took my time to take photos, make notes, and create a plan for the work to be done. I had already put together a phased restoration plan and a timeline, but now it was time to get very specific.

I took lots of photos. In the evenings, I set up slide shows on my computer. Amazing how many things I picked up while looking at the photos that I didn't notice while looking at the boat. I began to take a serious look at the construction. It slowly dawned on me that this hull didn't really look like a Herreshoff build. The scantlings were way off, far too heavy. The only drawing of the boat we had was a construction drawing. In the drawing were the profile and four sections, as well as scantlings and specifications for planking, framing, and decking, along with details of the general arrangements. (Figure 5). I began to differentiate between #227, as built in 1902, and VAPOR, as she sat in my shop.

At this point I didn't know whether VAPOR's hull as she sat in my shop had been built at the Herreshoff yard. She had the Herreshoff constructor's plaque mounted on her engine, designating her as #227. The engine, the boiler, and the propeller were Herreshoff without question. The general shape of the hull and the arrangements appeared to match the construction drawing almost perfectly. But there were a few serious discrepancies. The beautiful bronzework was not HMC, the foredeck was longer and the forward cockpit correspondingly shorter than in the construction drawing.

I took the lines off of VAPOR, drew them out, and compared them to the #227 construction drawing. The profile was virtually identical, as close as a one-hundred-year old boat can be to its original drawings. The sections were so similar; that there was really very little doubt that this hull had been designed by NGH. The quality of the construction drawing I am sure was very good originally, but the copies had been run through who knows how many copiers and scanners, so I couldn't be sure the shapes were accurate.

