MODELING

CIVIL WAR IRONCLAD SHIPS

By
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The Authors

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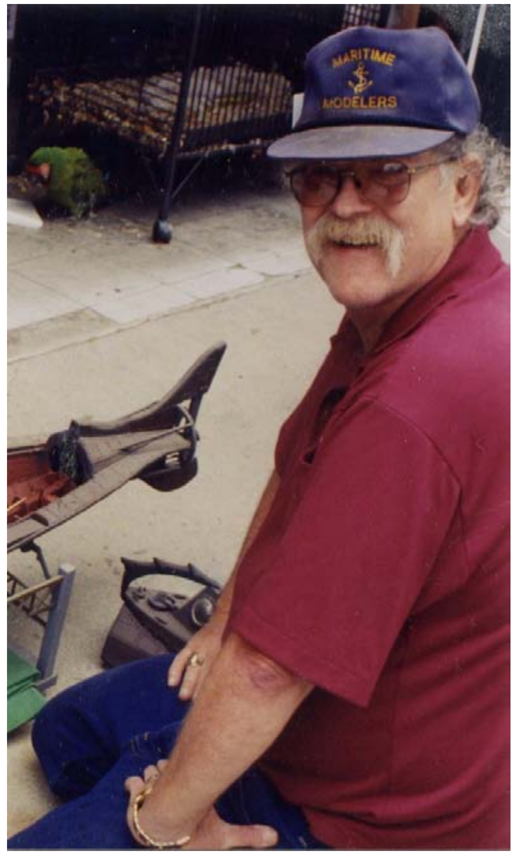

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Introduction

S. Lund

Ship modeling is a hobby of infinite variety. The subject matter and the different degrees of detail, complexity, and accuracy pursued guarantee it.

Some models are built from brief historical references and fleshed out by following known styles of maritime architecture and ship building practices of the age. Others are built from meticulously drawn shipyard or builders blueprints and detailed from photos or first hand observation of the actual subject. The degrees of fidelity possible or sought after are endless.

What a model builder has to first decide is just what level of detail and fidelity he desires to achieve. From that will come the choice of subject matter. For instance, it would not be realistic to hope to achieve the fidelity to scale and historical accuracy possible on a model of a current service naval vessel on a Second Century B.C. Greek Trireme. There just isn't the necessary data available.

This was the dilemma I faced when I first desired to model the subject matter of this book. The Civil War period was just at the dawning of the era that would produce the plethora of data that would make documenting naval subjects for ship modeling what it is today. Ships were starting to be built of metal and to plans, rather than by the shipwright's "eye." Naval shipyards would soon be regularly and consistently documenting the changes they applied to ships in refit or overhaul.

I soon found that the quality, consistency, and the quantity of material available on the subjects was, at best, "uneven". I found that there are far more photographs of Union subjects than I had supposed, but that photos of Confederate ironclads are extremely rare. For instance, there are only two known photos taken by Confederate photographers of their ironclads, the CSS Chicora and the CSS Jackson. The well known and often published photos of the Tennessee, the Albemarle, and the Atlanta were taken when in Union hands either after their capture or immediately after the end of the war.

Plans drawn at the shipyards in the late 1800s are available for one of the Passaic class Monitors (USS Montauk), and parts of blueprint type drawings have been published for the original Monitor and some of the Canonicus class. Lithographs and paintings were produced of the USS Galena, but the only photos known were taken from on board, and don't even begin to show an overall view.

For the Confederate subjects, the outlook is bleak. Some attempt was made after the war to make plans from the few existing drawings made by John Porter during the conversion of the hulk of the USS Merrimac to the ironclad CSS Virginia. A few plans of some views by Confederate naval constructors have come to light on some of the other Confederate ironclads, but no complete plans of any of the vessels are known. The end result is that any current published drawings are conjectural at best.

The end result of all this was for me to conclude that I must build my models to a standard that would be termed by aircraft modelers as “stand off” scale. But, since I enjoy building “working” models more than I enjoy “static” models, this doesn’t pose much of a hardship. I have always enjoyed the challenge of making a model that is attractive, realistic, and to have it be one that “works.”

If such an approach is not repugnant to the reader, then you can proceed into an activity that coauthor Bill Hathaway and I have found to be immensely interesting and rewarding. We are presenting here, a “how **we** did it” book, rather than a “how to do it” book. You will see that there are challenges in abundance still waiting to be tackled. In short, there is lots of fun to be had here.

1 Modeling The Ironclads

S. Lund

The American Civil War spawned a period of unprecedented progress in the technology of naval warfare. When the conflict began the Union Navy was comprised of less than forty wooden hulled ships with only a few of them powered by steam. By the war's end powerful turreted ironclad warships, the high tech wonders of their day, had become the mainstays of the fleet and had profoundly changed the face of naval warfare.

Almost everyone is familiar with the famous battle between the ironclads "Monitor and Merrimac" (actually rechristened the CSS Virginia by the Confederates). What most people are not aware of is that by the end of the war the Union had built over 30 of the Monitor type ironclads and that the Confederate Navy had likewise constructed over 20 of the casemate type ironclad warship style that they preferred.

The USS Monitor was the prototype of the turreted type of ironclad most favored by the union, and she was built in the astonishing time of a little over 100 days. The Union was quite satisfied with the accounting she made of herself at her one and only battle with the CSS Virginia at Hampton Roads in March of 1862. Within days, ships of an improved design were ordered from the Monitor's designer, John Ericsson, and the turreted "Monitor type" ship became the preferred configuration with the Union Navy for the rest of the war. "Monitor" was no longer the name of a single ship, it now became a distinct type of ship of which several "Classes"would emerge.

The first significant changes to the basic design were an almost 30 foot increase in length, a refined (rounded) hull design, the pilot house on top of the turret, one 15 inch gun in place of one of the two 11 inch Dahlgren pieces on the original Monitor, increased armor and permanent smokestack and vents. This was the Passaic class, and it would eventually number 10 vessels. Some of them would actually see service in the Spanish-American War and soldier on into the dawn of the twentieth century.

Within a few months, the requirement for further monitors was identified along with the need for further improvements (based on more combat experience) to the basic single-turret design. The new Canonicus class (sometimes referred erroneously as the Tippecanoe class) had a number of further refinements. The most obvious changes were in the more streamlined hull and raft designs, allowing for an increase in speed without an increase in the horsepower of the engine. In addition, the armament was increased to two 15inch guns, overall length was increased 25 feet, larger boilers were fitted, as well as improvements to the gun recoil system, armor, smokestack (armored and made semi-retractable), and to the ventilation/blower system.

It seems as though the configurations of the Monitor and the Virginia set down the two basic plan forms that both sides would prefer (there would, of course, be exceptions) to build for the rest of the war. If the preferred Union type would be referred to as a “tin can on a shingle” then the equally descriptive “chicken coop on a raft”term would have to apply to the Confederate approach. These have been the configurations that have mostly been chosen to model, but you’ll see a couple of exceptions here as well.

The modeler has three options for the construction method of these ships; Kit building, “Kit bashing”, and Scratch building. The Monitor and Virginia were the two kit-built ships in our fleet. As with most builders, I modified and “enhanced” the models as I constructed them. It is certainly easier to change someone else’s design than to do it all from scratch. I found this approach to be very useful as I got “my feet wet” on these type of ships. I freely admit that I learned a lot from the Dumas kits.

“Kit bashing” is a practice almost all modelers engage in to varying degrees. Bill and I might have gone to extremes with him taking the bandsaw to the Monitor and Virginia hulls, and me cutting Cutty Sark hulls down to the waterline to make the Galena and Saugus. I define the term as ending up with a major component from the “bashed” kit as a significant part of the new model.

Scratch building, is just that. The whole thing is designed by or for the modeler from the “keel up”, and can be whatever size or scale he chooses. This, is by far, the most preferable method when building ships of such a radical departure from what is normally seen in kit form. As a rule, modeling these craft for radio control calls for some concessions. One has to keep in mind that the fine level of detail found in static models tends to result in a model that is much too fragile to be handled in “operational” conditions.

For example;

Whereas one would normally expect to display ship’s boats on davits, one should stow them on blocks for a much more robust arrangement.

If awnings are erected, they are best made of thin sheet styrene and made removable. If left on the boat while afloat, they tend to want to “fly away” in the wind.

Flag staffs and jack staffs are best made removable by having them plug into tube sockets set in the deck.

Rigging lines, stays, and guy wires (for stacks, mostly) should be kept to a minimum due to their fragile nature. Guy wires are best executed in thin brass wire. It remains taut and can be painted or chemically blackened.

The “on/off” switch must be either disguised or concealed under an easily removable hatch, deck section, or panel.

With the Monitor types, a few technical issues emerge that are common. Mechanizing the turret is one. So far, we've found that this is best done by driving it directly with a servo. On the Monitor and the Saugus, the servo that controls the rudder controls the turret as well. In this way, the scene on the deck is animated every time you move the rudder. It also gives one the instant feedback that "all is well" with the inner workings of the model. The disadvantage of this is that the turret only points about 45 degrees left and right of center. And when you incorporate guns that actually fire, your USS Monitor model illustrates an "authentic design flaw". If you forget to slew the rudder before you fire, you blast the pilot house!

Coauthor Bill Hathaway, solved this problem neatly on his Dumas Monitor. He uses a dedicated servo, modified by removing its internal stops so that it rotates a full 360 degrees. In this way, one can engage in some pretty precise gunnery, independent of the rudder.

He also solved another space problem in his model (the Dumas model is no exception when I say that most of the monitor types are somewhat space limited internally). Rather than install a conventional speed control unit, he modified another servo to serve as both the speed control and the primary drive motor for the boat. Bill is an award winning modeler and a very clever fellow as well. A little later on, he'll cover in detail just how he did these things and lots more.

Also, in the turret, you have to do some clever miniature mechanization if you want to make the guns fire. The ignition process is pretty simple with the partially rotating turret. One merely passes the wires down through the bottom of the turret. With the fully rotating variety however, one has to use a "brush against a rotating ring" arrangement. Here again, space is the big issue.

The other most prevalent engineering problem with the monitor configuration is the upper/lower hull joint. In the Saugus I elected to build the hull and "raft" as separate components and join them with through bolts. I did this because the small size of the hull necessitated that I have access to everything from the rudder linkage in the stern to the receiver and its battery box in the bow. I have subsequently found some space saving methods and equipment that could change this basic premise.

The raft and lower hull are connected by through bolts passing through beams in both assemblies. To assure an absolutely watertight joint, it is necessary to run a strip of plumber's putty around the entire seam before putting the boat into the water. It works well enough, but it is a tedious practice at best.

The Dumas Monitor solution is the simplest. The hull and the raft are integral and access to the interior is gained through the top of the deck. The only problem is that in order to maintain structural integrity, you wind up with access to only about ½ to 2/3 of the interior of the lower hull. But, with a little prior planning, that can be lived with. I feel that, having built both configurations, the Dumas solution is the most practical and seaworthy.

The casemate configuration was first used by the Confederates at the opening of hostilities at Ft. Sumpter in the form of a “floating battery” in Charleston harbor. Batteries of this sort were first developed by the French and used in the Crimean War in 1854.

That the CSS Virginia would be of such a shape was dictated by the necessities of placing a heavy battery of guns on an existing hull. The size of the USS Merrimac’s hull dictated the immense size and draft of the resulting vessel. The excessively deep draft, low freeboard, and ungainly handling resulted in a craft that could only operate in the Hampton Roads. She could neither go up the James River to the safety of Richmond nor go out into Chesapeake Bay to attack Washington D.C.. I mention all this to bring attention to the fact that I have found that the model of the Virginia has all the less than desirable qualities of the real article faithfully duplicated. It has the deepest draft and the widest turning radius of all the ironclads in my collection.

Subsequent Confederate casemate ironclads were typically almost one hundred feet shorter and with drafts ten or more feet shallower. Predictably, the Richmond class and Albemarle class ships were much more practical for the river environment where they were mainly employed.

The principal design issue affecting building a satisfactory model of any of the casemate type is the casemate/hull joint. On the Virginia, the problem is compounded by the fact that the actual deck was under water. Dumas recommends that you deviate from scale in this regard.

You certainly can do that, but I found it unnecessary. The model is designed with a one inch high hatch lip. This “shoe box lid” arrangement is just like that found to this day on cargo holds and hatches on virtually all ships. If built carefully, the casemate fits tightly down over it, resulting in a very good seal. I’ve never had any leakage at all through that joint on my models. I view this as the best solution to the problem on any of the casemate type ships. On the other Confederate ships with their decks above the water, the result is even better.

A key issue with modeling the ironclad ships is size. When starting out on this adventure, I built the Saugus in an odd scale (1/87) dictated by the size of the plastic hull used and then proceeded to build the Tennessee in the same scale as a companion piece. The result was two models with extremely cramped interiors. The logical next step was to go to a larger size and standardize on it. I found the 1/72 scale that the Dumas Monitor/Virginia kit came in, to be ideal. The result is having adequate internal space in almost all cases, and having figures and accessories (such as field pieces for Monitor decks) available to liven up the decks of all the subjects. The Civil War figures available tend to be army subjects, but they can be easily “navalized”.

Color schemes warrant some discussion here. It seems that the most popular impression is that all ironclads were black. That is certainly the impression given by most of the most common paintings depicting the Monitor/Virginia combat. It may even be true in the case of those two vessels and some others; but I doubt it.

There are several good photos taken on the deck of the Monitor, and they appear to show the color of her metal as black. However, several factors lead me to conclude that she was unpainted. What leads me to this conclusion are the hurried schedule of her completion, the fact that iron (not steel, in this case) usually soon forms a "black oxide" covering when it comes out of the foundry, and the fact that George Greer says in his letter to his wife of he and another sailor; "..we have painted her a very light Lead Color." and not that they "repainted" her.

Even without the benefit of a George Greer type reference, a similar case can also be made that the Virginia was also left unpainted. The fact that her departure for operations was so hasty that workmen had to be stopped in their tasks and taken off the ship and her gun port shutters were left on the dock uninstalled argues for any tasks considered "cosmetic" being left undone. Its black color described by witnesses could also be attributed to the natural "black oxide" finish mentioned earlier and to natural weathering.

Furthermore, witnesses have reported some Union ironclads as "black" when existing photos of the actual vessels named clearly show them as varying shades of grey. This just adds to the confusion and causes one to have to take such "eyewitness accounts" with a grain of salt.

Some Union ironclads actually had specified color schemes. With the Passaic class monitors came the first case of "mass produced" naval ships. Realizing the confusion to Command and Control that could ensue with identical ships fighting together, the Union navy issued directives to paint the craft with distinctive markings.

Their turrets, pilot houses, stacks, and bullet shields were painted in varying combinations of colors such as black, white, green, and red. The decks, however, seem to have been a uniform light grey color. This was probably the "light lead" color that George Greer mentions. A breakdown of these various color schemes is to be found in the reference section at the back of this book. It is compiled from written accounts and available photographic references.

For the most part, the "below the waterline" colors appear to be varying shades of light grey. Construction or drydock photos of the Tecumseh, Manhattan, Camanche, Dictator, and even the Atlanta all seem to show light shades of what appears to be grey. This can be misleading, however. The cameras of the era frequently rendered reds (natural brick, for instance) as a light grey shade. A "red lead" color (very similar to brick red) was in use during the period, leading me to surmise that it could have been the color we see at the waterline of many Civil War ships. Many contemporary artists seem to have come to the same conclusion and have used the color in depicting some of the ships in paintings in contemporary publications. Using that color certainly makes for a much more attractive model.

The exterior schemes of Confederate ironclads seem to have been almost "regionalized." The ironclads stationed in Savannah are said to have been painted black. The one example we do have from that locale is the Atlanta. She appears in the photographs as more of a dark grey, but might be described as a "weathered" black. Her color doesn't appear to me to be as dark as some of the Monitors that were photographed on the James River with her during the same period.

The Chicora, Charleston, Columbia, and Palmetto State, all stationed in Charleston, are described as painted light blue. A contemporary painting by Conrad Wise Chapman (who is also known for his famous painting of the CSS Hunley) shows the Chicora and the Palmetto State to have at least their stacks and the rear of Chicora's casemate to be painted in that color. The rest of the surfaces on the craft seem to be a brownish grey. In view of the harsh conditions prevalent and the tendency of metal to rust, the color in the painting strikes me as being an accurate depiction.

The light brown or "butternut brown" color used to describe the ironclads of the James River Squadron (Fredericksburg, Virginia II, Richmond, and Texas) might also be a description of light colored ships with the addition of rust.

The other details would, in all likelihood, follow standard maritime practices of the day. I would expect to find the wood on the decks left in their natural state and turning the greyish hue that it becomes as it weathers. In service, virtually all exposed metal items such as anchors, chain, bitts, chocks, and rails were painted black, which quickly weathered. Cannon were in the same category, but are often seen to be a gloss black. This is understandable when you consider that in this application they were not as exposed to the weather as on conventional warships, and that they were understandably some of the best maintained equipment on board.

As you can see, even with photographs, contemporary descriptions, and paintings for source material, it is still hard to reach definite conclusions. There is, however, plenty of material and information to choose from to enable one to build an eye catching model with enough "character". It all goes back to a point I alluded to in the Introduction; the aim is to build a model that is as accurate as is possible, while at the same time making it attractive (a difficult task since the subject ships couldn't exactly be described as "elegant" or "graceful"), and having it actually "work".

To me, a good color scheme is essential to achieving the first two. And solving the inherent technical problems pertaining to the monitor and casemate configurations described earlier, is key to achieving the last.

2 Scale Data

S. Lund

As I mentioned in the Introduction, obtaining plans of sufficient quality to model these ships to a museum standard would be extremely hard to do. To date, the only plan set that I have been able to obtain that was from shipyard drawings is that of the USS Montauk. The plans depict the ship in her “peacetime” configuration around 1896.

If one did want to build an ironclad as a high standard static model, this plan set would probably be sufficient. It is rich with detail information and depicts such peacetime additions as a hurricane deck and a main deck festooned with vents. Some interior data (depicting the area inside the turret and immediately below it) is shown. Other publications (such as Tony Gibbons’ “Warships and Naval Battles of the Civil War” listed at the back of this book) depict an interior layout, although it may conjectural. Using the shipyard drawings and the Tony Gibbons material, I assembled the plan set that was used to construct my USS Passaic model.

Quite a bit of published material is also available on the Monitor and the Virginia. The most accurate drawings published to date are those published in the Summner B. Besse booklet “C.S. Ironclad Virginia and U.S. Ironclad Monitor” published and sold by the Mariners Museum. They are somewhat small (the **book** is small) and show exterior only. There are other blueprint type drawings depicted in fragmentary form in various publications and attributed to the Mariner’s Museum collection. One might assume that they might be available upon request. I can personally attest that they are not available through the museum gift shop. Excellent line drawings and paintings of both craft are also to be found in George F. Amadon’s “Rise of the Ironclads”. That book is also still in print.

As far as published plans go, the products offered by Taubman Plans Service are “top of the line”. They offer a very comprehensive line of plans sets that include most of the ships featured in this book. Their plans weren’t used by us in all cases, but they are certainly a valuable resource and we highly recommend them. Taubman’s address is to be found in this book’s Reference Listing.

As I continue in presenting the story of the available reference material, we can move on to the Canonicus class Monitors. The Warship Profile #36, mentioned in the reference listing has very good material on this subject. Some of the cross section drawings are from original sources, and the paintings are of excellent quality. There is a good cutaway depiction of the entire interior there are a number of contemporary technical drawings depicting interior details to a high degree of detail. I was able to build my USS Saugus and Canonicus models to a satisfactory degree using this material. The down side to all this is the fact that the Profile is a 1973 publication and out of print.

Some excellent drawings of the CSS Richmond and the rest of the ironclads that were built to defend Richmond can be found in the book “Capital Navy”. The book is still available and contains high quality drawings of the Richmond, Virginia II, Fredericksburg, and the Texas. The drawings are based on the few surviving plans by naval constructors and authoritative drawings and paintings. The referenced drawings include John L Porter’s profile view of the Fredericksburg and his sectional view of the Texas, as well as William A. Graves’ profile and sectional views of the Virginia II. As far as quality and completeness go, these are some of the best. David J. Meagher, the draftsman, offers this material as posters and individual plans. His contact information is listed in the Reference Listing at the back of this book.

Speaking of David J. Meagher plans. If you are interested in obtaining plans for most of the models described in this book, then Taubman Plans Service is the place to go. Plans of ironclads by Meagher include; CSS Tennessee, CSS Virginia, CSS Virginia II, USS Monitor, USS Cairo, USS New Ironsides, USS Choctaw, CSS Richmond, CSS Texas, CSS Atlanta, CSS Fredericksburg, USS Galena, CSS Stonewall, USS Osage, USS Keokuk, CSS Arkansas, and USS Onandaga. Taubman also offers plans for CSS Albermarle and USS Dunderberg. The scales are not consistent, but they offer an excellent reference to design ones model from. As mentioned earlier, information on Taubman is to be found in the reference section.

As I just mentioned, paintings are also a good source of information. Contemporary artists such as William R. McGrath and Tom Freeman are widely known for the historical and technical accuracy of their dramatic artwork. I constantly seek out the large format books on the Civil War for examples of their work and that of others. Contact information on William R. McGrath is available in the Reference section.

Paper models are a little recognized medium that is able to achieve quite a high standard of detail and realism. This is especially true when compound curves are not called for. I often use them as patterns for constructing external detail items such as stacks and deck structures, as well as for working out solutions to structural problems.

Items engineered to be executed in paper readily translate into sheet balsa, bass wood, or styrene. The plans can be easily enlarged on the copy machine to become full sized patterns.

In the case of the Tennessee and the Richmond, I found that William Mahmood had done a superb job of engineering the structure of the whole model. The parts fit perfectly and all that was necessary was the blow them up to the appropriate size.

The 1/150 scale model of the USS Monitor by F. Richard Dressler sold by Paper Models International contains a full interior, and is incredibly detailed. It can be easily classified as the definitive work on the subject. It was designed with the cooperation of the Mariners Museum, the caretakers of the recently recovered Monitor components and artifacts, and the level of detail is astounding

Magazine articles are a good source of material for some of the subjects. Publications such as Ships in Scale, Sea Classics, and Seaways have pertinent articles from time to time. What I have found to date makes for some interesting possibilities for future projects. Ships in Scale magazine has published articles on three subjects that have included plan drawings. The article on the USS Milwaukee, a twin turreted river monitor, is to be found in their Volume XII, Number 6 issue. The article on the CSS Arkansas is in the Volume XIII, Number 5 issue. And the article on the CSS Stonewall is to be found in Volume XIV, Number 8. Back issues of the magazine are available. All three models are by the same builder (Edward D. Parent), are well researched, and were rendered in 1/240 scale. Although the author terms his models as “conjectural”, the plans and information in the articles would certainly be adequate to enable one to build a “stand off” scale model.

3 Technical Issues

S. Lund

Modeling these craft has been a truly ground breaking experience for me. Many of the standard ship modeling practices simply did not apply to these types. This resulted in a steady procession of problems to be solved and, in the end, a very satisfying experience.

Building the Saugus presented the first of the challenges that the Monitor configuration brings with it. The turret is the first that comes to the forefront because it is the most prominent feature. The more the turret can do, the more appealing and interesting the model becomes.

One extreme in this matter is that of the Dumas model. It just sits there. It can be moved by hand to whatever position one chooses; but nothing else. With a little planning and thought, one can do lots better.

As I mentioned earlier, the first thing one can do with the turret is to make it rotate. This can be done most easily by locating the rudder servo directly under the center of the turret. A shaft from its center engages a socket on the top of the rudder control horn, and the turret turns the same amount as the rudder displaces. This simple method does not require an additional servo, but it does mean that the degree of movement is somewhat restricted.

Bill Hathaway's modified servo method allows for full 360 degree travel. A small size servo can be used to minimize the space penalty. The down side to this is that many modelers are reluctant to go that "deep" into the inner workings of the system components. Hopefully, a later chapter in this book will help to dispel some of that tendency.

