1998

Western Ship Model

Conference & Exhibit

PROCEEDINGS

SHIP MODELERS *Association*

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Introduction

Building on the success of the first two conferences, the 3rd Western Ship Model Conference and Exhibit was held on-board the RMS Queen Mary in long Beach, California on March 27, 28, and 29 of 1998. The meeting was hosted by the Ship Modelers Association. The Conference statistics, which are given below, represent a large improvement over those of previous conferences.

- 269 ship models were on exhibit.
- 205 people attended the seminars
- 192 people attended the banquet.
- >1050 "walk in" visitors saw the models.
- 6 outstanding speakers made presentations.
- After dinner speech was interesting to both modelers and guests.
- 13 vendors were present.
- Attendees came from all parts of the U. S. and from England, Canada, and the Netherlands. Twelve people came from Japan.

Background

The Genesis of the conference was a conversation between Lloyd Warner and Bill Russell in the Fall of 1996. They decided to ask the Officers of the Ship Modelers Association to authorize the formation of a Conference Committee to plan and organize the 3rd Western Ship Model Conference and Exhibit, to be held in late March of 1998. The SMA Officers readily approved the proposal

A call went out through the newsletter and through word of mouth for people to serve on the Conference Committee. Soon, more than 15 people joined the Committee, including almost all of the people who had served on the Committee for the 2nd Conference held in 1996. In fact, many of the assignments remained the same, and the Committee approached the task with experience and enthusiasm. The ability to build on the experience gained in organizing the two previous conferences was fundamental to the efficient planning of the new conference.

Meetings began to be held once a month beginning in September of 1996, and continued until January, 1998, when the frequency was increased to every other week, with smaller meetings and visits to the Queen Mary interspersed.

Important Decisions

Several important decisions were taken soon after the Committee was formed.

1. It was decided to concentrate available resources on the speakers, and to have the courage to seek the best available speakers, regardless of where they live, and regardless of the position they hold. Where choices had to be made, the priority would be given to acquiring the speakers that were sought.

2. It was decided that the Conference and the Ship Modelers Association would benefit by the establishment of a club web site. The SMA Officers agreed and Monica Chaban was asked to establish the site and to be the Web Manager. Initially some of the web site expenses were paid by the Conference, and later it was fully funded by the Club. The web site that Monica established has been successful beyond our most optimistic expectations, both for the Conference and the Club. It has served as a major

means of disseminating information about the Conference and for attracting registrations.

Some Innovations

1. Henry Bridenbecker was a master ship modeler who was a member of the SMA, and was widely known and respected throughout this country. He passed away since the last Conference, so members of the SMA wanted to remember and recognize him by displaying the entire 25-model collection of his models at the Conference. Fortunately, Don Dressel was able to obtain the approval of Henry's family to do this.
2. The Committee wanted to make a strong effort to encourage members of *The Rope*, the ship model club of Tokyo to attend. Yas Komorita was instrumental in helping to communicate with them, and in avoiding cultural mis-steps. As a result, *The Rope* was well represented at the Conference.
3. Having noticed the interest generated by a few of Jack Moffett's drawings at the last conference, Bill Russell decided to gather as many of the drawings as possible for display at the Conference. A good number of the original drawings were in the newsletter editor's files, but many could only be found in copies in the newsletter itself, and many of them were in poor condition, and some had been copied on colored paper. A significant effort involving computer graphics manipulation resulted in a complete set consisting of more than 100 drawings reproduced in books of 11 X 17 inch format. All or very nearly all of Jack's drawings that have appeared in the SMA newsletter were included.
4. It was decided to recognize two people who have made significant contributions to ship model building by presenting them with portrait drawings by Jack Moffett. They are Gene Larson, Chairman of the Nautical Research Guild, and Rob Napier, Editor of the Nautical Research Journal.

The Committee

The Conference Committee members for the 3rd Western Ship Model Conference and Exhibit are listed on the next page. Their primary function is listed, but it should be understood that everyone participated with energy and originality in whatever task that needed to be done. The Committee was filled with "self starters".

The Committee

Kathy St. Amant	Logo Art, Medallions, Model pickup and delivery
Monica Chaban	Web Site
Ken Clark	Senior Citizen Coordination
Eric Dodson	Exhibit Planning and Floor Manager
Don Dressel	Demonstrator Coordination, Proceedings Editor, technician supervision
Clyde Emerson	Signs and Banners
Robert Graham	Exhibit Coordination, Shadow Box
Steven Jones	Exhibit Planning and Coordination
Yasuhiko Komorita	Coordination with The Rope, Photography Planning
Bob Morgan	Representative of Maritime Modelers
Bill Russell	Committee Chairman, Moffett Drawing Collection
Sid Siegel	Speaker Coordination and Acquisition
Richard Snyder	Photography
Roy Tomooka	Vendor Recruitment and Coordination
Lloyd Warner	Registrar, Treasurer, Queen Mary Coordination
Bill Wicks	Mayflower Group Leader
Dave Yotter	Speaker Acquisition and Coordination

SHIP MODELS AS RESEARCH TOOLS

FOR

RECONSTRUCTING SHIPWRECKS

By Richard Steffy

Ships and boats have been plying the waters of the earth for a long time – at least ten thousand years in the eastern Mediterranean Sea.[1] Many of them never reached their destinations, falling victim to storms, reefs, piracy, or countless other misfortunes. An impressive number of these wrecks still survive on the seabed in one form or another, some of them after thousands of years. The Institute if Nautical Archaeology recently finished the excavation of a merchantman dating to the fourteenth century B.C., including part of its wooden hull.[2] However, most of the world's shipwrecks may never be found because of their depth, location, or other forms of inaccessibility. Among those that have been or will be excavated, wooden hulls sometimes deteriorated and disappeared completely, leaving the inorganic cargo and artifacts they carried strewn around the wreck site. In this presentation, only wrecks with substantial hull preservation (ten percent or more) are of interest. The hull is the most important artifact on virtually every underwater excavation, even on wrecks where hull remains are extremely fragmentary. And ship models are among the most important tools used to analyze and interpret those important artifacts.

In our ship laboratories at Texas A&M University, a variety of wooden ships and boats dating from the fourth-century B.C. to the present century have been analyzed. By duplicating what has been excavated or by going through the original building process, even in scaled-down versions, we usually can find answers to our questions or increase our knowledge about shipbuilding technology. Sometimes these models provide a second function as museum displays, where they provide visitors with a visual comprehension of the vessels. Many processes can be used to reconstruct ships and boats, but this paper deals only with three-dimensional research --- the use of models and replicas as research mediums.

Excavation and Recording

Wooden hulls are preserved only when they are protected. In waters where marine life does not attack the wood, vessels may remain nearly intact, as in the case of the *Vasa* in Sweden or the numerous well

preserved wrecks in Lake Champlain. In warmer, teredo-infested waters, however, those parts of the hull that get covered with overburden usually are the only timbers to survive. On typical Mediterranean or Caribbean deepwater wrecks, for instance, decks and upperworks disappear first, deck beams weaken, and the weight of the cargo pressing on the bottom and sides of the hull usually causes the sides to separate and flatten on the seabed. By the time the hull has been pressed against the seabed, however, much of the original structure has been lost. What survives (if any) is gradually silted over and, when completely protected from oxidation, erosion, and teredo by overburden, the subtraction process ceases.

The goals of ship reconstruction extend far beyond a mere understanding of what the ship looked like or how it was rigged. Because wooden sailing ships were among the more complex structures of their time, to study them is to study some of the best technology of the periods they represent. First of all, it is necessary to develop as nearly complete framing and planking plans as possible. Wood types are determined so that more might be learned about the timber trade, and metals analyzed so that the state of metallurgy in that period can be evaluated; in some cases, these analyses might even establish the location in which the vessel was built. We sample the pitches and caulking, the metal and wood sheathings, the cordage, and try to determine how many false keels were replaced. Although rigging disappears first in most cases, we also attempt to establish a rigging plan. A lines drawing, even a partial one, can tell us not only about hull shapes, but about displacement, stability, centers of effort and lateral resistance, and on and on. But we don't stop with the vessel–it's the people who are most important. It was the people who turned trees into complex mobile structures capable of carrying enormous loads over great distances, and it was people who loaded them, manned them, and defended them. Most of all, we study the clues left by the shipwrights. These were the unsung heroes of the history of technology. Their tool strokes can tell us what sort of tools they were using, what the blade widths were, how well disciplined was their craftsmanship, and even whether they were left- or right-handed. Unfortunately, the best shipwrights left the most subtle tool strokes; sometime their adzing was so smooth that hull surfaces look like they were planed. And so we pray for the ghost of an apprentice now and then. Their less regular strokes and occasional gouges provide more information, although we still salute those smooth, subtle strokes of the master craftsmen.

Excavation and recording must be oriented to accommodate the gathering of all of the above data as well as unexpected information. It also must be structured to address the extent of hull survival and the eventual disposition of its remains. After the removal of overburden and artifacts, the hull remains are carefully recorded if they are to stay on the bottom. If they are to be removed and preserved, they are completely mapped and labeled before being excavated. They are then stored in freshwater tanks, where they can be recorded in detail with drawings and photographs. Once recorded, the wood is treated by one of various conservation methods and then reassembled or otherwise stored for study.

Site Dioramas

It is often imperative that the way in which the vessel settled and dispersed on the seabed is understood in order to better understand original hull details and cargo placement. Such information can also provide details concerning the cause of the sinking or the plight of the crew. Consequently, the arrangement of the hull remains on the seabed usually are the initial sources of evidence for hull reconstructions. Although most wrecksite studies are done with drawings, sketches, and photographs, now and then they can be better analyzed three-dimensionally. My first such study was done with a cardboard and polystyrene assembly, but in the case of a particularly curious medieval merchantman that sank off the southern coast of Turkey about A.D.1025, a complete seabed model was constructed (Fig. 1).[3] Such models are called *site dioramas*, and these days they are more readily done on computers. With recent improvements in scanning and graphics capabilities, computer dioramas are probably more efficient, too, since changes in seabed details can be made much more quickly and effectively. In fact, some people argue that computer models of any form are better than conventional forms of ship models. I disagree. Although I am writing this on a computer and use the device extensively to store data, sketch, and make comparative analyses, I much prefer those wooden, three-dimensional creations to arrive at most of my structural conclusions. While a good graphics program permits almost any form of computer modeling, much of it approaching three-dimensional aspects in quality, I still like to feel the tension of a batten as it is pushed into a sternpost or the resistance of a plank as a seam is closed, or even the smell of the wood as it is cut. The flat screen has never presented such details in as gratifying a manner.

The diorama for the Serçe Limani wrecksite was constructed to help us determine how and why the timbers of the wreck ended up in such a curious pattern. By understanding that process, we hoped to learn more about the unusual timber configurations that were brought to the surface. The diorama and research models were built in 1:10 scale. Most of my research models are made to this scale, except for those depicting ancient Greek or Roman vessels, where complicated joinery in the edges of the planking sometimes demands a more practical 1:5 scale. Models constructed smaller than 1:10 lose a lot of their research potential for all but the simplest of watercraft. I usually work in the metric system, unless the subjects are English- or American-built vessels.

Because this is a job and not a hobby, there are practical limits to our modeling. Consequently, it was impractical to model the hundreds of fist-sized fragments of wood on the site plan. Instead, important groups of fragments were combined into one and eventually a diorama was developed with several hundred of the most important fragments and fragment groups. It was far from Admiralty model standards. A simple white pine frame supported a fiberboard base for the seabed. Sawdust from our bandsaw was used to imitate the soft bottom at the site–sawdust performs much better at scale sizes than sand or soil. Plaster was shaped to imitate the limestone outcropping in the seabed and the concretions surrounding the iron anchors. Because the fragments had to be moved around to

determine the sequence of hull dispersion, they were left loose at first. It was a highly successful venture. Not only did we learn about the sequence of the hull's breakup, but the model also cleared up questions about cargo and anchor movement and stowage questions of other specialists on our project.

Since research models are often anything but mantlepiece material, we frequently have to destroy them to make room for the next ones. However, if another purpose can be found for them we are happy to oblige. Such was the case with the Serçe Limani site diorama. It was sprayed with laquer and hung on the wall of the reception area of the nautical archaeology program at Texas A&M University, where it became both a unique wall decoration and a three-dimensional example of a wreck site for the benefit of students and visitors.

Components, Molds and Battens, and Fragment Models

Individual components are sometimes modeled, such as mast steps, bilge pumps, windlasses, hatch framing, complex or oddly-shaped frame timbers, or whatever does not seem to follow the known patterns for such devices. Our first look at an ancient mast step nearly three decades ago was a surprise. It contained half a dozen mortises and a notched, semicircular cut for the mast heel for which there were no parallels and no ready explanations.[4] Eventually, after handling and staring at a 1:5 scale model of the *step for* months, the function of all those slots and holes finally became apparent. In fact, this simple model eventually taught us a lot about ancient ship handling in general. Dioramas and component models are used infrequently, however. Usually, one of the first research models to be employed in a hull study is the mold-and- batten model. You may know them as crows-nest models or builders half-models. Regardless of what they are called, these are marvelous study mediums. Of all the research models I have used over the years, these have been the most fruitful. They are also the cheapest, fastest, and least attractive of all the research models.

Three-dimensional hull studies begin with the development of hull shapes. From the very beginning, we are thinking rising and narrowing lines, buttock lines, waterlines, diagonals, and all the other contours that will turn this pile of rotten wood back into the sea kindly work of art it once was. Hulls flatten out on the seabed or they break up so that original shapes are hard to recognize. But they are still there–some of the cross-sectional shapes of planks and keels are still visible, and some frames still retain at least parts of their curvatures, if only in the form of a series of broken fragments. All of this can be recognized and restored with a little ingenuity, hard work, and the right types of models.

Usually one begins with frame shapes–the midship frame or the broadest, fullest frame shape that can be found. That can be turned into a lateral hull shape, or at least a part of a lateral shape. The first body line is then underway, initially on paper but soon thereafter as a mold. I prefer one-eight inch thick fiberboard molds because they are fairly strong, cheap, and easily altered. A slat across one of their sides keeps them from bending. There are plenty of mistakes and corrections to be made along the way, so that several molds, or even complete mold models, might have to be replaced by more accurate shapes. However, once that

first mold is shaped, however limited in hull coverage it might be, we are on our way to solving this undersea mystery. Once a second mold is developed, the reconstruction takes on its third dimension–length. And after several molds are developed, one gets that uncontrollable urge to set them up on a base and stretch battens over them to get the first hull shapes. And that is the way it goes until a complete hull shape, or as complete a shape as possible, is accomplished.[5]

Battens can be made from a variety of woods, as long as the grain is strong, straight, and flexible. I prefer a good grade of straight-grained white pine; it is workable and more accurate in the ends of the hull. Basswood and balsa are too soft to provide the right answers, while most oaks and mahoganies are too tight-grained. Battens are made square (1/8th- to ¼ inch-square for most 1:10 models) for early studies where general shapes are desired, but they are soon shaped in various cross-sections more suited for a particular assignment. They can be fitted into slots in the molds, fastened to their edges, or attached to beveled supports that are in turn attached to the molds. I usually prefer the latter.

Mold-and-batten models come in various forms, depending on their purpose. For simply determining hull shapes, one can do with a standard half-mold model, in which body shapes on one side of the hull are attached to a backboard and a single set of battens determines the shapes. Full body mold models are better for studying the ends of hulls (two or several possibilities can be tried at once) or for comparing buttock lines on one side with waterlines on the other. In the case of that Serçe Limani vessel in Turkey, a mold model was developed for determining planking shapes when repaired planks and diminishing strakes made a study on paper impossible. Here, waterlines, buttock lines, and eventually diagonals were fitted over one side of the full body shapes; planking seams were represented by battens stretched over the other side (Figs. 2 and 3). For such studies, batten shapes and sizes become extremely critical to the accuracy of the projections.

Mold-and-batten models can be used for a variety of other tasks, such as developing preliminary planking plans or separating original planking from later repairs (Fig. 4). They can even be carried, step by step, from the initial development of hull lines to the projection of planking seams beyond their survival and even to the location of the seabed fragments within those planking seams. Such was the case with a mold-and-batten model of the Kyrenia ship, a little square-rigged merchantman than sank off the northern coast of Cyprus with a load of wine in the fourth-century B.C. In this case, the line battens were eventually replaced with seam battens. Then a series of diagonal battens was used to check the previous work, after which strips of cardboard were stretched over them to form a solid base. Fragments were then drawn to the same scale (1:5) on drafting film and adjusted on the cardboard surface until they fit both hull contours and neighboring fragments. This was one of eighteen models used to determine all the details about the Kyrenia ship.[6]

The Kyrenia model just described was one of several forms of fragment models. In the case of that medieval merchantman whose wreckage we modeled in the form of a site diorama, two sets of wooden fragments were made, one for the diorama and one for a

development model. In this case, the preliminary hull lines and framing and planking plans had been developed with two of the mold-and-batten models described above. Because the ship and its cargo was so valuable to historians, it was decided to display the finds in a museum inside a medieval castle in Bodrum, Turkey. In order to plan the displays for the reassembled hull fragments and other finds, the second set of fragments were assembled around a set of body molds, which were then removed. Museum walls, ramps, and other details were inserted so that the museum could be envisioned more readily for planning purposes (Fig. 5). But that was only one function of the model. It also served as a dress rehearsal for the eventual reassembly of the original hull remains as well as a study of wales, upper works, and missing areas.

Sections, Sectional Replicas, and other Built-up Models

It is not always necessary to build a model to illustrate or research a project; sometimes they have already been built for us. In 1980, I directed a field school excavation of the remains of the HMS *Charon*, in my opinion one of the most beautiful warships ever built. The *Charon* was a British fifth-rate, forty-four gun warship built in Harwich in 1778. She was the pride of a support fleet assembled by General Cornwallis for the siege of Yorktown, the final military confrontation in the American Revolution. In October, 1781, the *Charon* was set afire by hot shot and sank in the York River near Gloucester Point, Virginia.[7]

In this case, we had only to compare what we saw on the bottom of the York River with the original drawings of the *Charon*, which were still on file in the archives of the National Maritime Museum in Greenwich. Furthermore, there was a beautiful, fully-rigged model of her on display in the Science Museum in London. Although the model was built only about fifty years ago, it was extremely well-detailed and accurate. Existing models have helped many of our staff members in their research, ranging from American builders' models to the clay models of the ancient Greeks.

Most of the ships we excavate, however, have no drawings, models, or descriptions to aid their identification. In fact, quite a few of them were types we never knew existed. In such cases, many hours of work and numerous methods of research must be conducted before the project has reached the stage where an accurate set of hull lines and a fairly complete construction plan have been developed. When that point is reached, however, more elaborate modeling gets underway. For the most part, this involves built-up models, ranging from sections and sectional replicas to various forms of completely built-up hulls that can sometimes extend to full-scale reproductions. Even where survival is limited to only a few percent of the original hull, a built-up version is sometimes useful for study by other disciplines or as a museum exhibit in company with cargo and artifacts from the excavation. If only ten percent of a hull is accurately portrayed, and there are enough ten percent survivals from that period and they all are studied carefully, then eventually that ship type will no longer be a mystery. In fact, much of our archaeological knowledge of shipbuilding comes from the contributions made by a multitude of poorly preserved but carefully recorded wrecks.

Sectional models take on a variety of forms and purposes. A sectional model of the U. S. Navy's marvelous ship-sloop *Peacock* was one of a number of models used in my classes to teach budding archaeologists about wooden hull construction. Section models are used mostly for relating to laypersons or professionals not familiar with that form of hull structure. For that reason, they are usually made in larger scales, and sometimes in full scale. That fourth-century B.C. Greek merchantman, whose remains were reassembled in a Crusader castle in Kyrenia, Cyprus, had a full-scale model of two meters of its midsection built so that visitors to the museum could better understand the size and shape of the original hull. It also was used to display some of the cargo and the way it was stowed in the hold. Lay visitors can comprehend a vessel, even such a small portion of a vessel, far better than the rotted remains that have been reassembled in the next room. In cases such as this, the model is made in the same sequence as the original hull and utilizes the same materials. For this vessel, the planking was edge-joined with mortise-and-tenon joints and erected before the framework was installed. This is most commonly known as shell-first construction, a method utilized in the Mediterranean and surrounding waters from the Bronze Age until about the eighth-century A.D. In this case, the false keel and tenons in the plank edges were made from Turkey oak; all of the rest of the hull was constructed of Aleppo pine and the frames clench-nailed to the planking shell with hand-forged copper nails.

The Kyrenia sectional replica was free-standing, a full-scale reproduction of a complete section of the hull near amidships. A full-sized half-section was made for that medieval glass carrier on display in the castle in Bodrum, Turkey, and inserted into the original hull reassembly. Those remains were reassembled, even though only about twenty percent of the hull survived, because this was one of the earliest hulls found that had been built utilizing the latter day methods of preassembling and pre-erecting frames. In this case, an area was replicated where there was little original survival. Here too, original cargo was installed in the replica. Its installation has made visitor comprehension of the hull considerably easier. It also was built using the same wood species as those in the original vessel– an oak keel and pine planks fastened to pine frames with iron nails and small treenails.

But original wood types often do not lend themselves to scale construction, especially for models that are expected to be displayed for a long time with little maintenance. Most of our final research models are completely built up in the sequence we established as the original one. For most of my research, I preferred a good grade of straight-grained white pine to anything else. It was tool-friendly, easily workable, and both rigid and flexible as needed. If a built-up model is intended to continue its life as a museum display or traveling exhibit, however, a more attractive and serviceable species might be utilized.

There have been some elaborate, highly detailed models made in our ship labs. One of the final Kyrenia models duplicated every little mortise and tenon in the plank edges. A large-scale model of the Brown's Ferry vessel, an early eighteenth-century brick carrier that sank in the Black River in South Carolina, was made from pine to study its construction details and sequences.[8] It was never intended for museum display and was not rigged at first (Fig. 6). But a model was

needed in South Carolina to make its appearance known and to gain support for preserving it. With only a few days to convert it, I made masts from spade handles, rigged and varnished it, and hauled it to South Carolina in the back of my car, arriving just in time for the scheduled press conference. Both model and preserved prototype are now in the museum in Georgetown, South Carolina.

Another study model made from laboratory pine was a 1:10 scale analysis of the sparse remains of a seventh-century Byzantine ship that sank off Yassiada in the Turkish Aegean.[9] In this case I couldn't understand the details of the interior construction, especially the half-logs used for ceiling and the curious framing plan. Thus I made a very precise, step-by-step reproduction of what I believed to be the building sequence and methodology. But, because the interior was so crucial to my study, I made a longitudinal half-model of the port side, the side that was preserved most extensively (Fig. 7). It was a fruitful study, and I was about to retire the model when the museum director in Turkey heard about it and asked that it be sent there. In this case, the original hull had not been reassembled and he felt the visitors needed something to visualize what carried this cargo and weapons. And so I did some sanding, varnishing, and very careful packaging, and the six-foot long model was air-freighted to Turkey. What I expected would be a short-lived exhibit is still looking like new after a nineteen-year sojourn in a humid Mediterranean climate with lots of handling by non-modelers.

The Yassiada model enjoyed further fanfare recently. A full-scale replica of its stern has been built in a little Byzantine chapel within the castle, where tourists can view the cook using the tile hearth in the after cabin and other facets of seventh-century life at sea . The little pine research model now sets alongside, enjoying another career as a tool for educating tourists about ships and the sea.

In Scandinavia, Mediterranean countries, in North America–indeed, in museums all over the world, more and more models and replicas are being used to explain the results of archaeological research. It is a trend that I believe will continue to expand for a long time. In fact, one of my own favorite projects used a replica to study the sailing characteristics of the hull we excavated. The Kyrenia ship, that fourth-century B.C. merchantman reassembled in the Crusader castle in Kyrenia, Cyprus, was produced again as *Kyrenia II*.[10] The full-scale copy was made from the same types of wood and metal and was constructed in the same sequence as the prototype. Kyrenia II was launched in Perama, Greece, in 1985. This, too, is modeling, albeit in full scale, and it was experimental; many building processes were tried in numerous ways, answering questions that remained from our earlier research. Consequently, it took nearly three years to build, after which its primary purpose was fulfilled–to study the sailing methods of the ancient Greeks. It has made numerous small voyages and some long ones, notably from Greece to Cyprus and back again, using only the wind and sometimes sailing with what we have determined to be an original crew complement of four. It still survives in solid shape, at the moment in the south of Greece near Athens.

There were many other models and model types used for research in our labs over the

years. Lift models of several vessels were made to study physical characteristics; there was a 1:5 scale sailing model built to test the sailing characteristics of the fourth-century B. C. Kyrenia ship; a fully rigged built-up model of a first-century boat excavated in the Sea of Galilee was used for study and now sits behind glass near the original boat in Israel; there were models of medieval ships excavated in the polders of The Netherlands, of funerary vessels in Egypt, of the bow of a merchant ship found in the excavation for the foundations of a Manhattan skyscraper, and of the stern of a Spanish vessel wrecked on the coast of Texas in 1554. And several more experimental projects are underway as I write this. These are but a few of the many models and model types that can and have been used to convert mysterious fragments of rotting wood into lines drawings, construction plans, and reams of information about the ships, their crews, their builders, and the thousands of other people whose lives were directly affected by these magnificent wooden works of art. Few discoveries can reveal such a variety of knowledge about our past as a shipwreck. And no single object can tell as much about a technology and the society it represents as the remains of a wooden vessel. All that is necessary to unlock those secrets is the ability to select the proper mediums of investigation. Ship models, even with today's computer inroads, remain the best of those mediums.

CAPTIONS FOR ILLUSTRATIONS

Fig. 1. Not an underwater photo, but a 1:10 scale site diorama of the Serçe Limani medieval wreck site. (Photo by the author)

Figs. 2 and 3. Bow and bottom views of an early mold-and-batten model of the same medieval wreck at Serçe Limani. The port side of the model has battens representing bottom planking seams, while those on the starboard side are being used to determine and confirm the diagonals for the body plan. (Photos by the author)

Fig. 4. This model has wooden molds covered with thin pine planks of various shades. It was a successful attempt at separating repairs from original planking in this sparsely preserved, strangely planked hull. (Institute of Nautical Archaeology photo)

Fig. 5. A fragment model set inside a mockup of a museum building. The model served both as a device for planning the reassembly of the original hull remains and to study museum display aesthetics. (Institute of Nautical Archaeology photo)

Fig. 6. A built-up model of the eighteenth-century Brown's Ferry vessel, in this case based on a preliminary study, is being used to determine hull details and construction sequence. Not the crooked path of some of the frame timbers. (Photo by the author)

Fig. 7. A built-up half-model of the Yassiada Byzantine ship. A dual purpose model, it was the first used to determine interior construction details and was later completed as a museum display. (Photo by the author)

NOTES

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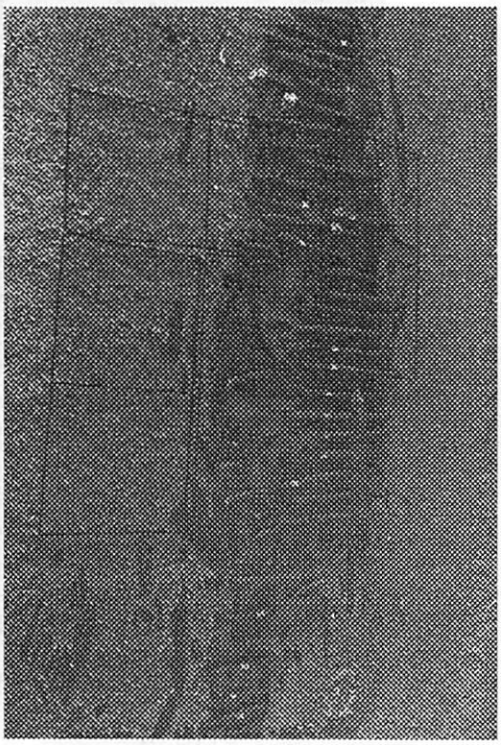

FIG. 1

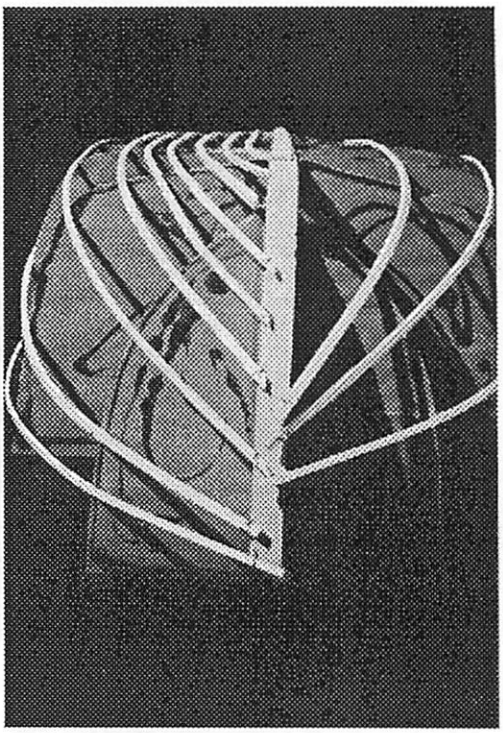

FIG. 2

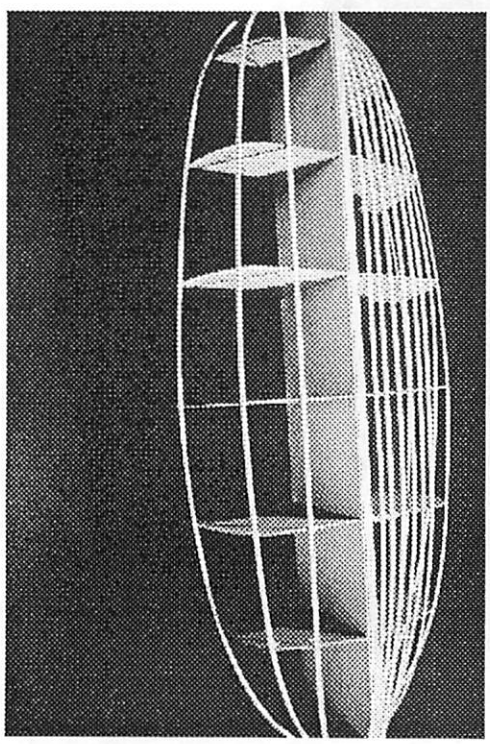

FIG. 3

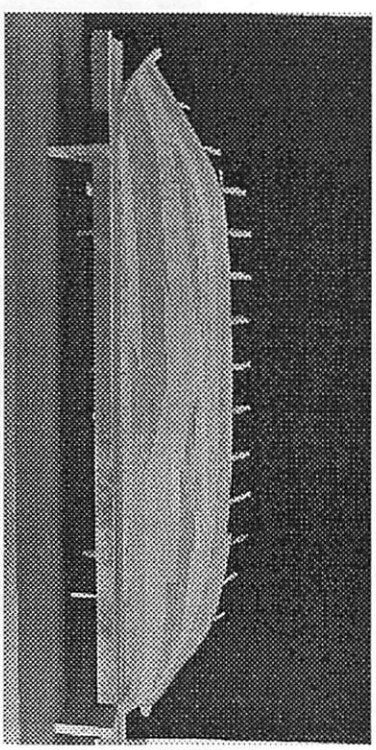

FIG. 4

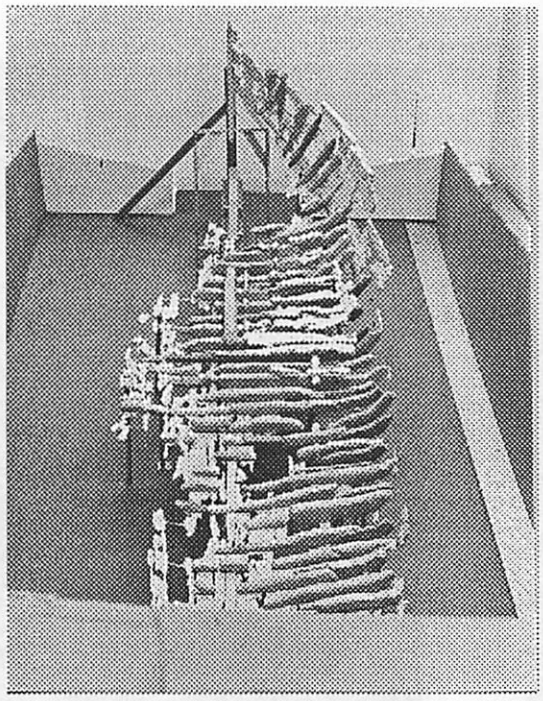

FIG. 5

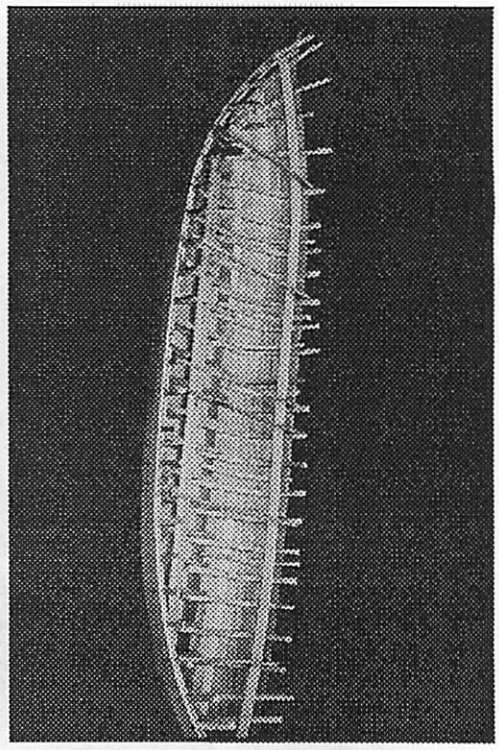

FIG. 6

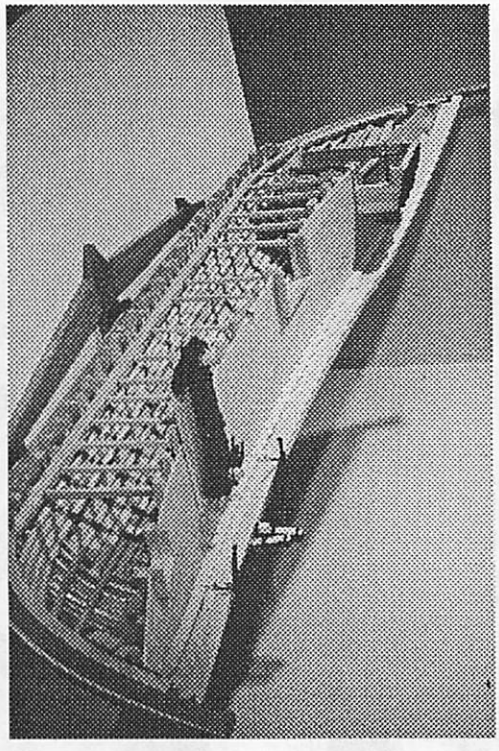

FIG. 7

J. RICHARD STEFFY

J. Richard Steffy grew up in Denver, Pennsylvania, served in the Navy in World War II, and was partner in a family electrical conditioning business for 25 years. He began a life-long study of wooden ship construction as a hobby. He left the family business to help reconstruct an ancient Greek ship in Cyprus.