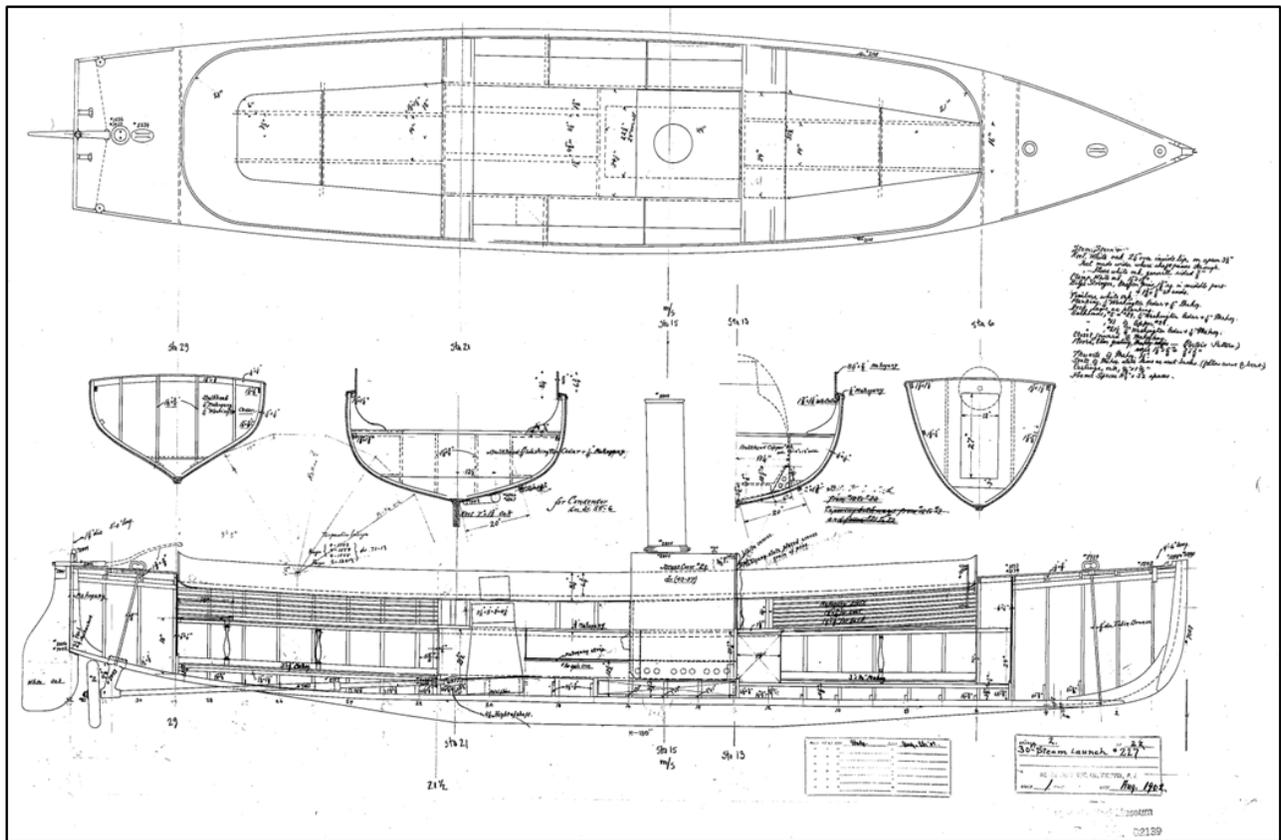


Figure 5 - The info box in the lower right corner reads in part, “30 ft Steam Launch #227 Herreshoff Mfg Co, Bristol, RI Aug 1902”. This is the only drawing we obtained specifically referring to #227. Courtesy of Kurt Hasselbalch, MIT Museum.

I did a web search for similar boats. I went right to the Herreshoff Marine Museum (HMM) site and found a couple of launches, but no steam powered vessels. As I was perusing the site, I discovered that CYS 2008 was about to happen. I knew instantly that I should make every effort to get to Bristol.

Within a few days, I had my CYS registration, my tickets, and my accommodations set up. I put together a few photos of the boat, with some construction detail shots to show to anyone I might find who could give me some help in deciphering what had become a sort of mystery. How had this 1902 Herreshoff steam launch come to have the bronze hardware, and possibly the hull itself, from some other yard, seemingly not Herreshoff?

I studied my construction plan, my photos, and the few Herreshoff history books I had before my trip. Jon Martin urged me to contact Halsey Herreshoff before I left. I did, and he became interested in the project. When I arrived, I presented Halsey and curator John Palmieri with my situation. It was a busy weekend. On Sunday afternoon, after three great days of rubbing elbows with lots of other yacht restoration fanatics, we ended up in NGH’s model room, perusing the records and the half models. I took lots

of photos, and looked into everything that seemed even remotely related to my project.

Somewhat out of the way at the museum, there is an interesting launch 240, as she is known, is a very narrow, lightly built boat, bright finished, with accommodations very different from #227. She was built in 1904. “The boat gets her name partly from her hull number, and partly from her expected speed, 2 minutes and forty seconds, having been a record time for a trotting horse to travel a mile” (quoted from the specifications and information sheet on her deck). I took a series of photos of her.

Pretty well saturated with information, new friends, and new experiences, I reluctantly left Bristol.

Back home after the CYS event, things got very thick. I had a lot of information, but no clear picture in my mind of VAPOR’s true beginnings. All this research was very interesting, but how would it help me to rebuild the boat? As VAPOR, with her heavier scantlings, long foredeck and beautiful bronze work, or, as original? But what, exactly, was #227 originally?