It is amazing to see just how much "life" is added to a model under way when a feature such as the turret is animated in this way. The ships tend to look very austere and sterile because of their relatively uncluttered decks, and having movement on them is very appealing. One of the most eye catching sights I've seen to date has been having the Passaic cruise by with figures visible on her deck and her turret slowly revolving.

Another arresting feature is having the guns fire a small charge of black powder. This feature went through several evolutions to arrive at the compact and reliable system I use now. More of that in another chapter.

The use of styrene plastic sheet to simulate the armor went through quite an evolution. The issues are thickness and adhesion. The first model (Saugus) had armor of .010 sheet for the turret and .020 for the deck and sides. The .010 material lends itself well to taking the impression from the tracing wheel to simulate the rivets on the turret (they were actually **bolt** heads) and other places. The .020 material bonded well to the plywood deck, and I had no problems with the armor on the Saugus. As a result, I was lulled into a false sense of security.

On the Dumas Monitor/Virginia kit, .020 material is used throughout. That thickness worked well for the riveted (bolted) panels on the sides of the Monitors turret and raft. However, the decks and the Virginia's casemate sides were a different matter. If you look closely at photos of the two ships that were obviously taken on sunny (read; **warm**) days, you will see signs of the material buckling as it expands due to the heat. It was necessary to go to .040 material on the subsequent models to overcome the problem. Even then, it was found necessary to apply the panels in widths no greater than two inches and to leave small gaps between them for expansion.

Although building in 1/72 scale leaves a lot more internal volume, space saving is still a good thing to pursue. The Dumas models can serve as a "good example of a bad example". Due to the fact that the Dumas product line has only one type of speed control, the designer of the Monitor / Virginia kit was obviously tasked to use Dumas technology only. Their unit is about the size of a package of cigarettes and must have its external control lever moved by a servo. The result is an arrangement that takes up at least twice the space of a current-generation solid-state speed control.

In the Virginia, it did not pose a serious problem. In the case of the Monitor, the size was prohibitive. The designer was unable to fit the unit into the hull, so he substituted a servo driven on/off/reverse switch arrangement. The resulting board/ micro switch arrangement was a pretty crude arrangement for speed control. I substituted a HITEC speed control unit, and then found the switch unit to be quite suitable for adaptation to a "fire control" for the guns. In fact, the principal of a servo arm actuating micro switches to change current flow in circuits is one I have used in several of the ships in applications such as fire control (USS Monitor, CSS Virginia, and CSS Richmond) and sail control (USS Galena).

Another space saving approach is eliminating a speed control completely by using a servo/motor such as described by Bill Hathaway in the chapter on Modifying Servos. One thing he cautions one to take into consideration is the fact that the motors on even the large type servos we use are not particularly robust. Consequently, they have trouble turning heavy props, such as the cast bronze type. The problem shows up as a rapid drain on the battery's power.

A simple solution is to use a lighter, shallower pitched prop. Bill makes simple and authentic looking props by soldering brass sheet blades to 1/8 inch-shaft wheel retainer collars. The result is a prop that looks right and performs well with the servo/motors.

Another consideration, although not necessarily a problem, is the fact that the motor takes up one channel on the receiver. So, when you use two motors (such as on the Arkansas and the Onandaga), you tie up two control sticks. The "up side" to this is that we've found that steering with differential power is much more effective than using the rudder (at least, on **these** two ships, anyway).

If you are limited in channels and/or control sticks, it no serious problem to run two servo motors off one speed control. All that is necessary is to use a commercially available splitter cord. I've run the Onandaga both ways to gage just how effective "rudder only" control is for steering it (not very).

Another application for the previously mentioned 1/8 inch-shaft wheel collars is in fabricating control horns. In the case of both the Richmond and the Onandaga, space was tight and a "custom"design proved to be necessary. Just cut and drill the horn out of brass stock, buff the chrome plating off the collar, and solder the pieces together. Because of the allen screw in the collars, they are infinitely adjustable for getting just the "right" throw or angle on a linkage.

4 Construction Techniques

B. Hathaway

The model of the USS Passaic was originally planned to be built with the CSS Alabama hull and using the raft/hull configuration of the Dumas USS Monitor. The resulting model in 1/76 scale (the Monitor is in 1/72 scale) would still have more internal space than the Dumas Monitor model.

The lower hull, as just mentioned, was to be taken from the Revell kit of the CSS Alabama. When I first embarked upon the project of recreating the ironclads, I realized that using an existing hull would speed things up considerably. After quite a search, I arrived at the conclusion that the 1/96 scale hull of Revell's Cutty Sark and Thermoplyae kits would be just about right. That proved to be an adequate solution for the Saugus and the Galena. The Saugus was modeled in 1/90 scale and the hull proved to be barely adequate as far as internal space is concerned.

In the case of the Galena, the hull was cut down to the waterline and then built back up to the correct planform with balsa and basswood. The result was a very tight fit for the internal equipment that had to be accommodated. I resolved to find a better solution.

In the era that Revell first kitted the clipper ships just mentioned, they also produced a kit of the Confederate sea raider Alabama. The kit was actually derived from their USS Kearsarge kit, but that isn't significant at the moment. The Alabama was steam powered. I found that the hull, although approximately the same length as that of the Cutty Sark/Thermoplyae, has approximately 25% more internal volume, presumably to accommodate the steam engine and its required boilers and coal storage. It is boxier and more slab sided than the much more elegant and streamlined clipper hull, but perfect for our purposes. What's more, warship hulls of this era tended to be somewhat generic. Ship yards built up stocks of standardized frames to be used for repairs and new construction. So, a case can be made for the authenticity of u sing these hulls for the ships that I have indeed used them for.

The rub here is that the Alabama kit is out of production and is only available through collector's channels. I obtained one on the internet for $80, and that wasn't even the top price that it goes for. Needless to say, it isn't practical nor desirable to cut up an $80 collector's item every time one wants to build one of these models.

The obvious solution is to make a mold from the Alabama hull. This, I did using latex for the impression, and then stiffening it with plaster. I modeled it from the waterline down for ease of production. This results in a female mold that allows the surface detail of the original to be retained.

The resin and fiberglass cloth is laid into the mold after a layer of gelcoat is put down first. This makes for a good exterior finish and does a nice job of retaining the surface detail mentioned above. The end result is a hull suitable for the Passaic, Onandaga, and other subjects with similar hull designs. The Atlanta, having taken her hull and engines from the English-built Fingal, is another good candidate.

The only problem here is that you have to scale the model around the dimensions of the basic hull. This does, however, result in some odd scales to deal with.

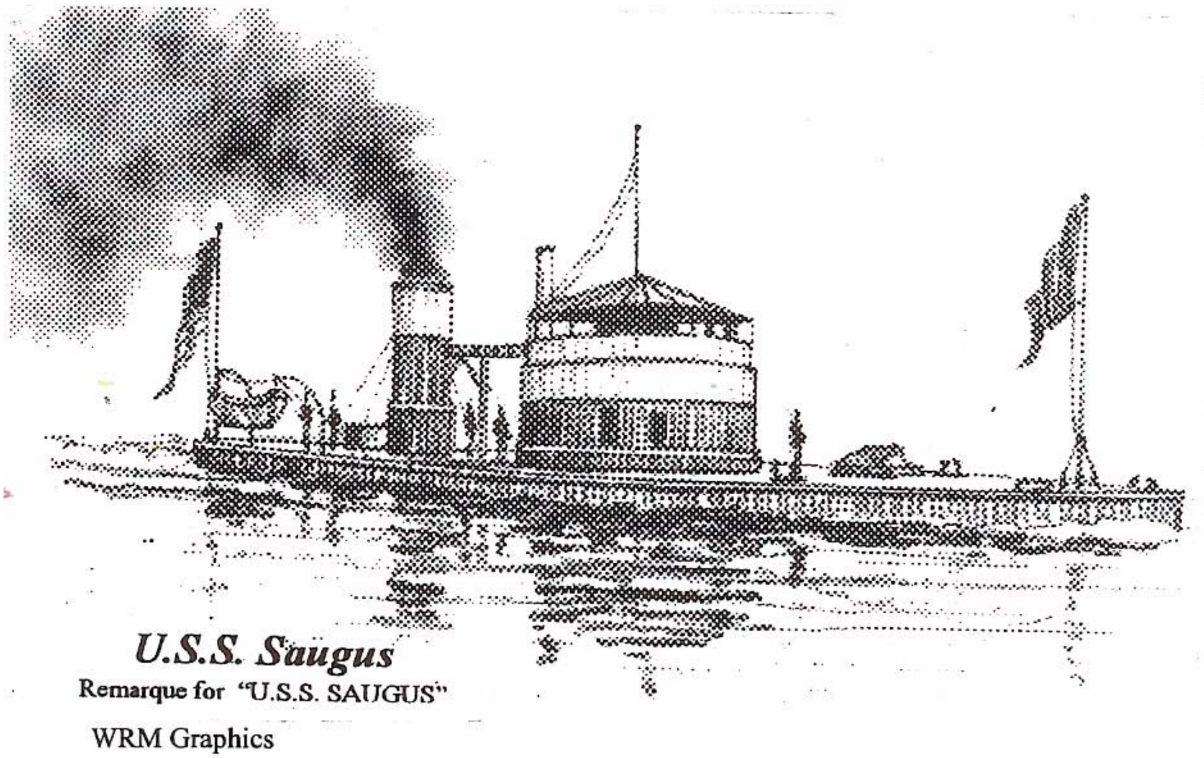
5 Model Construction

In this chapter:

The following ships are discussed;

Union

Confederate



USS Saugus

USS Saugus

The last class of single turret monitor is the subject of this model. I had originally planned to model the USS Tecumseh (after the ship whose demise inspired Adm. Farragut's famous "Damn the torpedoes, full speed ahead!" order). But, when I finished the weathering job on its finish and then realized that the Tecumseh was only afloat four months, I had to choose its sister ship the USS Saugus. The Saugus served her entire war time career as one of five Monitors in the James River Squadron, saw action against the Confederate ironclad squadron defending Richmond, and had lots of time to weather (it remained in service till 1891).

The model was the first ironclad I attempted, and was actually inspired by one of the paper waterline models of the Tecumseh designed and marketed by William Mahmood. The line of ironclads he offers includes three different monitor types and at least as many different Confederate ironclads, all in about the same size range. The subjects lend themselves nicely to paper as a medium because the actual warships were all built of flat or curved sections of iron plate. Building a number of the paper models whetted my appetite for these ships and started me down the path that led to this current obsession.

Besides the actual paper model itself (which although accurate in shape and proportion, lacks a lot of detail), I came to find that there was an adequate amount of published data available to make a reasonably accurate scale model. My primary source of drawings was Warship Profile number 36, titled "United States Navy Monitors of the Civil war", published in 1974. It is a bit hard to find, but is rich in historical data on all the monitors. In addition, there turned out to be several photographic depictions of various types in some of the "Pictorial History of the Civil War" type books in the library. Armed with the various drawings in the Profile, my calculator, and a copy machine, I enlarged all the drawings up to the same scale.

I will have to admit up front that the hull shape is not absolutely correct. The actual shape is slightly wider and more rounded at the stern than the hull I used. The "offending"(to some, no doubt) hull is a 1/96 scale item taken from the Revell "Thermopylae" clipper ship. This was cut down to the waterline to give it the correct depth, the bow was reshaped to the correct vertical profile, the rudder was removed, and the stern was drilled to accept the prop shaft tunnel. The result is a hull that has sufficient space (barely) for the required motor, batteries, radio gear, and ballast. The overall result (since the hull size dictated the rest of the model's dimensions) is a 1/86th scale model with an overall length of 30 inches.

The deck or “raft” as it is often referred to in Civil War accounts, is one piece of 3/32 inch birch plywood, pierced for the turret, vent, and smoke stack. The scale thickness of the raft is achieved with balsa framing, filled with 1/4 inch styrafoam wherever space is available. The original intent of this was to provide reserve buoyancy in case it ever took on water. In practice, it proved to be an exercise in futility. Because the boat carries over a pound and a half of lead for trim purposes, it is not possible to add enough styrafoam to keep it afloat. As a matter of fact, lack of reserve buoyancy was a flaw in the actual design of all the Monitor types. It resulted in the Tecumseh sinking in less than three minutes after striking a mine (called a torpedo in those days) and the Weehawken sinking in a storm. It is also felt that this contributed to the sinking of the original Monitor as well.

The deck is attached to the hull by basswood beams in the hull fitted with aircraft type self-centering nutplates. The units were epoxied in place and then further strengthened by pins drilled through the hull. These pieces are under considerable shear strain because of the through bolts that hold the hull and raft together, necessitating the requirement to pierce the hull. The screws holding the upper and lower parts together are accessed through the holes in the deck for the turret and the stack. The watertight seal is achieved by the fact that the actual point where the hull and deck join is actually above the waterline and that I run a strip of plumber’s putty around the point where they join as an added bit of “insurance”. To date, the only leakage I’ve encountered has been a slight amount (about two thimble fulls in an hour of running) that seems to enter through the rudder pushrod opening. Both that and the prop shaft opening are packed with lithium grease to minimize leakage.

The turret is a 3 inch diameter PVC drain grill from the plumbing department of the local home improvement store. It is precisely the correct width, and its correct height above the deck is achieved by attaching the armored collar around its base at the appropriate height. It, along with the pilot house and smoke stack (both made from pill bottles) is “plated” with .010 styrene. The distinctive rivet pattern is embossed from behind with a tracing wheel. The deck top and sides are also covered with the same material and scored with the correct panel line detail. The added benefit of the grill structure in the bottom of the drain used is that it provides a good solid base for the mounting of the functional cannon and the turret pivot mounting to the servo.

Other deck details such as the cutters as well as some figures and deck fittings came from the Thermopolae model that provided the hull. The hatches and turret armored ring are Plastruct square stock and the flag poles and vent stack are various thicknesses of brass tubing.

Other details are fabricated from Plastruct and sheet styrene. The overall finish is Model Master Gull Grey for the deck, Gunship Gray for the bottom of the turret and stacks, and Primer White for the top of the turret, pilot house, and stacks.

So much for the exterior, now let’s talk about what is inside. The craft is equipped with a Ranger II FM, 3 channel R/C system that provides for rudder, speed control, and individually firing the cannons in the turret.

The speed control is controlled by the #2 servo through the transmitter's throttle control stick. The Dumas 6 volt unit gives forward, reverse, and stop. The unit is more than adequate for what is required of it, although somewhat on the large side for this application. If I had it to do over again, I would have used one of the solid state units that don't require a servo.

The rudder (#1) servo is positioned directly under the turret, and as a result, is used to drive both rudder and turret. This arrangement has proven to be very helpful, giving a visual indication of rudder movement on the model as well as enabling me to aim the guns to some extent (45 degrees left or right of center). To make the turret revolve 360 degrees would have involved the use of space that isn't available in this model.

The cannons are fired by a simple lever switch moved by the #3 servo. The servo is controlled by a knob on the transmitter. Turn the knob left, the servo arm moves left and completes a circuit, firing the left cannon. Turn the knob the other way and the salvo is complete.

The cannons themselves are 1/4 inch O.D. thick-walled aluminum tubing. Estes model rocket ignitors provide the ignition and a few grains of FFFg black powder create a most realistic smoke cloud (with very little noise). A small wad of beeswax at the breech end prevents (or rather, reduces) blowback into the turret. There is little back pressure since there is no projectile and only light tissue paper wadding. It can be a real crowd pleaser when the Saugus cruises up to my anchored, non powered CSS Tennessee model, turns its turret toward the enemy craft, and unleashes a salvo!

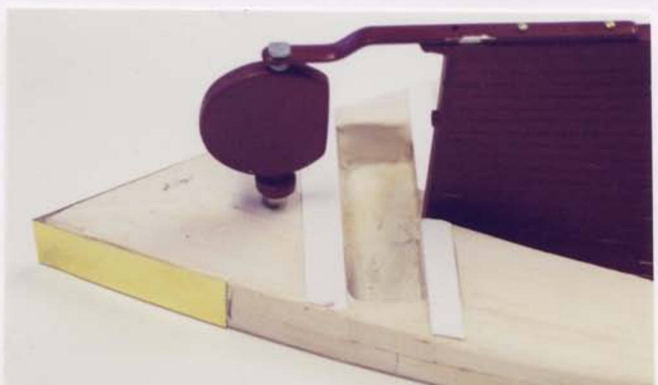
All in all the model has turned out to be quite pleasing, both as an operational and as a display model. The only item that mars its appearance for static display is the external rudder control horn and the pushrod arm emerging from the hull on the starboard side. It is up under the raft overhang however, and is really quite unobtrusive. The scale rudder has proven to be adequate in response, and the bronze Dumas four bladed bronze prop is also close to scale in size and shape, and provides adequate thrust. The model's appearance in the water is quite realistic. It required over 1 ½ pounds of lead ballast to achieve proper trim and it displays a realistic low freeboard profile as a result.

As a matter of fairness, I should point out here that the low freeboard also results in a very realistic "lack of seaworthiness" so characteristic in the actual ships. The sinkings of the USS Monitor and the USS Weehawken (at its moorings, no less) can be attributed to this quality. In anything but calm conditions, the Monitor type models suffer. The low freeboard (ranging from ½ inch for the Saugus to 3/4inch for the Monitor means that in anything rougher than a one inch "sea", waves wash over the deck and the boats have a hard time making headway. Leakage is very slight, because the turret joints don't tend to ship much (if any) water, and they are the only significant openings in the decks on this type. In short, the smoother the water the better these boats look and perform.

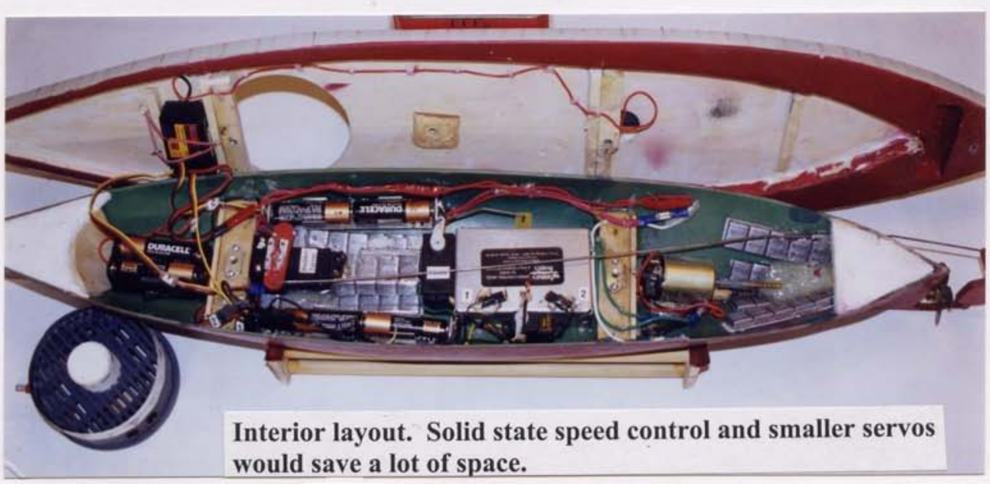
USS Saugus

Underway

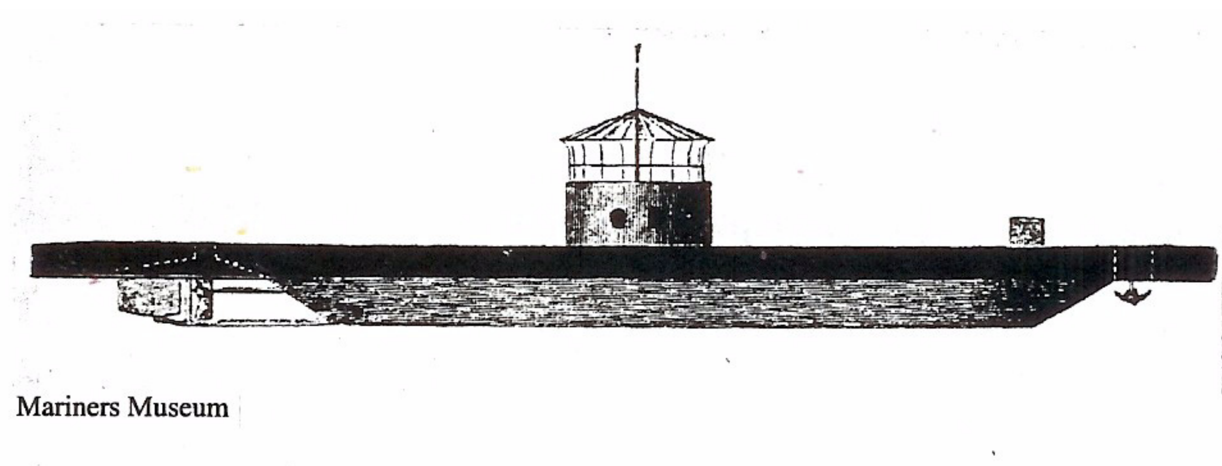
This view shows the hull configuration to advantage



Rudder/prop well with raft end reenforcement



Interior layout. Solid state speed control and smaller servos would save a lot of space.



USS Monitor

USS Monitor

The Monitor was also built from the Dumas kit. I took a similar approach with it as I did with the Virginia. Most of the improvements incorporated have to do with building it in the "after the battle" configuration, with cutters, repaired/improved pilot house, vent and smoke stacks, and deck hatches. It also has operating cannon, the turret turning in conjunction with the rudder, and an authentic color scheme (the Dumas kit simply advises that both ships be painted "flat black"). All this makes for a much more interesting model, as the "fighting trim" configuration of the day of the Battle of Hampton Roads makes for a pretty sterile subject.

The turret as designed in the kit was meant to be stationary and sported two (excessively) protruding cast cannon. The kit supplied external detail materials, such as the sheet styrene "skin" with its authentic rivet pattern, the photo etched brass railings and awning frame, and the vacuformed awning were retained because they are extremely accurate and make quite attractive details on the completed model.

The turret body itself was fabricated from one of the PVC drain grills mentioned earlier in the description of the USS Saugus. The difference is that in 1/72 scale, it is wider and taller than the one on the Saugus in 1/90th scale. The correct width and height was obtained by wrapping a 3/32in. strip of balsa around the piece. The kit supplied styrene "skin" was then applied over that. An added benefit of the "soft" backing was that I was able to duplicate the dents in the armor visible in several well-known photos taken on the Monitor's deck after the battle. I subsequently verified the position of the four prominent dents and the five others known, by viewing the real turret at the Mariners Museum. The dents were applied by holding a suitable sized ball bearing at the correct locations and squeezing it down with a "C" clamp.

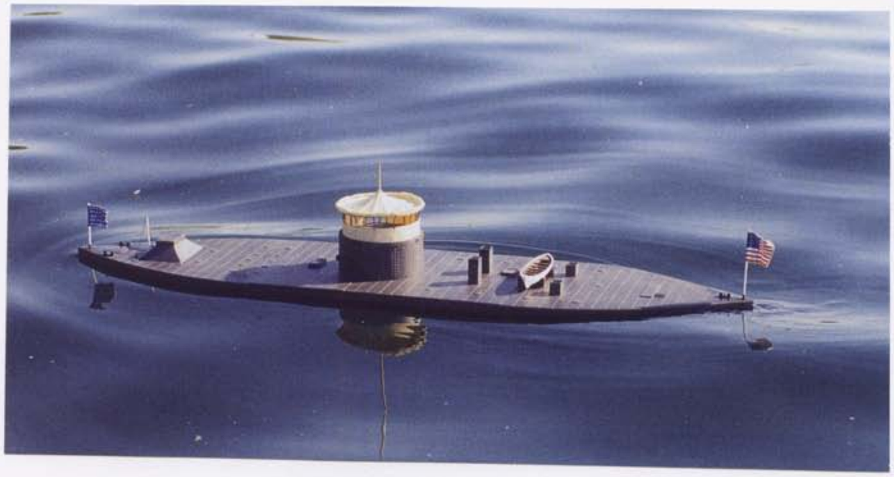
The turret turns because rudder servo is located directly under the turret, as in the Saugus. The throw with full port or starboard rudder is about 45 degrees. This allows you to fire the guns without damaging the pilot house. As mentioned earlier, this was a very real threat on the full sized vessel.