Dr. Steffy joined the staff of the new Institute of Nautical Archeology in 1973 as their specialist on ship construction. He joined the faculty of Texas A&M University in 1976. He has been retired since 1990, but retains an active relationship with both the Institute and the University. Recently, his work has focused on interpreting ship building technology of Mediterranean vessels of the Classical and Medieval periods. A MacArthur Fellow, he has served on numerous museum and shipwrecks projects in the United States, Canada, Cyprus, Greece, Israel, Italy and turkey. He has published and lectured widely. His latest boo, Wooden Ship Building and the Interpretation of Shipwrecks, is a highly regarded work on ship reconstruction.

In spite of advances in computer sciences and laboratory techniques, ship models still play a vital role in converting the rotted remains of certain wrecks into technical drawings and specifications lists. In one case, no less than eighteen models of various types and scales were used to reconstruct the vessel. This presentation describes the roles such models have played in identifying the characteristics of ships from a period of over two thousand years.

SHIP MODELS FOR ART'S SAKE
OR
THE UNQUANTIFIABLE SIDE OF SHIP MODELING

by Erik A.R. Ronnberg, Jr.

The title of this paper has a double meaning, as I shall do more than just explore the artistic side of model-making. Eighteen years ago, I began a decade-long collaboration with a marine artist who commissioned a series of models which he used as subjects for his paintings. It was a true collaboration in the sense that he acquired models for his paintings which afforded the detail and precision he wanted, while my knowledge of finishing models to his standards of realism was greatly enlarged and my way of conceptualizing a model was pushed beyond any limits I had then imagined. Some years previous to this collaboration, I had studied watercolor painting and learned much about color mixing and use of color to create atmospheric effects. This provided the ideal theoretical background for a very intensive and rewarding decade's work.

Where ship models belong in the nebulous realm we call "art" will probably never be resolved, but we can certainly enjoy the process of exploring the issue. What adds excitement to the pleasure is when a recognized artist reaches out to the model-maker to involve him in the retelling of maritime history, the one working in two dimensions, the other in three. Inspired model-making leads to inspired painting, which in turn spurs the one to work even more imaginatively on the other's behalf.

Long before I built any models for artists, I was thinking about ship models as art or, if they were not art, what aspects of them might be regarded as art. Now, after nearly forty years of building ship models to scale (I am not counting another decade of childhood activity), I have concluded that model-making is divided into two types of activity:

1. Construction of parts that must be measured or gauged to some standard or tolerances and finished to a prescribed standard or specification, i.e. there is no guesswork.
2. Construction or finishing of parts that can not be measured, gauged, or formulated to any known standards, i.e. it is all guesswork and you have got to use your creative ability to make the results credibly. Therein, I think, lies the "art" in ship model building.

Having worked for an industrial model-making firm in the late 1960's, I quickly learned that the first type of activity was regarded as model-making; the latter was relegated to a catch-all category – "artwork" (note that I said "artwork", not "art"). Every employee in the shop was expected to be proficient at model-making (as indeed they were), but not many of them were proficient at, or even cared about, artwork. On numerous occasions, artwork was such an

important part of a model in progress that specialists were brought in to deal with it. These were usually commercial artists, but architects would choose the colors for models built to their designs, and one sculptor was called on to make scale figures and other difficult shapes which required free-hand treatment. What struck me about this situation was the indifference of many model-makers to artwork when they were otherwise tough critics of dimensions and details which could be scaled to fine tolerances – and pity the poor associate whose model-making standards did not measure up!

What I saw in the industrial shop offered a strong foretaste of what I would find in the ship modeling fraternity; lots of attention to accuracy; less interest - sometimes no interest - in the artistic aspects of model construction and finishing. My attempts to learn why through discussion and confrontation did little to alter viewpoints, and in some cases I had to change the subject quickly to avoid confrontation of a less pleasant sort.

I can only conclude that some model-makers are – or can be – receptive to the artistic side of ship modeling. The others feel little or no need to broaden their views into this aspect, and as long as they are happy that way, I see no need to change their minds. Ship models are built by people who derive pleasure from the intricacies of creating a structure that combines many different materials in a fantastic variety of shapes. Who would build a model if he felt constrained to meet standards he did not agree with and found only boredom and drudgery instead of an enjoyable challenge? On that basis, I offer my views in the hope that all will understand and appreciate them to some extent; that a few might be encouraged to experiment with them in their own way; but that none will view them as rules or standards by which other models should be judged.

Before any aspect of his ship model can be viewed as art, the scale ship modeler (I am not including models or model-makers in the not-to-scale, or folk art, category) must stop looking at what he is building as a model and start thinking of it as a ship. It is no different from what the artist does when he goes down to the waterfront to paint pictures of ships from life. For the artist, the reality lies before him, to be studied and conveyed to paper or canvas as his own interpretation of reality. For the model-maker, the reality of a ship long gone lies in plans, models, artifacts, paintings, and photographs of the vessel, and much research effort must often be expended to assemble the information which enables him to make his interpretation of a ship. Before he can capture realism in a model, he must above all have a realistic image of the ship in his mind.

A good representational artist will have a painting finished in his mind's eye well before the picture has been completed – or even before it has been started. In doing so, he summons his knowledge of form, composition, color, value, drawing technique, and brushwork to give life to the image. A model-maker can give life to a model – make it truly a ship in miniature – by the same methods. If this seems far-fetched, consider the elements of artistic method just mentioned.

1. Knowledge of form – If a poor eye for form can ruin a drawing, it is equally bad for a ship model hull. A good hull must not just be accurately templated, but must look fair

to the eye and feel fair to the hand. Sensitive fingers will often find errors which the eye has missed. Critical shapes, such as how and stern profiles, sheer lines, and subtle changes of contours were often brought to final form on the ship by eye. One shipwright in Essex, Massachusetts, when ready to strike the sheer on a vessel he was building, would trudge out into the surrounding marsh so he could judge the curve of the sheer from a distance and alter it to his satisfaction. No records of such "design alterations" survive on paper, which means that if a model is to be built of a vessel so-altered, its sheer must be reconstructed using photographs and a practiced eye.

The process of shaping a hull is not unlike the drawing process in painting a picture; it is in fact a highly regulated from of sculpture which also relies on drafting in its preliminary stages. The disciplines of measurement must be followed, but the model-maker must also be appreciative of the forms which he is developing and respond imaginatively when the lines on the blueprint do not look anything like what is seen in photographs or other documentation.

2. Composition – At first glance, the idea of "composing" a ship model seems improbably, yet we do exactly that when we choose to rig or not rig the hull, array it (or not) with deck gear and crew figures, and above all, when we decide how the finished model is to be mounted for display. Ship model galleries make a great deal over a model's "presentation", as they like to call it, and it is high time we listened to them. Personal taste will always make this subject controversial, and if a model-maker has strong feelings about how his model should be mounted, there is little point in arguing with him. If a model is built for sale, much thought should be given to its presentation, for it can affect the selling price very significantly. In many instances, a gallery will purchase a model still on its working baseboard, then have it mounted in a custom-made case. A few of my own models have been mounted in this fashion, and while they were not objectionable, I have always been happiest when I have worked out a baseboard and case design of my own, incorporating features or details which the gallery has found to have appeal to customers.

3. Color – It is not enough to know what colors were used to paint ships at a given time and then hunt up the nearest out-of-the-bottle colors to paint your model. The concept of "scale colors" has long been known to model-makers in other fields; it is no less valid for ship models and is not difficult to understand or apply. Simulated weathering over scale colors can further heighten realism, while bringing out surface details and making hull contours more apparent.

Scale color is the lightening and tinting of a model's colors to give the illusion of seeing a ship from a distance. Its principle is based on atmospheric haze, which causes objects to appear lighter and with a stronger bluish cast as distance increases. Progressively smaller scales require increasingly lighter and bluer colors as they represent vessels being viewed at increasingly greater distances.

4. Value – Values are the various degrees of lightness or darkness of color, the juxtaposition of which provides clear and pleasing color contrasts. This is no different from painting a picture in which not only shapes of individual objects, but the whole composition, is controlled by skillful use of

values. In a model, lights and darks can be similarly controlled to better define the load waterline, or to heighten or diminish contrasts between different topside colors. Contrast control can help play down distracting colors or details which break up the model visually, or it can be used to relieve a monotonous color scheme by highlighting details that are very small or in very low relief.

Not to be forgotten is the contrast between the model and its mounting. So often a model's hull colors are so close in value to its baseboard that the two blend with each other, leaving the hull's outline indistinct and its geometry impossible to visualize. When I was painting with watercolors in the 1970's, my instructor's first lesson was about values and their role in controlling the composition of the picture. In hindsight, I still feel that was the most important lesson he taught me and I have found it to be no less important to a ship model's finished appearance.

5. Drawing and brush techniques – In model-making, scribing is more commonly done than drafting with ink or pencil, but I have used all three and have to say that these techniques are quite different from drawing on paper or canvas. Any line-work tends to be highly controlled, using battens and other guides to produce accurate lines for plank seams, cove moldings or paint stripes. Brush technique is also very controlled to insure even paint coverage or accuracy in lettering and painting scrollwork. It is in weathering and depiction of wear and tear that free-hand brushwork is called for, using a variety of techniques with glazes (applications of thinned paint) and dry brush (application of nearly dry paint to create a streaked effect for rust stains and salt spray residue; also for grime and wear on decks and deck fittings). Spatter techniques are useful to simulate fish scales on the decks of fishing vessels.

From the above list, you should have gathered that most of these techniques are used in the finishing stages of construction. What must be understood is that preparation for finishing a model or a model's parts begins at the outset of the project. All the methods for smoothing and priming the wood and metal surfaces are planned and executed in sequence, and all of the parts require as careful surface preparation as for a model which is to be spray-painted. Weathering effects and simulated wear are not disguises for careless workmanship or short cuts to finishing.

Some views of a hull in progress will help to illustrated finishing sequence and surface preparation (this is a model of the Marblehead fishing schooner *AMY KNIGHT*, period 1835). The woods selected were New England Poplar for the hull lifts; holly for the keel, wales, bulwark stanchions, and rails, basswood for deck planking and most deck furniture. These woods seem to have very similar behavior and receptivity to paint and glue, and I am hopeful that the model will last a long time before wood shrinkage and glue failure will cause it to come apart. Note that the hull was carved up to the level of the main rails. The bulwark planking was carved into the hull block down to a thickness of 1/16", sanded smooth, and primed on the inboard side prior to adding the stanchions. This sequence greatly improved the finish of these surfaces while carving the bulwarks in place allowed for accurate templating of their shape (Figure #1).

This stern view (Figure #2) shows the transom veneered (with basswood sheet, the

quarter pieces are holly) and the outboard parts of the hull are ready for their primer coats. I have been using acrylic gesso for a primer for fifteen years, and have found it very satisfactory as a base for finish coats mixed from artists' acrylic colors. The water which thins the gesso tends to raise the grain of basswood and poplar, which are not fun to sand. Once the primer coats are built up and sanded smooth, they are as impervious to water as oil base paints, and it is possible to achieve a finish nearly as fine as lacquer ware. I usually stop with 400-grit sandpaper and find it an excellent surface for a flat or matte finish.

This midships (Figure #3) view shows beaded moldings which I scraped into the hull prior to priming. With surface detail this prominent, I decided to scrape it directly into the bare wood. For most planking seams, a simple scribe line is made after the hull has been gessoed. I find that the gesso tends to give the wood surface a more uniform hardness so the scriber is less prone to be diverted by the wood grain. The main rail in this view has been painted a warm gray, which is actually a ground color which I applied over the white outboard surface of the hull. The warm cast of this color provided a good color foundation for the finish colors (mostly black and greens) and follows another fine old tradition among artists who applied ground colors to their canvases to block in the various values and color masses.

In this deck view (Figure #4), the planking was laid with Japanese tissue (painted very dark brown) glued to each plank edge to indicated the pitch of the payed deck. A light oil stain and thin coat of matter varnish provided and adequate base for whatever wear and weathering was to be added later. The forward companionway, made mostly of basswood, is ready to be gessoed. The windlass was turned from holly with holly whelps glued to four sides. The ragged sawcuts on the whelp faces were carved away by hand, then finished with files and sandpaper.

A close-up view of the bow (Figure #5) shows the topsides gessoed and the holly gammon knee fitted. The sea serpent head (a very popular motif for this time and region) was carved from boxwood, gold-leafed, and glued to the knee. With any exotic finish work like this, the sooner it can be made, the better. Carvings and lettering should be done while the hull is relatively free of surface detail that can interfere with this work.

In the finished model (Figure #6) we see the results of all this preparation. Weathering colors were a light gray for the salt streaks and a light reddish brown for rust stains. Both were applied by dry-brushing in a succession of very thin coats, but when I had finished, I found the effects were too strong. With a small damp sponge, I carefully swabbed the weathered surfaces, removing the gray and rust colors in small increments until the remaining colors gave the desired effect. The yellow band in the bulwarks represents a pine strake that was varnished bright on the actual vessel. On the model, this plank was first painted a dull yellow ochre; a "wood grain" effect was then created by painting over it with burnt umber thinned with matte acrylic varnish. The umber wash was applied more heavily than dry-brushing and in long overlapping streaks; several applications were necessary.

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In the late 1970s, I was approached by the marine artist Tom Hoyne to build for him a

series of models of fishing schooners which he could study and use as posing subjects for his paintings. Tom had been a very successful commercial artist, but decided to phase out this work so he could give more time to marine painting and to depicting the New England fisheries, his favorite subject. Although he had lived and worked most of his life in Chicago, his boyhood summers were spent on the New England Coast, where the lore of the Gloucester fishing schooners had worked their magic on him.

Tom knew all the tricks of painting historic scenes based on photographs, but his resource could be very inadequate if he wanted to depict a vessel from an unusual angle, or if problems of perspective or hidden detail proved to be insoluble. What he wanted were models which could be posed and viewed to suit his needs; moreover, he wanted highly detailed models to a uniform large scale (3/8" = 1'). This requirement would produce models of the larger vessels of five to six feet in overall length with detailing of deck gear and rigging that went "right down to the boltheads". The resulting models would stand up well to close-in scrutiny and their details could be transposed to canvas without loss of sharpness or purposeful appearance. As Tom put it very bluntly, he was "sick and tired of faking details with blobs of paint."

While my association with Tom Hoyne marked a turning point in the development of my model-making style, this did not happen overnight, and the first model I built for him was finished very conventionally. This model was of the early knockabout schooner *THOMAS A. CROMWELL*, and its hull was actually started by Tom, who soon realized that he would not have time for both painting and model-making. On a trail basis, I completed the hull, fitted it out, and rigged it, keeping close track of my time.

In contradiction to all I have said, this model (Figure #7) was finished with xylol-based model railroad paints, the colors coming "straight form the bottle" with no modification except for the buff color of the dories. Tom had covered the deck with bristol paper, painted it, and scribed the plank seams with pencil, which actually looked better than it sounds. I made no attempt to scribe the outboard planking. The finished model was impressive, but on looking closer it was obvious that the overall effect was not as convincing as the fine detail. More attention would have to be given to outboard detail and I would have to do some experimenting to find a more realistic finish.

My second effort – and the first hull made under my full control – was a model of the plumb-stem schooner *HARRY L. BELDEN (Figure #8)*. In this overall view, which shows the colors accurately, you can see my first efforts at muting the colors. The topside black was actually a deep, cold gray; the bottom color a brown; the deck colors were similarly toned down in hue. I was still using the model railroad colors and not enjoying the mess and thinner fumes from mixing low viscosity paint in small bottles.

This view (Figure #9), which is too dense and has inaccurate color balance, shows my first attempt to deal with hull detail, the planking being scribed, the cove molding scraped in, and the name and hawse pipe scroll carved into the block. A rather high gloss is evident, and this was added at Tom's insistence. In posing the *CROMWELL* model for study, he found that the matte finish of the hull gave some interesting reflections, but if it was glossier,

the spotlighted hull would glisten as if it were wet. The scored planking of the *BELDEN* further enhanced this effect, so these features were retained in later models.

On the third try, I switched from the model railroad paints to artists' acrylic paints – the kind that comes in tubes (or jars) and are thinned with water. While priming the wood with the acrylic gesso was more tedious, and thinning the paint to the right brushing consistency took practice, the paint had advantages which far outweighed these problems. Foremost was the ease of mixing colors, which is just like mixing oils or watercolors. This spurred me to get serious with the scale color concept and I experimented with mixtures of various colors to produce a gray that would be mixed with all colors on the model. I soon found that mixing thalo, burnt umber, and white could produce a whole scale of grays, ranging from warm to cold or near-black to near-white. I selected a slightly warm middle gray which when added to black, copper red, deck gray, and white I had mixed for the model, I had a family of colors which were far more effective at creating the illusion of the model being a ship seen from a distance.

This model is of the knockabout schooner *ARETHUSA (Figure #10)* and was one of Tom's favorites in his collection. Encouraged with my progress with acrylics, I asked him if he would mind if I experimented with weathering, and he readily agreed. On deck, this was mostly rust stains from the ironwork and dirt around hatches, companionways, and other high-traffic areas. This view shows the fish sorting pens, bait boards and other gear related to handling the catch, reflecting redoubled research efforts on Tom's and my parts to get these models to look like fishing vessels in their working state.

This close-up of the *ARETHUSA* model's mid-ships area (Figure #11) shows a bit of the outboard weathering not visible in the previous views. In large scale models like this, dealing with the hardware was very satisfying. The Edson pump at the main fife rail has virtually the same number of parts as an original and is large enough for most people to appreciated its complexities, whether they understand its mechanical principles or not.

As soon as I delivered a finished model, Tom would get busy painting pictures of it – or with it as a guide. This painting was typical of the payoff from the *ARETHUSA* model. Knockabout schooners (the ones without bowsprits) were his favorites, which is why two of the first three models were of this rig. Tom soon realized that the *CROMWELL* was too extreme in her form to be much help in visualizing the more typical knockabouts, so *ARETHUSA* was chosen as a good example of the design once its desirable characteristics had been settled on.

Finishing the subsequent models followed the methods I used for *ARETHUSA*, but with refinements of color mixtures and brush technique. The next large schooner model was an Indian-header (Figure #12), so-called because the first examples of the type were named for famous Native Americans, although the example Tom chose was not so-named. Indian-headers were first designed by Thomas F. McManus; they had short keels, round bows, and long bowsprits. Tom picked *CAVALIER* at my urging, because she had an elaborate color scheme which was documented by a fine contemporaneous model whose builder would have known the vessel very well.

The early 1900s saw the introduction of gasoline engines to assist in hoisting and working the anchor windlass. Tom was only too happy to see these additions to his models (Figure #13) and made good use of them in the lively deck scenes he sometimes painted.

The model shows the unusual color scheme of this schooner. Tom was pleased to have all these different colors as they made many deck and bulwark details stand out in stronger contrast.

The archtypical fishing schooner – the best-remembered of the "work boats," not the racers – was the semi-knockabout, which looked like an Indian-header but had a longer bow and a shorter bowsprit. *ELSIE* was the most famous of them, but Tom wanted another example, so we settled on *STILETTO (Figure #14).* This schooner had a long life, and there were still a few old-timers around who remembered her, one of them having had the sense to take notes on her color scheme and some of her rigging details.

Like *CAVALIER, STILETTO* had a busy deck arrangement with hoisting machinery and fishing gear (Figure #15). All of these models could be refitted for other types of fishing, with different sizes of dories, seine boats, and fish pen configurations. In this view, the model is fitted for halibuting.

Tom's interest in the fisheries included the earlier periods, and had he lived longer, his collection would have included examples of all the major vessel types. The earliest actually built was this model of the pinky *ESSEX* of 1821 (Figure #16), a good example of the type as built in the Essex-Gloucester region.

The term pinky is of Dutch origin and refers to the "pinched" stern which forms a pointed extension of the bulwarks over the rudder head (Figure # 17). Few good examples survived to be photographed, although there were many more still sailing but with their sterns altered beyond recognition. This deck view looking aft shows the strong S-curve which is formed where the planking makes the transition from the bulwarks to the tombstone.

We have seen this model of the Marblehead fishing schooner *AMY KNIGHT* under construction (Figure # 18). The term "Marblehead heeltapper" is often given to this breed of schooner, but no one has been able to trace the origins of that nickname to a time before the 1870s. Most likely it was bestowed by neighboring towns as an insult when the vessels survived only in memory.

Marblehead fishing schooners are thought of as an 18th century type, but some, like this example, were built as late as the 1830s and lasted until the 1860s. Fishing was seasonal, and in the winters, they were rigged with square topsails and jib-booms, then sailed to the West Indies with cargoes of badly-cured salt codfish to sell to the plantations. This model was provided with rigs and deck gear for both types of activity.

The Gloucester sloop-boat was another small type that fascinated Tom. This is a plumb-steamer named *VESTA* with a deck length of about 50 feet (Figure #19). The lines of this sloop survived and Howard I. Chapelle attempted a reconstruction. When I built this model, an excellent photograph provided details not available to Chapelle, but I still had to guess at the spar dimensions. Not long after the model was done, a sailmaker's book of spar measurements was found to have data on

VESTA which indicated that I had gotten the bowsprit too long, but was very close on the other spars.

The model as I finished it had a lot of weathering, but Tom wanted even more, on the correct reasoning that the boats got a lot of wear and tear. The salt streaks certainly do bring out the hull contours when viewed at an angle – which is what he wanted (Figure # 20).

Sloop-boats were the subjects of some of Tom's liveliest fishing scenes with *VESTA* figuring prominently in them. It was interesting, and sometimes amusing, to see Tom's enthusiasms change with each new model. His paintings of the more obscure vessel types were often his most imaginative, due not just to the novelty, but to the research he did to reconstruct the settings and activity of these vessels. His research skills were well-honed from years in the commercial art field. Those skills did not languish when he switched to marine painting.

(Editors note: The last model talked about by the author had no photo prints available at the time of this writing - just transparencies. He suggests that anyone interested may want to consult his NRJ article)

The last model Tom Hoyne commissioned he did not live to see. I have always regretted this, because it was a subject that intrigued him, having already made paintings of steam trawlers based on much less information than at my disposal. The model is of the Boston steam trawler *SURF*, an early example of the steel-hulled otter trawlers that revolutionized the Banks fishery technology of New England. This was the most complex model I was to build for Tom, also the most demanding of time, both for research and construction.

The model was made of wood, with thin veneers to represent the shell plating. Rivet detail was simulated with 26,000 pieces of copper wire. The deck fittings and machinery were made of metal.

Although Tom had died before the model was completed, his family insisted that I finish it so it could join the rest of the collection which was then being transferred to a museum. I thought long about giving it a weathered finish with lots of rust, grime, and fish scales, but decided not to and finished her to look like the vessel when new. Weathering a model like this would have been a huge task in itself, not the least being the research to figure out how the otter trawl gear, the deck hands, and the tons of fish would have made their marks. It might sound easy. Is a model finished like this still art? Build one and then decide!

Having started this lecture with a Hoyne painting, let's end it with one. This one is my personal favorite – the *HARRY L. BELDEN* stamping to windward "On the Last Leg to Gloucester." I spent a whole evening at the owner's residence, communing with the original; this slide does not do it justice. I do feel that there are aspects of ship models that can only be regarded as art, and I know very well that good ship models can inspire good artists to do their finest work, just as good artists and their paintings have inspired the building of good ship models.

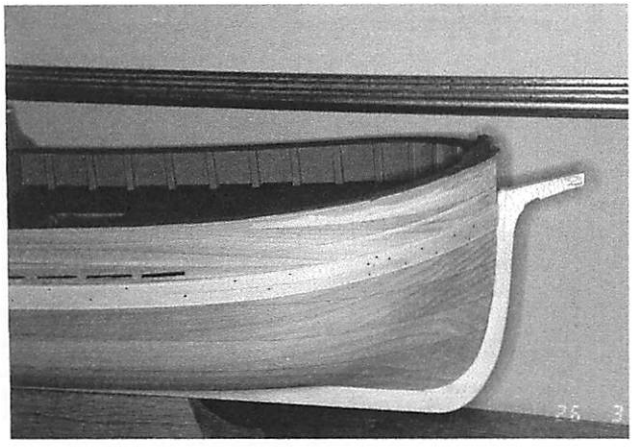
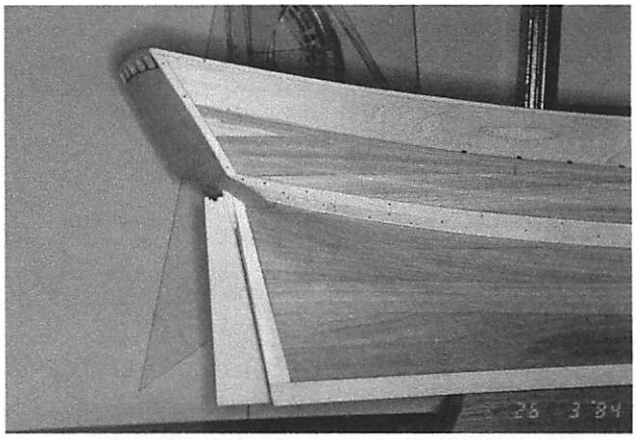


Figure 1



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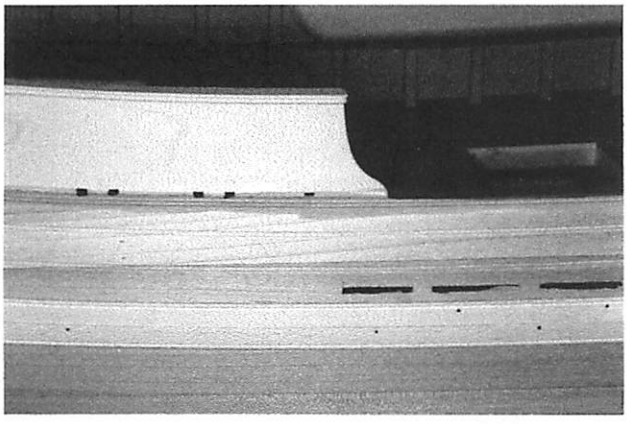

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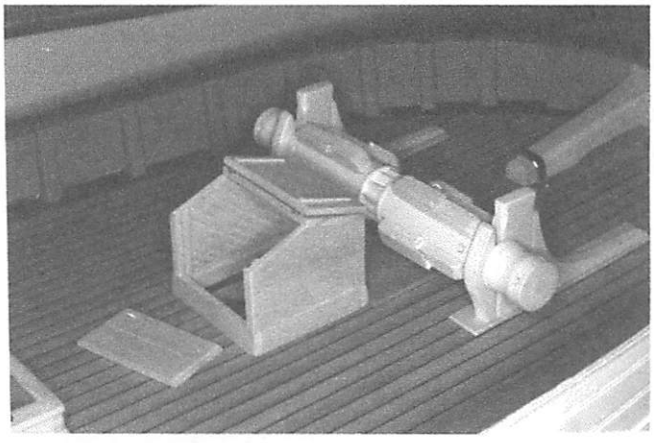

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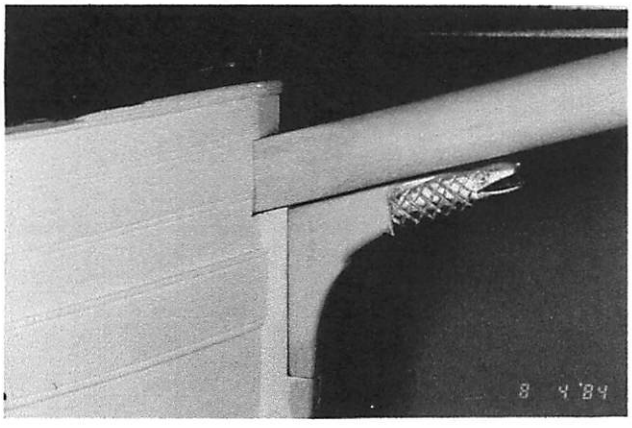

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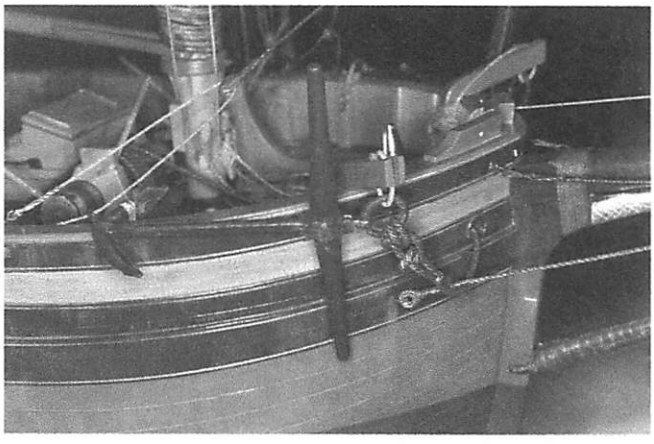

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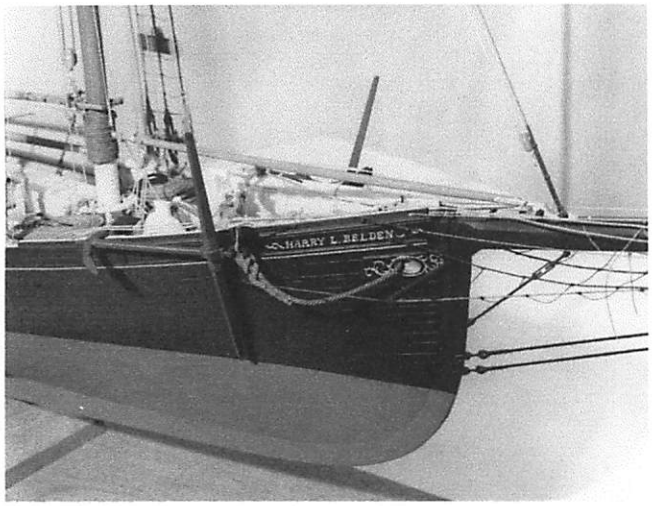

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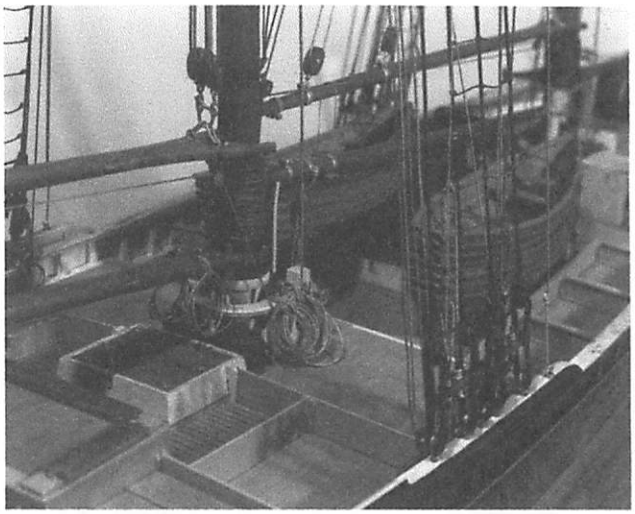

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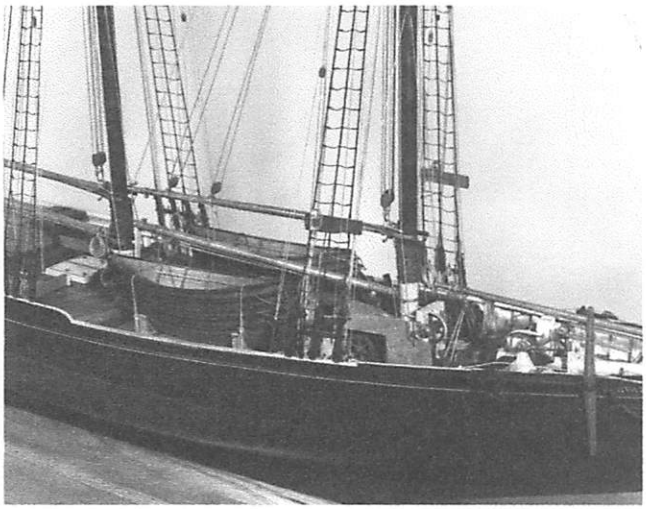

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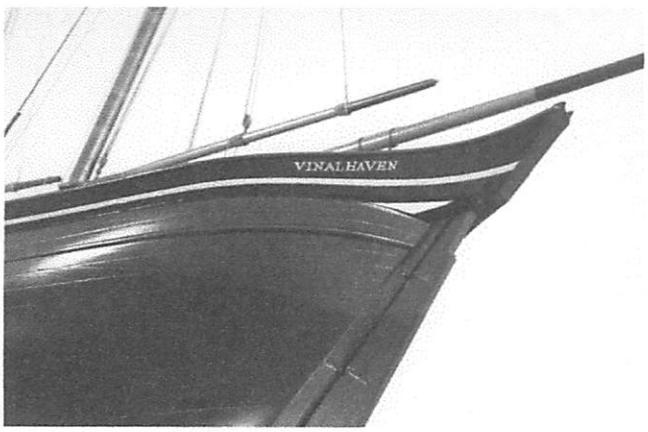

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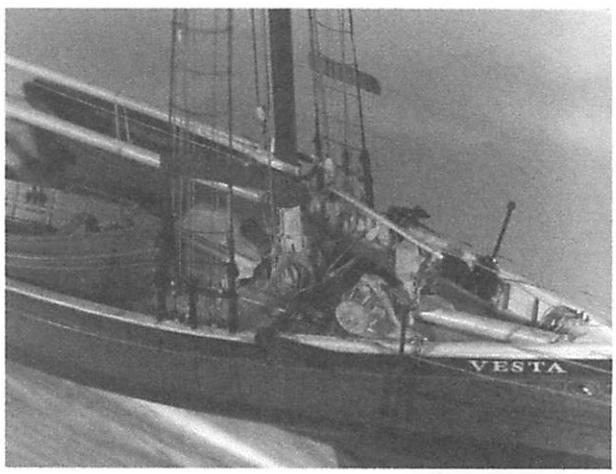

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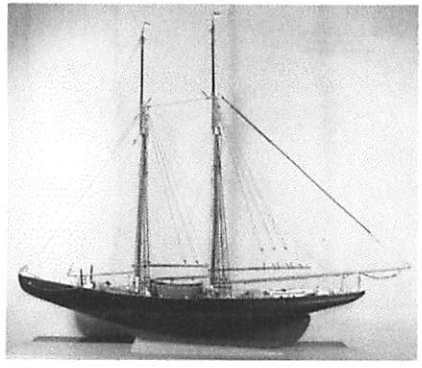

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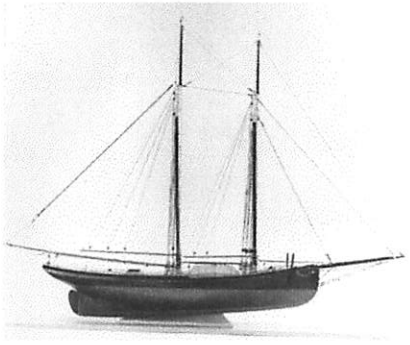

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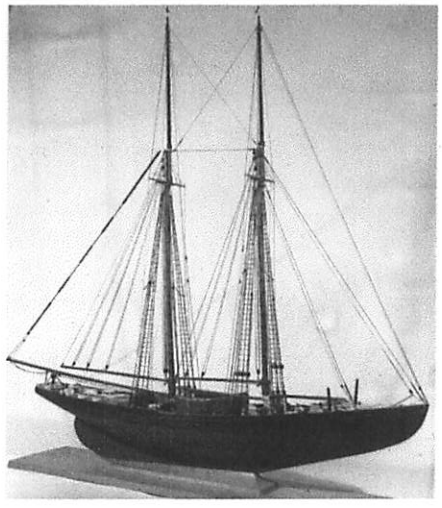

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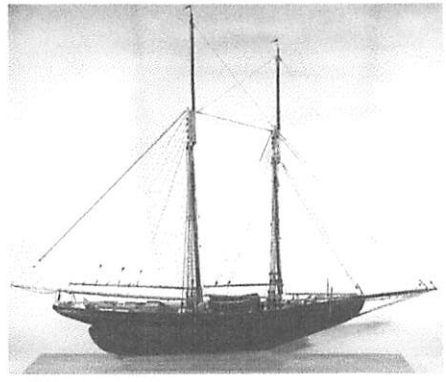

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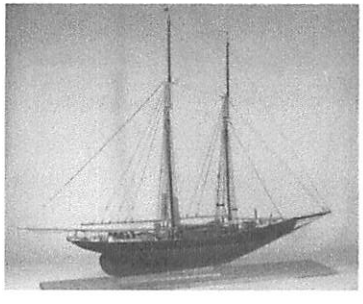

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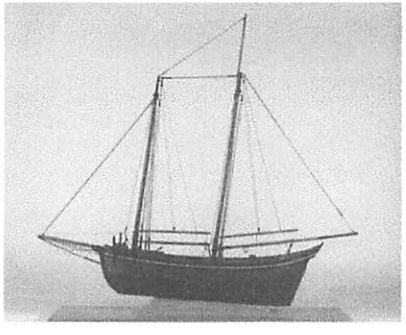

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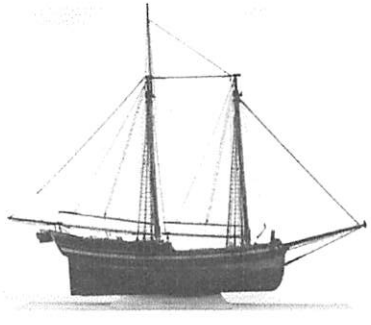

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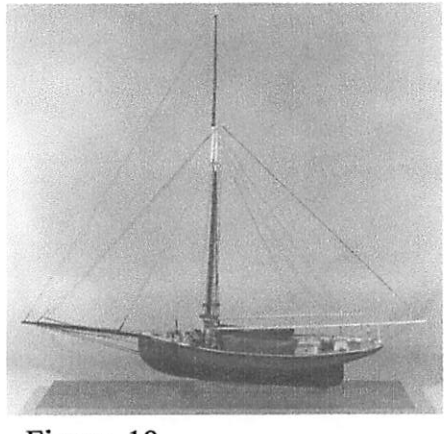

Figure 19

ERIK A. R. RONNBERG, Jr.