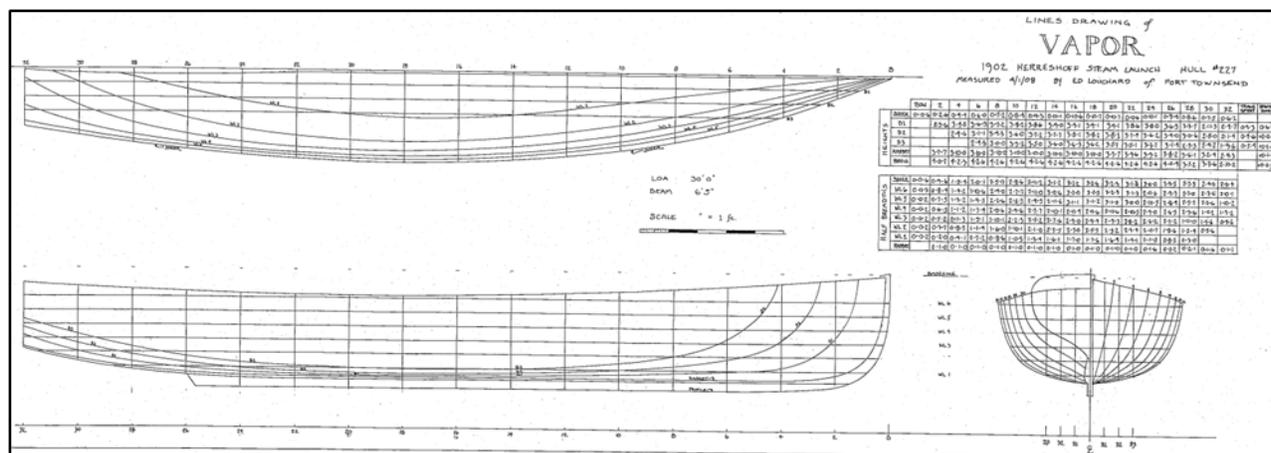


Figure 6 – After coaxing VAPOR’s hull back into shape, I took her lines off using a laser level, drawn out to 3/4" scale.

I felt that we had to know VAPOR’s original construction as near as possible before we could make a decision. We had just the construction drawing of #227. No specific lines drawings known to be #227. No photos, no other history written or otherwise prior to the Martin family’s acquisition in 1950. The construction drawing called out very light scantlings. Double planking, “1/4” mahogany over 1/4” Washington Cedar”, and frames 7/8” square spaced 11 1/4”.

VAPOR had 7/8” Philippine mahogany single planking on 7/8” x 1 3/8” oak frames spaced 5 5/8”. Interestingly, the frame spacing of 5 5/8” was exactly half the original 11-1/4” spacing.

In studying the half model book from NGH’s Model Room at HMM, I had found the half model used in #227’s construction: Sequence #424. That half model was used as a basis for many hulls. See note #2.

One late night, while I was perusing my photos of the trip, I noticed that 240 was one of the hulls listed as being built to half model sequence #424. I came to a full stop. 240? That skinny, lightly built thing down on the museum floor? The gas engine launch that looked nothing whatsoever like VAPOR? Related directly to #227?

As regards half model #424, the half model book reads (I have shortened it up considerably here) “Model made 1897,199 28’ long frames spaces 10 1/2”....227 30’ Yacoma.... 240 30’ by 5’ 240 gasoline....”

John Palmieri of HMM had told me how NGH would change the mold spacing to create different hull lengths from the same set of offsets. Evidently, he altered beam as well, by ratioing the beam to the length (ie: length no change; beam 13/16).

So I had a closer look at the photos of 240 I had taken while I was at the museum. I compared her details to the

construction drawing I had of #227, which Jon had gotten years ago from Kurt Hasselbalch at the MIT Museum, where many HMC drawings reside. Sure enough, #240 looked to have been built using the same scantlings as those found in #227’s drawing. The pieces of the puzzle were starting to fit together. As Maynard Bray then said to me, “now you have an existing construction precedent from which to work.”

One document I got from Mr. Hasselbalch was a copy of a small book of offset notations in which NGH put down the measurements of a number of the launches. The only set of offsets that seemed to pertain was notated hull #199. They seemed to be the original set of offsets from that half model, #424. , Not being all that familiar with such things Herreshoff when I first looked at that booklet, the notations seemed written in some old fashion, long since forgotten and unusable to modern builders. On studying it out, I found it fairly simple to figure out how to translate his notations into offsets I could use to draw out the lines for #199. So I did. Using the profile from the #227 construction drawing, I drew a 30ft rendition of #199 which should be, according to Capt Nat’s notes, the same as the original #227. (Figure 7).

Now I had three drawings which I could compare. Sort of a triangulation, if you will, of the position we were in: The original construction drawing of #227; VAPOR’s lines drawing I had taken off her hull, and the rendition of #199 I made from the profile of #227 and the offsets from Capt Nat’s little booklet.

I laid VAPOR’s sections over those of #199. They were so close, yet, midships, at stations 12, 16 and 20, VAPOR had more flare to her topsides, and a slacker bilge. Stations 2, 4, 6, 8, 28, 30, and the transom were virtually identical, as close as measuring off a hull can provide. At this point I had a pretty good idea of VAPOR’s origins. She was certainly built at HMC in 1902 to the lines of #424 and the construction drawing of #227.