The interior space available for the radio gear and "inner workings" is quite tight, calling for some creative thinking. The kit recommended configuration called for a simple "on/off" switch motor control, probably (as was mentioned earlier) due to the fact that Dumas'only speed control unit is too big for the job. I used a HITEC SP-6 speed control and one of their small sized servos for the rudder and had enough space left over for sufficient battery power and the "fire control" unit. The only (slightly) adverse effect of all this was that with all the components in the only positions they would fit in, it came out a bit down by the bow, necessitating some aft ballast. This wasn't much of a problem, because it took a total of almost 5lbs. of ballast to get to float deep enough in the water, anyway.

And speaking of “deep in the water”, I should discuss its sea-keeping/handling characteristics. They would be best described as “authentic”. Its rather crude (the inventor John Erickson was more of an **engineer** than a naval architect) hull design results in poor efficiency of its propeller/rudder performance. The kit recommended the use of a nylon “speed” prop (supplied in the kit) and I elected to use the metal scale prop supplied, instead. I have tested it with both props, and it still wallows in the troughs of the waves and has them breaking over the deck even a “moderate sea”condition. The result is that it tends to “plow” through the waves, rather than ride over them. Ironically, this is a phenomena described by the crew when she was forced to operate in heavy sea conditions. So, in that respect, a somewhat undesirable bit of “scale effect” has been achieved.

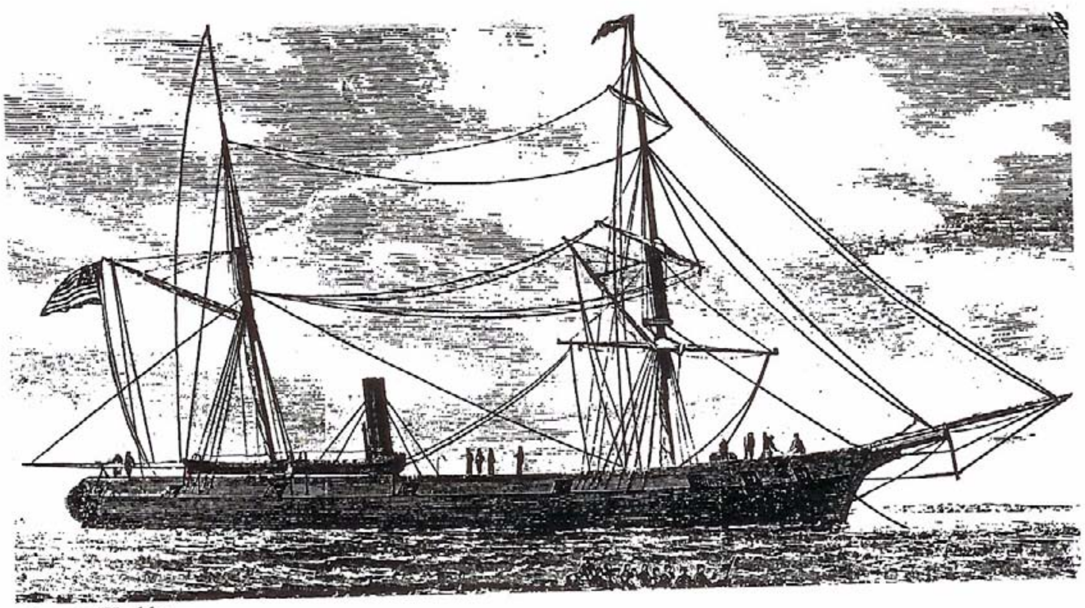
All of the ironclads I’ve built to date are most happy in “mill pond” conditions, due to their “authentic unseaworthiness” as I pointed out earlier when discussing the Saugus. The one exception to this is the USS Galena, a very different design from all the other raft-like designs described.

USS Monitor



B. Kramer Photo

The model's "gunmetal" shade finish nicely matches the "black" appearance of the ship in contemporary Civil War photographs.



Harpers Weekly

USS Galena

USS Galena

I elected to model this ship, because I wanted to have all three of the basic configurations of Civil War ironclads represented in my collection. These were; the Monitor and Saugus representing the “turreted” configuration, the Virginia and Tennessee of the “casemate” type, and the Galena with the “broadside battery” configuration favored by almost all warships up to the introduction of the armored turret. I also wanted to tackle the challenge of building a model with functioning sails and rigging. More on that later.

The Galena is best described as an armored Steam Sloop. Her hull configuration and rigging were very conventional by the standards of warship design of the day. In fact, the specs for all three of the first ironclads ordered by the Ironclad Board had called for masts and sails. Erickson ignored the requirement for the Monitor, but the Galena and the New Ironsides were, in fact, duly delivered with masts and sails. Neither saw action with them fitted due to the fact that steam was by then considered the primary source of power for a warship and falling masts and spars were a well known hazard to crews in action.

The hull of this ship is based on that of the Revell 1/96 scale “Cutty Sark”(virtually identical to the previously mentioned Thermoplyae except that it is molded black plastic and the Thermoplye is molded in green). Using this hull resulted in a model in 1/76 scale, rather than the 1/72 scale of most of the other model in this book. The small difference in size is not particularly jarring when it is displayed along side the others.

I cut it down to the waterline and then built it back up to the correct profile and cross section with basswood bulkheads, balsa planking, and carved block balsa in the stern. The “armor plating”(which on the actual ship was applied much like modern metal house siding) is made up of .010 styrene strips. The deck is the same type of commercially available glued stringer material that I used on the Virginia. Many of the deck details such as the hatches, wheel, gratings, boats, and bitts were taken from the Cutty Sark kit. The stack was fabricated from a suitable sized Estes rocket tube, sheathed in .010 styrene. Like on the Saugus, the rivets were impressed into the back of the material with a tracing wheel. The main deck is removable for access to the batteries and “inner workings” and the rear portion comes off to provide access to the “on/off’ switch.

The masts and spars are commercial tapered wood ship stock items obtained from the Dromedary Ship Model Supply catalog. In fact, other than the lower hull and some deck details, the rest of the ship is built of wood. The overall effect is a very attractive display model that performs very satisfactorily in the water.

The real challenge with this model was to make the rigging functional, have effective motor control, accommodate the four channel radio control equipment, and have sufficient battery power on board to run it all. All this had to fit into the rather trim clipper ship hull and still result in a model that is more seaworthy than the previous ironclads I have built.

The sails are “reefed” and lowered and the yard arms are canted to port and starboard by drum winches that are attached to the output shafts of Tamiya “High Efficiency” gearboxes. I used the “High Power Gear Box” version to power lines that emerge through openings in the deck directly below the main mast and run up to an eye just above the highest yard arm. Lines are attached to the bottom of the sails in the middle, and pulling them up “reefs” the sails and pulling them down lowers the sails. Communicating lines run to the mizzen mast to do the same with the two sails at the top of that mast, as well. The spanker and jibs are not controlled.

The sheets controlling the yard arms are controlled by a winch made from Tamiya’s “Worm Gear Box”. It’s lines emerge from the deck at the gunwales and slightly aft of the mainsail. Lines run up to all three yards on the mainmast and lines from those yards communicate with the yards on the mizzen.

The astounding thing (to me)about all this complex rigging is that it actually works. And, what’s more, it contributes to the handling qualities of the model in the water. But I’m getting ahead of myself here. More on that later.

The motor is a 6-9 volt unit from Radio Shack, the speed control is a Hitec SP-6 unit, and the radio control system is a Hitec Laser 4. I use the two servos associated with the left stick for motor and rudder control, and the other two to control the sails through the second stick on the right side of the control box. Slewing the stick left and right cants the yards. Pushing the stick forward reefs the sails and pulling it to the rear lowers them. The “sail control”servos actuate micro switches that control the direction of the current flow to the motors powering the winch/gearboxes.

The end result of all this is a model with a very tightly-packed situation below decks. By the time the motor, speed control, servos, radio gear, “sail control unit”, and batteries were packed into the narrow hull, I had real doubts as to how well it would float. Happily, all that complexity translated into weight. The model floats right down at its scale waterline, and only required a small amount of ballast and careful battery placement to trim it properly.

When the model takes to the water, it is somewhat impressive. In a light breeze, it will sail before the wind like a true square rigger. Canting the yards aids in maximizing the effect of the sails, and it answers the helm nicely under sail power alone. It sails comfortably with a “quartering” wind without heeling over excessively. In fact, it will right itself readily even when it heels over as much as 45 degrees.

When it reaches the “bottom” (downwind) end of the pond and has to come about, all of its working features really come into play. I simply reef the sails, start up the motor (it is powered by six volts and has some authority), and give it full port or starboard rudder. It comes about smartly under full power and control. It experiences none of the “missing stays”, wallowing about “in irons”, or heeling dangerously over when broadside to the wind, that bedeviled real square riggers. I can see how steam power must have been greeted as a real boon when it came to maneuvering the warships that still relied on sail power for their primary propulsion.

With the sails reefed it can make reasonable headway against the wind, and make its way back up the pond in a satisfactory manner. My feeling is that trying to tack is a little too ambitious for a model rigged, trimmed, and equipped such as this one. I think I'd only be willing to try it with a bigger model (a foot or so longer and several pounds heavier). Seeing it heel over in a stiff breeze tends to give me anxious moments, and tacking entails way too much of that.

If I build another ship with similar rig and equipment (I'm presently researching the USS Kearsarge), I would like to do a better job with the reefing of the sails. I would like to see them reefed to the extent that they are completely folded and offer little or no drag, rather than the partial folding that I am able to achieve now. I feel that reefing the sails from as many as four points (using brails as in actual practice) rather than only in the center, and making them out of more supple material such as silk might do the trick.

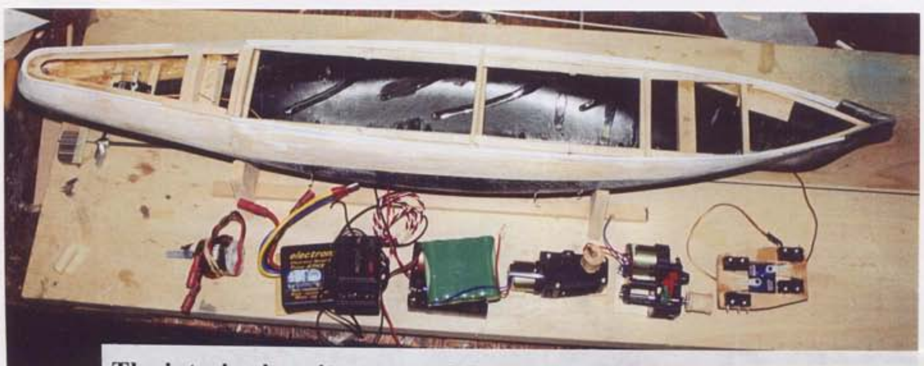
As time passed, and I acquired more "sea time" on the vessel, I decided that I didn't like the anxious moments I sometimes experienced when coming about in a stiff breeze. So, I have subsequently fabricated a removable weighted keel.

The effect has been a great reduction in the amount the ship heels over when broadside to the wind, and a corresponding reduction in **anxiety** on my part! So, I would have to say that this is an improvement that I would highly recommend.

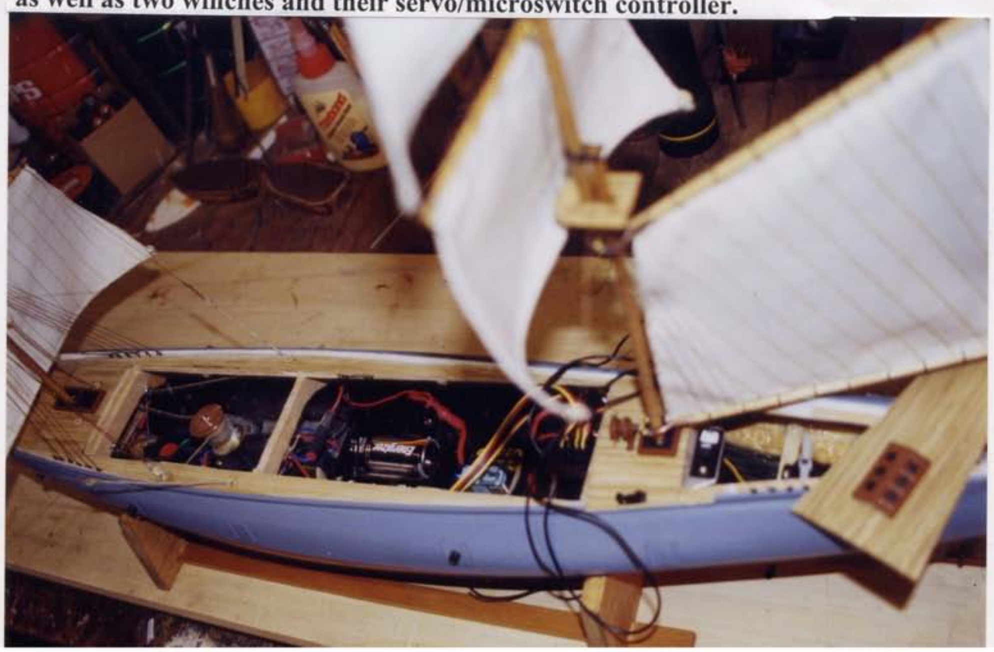
Overall, I would say that this is one of the most pleasing ship models I have built. The appearance of a square rigged ship actually using sail power almost always attracts attention and interest wherever I take it to sail. And even though it also has a screw, I have never had anyone take issue with it at any of the "sailboat only" ponds I have visited.

I really find it enjoyable to take it out on a day when the breezes are low and fitful, and the sailboat people are pulling their hair and praying to the wind gods. I launch Galena with sails reefed, motor it out to the middle of the pond, unfurl the sails, and sit awaiting the next breeze. It is a beautiful sight to see when the sails begin to fill and it begins to move under sail power. It fills me with the resolve that; "I **will** build the Kearsarge".

USS Galena

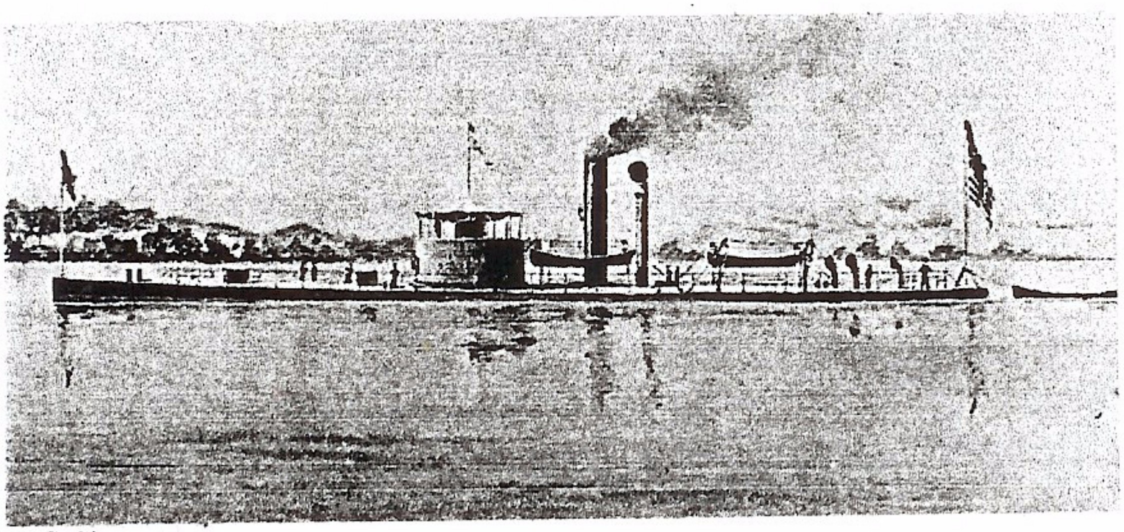


The interior is quite cramped, having to accommodate the usual R/C gear as well as two winches and their servo/microswitch controller.



USS Galena

The Galena underway, using both sail and motor power. Note the reefed sails in the upper photo.



R.G. Skerrett

USS Passaic

USS Passaic

The building method best followed for this model is the way the Canonicus was built. That is to say; built up block type hull like the Richmond, deck constructed of a substrait of .092 Lexan with a deck overlay of .040 scribed styrene, and turret constructed from one of the 3" PVC pipe drains mentioned in the section on the USS Monitor.

Now, having said all that, I'll relate how the Passaic model (actually the USS Nahant) was actually built. The Nahant has a more appealing (to me, anyway) color scheme (see the "Color Schemes" chapter), so that is why the Passaic ended up that way.

When Bill Hathaway and I embarked upon the project of creating a 1/72 scale Civil War navy, we both came to the table with some of the ships already built. He had the Choctaw, Teaser, and the Dumas Monitor completed, and the Virginia about half done. As he relates in the CSS Arkansas segment, the hull of the Virginia was to become the basis for that ship.

I had completed the Saugus and Tennessee in 1/87 scale, and the Galena, Monitor, and Virginia in 1/72 scale. So, we decided that all future vessels would be in 1/72 scale and that we would try to build representatives of the all the principal types of ironclad ships employed by both combatants in the war. Various subjects were explored, and over a period of time it was decided to build the Passaic, Arkansas, Canonicus, Richmond, Osage, Onandaga, and Texas.

It seemed a shame to have a duplication in the "Monitor department", so Bill donated his to the cause of providing the Passaic to the line up of Monitor-type ships. Although the Passaic class ships had rounded hulls that were considerably different from that of the original Monitor, it was decided to use the old hull anyway for simplicity's sake.

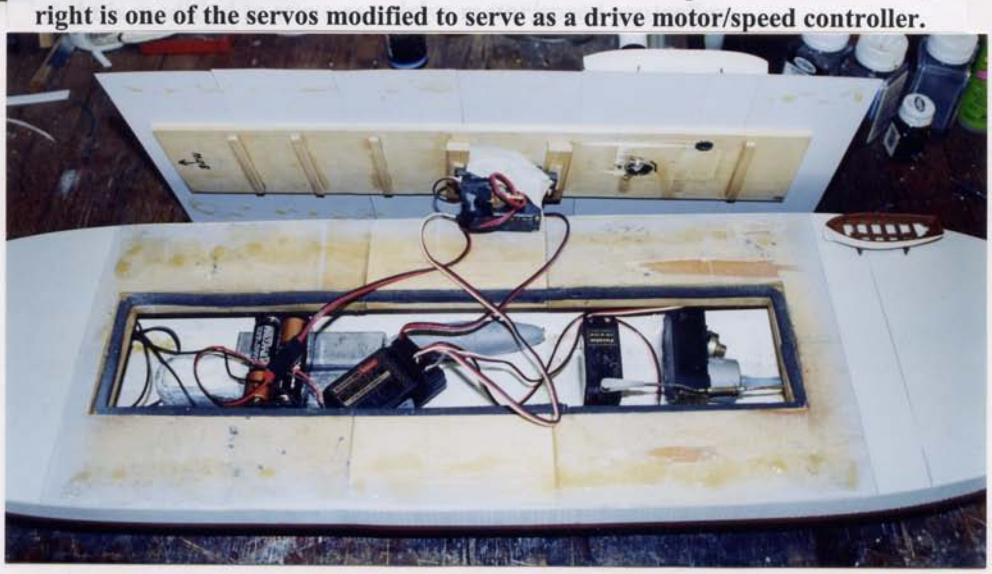
The decks of the two ships were virtually identical except for the fact that the Passaic was 28 feet longer than the Monitor. It was a relatively simple task to splice in a 5 inch constant-chord section into the middle of the ship. This was the principal structural modification necessary, and the rest of the changes were fairly minor.

The Dumas balsa and plastic turret was retained and then "enhanced" with a turret base ring, awning, and bullet shield. Bill had fitted one of his 360 degree servos to power the turret, and that was retained. Detailed with the complement of hatches, stacks, ship's boats, and other details that the Canonicus, Monitor, and Onandaga all display, the Passaic/Nahant fits in well with the rest of the fleet.

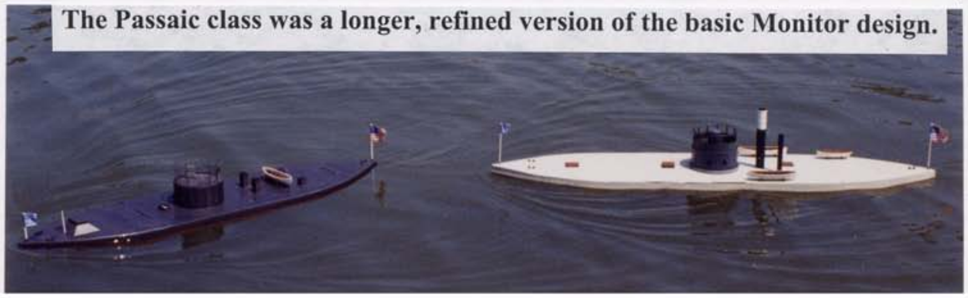
In fact, I do plan to eventually build a "keel up" version of this ship. The post war configuration with a hurricane deck fitted and all kinds of peace-time "clutter" appeals to me. The 1898 era plans of that configuration that were mentioned earlier, faithfully show those details to good effect.

USS Passaic

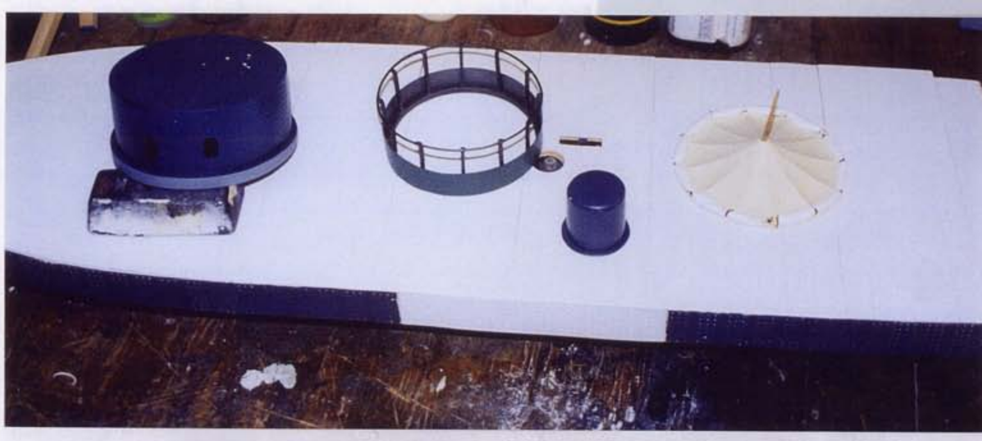
Interior layout (below) shows lots of available internal space. The unit at the right is one of the servos modified to serve as a drive motor/speed controller.



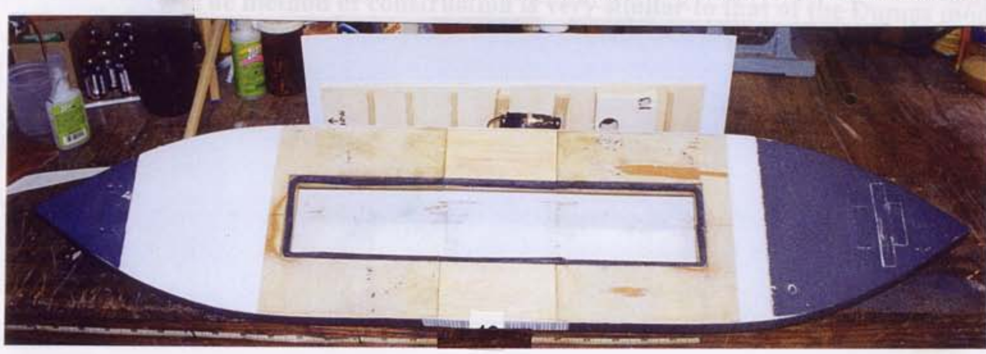
The Passaic class was a longer, refined version of the basic Monitor design.