When Erik Ronnberg, Jr. received his degree from Long Island University in South Hampton, New York, he had already been working as a professional model maker for 1 ½ years for the industrial modeling firm of Atkins and Merrill in Sudbury, Massachusetts. Following school, Erik spent four years at the New Bedford Whaling Museum as an assistant and associate curator of maritime history. He built the wonderful ½ inch = 1 foot scale model of Kate Cory for the museum and entered publishing with plans of this whaler in 1972 when he was 29.

In 1973, Erik returned to his home in Rockport, Massachusetts, to work with his father. The elder Ronnberg had emigrated from Sweden in 1942 and was a ship rigger and model builder. The Ronnberg apple did not fall far from the tree.

Focusing on Gloucester fishing schooners, Erik produced a series of 3/8 inch = 1 foot scale models of them, at the prodigious rate of about one per year for a decade, for marine artist Thomas Hoyne, who used them to "pose" for his paintings.

Erik started writing for the Nautical Research Journal in the late 1960s and his contributions continue to be popular and important. He served as the magazine's editor from 1990 until 1993 and brought the publication into the twentieth century.

A long time resident of Rockport, Erik has recently moved to Gloucester where he is doing commercial ship model building.

MODEL BUILDING AS A METHOD OF SCIENTIFIC RESEARCH

By A. J. Hoving

There is something confusing about ship models. Looking at them means observing two things at the same time. First, we see a complicated small object made of wood, metal, textile fabrics, paper and paint, and at the same time we imagine the object it depicts: the full-size vessel. A Dutch author once described it as "the Doll's House Syndrome" – making small replicas of something big and feeling the pleasure of looking at it. But is that the reason for the existence of models?

Why were ship models made anyway? And why do we make models nowadays?

These two questions have different answers. Probably the oldest models were made for religious reasons. We found them in Pharaoh's graves in Egypt where they served a symbolic purpose: to help the Pharaoh's spirit to cross the river. In Holland, in many churches, we have models hanging from the ceiling. They were meant to persuade God to protect the ships from storms. Even today ships are placed in churches in Holland but the placement is probably less for superstitious reasons and as simple decoration of the bare, unadorned Protestant churches.

In the seventeenth-century England, technical models appeared that were built by Royal shipyards. They were probably used to persuade the King to order a ship that the model represented, and to commission the yard to build it. The models probably had a decorative function as well. In Holland we know of a few seventeenth-century models, but their purpose was for decoration only. That does not necessarily mean they were not technically correct. Some of them are and some of them are not. Presentation models, built to persuade buyers to order ships, were introduced in Holland in the first half of the eighteenth century. After that, models seem to have been built for a number of reasons:

- They were part of the ship design process.
- They served as a three dimensional archive of a ship's appearance.
- They were used for training.
- They were used to conduct experiments.
- They were used to explain new inventions.
- They served, maybe, another dozen functions.
- For prisoners of war, they served as a way to make a living.

When we compare these reasons with our reasons to make ship models today, we see a massive difference. I am sure most of the model builders today build models because they feel attracted to ships. We have the luxury of abundant time and we use modeling as a pastime and as a way to impress other people. But most of all, we probably build ship models because they make us feel like we are in a close relationship with the actual subject.

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Ship model building is such a large compilation of complex techniques that it is

difficult enough to keep a person engaged in the process for an entire lifetime. But the process also offers an opportunity to learn things. Like most processes, successful modeling opens possibilities for other applications. As an example, when a child learns how to ride a bike, the riding itself is a joy and a challenge. Once he controls the technique, however, he uses the bike as transportation to go to school.

In model building the same thing can happen. There may come a moment in one's model building career when the technique itself is no longer so engaging. But then it can be used for other purposes: to compare, to learn to understand, to build an image of a complex construction or process, or even to rediscover long-lost methods. It may sound pretentious to call that science, but, basically, it is.

*****

The first time I used model building to find an answer to a specific question was in 1979. I had bought a book written by a man who's successor I have since become, much to my own surprise. Herman Ketting's *de Prins Willem* was the first book published in Holland to deal in a serious way with seventeenth-century shipbuilding and it was the book I had been Anticipating for years. It is not that I agreed with everything Ketting wrote – I actually disagree with him in practically every respect – but at least something Dutch finally had come out. The *Prins Willem* was an East Indiaman, built in Middelburg, Zeeland, in 1649 and it was lost in 1661 on the way back from its sixth trip to the East. The model of this ship is one of the oldest in the Rijksmuseum collection in Amsterdam. In the book, I learned that the *Prins Willem* was 181 feet long. By that time I had done some studying about the Dutch East India Company and knew that sizes of ships were dictated by the managing directors, the "Heeren Zeventien." For reasons of standardization, the biggest ships were usually 160 feet long, the medium sized ones were 145 feet, and the smallest rate was 130 feet long. These sizes varied during the two centuries of the VOC's existence. In some rare occasions, Zeeland ships sometimes were made 170 feet long, but never longer. Dutch Admiralty ships were 175 feet at the very most. Why would the *Prins Willem* be 181 feet, I wondered. The statement originated from an eighteenth-century repair list, where repaired ships and their sizes were mentioned. But comparison with data in the archives showed that over 40 percent of the sizes on the list were wrong. Besides, the number of shrouds of the ship pointed out that the length was 160 to 165 feet at the most. This is known from a simple formula found in a shipbuilders manual. Assuming this size is right, the model appears to be at a 1:44 scale and not 1:50, like Ketting claimed. With 11 inches in a seventeenth-century Amsterdam foot, the scale 1:44 makes perfect sense.

What has all this to do with model building? I simply built relatively simple models of every Dutch seventeenth-century vessel I know at that moment and placed it next to the model of the *Prins Willem*, in the same scale, but as if it was 181 feet long. The appearance was absolutely convincing. Anyone could see that the *Prins Willem* could never have been so big. Absolutely everything was out of proportion. This was the first time I used modeling as a method to check something out.

*****

Things were to become a lot more complicated in just a short time. In the same year, 1979, the facsimile of Nicolaes Witsen's book about shipbuilding and management came out. The original book dated from 1671 and was written by a Dutch lawyer, diplomat, and later Lord Mayor of Amsterdam and it was the first book written in Holland that dealt with shipbuilding. It has always been regarded as the most prominent book of its ear but I am forced to say that, in more than three hundred years of existence, probably nobody ever read it completely. This is because the book is a total mess. Officially, there is a sort of structure in it, but in practice, Witsen wrote whatever he could think of at the moment he was writing. Yet it contains about 40 pages of data on a ship that he used as an example to explain the method of shipbuilding used in his days. This is absolutely unique, because the method was not recorded before since Dutch shipwrights did not use plans or drawings. They managed to build ships with little more than some formulae in their heads. And with those ships, Holland succeeded to conquer the world.

Those 40 pages of data really put a spell on me and the thought that I could find enough material to reconstruct the original lines of a ship nobody alive had ever seen sent shivers down my spine. I copied the relevant pages and cut the text into about 1,200 different pieces. Then I tried to combine text fragments belonging to the same subjects and slowly some order, some arrangement, began to appear.

It took me three years to make drawings out of the data and two and a half more to build the model that is now in the Shipping Museum in my hometown of Groningen. While building the model, all the mistakes I had made while drawing the plans appeared and every mistake had to be eliminated in the drawings. Model building served here as a method to understand the old texts and to check the drawings which had been constructed from the text fragments. It was a hard method, but it really worked fine.

*****

By now the lid had come off Pandora's box. I had not found all the answers by drawing and building Witsen's pinas ship. Now, one new question after the other popped up. During the model's building, for instance, I often had the feeling I was doing it all wrong. Witsen described a shell-first construction method and I used a traditional model making method of shaping frames first and then covering them with planks. It appeared to me that by using the seventeenth-century way of construction, even on the model, that I would run into a lot of problems now that they would have encountered then. For the pinas model it was too late, but my next project was to apply the traditional seventeenth-century construction methods in model building and see what answers that process would deliver.

Things were more complicated than I expected. In 1697, a second book on Dutch shipbuilding was published. It was written by a Rotterdam shipbuilder, Cornelus van Yk. His book had much more structure that Witsen's book had, and for this reason it was used more often by scholars. Careful reading, however, taught me that Van Yk described a different type of shipbuilding than Witsen did. So I decided to try out both methods and to record what I was doing with my camera. Since my childhood I have had a very problematic relationship with photography. At the most crucial moments either I or the camera fail. That is how my wife and I lost the very first pictures

of my son's first few weeks. In this case something similar happened. After the project there was nothing on the film. So I did it again, and again something went wrong. When I did it for the third time I noticed that I began to develop a feel for the shape of the model I was working on. I was working faster, and made fewer mistakes than I had during the previous sessions.

The vessel was a relatively simple pleasure vessel of about 40 feet and Witsen gave a small description of it with a simple sketch. Most uncharacteristically, he added some data about the circumference of the boat. As you might know, Holland was the first county where vessels were built only for pleasure.

The description Witsen gave is called a *bestek*, which means a specification contract. These written agreements between the shipbuilder and his customer detailed the ship that was to be built, and they obviously contained information about the ship to allow the builder to build it. Of course the builder also had his formulae, which were simple rules of thumb in which the dimensions of every structural part of the ship was given. For instance, if a ship was to be 100 feet long, the inside of the stern was one inch wide for every 10 feet of length. Every further size was acquired from the size of the stem: the planks were ¼ of the stem, the wales ½, the lower deckbeams 1 1/8 and the frames on the keel ¾, and higher up 2/3, ending in ½ at the top. And so on. I started out with doing some drawing. The stem, stern, and the "midship frame" are things that are usually in these contracts. With the data about the keel there is enough information to make it possible to erect the spine of the ship. The first strake, the garboard strake, was fitted into the rabbit. Now, the bottom of the ship was shaped. In shell-first building they start with the outside, and that was exactly how Witsen described it. The bottom of the ship was ¾ of the total width. How the bottom rose towards the sides was written in the contract, but how the planks were shaped in longitudinal direction was a question that could only be answered in practice: it appeared to change very little. Only towards the stern did the plank twist to fit against the sides of the sternpost. In front, planks were lead towards the stem, but as flatly as possible. Then one or two floors were fitted and on each side of them a futtock was mounted. This defined the shape of the bilge, which was then planked. The bilge was especially hard to shape correctly, and I noticed that it took quite some experience to do it right. The third time was a lot easier than the first.

The "bowl" that I had now was then filled with frame parts. Shipbuilding was a very fast business in those days. A medium sized ship was built in 4 or 5 months by 20 or 22 men, according to Witsen. I began to understand why. It is very easy to bring curved wood into the bowl, to find a place where it almost fits, to cut off the sap-wood and drive in wooden dowels. It works fast and wastes a minimum amount of wood. The ceiling could then be made and some futtocks were erected, to which a very important structural part was attached: the sheer strake. This temporary batten defined the circumference of the ship and its sheer. Once placed to the shipbuilders content, the rest of the futtocks were put in. The inside was faired and the heavy clamps for the deckbeams were mounted. Once the beams were dovetailed in, the construction had considerable strength and could be finished without further problems.

The method of the Rotterdam shipwright van Yk differed. He erected four frames on the keel and formed a net of battens around them. Then the sections of the frame were installed and when the inside of the ship was strengthened by the deckbeams, the outside was planked.

Though the Amsterdam and Rotterdam systems differed, they had many similarities. Both methods were done without drawings, both methods were defined by a number of traditional formulae, and both methods were simple and fast.

I explained my experience at an international symposium and it was a direct result of that paper that I have my present job in the ship model restoration department of the Rijksmuseum.

In this case, model building worked to provide a projected image and a comparison of variations of a rather complex process.

*****

Not much is left of the great accomplishments of my ancestors, but we do have a number of specification contracts. Up to now these contracts were looked upon as just an interesting pile of data, because they are hopelessly short of the most important things we want to know about these ships – like the shapes of the hulls. I found out that if the original building method is combined with the formulae that the shipbuilder carried around in his head, these contracts contained enough information to form a perfectly plausible model, even if the model builder has never seen the ship before.

In 1991, I was commissioned to build models of the two ships Abel Tasman used when he discovered Tasmania and New Zealand. This took place in 1642 and there are no pictures that depict the ships. The only possible thing I could do was find a contract of a similar ship from those days and work from it, like the shipbuilder in the seventeenth-century did. It appeared to be a very useful exercise. It is most rewarding to find out what shape a ship must have had in a very specific period. Early seventeenth-century ships do not look exactly the same as examples from later in the century. Also the decoration and the rigging was subject to a slowly changing fashion. But again the combination of a written contract, the builder's rule of thumb, and the traditional building method led to plausible results.

The *Heemskerck*, Tasman's ship, was a yacht. This word had nothing to do with the luxurious vessels that we call yachts today. The term only meant that the vessel was built to be fast. The East Indian Company had a lot of ships of this type in Asia, where they served both as men-of-war and as freighters. I used a contract I found in Witsen's book for another yacht from the same period and scaled it up to the size the *Heemskerck* must have been: 106 feet. The building process was relatively short. The model was made in a year of spare time and again it struck me how simple and fast the ship shaped itself during the building process. With the data the contract gives, the possibilities and impossibilities of shapes the wood can be worked are used as guides. If a plank gets a shape which is too complicated, something is wrong. The method allows for mistakes. It corrects itself. A wrong shape will inevitably lead to the need to return to the mistake's origin and change it. And changes are easy to make. Fastening with wooden pegs allows the builder to cut away mistakes without further problems. Thus model building

taught me a lot about the method of construction in the seventeenth-century, and, nowadays, I am involved in several replica building projects where this sort of knowledge has led to overcoming problems on several occasions.

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There is one last example I would like to show you. One of Holland's most successful ship types of the seventeenth-century was undoubtedly the fluit. Practically all merchant shipping within Europe was done with this type of vessel, which was cheap to build and to manage and had very satisfactory sailing characteristics, due to its length to beam ratio of 4 or more to 1. Besides, the narrow deck allowed the ship's owners to dodge tolls which were based on the width of the upper deck. Tasman's second ship was a fluit and New Zealand wanted a model of this ship, *Zeehaen*, as well. In spite of the enormous number of fluits built during the seventeenth-century, nothing tangible has remained. At least not enough to build a model from.

Having built a number of models in the shell-first way, this time I allowed myself to experiment to establish the limitations of the method. I deliberately broke rules and tried to cause wrong shapes. But every time I broke the rules, the original formulae proved to be right and each time I had to return to where I made the mistake and correct it I found it to be in accordance with the ancient shipbuilding rules.

Of course one has to be very careful when drawing conclusions from model building experiments. There are aspects of shipbuilding that cannot be worked out in small scale. For instance, in full-size replica building, it appeared that the bevel planed on the edges of the hull planking is very important, both for fitting the plank and for shaping the ship. Model building obviously has its limitations. But, still, for providing a better understanding and consciousness of the areas where problems can be expected when doing full-size building, model building can do a magnificent job.

Working with the model building process I described here allowed me to recover the shapes of vessels I was studying. Without the use of model building techniques, I would not have been able to do this study. The shipbuilding process has to do with the use of both hands and brains and any research using only one of the two is incomplete. Model building can contribute to the understanding of forgotten techniques.

*****

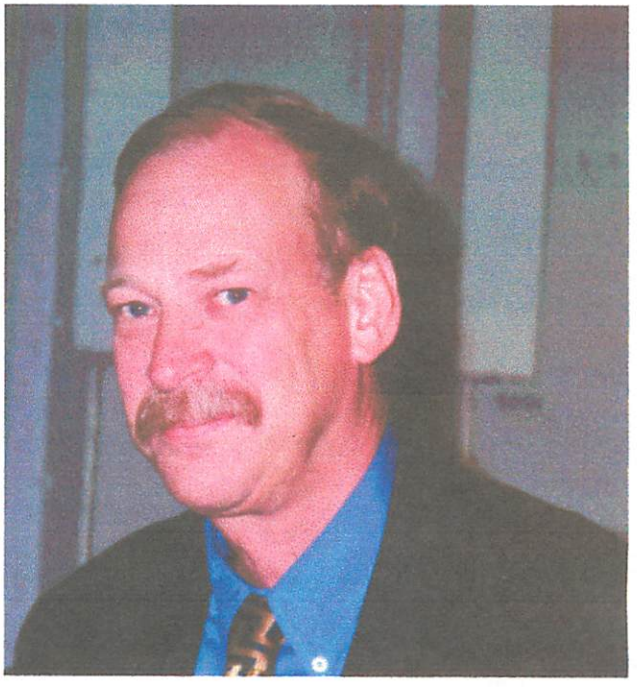
On the other hand, let's not dramatize the significance of all this. In the very first place, I make models because I like to make them, not because I want to carry around a heavy scientific burden. Building ship models is fun, and twenty years ago I noticed that when I was using plywood for framing I constantly chased myself to get to a stage in which the plywood was no longer visible. It bothered me when I looked at my own product that it showed features that had never been on the actual ships. The process of working in exactly the same way as the ancient shipbuilders released me from this annoyance. And it is very reassuring that I can stop working on a model any time I want to. Every stage of the construction process can be an end-stage if desired. The model can serve a shipyard diorama any time. There is no other urge to continue with the model except for curiosity. Curiosity may have killed the cat, but it also is the root of science.

A. J. HOVING

I was born in 1947 in Groningen, Holland. I taught basic training for children up to 12 years old for 10 years and after that woodworking to young people up to 18 years old for another ten years.

Up to 1978 I worked as a volunteer restorer for the Northern Shipping Museum in my home town. As my interest lay in 17th century ships I tried to find material as a basis for modeling. Thus I was introduced to the oldest Dutch publication on shipbuilding: the book by the Amsterdam Lord-Mayor Nicolaes Witsen: "Aeloude en Hedendaegse Scheeps-bouw in Bestier", 1671 (Old and Modern Shipbuilding and Management). In 1979 I started to work on building a model of the vessel Witsen used in his book as an example: a "pinasschip". The model was completed in 1985 and consequently bought by the Northern Shipping Museum. As the book was very impenetrable and I had worked with it for years, knowing my way around in it, I started reshaping it for as far as the shipbuilding part was concerned. My re-edited version of the book came out in 1994: "Nicolaes Witsens Scheeps-bouw-konst Open Gestelt". The English version, "Witsens Shipbuilding Revealed" may come out this year by Boudriot Publications.

As a result of a speech for the International Symposium for Ship and Boat Archaeology in 1988 in Amsterdam, I was asked to work in the Rijksmuseum in Amsterdam as the head of the Restoration Office of the Department of Dutch History. Here I worked for years on the historical Navy Collection which was in a bad state. The collection consists of 1600 nautical objects and is available for exhibition now, thanks to my great team of both scientists, restorer, photographer and depotkeeper. Today I spend my days restoring "in depth" important items of the collection of the Rijksmuseum. Apart from that I am involved in several reconstruction projects of ancient ships and making models as well.



BRIG-OF-WAR EAGLE

HISTORY OF THE SHIP

By Joseph R. McCleary

During the War of 1812 both the United States Navy and the British Navy built or purchased ships to operate on Lake Champlain, which lies between the states of New York and Vermont. Due to the primitive roads in this locale, the only practical way to travel was by boat and ship on Lake Champlain, Lake George and connecting or nearby river systems. The primary mission of opposing navies was to control travel on the lake. The British wished to employ Lake Champlain as an invasion route since it very nearly connected the Saint Lawrence River (via the Richelieu River) with the Hudson River. If the British could control this entire waterway, they could isolate New England from the rest of the United States, capture New York City, and significantly weaken the nation's ability and will to effectively continue the war. The mission of the American squadron, under Master Commandant Thomas Macdonough, who also held the courtesy title of commodore, was to deny access and control of Lake Champlain to the British.

By the spring of 1814, Macdonough had assembled a squadron consisting of the corvette *Saratoga* (26 guns), the schooner *Ticonderoga* (17 guns), the sloop *Preble* (7 guns) and 10 gunboats carrying one or two guns each. The British had a force consisting of the brig *Linnet* (18 guns) and the sloops *Chubb* and *Finch* (both with 11 guns), plus 17 gunboats each carrying one or two guns. But the British were building another ship, larger than *Saratoga*, at the Isle aux Noix on the Richelieu River that flows into Lake Champlain. This ship, eventually to be named HMS *Confiance*, was designed to carry 32 guns and would give the British sufficiently superior strength to overwhelm the American squadron.

Macdonough had long been pressing the Secretary of the Navy, William Jones, to authorize the construction of another ship or brig to reinforce his squadron. Because the resources of the United States were at this point in the war badly over-stretched, Jones was reluctant to authorize another ship unless it was absolutely required. By the summer or 1814 the need became apparent and Jones directed the brothers Adam and Noah Brown, who were well known ship builders from New York City, to proceed to Vergennes, Vermont with a party of shipwrights and to construct, as quickly as possible, a brig of 20 guns. The Browns had built ships for Oliver Hazard Perry's victorious squadron at Erie, Pennsylvania in 1813 and during the late winter of 1813/1814 had built Macdonough's flagship *Saratoga* at Vergennes. In between, they had built the sloop-of-war *Peacock* at their yard in New York City. This latter ship would gain fame under Captain Lewis Warrington. The Browns were extremely busy builders but in the end they constructed an amazingly large number of successful ships. The Browns constructed the ship that would be called *Eagle* in the remarkable

short time of 20 days (July 23 to August 11, 1814) from keel laying to launching. The ship measured 117 ft. 3 in. between perpendiculars, with an extreme breadth of 35 ft. 5 in. and a depth in hold of 7 ft. 3 in. A ship of this size is calculated to have a displacement of about 500 tons. Master Commandant Robert Henley, a native of Williamsburg, Virginia, was given command. Henley recommended that his ship be named *Surprise*, as she would certainly be a surprise to the British when they ran into her. Macdonough directed that the new brig be named *Eagle*.

After a brief fitting-out period, *Eagle* sailed to join Macdonough's squadron positioned at Plattsburgh Bay. The American ships were located here to support the American army that was entrenched nearby at Plattsburgh, New York to resist and approaching British army that possessed overwhelming strength. *Eagle*, like most of the American ships was short of crew, so Macdonough "borrowed" soldiers from the American army including some prisoners who were guilty of minor offenses. The whole squadron began to train earnestly for the anticipated battle. Because Macdonough realized he could never train his men adequately to both sail and fight, he decided to offer battle while anchored in Plattsburgh Bay. This strategy would force the British into a difficult fighting approach. The British could not remain passive, as a stalemate would favor the Americans.

As anticipated, the British squadron arrived on September 11, 1814 with its commander, Captain George Downie, flying his flag in HMS *Confiance*, which had been completed even more recently than *Eagle*. Downie had anticipated that the Americans would elect to fight at anchor and adopted a strategy used by Rear Admiral Horatio Nelson to defeat a superior (anchored) French fleet at the Battle of the Nile in 1798. Like, Nelson, Downie planned to envelope the head of the American line of ships by passing some of his own ships to landward of the Americans and the overwhelm them in succession. The strategy did not work. The British ships were not able to get into their planned positions and Downie was killed early in the battle. After a hard fought action, the four principal British ships were forced to surrender while their supporting gunboats fled north to Canada. The next day, with control of Lake Champlain firmly in American hands, the invading British army broke camp and also withdrew to Canada. A single "sea" battle had produced a significant strategic effect.

As the year 1814 drew to a close, Macdonough's squadron and their British prizes withdrew to the town of Whitehall, New York at the southern end of the lake to be laid up for the winter. None of these ships ever saw action again as the War of 1812 came to an end in February 1815. With the coming of peace, the ships were "moth balled" and left at anchor in the nearby Pultney River. In the ensuing years some of the ships sank at their moorings as the result of decay or storm damage. Others were sold for scrap. *Eagle* was sold in 1825 to a ship breaker but the ship sank before it could be dismantled. Since her slight value did not warrant a salvage effort, she was quickly forgotten.

In 1984, a team of nautical archaeologists from Texas A&M University, working under the direction of Kevin Crisman, located the remains of *Eagle* and conducted an extensive survey of the vessel. Mr. Crisman described the search and survey results in a book, "The *Eagle*, an American Brig on Lake Champlain in the War of 1812", published by the Naval Institute Press in 1987. The model of *Eagle* is based

on this book and a set of plans that are not commercially available, but which were kindly provided to me by Mr. Crisman.

CONSTRUCTION DETAILS OF THE BRIG *EAGLE*

USS *Eagle* was built at Vergennes, Vermont in 1814 in the remarkable short time of 20 days from keel laying to launching. She fought her first and only battle exactly one month after launching. Three months after the battle the ship was laid-up in waterborne storage and never employed again in active service. Probably no more efficient application of the "just in time" management system can be cited in history.

Vergennes, which is located on the Vermont side of Lake Champlain, was chosen as the building site for a number of reasons. It is located several miles up Otter Creek from the waters of the lake. This separation provided unique geographic protection against a raid by the British naval squadron that periodically operated on the lake. Otter Creek is sufficiently fast and deep so that it does not freeze in the winter even when Lake Champlain freezes. The creek thus provided year-round power to local saw mills as well as blast furnaces, iron forges and rolling mills that could provide much needed timber and iron products to support large ship building projects. Noah and Adam Brown, who built *Eagle*, were familiar with the area, as they had previously built Commodore Thomas Macdonough's flagship, *Saratoga,* at the same place in early 1814. With its deep-water creek and well-developed timber and iron industries, Vergennes was an excellent ship building location. There was also a good water and land transportation route via the Hudson River to New York City from whence cannon and other vital equipment, not locally available, could be shipped.

Eagle's design was extremely simple. She was built of green wood and little or no discrimination was paid to what species of trees was employed. It was said that there were trees standing in the forest in the morning that were part of the ship's fabric by evening. Such species of wood as hard maple, white ash, white pine, red oak and chestnut, which are almost never used in shipbuilding, were employed in *Eagle's* construction as well as white oak, spruce and elm, which are normally used in ship construction. Since she was to operate in fresh water, iron fastenings, such as spikes and bolts, were used extensively in place of treenails (or trunnels). This latter type of wooden fastener was required for ships operating in salt water due to corrosion problems with iron. Extensive use of iron fastenings, which were locally available in abundance, added to the speed of construction and the strength of the ship. To further speed construction, no knees of any sort were used. Massive timbers forming the clamps and waterways into which the deck beams were deeply mortised and then firmly spiked effectively tied the ship's frames and deck beams together. An ocean-going vessel built in this manner would have quickly broken up in a storm, but ships on Lake Champlain usually anchored during bad weather and were entirely laid up during the winter when most storms occur.

The requirement for speedy construction over-rode some strength considerations. The Browns demonstrated remarkable talent to come up with these simplified but effective design modifications.

The ship was built with cant frames only at the bow. The frames near the stern were set square to the keel and heavily beveled inside and out to follow the curve of the hull. While wasteful of wood, this building method speeded construction. Wood was

abundantly available; time was not. A glance at the plans shows that the frames were not evenly spaced. Near the midships frame there is even an extra half-frame inserted as a filler for unknown reasons. This is a very unusual condition. Master ship builders would normally space a ship's frames very evenly, if for no other reason than to demonstrate their skill and attention to detail. In my opinion, this uneven spacing resulted from a situation whereby to speed construction the Browns employed teams of carpenters to build numbers of frames in parallel. The frames were brought to the building way and erected as they were finished and not in the usual method where the midships (or widest frame) was built and erected first to be followed by successive frames fore and aft in exact order. This random pattern of frame construction and erection saved time but resulted in uneven spacing which was so great at one point that an extra frame had to be inserted as a filler. While this uneven spacing was cosmetically ugly it did not detract materially from the strength of the ship and would be largely hidden after the hull was planked.

Eagle was a simple gun platform with little or no refinements and was very heavily armed for her modest size with four 18-pounder cannons and six 32-pounder carronades per side for a total of 20 guns. She had an extremely small depth of hold, which gave little storage space, but since she was never out of sight of land, little storage space was needed. The restricted depth of hold also produced a shallow draft that allowed *Eagle* to operate comfortably in the shoal waters of Lake Champlain. Fresh water did not need to be carried as it could be dipped up from over the side. She is equipped with only one scupper (drain hole) per side in recognition that the only water that would need to be drained off the decks was rainwater.

CONSTRUCTION OF THE MODEL

SCALE 1:48

The model of the *Eagle* was constructed mainly of wood using the plank-on-frame method. The model is not an emblematic representation but purports to show the ship and all her construction members as they actually existed. The model is based on a survey completed in 1984 on the wreck of the *Eagle*. The area below the waterline has been left unplanked to show the original (and somewhat unusual) method of framing. Much of the topside planking on the starboard side has been omitted to show this ship's unique style of construction and to reveal other internal details including the uneven spacing of frames and the variable size of the deck beams. No item used in this model was purchased or obtained from any source other than myself with the exception of the hammock netting that is made from bridal veil material died black.

Materials that were used are as follows:

- Castello boxwood: keel, deadwood, frames and some planking
- American holly: main and orlop deck planking
- African ebony: some hull planking and the cap rails
- European boxwood: hatch gratings, pumps, bitts, deadeyes, blocks and other fine-detail deck fittings
- Swiss pear: gun carriages, hatch combings, and binnacle
- Cast pewter: cannons and carronades
- Brass (chemically blackened): iron fittings such as anchors, deadeye chains, gudgeons and pintles, hammock netting cranes.

For aesthetic purposes no paint was used (except on the galley stove) but different species of wood were employed to provide

the required color contrast between various structures and fittings. Since the original ship was put together largely with irons spikes and bolts, these iron fittings have been simulated by the use of ebony pegs which were drawn down to the proper scale diameters using a jeweler's draw plate.

In two instances the model differs from the plans provided by Texas A&M for the reasons indicted:

The plan shows the ship equipped with a steering wheel to control the rudder through the tiller. Archaeologists included the wheel in their plans but admitted it was purely speculative. There is no evidence on the vessel's remains to indicate if there was a wheel or not. I have chosen to delete the wheel and to include only a simple tiller, as this was the usual method used for steering lake boats. Further, the after-most 18-pounder guns would seriously interfere with a wheel and its tackle.

The plans also show low-profile planked hammock stowage boxes above the cap rail. At the scale utilized, these boxes would only be about one foot high which is far too shallow to be practical for hammock stowage. Again, there is not evidence on the vessel's remains as to how hammock stowage was arranged. The type stowage shown on the plans is based on a non-contemporary drawing of USS *Saratoga* in the National Archives. I have chosen to outfit the model with the style of iron hammock cranes and rope netting that was standard on warships in the early 19th century and which the Browns were known to have installed on USS *Peacock* when she was built at nearly the same time. It is reasonable that the hammock stowage would have been higher than one foot so as to provide better cover for the gun crews from small arms fire as the *Eagle's* bulwarks stood only about four feet high.

Since we have not firm idea as to how *Eagle's* rig looked, and since her rig is of no great importance (her one battle was fought at anchor), I have chosen not to rig the model. Since the model has been left unplanked in many areas to show interior and construction details, it would have been extremely difficult to rig the model. I have therefore outfitted the model with broken off stub masts and bowsprit only to show the size and location of these items.