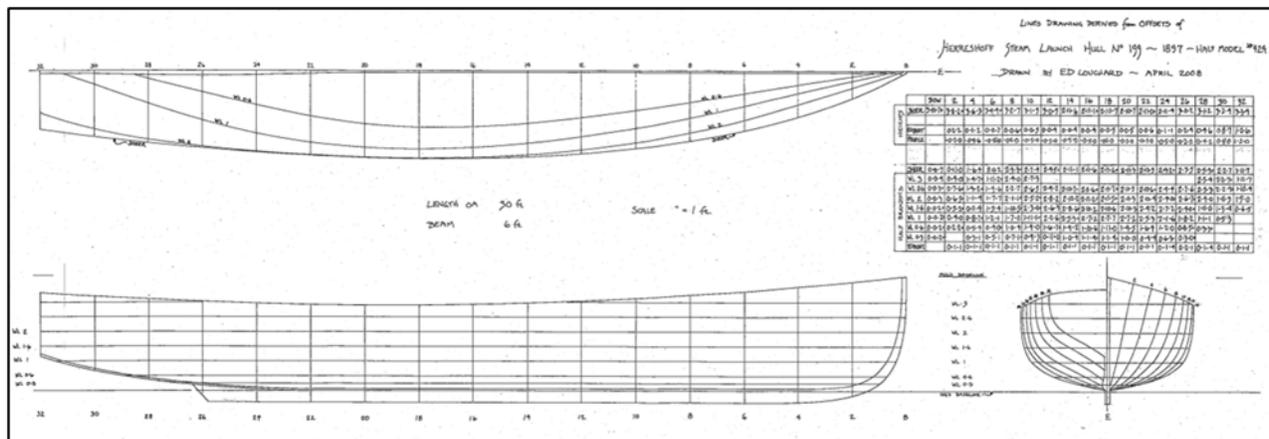


Figure 7 - Using the notations from NGH's notebook, and the profile from NGH's original construction drawing, I was able to create what are almost certainly #227's original lines.

The only unknown was the extent of the rebuild #227 had undergone to become VAPOR. To find out, I had to find whatever evidence I could of the original HMC build inside VAPOR.

The next step was to take the boat apart piece by piece, numbering each part with its respective station in the boat, and taking photos all the while. I was hoping that I might become so familiar with the parts as to be able to differentiate between possible original Herreshoff elements, and those added or changed out later on.

One exciting day, I noticed that the stem on VAPOR had a very unusual configuration. The half breadth of the rabbet increases as it moves up the last 12" towards the bow chocks. It makes the manufacture of the stem much more involved, as the siding of the stem actually increases as it moves up towards the deck, or decreases as it moves

down towards the waterline, whichever way you look at it. So, to lay out the rabbet on the stem timber, one must taper the timber first very accurately, then lay out the rabbet, then cut the rabbet. The usual manner is of course, to cut the stem with parallel sides, simply running it through the thickness planer, then proceed with layout and the cutting of the profile and rabbet.

In examining the photos of #240, I noticed the stem had that same flare. I had noticed that detail only one other time. The Yankee One-Design, has that same feature. (See note 3).

This detail led me to believe that VAPOR's stem is actually a part of the original build, as it seemed unlikely the rebuilders, whoever they were, would have tapered the stem in that fashion.