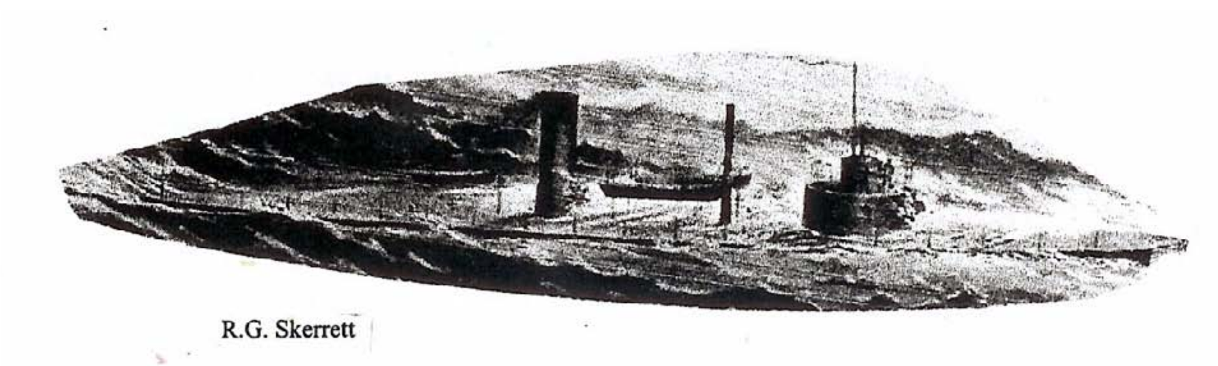


USS Passaic



This view shows the 5 inch "stretch" added to the Dumas model.





USS Canonicus

USS Canonicus

Bill Hathaway is a big believer in built up hulls and building them as simply as is practical. The Richmond's hull was my first venture into his method of using block and sheet balsa to reduce the amount of carving and hollowing needed to produce a hull with a nicely rounded exterior and a spacious interior.

The hull of the Canonicus was my next effort. These vessels (nine of the class were built) were a serious attempt to increase the hull efficiency (and hence; speed) of a ship 25 feet longer than the Passaic class, without increasing the size (read: coal consumption) of the engine. To that end, the shape is indeed considerably more refined. Unfortunately, they were somewhat of a disappointment, achieving a top speed of only 8 knots (4 knots short of their design speed). This was only a one knot improvement over the speed of their predecessors.

All that aside, what it translates into for the modeler is a hull with ample space for all the equipment, batteries, and ballast. In fact, looking at the photos, it looks almost **bare** inside.

This ship is also where I first started to use .092 Lexan as the deck substrait. It is a good and stable material that can be cut and beveled to produce a tightly sealing joint. What I found works best is to glue strips of the material under the decking to form a shelf approximately an inch wide for the removable piece to rest on. The styrene deck then rests on top of it, overlapping the joints. The result is a fairly watertight joint that can be further sealed with the application of Vaseline to the shelf.

Many of my turrets have had their appearance enhanced by the application of the vacuformed sheets of riveted material from the Dumas Monitor. The material is available from Dumas, and it assures you of a piece with the correct rivet (actually, **bolt head**, as I stated earlier) pattern, of the correct size for a 1/72 scale Erickson turret. And since all the turrets on the vessels in this book were 20 foot diameter Erickson turrets, this method is applicable throughout.

Their side armor material, however is not correct. They merely duplicated the three-row turret pattern in one inch wide by three inch long strips for application to the sides of the "raft" portion of the hull. What is needed is a pattern depicting squares with a bolt pattern around the perimeter of each piece. This can be done by making male molds out of strips of .045 (or thicker) aluminum, drilled with holes the correct size of the bolt heads. These are then turned over to a hobby specialty company or to a company who makes those thin plastic magnetic signs you sometimes see on vehicle doors. They can then vacuform the strips for you in .020 styrene. The holes suck in the material and produce the effect of the bolt heads. By making four such mold strips (I used Lexan, which the heat of the process eventually destroyed) I was able to get enough strips made in one session to cover the sides of three ironclads.

Some of the scale external details, such as the boats and anchors were made removable. The two stacks, however, were anchored to wooden blocks under the deck That way, they can be used as handles to lift the deck. It is a deliberate tight fit, so it sometimes takes some force to lift it out.

Other details available from the Dumas Monitor are those superb awnings you see on virtually all my turreted ships. These awnings were used extensively, because the tops of the turrets were open to the weather. Their basic structure was a railroad rail grating that had perforated iron plates laid over it when in action. It appears that the conical infantry “Sibley” tents were sometimes used for this purpose.

Anyway, I have made one in a smaller scale for the earlier Saugus, and I will have to say that the Dumas units look a lot more realistic. Their appearance can be further enhanced by rolled tissue paper, tied at intervals, around the outside perimeter of the awning to simulate rolled canvas side curtains.

The final touch I always add is weathering and rust. These ships spent their entire wartime careers out in the weather, and they should show it. I always try to pick out the seams with rust and make it streak down where such deck fittings as bitts, chocks, anchor chains, and hawse lips are present. The stacks were made of riveted sheet iron and also had seams in them that you can stream streaks of rust down from.

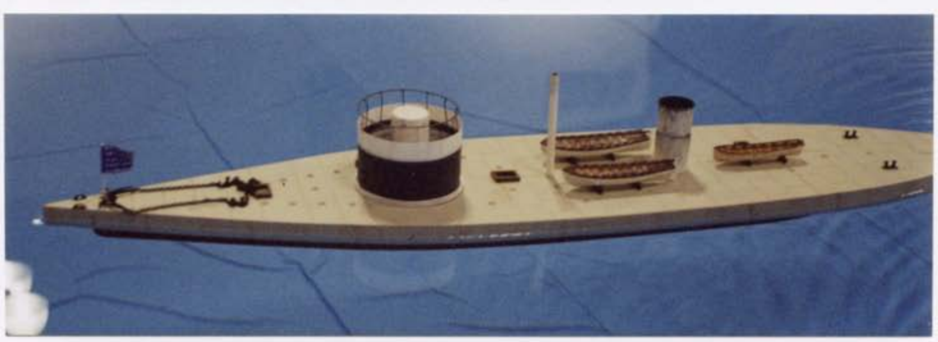
Don’t forget to go heavy with the soot and grime, as well. These ships were coal-fired, and the stacks and decks would be streaked with coal dust and soot.

When everything is grimy and rusty to your satisfaction, shoot it all over with a coat of “Dullcote” to seal in the results of your hard work. It can be a bit of a disappointment for a nicely weathered ship to return from a voyage washed clean.

USS Canonicus

Trim is important with the long hulls. A little "down by the bow" results in the ship "plowing under".

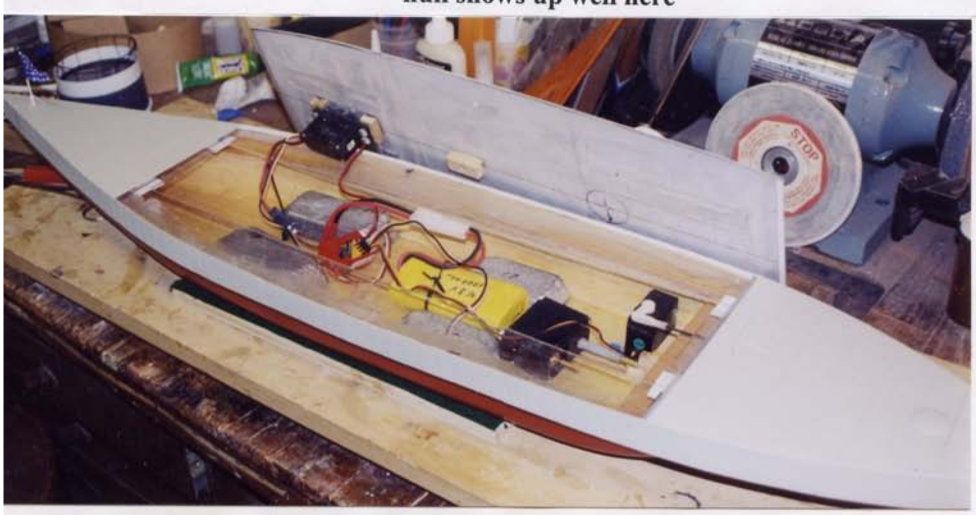
The refined hull/raft streamlining results in good speed and handling

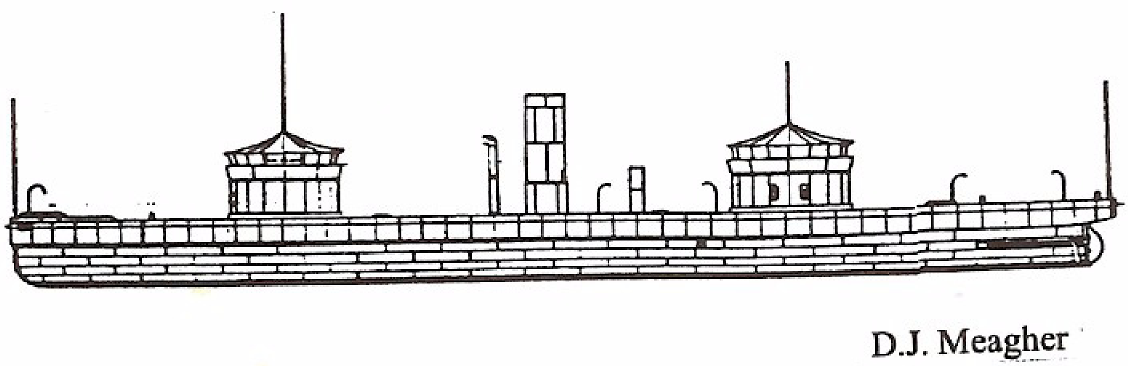


USS Canonicus

he size difference between two hulls of the same ship rendered in 1/87 and 1/72 scales
dramatic.

The roominess of the interior of the "block and sheet" construction
hull shows up well here





USS Onandaga

USS Onandaga

This ship represents a departure from the single turret formula that Monitor inventor John Erickson favored. As a result, she was designed and built by G.W. Quintard under contract from the Union Navy, but still featured Erickson turrets.

She is considered a success in her service, having participated in several engagements on her wartime station on the James River, and never suffering any damage or casualties. She was considered the most powerful warship that blockaded the Confederate “Capital Navy” which guarded Richmond. On one occasion, she engaged three Confederate ironclads and effectively penetrated the armor of two of them, causing them all to withdraw from the action. She was sold to the French after the war, crossed the Atlantic unassisted, and served with their navy til 1905.

This model’s hull is of Bill Hathaway’s other favorite type of built up construction. It is much thinner and of lighter construction, being of the more conventional keel, rib, and planking method favored by a lot of static modelers. The difference with an operational boat of this size, is that more robust materials are used throughout. Plywood is used for the ribs, solid basswood for the keel, and hard balsa and bass strips for the planking. This is then fiberglassed on the outside (as are all the balsa hulls) and coated with finishing resin on the inside. The result is a light, tough, shell-like structure that stands up nicely to any of the demands placed upon it. The method is best suited to the deeper hull types that have more compound curves.

One of the first challenges presented by this model was the twin screw arrangement. Typically, rudders aren’t very effective with this arrangement, so the best practice is to throttle each motor separately. With conventional ship model speed control systems (you’d need two of the units), this could get to be expensive and complex. With Bill’s “servo motor” arrangement, it is all relatively simple. Each motor is controlled by a separate channel, controlled by the fore and aft throw of one of the transmitter’s control sticks.

The other significant challenge was the mechanization of two turrets. I use a 6 channel R/C rig for this ship, and it takes five of the six to do that is required. The unit has one channel controlled by a two position toggle switch. I use that one to select “Turret A” or “Turret B”. Another channel has a rheostat-type knob that is used to control the direction and speed of the turret rotation. Now, if I could just figure out how to fire the **guns** with that one remaining channel................

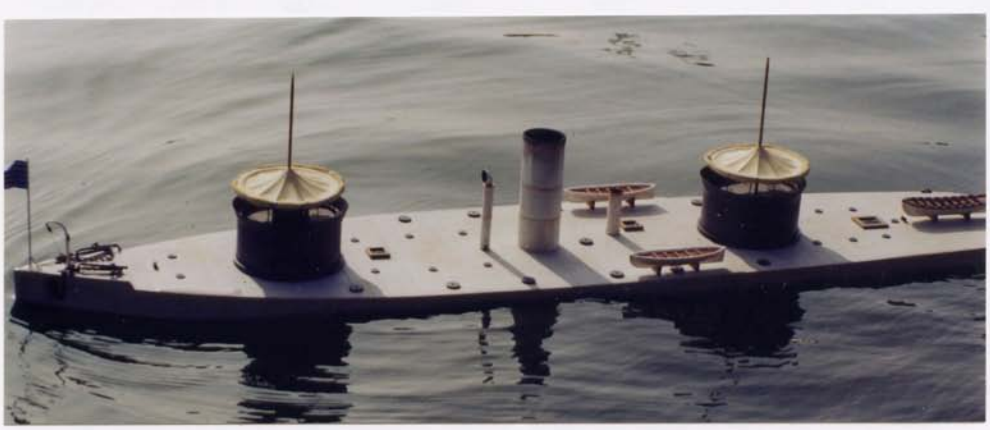
The external details and weathering pretty much follow the practices developed for and on the other Monitors. It just seems that with the addition of more turrets on this ship, came the addition of more **everything else**. More stacks, more vents, more hatches and ports. And although she is the same length as the Canonicus, she appears to have considerably more bulk, as well. In fact the real vessel displaced almost 25% more tonnage than did the Canonicus. So, I guess the overall impression it gives is pretty true and accurate.

No doubt, because of it's bulk, it has proven to be the best handling of the Monitor types in rough water (as rough water as they can take, that is). The forward turret is isolated and well sealed, and the first deck joint is located a bit aft of that. So, water washing over the bow seldom finds its way inside.

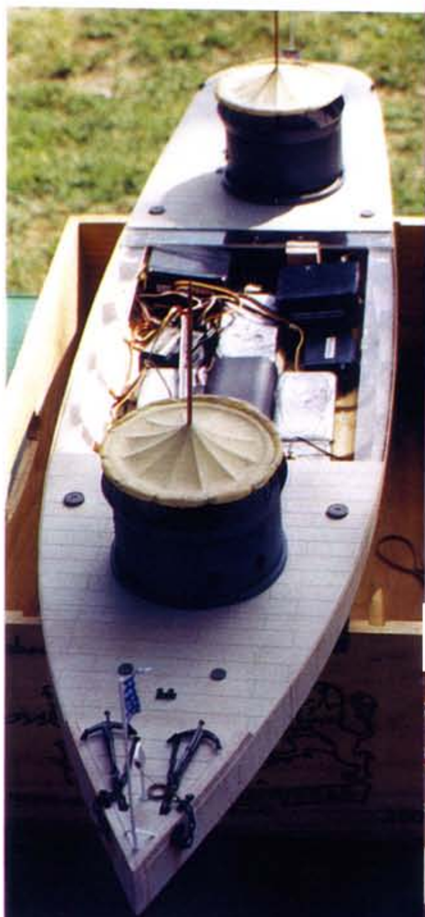
Because of the twin props, it has also proven to be very maneuverable. So much so, in fact, that it has now superseded the Richmond in my choice for a ship to enter in the navigation event.

USS Onandaga

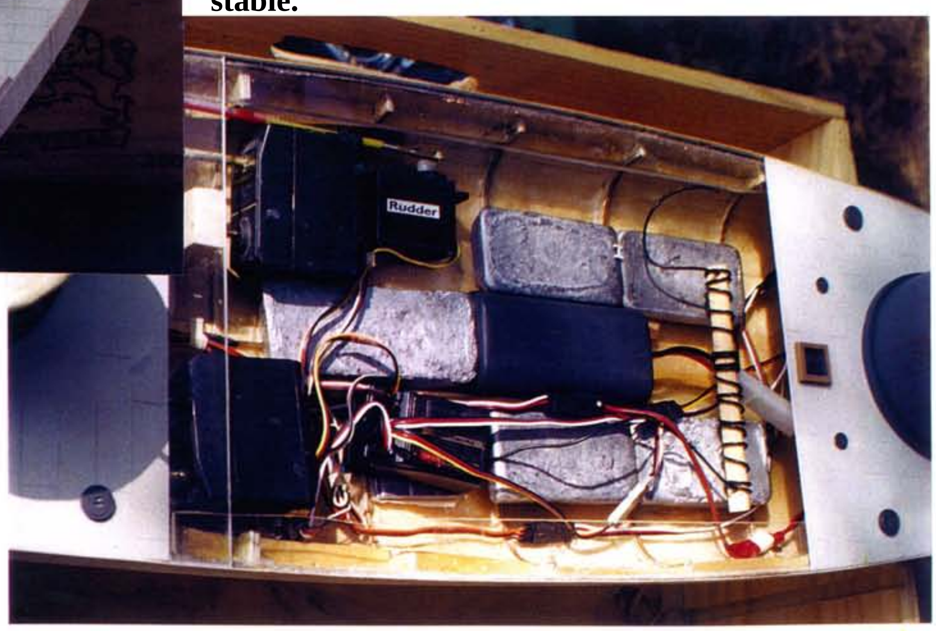
The rivet detail possible with the vacuformed strips shows up well here



USS Onandaga

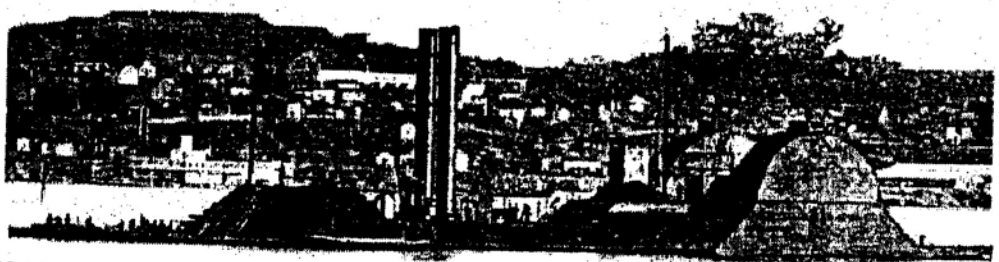


The boat is as large as a skateboard, quite roomy, and stable.



USS Onandaga

The rounded configuration with its compound curves lends itself to the rib/plank method of construction



USS *Choctaw* National Archives

USS Choctaw

USS Choctaw

Several years ago I received a book, "Naval Warfare, Courage and Combat on the Water" by John Wideman, and fell in love with a boat portrayed in a painting in the book, a big, ponderous, impossible looking thing, the *USS Choctaw*. My previous model experience had not included any fighting boats but this thing was right up my alley, big and slow and unusual, and so a new chapter in my creative endeavors opened up and I started my first Civil War ironclad project.

The *USS Choctaw* was converted from a civilian side-wheel packet in 1862 and was 260' long, 69' in the beam and had an 8' draft. She was designed as a thinly armored casemated ram but was to slow to function as one. By all accounts she was a beast to handle. Displacing over 1000 tons, her top design speed was 7 knots but she was never able to reach that. Armed with three 11" Dahlgren smoothbores, two 30# Parrot rifles and two 24 pounders her primary duties were shore bombardment and support of troops. It seems that her only naval engagement was to sink one of her own tugboats, the *Lily*. She survived the war and was scrapped in 1866.

One of the reasons I was attracted to this project was that it was a side-wheel paddle boat and in my collection of things as of yet unbuilt I had a hull from a Dumas *Mt. Washington* (a side-wheel paddle boat) kit that had been modified by having the sponsons cut off, leaving a narrow hull that seemed perfect for conversion into the *Choctaw*. I drew up a set of plans based on some photos and the aforementioned painting that fit the image of the Choctaw and fit on the surplus hull I had. I made some design changes based on experiences by others on *Mt Washington* models, that they are very tippy due to the narrow hull and are top heavy as well. The *Chocta*w had very high paddle wheel boxes as the boat rode very low in the water and the paddles were mounted very high. In the model I planned to run the boat higher out of the water and the paddles deeper in the water so I lowered the paddle wheel boxes to get rid of some of the top heaviness. But with a little guess work (a lot) and some creative imagination here and there I arrived at a design that looked like the *Choctaw* and fit on my surplus hull. I chose to build in 1/72 scale primarily because I wanted to have a crew on the boat and there were lots of 1/72 Civil War figures available. This created a model that was about 44" long that fit the old *Mt Washington* hull perfectly.

My first step in construction was to drill and install a brass rudder tube in the hull. This was sealed with bondo. The next step was to construct a 1/8" thick lexan sub deck on the hull. There was one large opening in the deck, which allowed access to the batteries, radio gear and the paddle wheel drive system. The hull shape and openings were traced onto the lexan, cut out and the piece glued to the fiberglass hull with epoxy. After the epoxy set a wooden coaming was added to the forward part of the deck opening. My next step was to finalize and plan the drive mechanisms. I would be using an independent drive for each paddle wheel, consisting of a 12V (run at 7.2V) gear-head motor with 1/8" toothed belt drive to the paddle-wheel shaft. Each paddle-wheel shaft was supported by two bearings made of brass tubing soldered to a flat plate and mounted on a wooden spacer to support the wheel at the correct height. Before I could fabricate the mounting I needed to build the paddle wheels.

The paddle wheels were designed and drawn using Autocad and full size layout patterns were printed. The wheels were designed using rings 1/4" wide cut off of 4" and 2" PVC pipe and wooden spokes joined in the center to a plywood hub. The full size patterns were covered with wax paper and the wheels built directly on them. After the wheels were built the exact center was determined, marked and a hole for the shaft was drilled, the shafts being made of 3/16" diameter stainless steel rod. The paddle blades were made of plywood. Two ring and spoke assemblies were slid onto a shaft, spaced correctly, trued up and the blades (buckets) were glued on. After the buckets dried the wheels were glued to the shafts. The result was two easily made and true running paddle wheels. The paddles were then painted with several coats of red oxide primer.

The next step was to mark the intended water line on the hull, set the paddle depth (I am running these paddles about ½" into the water) and note the center line of the shaft. I then constructed the wooden shaft supports and glued them into the hull. A large lexan splash shield was glued to the top of the sub deck and the shaft support at the hull line and running about 1" above the shaft center point. A hole was drilled into the splash shield for the shaft to run through (in hindsight an error but more on that later). The various coamings and splash shields were glued and caulked together to provide some measure of keeping most of the water out of the hull. The paddles were temporarily mounted and work on superstructure was started.

The entire superstructure was designed as one lift-off unit to give maximum access to the working parts in the hull. The design was a bottom plate conforming to the hull lines, butting up to the various coamings and a top plate of the appropriate shape of each section of the superstructure supported off of the bottom plate with various bits of wood. The paddle boxes were made of plywood and were designed to slide over the outside of the splash shield previously installed, with a generous overlap. This was to keep water from the paddle boxes out of the hull while still allowing easy removal and access to the paddles and drive system. The paddle boxes were an integral part of the superstructure assembly. After the carcass was constructed the sides were glued to the top and bottom plates using styrene strips to simulate armor. Since most of the armor was slanted and most of the surfaces were curved each piece of styrene had to be tapered. It was a time consuming job but the effort was rewarded in the finished look. After all of the siding and armor plate was put on a wooden deck was applied to the top plate.

The smoke stacks were fabricated out of brass shim-stock by cutting the pieces to size, rolling in rivets using a ponce wheel, wrapping the brass around a wooden dowel of the proper size and soldering the seam. Wire reinforcing was soldered to the top of the stack and the assembly was then removed from the dowel. The two stacks were soldered together using various bits of brass rod and the assembly mounted to the superstructure. The pilot house and the cook house along with various other deck structures were fabricated out of sheet styrene and glued to the deck. Two stair structures from the deck to the top of each paddle box were constructed from HO scale stair parts and bits of sheet styrene. The flagpoles and hog cable supports were made from wood and glued in place. The hog cable was made from braided wire and affixed in place (most steamboats had very shallow hulls that tended to droop, or hog, at each end. To fix this a cable or chain was run from the bow to the stern over support masts and trussed up the hull to keep it from drooping). Many handrails were constructed from brass wire in place by drilling and inserting the poles and soldering the rails to them. After the superstructure was completed a spruce strip wood deck was applied over the sub deck. A rudder was made from sheet brass and soldered to a 1/8” brass rod. A drill bit was inserted into the previously installed brass rudder tube from the bottom of the hull and the deck drilled through. A tiller arm was fabricated out of brass and a 1/8” wheel collar. The rudderpost was inserted and the tiller arm held the assembly in place exposed above the deck. The rudder is cable operated with exposed cables running across the deck from the superstructure.