JOSEPH R. McCLEARY

Joe McCleary grew up in Montclair, New Jersey and graduated from Tufts University, in Medford, Massachusetts with a degree in history. In 1993 he retired from the Navy as a Captain after a thirty four year career (mainly in submarines) which was notable only for its longevity. He is no stranger to California, as he and his wife, Helen, lived in San Diego from 1966 to 1969 where their only daughter, Gretchen, was born, making her one of the few Californians who is actually a native.

Joe and Helen currently live in Williamsburg, Virginia where he is a member of the Hampton Roads Ship Model Society and also "works" as a volunteer at the Mariners' Museum in Newport News demonstrating the art of the ship modeler. He also performs repair work on the museum's collection when required. Joe has been a member of the board of directors of the Nautical Research Guild since 1992 and frequently writes for the *Nautical Research Journal.* He has won awards for ship models in competitions at the Model Engineer's Exhibition in London, the Mariners' Museum, and the USS Constitution Museum in Boston. Joe plans to speak on the history of the United States Navy's Brig of War *Eagle* which served in Commodore Thomas Macdonough's squadron defending Lake Champlain during the War of 1812. He will also cover some of the lessons learned in building a 1:48 scale, plank-on-frame model of this vessel.

Ship Models from the Inside Out

"A study of the Construction, Style and Fittings of British Navy Ship Models 1655-1800"

After a brief introduction Simon Stephens gave a breakdown on the structure of his presentation, the first part consisting of a slide illustrated talk on the history and development of ship models leading up to the origin of 'Navy Board' style of models as well as the modem day methods of using x-rays and endoscopes to interpret methods of construction amongst other things. The second part was video footage taken using an endoscope of a selection of models from the collection of Geenwich on which some of the theories and his research was based.

The origins of model making can be traced as far back as 1800 BC when the Egyptians made models of their vessels that were used extensively on the Nile which could be both rowed as well as sailed depending upon the direction of travel. Models of these boats were made, normally complete with figures and a sarcophagus on deck, as part of the extensive 'furniture' found in most of the tombs of the nobility. There was then a large gap of 3,000 years before ship models resurfaced in their traditional three dimensional form where they were again used in a religious category as 'votive offerings' and displayed in churches throughout Europe - a practice that still continues today. The earliest surviving example of a votive model originates from a church in Mataro, near Barcelona, Spain, and dates from about 1450.

From the British perspective, one of the earliest references to ship models appears in the autobiography of Phineas Pett, one of a well established family of shipbuilders, where he made and presented a model to his good friend John Trevor in December 1599. Later Pett also made a frame model of the ROYAL SOVEREIGN which he presented to Charles 1. From the mid seventeenth century onwards, references to ship models start to become more frequent, none more so than in well known diaries of Samuel Pepys where he makes comment on several occasions of his fascination with ship models. It is during his term in office at the Navy Board from the early 1660's onwards that we start to see the use of ship models in conjunction with plans as a way of conveying the complex design and structure of a warship for discussion by the members of the Board. These models, with the earliest surviving example dating from c. 1665, were built in frame with very little exterior planking, and their primary use was to illustrate the shape of the hull, layout of the guns and show the elaborate and extensive decoration. By the end of the century, the models themselves were fast becoming popular amongst high ranking civil servants and naval officers as a number of them were 'acquired' as fine art furnishings for their stately homes.

It is from the early eighteenth century onwards that both collections as well as individual models start to appear and it is from these that the collection at Greenwich originates. A number of the models were held by the Navy in the model room at Somerset House and from the 1830's onwards, were accessible to the public, for the first time. By 1864 the collection was relocated at the newly created School of Naval Architecture, South Kensington on the site of the present Natural History Museum. The naval collection was continually being added to and by 1873 it had outgrown the building. It was decided to move the school

together with the model collection to the Royal Naval College, Greenwich, where it became known as the Royal Naval Museum.

In 19 1 0 the Society for Nautical Research was founded and by 1925 had focused its efforts on 'establishing a Naval and Nautical Museum of National importance and National dignity.' By 1933, the buildings in which the present museum are situated, became vacant when the Hospital School was moved to Holbrook, Suffolk. An Act of Parliament was passed the following year establishing the National Maritime Museum and the nearby Royal Naval Museum collection was transferred to form the backbone of the new national collection. In subsequent years, other important ship model collections were added by influential people such as Sir Junes Caird, Dr. R. C. Anderson, as well as a small but very important collection of models acquired from the training ship MERCURY.

Most of the research and study by Simon of this period of ship model construction has been carried out on both the 'Navy Board' and Georgian, styles of model in the collection at Greenwich. The general definitions of these two groups of models are that the Navy Board models of a hull partially or full planked above the wales whilst leaving the open stylised frames below the waterline so as to accentuate the shape of the hull. They were generally unrigged with partially planked decks which allowed details of the guns, accommodation and internal fittings to be seen. Probably the most striking feature of these models is the intricate carved decoration on the bow and stern areas as well as the wreathed gunports along the sides which were covered with gold leaf or paint. The Georgian style models started to appear from about 1710 onwards and consisted of a fully planked hull on a wooden core built in 'bread and butter' fashion. Again the deck planking was partially omitted but the rigging of models during this period was more common, probably due to the changes brought about by the rigging establishment of 1719

The use of endoscopes and boroscopes, together with x-rays of ship models has allowed the detailed study of the construction as well as possible identification of the woods and materials used. By their very nature of being a hollow wooden three dimensional representation of a ship, it allows one to look at the various woods which have not been affected by the light, varnish and stains. Also it is possible to work out the sequence of construction by looking at the various clues left such as glue and varnish 'runs' together with the way the wooden components have been pinned together which are hidden by layers of external planking. The various methods of planking were also looked at as to whether they were pinned and glued individually or larger pieces of wood where the planks had been scribed and stamped.

The second part of Simon's presentation was in the form of a roughly edited video of the various models that have been examined using the above methods. After a brief tour of the ship model gallery including how the endoscope was set up and used, the first example to be filmed was one of the earliest ship models in the Museum's collection, a frame model of a 50-55 gun ship of c. 1655. Here it was possible to study the construction process by using x-rays which not only highlighted the mass of metal pins holding the whole structure together, but they also show the of damage by wood worm as well as later restorations. The next example was a model of a 70 gun ship of c. 1698 which over the years had been badly

damaged by wood worm to the stern area. As a result of this it was decided to rebuild this part of the model to give not only structural support to the remaining portion but also to add a working whipstaff to the already existing fittings situated on the deck above and tiller below. By carefully working the rudder externally, it was possible to film a whipstaff in action in the cramped conditions between decks.

The third model was of a three decker 96 gun ship of c. 1703 where the interior of the hull was explored in close detail showing how the individual frames had been chiseled and snapped into the hull to create the stylized hull framing. By this time model makers were becoming more adventurous and started to include fittings such as rigged capstans, stairways and stoves. On this particular model there is a complete set of beautifully painted miniature portraits of mythological figures mounted in moulded panels in the grand cabin. Because of the size and diameter of this equipment, it allowed access through the main entry port on the lower gun deck which revealed an exciting panoramic view along the deck cluttered with various fittings such as deck pillars and main capstan as well as years of dust.

The model of the ROYAL CHARLOTTE, a 100 gun ship of 1789, was chosen to illustrate the Georgian style and included such features as internal cabin decoration and layout, highly detailed and beautifully carved stem decoration. The interior of the hull was explored through the mast apertures where it was possible to see the individual 1/4 inch planks which had been glued together in bread and butter fashion to produce the carcass to which the, external planks were pinned and glued. Tool marks were visible where the model maker had gouged out the carcass to reduce the model's weight.

The final model to filmed was of the ROYAL GEORGE, a 100 gun ship of 1756 and arguably one of the finest examples of eighteenth century model making. It is not difficult to understand why, as this model is one of several commissioned in 1772 by the then First Lord of the Admiralty, John Montagu, the third Earl of Sandwich, for presentation to the Prince of Wales to raise his interest in naval matters. The model is fully planked on the starboard side and is complete with gunport lids and bulwark decoration. The port side has been left totally unplanked with alternate frames omitted to enable the wealth of internal fixtures and fittings to be seen. Because it was a royal commission, the over indulgence and quality of craftsmanship of the model makers is stunning, making it a perfect candidate to explore with an endoscope. The internal features are many but the selection included bilge pumps with the leather valves and chains, galley stove and pantry, the Great Cabin paneling complete with working doors on small brass hinges and beautiful marquetry flooring on which is a fire hearth is modeled in brass. The exterior of the model is just as impressive as the carved decoration is of the highest quality. The bulwark friezes have been painted on by hand with areas of the stern galleries highlighted in mother-of-pearl and intricate stern lanterns which are modeled in bone.

SIMON STEPHENS

After college, Simon Stephens spent one year, as an archeological draftsman in a British government-training program near his home is Essex. In 1978, he joined the National Maritime Museum in London, and he has been there ever since.

He initially worked in the Ships Department that was then responsible for the museum's collections of ship models, of full-size boats, of figureheads, and of ships' equipment. When he was assigned to the huge ship models collection, the seventeenth-century and eighteenth-century models mesmerized him. He also developed an interest in the history of Britain's famous life saving service.

In 1988, Simon was appointed curator of the ship models and the assignment permitted him to travel both in the UK and abroad to study most of the world's major collections that are in public and private hands. He has published two books: Ship Models, Their Purpose and Development from 1650 to Present in 1995, and Ship Models, Maritime Collection Series, in 1992.

Simon lectures to clubs and societies and writes for maritime magazines. He is a consultant to several British government departments and to other national bodies, shipping companies, and auction houses.

Simon and his wife Karen have two young daughters, Charlotte and Katherine.

Simon lectured at the Western Ship Model Conference & Exhibit, 1998, on "Using Fiber Optics to Examine the Interior of Ship Models."

Steamboat Design and Architecture for the Model Maker[1]

A Presentation at the 3rd Western Ship Model Conference and Exhibit
on the R. M. S. *Queen Mary*,
on Saturday, March 28, 1998,
at Long Beach, California,
by
Jack E. Custer,
Editor of the *Egregious Steamboat Journal*
and
Vice President of Steamboats Masters & Associates, Inc.
Louisville, Kentucky

The steamboat is America's most historic icon of design, aesthetics, and engineering. What is surprising for such an illustrious entity as the steamboat is that so few have studied the steamboat's architecture and design. This is a topic for which model builders have seldom been able to find adequate information. This presentation will explain the fundamentals of steamboat architecture and show what resources are available to learn more about this topic.

The most aesthetic steamboats were built by men who had minimal architectural and engineering training. In fact, most 19th century steamboats were not built with blueprints and plans such as we know them today.

Instead a steamboat builder would have a stock of half hull models. After an initial consultation with a prospective customer, the boat yard staff would determine which hull model was most suitable for the proposed application. The chosen hull could either be scaled up or down to fit the needs. Occasionally hybrid hulls were designed by taking qualities from two different half models and combining them. The rest of a steamboat's construction evolved in a loosely coordinated fashion whereby there was a separate subcontractor for the cabin, engines, boilers, and iron work. Despite the amorphous process, the results were usually satisfactory.

This procedure lasted many years. There was no serious change until the late 19th century when iron hull steamboats were first built in quantity. Unlike wooden construction, iron steamboat construction required a more regimented approach and this soon led to the adoption of more formal plans.

Learning about 19th century steamboats for which there are no or few plans is a formidable research challenge; but it is an area in which there has been considerable advancement during the past 45 years.

A serious student of the steamboat can spend a lifetime ferreting out information on this topic in contrast to the short time that it takes to receive two advanced degrees. Even after a lifetime of study, the most diligent researcher will still feel that he/she has barely scraped away the tip of the iceberg of one of the greatest masses of untouched research material in any scholarly vista. Probably no other topic in marine history can involve so many different areas of study as the steamboat.

The steamboat is in a class by itself in maritime history, for there is nothing else comparable to it. Unlike so many other American items that came about by borrowing so many ideas *in toto* from

England and Europe, the steamboat came to fruition with minimal help from abroad. Of course, Robert Fulton secured a Boulton & Watt steam engine for the *Orleans* of 1811; but it was not long before the Americans developed their own singular type of horizontal long stroke steam engine especially suited for steamboats.

One reason for the American steamboat's rapid development and ultimate success was the Americans' willingness to experiment. Their distinct advantage was not being fettered with customary approaches because the steamboat was such a new idea and for which there was little conventional thinking. For once there was something so new that there were no known standards and no one really knew the best approach. The British and the French had each had some success with the steamboat. Each country had taken a different approach and the Americans were taking yet another. It was one of the earliest examples of international intellectual and engineering competition.

Outside the *Orleans*' initial usage of an English steam engine, American steamboating otherwise totally relied on American engineering and ingenuity. The names of John Fitch, Oliver Evans, and Robert Fulton are most commonly associated with the steamboat's early development; however, the steamboat's development and fruition was an accretional process and the credit actually belongs to at least 100 other people who were variously involved and had success with steamboats prior to Fulton. There are some, e.g., James Rumsey, to whom unwarranted credit has been given.

What made the significant difference in the steamboat's rapid development here vs. abroad was the singular character of the American rivers. The Mississippi, the Ohio, and the Missouri provided access to more than half of the country. It was then that the rivers were the highways to the west.

Outside of the coastal areas during the late 18th and early 19th centuries, personal transportation generally remained a dream. Along the coasts sailing vessels provided transportation; but there were few rivers on which sailing ships could travel any significant distance.

If you wished to reach any distant point inland, you had the choice of walking, riding horseback or riding behind beasts of burden in wheeled vehicles. Urban travel was difficult because of the unpaved streets that quickly became seas of mud. Travel beyond urban areas was rugged and laborious, for one had to pass through heavily wooded sections that made any speed in travel negligible. What were considered "roads" were actually rough trails.

Those who wished to head to the west started across Pennsylvania on several rugged trails. It was no easy undertaking and it took several months of discomfort. When people finally reached the confluence of the Allegheny and the Monongahela Rivers, where the Ohio is formed, at what would late become Pittsburgh, only the first part of the adventure was over.

At Pittsburgh a family would purchase a flatboat and soon begin a pioneering odyssey down the Ohio to the land of their dreams. Compared to the rugged trip across Pennsylvania by land, the voyage down the Ohio was much easier; but it was still far from easy. The reason was that the Ohio River was then without any improvements; and this meant that there was no guaranteed depth in the navigation channel.

All transportation was done on the annual rises in the rivers. That is to say, during late January or early February, the ice might melt enough to cause a natural rise.

Usually a spring rise came in April. The Ohio river was wont to become nearly dry during the summer. There was usually a fall rise that came in October, though it could be as late as November or early December. Early 19th century river travel was far from convenient.

Early river travel was done on board flatboats and keelboats. Flatboats tended to be floated downstream and dismantled at the destination and recycled for their wood. Keelboats, on the other hand, were substantially constructed and were intended to last for many trips. The keelboats were taken back upstream by manual labor.

Although early river travel was primitive, the rivers quickly became our highways to the west and would remain so for many years to come. The enormity of the American continent made many realize that the application of steam to river transportation was a necessity for the country's future expansion.

At the same time many others had great faith in building canals across the United States. The canal was a viable solution; but it was not the panacea that some thought that it was. Another event fomented the rush to solve the contemporary transportation challenge.

When the Louisiana Purchase came about in 1803, the rivers were the highway to the west and the most practical means of transportation; but there was only one way to conquer the rivers for the purpose of using them for transportation and that was the development of the steamboat. It was obvious that whoever developed the steamboat first would make an incredible amount of money because of the desperate need for improved transportation.

Chancellor Robert Livingston was an opulent sophisticated New Yorker. He was cultured and politically astute, though no engineer. Word of the impending Louisiana Purchase in 1803 came to him by way of his brother in New Orleans. Livingston realized that the United States' size would suddenly be increased overnight and that the steamboat would have an important role in the near future.

America's instant enormity brought a challenge to develop a new form of transportation, one that had previously only been dreamed about here and abroad. The main motivation was that whoever was the first to develop the steamboat would make the most amount of money; and this was precisely what Livingston and many others were most interested in.

Livingston knew that the steamboat was a technological possibility and he sought out the assistance of Nicholas Roosevelt and Robert Fulton. Although the steamboat would come about on the Hudson in 1807, it would not be until 1811 that the *Orleans* made her epochal trip from Pittsburgh to New Orleans. That trip literally caused the world to change because steam power had been successfully applied to the Mississippi and Ohio Rivers and the dream of personal transportation was almost true.

The steamboat allowed the United States to make a number of quantum leaps; and the steamboat played no small part in the 19th century notion of our manifest destiny. Although few historians have been perceptive enough to understand the steamboat's role, the steamboat's significance ranks along with other monumental discoveries and developments such as the invention of gunpowder, the printing press, the development of the steam engine, the generation of electricity, the telegraph, the internal combustion motor, the transistor, the microprocessor, and, more recently, the Internet.

Samuel L. Clemens is a cynosure of American literature who inadvertently accelerated the steamboat's identity as an

American icon through *Tom Sawyer* and *Huckleberry Finn*. Clemens' works are known around the world and have been translated into so many different languages that the steamboat has become the ubiquitously known icon of America. For something so well-known as the steamboat to have attracted so little scholarly attention to its architecture in the past 187 years seems incongruous.

Few realize that there were ca. 16,000 steamboats on the North American continent. Atmoploiophiles have divided the known steamboats into ca. 85 categories. Steamboats have been propelled by sidewheels, sternwheels, centerwheels, and propellers. Their diversity is mind-boggling because the steamboat was so useful for so many different applications.

Although our knowledge of the earliest steamboat construction and techniques is far from satisfactory, we have managed to learn a lot about this topic from archaeological discoveries and old photographs of steamboats under construction.

Although there were ca. perhaps 60 significant steamboat building locations, only few steamboat building yards are well-known through photographs. What is surprising is that we know so little of some of the most famous yards.

For example, before the War of the Rebellion, New Albany, Indiana, had nine boatyards. New Albany built some of the most famous steamboats of all time, e.g., the *Eclipse* and the *Robt. E. Lee*; but there are no known extant photos of the New Albany yards.[2]

On the other hand, the Howard Yard of Jeffersonville, Indiana, is extremely well-known because the late Captain James Howard diligently photographed the yard's products from the late 1880s through the 1930s and his photos have been preserved.

Although the Howard photographs are incomparable and monumental, they have shed an inordinate amount of limelight on the Howard's role and many have wrongly inferred that the Howard Yard was far more important than it actually was. In fact, many well-read steamboat researchers are not aware that there were two other steamboat builders located in Jeffersonville.

Two of the most famous steamboats of all, the *Sultana* and the *Natchez* (VI), were built at Cincinnati, Ohio. Most Cincinnatians are unaware that their city has an illustrious role in steamboat building. This disturbing situation is repeated at many other places all along the Ohio, the Mississippi, the Missouri, and their tributaries; but there are few extant photos of those operations. When there is little photographic evidence to document the full story, invariably a historical imbalance is created.

What is most intriguing about the earliest steamboats is that their builders were at a total loss as to how to build them, for there had been no steamboats built previously and there were no precedents for them to follow.

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[2]Interviews with the late Paul Seabrook of New Albany, Indiana, 1974-85. Mr. Seabrook was well-known as a knowledgeable steamboat collector who was most interested in New Albany steamboats for nearly 80 years. He noted several times in his latter years that he had neither found nor seen photos of the old New Albany boat yards. Had such photos been extant Mr. Seabrook would have been the one most likely to have known about them. Such photos may have existed at one time; however, boat yards along the Ohio River were so ordinary in the 19th century that they were hardly worthy of photographic attention. That, however, is precisely why the Howard photos are so valuable, viz., James Howard photographed in detail what everyone else thought was so ordinary. Would that there had been a Jim Howard for the other boat yards.

The early steamboat builders understandably and regrettably borrowed many techniques from shipbuilders. Their worst mistake, however, was using a deep draught hull on the unimproved Ohio River, for it was unable to accommodate the variable river stages.

The early steamboats had bowsprits, figureheads, and martingales. All of these were standard for saltwater sailing vessels and yet useless on the inland rivers. These items were either quickly abandoned or modified into more useful adaptations for steamboats.

Between 1811 and 1832 the deep draught hull was supplanted by the shallow draught hull. The most innovative aspect was the incorporation of a flat bottom that allowed a steamboat to handle the constantly changing levels of the early unimproved rivers.

Even though the deep draught hull was abandoned on the rivers, the rib and buttock lines used for shallow draught steamboat hull were not unlike those championed by John W. Griffith and Donald McKay, though seemingly vertically compressed.

Also abandoning the deep draught hull for the shallow draught left little room to accommodate steamboat engines in the hull. This appears to be the aetiology of the development of the horizontal long stroke steamboat engine using levers and poppet valves. Usually this change is attributed to Henry Shreve;but there is really no evidence that Shreve deserves the credit.[3]

The shift to the shallow draught hull was a monumental technological move. The new hull's flat bottom allowed a steamboat to survive groundings. Because of the nature of the unimproved 19th century rivers, it was difficult to know what to expect in operating a steamboat from one day to the next.

When a rise was over and low water was imminent, steamboat men generally looked for pools of water where a steamboat could continue to float. On the other hand, a serious drop in the river level might leave a steamboat high an dry for a while. The flat bottomed hull was a marvel of practical engineering and especially useful in that it was flexible enough to allow a steamboat to survive almost any situation.

Whereas the standard saltwater shipbuilding philosophy was using heavy ribs and heavy planking, the steamboat builders used light ribs and medium planking for their hulls. Although this change was a definite improvement, the resulting innovative steamboat hull had a serious weight distribution problem with the concentration of the boilers' weight forward and the engines' weight aft.

Unfortunately we have little detailed extant information on how these problems were solved; but it appears that steamboat hulls were stiffened and given internal rigidity in the 1830s.[4] The following is a synoptic interpretation of how it was achieved.

Steamboat hulls were internally stiffened in three different ways: (1) by using a center and wing bulkheads; (2) footlands; and (3) and hogchain posts and hogchains. The two latter systems were structurally integrated inside the wing bulkheads. The footlands formed the bottoms of the wing bulkheads and they together functioned as parallel backbones and stiffeners for the hull's bottom. The hogchain posts' bottoms were inserted into the footlands and the hogchains were anchored in them with clevises as well. The footlands, the wing bulkheads, the hogchain posts, and the

[3] *Cf.* Louis C. Hunter, *Steamboats on the Western Rivers* (Cambridge: Harvard University Press, 1949): 75-6.

[4] *Ibid.*, 96.

hogchains with their clevises formed two parallel bottom chord cantilevers that kept the hull flat and partially supported the boilers and machinery.

Who else except American steamboat builders of the 1830s would have been so audacious as to combine their own contemporary ingenuity with a systems of hogchains, an idea that goes back to Egyptian times 3400 years earlier? Hogchains would remain in use on steamboats until the late 1920s when welding and better metallurgy made them no longer the necessities that they were in the 19th century.

Our knowledge of the early steamboats is limited to the excellent sketches and paintings of foreign artists, such as Karl Bodmer, Charles Alexandre LeSueur, and Achille St. Aulaire. Their work is so good that steamboat historians have been able to develop plans for boats from their sketches by using photogrammetrics.

What we can see about the early steamboats in their sketches and paintings is a gradual progression toward a perceptible standard in steamboating architecture that slowly approached an aesthetic ideal. The most noticeable characteristic is the sheer, the longitudinal curve in the decks, and the camber, or crown, the lateral curve in the decks.

The steamboat builders borrowed sheer from saltwater shipbuilding. The difference, however, was that the steamboat builders incorporated the sheer into the truss system created by the footlands, bulkheads, and the hogchains.

The crown, of course, allowed the decks to drain. We should add for the sake of model builders unfamiliar with steamboat hulls and superstructures, that there was no such thing as "tumble home" involved in steamboat hulls.

One unusual aspect of sheer and crown was that steamboat builders tended to exaggerate it slightly more on each ascending deck as the superstructure rose upwards. That is to say, you'll usually notice a slight increase in sheer at the ends more than anywhere else. Similarly, the crown tends to increase from deck to deck, especially at the ends of roofs, decks, and skylights.

Along the main deck there are a number of stationary stanchions and hanging fenders. All these slope inward slightly as they reach the second deck, the boiler deck. However, the stanchions around the boiler deck to not slope inward to the deck above. The smokestacks, however, lean out from each other at their tops.

The steamboat builders used curvilinear and rectilinear lines. These lines worked together to form a harmony and an amazing level of symmetry that grew closer to perfection with each passing decade from 1811 until 1866. It was during this 55 year period that the first steamboat, the *Orleans*, went from such a primordial entity to the sublime aesthetics of the *Robt. E. Lee* of 1866, the greatest steamboat of all time, and completed an aesthetic metamorphosis.

What is intriguing about steamboat architecture is that the designers and builders took such mundane entities and turned them into floating poetry in motion with their own peculiar sense of aesthetics and symmetry seen nowhere else.

Unlike modern boat builders and naval architects who know only to use right angles, flat surfaces, and rectilinear lines, 19th century steamboat builders judiciously avoided flat surfaces and rectilinear lines, even though it was impossible to build a boat without them. You ask how? A steamboat has several completely flat surfaces: (1) the sides of a pilot house; (2) the bottom of the hull; and (3) the stern engine room bulkhead on a sternwheeler ahead of the sternwheel.

If you study steamboat photographs extensively, you'll probably not notice any flat surfaces or rectilinear lines because the steamboat builders had a wonderful elusive way of unconsciously leading your eye away from them. Yes, they used optical allusions so subtly that students of steamboat architecture have only been able to detect them after many long hours of tedious photo analysis. The steamboat builders knew how to use slight variations in certain places that **appear** correct, though we know from research and photogrammetrics that they were actually anomalous.

Steamboat builders cleverly concealed these flat surfaces and subdued rectilinear lines by juxtaposing them against nearby curvilinear lines and surfaces. In other places they simply reduced angularity by raking a line; but you won't detect this without serious effort.

These techniques are so subtle that you cannot realize how they work until you see poorly executed steamboat architecture and compare it. A good example is the *Mark Twain*, the steamboat at Disneyland in Anaheim, California. The *Mark Twain* is very well done and she embodies all the subtleties of superlative steamboat architecture except for one detail. When you watch her pass, you realize that her hogchains are not raked adequately and this oversight stands out badly. Perhaps one person in 40 million will recognize that oversight; but that is what you learn to see after you have studied steamboat architecture in detail via thousands of old photographs.

All these wonderful aesthetic notions were achieved by men who had minimal aesthetics in their own lives and background. As a result, they achieved a sublime level of artfuness by their own unartfulness.

We should emphasize that there was **no** absolute standard way of building steamboats, for there were many regional and local variations. Perhaps the most interesting—and challenging—aspect of studying steamboat designs is learning how many different architectural styles there were. May will erroneously assume that steamboat architecture was generic; but nothing could be further from the truth. Each boatyard tended to be different from the rest.

The boats built at New Albany, Indiana, a short distance downstream from the Howard Yard at Jeffersonville, Indiana, were different in their style, architecture, and appearance from the Howard boats. Similar, yes; but otherwise very different. You'll find that the boats built on the Upper Mississippi River are unlike those built on the Ohio. This overwhelming diversity is the reason that you cannot make rash assumptions about steamboat architecture without studying at least 10,000 steamboat photos.

A good shibboleth for a person's ignorance of steamboat architecture will be his/her use of the term "Steamboat Gothic." This was the title of a novel by Frances Parkinson Keyes. Many obtusely assume that it is a proper term applicable to all steamboat architecture. On the contrary, there is nothing remotely Gothic about steamboat architecture; and it is an error to associate the steamboat style with anything Gothic.

When you talk of "steamboat style," you're referring to something uniquely American. It has some early elements of art nouveau, some Victorian, and even Eastlake; but it is not any one of these. In reality, it is an egregious American hodge-podge of styles that, believe it or not, work together in an amazing harmony. Although most look at the steamboat as being something incredibly "old-fashioned," it actually reflected the latest styles of its day

Of course, not all steamboats were elegant and aesthetic. Some were dowdy, dumpy, and bereft of any grace or elegance. The big fancy sidewheelers that ran from New Orleans upstream to Greenville, Mississippi, each fall during the cotton season's end were the most elegant of them all. The grandest boats with the superlative steamboat architecture came between 1866-1886, long after Samuel L. Clemens had left the Mississippi to make his fame and fortune as a writer.

What is most compelling about steamboat architecture is that it was the product of men who knew nothing about the history of architecture and had no inkling of sophisticated naval architecture. Equally incredible is the fact that unlettered steamboat carpenters somehow knew about entasis and many other techniques that Ikteinos and Kallikrates, the architects of the Parthenon, employed long ago.

The men who built steamboats generally had little education and many were barely literate. They learned their craft from others without any textbook. As a result of this process, their learning was carried in their head without being written down. Furthermore, little about steamboat construction and its architecture has ever been written down. It has largely been an effort on the part of several serious steamboat scholars that this knowledge has literally been resurrected by the careful study of old steamboat photographs and poring over old documents from the 19th century.

The principles of steamboat building were surprisingly simple for entities that had the elaborate nature of a seven layer wedding cake. The principles can be distilled down to these few statements: any line on a steamboat must be fair. Above all, those lines must combine to form a graceful, fluid elegance with an overall symmetry.

However, those principles did not always hold true, for there were many steamboats that were hardly aesthetic masterpieces because their owners did *not* have enough money for the niceties.

Probably the best examples of the ugly steamboats are the various gunboats built for the Union during the War of the Rebellion. There were several exceptions that are fascinating to study even now.[5] For the most part, the Union gunboats were excessively rectilinear; but, despite their seeming design simplicity, they can be genuine challenges for a model builder to duplicate.

You may also learn that some steamboats that were magnificent in their appearance were not necessarily well-liked because of certain resulting operational problems. Specifically, sustained sheer at the bow of a steamboat can rise to the point that it was difficult for deckhands to handle the stage and the ropes at a landing.

Methodical steamboat architectural researchers have learned that the sheer was occasionally allowed to dwindle to make a boat's operation more practical. That is to say, while aesthetics were paramount, they were occasionally sacrificed. Also, the crown was occasionally was allowed to flatten out in certain places for the sake of practicality.

Another design technique is "diminished mass." Many of the largest Greek temples still standing tend to look much smaller than they actually are. When you look at them from a distance, they do not appear large at all; but when you come close to them, their size becomes incredibly large.

This is the hallmark of a good design, viz., that it does not look so large. Ettore Bugatti did this in automobiles with his La Royale. Boeing has done it with the 767.

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[5]E.g., the *Lafayette*, *Choctaw*, and the *Eastport*.

Steamboat designers and builders had a similar proclivity whereby they could make a steamboat over 300 feet in length seem almost petite from a distance. This can be seen in the largest towboats as well as the largest packets.

The Towboat

The sole benign byproduct of the War of the Rebellion (1861-65) was the evolution of the towboat. The towboat came about in the 1850s and the first ones were sidewheelers, for which we have no photographs.

The reason that sternwheeler supplanted the early sidewheel towboats and subsequently dominated towboating was that sternwheelers can have up to four rudders, whereas the sidewheeler normally only had one. The sternwheeler's extra rudders could provide much better control over a tow of coalboats and barges.

The sudden need for coal in great quantities from the Monongahela River valley in Pennsylvania to fuel the Union gunboats and transports at Fort Henry and Fort Donelson in the spring of 1862 and later Vicksburg caused towboating to become a serious part of the wartime river industry and the early military/industrial complex.

The early sternwheel towboats were perhaps the ugliest nautical creations of all time. They had minimal aesthetics and symmetry because they needed none. Whereas the fancy packet was in essence a floating hotel, the towboat was a floating dormitory for men who had left the coal mines and had gone on the river to become steamboat men.

The towboaters were a group unto themselves and were generally looked down upon by the other steamboat men as crude louts from western Pennsylvania. These crude louts were hardly as stupid as their rustic appearance first indicated. Many quietly made fortunes by supplying the Union gunboats with coal at high prices.

After the war many Union soldiers returned to Pennsylvania and became involved in the wholesale shipment of coal to the nascent southern industries. This gradually became a huge business that used wooden coalboats and barges to bring coal south. At first it was a one way trip for the coalboats that were sold with the coal, dismantled, and their wood recycled.

By 1870 the need for coal in the industrializing South increased so much that the coalboats became two way craft and they were no longer dismantled except when they wore out. Gradually a coal distribution was established whereby coal was wholesaled from Pittsburgh to distributors along the Ohio and the Mississippi who in turn retailed it to consumers.

Most will assume that the fancy packets were the dominant steamboats during this era; but that is not accurate. The proliferation of railroads that came in the 1860s and 1870s with government subsidies made it difficult for the unsubsidized steamboats to make money.

By the mid-1880s the Ohio and the Mississippi Rivers had sets of rails along each bank for most of their distances. The result was that the long distance packets were struggling and their day was actually over.

While the big packets were in the midst of hard times, the towboaters found themselves in the midst of a new prosperity resulting from growing coal trade between Pittsburgh and New Orleans. As the coal trade grew in the 1870s and the 1880s, the towboaters' attitudes towards their towboats changed.

They began to look at their mundane towboats and wanted them to have grace and elegance not unlike the packets, though not identical. The towboaters' innate prevailing

desire was to outclass one another and they did this through their towboats. Steamboat men, whether towboaters or packet men, could not stand being outclassed, whether they were on the most elegant packet or the most non-descript towboat. Life aboard steamboats was very competitive

When it came to towboaters and their feelings about their towboats, that was the province of the unalloyed male ego. Towboaters fanatically followed the latest records of the largest coalboat or model barge movements, the fastest runs, or any tidbit of river news indicating that one towboat had outdone or outclassed another.

Rivalries between towboat crews frequently reached flash points and burned through their egos' thin shells. And as towboats gradually took on a fairly standard appearance in the 1880s and shed their early dowdy appearances, their crews enjoyed not so subtle competition as to whose towboat was the fastest, most powerful, and/or—especially—the most imposing in appearance.

Whereas packets embodied majesty, elegance, fluidity, and gracefulness, towboats embodied a totally different spirit. Their forte was power and their symmetrical designs reflected power and strength in every line. This beefy aura was in turn further enhanced by the flying buttress effect of their hogchains and their carefully raked hogchain posts. They exuded power in their every symmetrical line.

The towboats of the 1880s took on a carefully orchestrated and restrained brawny handsome appearance that evoked power per se in a context of subdued understated elegance. In contrast to the towboaters' rough penchant, the towboats of the late 1870s and the 1880s were very different from their Spartan predecessors of the 1850s and 1860s.

Towboats were venerated for their power. They were understandably perceived as masculine creations, the very antithesis of the packet. They became fancier in the 1880s, though in a most controlled sense of restrained grace. As they became larger, they took on their own peculiar sense of symmetry and aesthetics.