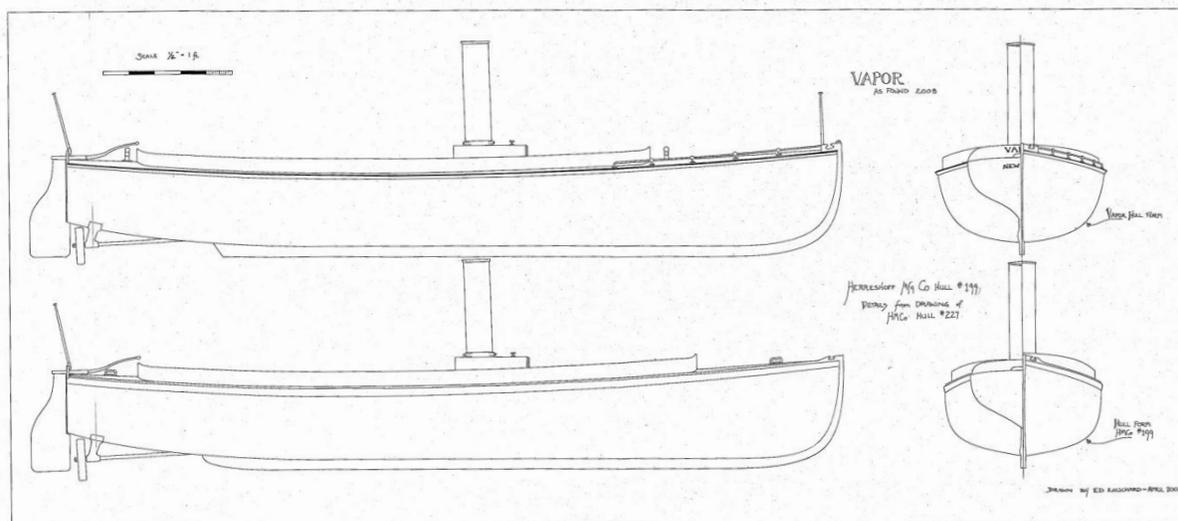


Figure 8 - My comparison drawing of VAPOR, as she has existed for over 70 years, and the original #227. Note VAPOR's shortened cockpit forward, the bronze rails, and the bronze bollards which replaced the original lifting eyes.

Next, I found the transom to be 5/8" Honduras or African mahogany, beautifully beveled to the planking. VAPOR's Philippine planking is 7/8". Often the transom is the pick of the planking stock, and so the same species and dimension. So the transom seemed a likely suspect to be original.

Maynard Bray suggested I look for square, bronze nuts as used by the Herreshoff yard.

Funny how long it takes to see something that is literally right in front me. There were square nuts, obviously very old, on many of the stem/knee bolts, and some down the centerline, and a few on the transom knee bolting it to the transom and the keel timber. The presence of those nuts, along with the configuration and condition, led me to believe the entire centerline of VAPOR, the stem, stem knee, keel, stern knee and transom, was original HMC.

RESTORATION PLANNING

Now we had all the information I could gather pertaining to #227 and VAPOR. We had a pretty good idea of her original build and a good guess at her reconstruction history. Now we could get on with the restoration.

The first choice was between a return to Herreshoff scantlings and construction or to stay with the shape and configuration of VAPOR. I drew a comparison drawing of the two potential boats (Figure 8). After some deliberation, we decided to stay with the shape and configuration of VAPOR as Jon had known her for over 50 years. (See Note 4)

I went back to my ideas I had laid out months before on how the restoration might proceed. It looked something like this:

Phase I:

- 1) Shore up boat level and true. Remove twist and hogging. Initial documentation of shape, structure and furniture. Remove interior furniture.
- 2) Take the lines of the hull.
- 3) Remove deck down to shelf/clamp. Retain deck framing, install cross spalls to hold shape of hull.
- 4) Remove bulkheads, tankage, piping, etc.
- 5) Remove hull frames and floors in the way of bulkhead style molds intended to recreate original shape.

Phase II:

- 6) Remove 25% of planking to facilitate clamping and use of heavy fairing stringers.
- 7) Loft and build molds, install.
- 8) Replace or refit keel plank, false keel, transom, floors and associated structural.

- 9) Steam in new frames using old planking as molds, fasten off at shelf/clamp.
- 10) Fit new sheer planks and guard rails.

Phase III:

- 11) Invert boat using endless slings.
- 12) Replank as necessary, double plank with G flex epoxy.
- 13) Bore and fit shaft housing.
- 14) Fair hull, apply protective coatings.
- 15) Roll over upright, set up level and recheck all measurements.

Phase IV:

- 16) Refit structural members in way of engine, bulkheads, etc.
- 17) Rebuild deck framing as necessary.
- 18) Build new deck.
- 19) Fair and seam new deck.
- 20) Bend in new coaming.