The superstructure was removed and set aside for painting. At this time the paddlewheels were mounted to the pillow block support bearings using 1/8” wheel collars. The drive motors were mounted on wooden support blocks with brass hold down straps. A drive pulley was fixed to the inboard end of each wheel shaft and the drive belt placed and the motors tightened down to proper belt tension. The steering servo was mounted in the motor compartment and the steering cables connected to it. Each motor is controlled by a Hitek speed control and is powered by two 7.2V NiCad batteries run in parallel. Four batteries were selected as much for weight as for power. There was plenty of room in the hull so radio installation was straightforward and easy. The superstructure was put on and the boat was floated in the bathtub for initial ballast. Quite a bit of lead shot was added to get the water line down and to level the boat as it wanted to float bow high. Initial floating did not discover any leaks.

The boat was primed using red oxide primer and then painted a uniform dull gray over all areas except the exposed wood decks. Model railroad dry rusting powder of several shades of rust was brushed on to age the gray armor and metal parts. The decks were sealed and stained with an oil based penetrating stain and were brushed in a blast pattern in front of each cannon that fired across the forward decks using dry black powder after the stain dried. Various details were painted and highlighted to create an aged and used look to the boat. The lower hull was kept gray and did not have the traditional red paint applied below the waterline. After all painting was finished several liberal coats of Testor’s dull coat was applied. 1/72 Civil War figures were painted and applied to the deck along with two field cannons. HO scale cats and dogs were added (I always put cats and dogs on my boats) along with boxes, ropes, chains and general deck clutter. Boat davits were made from brass rod and two boats were painted and added. The boats were from a Revell kit of the *CSS Alabama* and are a perfect fit. A large cloth American flag was added to the mast (OK it has to many stars but who is counting). After many hours of detail work I have produced a dark, dingy, rusty, unkempt hulk. In other words perfect.

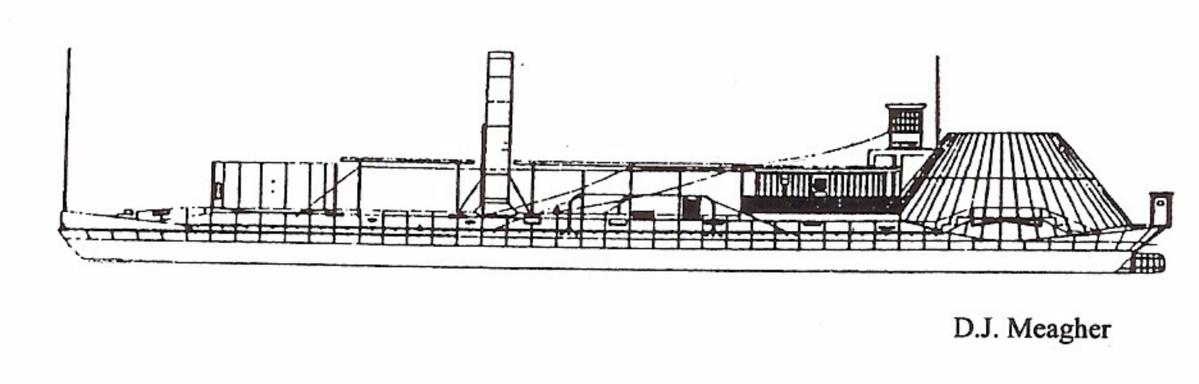
Sea trials. After too long a wait I finally had a brief chance to take the *Choctaw* out for its first float in the local pond. I only had a very brief time so I placed her in the water and hit the throttles. The boat floated right at the correct water line, did not lean into turns, turned well with rudder only (about a 12’ circle), and could spin on its own axis using one paddle forward and one paddle reverse. It worked well! After about 2 minutes I pulled it out and checked for water inside. It was dry. A perfect first float. Several days after I was doing some work on the hull and had it set, with the superstructure off, on a temporary workbench in my driveway. Somehow the garage door was shut and, CRUNCH, came down on the hull. The only apparent damage was to pieces of the coaming, which I proceeded to fix. No real damage done. Next time I had the boat out I noticed she had developed a list after about 5 minutes running. I pulled her in and found LOTS of water in the hull. Thinking I had a hidden crack in the hull after the garage door incident I drained the hull and set it in the pond. No new water leaked in. Everything looked tight so I was puzzled. Several weeks later I ran her again. WATER everywhere. No apparent leaks were observed which pointed to the paddle wheels pumping water in. Earlier I had mentioned that the paddle shaft ran free through a small hole in the splash shield. This was sealed with a generous glob of Vaseline each time the boat ran but apparently it wasn't enough. The paddle wheels running in the paddle wheel boxes act like pumps and produce a lot of water. I remade the outboard shaft bearing such that the brass bearing tube ran through the splash shield, which was then sealed to the splash shield and acted like a stuffing box. Back to the lake and NO WATER. Problem solved. The *Choctaw* is fun to operate and the paddle wheels have their own unique sound, sort of like a pig snuffling through the water. She is earning the nickname Pigboat.

USS Choctaw

The Choctaw's size in 1/72 scale makes an impressive model.

The paddle wheels churn up a considerable wake.

The casemate joint is similar to that used on the Virginia and Richmond.



USS Osage

USS Osage

The *CSS Arkansas* is completed, the shop has been cleaned out, the missing tools have been found, a few dollars have been obtained, and the desire to replicate another obscure floating piece of American history has returned. I have had good experiences operating my paddle wheel ironclad, the *USS Choctaw*, and had run across another very unusual boat in my research, a paddle wheel monitor. In fact there were two boats constructed on this pattern, the *USS Osage* and the *USS Neosho*. They were very shallow draft flat-bottomed riverine type gun platforms with a single turret very far forward and a single paddlewheel mounted in a big cone shaped armored housing aft. The boats were successful as shore bombardment batteries and supply ships but were reported to be hard to handle at times due to poor steering abilities. The *USS Osage* was sunk by a Confederate mine in early 1865 but was salvaged. I obtained a set of plans from Taubmans and was off to the naval architect's (my computer) for development of working drawings.

As all of Old Navy's floating stock is in 1/72 scale and very few of the obtainable drawings are in that scale the usual procedures of scanning the drawings into the computer, tracing the lines into Autocad and developing the working drawings in the exact size required was started. This project went very fast as the hull design, being flat bottomed, lent itself to large plywood pieces with no ribs to be drawn out. The final construction was based around a plywood bottom with a plywood subdeck and balsa filler pieces to keep the two apart. The boat has one unusual feature in that the deck is bowed and not flat. The amount of work and complexities this generated was grossly underestimated during the design phase. I designed the upper deck as a two part construction, breaking after the turret and the entire rear deck and fixtures lifting off as one shell. I designed some very shallow ribs to follow the deck curve. With the major design features settled the working drawings and patterns were printed and construction was started.

The basic building stock was my old cheap standby; 1/8" thick door skin plywood available at the lumber store for about $8 for a 4' x 8' piece. The lower and upper hull patterns were spray glued onto door skin and trimmed to size on the bandsaw. Block balsa was sawed to the proper thickness and was glued between the top and bottom hull plates (only at the edges, leaving the center open). This was then sanded to the outline of the plywood, forming the hull sides. The rear was left open for construction of the paddlewheel box. The paddlewheel is mounted somewhat forward and in the center of the boat in this design and an opening in the bottom of the hull was framed for it. With the basic hull formed fiberglass cloth and resin was applied and sanded.

The hull top was next. Since there needed to be a flat space for the turret to rotate on and the rest of the deck was curved, I needed to make the turret at this stage of the operation to get accurate measurements from. I was planning the usual monitor type construction of a plastic pipe drain fitting with a thin skin of balsa glued on to get the proper diameter and thin plastic rivet skin (obtained from Dumas monitor kits) glued on over that when Steve said he just happened to have a completed spare Monitor turret I could use. I didn't ask him which boat he had recently sunk to have a spare turret from and quickly took possession of the turret (and a fine piece of work it is). With the turret size fixed I made a plywood circle to fit the turret and also a fixed glacis ring at the base of the turret. I would mount the turret on a modified servo for motion and this fixed the height of the deck with the servo sitting flat on the hull bottom. I mounted the servo into the plywood circle and glued this assembly into the hull using balsa spacer blocks. As the bow deck section in front of the turret is double curved I decided to carve it instead of framing it and proceeded to fill in the space with balsa blocks, which I then carved and sanded to shape. The deck was to be removable just aft of the turret and this section was planned next. I made several ribs from 1/8" plywood and glued them together with spruce stringers to form a shell over the central opening in the subdeck. This was covered with 1/8" balsa strips and sanded smooth.

The paddle wheel was next on the agenda and I constructed one using rings cut from PVC pipe joined with ½" spruce paddles and all fixed to an 1/8" stainless steel shaft. This was painted in primer red. A waterproof wheel box was constructed out of Lexan plastic and the paddlewheel was mounted into it using waterproof shaft fittings (obtained from the local RC submarine supply source) as bearing blocks. This whole assembly was mounted into the hull and sealed with glue and silicone. I had obtained a very nice gear motor from a Robotic supply store I found on the internet and this was mounted into the hull and connected to the paddle wheel using a large "O" ring as a drive belt. I planned to run this using a 7.2 volt 6 cell battery. The rudders were then fabricated from brass sheet and 1/8" brass shaft and covered with wood for appearance. I added a third rudder in the center of the boat as I felt the two original rudders would give only marginal effect, being at the edge of the slipstream. The rudder servo was mounted and the control arms fabricated from wheel collars and brass wire. The paddle wheel box had to be in place to design the linkage from the rudder servo, which was mounted in front of the box, to the rudders, which were mounted aft. This was completed and checked for proper operation.

With the rudders and the paddlewheel box in place the rest of the removable deck shell base was fabricated from pieces of plywood. The paddlewheel armor shell was next to be built. This was started by framing up the flat top piece using wood pieces that fit around the paddlewheel box and connected to the subdeck. The shell was a truncated cone made up from tapered styrene strips mounted vertically. After the styrene was fitted the whole assembly received a layer of fiberglass and resin on the inside for strength. The front of the cone was trimmed to fit properly over the rudder servo and the drive motor, both of which are higher than the deck. These will be covered by the deck house which sits right in front of the wheel cover. The whole deck shell was to be removable as one unit and was planned to sit on the deck without any mechanical hold downs. I should be noted that the shell is rather flimsy at the point of connection between the paddlewheel cover and the deck shell as quite a bit of the supporting wood is cut away to obtain clearance for the drive motor, belts and steering servo. This leaves a very thin connection point on either side of the shell. The plan was that the deckhouse would stiffen this up when it was built. The deckhouse was built and framed into the deck shell and all seem correct. The deck was to be .03 styrene with panel lines scribed into it. There was to be an overlap of the deck plates at the break point of the shell just aft of the turret to provide a hold down of the front of the removable shell. This was made and the shell covered with styrene, glued down with contact cement. After the deck plating was glued on it seems the deck shell got an incurable bow to it. No matter what I did the rear of the shell lifted up. Some sort of mechanical latch would be required, and at this point there seemed nothing better than some ugly screws down through the deck, when a brainstorm occurred. I was investigating on how to mount a flagpole on top of the paddlewheel casemate when it occurred to me that the pole mount could be made into a latch. I simply used a threaded stud mounted into the top of the waterproof paddlewheel housing and projecting through a hole in the top of the paddlewheel casemate. The base of the flagpole was made up of a threaded insert soldered to a washer that was then screwed onto the stud, thus holding the shell down. Problem neatly solved.

The deckhouse and the pilot station were made from styrene and mounted on the deck shell. The stack was made of brass shim stock with rivets rolled in using a ponce wheel and was mounted to the deck. An extensive system of rails and stanchions was made of brass for the awning support. Davits for two boats were also fashions from brass. A catwalk with handrail was made for each side of the boat. All of the various deck things were made and glued on and the boat was ready for painting. The deckhouse was painted with a green roof and buff walls mostly for a visual difference. This boat was mostly gray due to the iron deck and the iron paddlewheel casemate and the buff deck house broke this up and is very pleasing looking. The same idea was used in making the turret darker that the decks. This shows up in the available black and white photos of the boat. Also take from the photos were false gun ports painted on the sides of the turret to confuse observers as to the direction the turret was facing. These were painted entirely by eye on the model to give a hand painted appearance.

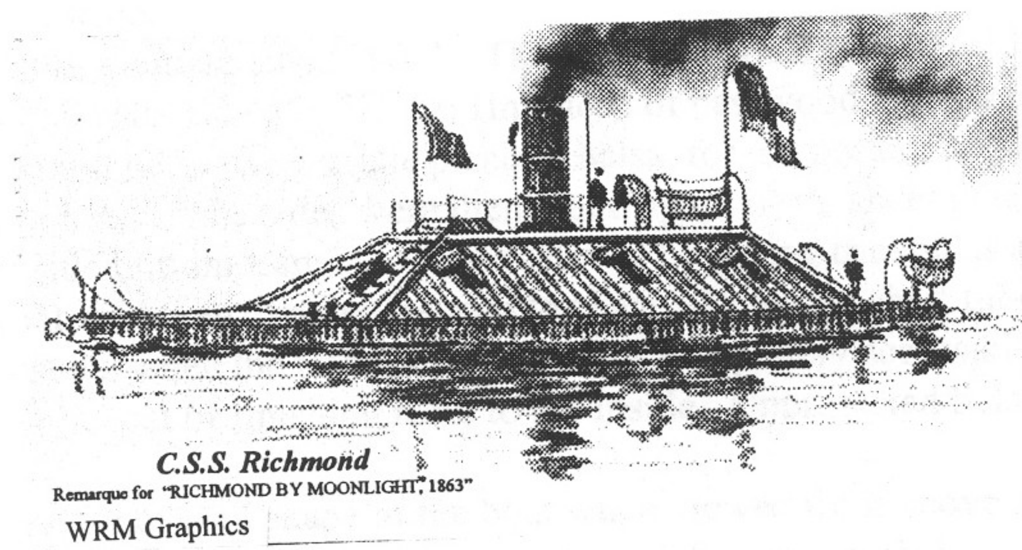
Time for the first runs. Old Navy had the fleet at the west coast AMA show and had a beautiful indoor pond to run in. The *USS Osage* was put in the water and three things were quickly discovered. One, the boat moved pretty good but it was apparent that the motor was geared to low and a 12 volt system would be required for any speed. Two, the boat, even with three rudders, had a very realistic turning circle, which is to say large. And three, better waterproofing would be required as the boat filled up with water on a dead flat pond. The answer to the first problem was easily fixed as I simply bought a 12v nicad stick at the show and it proved OK, The second problem was unfixable as it was on the real boat. And the third problem will be fixed with additional water berms installed at the rear of the boat.

The *USS Osage* has proved a very interesting project to complete, is very different in appearance and is proving to be a reliable performer. It has provided some different modeling skills and solutions and is proving to be a real proof of concept model for future construction of one of the *USS Cairo* class ironclads, which had a similar paddlewheel arrangement.

USS Osage

The deck joint aft of the turret is unobtrusive

The humped “turtleback” deck was a means of providing internal space on the shallow draft river craft



CSS Richmond

CSS Richmond

This model was built as a departure from most of the previous designs in that it uses no components from other models and could be described as entirely scratch built.

The subject is a good example of a "generic" Confederate ironclad. She was designed by the same team who built the Virginia, and laid down in the Gosport Navy Yard where the Virginia was completed and based. There were at least six ships built of this design, giving the modeler considerable choice of detail and color scheme.

The basic design of the model draws heavily from the Dumas CSS Virginia. The casemate is built up in the Dumas manner on a framework of 1/8in. Birch plywood covered with 1/32in. Ply skinning. The upper (spar) deck os also 1/8in. Ply with the top covered with 3/32in. strip decking material. The fore and aft decks are also covered with the same material. Over the plywood skin the armor plate of .040 "V grooved" styrene sheet is applied. Evergreen plastics makes the stock with the scribing at different intervals. We found that the .125 interval is perfect for the "Confederate pattern" in 1/72 scale.

The hull was built up as a square sided "box". This consists of a bottom piece composed of two pieces of 1/4in. balsa on each side of a 3/32 X 1in. piece of basswood serving as the keel. Another way of doing this would be to use a single piece of balsa for the bottom and add a basswood capstrip as a "false keel". The sides were then made up of 1/8in. sheet glued to the bottom piece. The rounded side/bottom transition was achieved by gluing triangular stock to the inside of the bottom/side joint, and then carving the area to shape. The prop shaft tube/stuffing box should be added at this stage when the interior of the hull is completely accessible. This is also a good time to apply a thin coat of finishing resin to the inside. Unprotected balsa is as absorbent as a sponge.

The piece that defines the overall shape of the boat when viewed from above and forms the main deck is referred to as the "raft". The raft was cut from 1/8in. ply, sealed, and then joined to the hull. After suitable shaping and sanding, the raft/hull transition was added. This is applied in 1 to 2in. sections of 1/16in. balsa cut cross-grain to allow bending around the curve of the hull. One will note that it follows a "waterline" and terminates at and is cut off flush with the top of the raft. This forms the bottom half of the transition area referred to as the "knuckle" by its designers. This area is also armor plated with vertical strips of "V grooved" sheet styrene.

Before the styrene "armor plate" is added, however, the bottom half of the boat is covered with one layer of fiberglass cloth. The layer of lightweight cloth and resin serves to armor the soft balsa hull against the inevitable dents and dings and ensures that the hull is entirely waterproof.

The hatch lip is now added to the cut out portion of the raft that gives access to the interior of the boat. This is made of 1/16 X 1 in. basswood strip, and should project up at least 1/2in.above the top surface of the raft (deck).

The shape of the cut out portion of the raft defines the corresponding shape of the cut out on the inside of the bottom piece of the casemate. The casemate’s outside shape is defined by the raft sides and the fore and aft lines where it meets the deck. The casemate frame and top pieces should be glued to the bottom piece while it is fitted in place on the deck.. Just be very sure that you isolate the two assemblies from each other with Saran Wrap or some other suitable barrier material, so that they don’t become bonded together.

Once the casemate is fabricated, the fore and aft decks need to be fabricated and installed. One thing to be particularly careful about is waterproofing them. When you use the “shoebox lid” type casemate/deck joint, the main deck is always wet. So, the ends of the higher riding decks at the ends of the ship are exposed to water. They must be sealed with resin or such material, or water may get under the deck planking material and make it buckle. I say this from experience.

The armor plating is .040 styrene scribed to portray strips that were 6" wide on the real ship. The previously described Evergreen prescribed sheets of .040 styrene with .125 spacing, are perfect. **Or**, you can scribe them by hand with a steel straight edge and a scribing tool. You don’t want to use an Xacto #11 blade, because it creates a “V” shaped furrow rather than a round-bottomed channel. Hobby shops carry such a scriber. It looks like a dental pick and is usually referred to as a “Panel Scriber”. Even if you don’t scribe the panels on the Richmond, you will need to do so on the decks if you model any of the Monitor type ships.

A little side note on the issue of “Confederate armor plate”. You may have read of the Confederates using railroad rails for armoring their ships. Using “raw” rails was, in fact, done on the CSS Arkansas (she was completed in a side channel of the Yazoo River under very primitive conditions). The Arkansas is, however, the **only** instance where it is known for certain that this was done.

The rest of the time, the rails were shipped to an iron foundry (usually Tredeger in Richmond) where they were heated and rolled into 2" thick, 6" wide strips. The strips were then punched with holes for bolts and shipped to the shipyard for installation. The Richmond-built ironclads, the Virginia, Albemarle, and Neuse were all armored in this manner.

Once the deck sheeting and armor plating are installed, the exterior of the ship is ready for detailing. As the photos will show, I used various commercially available deck fittings and equipment to “clutter” the place up. As mentioned earlier, a large selection of 1/72 scale Civil War figures are available. One thing I found useful was that **Russian** Napolionic-era infantry troops wore a hat that is somewhat similar to the Navy enlisted hat. All it lacks is the pom pom on the top. So, if you aren’t adverse to beheading some figures, you can come out with some pretty good subjects to add to your model for “character”.

When it comes to installing the hardware inside the hull, one becomes permanently converted to using purpose-built hulls rather than adapting someone else's. This hull allows for the use of "D" size batteries for ballast purposes and plenty of other room for fire-control switching board, speed control, servos, receiver, and drive motor. The model features the usual rudder and speed control, as well as a fire control system to fire the guns individually. More on the guns in the "Cannons and fire control" chapter.

One of the things I elected to do was steer her with external chains. The Virginia and the Tennessee were known to have used this highly vulnerable practice. And, oddly enough, the Union Passaic class Monitors used such a system, as well. In the case of this model, there just was not enough real estate available in the pointed stern to accommodate the necessary concealed bellcrank and pushrod. The overall effect is quite pleasing, though. It animates the deck to some degree to see the chains in motion back on the stern.

The model handles quite well in the water, and has a turtle-like appearance while under way. The difficult part is trying to distinguish the bow from the stern! I am so pleased with its handling and maneuverability, that I plan to enter it in the navigation event in one of our model boat club regattas.

The deck joint is quite watertight, and I have never gotten any water inside the boat. It is quite comforting to know this when you see waves washing over the bow and foredeck.

CSS Richmond

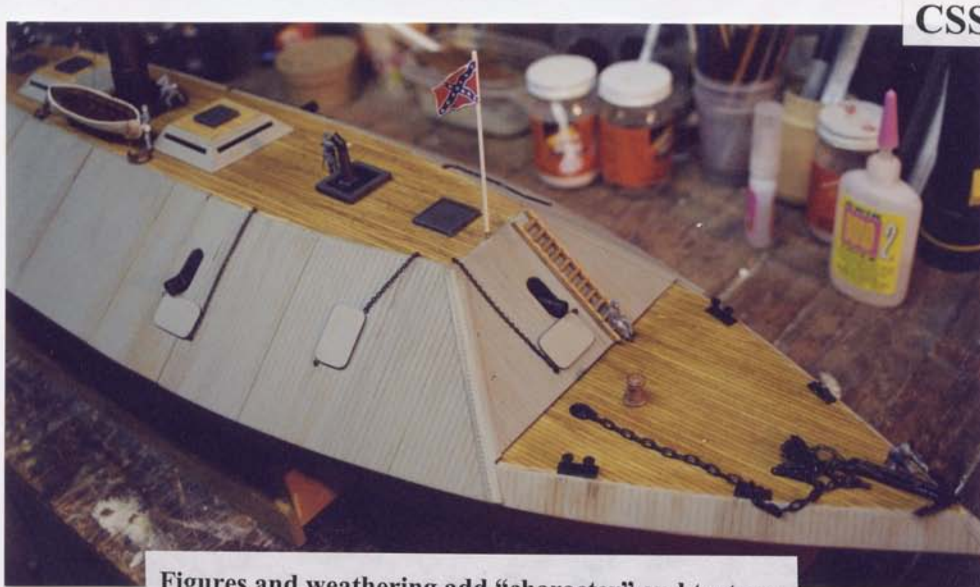
Underway

Firing port gun

Firing starboard gun

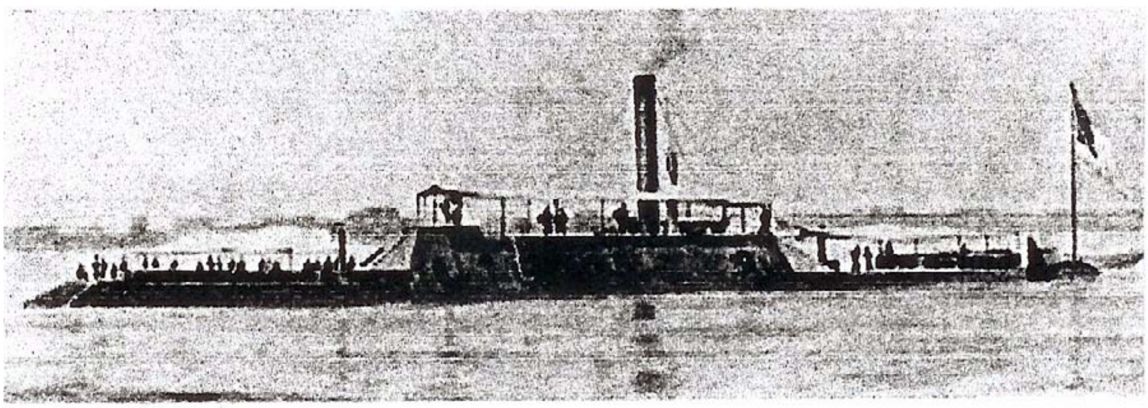
37

CSS Richmond



Figures and weathering add "character" and texture.