Towboat men knew very well which towboats had been designed by Captain Peter Sprague, Andrew Axton, or Ike Hammett, for their hallmarks were their distinctive designs. There were numerous non-descript towboats with minimal graceful lines; but their gangly unrefined lines elicited no pride from their crews.

The towboats with nice clean symmetrical lines had ardent followers and were favorites with the towboating crowd. The homes of towboat men invariably had large framed photos of their favorite towboats for conversation and bragging purposes.

Doing It Yourself

Steamboats were generally built with a minimum of specifications and without blueprints in the modern sense until the advent of iron and steel hulls. As a result, it was difficult to fully understand the design of many steamboats until the mid-1950s. It was then that Alan L. Bates (1923--), a marine architect of Louisville, Kentucky, began using photogrammetric techniques to develop model plans for steamboats not built with plans in the first place. Although it took Bates several efforts, eventually with the assistance of the late Captain James E. Howard as his mentor, he began to recapture on paper what had nearly become the lost art of steamboat building and its architecture.

Bates' enormous contribution to steamboating research was single-handedly enabling steamboat design and architecture to be systematically analyzed and studied.

Others have since followed in Bates' pioneering photogrammetric footsteps and have developed plans for other steamboats that were built without blueprints or for which the plans were lost over the years.

Although developing blueprints from photos is not difficult, it is a process that requires extreme patience, several efforts, and occasionally having to scrap everything and start over from the beginning. This process is not for everyone. Only people with tenacity should try it.

There are a number of excellent steamboat model plans available and we sell these through the *Steamboat Store Catalogue*. Instead of starting off with the fanciest packet or the most complex towboat design, find a reasonably simple one to begin with. Study the *Steamboat Cyclopoedium* thoroughly and re-read it several times. Obtain all possible photos of the boat you want to model and study them until you feel as though you know the boat from stem to stern.

If you are new to steamboat model building, you'll find that there is a lot to learn and studying a simple set of plans can help you understand a steamboat's design and architectural peculiarities without becoming overwhelmed.

Later on, though, you may want to build a particular intriguing boat for which there are no available plans or blueprints. Doing your own plans can be a most gratifying undertaking and you may blaze some new research trails in the process.

Our advice for doing your own plans is to do your research, find every bit of evidence and every photograph or illustration possible, become thoroughly knowledgeable of this material, and then start your plans.

Study all the graphic evidence. You may find that there are certain time periods for which there are no photos of a boat. This can lead you into the realm of conjecture; and this is where you can make serious errors. Some prefer to depict a steamboat's appearance during a particular era, for which there are more extant photographs. The wisest course is to study all the extant photographs of a particular steamboat and carefully establish a chronology of the changes and alterations. That allows you to determine any changes in a boat's appearance and reduce the chance of errors in your conjectures.

If you develop your own plans, study every extant photo carefully. Every serious student of steamboats has an assortment of high-powered magnifiers and uses them constantly to ferret out arcane details.

I'll warn you ahead of time that studying steamboat architecture can become an enveloping passion that will last a lifetime. Several who have pursued this topic seriously have managed to unravel the mysteries of design techniques that have been forgotten for over a century.

You should study genres of steamboats, the designs especially favored by certain lines or companies, and study the builders and all their boats in order to draw reasoned conclusions. In addition, it is worthwhile to study each work of certain steamboat designers to determine their characteristic design proportions and techniques.

Some model builders have first built superlative saltwater vessels and have then decided to try their hands at developing plans for a steamboat model. We have seen mediocre steamboat plans come from excellent ship model builders. There are many similarities between saltwater craft and steamboats; but there are also many differences. This is why you have to study the various designs and architecture of steamboats so carefully to get them right. The amount of research is just as important as applying the proper finish to a model.

Our company has occasionally been called on to help out people who have built steamboat models using 19th century plans for government steamboats. The reason for being called was usually "I duplicated the plans precisely; but the model does not look like the photos of the same boat. What went wrong?"

One frequently encountered difficulty in using old plans is the issue of "proposed" vs. "as built." These are two different items. We can show you a number of plans where the proposed steamboat looked nothing like what was subsequently built. This is especially peculiar to governmental agency steamboats.

Usually what happened in building a government steamboat (e.g., for the Lighthouse Service, U. S. Engineers, Mississippi River Commission, Missouri River Commission, et cet.), was that the original plans were submitted to a committee which then proceeded to bicker and redesign the boat until the end product looked very different from the original plans. This is also the reason that government steamboats were notorious for being such bad designs.

Steamboat builders routinely made many changes during construction without necessarily documenting those changes. It is not out of the ordinary to find original plans with five alternative methods noted for certain details. Don't be surprised to learn that none of the alternative proposals was used. For this reason it is imperative to examine photographs of the actual steamboat to compare with the **proposed** plans to see if the steamboat was built similarly or not.

If you find that one particular steamboat intrigues you, you might find that there is an authority who specializes in that boat's history. Those monomaniacs can be most helpful for developing plans because they will usually have already sought out every known photograph and can show you precisely what you need. If you enjoy reading the accounts in river columns of old newspapers, you'll find a gold mine of wonderful details there.

Steamboats can challenge the very best model ship/boat builder, so be prepared for your first effort at attempting to reduce a steamboat in a photo to plans to require several tries before you're satisfied.

There will inevitably be some occasions during which you'll have to walk away from your drawing board for a week or two to allow your mental faculties to recover. Learning to conceptualize a steamboat in three dimensions for two dimensional plans can take time and leave your mind numb.

If you feel that you've reached the end of your rope, don't despair. Several resourceful steamboat scholars and model builders will be glad to help you out and answer your questions. Usually you can e-mail, fax, or telephone these folks and they'll solve your problem fairly quickly. In many cases, you'll eventually learn that your "problem" has been experienced by others long beforehand—though they won't tell you that immediately.

- Anyone who has made his way to the top in steamboat history and architecture has made mistakes. Don't be afraid to make mistakes so long as you can learn from them. Usually the best steamboat model makers will have a few photos of their early blunders and will go out of their way to make certain that no one else makes a similar error.

Two terms to watch out for are the absolutes "always" and "never." When you work with steamboat architecture and design, it's safer to go with "usually." You'll quickly learn that few things were ever done in the same identical fashion.

Once you've done your basic research, you'll be able to build an incredible model. Those who build steamboat models from plans that they researched and drawn have transcended from being mere "model makers" to become "model engineers." These people eventually become the steamboat gurus.

When you research steamboats seriously, you study history, architecture, engineering, design, technology, and a host of other intriguing topics that you'll never learn about in any college or graduate course.

Steamboats remain the least studied vista in maritime history. Steamboat design and architecture represent the ultimate challenge for a model builder. It's an incomparable learning process and we invite you to come aboard and share this wonderful experience with us.

Learning More

You'll have to look carefully to find books on steamboats and river history; however, there is a wide spectrum of information available. The following are basic books that will help you learn about steamboats. Use them as starting places and branch off into the river columns in old microfilmed newspapers of river cities to learn more.

Way's Packet Directory (1994) revision). This is a useful starting place; but it does not deal with any steamboat before 1848.

Ways' Towboat Directory (1990). This is a useful book for learning some of the basics of towboating history.

The Merchant Steam Vessels of the United States 1790-1868 (usually called the *Lytle-Holdcamper List*). This is the definitive source for learning more about the early steamboats.

Alan L. Bates' *Western Rivers Steamboat Cyclopoedium* (1969) is an excellent place to learn about the many technical aspects of steamboats. This is mandatory reading for any serious steamboat enthusiast.

Louis C. Hunter's *Steamboats on the Western Rivers* (1949) is the standard reference. It is, however, extremely technical and not easy reading for most.

You can order these and many more interesting books through the *Steamboat Store Catalogue*. The toll-free number is 1-888-JMWHITE. MasterCard and VISA are gladly accepted.

Periodicals

The *Egregious Steamboat Journal* has been published since 1991. It costs $20.00 per year (U.S.). write Steamboat Masters & Associates, Inc., P. O. Box 3046, Louisville, KY, 40201-3046.

Other Sources

There are many good sources for learning more about steamboats. There are wonderful collections at certain libraries. Since steamboating is not a topic widely known to librarians, you may not find the assistance you need immediately. Our suggestion is to call ahead of time to make an appointment. Some excellent collections are housed separately in special collections and require special arrangements to view them.

For the most extensive holdings in steamboat photos, travel to La Crosse, Wisconsin. The Murphy Library of the University of Wisconsin at La Crosse has a superlative collection of 46,000+ steamboat and river scenes. Call the

Special Collections Section at 608-785-8511 and ask for Ms. Linda Sondreal.

The Mercantile Library at St. Louis is currently merging with the University of Missouri at St. Louis. It has the Ruth Ferris collection, the Waterways Journal Collection, and the Herman T. Pott Collection.

The Lilly Library of Indiana University at Bloomington, Indiana, has the papers for the Howard Yard of Jeffersonville, Indiana.

The Donald T. Wright Collection is now part of the William Merrick Jones Collection It is housed at Tulane University in New Orleans and access to this collection is limited.

Western Kentucky University at Bowling Green, Kentucky, has the Courtney M. Ellis Collection and the Will S. Hays Collection.

The Filson Club in Louisville, Kentucky, has the Flora Collection which is now part of the Arthur Hopkins Collection.

The Public Library of Hamilton County and Cincinnati has an excellent source of materials at the Inland Rivers Library in the Rare Book Section.

The University of Louisville has a superlative Photo Archives in the Ekstrom Library. You'll find the Stryker Collection and several others that are exceptionally useful in river and steamboat research.

The National Archives has an abundance of primary steamboat documentation dating back to the 19th century. The regional branches at Chicago, Kansas City, Atlanta, and Philadelphia have a wealth of archival materials on steamboats. It is prudent to call ahead to make an appointment to visit. Some branches have extended hours on certain weeknights. The volume of material at the National Archives is huge. If you visit a branch, plan to spend at least a day. There is no such things as "a quick trip" to the National Archives.

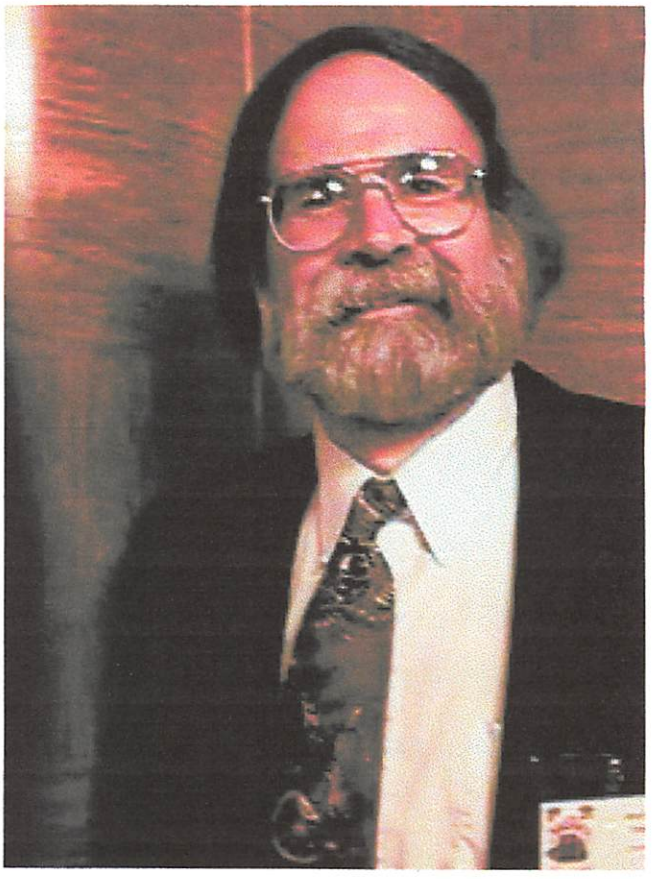
Since few librarians will be knowledgeable of steamboats, you're likely to be inadvertently guided into irrelevant topics such as "steamships." Frequently there are catalogues and guides to various collections. It is prudent to call ahead of time to ask a librarian about the various available guides and ancillaries that you can order. Be sure to review these ahead of time so that you can know precisely what to ask for.

The National Archives has many branches and certain materials may be located in places that make no immediate sense (e.g., the Louisville records are in Chicago, the Pittsburgh records are in Philadelphia records are in Pittsburgh, and the Memphis records are in Atlanta). Our company has found that the National Archives holdings are incredibly useful and the staffs at the various branches have been most helpful.

Again, please call any library ahead of time to make certain that the materials you want to see are available, are catalogued, and have not been transferred elsewhere for storage or conservation.

JACK CUSTER

Jack Custer hails from West Virginia and had received degrees in Greek and Latin, which he has also taught. Intrigued with steamboats from an early age, Jack decided to apply classical scholarship to the study of the boats indigenous to his part of the world. Jack has developed a specialty in the architecture of the bigger towboats, especially the designs of Captain Peter Sarague.



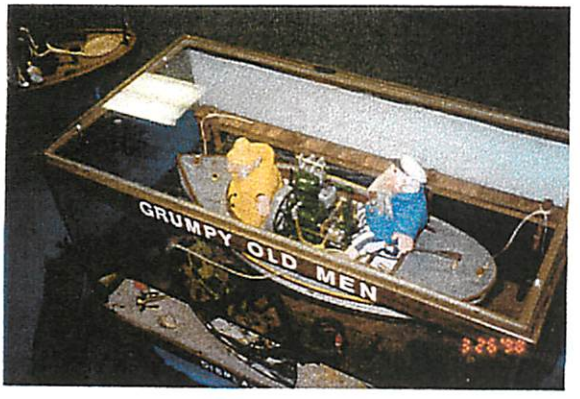
Since the 1970's, Jack's passion has been his business. He and his wife Sandy (who he met aboard a steamboat) own and operate Steamboat Masters & Associates, a Louisville, Kentucky, company devoted to research, consulting, and publishing on steamboat topics. They publish The Egregious Steamboat Journal, and Jack's writings have appeared in numerous other magazines including Sea History, The Work Boat, Nautical Collector, Waterways Journal, and Ships in Scale.

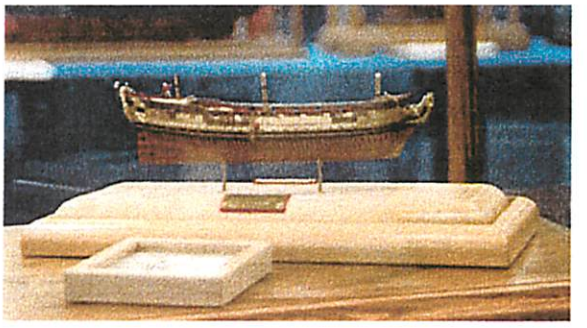
Jack's company has done archeological research for the Army Corps of Engineers, graphics research for the 1996 United States Postal Service steamboat stamps, and research for various artists and museums.

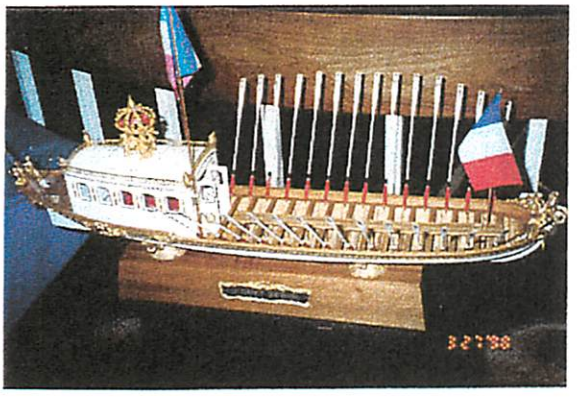
Jack spoke on steamboat architecture and how builders juxtaposed curvilinear and rectilinear aspects of their design.

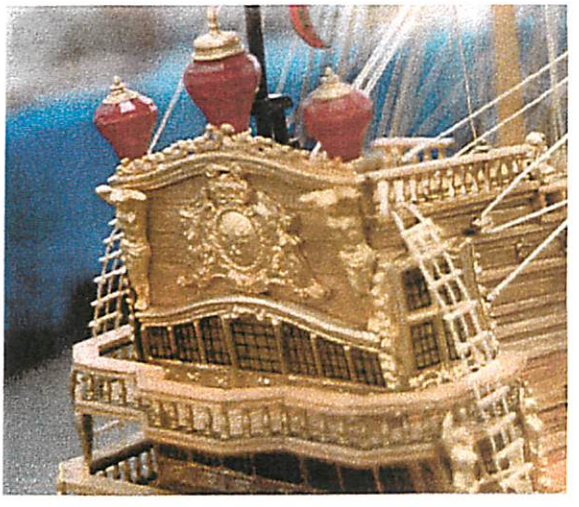
1998 WESTERN SHIP MODEL CONFERENCE

SHIP MODELS



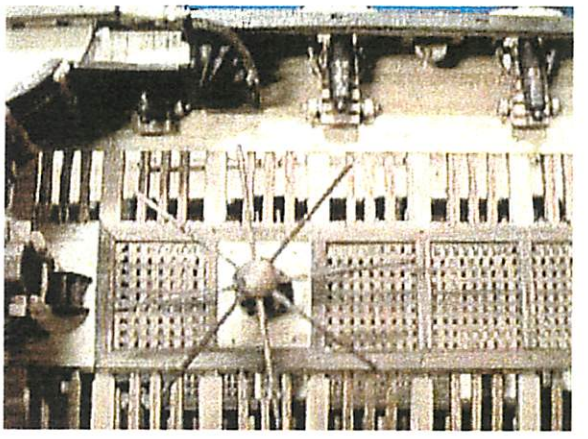


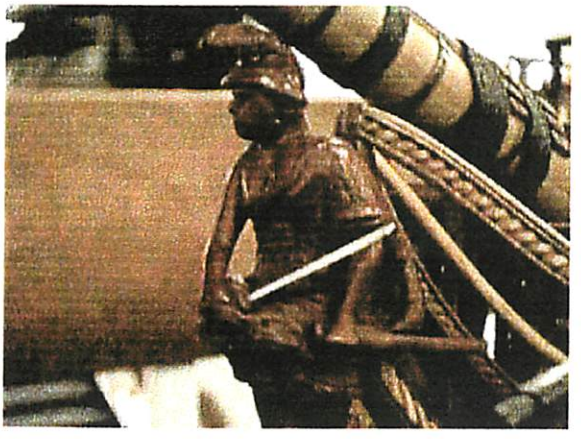


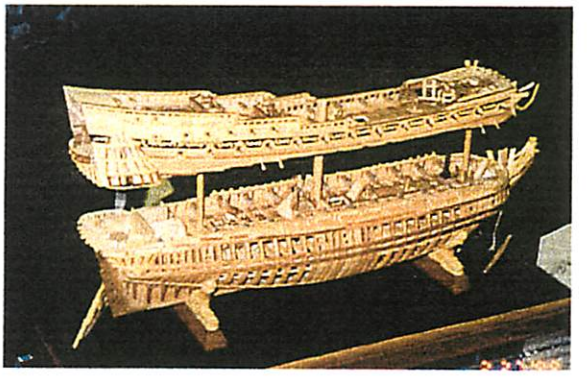


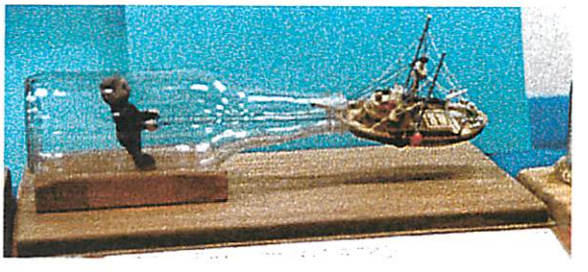
1998 WESTERN SHIP MODEL CONFERENCE

SHIP MODELS



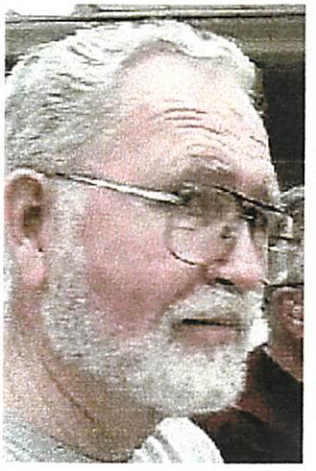




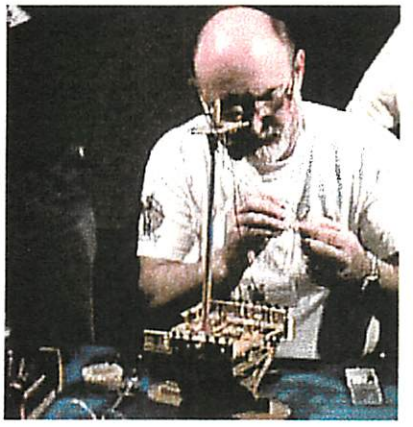


1998 WESTERN SHIP MODEL CONFERENCE

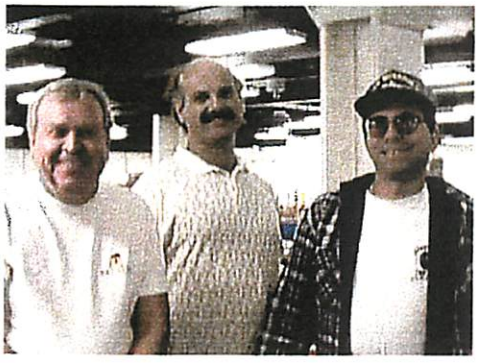
PEOPLE



Chairman Bill Russell



Registrar Lloyd Warner



CRAIG HUSAR

Craig Husar loves to untangle a good mystery. He deals in diamonds, one of earth's most precious treasures. Craig is currently preparing the debut of a traveling exhibition, consisting of rare and exotic diamonds, for the Alan Friedman Company of Beverly Hills.

As the Exhibition Director for Mel Fisher's *"Treasures of the Atocha"* traveling museum exhibit, Craig was responsible for a $40 million private collection of 17th century sunken Spanish artifacts. During his tenure, the exhibit traveled to 80 North American cities, attracted 250,000 visitors and generated revenues of over $10 million. Craig recovered emeralds, silver "pieces of eight" and pottery shards while scuba diving on the Atocha site. He has written several articles on the Atocha and makes frequent appearances on television and radio talk shows. His motivational lectures have inspired dreams.

As an Instructor of Gemology, for the Gemological Institute of America in Santa Monica, Craig lectured on diamonds and colored gemstones. Archaeological interests in early Mezo-American culture lead to his specialization in Colombian emeralds. To broaden his knowledge of oceanography, Craig is pursuing a Master's Degree in Marine Biology.

Craig gave a speech at the banquet describing his involvement with the Atocha and its treasure.

ODYSSEY OF A MODELER

One of the Ship Modelers Association's most renown members was Henry Bridenbecker. Henry made many scratch built models over the years. As a scratch modeler, he did not rely on ready made products for his models, but made them through his own effort and ingenuity from any raw materials he happened to have on hand.

Henry's interest in ship model building began in the mid 20's, at about the age of 14. He had a few simple tools such as a block plane, knife, coping saw, ruler, hand crank drill, and his Dad's big swivel vise. Glue was a problem back then. There was LePage liquid glue, which was sticky but did not hold wood very well, and there was hot furniture glue, which smelled terrible when heated on his mother's kitchen stove, and didn't hold worth a hoot unless the material being glued was clamped under pressure. It also required several hours to set up.

Henry started out building scratch models as he not only could not afford kits, but he did not realize that kits and plans existed. His building materials consisted of sugar pine, cedar from cigar boxes and cardboard from Manilla folders. He got small cans of enamel in various colors that took forever to dry. Wire brads were the best fasteners and very small screw eyes made fine deck ring bolts. His "plans" were made by hand copying pictures of small boats in various magazines.

Popular Science magazine furnished him with his first projects by supplying him with drawings and instructions for various solid hull models. One of his first models was of the Indianapolis.

His next project was a Spanish Galleon from drawings by Captain E. Armitage McCann who was often called the "father" of modern model ship building. In one example of following Captain McCann's advise, he borrowed one of his mothers celluloid knitting needles and sliced off several thin discs. Next he got one of her smaller sewing needles and held it in a flame on the kitchen stove until it became red hot. He then burned three holes in the celluloid disc for lanyards. Henry recalled that his best production was about three acceptable deadeyes out of ten.

After several models he started on his first plank-on-frame model of the Malek Adhel. When he started making ship and cant frames, fastening them to the keel and deadwood, and also fashioning bilge stringers and beam shelves and the other structural members of the hull, he became engrossed in this fascinating new dimension of the hobby.

After his children had left home, and while convalescing for 6 months with a fractured hip and pelvis, he dived into his hobby. With help and encouragement from his wife Phyllis, he assembled and rigged (while being held rigidly in a cast) several plastic models and finished the upper rigging on the Malek Adhel. After his retirement, he spent 35 hours a week ship modeling and using his leisure time to research each new project he undertook. Most of his models were created in a small five by ten workshop, using tools he often created to complete a special task at hand.

Henry liked to choose to model a ship not often built by other modelers. For example, he modeled a service boat, a river barge, an ancient coastal trader, a Dutch fisherman's boat – in other words the not so famous and grand vessels. He believed that these unusual ships played an important part in the development of shipping in our history. His models span a period from 300 BC into the latter part of the 19th century, each being of a different type and period. They provided him with some knowledge of the construction and function as well as something about the men who sailed on them.

In his opinion, an authentically modeled ship fits together naturally. The interior construction does not have to be faked, and the modeler can appreciate and understand her structural beauty. Even if the hull were to be completely planked, the modeler would still know that the ship was honestly built and would be rewarded with the feeling of pride.

In addition to authenticity, Henry felt that scale was of utmost importance when building any model. It would grate on him to see a ship's ladder with steps 2 feet apart, belaying pins 4 feet long, or hatch gratings with openings big enough for a man to put his leg through.

Henry's test for the finest fixture or detail was could it be distinguished with the naked eye, assuming the model was the real thing, from about 75 feet away. If you could not identify it at that range he did not attempt to make it.

The models in the Bridenbecker collection, shown in our 1998 Western Ship Model Conference and Exhibit, represent a life's work, reflecting personal techniques, interests, and tens of thousands of hours of experience. It was a privilege to show Henry's collection. We are sure that you enjoyed it.

Carving for the Model Shipwright

By Frank Wilhite

PREPARATION FOR CARVING

The technique of miniature carving is perfected primarily through experience. However, one can put their best step forward if you make the best possible preparation for the actual carving. I have developed the following guidelines from making many mistakes over the past ten years. I wish to emphasize that these guidelines represent my opinion, which are not necessarily shared by other model shipwright carvers.

MAKING PATTERNS

Many other carvers can just take a block of wood, picture the mermaid figurehead to be carved and proceed to "remove all the wood that is not the mermaid." I am not artistic enough to do this so I go to the library and look through several books to find the best possible drawings (or photographs) of the object I want to carve. Using several drawings from different books I may even cut and paste portions of drawing copies in order to get the exact pose and appearance I desire for the carving.

After I have cut and pasted side and front views of the object, I take them to a copier and, using a ruler and calculator, change the size setting on the copier to achieve an actual size pattern. This will work even if the two views are different in size. I then make several copies of the patterns.

APPLYING PATTERNS TO WOOD

I have tried many methods of applying patterns to wood: using spray adhesive on the back of the pattern; using carbon paper; piercing through the pattern into the wood with the tip of a scalpel; etc. All these techniques have advantages and disadvantages. In my opinion, the best technique is to transfer the pattern directly to the wood using heat. Any Xerox type copy or laser printed pattern can be heat transferred to wood. An iron can be used but I have never been able to get it to work properly, besides using an iron is very awkward to transfer a small pattern.

The best tool I have found is the "Transfer Tool", item no. 910-507, sold by Woodworker's Supply @ 1-800-645-9292 for about $20.00. This tool works extremely well transferring even the faintest pattern cleanly to wood. The only disadvantage is that the transferred pattern is a "mirror image." The answer to this problem is to make a transparency copy (@ a cost of about 40 cents), then flip it over to make the final copies.

SAWING OUT THE WOOD PATTERN

The wood can be sawed out using a jewelers saw with a 1/0 blade or smaller. Once it took me 3 hours to saw out a 3-inch section of scrollwork. I decided then there had to be a better way. I purchased a Delta Model 40-650 Variable Speed Scroll Saw but there are several others that would also meet our requirements. These requirements include: a slow cutting speed no greater than 350 strokes per minute; the ability to clamp blades as small as 8/0 size (width 0.0126 in., thickness 0.0063 in.);

the quality and smoothness of operation to use 8/0 blades without breaking them.

So that you can see what you are sawing use a light that provides a large well-lit area with no shadows if possible. Also use a head mounted binocular magnifier of at least 3 power with a working distance of at least 8 inches. This means the magnifier must have compound not simple lenses. I use an Eschenbach 1636-4 which is 4 power at 10 inches costing about $190.00.

In my opinion, one should saw to the pattern line, not outside it as is suggested by many others. This is especially true in sawing out scrollwork. I have seen much carved scrollwork on ship models that looks too bulbous. I feel that scrollwork should have a delicate look so I always saw it out to the line. The exception to this rule may be figureheads, but do not saw too far outside the line or you may end up with an out-of-proportion carving.

CARVING TOOLS AND ACCESSORIES

Before I discuss carving tools the most important accessory you must have is a binocular head mounted magnifier. Just as I mentioned above in sawing out the pattern, you must be able to see what you are doing. In addition, when you have carved something that looks pretty good at 4 power, it will look fantastic to the naked eye.

Some carvers use miniature hand carving tools for model ship carvings. I find them too difficult to control, so I use only hand grinders and air turbine engravers. To rough out a figure down to the approximate shape I use the smallest Dremel hand grinder Model 260, which I purchased in 1962. This model is discontinued but there are other small models, such as the mini-mite, that are available. Definitely use a small lightweight tool for maximum control.

For the final carving I use an air turbine engraving tool which runs at 200,000 rpm or greater. This allows one to delicately "wipe away" the wood with tremendous control. The February, 1998 issue of Wood Magazine had an article comparing four of these engravers. I have the Ultra-Speed Turbo Carver. In addition, I also use the disposable dental hand piece engraver sold by Spray-Sok (@ 1-800-327-7729) for about $50.00.

The engravers use only 1/16-inch diameter burrs so I usually find used dental burrs or buy them new from a dental supply company. I also custom make burrs from broken dental burrs for special purposes.

Instead of using an air compressor to run the air turbine, I use a 20-pound cylinder of liquid CO2. It is much quieter than a compressor and is very easy to use.

The following three articles provide much additional information useful in carving: (1) written by Rev. William Romero as part of his CONFEDERACY practicum, practical rules for drawing the human figure so you can draw your own pattern to carve; (2) portion of an article for the Nautical Research Journal written by Roman Barzana, provides information of ship model carving including using a non-wood material; (3) from an unknown magazine, written by John Blight, provides additional general information.

HOW TO TURN OUT A QUALITY CANNON IN TEN MINUTES OR LESS

By David M. Sherwood

Text and Photos by David C. Leach

David Sherwood, an accomplished Southern California ship modeler, faced what could have been a monumental task. He reckoned that it would take him as many as twenty working days to turn out the seventy-four cannon to go aboard his *HMS Alfred-74* if he was to turn them out the usual way, in brass, one at a time by hand. Buying them ready-made was not an option; the quality of the store-brought stuff was not up to David's high standards. To adapt some computer-driven machining process was also out of the question; the cost could not be justified. So he began to search for a practical, economical solution to cannon making which would reduce the production time involved, yet still produce a quality product.

The solution turned out to be a combining of existing tools and techniques as opposed to some revolutionary new discovery. After some experimental tinkering and fine tuning, and confident that his approach would work, David invited me over to his shop to have a look and possibly assist him in writing an article about his find.

He greeted me at the door by handing me a small tray containing about thirty miniature cannon, which except for their size, looked exactly like the real thing...authentic curves at the cascebel, a pleasing bell-like flare at the muzzle, each sporting a semi-gloss black sheen. What's more, they were all alike. Clearly he was onto something.

"The problem," David said, "is that turning a piece of brass on a lathe is a one-off process. You cut, then measure, cut some more, then measure again, from as many as ten dimensions for a 32-pounder. It is painstaking, laborious, and what you end up with is a piece that can't possibly match the curves of a real cannon, and no two ever come out the same. Furthermore, the brass has to be polished and chemically blackened. I just had to find another way!"
Inspired by the article on *HMS Alfred-74* in Harold Hahn's book, *Ships of the American Revolution and Their Models* (London, Conway Maritime Press Ltd., 1988), David began construction of a 3/16 in. = 1 ft. model in the Autumn of 1995, with a goal to complete it in three years. When the hull was finished and the time came to make and install the cannon, David did some serious thinking about how to turn out higher-quality cannon in less time.

It was an illustration of a cannon-making technique in Hahn's book that got David to thinking. Hahn suggested that a paper template be made to locate the various points along the barrel. While this approach represented an improvement over having to stop frequently and measure the work, it was still a one-off process, which required free hand filing, causing variations from piece to piece

However, David's "big idea" did not come together until, while thumbing through a Micro Mark catalog, he spotted a duplicator attachment for the Carba-Tec woodturning lathe. It used a metal template to turn out

look-alike screwdriver handles and such. "Why not adapt the duplicator to my Unimat SL 1000 and make the cannon out of ebony?" he reasoned.

The idea had a lot of things going for it. One template gets made one time, from which hundreds of identical pieces could be produced. Accuracy and consistency could be maintained, with small changes possible by adjusting the template, resulting in overall higher quality. Ebony is naturally black, so there would be no time-consuming polishing and blackening as there is with brass. Additionally, the weight advantage of wood made it less likely that cannon would shake loose in transit and damage the model. There was also the promise of cost benefits. The duplicator approach represented a relatively low-cost solution (computer-controlled machines cost thousands; the catalog price for the duplicator was $129.00.) The cost of 74 pre-made cannon would have exceeded that of the duplicator, and the only alternative was to turn them out one at a time by hand. Furthermore, neither of these approaches would produce the level of quality David wanted to achieve.