Phase V:

- 21) Refit furniture.
- 22) Finish deck, coaming, furniture, etc.
- 23) Final hull finishing.
- 24) Refit systems and hardware.
- 25) Refit and hang rudder.

Our goal was to simultaneously create a hull that embodies and carries forth the soul and tradition of the original build, and is built to give years of trouble free service and to withstand the rigors of living on a trailer in Southern California. With construction taking place in the cooler wetter climate of the Pacific Northwest, I wanted the hull to survive the transition to a warmer, dryer climate

The decision was made to double plank the hull using G flex epoxy between the layers, in the garboard seam, and between the frames and the inner layer of planking. The floors would be laminated, and the keel would be original construction scantlings and configuration. The frames and planking would be much lighter than VAPOR, but about 30% heavier than the original #227.



Figure 9 - Old centerline timbers removed. Ready to fit the new keel up to the notches in the molds.

Very important to Jon and myself was that we retain as much as possible the look and feel of the original traditionally built hull. I have seen many wonderful, traditionally built boats get a modern makeover, only to lose a great deal of their original charm. The intentions are good, of course. Watertightness and ease of maintenance are very desirable. We are trying to attain that combination of original charm and modern structural integrity that is such an elusive quality.

Making these construction decisions has been and continues to be a long, complex, and thoughtful process.

PROGRESS TO DATE

After taking the lines off VAPOR, then documenting and disassembling the interior and deck, we built molds which we fit down inside the old planking. It took some effort to reshape the old planking into a symmetrical orientation. We then built a strongback and fitted it to the tops of the molds to align and strengthen our setup. The strongback was then attached to the walls and overhead. This permitted us to suspend the boat while we removed the old keel and fit all the new centerline timbers.

The new transom was laminated, fastened to the new keel and new sheer planks. Laminated floors were glued up and bolted through the keel. Every third plank was removed, and ribbands screwed on to provide structure for steaming in 7/8" x 1 3/8" oak frames every 9", which were then fastened to the floors with copper rivets.



Figure 10 - The laminated transom planks were glued up just as they were oriented in the big board. This resulted in a transition from rift grain at the top of the transom to flat grain at the bottom where it meets the keel. It measures 27" tall, which was only half the width of the big board.

At that point we had a pretty good structure which was strong enough to turn over in a set of slings. After thinking about it for months, the day before we were set to roll the boat, I found a set of photos depicting the rolling over of a hull at HMC. The setup was almost identical to what we had put together. It was great to have a precedent for the operation we were about to undertake.



Figure 11 - Rolling TSANA with line and blocks. (Herreshoff Marine Museum photo, 1932.)

Rolling the boat was exciting but uneventful, which was fine with me. We again set up the boat level and true and ready for planking to commence.



Figure 12 - Rolling VAPOR with straps and rollers.

We found 5 boards of African Mahogany, aka Khaya, at Edensaw Woods in Port Townsend, conveniently located about one mile from my shop. My old boat school mate Charlie Moore runs Edensaw, along with another boat school alumni, New Zealander Jim "Kiwi" Ferris. These planks were 2" thick, averaged about 56" wide, and were over 34' long. About 700 lbs each.

In looking over the boards at Edensaw, I realized I would need to be able to examine both sides of each board during the milling process in order to determine the best use of the material. I needed to be able to shuffle the boards as necessary to get the best looking planks high on the topsides, and use the rest for inner planking and bottom planking, as well as decking and interior work.



Figure 13 - Rolled over, set up and fitting the first garboard. We doubled all the ribbands to help keep the frames in shape.

Recently I had built an addition to the north side of my shop to house my planer, joiner and table saw, as well as my 34ft A&R yawl during her restoration. She was very

happy in her new home. In the north shop she was pleasantly protected from rain and sun and wind. Even the heat of the day was minimal, the shop being protected by the larger shop to the south. Two large doors open into the main shop, creating a 20' long, 10' high opening between the two.



Figure 14 - Big African Mahogany boards - 2" x 56" x 34'6".

So, space being needed for those huge planks, STORTEBEKER III sadly moved outside, to be covered by a large tarp, and the preparations to bring in the big boards began. First, another overhead rail with two one ton chain hoists; then, three 6 foot wide bunks on which the planks would rest; next, vertical 4x4's to support and lash the boards, for examining the board below; then some extra lighting and rewiring to accommodate moving the band saw to its new location between the main shop and the plank bunks.