The hull is roomy enough to accommodate all necessary gear.


F. Muller

CSS Tennessee

CSS Tennessee

This boat was made for one purpose only: to provide a “foil” for the Saugus. It is, in fact, a 1/90th scale unpowered “raft”equipped with nine functional cannon. Its sole function is to sit at anchor and fire its cannon at one minute intervals, while a powered **Union** ironclad maneuvers around it.

This craft is based heavily on the Mahmood paper model. The components of the model were blown up to 1/90th scale on the copy machine and used as full sized patterns. The colored paper components were actually laminated to the balsa and then clear doped to make them waterproof.

The hull is a slab of ½ inch balsa, with the removable casemate keyed in place on it. The top deck (spar deck), which mounts the smokestack, is made removable. This allows access to the timer mechanism (a kitchen egg timer adapted for the purpose) for the cannons.

I elected to build the Tennessee because she is one Confederate ironclad that actually did battle with a Canonicus class Monitor. She was, in fact, disabled and captured in the Battle of Mobile bay by a force of no less than three Monitors. The fourth in the original force was the Tecumseh which went down at the onset of the battle. Both the Tecumseh and the surviving Manhattan were of the Canonicus class. I was compelled to build her in this simplified form, because there is very little printed information and no reliable drawings available of the subject. There are, however, some fairly clear photos of her in service. This is largely due to the fact that they were taken by Union photographers after she was captured (and subsequently renamed the **USS** Tennessee).

Although the “dumb and simple” approach was pursued with this model, it doesn’t mean that it is necessarily the only way. I chose the Tennessee for configuring as a 1/90 scale floating/shooting “target” because I wanted a ship that actually did do battle with an ironclad of the same class as the Saugus in order to illustrate what they might have looked like in combat.

If one desired to build a larger scale example of this ship (which I plan to do sometime in the future), one could easily blow up the component parts of the Mahmood model or the Taubman plans to 1/72 scale and come up with a model about 34 inches in length. One could build the hull in the same manner as described in the part on building the Richmond, as well as the same basic construction method. Since all information on the Tennessee below the waterline is conjectural, the main concern on the model is to have enough internal space to accommodate the necessary internal components.

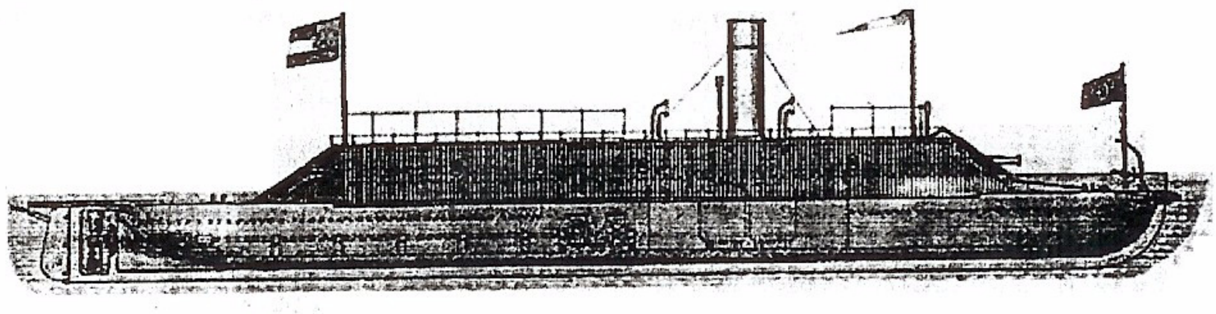
The ship’s casemate in the 1/90 scale that I built the “target” version, is a little on the small side. It is only about an inch or so high on the inside, and the slope of the sides further restricts internal volume. Scaling it up to 1/72 scale allows for ample internal space and makes for a nice sized model overall. The Tennessee was, in fact, the largest ironclad built by the Confederates after the CSS Virginia; measuring 209 feet long.

CSS Tennessee

The slab sided arrangement of the Confederate "casemate" configuration shows up well.

The Saugus and the Tennessee are built in the smaller 1/90 scale.

Interior layout showing timer, guns, and "raft" for hull.



NY Historical Soc.

CSS Virginia

CSS Virginia

Both this ship and the USS Monitor are well portrayed in the Dumas kit (which contains both ships in one box). Consequently, I elected to build the kits “from the box” and add some improvements. In the case of the Virginia, these came primarily in the form of working cannon and improved scale details.

The cannon are the same 1/4 aluminum tubing I used in the Saugus, with the glo plug ignition system used on the Richmond. However, in order to make the firing of the cannon selectable, it was necessary to design a “fire control” system. This consists of two servos activating six micro switches, which fire the side cannon in pairs (there are four on each side) and the bow and stern cannon individually.

The cannon are all removable, and tied together in a wiring harness that connects to the fire control system with servo type connectors. The guns then slide into fixed tubes in the gun ports. This arrangement has allowed for the added advantage of being able to close off the gun ports to render them watertight. This might not strike one as any big deal until you see two inch waves washing over the ports. Then, the feature becomes a great source of comfort and peace of mind.

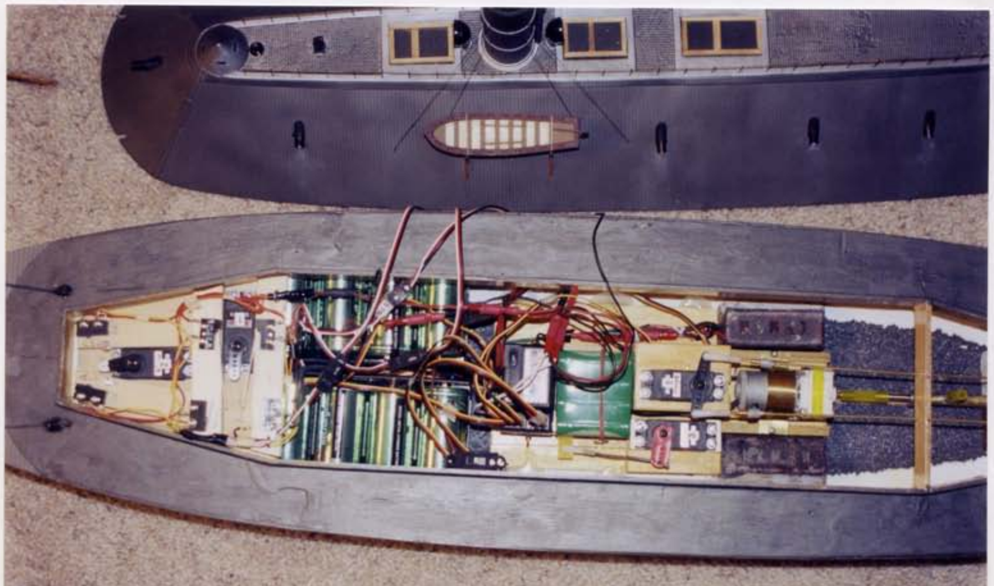
Some of the additional scale details included fabricating the rear deck from commercially available material made of individual stringers (the real thing was built of 12inch beams butted together), fabricating the overhead hatches from basswood and anodized brass screen, and using Steingraeber boats for her cutters in place of the vacuum formed examples supplied. In addition, since there is strong evidence that she was left unpainted, I elected to paint her with shades of metal colors from the Model Master line. The casemate is overall Titanium, the stack is Burnt Iron (upper) and darkened Gunmetal, the hull is Copper, and the submerged decks and spar deck are Gunmetal. All metal fittings, such as bitts, vents, and anchors are Gloss Black.

The model, in 1/72 scale is 46 inches long and weighs in at 22 pounds. In the water it conveys the impression of a “seagoing alligator” that some of the witnesses of the Hampton Roads battle have described. She is pretty impressive when underway, and has an authentically “clumsy” wide turning radius. In fact, in a 30 foot square pool at an indoor model meet, she was unable to turn around without backing up.

She is pretty stable though, due to her deep draft (her decks are submerged just like the original). But waves still lap up her sides in a one to two inch “sea”. Happily, she has good watertight integrity; due to the Dumas casemate joint design. This incorporates the one inch high hatch lip on the hull portion described earlier, with a corresponding piece mating with it from the casemate. The resulting joint is quite watertight, and has proven to be our preferred arrangement for joining casemate structures to the inevitably low decks that tend to accompany them.

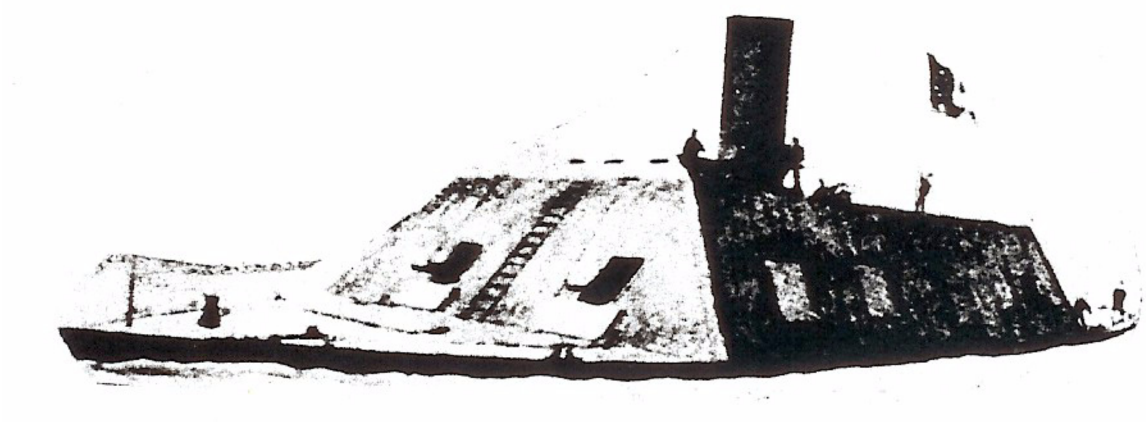
CSS Virginia

The Virginia has a deep draft and operates with parts of the deck awash.



Interior is quite spacious.

B. Kramer Photo



CSS Arkansas

CSS Arkansas

Having built the *USS Choctaw* and immersed myself in research on Civil War ironclads, I was looking for a new project. I noticed that Dumas was closing out their twin pack of Civil War ironclads, the *USS Monitor* and the *CSS Virginia*, at a very decent price so I ordered the kit. I built the *USS Monitor* and was about ¾ of the way through the *Virginia* when I sort of lost interest in the projects. There they sat until I had established a renewed interest in ironclads due to my association with master modeler and dear friend, Steve Lund. Steve had built the same kit I had but had done a truly outstanding job, much better than mine. Since by this time we had decided that we should build every ironclad we could I sacrificed my *Monitor* and *Virginia* to be transformed into other projects. Steve took the *Monitor* and ran it through the band saw to become the *USS Nahant*, but that is another story. I took the *Virginia* and ran it through the band saw and it became the *CSS Arkansas*.

The *Arkansas* was chosen as it had a boat like hull, similar to the *Virginia* but was quite a bit smaller and had twin screws. There is very little accurate information on the *Arkansas* other than it existed and its size. Some say that the casemate had vertical sides and others say they sloped. I designed mine with a slope as it looks better and since the conversion of the *Virginia* yields a fatter boat the sloped sides reduce the extra width somewhat. The *Arkansas* was started at Memphis, Tennessee in 1861 and was finished at Yazoo City, Mississippi in 1862. She was 165' long, 35' wide and had a draft of 11.5'. She carried two 8" smoothbore, two 32# rifles, two 100# columbiads and two 6" guns. She fought only two engagements, one a run down the Yazoo River to Vicksburg and another outside of Vicksburg where her engine failed and she was set afire to avoid capture. She more than held her own against superior Union forces.

As mentioned before, the *Virginia* was fed to the band saw and 12" was removed from the center. I should mention that the original kit construction was a plastic (ABS) hull in two halves, joined to a plywood keel and using a plywood deck. After cutting, the bow and stern sections were sanded flat, butted flush and glued together with epoxy and support pieces across the join line. Liberal amounts of bondo were applied to the joint and mostly removed until a smooth seam was made. Epoxy was applied to the interior joints in several applications to yield a watertight hull. The single prop shaft was filled with epoxy. As the new shortened hull had a canoe shape with no flat sides and the *Arkansas* had very flat sides some artistic license was called for. I built a plywood deck that had flat sides which hung out over the hull. Sort of like an aircraft carrier. This gave the look of the *Arkansas*. I used balsa to thicken the edges of the plywood deck down to the water line. Once afloat it is hard to tell that the hull does not meet the deck edges and the effect is very good. The deck was epoxied to the hull and given several coats of epoxy sealer.

The center access was cut out and a ¾" high coaming was glued in place. The casemate was laid out full size using Autocad (a wonderful computer drafting tool that makes scratch building boats a lot easier.) and frames cut. I built the casemate using plywood bottom plate, sides and top. Thin scribed styrene plastic sheets were used to cover the plywood casemate to simulate armor. Several gunports were cut out using a drill and lots of filing to get the square shapes. The stack was made using my usual methods of brass shim stock with rolled in rivets and soldered into a tube. In this case I used a core of PVC, which was left, in place as part of the stack. The pilot house was shaped out of a solid piece of basswood and covered with styrene. A spruce strip top and deck was then laid down and sealed with oil based stain/finish. Gunport covers were fabricated out of smooth styrene and glued in place. The entire casemate was finished with water based "rust" paint and additional streaks were added with dry rust powder in several shades. Gun blast marks were applied to the casemate and across the decks with dry black powder. Small chain was painted black and added to the gunports.

I was able to salvage the rudder from the *Virginia* and mounted it on the sternpost of the *Arkansas*. I used a pull-pull cable to operate the rudder but had to mount the cable holes below the water line in the hull. I fabricated a stuffing box arrangement where a shaft goes through an oversize tube filled with Vaseline. It works fine. None of the original ironclads were overpowered so I though this boat would be a good candidate for converted servo drives. I obtained two ¼ scale Hitek servos and proceeded to modify them into drive motors by removing the gears from the drive train. The Hitek servo has a very short gear on the motor so an extension shaft was made from brass tube and an 1/8" brass shaft. This was soldered together and then glued onto the motor gear with epoxy giving a shaft to mount the drive coupling to. Two ¾" diameter 4 blade propellers were made out of brass sheet soldered to a 1/8" wheel collar. The brass sheet was rounded and the propeller blades marked out and cut on the band saw. After some filing each blade was hand bent to the proper angle. Simple, fast and as later proved, very effective. A stuffing box was made from brass tubing to fit 1/8" stainless rod drive shafts. The drive servo motors were mounted with hot glue and silicon fuel tubing used for flexible drive couplings.

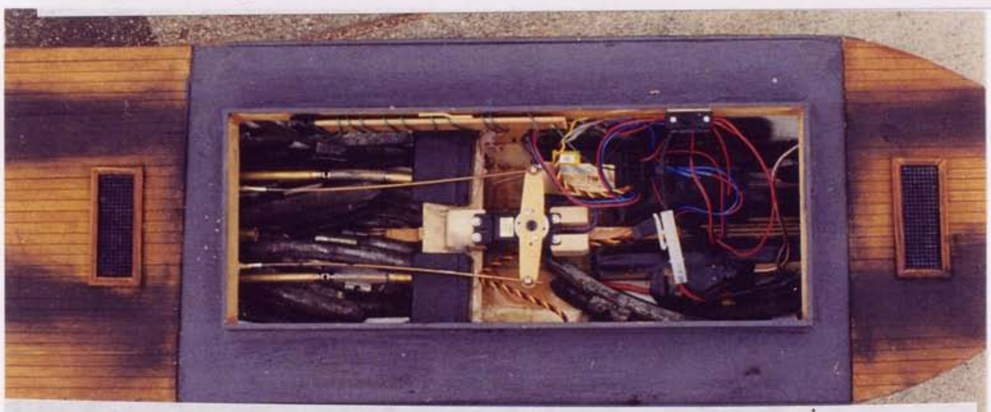
The hull was given several coats of red primer and then the finish colors were applied. Most of the hull is a dark red with gray above. Some rusting streaks were added and the whole boat, hull and casemate, was given three coats of Testor's dull coat. A battery pack consisting of 4 sub-C NiCads was built and installed. As this boat has plenty of room radio installation was straightforward and simple. Initial float test showed the boat stable and watertight with no leaks at the prop shafts or rudder cable shafts. Many pounds of surplus lead wheel weights were added to get the boat down to waterline. I chose to ballast this boat with the decks about ¼" above water.

First float day arrived and the boat proved to be correctly ballasted. The rudder has proved to be relatively ineffective with a huge turning circle on rudder alone. This will be improved with more rudder throw. The twin props with individual throttles are very effective so control is not a problem. The boat can be turned in its own length with the props. It is quite fast even with crude homemade props so effective speeds can be had with the throttles barely on. This gives very long run times. The boat looks very real in the water. Two ships boats were added to the after deck and a crew made of 1/72 scale plastic Civil War figures was stationed over the ship. Of course the usual cats and dogs found homes on the *Arkansas*. An anchor and chain completed the details. The *CSS Arkansas* is a rather plain and simple boat but is a valuable addition to the fleet.

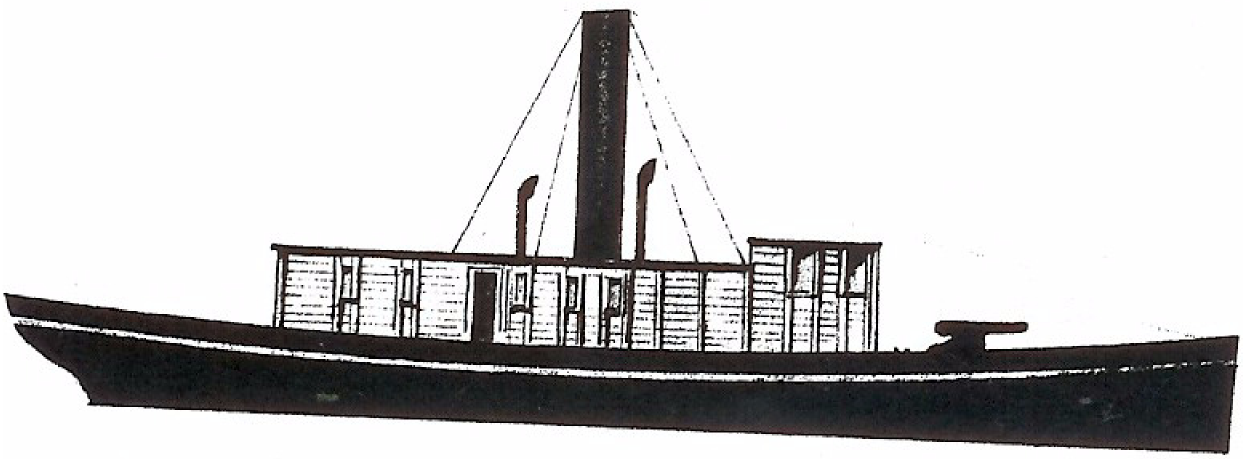
CSS Arkansas

Built on a riverbank, the prominent color of the Arkansas was rust.

The hatch arrangement used on these "casemate" ships ensures a watertight seal.



The use of "servo motors" (two) to drive her results in a very uncluttered interior.



Harpers Weekly

CSS Teaser

CSS Teaser

While doing research on Ironclads in general and the USS *Merrimack* / CSS *Virginia* in detail I kept running across mentions of the armed tugboat, CSS *Teaser*. The *Teaser* was part of the James River Flotilla and assisted the *Virginia* in her debut raid. The boat went on to several other actions, including being an observation balloon carrier. She was captured by the USS *Maratanza* after her boiler blew due to a lucky shell shot and was repaired and placed in Union service as the USS *Teaser*. There are two existent photos of the CSS *Teaser* after capture, one showing the forward deck and another looking aft, showing the boiler damage. There are no overall photos of the boat nor are there any good drawings. There is one lithograph of the *Teaser*, by a war correspondent, showing her capture but this is rather crude. The boat was a converted civilian single screw steam tugboat (the *York River*) and was 80 feet overall, displacing 64 tons. She carried one 12# Parrott rifle forward and one 32 pounder rifle aft. Of course I had to model her. Since there were no definitive plans, photos or good drawings, I researched what I could on screw driven tugboats of the Civil War era. The noted naval painter Tom Freeman's rendition of the *Virginia* in dry dock has a two-gun tugboat in the background. This has to be the *Teaser*. Unfortunately I think artistic license was used as this boat looks like a modern harbor tug and not at all like the boats of the period. I was able to find numerous drawings and some photos of screw tugs in my research. I used a photo of the USS *Daisy*, a Union Navy screw tug, as my general basis for design. Although this boat was not armed, the photo was clear enough to show much detail in general. The biggest design feature of all of the period tugs is the use of boxy structures. Modern tugs are rather rounded. Civil War tugs look like small riverboats or boxes on hulls. They have lots of square windows and doors and appear to be of very light construction. With a general idea of what I wanted to build I went to my workshop to see what I had to work with.

Normally when I design a project I obtain what plans and details that are available, scan them in to Autocad (a computer drafting program), make what modifications are needed and print them out to the scale I intend to build. I also make any patterns for ribs and keels as needed. As the *Teaser* would be in 1/72 scale this would equal a 13" hull, which is small for a working RC boat and quite small for a traditional wooden plank on rib covered with fiberglass RC hull. Additionally, steam driven tugboats have large stacks which make them top heavy when done in small scale. Luckily I had built a very successful model of a New York Harbor Tug in 1/87 scale previously and used that experience as a basis for the *Teaser*. Since there were no definitive plans of the Teaser to follow I did not make a set of drawings. I would let the materials used for construction as well as the "feel" of what I was making determine the final result.

My previous small tugboat had been made from a modified Lindburg harbor tug plastic kit. I had one more of these kits and used that as a starting point for the *Teaser*. I will admit now that the hull shape of this kit is not Civil War. It is much to rounded and full. Period tugs had very raft like hulls and were quite a bit shallower that this hull. But since the purpose of this model was to create the feeling of the *Teaser* as well as make for a reliable and workable RC model, I decided to use the modern hull to keep the water out of the rest of the boat. My first step is to deepen the hull. The original plastic hull is just to shallow to get enough stability especially when a steam boat is being built (the Lindburg harbor tug is diesel and has a lower stack than a steam tug). By the time enough ballast is added to keep it from rolling over it is sinking. I glued a ¾" strip of styrene plastic to the hull and faired it in with bondo. Most of the bondo was then sanded off giving me a smooth hull line. The original plastic deck was sanded smooth to eliminate some modern features and glued to the top of the hull strips. I now had a hull that will take enough ballast to be stable. This is all of the kit that I used for this model.

I should mention that before the deck is glued on the entire RC and drive gear must be planned and installed. The propeller for this boat is made of sheet brass and soldered to a hub. Not pretty but it works. The drive shaft is brass rod and the stuffing box is oversize brass tubing with bearing pieces soldered in to each end to match the drive shaft diameter. The stern hole was drilled, the shaft aligned and held in place with bondo. I use Vaseline in the stuffing box. The rudder was made from sheet brass and soldered to a brass rod. The rudder shaft housing is brass tube and extends above the waterline in the hull and is fixed with bondo. This rudder is not removable, once installed, as the rudder arm is a small brass strip soldered to the shaft. A brass rod with simple bends is fitted from a micro servo to the rudder arm. The deck, once installed, keeps the rod from lifting out of the arms. As space is at a premium in a small hull I use a modified servo for motor and speed control. A large size (1/4 scale) servo is modified by removing the drive gears and disconnecting the centering pot from the gear train. This provides a continuously running motor with proportional control both forward and reverse. The bigger size servo motors have a large shaft and will hold a piece of silicon fuel tubing, which serves as a universal coupling, to the propeller shaft. This motor/servo just plugs into a channel of the receiver and runs off of the system batteries and provides adequate power in a small space. The servo I used on the *Teaser* allowed my to keep the motor in the servo case and this was then hot glued to the hull. I use 4 sub-C nicads for system power as I need the weight. Even with this I will have to add lead to get the boat low enough to be stable. With the motors, servo and batteries in place the deck is added. The lead will be placed for final trim after the boat is complete.