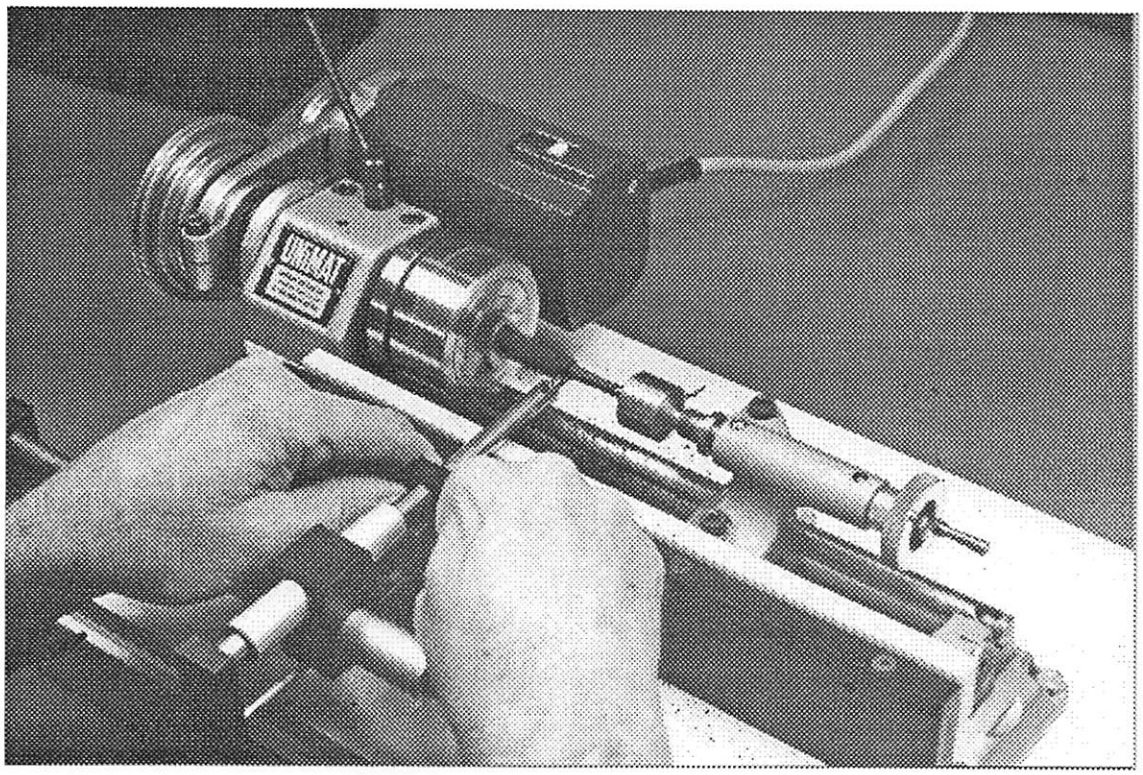
He then set to work to marry the duplicator with his venerable old Unimat, as shown in the photo, and developed a process to turn out perfect cannon in minutes rather than hours. The first order of business was to produce a template from a flat piece of brass strip stock. David traced the barrel diameters onto the brass (remembering to halve the diameters and allow space for clamping,) cut out the pattern with his band saw, then finished the template with a file until has was satisfied with its shape.

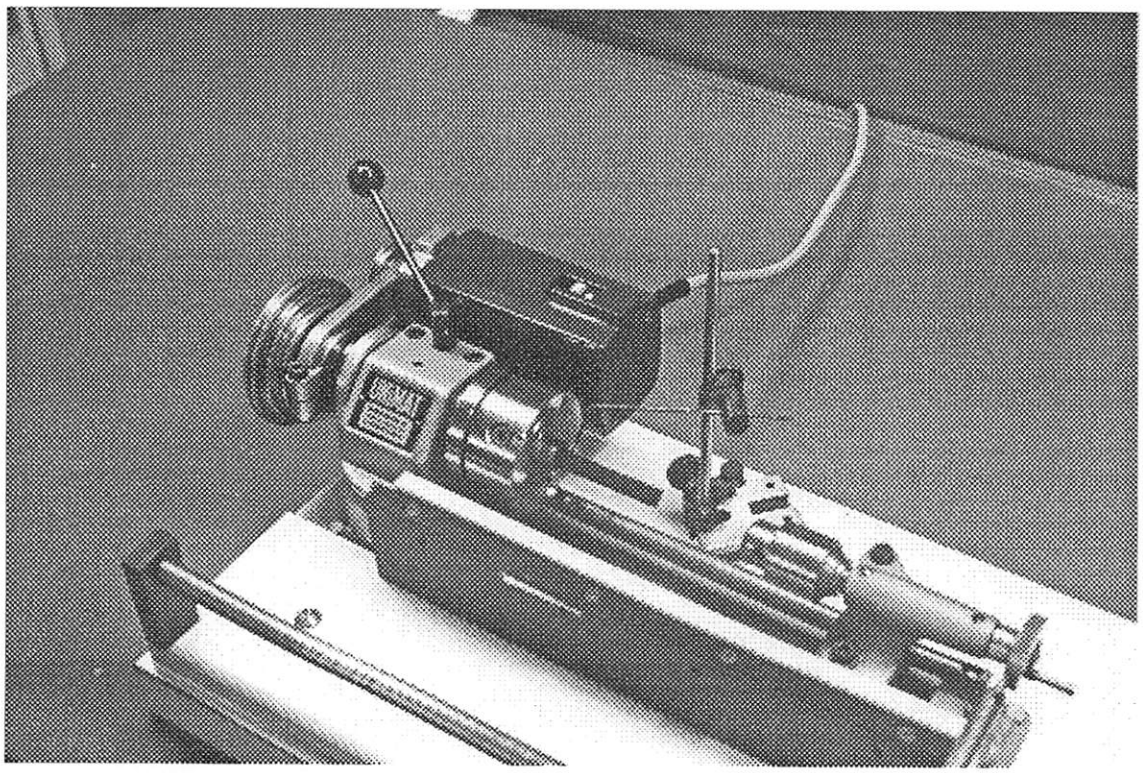
After several trail runs and fine-tuning, David was ready to demonstrate the technique before a live audience. At that point I was invited over. I watched and took pictures as he worked.

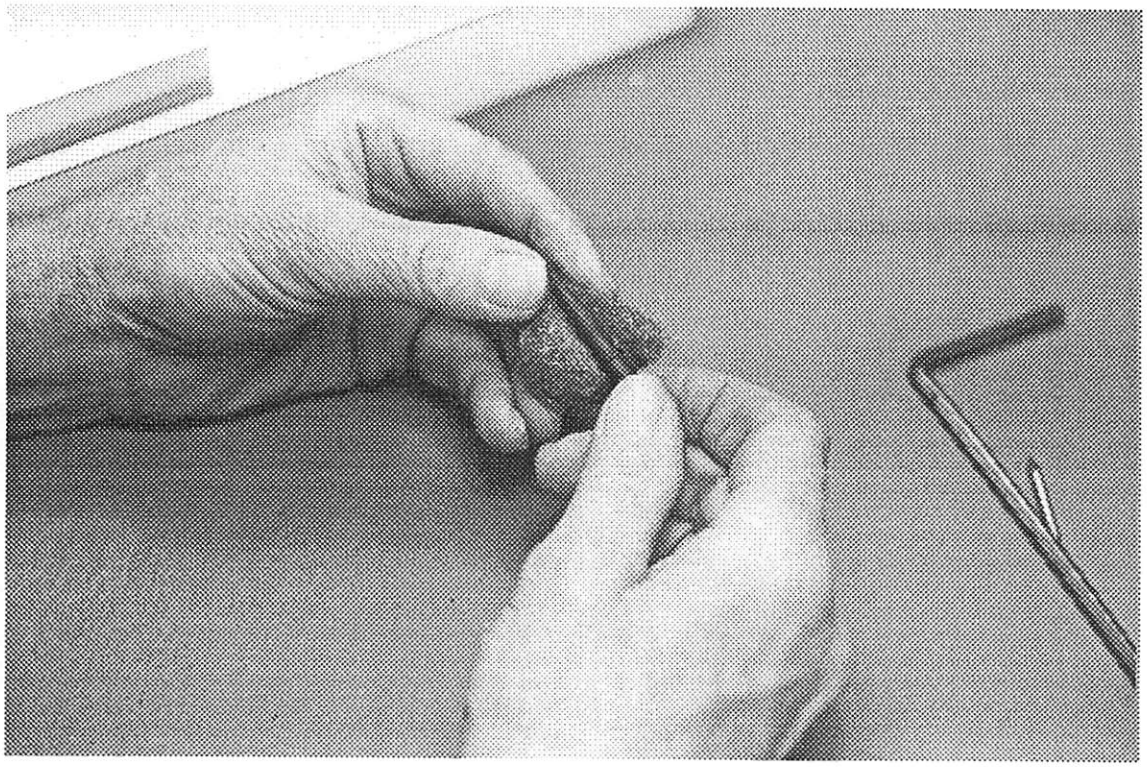
The first step was to set up the ebony (square and pre-cut to length) in the lathe, as shown in the next photo. David uses a 4-jaw chuck at the headstock to tightly grip as well as center the wood, making the final adjustments with the aid of a height gauge. At the tailstock, he first used a center bit in a Jacobs chuck to align the work, then replaced the center bit with a drill to bore the barrel. In the next photo, you can see the drill in position. Note the metal template in position at lower left of the photo. Once the barrel was bored, he then inserted a live center in the tailstock, adjusted and locked up the lathe settings, and the ebony was ready to turn, with the muzzle end toward the tailstock.

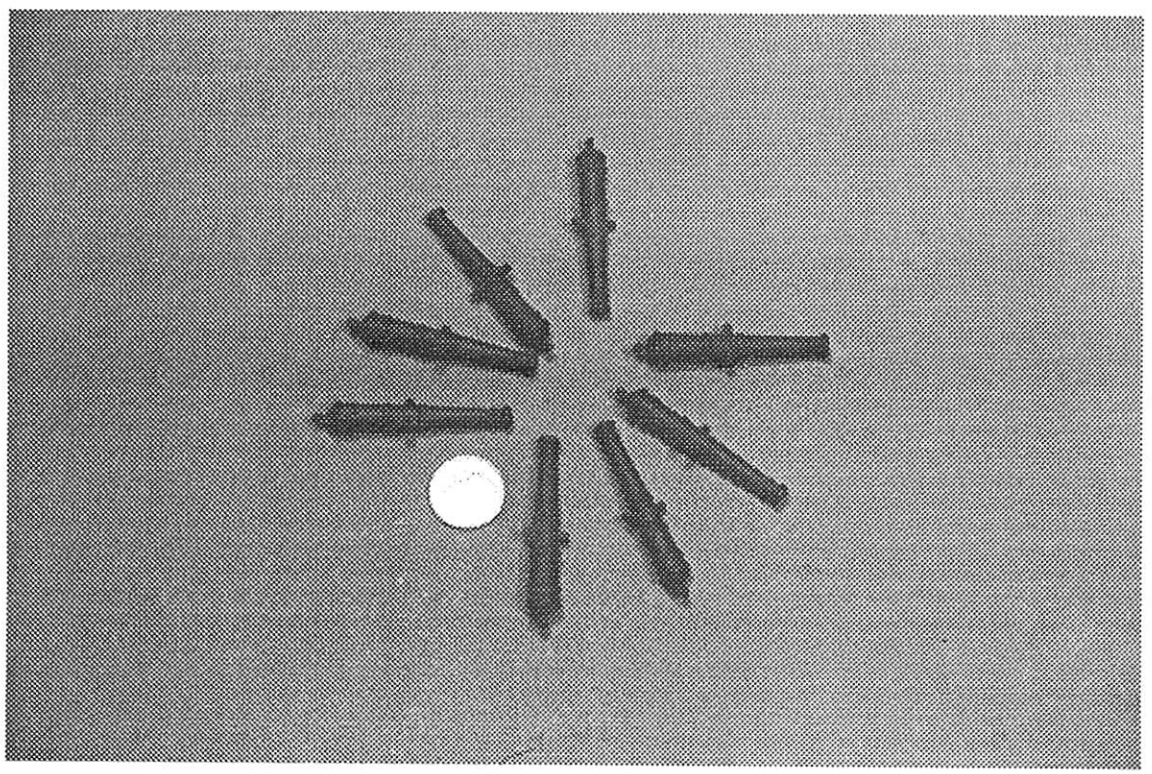
Next came the setting up on the template for depth of cut for the first piece by making a test cut and measuring with a vernier. Once the template was positioned and clamped, David flicked the switch and the lathe began turning. He started at the muzzle working toward the chuck, as shown, using pressure against the template as a guide, finishing as he went, turning out perfect rings and curves (see photo of nearly completed cannon.) Within a few minutes he had reached the cascabel and with a final push of the cutting tool, a miniature cannon dropped into the lathe bed.

Finishing the piece took just another minute or two. A dab of oil, #0000 steel wool, and a few twists of the wrist were all it took to make it presentable, as in the last photo. After drilling for and installing the trunions, the cannon was ready to be installed on its carriage and take its place on the ship. Simple as that.









Making Stanchions

by Bob Graham

Just about all drawings show that stanchions should be square at the top and bottom such as (B), The only ones I ever found to buy were round from end to end such as (A), and made of walnut, and were never quite to scale or size I wanted.

With a lathe and three homemade accessories you can easily make correctly shaped stanchions to the scale required, and in your choice of woods. The accessory tools are the hardest part. These are illustrated in the sketch and described below.

Holding Tool

Begin with a piece of brass bar stock approximately 1/2" diameter by 3 inches long and a piece of brass tubing sized so the wood for the stanchions will slide through snugly. I turned one end of the brass bar down to 0.409 so it would go inside the hole in the head of my Unimat. I then drilled a hole through the bar stock so the square tubing would fit tightly into the hole. It may be necessary to file the corners of the tubing slightly for it to fit well.

Formed Cutting Tool

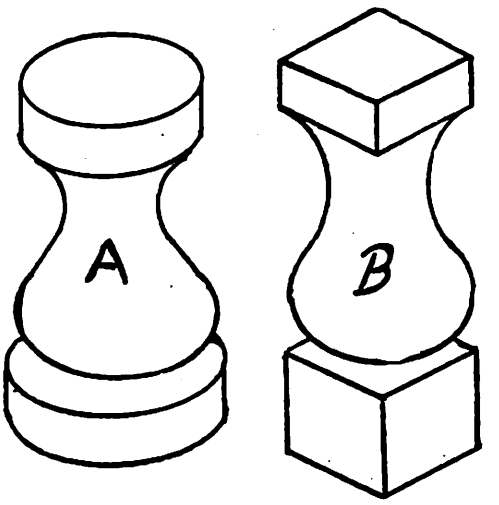
The next step is to make a formed cutting tool to the shape of the stanchion. This can be made from 1/4" square lathe tool stock. I had to rework the pattern tool several times to get it to cut correctly (i.e. to keep it from breaking or chipping the stanchions).

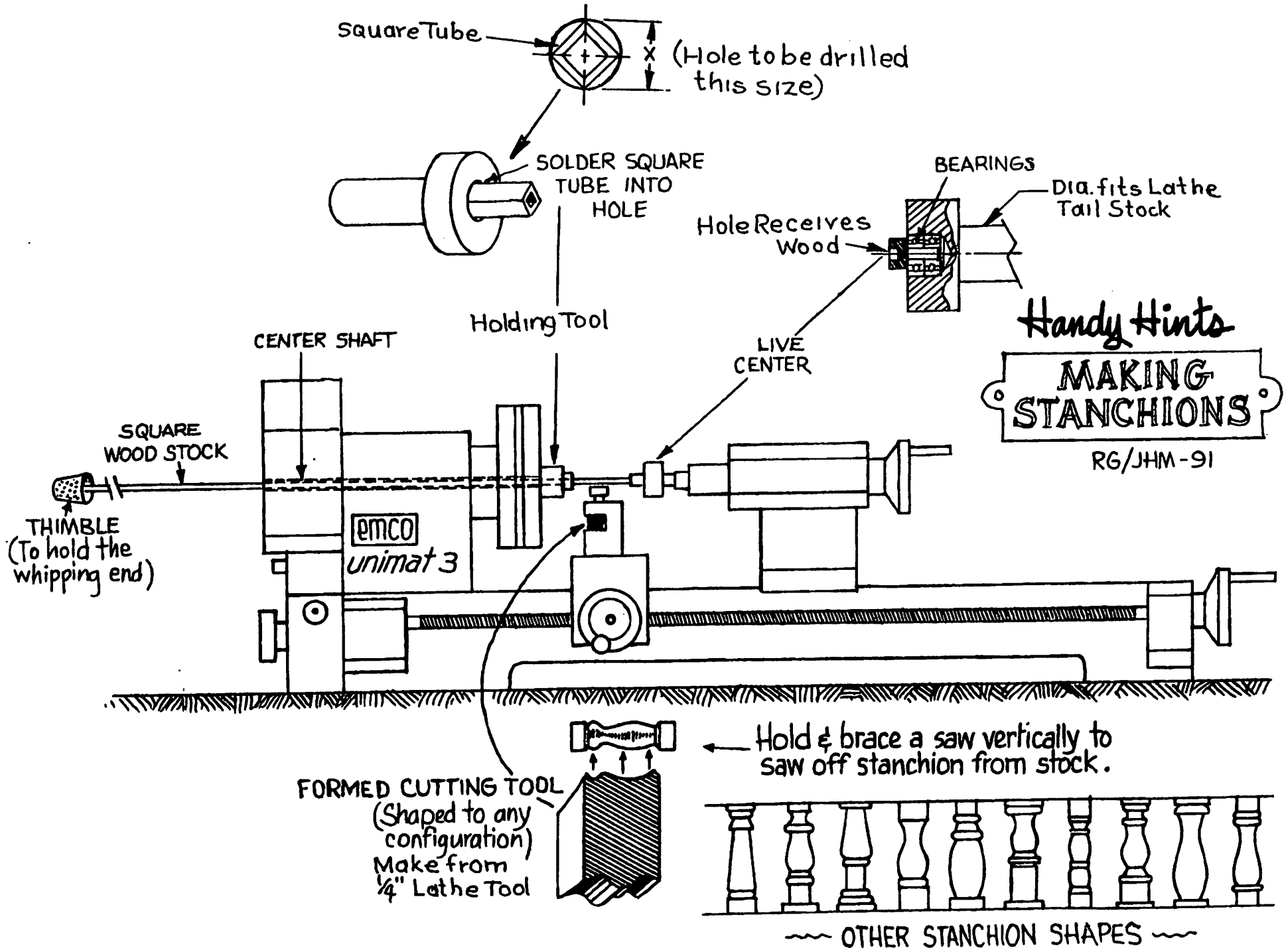
Live Center

A special live center that has a hole into which the square wood stock fits snugly is needed. The center is supported on two ball bearings as shown in the sketch. The two special parts can be made of brass on your lathe.

Procedure for Machining Stanchions

Put the holding tool in a 3-jaw chuck with the wood passing through the square hole and extending into the hole in the live center, as shown in sketch. Adjust the pattern cutting tool to the correct angle so that it cuts the stanchion properly. After the cutting tool is set, cut a stanchion and note the setting on the feed of the lathe. Back the cutter out, and using the end of the brass tube as a guide, place the saw on the frame of the lathe for support. If you do not you will find that it will jump around and damage the parts. Bring the saw in slowly and cut off the stanchion.




Square Tube
X
(Hole to be drilled this size)
SOLDER SQUARE TUBE INTO HOLE
BEARINGS
Dia. fits Lathe Tail Stock
Hole Receives Wood
Holding Tool
LIVE CENTER
CENTER SHAFT
SQUARE WOOD STOCK
THIMBLE (To hold the whipping end)
emco
unimat 3
Handy Hints
MAKING STANCHIONS
RG/JHM-91
FORMED CUTTING TOOL (Shaped to any configuration) Make from ¼" Lathe Tool
Hold & brace a saw vertically to saw off stanchion from stock.
OTHER STANCHION SHAPES

SHROUD INSTALLATION

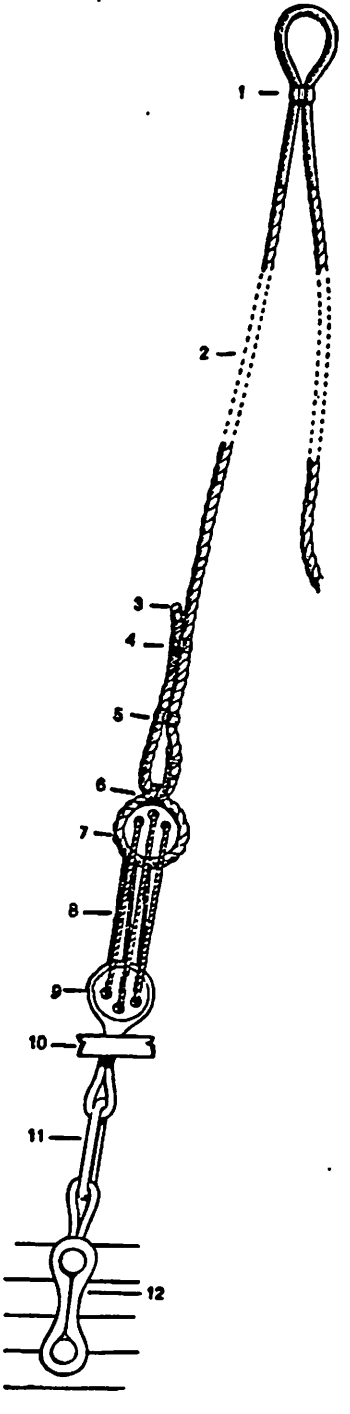
By Don Dressel

The shrouds are one of the very first things you put up when starting to rig your model. The shrouds (Fig. 1) are also one of the most important aspects of the rigging since they are more conspicuous than any other part of the rigging. The support of the masts and spars, and therefore the sails is dependent on the standing rigging, one of the main aspects again being the shrouds. Along with the stays, which support the lower masts from forward, the shrouds supported the masts from the sides. These lines, along with the backstays, tackle pendants, catharpins and futtuck shrouds, were termed "standing

Fig. 1

A lower shroud.

1. eye seizing
2. shroud
3. cap.
4. end seizing
5. middle seizing
6. throat seizing
7. deadeye
S. laniard
9. deadeye. iron bound 10. channel
It. links
12. chain plate



rigging". Running rigging was the part of the support structure that ran through blocks and was constantly moving or being moved. Generally, standing rigging was black or dark brown and running rigging was white or light tan in color. This was do to the fact that the standing rigging was tarred to make it last longer and wear better.

The number of shrouds varied depending on the size of the ship and which mast they were supporting. The foremast shroud came abreast of the axis of the mast and the aftermost shroud was installed as far aft as possible without interfering with the yards of the mast behind it. For the purposes of this demonstration, the mid-section of the Brig-of-war IRENE is being used. Since the shrouds were made in pairs, we will start with the first two shrouds on the starboard side. These two lines were actually one line, which goes from the forward deadeye on the port side, up over the head of the lower mainmast, and down to the next deadeye aft. There is an eye in the collar that fits over the masthead. One this model there is no odd pairing of shrouds, but if there should be then the port and starboard odd shroud is formed by splicing them into each other at the masthead.

However, before we fit the first pair of shrouds, we first have to install the tackle pendants over the main masthead. Large ships had two pendants on each side while smaller ships had only one on each side. Since we are doing a brig-of-war, she had only one pendant per side and we have to install this by splicing them together as indicated above. These tackle pendants must be served there entire length before they are installed. It is also best to install the grommet at the end of the tackle pendant before it is installed onto the mast – it would be very difficult to do it after the tackle pendant has been installed. In the interest of time, this was already completed for the purposes of this demonstration.

The size of the shroud is determined by the length of the main mast through formulas, which can be obtained from various books, some of which are indicated at the end of this paper. Fortunately for us, the book *Modeling the Brig of War IRENE* by Petrejus, which is the basis of this mid-section model, has all the figures already completed for the modeler – all you have to do is look up the required size of line. Another minor point, depending on how particular you want to be, is to determine the type of rope used for the shrouds – cable laid or hawser laid. For this demonstration, cable laid rope was determined to be the correct type of rope.

Once the size and type of rope has been determined and obtained (either commercially purchased or made by the modeler on a ropewalk), a line of approximately the proper length is obtained. For this demonstration, this length of rope was cut off a spool of old linen line from Cuttyhunk, which is no longer available.

Before the shroud is installed it has to be served. Technically it should be wormed, partialled and served. The worming and partialling are usually not done, since you then serve the line over the first two operations and all that work cannot be seen. All shrouds are served over the top portion that goes around the masthead and go down a distance of about ¼ from the middle on each side, which makes the serving end about a foot below the cartharpins (the top of Fig. 1 shows the serving of the shroud.) I used the "string-along" tool, which I had purchased a number of years ago to do the serving. This tool is no longer available, but a ropewalk would serve

just as well. The shroud is placed over the head of the mast and is marked where the serving should end. It is then removed and served to this mark. Again, in the interest of time, this operation was performed before the demonstration and the shroud was already served.

In addition to the above, the foremost shroud should be served its entire length! This is done to protect the shroud form the constant chaffing of the sails and boltropes. The first two pair of shrouds is now ready to be installed. This pair is installed on the starboard side. The next pair of shrouds will be installed on the port side. The third and forth pair of shrouds going aft will be installed on the starboard side, then port, etc. until all the shrouds have been installed. While installing the shrouds, make sure that the eyes of the shrouds that go over the masthead are well pressed down, as this makes the model (and the real ship) look much better and neater.

The channels and lower deadeyes were also already installed on the model prior to the demonstration. The actual installation of the first set of shrouds on the starboard side of the ship was then demonstrated. The shroud line was doubled over the masthead to make the first two shrouds. The second shroud was clipped to the chainplate of the second deadeye using a small alligator clip. The first shroud (the one that is served its entire length) is then prepared to have its deadeye turned in.

Since we are using cable laid rope, the turning in of the deadeye has to be done in the correct direction. This means that the free end of the shroud points to the bow on the starboard side when wrapping the deadeye. They are then installed with a throat seizing and the end seized to the standing part of the two round seizings (see Fig. 1).

To help with obtaining the correct distance between the deadeye on the shroud and the deadeye on the chain-plate, a simple tool is used (Fig. 2).

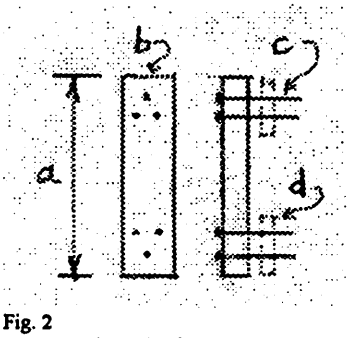


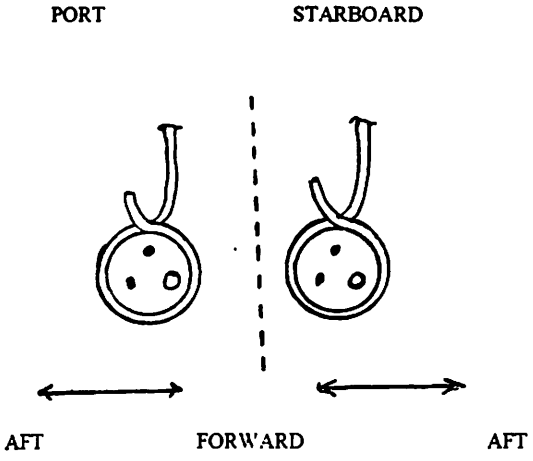
Fig. 2
- a. Length of Lanyard
- b. Wooden tool cut to length
- c. Small pins
- d. Deadeye inserted on pins

The lower part of the tool above was inserted into the first deadeye on the main chainplate. A second deadeye was inserted on the tool and the forward shroud wrapped around this deadeye. The end of the line was clamped to the shroud with another alligator clamp to temporarily hold it in place. The shroud was then tied at the proper place on the shroud. Once the upper deadeye is tied in place, the tool was removed and the deadeye properly seized to the shroud as shown in Fig. 1.

The next step is to lightly rove the lanyard through the upper and lower deadeyes of the foremost shroud. The proper size of the lanyard is again determined by formulas, but in our case was already given in Petrejus book, which makes things a lot easier. I happened to have the correct size line again on a spool of linen line from Cuttyhunk, which was used in the demonstration. A knot was tied at one end of the line (after the line had been run through a block of beeswax – all rigging line should be given a treatment of beeswax. This both helps

to preserve the line and makes it a lot easier to work with.) The correct placement of the knot end of the lanyard is shown in Fig. 3.

Fig. 3.



The lanyard is then rove through the holes as shown in Fig. 1 and left loose, which was done at the demonstration. Once this pair of deadeyes has been installed, the second shroud can be prepared in the same manner using the little deadeye tool and the lanyard rove through these deadeyes. You now have the first two shrouds on the starboard side installed with the lanyards loosely rove through the deadeyes. The next step is to install the first two shrouds on the port side. Care must be taken to make sure that you do not pull the mast out of its proper alignment. For this reason, the lanyards are not tightened down until both pairs of shrouds are installed starboard and port. They can then be secured. This same procedure is repeated until all the shrouds have been installed.

Following the installation of the shrouds, the futtock shrouds can be installed. Then the ratlines can be installed. This was only mentioned in the demonstration, since I ran out of time!

Some excellent references with respect to the rigging of ship models:

1. Anderson, R.C., *The Rigging of Ships in the Days of the Spritsail Topmast 1600-1720*; Conway Maritime Press, London, 1982.
2. Steel, *Elements of Mastmaking, Sailmaking and Rigging*; Edward W. Sweetman, New York, 1932.
3. Petrejus, E. W., *Modeling the Brig-of-War IRENE*; N.V. Uitgeversmaatcshappij "De Esch" – Hengelo – Holland, 1970.
4. Lees, James, *The Masting and Rigging of English Ships of War 1625-1860*; Conway Maritime Press, London, 1979.
5. Longridge, C. Nepean, *The Anatomy of Nelson's Ships*; Model and Allied Publications Limited, England, 1961.
6. Underhill, Harold A., *Masting and Rigging the Clipper Ship and Ocean Carrier*; Brown, Son and Ferguson, Ltd., Glasgow, 1946.
7. Underhill, Harold A., *Plank-on-Frame Models and Scale Masting and Rigging Volume II*; Brown, Son and Ferguson, Ltd., Glasgow, 1960.
8. Deane, Sir Anthony, *Doctrine of Naval Architecture, 1670*; ed. by Brian Lavery, Conway Maritime Press, London, 1981.

Frame Making

by Bill Wicks

The fabrication of frames for use in building ship models using Harold Hahn's method was demonstrated. The procedure demonstrated would apply to building plank-on-frame models of other types as well

To do the demonstration in the time available, partly built frames representative of the various steps were prepared in advance so that participants were able to observe the complete process. For example, a complete frame blank was available for demonstrating the process of cutting out the frame, without waiting for the frame blank that was made during the demonstration to dry. The steps of the process are as follows:

1. Obtain suitable strips of hard wood in accordance with Hahn's drawings. Thickness of the wood is critical, an accuracy of a few thousandths of an inch is needed. If the frame blanks are to be cut using a cutting jig such as described by Hahn, the width of the strips is also important.

2. Obtain two copies of the drawings that show the individual frames. Two copies are needed when a frame is beveled on both the inside and outside.

3. Cut the pieces of wood making up the frame blanks as shown on the drawings. Two different approaches can be used. (a) Mark the pieces with a pencil using Hahn's drawings as a guide. Then cut the pieces slightly long using a scroll saw and finish them to length using a disc sander. This results in smooth flat ends suitable for gluing. (b) An alternate method is to make a cutting jig and cut the pieces using a circular saw. If you have a precision saw such as a Preac, no sanding will be necessary.

4. Assemble the frame blanks over a copy of Hahn's drawing covered with waxed paper. Carpenters glue can be blackened with aniline dye or water based India Ink and used for assembling the frame blank. Most people find this to be attractive.

5. When the individual layers are dry, they can be laminated together using the black glue. As before, the two layers are aligned over Hahn's drawing. It is important to hold the drawings flat and under pressure while drying. The drawing that follows shows one method of doing this.

6. Cement the drawing of the individual frame to the laminated blank using rubber cement, taking care that it does not become wrinkled or torn.

7. Cut the outline of the frame using a scroll saw. If you feel confident, you may cut to the line. Otherwise cut a little outside the line and sand to the line using a small drum sander, possible mounted in your drill press.

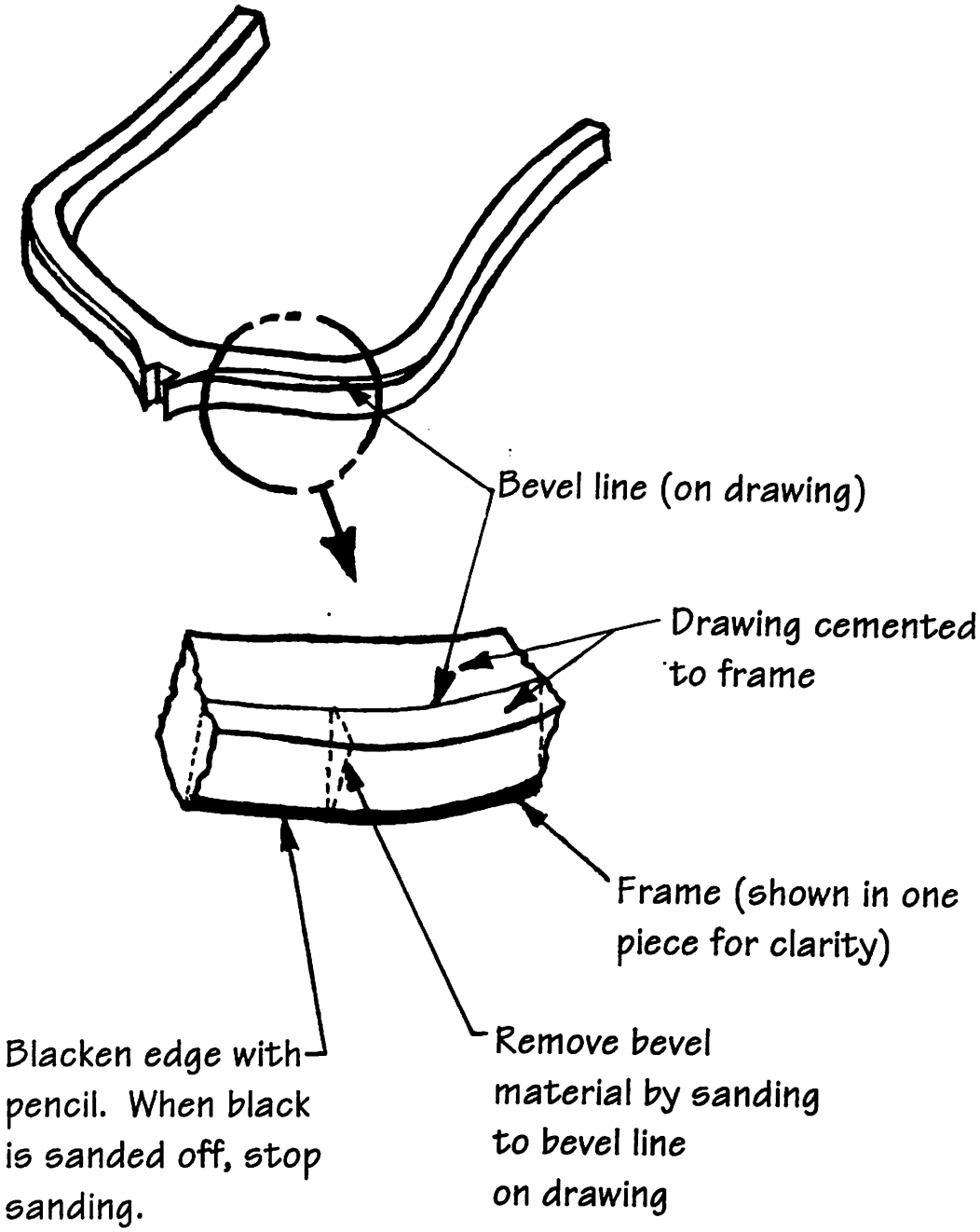
8. If there is a bevel, it will be shown on the drawing. The sketch that follows illustrates the procedure for cutting the bevel using a drum sander, possibly rotated by your Dremel tool. An outside bevel is shown. If an inside bevel is involved the procedure is the same, with a copy of the drawing cemented to the opposite side of the frame.