Now we had a pretty good set-up. All the getting out and machining in the north shop, hanging the planks on the new VAPOR in the main shop.

Using the dual chain hoists with slings, we could lift and shuffle the huge boards any way we needed to.

We cut out the basic plank shapes using a circular saw run up against a batten which is held in place by old exercise machine weights with 4 pins set into each. The pins are sharpened to provide a good grip on both the board and the batten.

Determining the planking schedule was the next order of business. This has proved to be an ongoing, thoughtful

affair, as we are looking to fit full length, book matched planks which reproduce the grain pattern across the board as they are fit to the hull. We are about half planked now, from the garboard up. We have learned a lot about this grain pattern business. We hope to get a nice transition from rift to flat, sheer to waterline, as we did on the transom. The transom was easy. Just cut them out and glue them down. The hull is different.

We settled on a 5/16" thick inner planking layer and a 1/2" thick outer layer. Wide planks near the keel, as the landing is fairly flat, then narrowing the planks as we approach the turn of the bilge, as the curvature of the frames increase. This approach seems to be working well. It has become desirable to flatten the mating surface of the inner planking after it is glued on, to simplify the fitting and edge beveling of the outer planking.



Figure 15 - Edge clamping second layer of planking.

When gluing a plank on, we found it desirable to edge clamp the new plank to the previous plank. We use a notched block on the edge of the new plank, and a small block glued to the existing plank above. Clamping those together squeezes the planks together in a wonderfully effective and satisfying way.

The hull will be bright finished, so as planking progressed, we really wanted to see the width of our glue lines, and the pattern produced by our plank layout. With more than 1/3 of the planking down, we had enough room to put the Square Disc Fairing Machine (SDFM) to use. This is a variable speed right angle grinder with an eight inch soft pad, to which my friend Russell Brown glued an eight inch square fiberglass plate, about 3/32" thick, with the corners rounded to about a 1" radius. This plate takes regular sheet paper glued with disc adhesive. I started with 60 grit. This tool, because of the corners, will not only remove wood faster than a round disc but also create a very fair surface. When I finished laminating the

transom, I got out the SDFM to knock it down, only to find I was out of sheet paper. I reluctantly used the soft pad with 40 grit, and knocked down the 27" x 48" surface. It came out pretty lumpy. The next day, having procured my 60 grit sheet paper, I had both surfaces smooth and fair in 10 minutes using the SDFM. Thanks, Russell.

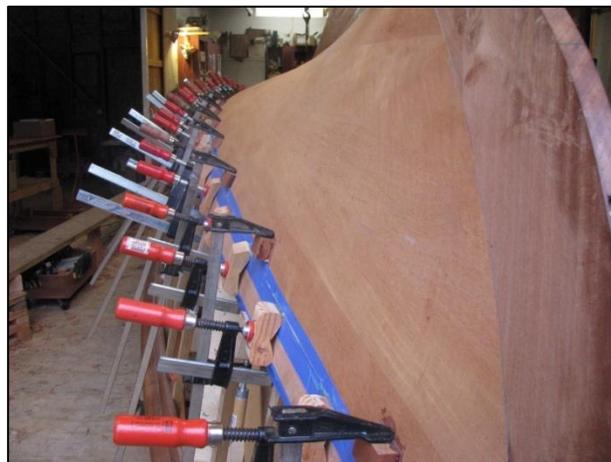


Figure 16 - After first fairing with the SDFM.

I must warn potential users of this method. DO NOT TRY THIS AT HOME. It can be a pretty wild ride when the surface is not flat. It takes a lot of body movement and control to sweep across a curved surface at a 45 degree angle. Three or four sweeps diagonally across the hull, then three or four across on the opposing diagonal. The results are worth the effort, though, and much less work than any other method I know.

As the planking proceeds, I am creating the procedure for boring the shaft hole through the keel. The keel in the way of the shaft hole is curved. We steam bent this section of the keel to match the lofting. It is about 2 1/2" thick and 6" wide in that area, with rabbets cut away to provide plank landing. Now that the planking is glued to the rabbet and the frames, the area has gained a great deal of structural integrity.