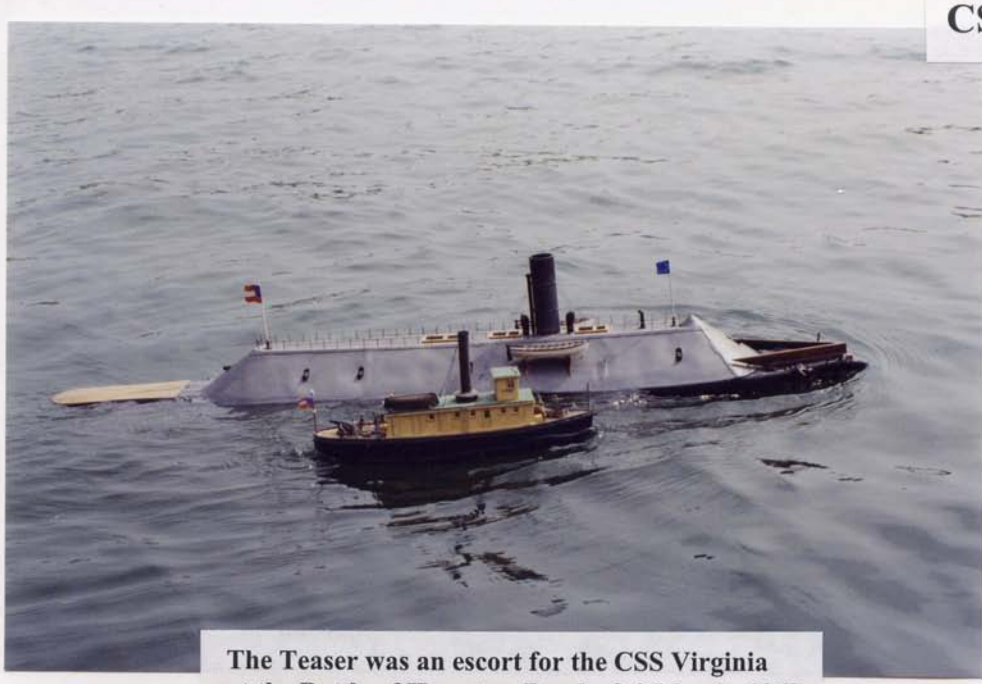
By looking at my reference photos and the hull I arrive at reasonable proportions for the deckhouse. The walls are cut from scribed styrene sheet. Before assembly I plan the cutouts for doors and windows. I use HO railroad scale doors and windows, as they look very authentic. All cuts are made with a sharp exacto knife and the doors and windows are installed before the deckhouse is assembled. I then add reinforcing strips along each edge of the sides and ends and glue it together with liquid cement. After the deckhouse is assembled (walls only, no roof) I place it on the deck, mark the deck cutout, cut the deck and then glue the deckhouse solidly to the deck. As all access to the interior of the boat is by lifting off the roof of the deckhouse, this gives me a very high sill to keep any water out of the hull. A roof is made from scribed sheet styrene and fitting with reinforcing strips that make a friction fit to the deckhouse walls. The pilothouse is made from styrene with HO scale windows and glued to the roof. As I always have crew on my boats a steersman and captain were fashioned from 1/72 Civil War plastic figures and installed in the pilothouse. The pilothouse roof was then glued on. I did not use any plastic glazing in any of the doors and windows. They are open. In this small scale it seems to look better that way. A smoke stack was made from very thin sheet brass shim stock by rolling in rivet patterns with a pounce wheel, wrapping the metal around a dowel of the correct diameter and soldering the seam. A piece of copper wire is soldered around the end and, after removing the dowel, a very pleasing, lightweight smoke stack is created. Some wood and sheet metal are added to the base and the stack is glued to the roof. An HO scale dinghy is glued upside down to the roof. The deck is now covered with HO scale strip wood, and stained. Bulwarks are made from styrene strips and glued on. Bulwarks are almost non-existent in the photos of period tugs that I have seen and I used pieces that are about 6" high, scale.

The actual photo of the *Teaser's* front gun is very detailed. I found a parrott rifle in a plastic Civil War artillery set and liberated it. I made a naval swivel mount out of wood, patterned after the photograph. This was pinned to the deck with 1/16" wire and allows the gun to swivel. The rear 32 pounder is not as detailed, the only piece showing in the original photo is the end of the barrel. I had access to a gun and swivel mount from the Revell model of the CSS *Alabama* and it scaled close enough to a 32 pounder with a 10' barrel to be useable. This was painted and pinned to the deck with wire. Deck clutter is barrels and boxes from the HO train supply and a gun crew was fashioned from plastic Civil War figures. I added a few dogs and cats (all of my boats have dogs and cats) and the deck is complete. Final details such as guy wire for the stack, davits for the boat and ladders to access the pilothouse are added and the boat is ready for paint.

There is no record of what colors the tugs were painted. Tom Freeman painted his tug gray in the *Alabama* paintings but again this is probably a hold over from modern navy practice. The photos and drawings I have, of course, are in black and white but show almost universally a very dark hull with a much lighter deckhouse. I found a color drawing in a book on Civil War boats showing a steam tug. It had a black hull with a buff deckhouse. This is how I painted the *Teaser*. A wooden display stand was made and the boat is ready for final floating.

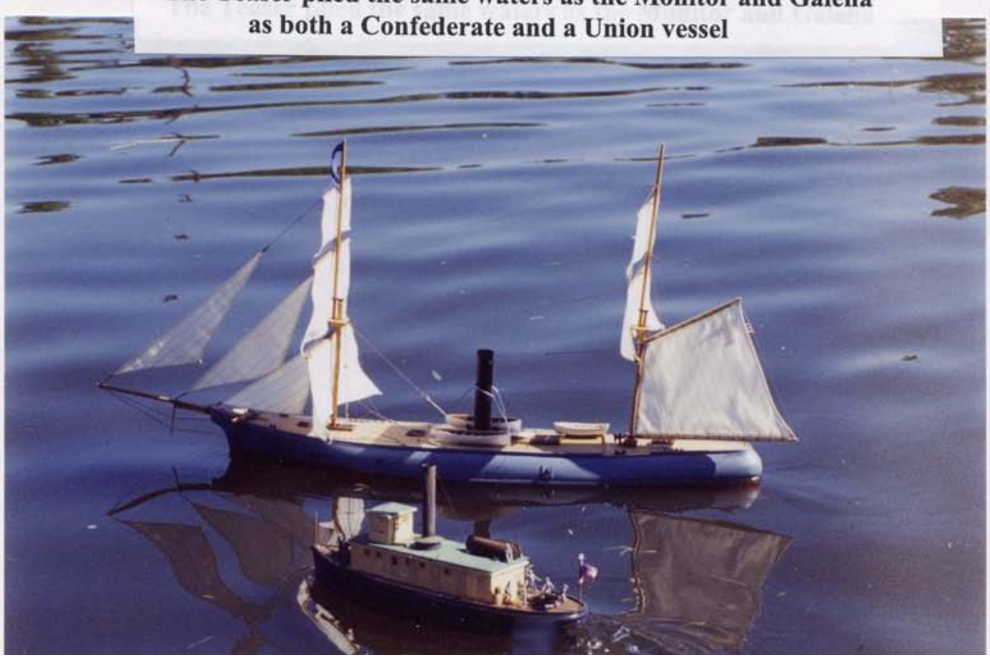
After all figures, deck clutter, switches and RC gear is installed the boat is floated and lead is added for final trim. I trim my boats first for roll over stability and then for final waterline. I float them a little high, as I do not like wet decks. The typical Civil War river tugboat (not seagoing types) floated very low, like a paddlewheel riverboat. I cheat. As has been pointed out and demonstrated by scale waterlines on other Civil War ironclads, we sometimes have typhoon scale waves in the local pond and make submarines out of our models. I try to avoid this if possible. I just pretend the boat is coming back from a cruise and is low on coal and riding high out of the water.

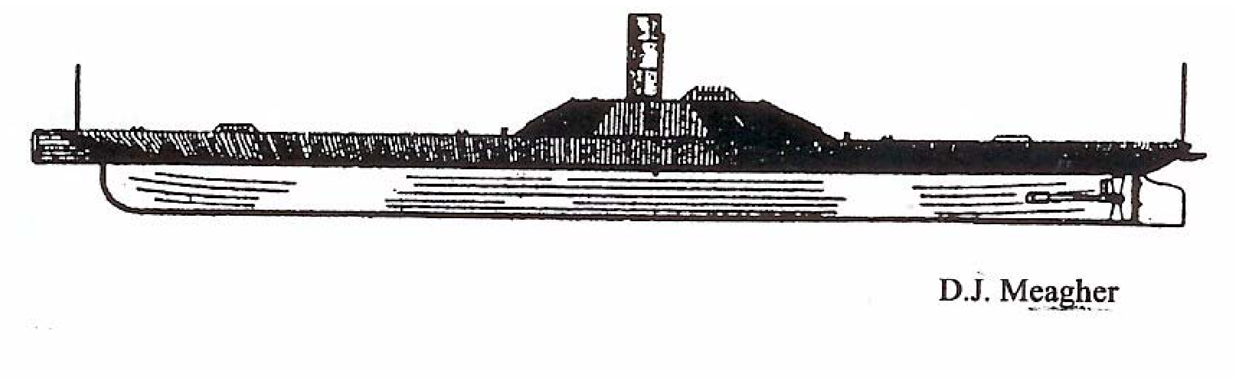
CSS Teaser



The Teaser was an escort for the CSS Virginia
at the Battle of Hampton Roads, 8-9 March, 1862

The Teaser plied the same waters as the Monitor and Galena
as both a Confederate and a Union vessel





CSS Texas

CSS Texas

Long before I started building any civil war boats I primarily built tug boats and in my constant quest for the rare and unusual I looked through any catalog of plans I could find just to see what they offered. While looking through Taubmans excellent plan catalog I ran across his series of Civil War plans. One boat caught my eye, the *CSS Texas*. As I am from Texas I thought I had to have this and ordered the plans. They arrived, I looked them over and promptly filed them away as I was busy with other projects. Now many years later I remembered I had the plans and finally found them. By this time I have done much research on Civil War boats and in looking over the plans I did not agree with certain features in the plans. Most civil war boats are very poorly documented and the *Texas* is no exception. There are no pictures of it (that I can find) and a few verbal descriptions. Anyway I thought the casemate shown in the plans was incorrect and proceeded to design a new one that matched the verbal descriptions. I hit the computer and the cad program and produced a new set of construction drawings in 72nd scale.

The *Texas* was the last ironclad the Confederacy tried to build. She was laid down in Richmond and was launched in 1865 but was not commissioned or evidently finished when the Richmond Navy Yard fell to Union forces. The *Texas* was one of two ships that were not destroyed and were captured. The Union took the *Texas* into her navy but she saw no action and was scrapped the next year. The *Texas* had 6 cannon (4 rifles and 2 smoothbore) and was typical of late war Southern ironclads in that she had a very small casemate for her size, a direct result of the iron shortage. By all accounts she would have been a very formidable fighting ship with a streamlined hull and twin engines. The four corner guns (the rifles) were on swivel mounts and could be aimed somewhat independent of the ships movement.

The *Texas* is a total scratch built boat. Due to her streamlined hull shape I decided to build her plank on frame with fiberglass cover. I laid out the frames using lite plywood and full size patterns I generated using computer cad. These were fastened to a keel made of ¼" plywood using a full size hull pattern for proper spacing. As the deck of the Texas was flat I could build the hull upside down with the keel up and the ribs laid out on the plans. After all was glued up I started planking her. I cut solid balsa blocks for the bow section and made a plywood stern plate. These were glued up to the frames and planking was started using 1/8" by ½" wide balsa strips. I plank using the "stealer" method which means that instead of tapering each plank I lay them on full width as far as they will go. Any holes that are left in the planking are filled with tapered "stealers" to create a fully planked hull. Easier to see than to describe but since the planking is not visible it is the fastest way to plank. After the planking is on I start shaping the bow blocks and sanding the planking smooth. The balsa works very easily and a hull is produced in a very short time. I covered the hull with some very light fiberglass cloth I had and epoxy resin. I use West Systems epoxy and love it. No smell like polyester resins and it mixes very easily and gives a smooth finish. After the resin cured I rough sanded the hull, did some filling with Bondo, and then wet sanded the hull smooth.

The deck was laid out using 1/8” plywood and reinforcing beams at the openings. The casemate on the *Texas* is quite small and is very sloped which gives a very small opening in the hull for equipment. As most of the ironclads require quite a bit of lead ballast to get down to the correct waterline this would not leave much room to get batteries, motors, radio equipment and servos in an accessible spot in the hull. I decided that the lead ballast could be slid forward and rearward under the deck from the opening and installed smooth floors with side boards to allow pushing the lead into place. The prop shafts were built next using 1/8” stainless steel rods and 3/16” brass shaft housings. These were installed in the hull and run forward so that the motors could be installed in the deck openings. The rudder was built using brass rod and brass sheet and installed. A flexible cable push-pull rod was installed from the rudder to the equipment bay. The deck was glued on using epoxy. A ½” coaming was built up around the equipment bay and the deck was sealed with epoxy resin.

The casemate was built using frames covered with 1/8” plywood. This was then centered on the coaming pieces and spacer blocks were installed to make a nice friction fit. The casemate was planked on top using individual spruce planks and covered on the sides using scribed styrene plastic sheets to simulate the armor plating.. The cannon ports were cut out using drills, flextools and files. A smokestack was built using a piece of PVC pipe as a base and covering this with brass shim stock with simulated rivets rolled in using a pounce wheel. A pilot house was built by carving a solid basswood block to the correct shape and covering with scribed styrene plastic. The Armour hull belt was installed using pieces of styrene plastic glued on with contact cement. This involved a lot of fitting but went fairly fast.

I made a set of props using sheet brass cut to shape and soldered to a 1/8” wheel collar. The blades are then hand bent to the proper pitch and the whole assembly was painted black. I decided to use converted servos as drive motors as they would be more than enough to achieve scale speed on the boat. I bought two Hobbico CS-80 large-scale servos and modified them for drive motors. These are real brutes and at $25.00 each are a real bargain for drive motors. These were installed in the equipment bay and connected to the drive shafts with silicon tubing. A standard servo was installed and connected to the flex cable to the rudder.

The deck was planked using individual spruce strips glued down with thick CA glue. I used the old trick of marking the edge of each strip with a magic marker so that there is a faint line between each strip to simulate caulking. There are several large openings on the original's deck and these were simulated with styrene. The deck was cut out over the rudder for access and a circular piece of styrene was glued down to cover this using silicon adhesive. The deck was sanded and finished using mixed stains and then simulated cannon blast was put on the deck in the proper places using dry brush on stains. The hull was painted a dark gray. Cannon port covers were made and attached to the casemate and operating chains were installed. The casemate was painted and aged with rust and grunge. Flagpoles were made and mounted, an armored anchor chain housing was made and hawse pipes were drilled into the bow. Two anchors and chain were installed and aged. The proper flags were installed and a crew was painted up and installed. Of course dogs and cats are part of the crew. Two plastic boats were painted up and installed on the after deck.

The boat was floated in the portable tub and lead bars were shoved under the decks to ballast her down to the operating waterline. Each lead bar has a wire tied to it for removal from under the deck. The remainder of the radio gear was installed next. For such a big boat the accessible room is very small. I have only enough room for one 6v nicad drive battery (made from a standard 6 cell 7.2v pack by cutting out 2 cells) but this has proven to be more than enough power. After ballasting was completed the first runs were made at the lake. This boat is a real performer. The sleek hull and small casemate give is a very modern look and the twin props really move it. It is quite fast and I find I run it with only one engine most of the time. Even though it rides very low in the water it has so far stayed quite dry inside, even with waves breaking over the bow. Rudder only turns are very large but with differential power to the motors she handles quite well.

CSS Texas

The battle that never was.........The Onandaga vs the Texas

The abbreviated casemate adds to the sleek appearance.
We sometimes refer to it as the “Ironclad Cigarette Boat”.

CSS Texas

The obvious disadvantage with the smaller casemate is a lot less available interior space.

6 Color Schemes

The overall “look” of a model, in my opinion, is an important factor in making the ship both attractive to the eye (a difficult task since none of the ironclads could be described as “elegant” or “graceful” and yet a convincing representation of the real thing. Good color scheme can be a major contribution.

The most popular impression that one gets while looking at most of the available photographs of these ships is that they were all painted black. And while that is certainly true of the Monitor in her “as delivered” state and many of the other ships, it is not necessarily true in all or most events.

At one time I was of the opinion that the oft published photos taken of the Monitor in July of 1862 showed her to be unpainted bare black iron. I had come to that conclusion after having seen her “black” raw iron state, knowing the haste in which she was built, and not seeing any chipped paint in the photos. That point of view even prompted me to finish my 1/72 scale monitor model in “gunmetal” shade that truly come close to matching the dark shade in the photos.

I have subsequently been proven wrong. The “Super Monitor” project has resulted in my gaining a great advantage by having access to some of the store of incredible information unearthed by the Mariners’ Museum staff and NOAA, provided to me by Anna Holloway and Jeff Johnston (of the Mariners’ Museum staff and NOAA respectively). This has lead to the dissolution of a lot of mistaken impressions and misinterpretations and has been replaced with hard cold facts. For instance, it turns out that requests for black paint and a bill for “painting the Monitor” have come to light, settling that issue for good.

In the absence of any such archival evidence in the case of the CSS Virginia, I do think that a good case can be made for the position that she was unpainted. The facts show her departure fro her maiden/operational debut was so hasty that workmen had to be stopped in the midst of their tasks and that her vital gunport shutters be left at the dock, uninstalled. This argues for any tasks considered “cosmetic” to be left undone. So, I maintain that her reported “black” color was the black iron oxide finish that her plates arrived with from the Tredeger Works in Richmond. She was also known to have been coated with a layer of tallow, or “pigfat”, that certainly would have served to darken her appearance and added a sheen to her on the day of the battle.

Some Union ironclads actually had specified colors schemes. With the Passaic class Monitors came the first examples of “mass produced” navy ships. Realizing the confusion could ensue with indentical ships fighting side by side, the Navy issued directives to the captains of these ships to paint them with “distinctive markings.”

The result was that for all classes of monitors their turrets, pilot houses, stacks, and bullet shields were painted in a variety of combinations of colors such as grey, black, green, white and red. The decks, however, for the most part seemed to be left in a light grey shade. This is most likely the “light lead” color the Monitor crewman George Geer reports having painted on his ship in August of 1862.

There are exceptions to this of course. The Canonicus is shown in her later years in a completely black scheme. In service photos of the Nahant show her grey decks with black turret, yet she is reported to have been painted all black shortly after she entered service on the Charleston blockade.

For the most part, “below the waterline” colors appear to be varying shades of “red lead.” Although construction and dry dock photos of the Tucumseh, Manhattan, Comanche, Dictator, and Atlanta seem to show light and medium shades of what appear to be grey, one has to conclude that we are in fact, seeing the camera’s rendition of red. Since it is known that “red lead” color was in common use at the time (note that all the red barns throughout the eastern part of the country then and now), it would lead one to the conclusion that the color was in use on ships as well. Many contemporary artist seems to have noted the same thing and rendered it so in their paintings. And, of course, the use of that color certainly makes for more attractive model.

As I mentioned in an earlier chapter, the exterior Confederate ironclad color schemes seem to have been somewhat “regionalized.” The ships built in Savannah have been reported to be painted black. And certainly, the photos of the captured CSS/USS Atlanta seem to show just that. She appears in the photos taken of her in Union Navy service on the James River, as black or dark grey. Let me state here that any time you consider black painted finish on these ships, you should always lighten it to a shade of “dark grey” (Model Master “Gunship Grey” or “Panzer Grey”, for instance). Black fades very quickly when exposed to the elements, and the most convincing finishes on the ship models in general are always the ones that are “lightened up” or toned down.

The Charleston ironclads (Chocra, Charleston, Colombia, and Palmetto State) are reported to have been painted “light blue.” A contemporary painting by Conrad Wise Chapman (who is best known for his painting of the CSS Hunley) show s the Chicora and the Charleston to have their stack that color with the casements having turned to a more of a brownish shade of grey. Very likely they were in fact, painted the same blue color overall but weathered to the shade shown in the painting. The modeler only has to decide what stage of deterioration they want to portray.

I think this “light blue” is the color of one of the models I saw displayed in a Charleston museum, that was described as painted “blockade blue.” The shade the modeler chose was very close to the Model Masters “Intermediate Blue” which is sort of a light blue-grey. This is the same shade I initially painted my Galena model shown earlier in this book. Both Union and Confederate vessels used a similar hue, and the Union navy even issued a directive to specify its use. The USS Hartford is known to have gone into the Battle of Mobile Bay in such a color scheme.

As for the Gulf theater, an overall light to medium grey papers to be the appropriate shade fro the Confederates. The photos taken of the Tennessee in New Orleans after her capture at the Battle of Mobile seem to show a medium grey shade. And Likewise, the only known photo of the CSS Jackson shows a shade of grey almost identical to that of the Tennessee.

Details on all the ships would, in all likelihood, follow the standard maritime practices of the day. One could expect to find wooden decks left in their natural state and turning grayish brown hue of old fence posts as they weathered. In service, virtually all exposed metal surfaces such as anchors, chain, chocks, bitts, and rails were painted, and black as the usual color. This of course weathers to the dull grey I mentioned earlier cannons were in the same category, but are often seen in a more glossy black color. This is understandable when you consider that in this application they were not as exposed as other parts of the ship. They were some of the best maintained equipment. Let me add that there is mention in contemporary resources of something referred to as “gun varnish.” This I would gather, would be a glossy varnish with some sort black pigment added.

As you can judge, even with all the photographic and printed materials available, it is still hard to draw many definitive conclusions. There is, however, plenty of material to choose from to enable one to build and eye catching model with enough “character.” It all goes back to what I alluded to earlier; the aim is to build a model that is accurate as possible. While at the same time, one strives to make the model appealing to the eye and still be able to run it in the water and function effectively.

What follows is an attempt to portray at least some of the fairly well documented color schemes of some of the ironclads. This has been an effort to make some sense of the photographs, descriptions, and the various graphic representations that have come to light so far.

With the Passaic class monitors, we have been fortunate to come with documentary and/or photographic evidence for virtually all of the ships color schemes. These are shown first.

With the Canonicus class, the record is not nearly so complete. I’ve attempted to give as complete a story there as is possible, but the available data comes almost completely from photographic sources. The principal problem with that source is that sometimes the photos are labeled incorrectly. All nine of the ships built are not represented. Because not all were completed in time for the war, photos of the four “non participants” are extremely rare. Two of them **did** see post war service (Manayunk and Tippecanoe), and we do have a photo of each of them. The other two (Catawba and Oneota) were not commissioned into the navy at all, and were sold to Peru in 1868.