References

1. *Ship Modelers Shop Notes*, edited by Merrit Edson, a publication of the Nautical Research Guild, Inc., 1979. Pages 90 - 102, A Plank on Frame Technique by Harold Hahn.

2. The Colonial Schooner, 1763 - 1775 by Harold Hahn, Naval Institute Press, 1981. Pages 105 - 112, Framing the Hannah's Hull.

3. *Ships of the American Revolution and Their Models* by Harold Hahn, 1988, Naval Institute Press. Pages 167 - 173, Framing Alfred's Hull.

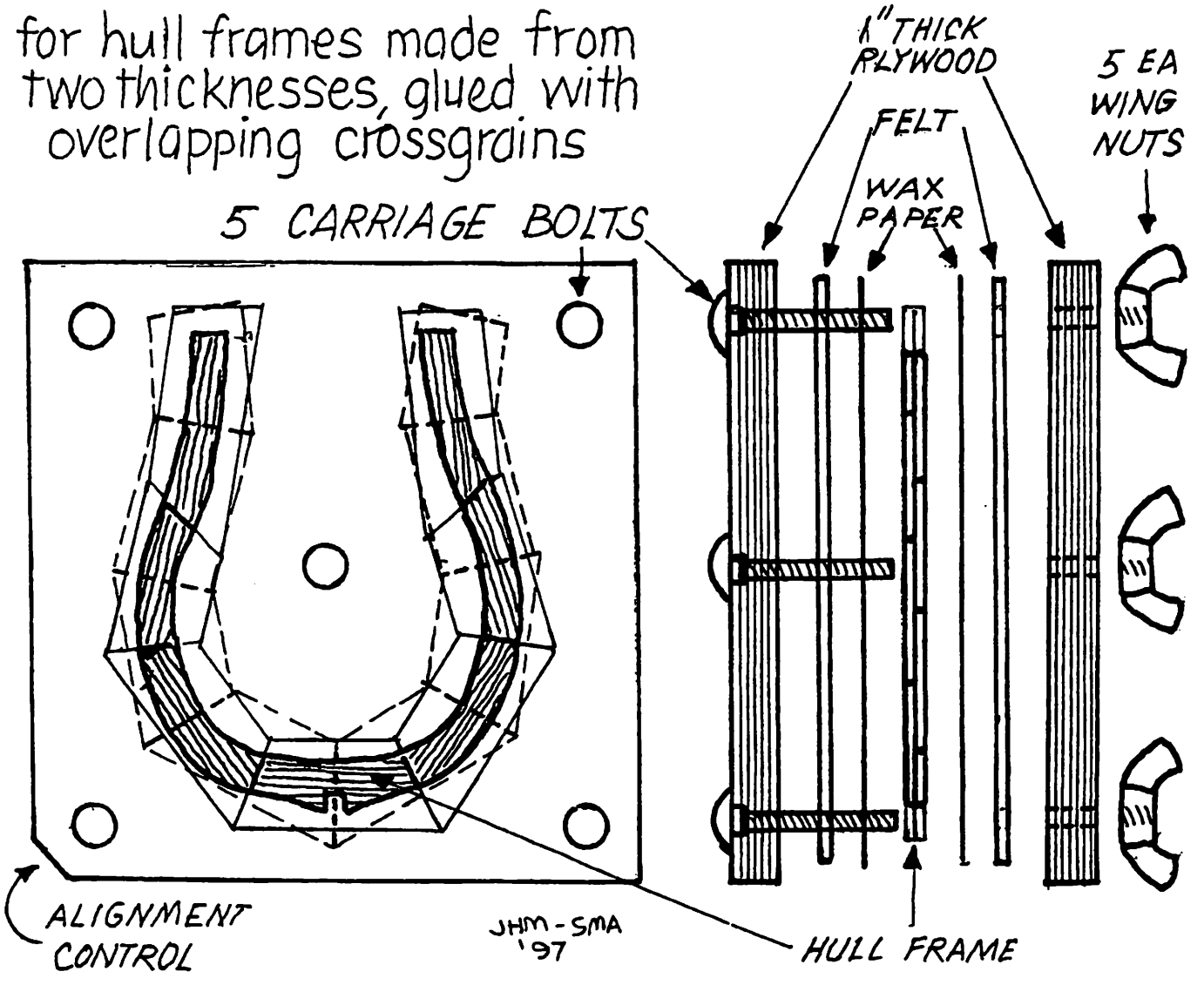


MAKING FRAME BEVELS

FROM THE SHOP of BOB BEACH... an

ANTI-WARP DRYING JIG

for hull frames made from two thicknesses, glued with overlapping crossgrains

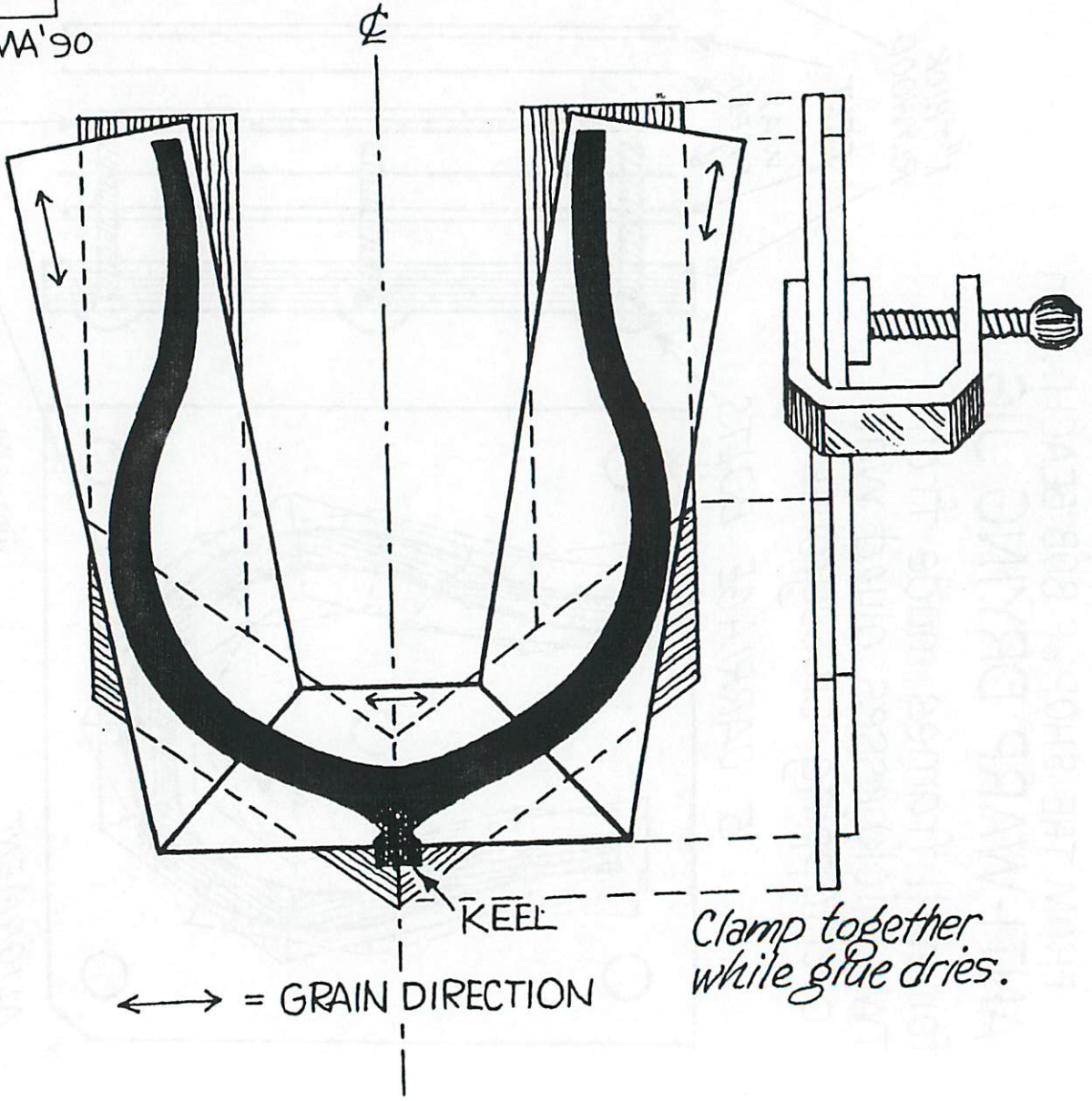


Handy Hints

FRAMES

HAHN/WICKS/JHM-SMA'90

To make a very strong Frame, make it in two thicknesses, laminated together. By crossing the grains & alternating the locations of the joints the frame will be unusually strong and not likely to break. It would seem that there is a lot of waste material but the loss is well worth it. Your Frames will be level and not warp.



CNC Machining

by Bill Amour

The CAD-CAM (Computer Aided Design - Computer Aided Machining) demonstration began with a brief showing of how a CAD design is made using lines and arcs. Used for this demonstration was Autocad LT for Windows. No attempt was made at this time to create a design because of time constraints but it was shown how this design is transferred to a DXF (Data Exchange Format) file to transfer the CAD design to a file a CAM program will understand.

Next was shown how the DXF file is changed to a format that the CNC (Computer Numerical Control) machine will understand using Bobcad CAD-CAM program. The Bobcad program converts the DXF program of lines and arcs to letters and numbers the CNC machine understands.

The first machining done was scroll work on the Continental Frigate Confederacy. Next, 1/4" = 1 ft. belaying pins were made. Then, without changing anything except for an entry in the program, 3/16" = 1 ft. scale belaying pins were made, and then 1/8" = 1 ft. scale pins.

After adding a fixture, 3/16" = 1 ft. scale 12 pound cannon barrels based on Harold Hahn's plans were made using brass stock.

Hardware and Software Programs Used

Sherline mill converted with Ah-Ha software, stepper motors and hardware.

Autocad LT CAD software. Not needed to run mill, but recommended to accelerate the design process

Bobcad CAD-CAM software. Not needed to run mill, but used to convert complex designs to machine language.

486-66 DX computer. To run mill with Ah-Ha software, a 386 PC is a minimum that can be used, but a 486 DX or higher is recommended for faster machine response and application of the CAD-CAM software.

Hardware and Software Sources

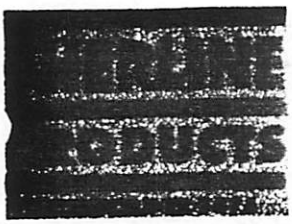
There are several sources for hardware and software needed for CNC milling. Refer to the sheets that follows for details. Sherline is the manufacturer of the milling machine, and they have provided a list of companies who do conversions on Sherline equipment.

Machining Fixtures

Special fixtures are often needed to adapt small machine tools for particular CNC operations. The drawing that follows shows the adapter that was used during the CNC milling demonstration. Of course, the specific dimensions may be varied, depending on your particular setup.

PRODUCTS

COMPANY	PRODUCTS
ah-ha Design Group, Inc. - Minnesota	CNC PRO - PC Motion Control Software Stepper Motor Driver Boards (OEM's only) Stepper Motors Complete CNC Control systems PC Digital Readout Systems Educational Materials
Minitech Machinery Corporation - Georgia (We do not represent to schools)	CNC Mini-Mill/2 (Desktop CNC Milling Machine) Sherline Mill Retrofit Package Sherline Lathe Retrofit Package Educational Materials
Rockford Ball Screws - Illinois	Ball Screws Preloaded Bridgeport Retrofit Kits
Arbor Image Corporation - Michigan	Draftsman (Software to convert scanned raster images into CAD drawings)
BOBCAD-CAM - California	CAD/CAM Software for Milling, Turning & EDM
SOON	Large Table CNC Routers CAD/CAM for surfaces Heavy Duty Benchtop CNC Machines



CNC Conversion Companies for SHERLINE Equipment

* Shortcut back to beginning of Dealers List.

A number of aftermarket manufacturers supply equipment to convert your SHERLINE tools into Computer Numeric Controlled tools. SHERLINE only produces manually operated machines. These companies purchase SHERLINE machines and. using their own conversion designs. stepper/drive motors and software. modify the machines to CNC. Some offer kits for you to convert your own machine to CNC.

* Indicates companies that sell primarily to the educational field and offer more safety features/bells & whistles; therefore. their prices are higher.

** Indicates companies that offer retro-fit kits and/or affordable CNC machines designed for the end user. not for the educational system.

**BACK TRACK. Attn: Gary Gaspord
1924 Glen Oak Drive. Glenview. IL 60025
(847) 998-0821

**BOBCAD-CAM. Attn: Ed Shiang
138 Arena Street. Unit B. El Segundo. CA 90245
(310) 606-9340

*D&M COMPUTING. Attn: Dave Ortner
1100 32nd Avenue South. Moorehead. MN 56560
(218) 233-5172

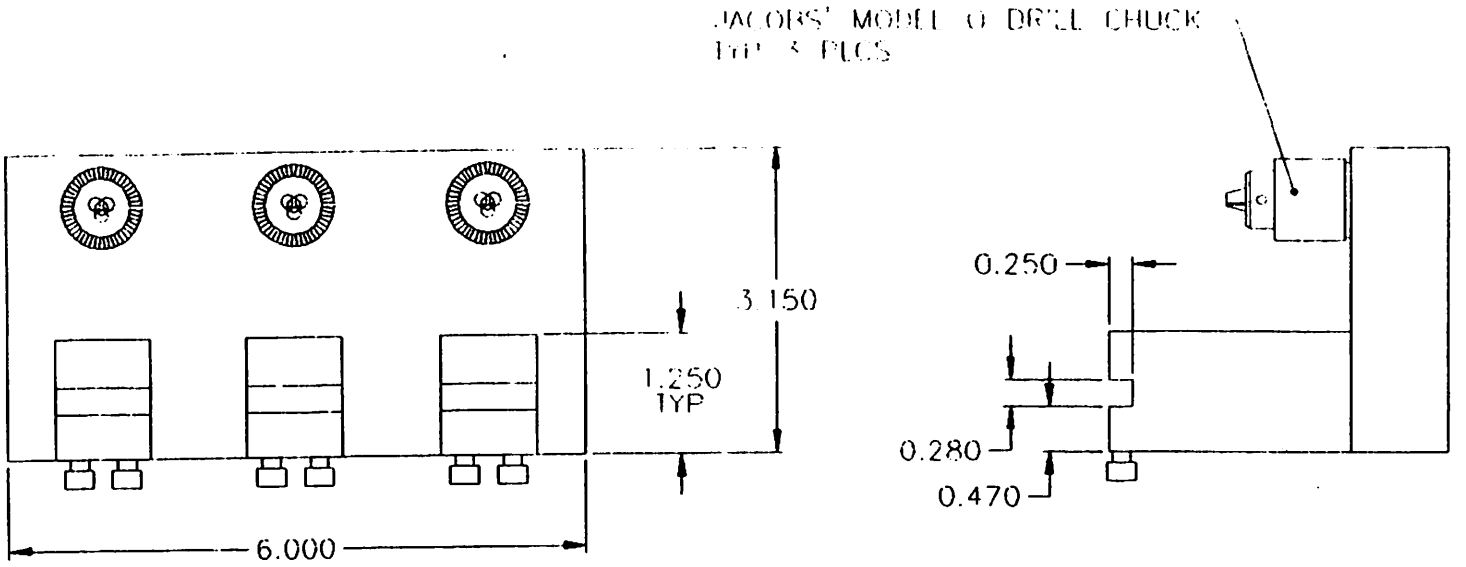
*DENFORD MACHINE TOOLS USA. INC.. Attn: Andy
815 W. Liberty Street. Unit 5. Medina. OH 44256
(216) 725-3497 (E-mail: sales @ denford.com)

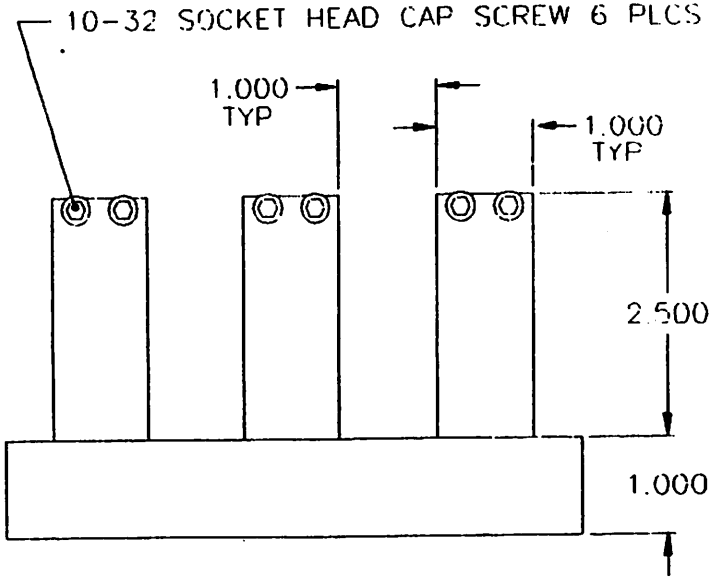
*LIGHT MACHINES CORPORATION. Attn: Dieter
444 E. Industrial Drive. Manchester. NH 03109-5317
(603) 625-8600

**MICROKINETICS CORPORATION. Attn: Maurice Khano
1220 Kennestone Circle. Suite J. Marrietta. GA 30066
(770) 422-7845

**MINITECH MACHINERY CORPORATION Attn: Jack Heald
1897 Wildwood Place NE. Atlanta. GA 30324
(404) 607-7228

* MTI TECHNOLOGIES. Attn Dwight Howell
6701 Olympic Highway. Unit H. Aberdeen. WA 98520
(360) 532-6984





THIS LATHE FIXTURE FOR A CNC MILL WILL HOLD UP TO 3 DIFFERENT 1/4" TOOL BITS AND UP TO 3 DIFFERENT DRILL BITS.
BASE AND TOOL HOLDERS MADE FROM 6061-T6 ALUMINUM PLATE.

Plans for year 2000
Western Ship Model Conference and Exhibit

The Western Ship Model Conference and Exhibit will be held in the year 2000 in late March. We will continue the tradition of holding the Conference on-board the RMS Queen Mary, which has proven to be an imminently suitable venue for the event.

A strong effort will be made to attract people from other countries, as well as all parts of the United States to attend the event. We have had some success in this regard for the first three Conferences, and believe the Conference can be more international than it has been.

We may honor some person who has made outstanding contributions to ship model building and nautical research. This would add a new dimension to the Conference.

We will continue the practice of inviting outstanding speakers from all over the world to speak at the Conference. Both model building and the underlying research will be addressed.

A continued effort will be made to improve the size and quality of the Exhibit. We note with pleasure that four models were brought from across the Pacific for the 1998 Conference. The prevailing sentiment is not to have a contest as part of the Exhibit.

We hope that as many of the previous attendees as possible will come again in 2000, and that many more will attend. The Ship Modelers Association will make every effort to make your attendance worth while.

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3-28-15 Nagata-kita Minamiku
Yokohama, 232-0071
JAPAN
81-045-714-1939

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81-0429-66-2301

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JAPAN 166
81-3-3311-6929

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1-10-32 Sakurayama Zushi
Kanagawa-ken, 249
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941-675-3416

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Irvine, CA 92604
714-551-2748

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4220 N. Colorado Drive
Kansas City, MO 64117
816-452-3816

"Prince" Class
Type: Ship of the Line
Circa: 1675 Scale: 1:144
Builder: Horace Cobb
156 Emanus Ct
Fort Myers, Fl 33912

3
Type: Banks Dory
Circa: 1850 Scale: 1:64
Builder: Dave Yotter
4352 Brookside
Irvine, CA 92714

A Carrack
Type: 14 Cent. Merchant Ship
Circa: 1400 Scale: 1:64
Builder: Henry Bridenbecker

Alva
Type: Fishing Vessel
Circa: Scale:
Builder: Adam Mello
1606 Harley St.
Calistoga, CA 94515

America
Type: Yacht
Circa: 1851 Scale: 1:96
Builder: Craig Coleman

Amesbury Skiff
Type: Dinghy
Circa: Scale: 1:12
Builder: Andy Sack
118 E. Cypress Ave.
Redland, CA 92373

Armed Launch
Type:
Circa: 1803 Scale: 1:17
Builder: Fred Reynolds
9055 Liatris Circle
Fountain Valley, CA 92708

16' Yawl Boat
Type:
Circa: 1776 Scale: 1:32
Builder: Luke Boulware
315 B. Ave. Del Mar
San Clemente, CA 92672

74 Gun Ship
Type:
Circa: 1778 Scale: 1:60
Builder: Katsuji Tsuchiya
4-13-3 Mariko
Shizuoka, JAPAN

Al Bahran
Type: Sambuq
Circa: 1400-Present Scale: 1:48
Builder: Lloyd Warner
2083 Reynosa Dr.
Torrance, CA 90501

America
Type: Schooner
Circa: 1851 Scale: 1:48
Builder: Bill Forbis
San Diego, CA

American Gunboat
Type: Gunboat
Circa: 1812 Scale: 1:55
Builder: Ken Clark
1461 Crownview Dr.
Corona, CA 91720

Anchor Hoy
Type: Service Boat
Circa: 1820 Scale: 1:64
Builder: Henry Bridenbecker

Arsenic
Type: Harbor Tug
Circa: Scale: 1:12
Builder: Mark J. Weitzman

Barcelona
Type: Diarama
Circa: 1900 Scale: 1:20
Builder: Larry Todd
5416 Frank Fenlon Ave.
Las Vegas, NV 89107

Batamya
Type: Super Tanker
Circa: 1977 Scale: 1:192
Builder: Tom Palen
1044 N. Richman Ave.
Fullerton, CA 92635

Battlestation
Type: Cutaway Section
Circa: 1815 Scale: 1:23
Builder: Richard Walton
2431 El Cajon Way
Oxnard, CA 93035

Benjamin W. Latham
Type: Fishing Schooner
Circa: 1902 Scale: 1:48
Builder: Jesse Tapscott
4559 Creekmont Ct.
Santa Rosa, CA 95404

Benjamin W. Latham
Type: Schooner
Circa: 1902 Scale: 1:48
Builder: Clyde Emerson
7719 Allengrove St.
Downey, CA 90240

Beriln
Type: Frigate
Circa: `674 Scale: 1:48
Builder: John Steinbrugge
4072 Ondine Cir.
Huntington Beach, CA 92649

Berlin
Type: Diorama
Circa: Scale: 1:25
Builder: Monica Chaban
5950 Canterbury Dr., #C204
Culver City, CA 90230

Bilbo Baggins
Type: Railroad Tugboat
Circa: 1920 Scale: 1:87
Builder: Bill Hathaway
16419 Bainbrook
Cerritos, CA 90703

Blandford
Type: Dockyard Model
Circa: 1720 Scale: 1:192
Builder: Gus Agustin
833 W. George St
Chicago, IL 60657

Block Island Boat
Type: Fishing Boat
Circa: 1860 Scale: 1:16
Builder: Rolly Kalayjian
19161 Valley Dr.
Villa Park, CA 92861

Bluenose
Type: Schooner
Circa: 1921 Scale: 1:96
Builder: John Zaiger
4220 N. Colorado Dr.
Kansas City, MO 64117

Bluenose
Type: Fishing Schooner
Circa: 1923 Scale: 1:64
Builder: Dave Yotter
4352 Brookside
Irvine, CA 92714

Bluenose
Type: Fishing Boat
Circa: 1921 Scale: 1:100
Builder: Richard Mitchell
120 N. Whiting Dr.
Payson, AZ 85544

Bluenose
Type: Fishing Schooner
Circa: 1920 Scale:
Builder: Kathy St. Amant
5950 Canterbury Dr. #C204
Culver City, CA 90230

Bluenose II
Type: Schooner
Circa: Scale: 1:75
Builder: Robert McGregor
11422 Cherry St.
Los Alamitos, CA 90720

Bo De J
Type: Monteray Fishing Boat
Circa: 1938 Scale: 1:18
Builder: James Moore
5 Ponderosa Rd.
Sedona, Az 86351

Boston Ship Chandler's Boat
Type:
Circa: 1876 Scale: 1:24
Builder: Luke Boulware
315 B. Ave. Del Mar
San Clemente, CA 92672

Boxer
Type: Harbor Tug
Circa: Scale: 1:32
Builder: Mark J. Weitzman

Brooklyn
Type: Cruiser
Circa: 1892 Scale: 1:96
Builder: Walter Panholzer
1995 Westlake Dr.
Kelseyville, CA 95451

Brooklyn
Type: Railroad Tug
Circa: 1910 Scale: 1:32
Builder: Bob Morgan
5840 Hersholt Ave.
Lakewood, CA 90712

Cacafuego
Type: Bomb Ketch
Circa: 17 th Cent. Scale: 1:360
Builder: Koichi Kanamori
3-28-15 Nagata-kita Minamiku
Yokohama, JAPAN

Californian
Type: Revenue Cutter
Circa: 1850 Scale: !;64
Builder: Dave Yotter
4352 Brookside
Irvine, CA 92714

Cannon
Type: 32 pounder
Circa: 1780 Scale: 1:12
Builder: Bob Graham
409 Buckingham Dr.
San Jacinto, CA 92583

Caroline
Type: Lumber Schooner
Circa: 1902 Scale: 1:64
Builder: Dave Yotter
4352 Brookside
Irvine, CA 92714

Carrie Price
Type: Skipjack
Circa: 1897 Scale: 1:48
Builder: John Kopf
21850 San Fernando Ave.
Cupertino, CA 95014

Carronade
Type: Gun
Circa: 1779 Scale: 1:24
Builder: Henry Bridenbecker

Catspaw Dinghy
Type:
Circa: 1897 Scale: 1:18
Builder: Al Nieman
919 Hassalo Ave. SE
Ocean Shores, WA 98569

Charlene E
Type: Lobster Boat
Circa: 1940 Scale:
Builder: Leon Embry

Charles M
Type: Harbor Tug
Circa: 1945 Scale: 1:48
Builder: Bob Morgan
5840 Hersholt Ave.
Lakewood, CA 90712

Charles Morgan
Type: Whaler
Circa: 1841 Scale: 1:96
Builder: Jim Brasher
2435 Faretto
Reno, NV 89511

Chinese Junk
Type:
Circa: Present Scale: 1:96
Builder: Henry Bikhazi
760 Harbor Island Dr.
Newport Beach, CA 92660

Combat Station
Type:
Circa: 1815 Scale: 1:23
Builder: Fred Reynolds
9055 Liatris Circle
Fountain Valley, CA 92708

Confederacy
Type: Frigate
Circa: 1778 Scale: 1:64
Builder: Clyde Emerson
7719 Allengrove St.
Downey, CA 90240

Confederacy
Type: Frigate
Circa: 1779 Scale: 1:64
Builder: Frank Wilhite
1195 N. Caswell Ave.
Pomona, CA 91767

Confederacy
Type: Frigate
Circa: 1778 Scale: 1:64
Builder: Bill Amour
1807B Harriman Ln.
Redondo Beach, Ca 90278

Confederacy
Type: Frigate
Circa: 1778 Scale: 1:64
Builder: Gary Kemper
751 E. Linfield St.
Azusa, CA 91702

Confederacy
Type: Frigate
Circa: 1781 Scale:
Builder: Ventura County Maritime Museum

Congo Star
Type: Steam Launch
Circa: Scale: 1:12
Builder: Mark J. Weitzman

Constellation
Type: Frigate
Circa: 1825 Scale: 1:85
Builder: Wayne Medeiros
4344 Camino Montura
Riverside, CA 92509

Cutty Sark
Type: Clipper
Circa: 1868 Scale: 1:75
Builder: Richard Mitchell
120 N. Whiting Dr.
Payson, AZ 85544

Danmark
Type: Traing Vessel
Circa: Scale: 1:75
Builder: Richard Mitchell
120 N. Whiting Dr.
Payson, AZ 85544

De Spiegel
Type: Dutch two-decker
Circa: 1663 Scale: 1:64
Builder: Sidney Siegel
2530 N. Cameron Ave.
Covina, CA 91724

Diligence
Type: English Revenue Cutter
Circa: 1765 Scale: 1:64
Builder: Richard Walton
2431 El Cajon Way
Oxnard, CA 93035

Dutchess of Fife
Type: Side Wheel Steamer
Circa: 1903 Scale: 1:48
Builder: William Bornemann
1329 Euclid Ave.
Upland, CA 91786

Eagle
Type: Schooner
Circa: 1847 Scale: 1:64
Builder: Bob Graham
406 Buckingham Dr.
San Jacinto, CA 92583

East Coast Scollaper
Type:
Circa: Scale:
Builder: Adam Mello
1606 Harley St.
Calistoga, CA 94515

Edith F. Todd
Type: Bugeye
Circa: 1901 Scale: 1"48
Builder: John Kopf
21850 San Fernando Ave.
Cupertino, CA 95014

Egyptian Ship
Type: Traveling Ship
Circa: Scale: 1:48
Builder: Bob Saddoris
Temple City, CA

Elizabeth
Type: Clipper
Circa: 1812 Scale: 1:98
Builder: Don Dressel
908 W. 22nd St.
Upland, CA 90786

Ern
Type: Pinky
Circa: 1700 Scale: 1:48
Builder: Henry Bridenbecker

Essex
Type: Frigate
Circa: 1799 Scale: 1:64
Builder: Bill Amour
1897 Harriman Unit B
Redondo Beach, CA 90278

Essex
Type: Frigste
Circa: 1799 Scale: 1:48
Builder: Richard Denney
1161 Cheri Dr.
La Habra, CA 90631

Euterpe
Type: Full Rig Ship
Circa: 1863 Scale: 1:48
Builder: Eric Dodson
26733 Kicking Horse Dr.
Corona, CA 91719

Fanny M
Type: Gundalow
Circa: 1886 Scale: 1:48
Builder: Henry Bridenbecker

Ferry
Type: Horse Operated
Circa: 1840 Scale: 1:24
Builder: Jack Moffett
16314 Candlelight Dr.
Whittier, CA 90604

Fish Market
Type: Diorama
Circa: Scale:
Builder: Adam Mello
1606 Harley St.
Calistoga, CA 94515

Flying Cloud
Type: Clipper
Circa: 1851 Scale:
Builder: Richard Mitchell
120 N. Whiting Dr.
Payson, AZ 85544

Flying Cloud
Type: Clipper
Circa: 1851 Scale: 1:96
Builder: Bob Graham
406 Buckingham Dr.
San Jacinto, CA 92583

Flying Fish
Type: Clipper
Circa: 1860 Scale: 1:50
Builder: Roy Tomooka
9683 Amberwick Cir.
Cypress, CA 90630

Flying Fish
Type: Clipper
Circa: 1851 Scale: 1:96
Builder: Ed Averkieff
640 La Vereda Dr.
La Habra, CA 90631

Freisland
Type: Ship of the Line
Circa: 1663 Scale: 1:78
Builder: Don Dressel
908 W. 22nd St.
Upland, CA 90786

Gail Ann
Type: Chesapeake Bay Skip Jack
Circa: Present Scale: 1:32
Builder: Hudson Patten
23509 Windom St.
West Hills, CA 91304

Gallia
Type: Sidewheel Passenger Ferry
Circa: 1913 Scale: 1:96
Builder: John McGann
6894 Queen St.
Arvada, CO 80004

Gaslight
Type: Scow Schooner
Circa: 1874 Scale: 1:48
Builder: Randle Biddle
23963-97 Arroyo Park Dr.
Valencia, CA 91355

Georgia J.
Type: Fishing Boat
Circa: Scale: 1:12
Builder: Edward Bair
1400 S. Lombard Dr.
Fullerton, CA 92832

Gerard
Type: Fishing Trawler
Circa: 1917 Scale: 1:20
Builder: Cornelis Van Dorp
621 W. Country Hills Dr.
La Habra, CA 90631

Gladiator
Type: Log Tug
Circa: Scale: 1:12
Builder: Mark J. Weitzman

Gloomph
Type: Quien Sabe?
Circa: 1000-1918 Scale:
Builder: Jack Moffett
16314 Candlelight Dr.
Whittier, CA 90604

Grampus
Type: Schooner
Circa: 1821 Scale: 1:64
Builder: Robert White
2305 Via Acalones
Palos Verdes Est., CA 90274

Grest Republic
Type: Clipper
Circa: 1853 Scale: 1:128
Builder: Kathy St. Amant
5950 Canterbury Dr. #c204
Culver City, CA 90230

Hancock
Type: Frigate
Circa: 1780 Scale: 1:96
Builder: Wayne Medeiros
4344 Camino Montura
Riverside, CA 92509

Hancock
Type: Frigate
Circa: 1777 Scale: 1:96
Builder: Bill Lanning
2127 MaRae Dr.
San Pedro, CA 90732

Hannah
Type: Topsail Schooner
Circa: 1775 Scale: 1:40
Builder: Richard Walton
2431 El Cajon Way
Oxnard, CA 93035

Hannah
Type: Schooner
Circa: Scale: 1:48
Builder: Henry Bridenbecker

Hanseatic Yacht
Type: Yacht
Circa: 1690 Scale: 1:50
Builder: Don Weld
232 Poinsettia Ave.
Corona del Mar, CA 92625

Harvey
Type: Clipper
Circa: 1847 Scale: 1:50
Builder: Carlo Silvio
1241 Lawrence Way
Oxnard, CA 93035

Herzogin Cecilie
Type: Barque
Circa: 1900 Scale: 1:96
Builder: Eric Seel
2711 Adams St.
Long Beach, CA 90810

Hicks Gy Rd. Head
Type: Gas Engine
Circa: Scale:
Builder: Leon Embry

HMS Alfred
Type: 74 gun Ship of the Line
Circa: 1778 Scale: 1:48
Builder: Henry Bikhazi
760 Harbor Island Dr.
Newport Beach, CA 92660

HMS Alfred
Type: 74 gun Ship of the Line
Circa: 1778 Scale: 1:64
Builder: David Sherwood
1217 Beachmont St.
Ventura, CA 93001

HMS Beagle
Type: Brig
Circa: 1820 Scale: 1:54
Builder: Jack Moffett
16314 Candlelight Dr.
Whittier, CA 90604