The first order of business in boring for the shaft was to determine the plank angle and path through the keel. To accomplish this, I fit the original HMC bronze prop strut in the original position. Next I stretched two strings from the engine shaft centerline through the centerline of the strut. I couldn't go through the keel of course, so I clamped a board horizontally through the hull framing, with its top edge on the centerline of the engine shaft, and stretched the two strings, port and starboard, aft to the centerline of the shaft hole through the strut.



Figure 17 - Lining out for the shaft hole through the steam bent keel timber.

Sighting across the two strings defined the point on the bottom face of the keel where the shaft centerline must enter the keel. From there, I made up a block which bolted to the bottom of the keel with a pre-bored hole in it which would guide the drill bit into the keel at the appropriate angle and in the correct fore and aft orientation. Then, the fun began. I made up the necessary bushings on the lathe to guide the long drill bits through the prop strut and into the guide block.

I gradually increased the size of the bore to 1 1/4" so I could fit a 1" boring bar through the hole with pillow block bearings at both ends of the bore to stabilize the boring bar. The boring bar is 12ft long and reaches all the way from the hole in the floor just aft of the engine, through the strut at the very aft end of the hull.



Figure 18 - Drilling second pass with a barefoot auger, using a guide block (which proved to be too short on the forward end) bored on the milling machine.

There was one tense afternoon when the bore got out of line after a pass with a 3/4" barefoot auger went awry. I hadn't provided any extra blocking for the bit to cut into as the bit exited the guide block and entered the keel, and again as the bit exited the keel. The result was an "S" - shaped hole. It looked horrific, but was actually only about 1/8" off center each way. The solution was to use a 4' long 1" twist bit with appropriate blocking so the bit would have something to bite into as it entered and exited this extremely low angle hole through the keel. After a second bore with a 1 1/4" bit, the hole was perfectly aligned again. I was lucky that time.

I am now engaged in boring the shaft hole out to about 2 1/2" to fit a liner which will accommodate a cutlass bearing outboard and the flax shaft seal in the original HMC bronze housing inboard.



Figure 19 - Ready to bore the first pass. A 1 inch diameter, 12 foot long bar slides in and out through pillow blocks. The bar is bored to accept a single cutter bit shaped and set to a neutral rake to allow boring without pulling the cutter into the work.

CONCLUSIONS

I plan to continue the story of the "Restoration of HMC #227 VAPOR" in CYS 2012. With a little luck and some fair tides, I will tell about the remainder of the hull, deck and furniture restoration, describe the restoration and installation of the steam plant, as well as launching, steam up, and sea trials.

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ABOUT THE AUTHOR:

Ed Louchard has had his own workbench since the age of five. His father taught him to use many different tools, in many different mediums. In 1970, he studied for a short time under Alex Weygers, a master blacksmith, toolmaker and sculptor, who had a great influence on his life and career. Ed has owned and operated a yacht restoration shop since 1981, after graduating from the Northwest School of Wooden Boatbuilding. As well as restoring many antique and vintage craft over 28 years, Ed built the SALISH STAR, a 27' 4-oared gig profiled in *Wooden Boat Magazine* #139. He owns the 1937 Abeking & Rasmussen yawl, STORTEBEKER III, once the private yacht of Henry Rasmussen. He lives with his wife Amy and 2 children in Port Townsend, Washington.

NOTES:

- 1) According to the HMCo Construction Record there were 26 launches with the 3 ½ x 5 x 8 x 4 ½ engine built from 1898 – 1903 in lengths of 26 – 34 feet.
- 2) Half models displayed in the NGH Model Room have been assigned arbitrary Model Sequence numbers based upon their location on the walls.
- 3) Yankee One-Design is a 'concensus design' developed by a committee including W. Starling Burgess and L. Francis Herreshoff from competing design submissions.
- 4) Jon and I both liked the bronzework which had been made for VAPOR at the time of her extensive rebuild by the unknown builder. Also, the longer foredeck with the railing was visually appealing, as well as the slightly increased flare to the topsides.