HMS Bounty
Type: Armed Transport
Circa: 1787 Scale: 1:48
Builder: Henry Bikhazi
760 Harbor Island Dr.
Newport Beach, CA 92660

HMS Endeavour
Type: Bark
Circa: 1764 Scale: 1:60
Builder: Russell A. Long
5938 Sandwood St.
Lakewood, CA 90713

HMS Iris
Type: Frigate
Circa: 1781 Scale: 1:96
Builder: Billy Russell
19705 S. Moorshire Dr.
Cerritos, CA 90703

HMS Prince
Type: 1st Rate
Circa: 1670 Scale: 1:48
Builder: John Steinbrugge
4072 Ondine Cir.
Huntington Beach, CA 92649

HMS Victory
Type: Ship of the Line
Circa: 1805 Scale: 1:240
Builder: Robert Hewitt
119-20th St.
San Diego, CA 92102

HMS Victory
Type: Ship of the Line
Circa: 1812 Scale: 1:98
Builder: Don Dressel
908 W. 22nd St.
Upland, CA 91784

Hunter
Type: Cutter
Circa: 1790 Scale: 1:22
Builder: Yoshiko Okumura
3-13-22 Naritahigashi
Tokyo, JAPAN

Imara
Type: Steam Powered Tug
Circa: 1931 Scale: 1:32
Builder: Raymond Bell
102 Rollingwood Dr.
Boulder Creek, CA 95006

Irene
Type: Bri g of War
Circa: 1806 Scale: 1:48
Builder: Henry Bridenbecker

Jefferson Davis
Type: Schooner
Circa: 1853 Scale: 1:128
Builder: Bill Forbis
San Diego, CA

HMS Prince
Type: Ship of the Line
Circa: 1670 Scale: 1:64
Builder: Bill Wicks
5411 Amy Ave.
W. Garden Grove, CA 92645

HMS Victory
Type: Ship of the Line
Circa: 1805 Scale: 1:196
Builder: Robert Hewitt
119-20th St.
San Diego, CA 92102

HMY Kitchen
Type: Dockyard Model
Circa: 1670 Scale: 1:192
Builder: Gus Agustin
833 W. George St.
Chicago, IL 60657

Idie
Type: Sharpie
Circa: 1800 Scale: 1:48
Builder: Henry Bridenbecker

Indiscreet
Type: Xebec
Circa: 1750 Scale:
Builder: Walter Upshur
2500 Teddy Dr. #17
Las Vegas, NV 89102

Jacque Lee
Type: Schooner
Circa: 1801 Scale: 1:96
Builder: Luke Boulware
315 B. Ave. Del Mar
San Clemente, CA 92672

Jha De Ci
Type: Victorian Launch
Circa: 1890 Scale: 1:20
Builder: Jim Cummings
26841 Basswood Ave.
R. Palos Verdes, CA 90275

Jhadi Sea II
Type: No. Sea Purse Seiner
Circa: 1920 Scale: 1:32
Builder: Jim Cummings
26841 Basswood Ave.
R. Palos Verdes, CA 90275

Kalmar Ship
Type: Sea Merchant
Circa: 1200 Scale: 1:32
Builder: Henry Bridenbecker

King of the Mississippi
Type: River Showboat
Circa: 1860 Scale: 1:50
Builder: Richard Mitchell
120 N. Whiting Dr.
Payson, AZ 85544

Kyrenia Ship
Type: Coastal Trader
Circa: 370 BC Scale: 1:32
Builder: Henry Bridenbecker

L.S.T. 542
Type: Landing Ship
Circa: 1945 Scale: 1:96
Builder: John Fry
8021 Joan Cir.
La Palma, CA 90623

La Jacinthe
Type: Schooner
Circa: 1825 Scale: 1:64
Builder: Clyde Emerson
7719 Allengrove St.
Downey, CA 90240

Lady Lynne
Type: Tramp Freighter
Circa: 1950 Scale: 1:48
Builder: John Fry
8021 Joan Cir,
La Palma, CA 90623

John Hancock
Type: Frigate
Circa: Scale: 1:96
Builder: Bob Beach
130 Clove Place
Brea, CA 92621

King of the Mississippi
Type: Steamboat
Circa: 1850 Scale: 1:48
Builder: Monica Chaban
5950 Canterbury Dr. C204
Culver City, CA 90230

King of the Mississippi
Type: Steam Boat
Circa: 1860 Scale: 1:64
Builder: Jack Moffett
16314 Candlelight Dr.
Whittier, CA 90604

L. A. Dunton
Type: Grand Bank Schooner
Circa: 1924 Scale:
Builder: Ventura County Maritime Museum

La Bombarda
Type: Bomb Ketch
Circa: 1702 Scale: 1:64
Builder: Ed Averkieff
640 La Vereda Dr.
La Habra, CA 90631

Lady Jean
Type: Express Criuser
Circa: 1920 Scale: 1:10
Builder: Jean Misner
440 - 44th Way
Long Beach, CA 90807

Lady Mondegreene
Type: Victorian Era Steam Launch
Circa: 1890 Scale: 1:10
Builder: Carson Thomson
7011 Trask Ave.
Playa del Rey, CA 90293

Le Canot Imperial
Type: Galley
Circa: 1810 Scale: 1:25
Builder: Koji Ohashi
20-9 3-chome
Yokohama, JAPAN

Le Mirage
Type: Ship of the Line
Circa: 1670 Scale: 1:78
Builder: Don Dressel
908 W. 22nd St.
Upland, CA 90786

Lexington
Type: Brig of War
Circa: 1775 Scale: 1:32
Builder: Richard Denney
1161 Cheri Dr.
La Habra, CA 90631

Liberty
Type: Brig
Circa: 1840 Scale: 1:48
Builder: John Steinbrugge
4072 Ondine Cir.
Huntington Beach, CA 92649

Lilly Jo
Type: River Packet
Circa: 1915 Scale: 1:32
Builder: Jim Cummings
26841 Basswood Ave.
R. Palos Verdes, CA 90275

Little Toot
Type: Novelty
Circa: Scale:
Builder: Warren Spielman
6840
Lees Way, Long Beach CA

Malek Adhel
Type: Brig
Circa: 1840 Scale: 1:48
Builder: Henry Bridenbecker

Man-O-War
Type: French Warship
Circa: 1669 Scale:
Builder: Richard Mitchell
120 N. Whiting Dr.
Payson, AZ 85544

Manu
Type: Railroad Tug
Circa: 1910 Scale: 1:32
Builder: James Addison
8091 Joan Circle
La Palma, CA 90623

Maria Henrietta
Type: Steam Tugboat
Circa: 1920 Scale: 1:20
Builder: Cornelis Van Dorp
621 W. Country Hills Dr.
La Habra, CA 90631

Mariner 35
Type: Ketch
Circa: 1964 Scale: 1:24
Builder: Crawford Westering
800 Via Lido Nord
Newport Beach, CA 92663

Mary
Type: Royal Yacht
Circa: 1660 Scale: 1:54
Builder: Jean Eckert
1623 Ben Roe
Los Altos, CA 94024

Mayflower
Type: Galleon
Circa: 1620 Scale: 1:48
Builder: Eldridge Welton
489 S. Greengrove Dr.
Orange, CA 92866

Mayflower
Type:
Circa: 1602 Scale: 1:48
Builder: Bill Lanning
2127 McRae Dr.
San Pedro, CA 90732

Mohawk
Type: Privateer
Circa: 1812 Scale: 1:54
Builder: Fred Schaffner
29001 Tackaberry Ct.
Agoura Hills, CA 91301

Mona Lisa
Type: Fishing Boat
Circa: 1930 Scale: 1:24
Builder: Victor Gutierrez

Monteray Fishing Vessel
Type:
Circa: Present Scale:
Builder: Adam Mello
1606 Harley St.
Calistoga, CA 94515

Mt. Washington
Type: Sidewheel Passenger Steamer
Circa: Scale:
Builder: Carson Thomson
7011 Trask Ave.
Playa del Rey, CA 90293

Naviello Toscano
Type: Italian Coaster
Circa: 1900 Scale: 1:32
Builder: Henry Bridenbecker

Neilson
Type: Snow
Circa: 1824 Scale: 1:48
Builder: Yoshiya
Okumura
Tokyo, Japan

New York
Type: Cruiser
Circa: 1893 Scale: 1:96
Builder: Walter Panholzer
1995 Westlake Dr.
Kelseyville, CA 95351

Mollie A.
Type: Fishing Boat
Circa: 1990 Scale: 1:12
Builder: Edward Bair
1400 S. Lombard Dr.
Fullerton, CA 92832

Monteray Fishing Vessel
Type: Ship in Bottle
Circa: Present Scale:
Builder: Adam Mello
1606 Harley St.
Calistoga, CA 94515

Monteray Fishing Vessel
Type:
Circa: Present Scale:
Builder: Adam Mello
1606 Harley St.
Calistoga, CA 94515

Nautilus
Type: Submarine
Circa: Scale: 1:35
Builder: Michael Farrar
3100 Yorba Linda Blvd. #A24
Fullerton, CA 92831

Neeltje Jacoba
Type: Sea Rescue Vessel
Circa: 1930 Scale: 1:20
Builder: Cornelis Van Dorp
621 W. Country Hills Dr.
La Habra, CA 90631

New Bedford Whaleboat
Type: Whaleboat
Circa: 1865 Scale: 1:24
Builder: Clyde Emerson
7719 Allengrove St.
Downey, CA 90240

Nonsuch
Type: Ketch
Circa: 1650 Scale: 1:32
Builder: Thomas Smith
5852 Camphor Ave.
Westminster, CA 92683

Norman Ship
Type: Trading Vessel
Circa: 1300 Scale: 1:60
Builder: Arnold Levine
1076 S. Genesee St.
Los Angeles, CA 90019

Nuestra Senora De La Concepcion
Type:
Circa: Scale:
Builder: Richard Denney
1161 Cheri Dr.
La Habra, CA 90631

Oosterwick
Type: Dutch two-decker
Circa: 1670 Scale: 1:64
Builder: Sidney Siegel
2530 N. Cameron Ave.
Covina, CA 91724

Pamir
Type: 4 Masted Bark
Circa: 1905 Scale: 1:150
Builder: Walter Upshur
2500 Teddy Dr. #17
Las Vegas, NV 89102

Permaquid
Type: Friendship Sloop
Circa: 1914 Scale: 1:48
Builder: John Kopf
2`1850 San Fernando Ave.
Cupertino, CA 95014

Phantom
Type: Schooner
Circa: 1868 Scale: 1:96
Builder: Thomas McGregor
15 Donegal Rd.
Peabody, MA 01960

Philadelphia
Type: Gunboat
Circa: 1776 Scale: 1:16
Builder: Dave Yotter
4352 Brookside
Irvine, CA 92604

North Light
Type: West Highland Coaster
Circa: 1920 Scale: 1:32
Builder: Jim Cummings
26841 Basswood Ave.
R. Palos Verdes, CA 90275

Oliver Cromwell
Type:
Circa: 1776 Scale: 1:48
Builder: Joe Bompensiero
San Diego, Ca

Pacific Star
Type:
Circa: 1900 Scale: 1:96
Builder: Philip Mattson
San Diego, CA

Panang
Type: Barque
Circa: 1900 Scale: 1:144
Builder: Eric Seel
2711 Adams St.
Long Beach, CA 90810

Phantom
Type: Pilot Boat
Circa: 1868 Scale: 1:96
Builder: Carlo Silvio
1241 Lawrence Way
Oxnard, CA 93035

Phantom
Type: Schooner
Circa: 1868 Scale: 1:96
Builder: Howard Kreutzinger
2641 Bellerive Ct.
Oxnard, CA 93030

Phillis I
Type: Colonial Bark
Circa: 1640 Scale: 1:48
Builder: Henry Bridenbecker

Phoebe Chase
Type: Canal Packet
Circa: 1840 Scale: 1:48
Builder: Henry Bridenbecker

Pirate Brig
Type: Brig
Circa: 1780 Scale: 1:96
Builder: Don Dressel
908 W. 22nd St.
Upland, CA 90786

Pono
Type: Ship Assist Tug
Circa: 1992 Scale: 1:24
Builder: Bob Morgan
5840 Hersholt Ave.
Lakewood, CA 90712

Pride of Windom
Type: Baltimore Clipper
Circa: 1880 Scale: 1:32
Builder: Hudson Patten
23509 Windom St.
West Hills, CA 91304

Pride's Tender
Type: Railroad Tugboat
Circa: 1900 Scale: 1:32
Builder: Hudson Patten
23509 Windom St.
West Hills, Ca 91304

Prince de Neufchatel
Type: Privateer
Circa: 1812 Scale: 1:48
Builder: Lloyd Warner
2083 Reynosa Dr.
Torrance, CA 90501

Providence
Type: River Boat
Circa: 1876 Scale: 1:24
Builder: Luke Boulware
315 B. Ave. Del Mar
San Clemente, CA 92672

PT 525
Type: Torpedo Boat
Circa: 1945 Scale: 1:16
Builder: Edward Bair
1400 S. Lombard Dr.
Fullerton, CA 92832

PT-109
Type: Motor Torpedo Boat
Circa: 1943 Scale: 1:20
Builder: Bob Morgan
5840 Hersholt Ave.
Lakewood, CA 90712

Queen Hatshepsuit's Barge
Type: Obelisk Barge
Circa: 1458 BC Scale: 1:96
Builder: John McGann
6894 Queen St.
Arvada, CO 80004

Raccoon
Type: Tugboat
Circa: 1895 Scale: 1:16
Builder: Bill Hathaway
16419 Bainbrook
Cerritos, CA 90703

Raleigh
Type: Frigate
Circa: 1776 Scale: 1:64
Builder: Jack Klein
San Diego, CA

Rattlesnake
Type: Privateer
Circa: 1780 Scale: 1:64
Builder: Billy Russell
19705 S. Moorshire Dr.
Cerritos, CA 90703

Rattlesnake
Type: Frigate
Circa: 1787 Scale: 1:48
Builder: Monica Chaban
5950 Canterbury Dr., #C204
Culver City, CA 90230

Rattlesnake
Type:
Circa: Scale: 1:48
Builder: John Bakker
305 Kendor Dr.
Anaheim, CA 92801

Rattlesnake
Type: Privateer
Circa: 1781 Scale: 1:64
Builder: Luke Boulware
315 B. Ave. Del Mar
San Clemente, CA 92672

Reafan
Type: Viking Ship
Circa: 900 Scale: 1:16
Builder: Bill Hathaway
16419 Bainbrook
Cerritos, CA 90703

Regenia S
Type: Schooner
Circa: 1900 Scale: 1:48
Builder: Henry Bridenbecker

Revenue Cutter
Type: Cutter
Circa: 1800 Scale: 1:64
Builder: Robert White
2305 Via Acalones
Palos Verdes Estates, CA 90274

Royal Caroline
Type: Launch
Circa: 1749 Scale: 1:192
Builder: Gus Agustin
833 W. George St.
Chicago, IL 60657

Royal Caroline
Type: Royal Yacht
Circa: 1749 Scale: 1:48
Builder: Ed Averkieff
640 La Vereda Dr.
La Habra, CA 90631

Rattlesnake
Type: Schooner
Circa: 1780 Scale: 1:48
Builder: Don Weld
232 Poinsettia Ave.
Corona del Mar, CA 92625

Rattlesnake
Type:
Circa: Scale: 1:48
Builder: Irwin Friedman
3140 Cornith Ave.
Los Angeles, CA 90066

Red Dragon
Type: Chinese Junk
Circa: Scale: 1:60
Builder: Larry Todd
5416 Frank Fenlon Ave.
Las Vegas, NV 89107

Revenge
Type: Galleon
Circa: 1574 Scale: 1:64
Builder: Ed Averkieff
640 La Vereda Dr.
La Habra, CA 90631

Royal Barge
Type:
Circa: 1750 Scale: 1:24
Builder: John Kopf
21850 San Fernando Ave.
Cupertino, CA 95014

Royal Caroline
Type: Dockyard Model
Circa: 1749 Scale: 1:192
Builder: Gus Agustin
833 W. George St.
Chicago, IL 60657

Royal Ship
Type: Ship of Cheops
Circa: 2500 B.C. Scale: 1:64
Builder: Bob Saddoris
Temple City, CA

Royal William
Type: British 1st Rate
Circa: 1719 Scale: 1:72
Builder: James Moore
5 Ponderosa Rd.
Sedona, AZ 86351

Saskia
Type: Dutch Pinnas
Circa: 1665 Scale: 1:52
Builder: James Moore
5 Ponderosa Rd.
Sedona, AZ 86351

Sea Shadow
Type: US Navy Experimental
Circa: 1990 Scale:
Builder: Doug Huntzinger
16601 Garfield Ave. Ste. 94
Paramount, CA 90723

Seaadler
Type: Sailing Raider
Circa: 1888 Scale: 1:64
Builder: Bob Graham
406 Buckingham Dr.
San Jacinto, CA 92583

Ship's Launch
Type: Launch
Circa: 1789 Scale: 1:24
Builder: Henry Bridenbecker

Snake
Type: Brig
Circa: 1798 Scale: 1:240
Builder: Robert Hewitt
119-20th St.
San Diego, CA 92102

Spanish Galleon
Type:
Circa: 1540 Scale: 1:78
Builder: Henry Bridenbecker

Royal Yacht Caroline
Type:
Circa: 1750 Scale: 1:48
Builder: John Kopf
21850 San Fernando Ave.
Cupertino, CA 95014

Sea Bright
Type: Dory Lifeboat
Circa: 1850 Scale: 1:16
Builder: Andy Sack
118 E. Cypress Ave.
Redlands, CA 92373

Sea View
Type: Submarine
Circa: Scale: 1:100
Builder: Michael Farrar
3100 Yorba Linda Blvd., #A24
Fullerton, CA 92831

Sharpshooter
Type: Schooner
Circa: 1900 Scale:
Builder: Richard Mitchell
120 N. Whiting Dr.
Payson, AZ 85544

Sinbad
Type: Sambuc
Circa: 1900 Scale: 1:32
Builder: Henry Bridenbecker

Soveign of the Seas
Type: Ship of the Line
Circa: 1670 Scale:
Builder: Grant Wilms
15506 Reeds
Overland Park, KS 66223

Spray
Type: Yawl
Circa: 1898 Scale: 1:32
Builder: Richard Walton
2431 El Cajon Way
Oxnard, CA 93035

Spray
Type: Sloop
Circa: 1895 Scale: 1:32
Builder: Henry Bridenbecker

SS Lane Victory
Type: Cargo Ship
Circa: 1945 Scale:
Builder: John Smith
P. O. Box 629
San Pedro, CA 90733

SS Texaco New Jersey
Type: WWII Tanker
Circa: 1961 Scale: 1:192
Builder: Fred Fraas
7624 Melotte St.
San Diego, CA 92119

SS United Victory
Type: WWII Merchant Ship
Circa: 1946 Scale: 1:192
Builder: Fred Fraas
7624 Melotte St.
San Diego, CA 92119

St. George
Type: Ship in Bottle
Circa: 1940 Scale:
Builder: Adam Mello
1606 Harley St.
Calistoga, CA 94515

St. George
Type: Swordfish Rig
Circa: Scale:
Builder: Adam Mello
1606 Harley St.
Calistoga, CA 94515

Standart
Type: Royal Steam Yacht
Circa: 1895 Scale: 1:96
Builder: Doug Huntzinger
16601 Garfield Ave., Ste. 94
Paramount, CA 90723

Stow Away
Type: Tug
Circa: 1920 Scale: 1:98
Builder: Victor Gutierrez

Stuart Royal Yacht
Type: Admiralty Board Model
Circa: 1670 Scale: 1:192
Builder: Gus Agustin
833 W. George St.
Chicago, IL 60657

Sultana
Type: Schooner
Circa: 1767 Scale: 1:64
Builder: Larry Todd
5416 Frank Fenlon Ave.
Las Vegas, NV 89107

Sultana
Type: Schooner
Circa: 1767 Scale: 1:48
Builder: Billy Russell
19705 S. Moorshire Dr.
Cerritos, CA 90703

Sultana
Type: Schooner
Circa: Scale: 1:64
Builder: David Dortch
20 Vesta La Cuesta
R. Santa Margarita, CA 92688

Sultana
Type: Schooner
Circa: 1768 Scale: 1:48
Builder: Bill Lanning
2127 MaRae Dr.
San Pedro, CA 90732

Swift
Type: Pilot Boat
Circa: 1790 Scale: 1:50
Builder: Robert McGregor
11422 Cherry St.
Los Alamitos, CA 90720

Swift
Type: Schooner
Circa: 1810 Scale: 1:48
Builder: Bob Graham
406 Buckingham Dr.
San Jacinto, CA 92583

Swift of Ipswich
Type: Schooner
Circa: 1938 Scale: 1:24
Builder: Eric Dodson
26733 Kicking Horse Dr.
Corona, CA 91719

Tancook Whaler
Type:
Circa: 1865 Scale: 1:32
Builder: Henry Bridenbecker

The Fisherman
Type:
Circa: Scale: 1:18
Builder: Bob Graham
406 Buckingham Dr.
San Jacinto, CA 92583

The Virginia
Type: Pinnace
Circa: 1608 Scale: 1:96
Builder: Henry Bridenbecker

Tholense
Type: Hoogaars
Circa: 1850 Scale: 1:48
Builder: Henry Bridenbecker

Tinkerbelle
Type: Lapstrake
Circa: 1965 Scale: 1:10
Builder: David Sherwood
1217 Beachmont St.
Ventura, CA 93001

Unkown
Type: Sharpie
Circa: 1870 Scale: 1:48
Builder: John Kopf
21850 San Fernando Ave.
Cupertino, CA 95014

Unnamed Trawler
Type:
Circa: Scale: 1:32
Builder: Mark J. Weitzman

USS Constitution
Type: Frigate
Circa: 1797 Scale: 1:93
Builder: Eldridge Welton
489 S. Greengrove Dr.
Orange, CA 92866

USS Constitution
Type: Frigate
Circa: 1797 Scale: 1:93
Builder: Larry Todd
5416 Frank Fenlon Ave.
Las Vegas, NV 89107

USS LCS(L)
Type: Landing Craft Support
Circa: 1945 Scale: 1:96
Builder: Edward Neubauer
11120 S E Maplehurst Road
Milwaulkee, OR 97222

USS LST-48
Type: Tank Landing Ship
Circa: 1945 Scale: 1:96
Builder: Edward Neubauer
11120 SE Maplehurst Rd.
Milwaukee, OR 97222

USS Virgo
Type: LCVP
Circa: 1940 Scale: 1:12
Builder: Edward Bair
1400 S. Lombard Dr.
Fullerton, CA 92832

USS Whiteside
Type: AKA-90
Circa: 1944 Scale: 1:96
Builder: Bob O'Brien
San Diego, CA

Venetian Gondola
Type:
Circa: 1890 Scale: 1:24
Builder: Tom Palen
1044 N. Richmon Ave.
Fullerton, CA 92635

Victorine
Type: Sloop
Circa: 1848 Scale: 1:64
Builder: Clyde Emerson
7719 Allengrove St.
Downey, CA 90240

Victory
Type: Ship of the Line
Circa: 1765 Scale: 1:78
Builder: Paul Gagne
13604 Bennington Ave.
Grandview, MO 64030

Vivan B
Type: Pleasure Schooner
Circa: 1930 Scale: 1:6
Builder: William Bornemann
1329 Euclid Ave.
Upland, CA 91786

Volante
Type: Brig
Circa: Scale: 1:96
Builder: R. G. Wright
San Diego, CA

Waker
Type: Deep Sea Tug
Circa: 1960 Scale: 1:20
Builder: Cornelis Van Dorp
621 W. Country Hills Dr.
La Habra, CA 90631

Wanderer
Type: Whaling Bark
Circa: 1878 Scale: 1:48
Builder: Eldridge Welton
489 S. Greengrove Dr.
Orange, CA 92866

Wanderer
Type: Whaling Bark
Circa: 1878 Scale: 1:48
Builder: John Steinbrugge
4072 Ondien Cir.
Huntington Beach, CA 92649

War Junk
Type: Chinese Warship
Circa: 1300-1900 Scale: 1:96
Builder: Henry Bridenbecker

Wasa
Type: Swedish Flagship
Circa: 1628 Scale: 1:75
Builder: Richard C. Mitchell
120 N. Whiting Dr.
Payson, AZ 85541

WASA
Type: Frigate
Circa: 1628 Scale: 1:96
Builder: Crawford Westering
800 Via Lido Nord
Newport Beach, CA 92663

Wasa Gun Station
Type:
Circa: 1628 Scale: 1:24
Builder: Fred Reynolds
9055 Liatris Circle
Fountain Valley, CA 92708

Wasp
Type: Sloop
Circa: 1803 Scale: 1:48
Builder: Henry Bridenbecker

Whaleboat
Type:
Circa: 1875 Scale: 1:16
Builder: Roy Tomooka
9683 Amberwick Cir.
Cypress, CA 90630

Whitehall Boat
Type: Yacht Tender
Circa: 1820 Scale: 1:16
Builder: Rolly Kalayjian
19161 Valley Dr.
Villa Park, CA 92861

Yacht Mary
Type: Dutch Yacht
Circa: 1660 Scale: 1:54
Builder: Don Dressel
908 W. 22 nd St.
Upland, CA 91786

White Wings
Type: Cruising Ketch
Circa: 1951 Scale: 1:16
Builder: Rolly Kalayjian
19161 Valley Dr.
Villa Park, CA 92861

Willie Bennett
Type: Skipjack
Circa: 1899 Scale: 1:32
Builder: Robert Prior
13235 Fiji Way Unit J
Marina del Rey, CA 90292

Yassi Ada Ship
Type: Merchant Ship
Circa: 700 Scale: 1:36
Builder: Henry Bridenbecker

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Craig Coleman Remembers the Beginning of the Ship Modelers Association

This is an edited transcript of a discussion of the early history of the Ship Modelers Association with Craig Coleman. Also participating in the interview were Don Dressel, Bob Graham, and Bill Russell. The language is purposely left informal. The meeting with Craig was in his hospital room in April, 1998, when he was awaiting a heart transplant. The operation was successfully performed on May 6. Questions and comments by Messrs. Dressel, Graham, and Russell are identified as SMA- , and Craig's responses are identified as CC- .

SMA- So how did it begin?

CC- Richard Nicholson and I met when he had a small store about the same size as this room [about 10 X 12 feet] back in 1969. It was on State College Boulevard. I saw one of his built up models over at Frank's Hobby Shop. I don't know if they are in business now.

SMA- Yes, they are.

CC- Anyway, I got his card, and he had just a little place, and he had a couple of built up ship models in it. He also did work out of his house. He did ivory work for a guy named Zuki. That is all we knew him by: Zuki.

SMA- What kind of Ivory work?

CC- This was old elephant tusks and old whales teeth that he would cut down. Then he would sell them. Richard got so busy that he moved into an industrial type place on State College just North of the 91 Freeway.

I knew Richard Nicholson when he was in the small shop. That's when I started doing restoration work for him, and then some commission work. This was back in '69.

SMA- Was the new shop pretty large?

CC-Yeah, it was. It was a good 4000 to 5000 square feet. He had every machine known to man, and he could make machines.

Anyway, they had that ivory business going, but it was not enough, and he had the retail business out front, which was the ship models [The Ship Shop]. He even sold sea shells and stuff. That's where I worked. So we sat down one day and asked ourselves what we could do to get some money out of the retail business. You know, to get some more stimulation.

We started some classes during the weekend, like the Mayflower Group. That didn't go over.

We had a library that was open to the public. We lost too many books. Boy, did we lose! I lost some very expensive books, but I loaned them.

Then we were sitting there and this lady who was working on a ship model came in. I don't know if you remember her. She was the only girl besides Mildred we had in the club. She said "Well, why don't you guys just start a club?". All three of us were sitting there : Jonas Josselson, and I, and Richard who was talking on the phone. I said, "Richard, you got to start a club. We'll get into this room once a month. We'll get everyone in."

SMA- Jonas was?

CC- He was a friend, and the other instant starter of the club. He was a model maker, and he since moved on. God, I don't know where.

SMA- I see him once in a while. Jonas was the first President of the club . . . the first real President.

CC- OK, he was the first real President. That was when we moved to Glendale Federal. That's when we had to close the Ship Shop. That's when we officially formed the club.

Before that I distributed a newsletter. I plagiarized a lot of things from Captain McCann.

At first, we just did demonstrations.

SMA- How did you get people to know about the meetings at the Ship Shop?

CC- When the customers came in, we verbally told them . . .to come in the third Wednesday. The consensus was the third Wednesday would be best. It's always been the third Wednesday. It was for demonstrations. This did not start as show-and-tell at all.

SMA- Who would you say were the earliest people who got involved in the meetings?

CC- Don Dressel was one of the first. We had a guy named Paul Semer who was exceptional – one of the finest model makers I have seen in my life. Chuck Austin was there, and Dave Yotter was one of the first. Jack Elem and Tom Palen were not at the first meetings – the demonstration meetings – but they were very early.

At that time, Jack was more into railroading than he was into ship modeling. He was also into sail planes. So he was not really into it in the beginning. But Tom Palen was. He drug Jack along, because Tom was working on the T2 tanker that he has now. It was a Blue jacket kit. The blueprints were very rough, so he went through fits with them.

The more we talked about it, the more we said "We've got to start a club." . The more minds that could be brought in, the more questions we could answer.

SMA- What about the demonstrations?

CC- Early demonstrations would be -- Roger Vanderwalker, another original member, was into wood carving. He was quite a wood carver. He showed us about sharpening, and making tools, and how to carve. We had Dennis Holland when his ship The Pilgrim was in his front yard. He wasn't living aboard yet. We had Joe Bruce, a custom woodworker. He came with a couple of buffers and some carving tools, all different sizes. Zip, Zip, Zap. In two seconds this tool is so sharp that you can shave with it, just as easily as could be.

SMA- What was the room where you met like?

CC- It was in the Ship Shop back room where all the machinery was. So, we had to clean up all the ivory dust once a month. Boy, was that a pain in the neck! The stuff stuck like glue to everything. A couple of guys would help us sweep up and Richard went out for some folding chairs. We would have 6 or 8 people at first, and it took 6 or 7 months before we started to have 18 or 20.

Another big thing we had for getting people for the club was the MAC Show. When Nicholson started his store, and the MAC show was in its infancy, there were maybe three ship models, but we started to push it and the numbers got large.

SMA- Some of the earliest club newsletters were on Ship Shop stationery. Did you write those?

CC- Some of them. We used to crank these things out in a hurry because we always forgot. Then we'd say "Oh my God, the meeting is next week.". So we'd type something up real fast, and Xerox it, and run it over to Hector the printer.

SMA- So the club was not official at that time.

CC- No it wasn't official. We called it the Ship Modelers Association and we just had a picture of a ship from a catalog for the mast head. And then Jack Elem came up with the logo we have now.

One thing I wanted to mention is that Roger Vanderwalker is the one who carved the plaque we use in the club. You know, one on our table that we use every month -- - He carved that.

SMA- What happened when the Ship Shop closed?

CC- We were desperate when we moved to Glendale Federal Savings and Loan in Fullerton. Tom Palen had an account there and found they had a room that they would let people use upstairs. So that's where we went. We sat down and decided: "OK, we need a steering committee, we need to elect officers, and have an editor for a newsletter. I told everyone that I was tired, and I'm not going to do it any more. I had a business to run, and it wasn't right because I had been doing 99 per cent of the work including cleaning the shop. That's when they elected Jonas the first President. I think Roger was the Vice President.

SMA- You were the second President.

CC- Yes.

SMA- Even in the Ship Shop days, some of our people were interested in the Nautical Research Guild, weren't they?

CC- We went to some NRG meetings. This was the Southern California Section of the NRG. We met in Marina Del Rey. A lot of well to do people were there. I mean, they came in full regalia, in mink stoles and all. I think we met at the Lobster House, and that is where I met Henry Bridenbecker. This was when we were germinating the idea of the club. At the dinner, they would be saying "Oh well, we've got to organize another trip to England." It was just fascinating, and all of these guys had money coming out the ears. And poor Henry worked at the phone company. He and I and his wife and Richard sat at one end of the table, and we said to Henry "Henry what would you think of having a club, just for fun instead of this hoity toity stuff?". Henry said "You name the place and time, and I'll be there.". So Henry was one of the original members. Now we don't have a Southern California Section of the NRG.

About a year after that we started getting a lot of guys from the Valley, Fred Schaffner one, and Roger Bacon another. In the 70's they started an SMA chapter in the Valley. That went on for years. I have no idea why it stopped.

SMA- What do you remember about Jack Elem?

CC- In the 70's some people wanted to change the meetings into more demonstrations, and this and that and the other. People started saying "Lets do something other than show and tell.". Jack Elem literally held the club together. He knew the people at the MAC show and at Pana Vise, and had model railroad affiliations. Some of his model sail planes won national trophies.

SMA- How many model shops were you associated with?

CC- The Ship Shop, and then Seaport Models, and Century Models, and then my shop, and then Model Expo, that I started and ran for a short time.

SMA- What was the name of your store?

CC- Coleman Model Yard

SMA- That was really a neat shop.

CC- I put a lot of work into that but I was stole blind by the night manager. Then I went into architectural model building. That's when I built the model of the Simon Weisenthal Center. Some time I will show you the tape of it narrated by James Earl Jones.

SMA- Craig was offering discounts to people – even at Century Models – if they were club members.

CC- My boss, Don Bradley did not like me doing that at all.
Some guys' wives wouldn't let them work on some stuff they wanted to work on. So they would sneak it in. Oh, I had to write a lot of false receipts.

SMA- What are your memories of how people started to build true plank on frame models?

CC- In the early days model kits were imported. First there were Billings kits that were not very good. But when we saw the Italian kits, it was like the Rolls Royce against the VW Bug. They were plank on bulkhead, and the solid hulls mostly died out. Not too many people did the plank on full frame. In fact, I could count on the fingers of one hand the people who were building scratch models of that type.

SMA- But many people build plank on frame models now.

CC- The reason is Harold Hahn. He showed us the easiest way to do that. I saw a lot of people try it but their hulls would be like this (gestures a wavy movement). They had no way of keeping things straight until Hahn came up with his method. And, Lloyd Warner began to supply the wood that was needed.

SMA- It's an interesting history.

CC- The SMA had simple beginnings, the reason being mercenary. Richard needed the money. He did have good Wednesdays. The problem was that it backfired on him because the guys wouldn't come in any other time of the week. He said. "Hell, why don't we have it twice a month or three times a month. Let's have it every week.". I said "We can't do that, Richard. They won't come." Once we got beyond the Ship Shop, I am sure that some people have said the same thing. If it wasn't for Jack Elem, the club would not be here today because of cliques that wanted to do different things.