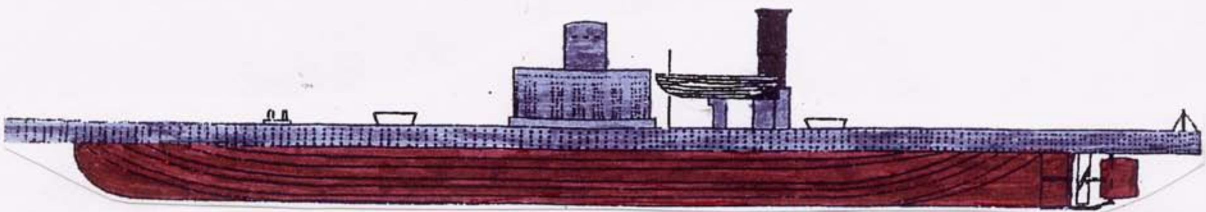
A real boon to the accuracy of the representations of the Tecumseh and the Manhattan is that we have paintings showing them (at least partially) by one of the foremost contemporary painters of Civil War navy subjects. Xanthus Smith was himself, actually present at the Battle of Mobile Bay where the two ships fought. His paintings are known for their technical accuracy and he was renown for his practice of interviewing witnesses and having them review his paintings for authenticity.

In the case of these illustrations of those two ships, I have attempted to glean every last detail and apply it. The result, I feel would make for interesting models. This is especially true, I feel for the scheme applied to the Manhattan. I particularly like the effect of the black stripe around the turret middle, giving it a “bandit mask” effect.

With the Confederate ships, I have relied upon contemporary paintings in two cases, as well as the few photos available. In the case of the Tennessee, we have photos and a painting by Xanthus Smith. Here again, I put much credence in the fact that he was present when she was captured.

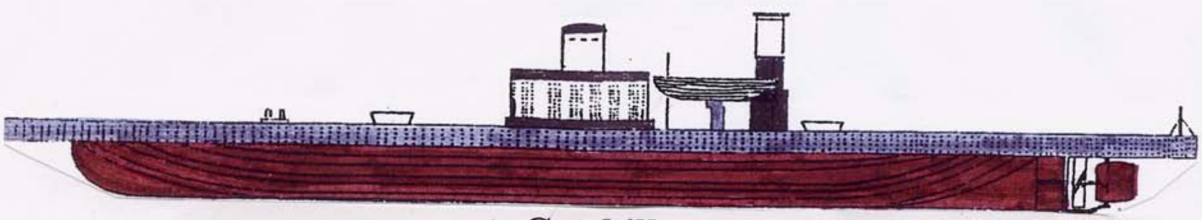
In the case of the Atlanta, she was captured by the Union, repaired, and put into service on the James River for the last years of the war. Photographs taken of the ironclads in that theater of operations substantially outnumber the ones we have from other locations and ports on the Blockade.

Passaic Class Monitors



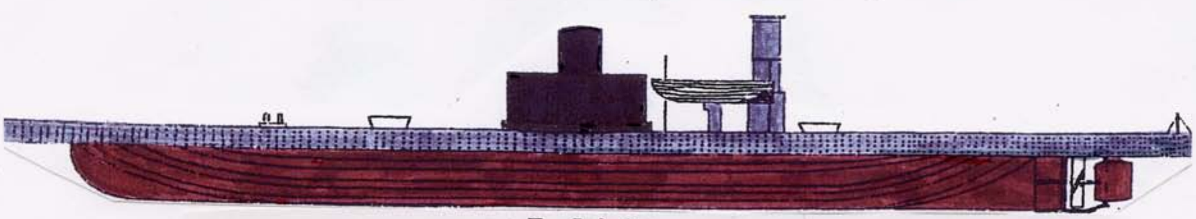
Camanche

Deck: Light gray. Turret/pilot house: Light gray. Stack: Light gray with upper 2/3 black. No bullet shield. Periscope on top of pilot house. Two 15in. Guns.



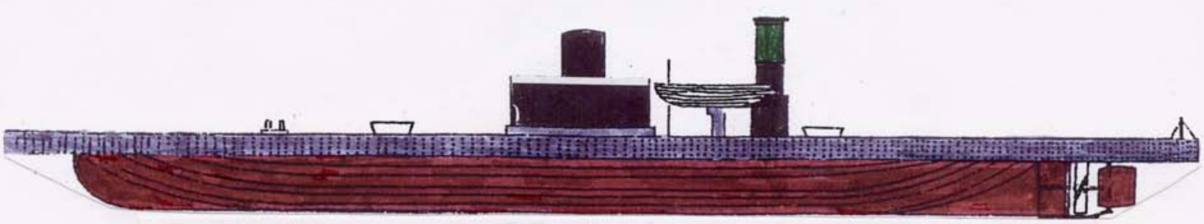
Catskill

Deck: Lead gray. Turret: White with black bands upper and lower. Pilot house: White with black band upper. Stack: Black with upper 1/3 white. No bullet shield.



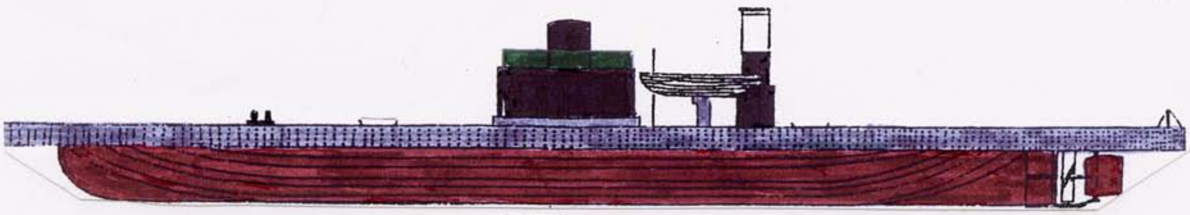
Lehigh

Deck: Lead gray. Turret/pilot house: Black. Stack: Lead gray. No bullet shield.



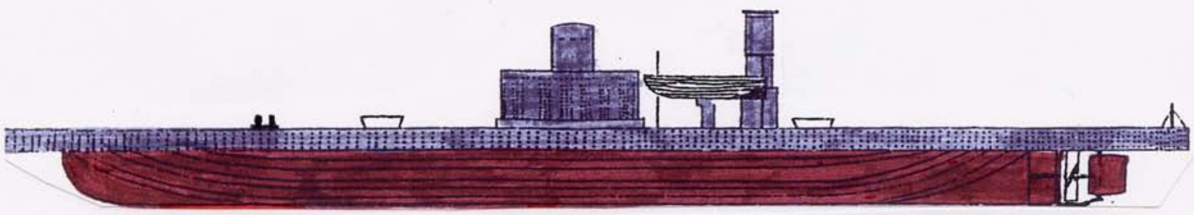
Montauk

Deck: Lead gray. Turret/pilot house: Black with narrow white ring around top of turret. Turret ring: Lead gray. Stack: Black with upper 1/3 Dark green. No bullet shield.



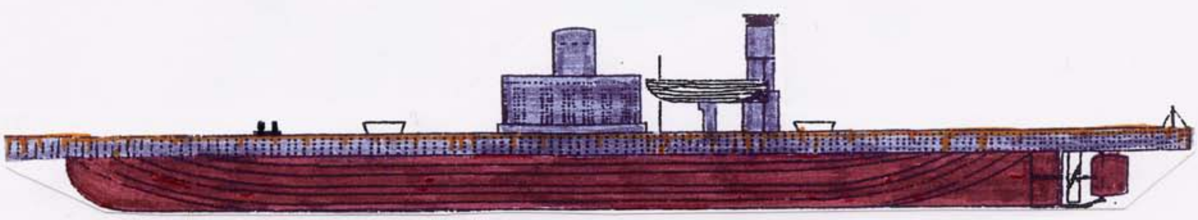
Nahant

Deck: Lead gray. Turret/pilot house: Black. Turret ring: Lead gray. Bullet shield: Dark green. Stack: Black with upper 1/3 white.



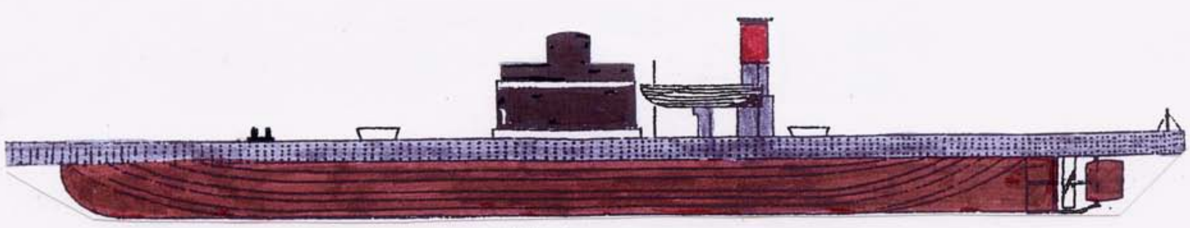
Nantucket

Deck: Lead gray. Turret/pilot house: Lead gray. Stack: Lead gray. No bullet shield.



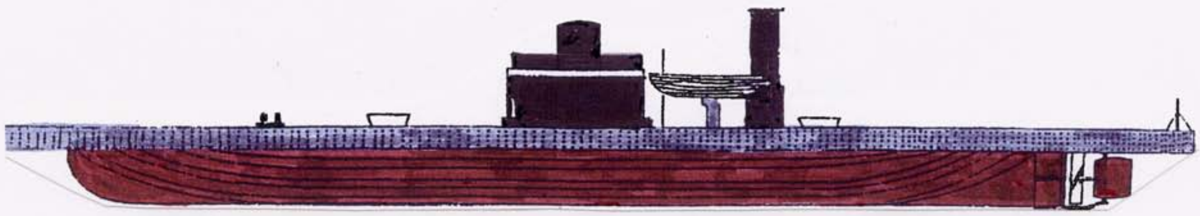
Passaic

Deck: Lead gray with extensive rust. Turret/pilot house: Lead gray. Stack: Lead gray with black ring around top. No bullet shield.



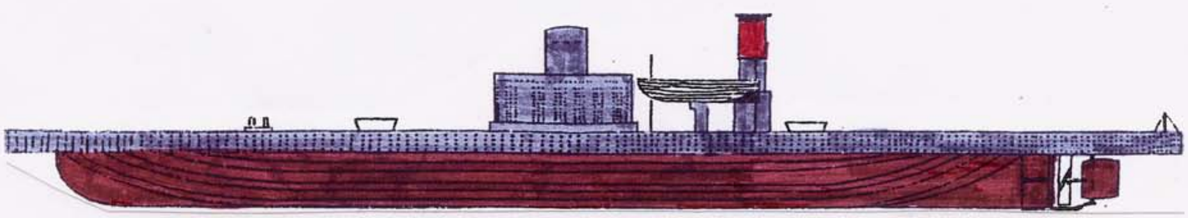
Patapsco

Deck: Lead gray. Turret/pilot house: Black with narrow white ring around top of turret. Turret ring: White. Bullet shield: Black. Stack: Lead gray with upper 1/3 Red.



Sangamon

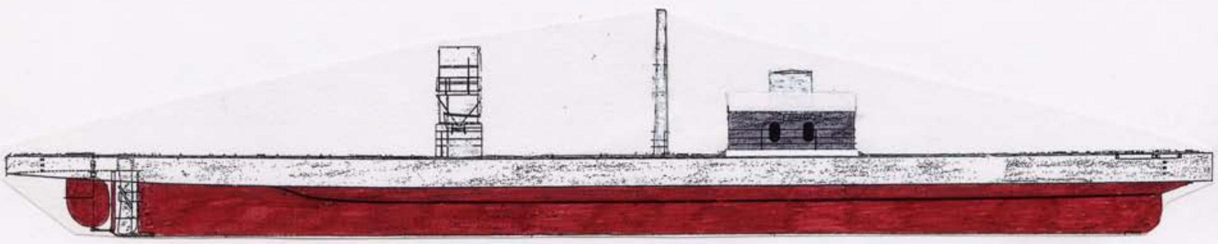
Deck: Lead gray. Turret/pilot house: Black with narrow white ring around top of turret. Bullet shield: Black. Stack: Black.



Weehawken

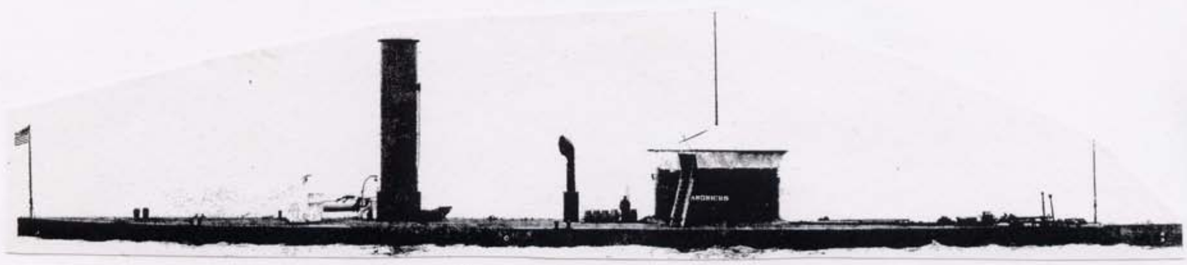
Deck: Lead gray. Turret/pilot house: Lead gray. Stack: Lead gray, upper 1/3 Red with thin black ring at top. No bullet shield.

Canonicus Class Monitors



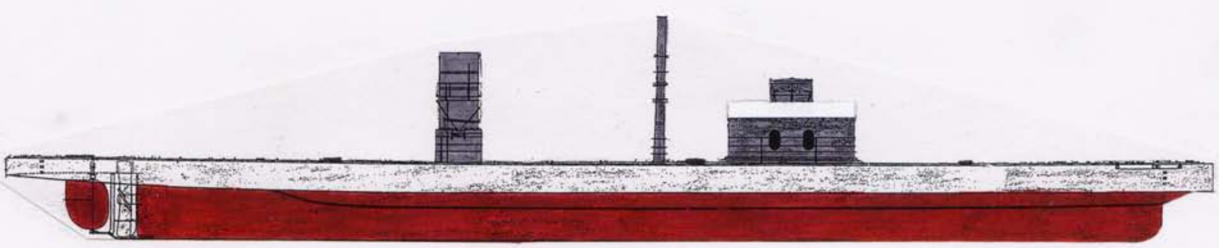
Canonicus (Civil War)

Deck/raft sides: Light gray. Turret: Black. Pilot house/bullet shield/turret ring/stack/vent: White. Hatch rims: Tan.



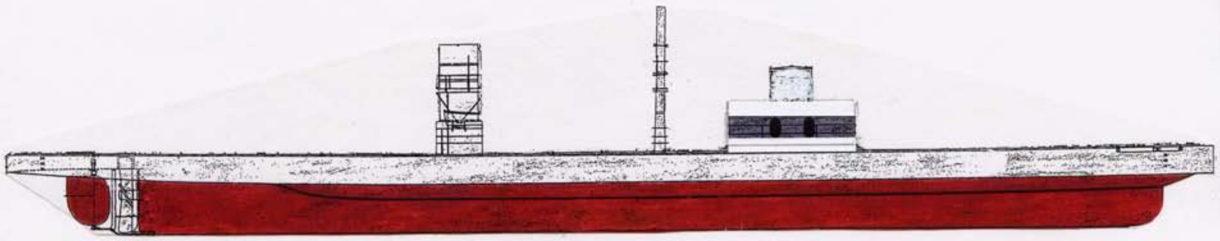
Canonicus (Post War)

Overall black. Deck covered with wooden planks, weathered gray (a result of being left unpainted). The name "Canonicus" on both sides of the turret in 18 inch high white letters. Draft markings fore and aft in 3 inch white numbers.



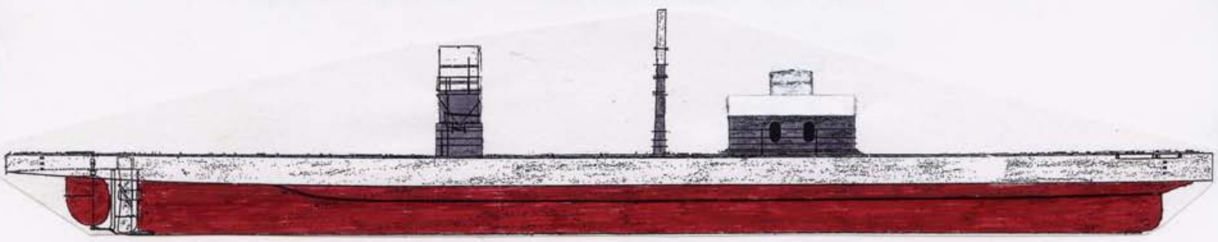
Mahopac

Deck/raft sides: Light gray. Turret/pilot house/stacks: Black. Bullet shield: White. Hatch rims: Brown.



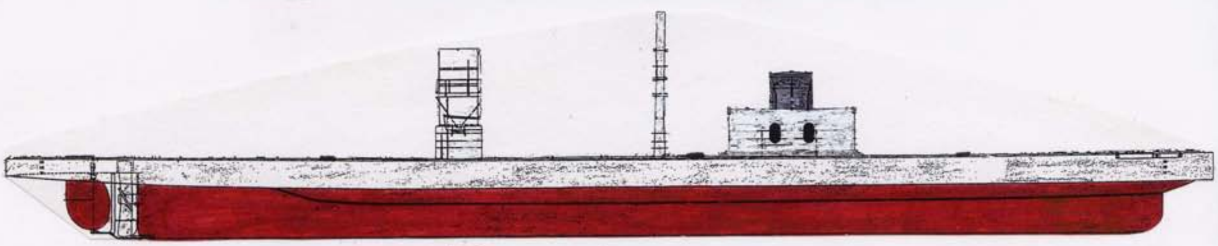
Manhattan

Deck/raft sides: Light gray. Turret/turret ring: White with black band the width of the height of the gun ports running through the center of the turret. Pilot house and stacks: White. No bullet shield. Hatch rims: Brown.



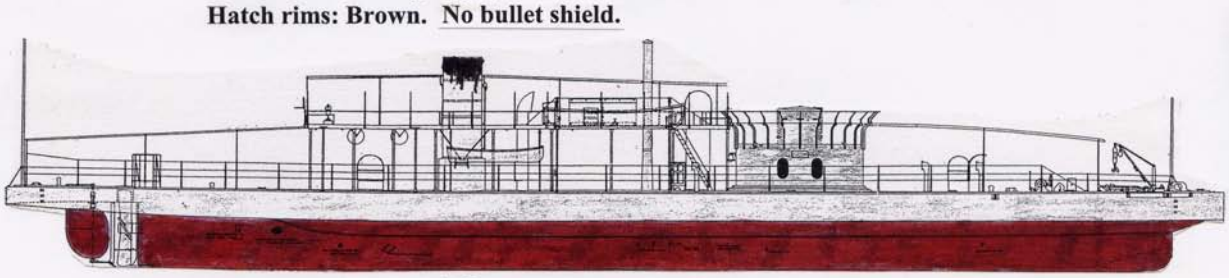
Saugus

Deck/raft sides: Light gray. Turret/turret ring: Black. Pilot house/bullet shield/upper 3 ft. of turret/upper 1/3 of stack and vent/hatch rims: White.



Tecumseh

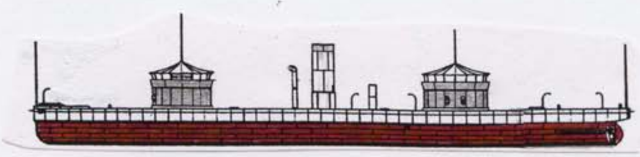
Deck/raft sides: Light gray. Turret/stack/vent: White. Pilot house: Black. Hatch rims: Brown. No bullet shield.



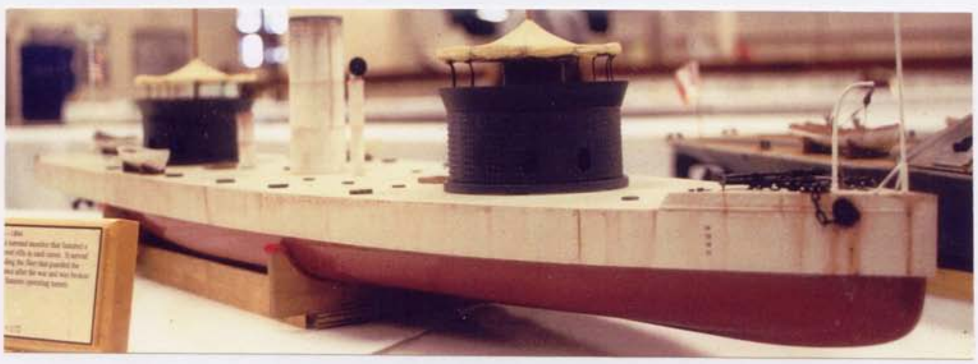
Tippecanoe (Post War)

Overall light to medium gray. Name "Wyandotte" in 18 inch letters on turret sides in black. Draft markings fore and aft in 3 inch black numbers.

Onandaga



Photos of her in Union service on the James River, show black or dark gray turrets and vents, white stacks and awnings, and black bitts, chocks, and anchors. The deck and raft sides are light gray. Using "artistic license" I chose to paint her "red lead" below the waterline and paint the hatch casings wood tan and the vent and coal chute stoppers gunmetal. Most of the photos also show rust streaks on the stacks and raft sides.

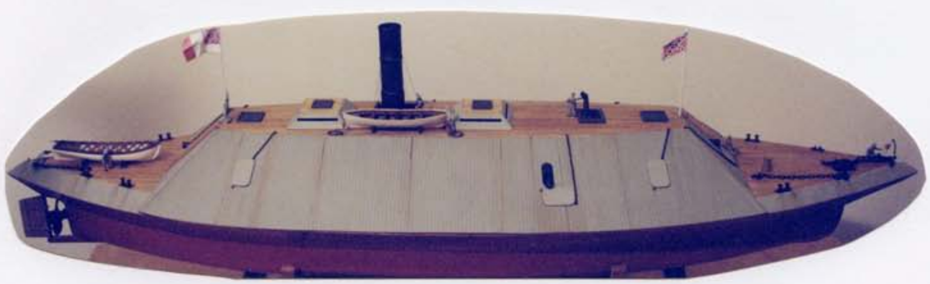


Richmond Class


CSS Chicora


CSS Palmetto State

These two of the Charleston-based ironclads are described as being painted light blue. These views from a Conrad Wise Chapman painting seem to show only the stacks blue, with the rest of the surfaces possibly light gray with rust, grime, and weathering.


CSS Richmond

With the exception of the Virginia and the Albemarle, the decks of most Confederate ironclads have been reported to be unarmored bare wood. When stained and finished, natural wood decks add considerably to the "texture" effect and overall contrast for the surface detail of the model. I take pains to use as many contrasting colors for the deck and surface details, in order to add to the eye appeal of the model.
One can be reasonably sure of an authentic color scheme if you stick to varying shades of gray and include lots of rust, grime, and weathering.

7 On Servos and Things

B. Hathaway

Many times in the write-ups of the various boat projects I make reference to modifying servos for different applications. Perhaps a further explanation is in order. Servos are those little motors that move a little bit when you waggle the stick on your transmitter and are good for moving rudders or moving micro switches. They can be much more. In modeling ironclads we are faced with some unique opportunities. Monitors require some method of animating a turret; all of the boats need compact power sources and individual throttle control on the twin-screw models. Modified servos can fill all of these functions.

A short, non-technical explanation of the workings and parts that make up a servo will help in understanding what we are doing when we modify a servo for a different application. Basically a servo is a motor attached to a gear train to slow it down and increase the output torque and a control system. The transmitter puts out a series of pulses that the receiver intercepts and sends to the servo. The servo is set so that when these pulses are “neutral” nothing moves. When you operate the transmitter the pulses change and the electronics in the servo let power through to the motor and the servo moves. The bigger the change in the pulses the more power the servo electronics gives to the motor and the faster the servo moves. As the motor moves the servo gears it also moves a variable resistor, or “pot” (short for potentiometer). This pot adjusts the pulses back to neutral so that the motor will stop after moving the gears a little. The gears also have mechanical stops built into them so that the servo will not move to far and get out of the adjustment range of the “pot”. This is why the standard servo only moves about ninety degrees or so.

One of the best alternate uses of a servo is a continuous turning powerful slow speed motor. This is great for turning and controlling turrets on monitors. You can turn fast or slow and in both directions and the servo itself is a great mount for the turret. Simply glue a servo arm to the bottom of the turret and press it on to the servo shaft. It is relatively easy to modify a servo for this use. Don’t be afraid to open up a servo. In most cases you can simply put it back together if you change your mind and all will be fine. First step is to remove any output arms from the top of the servo. Next open the case. There are usually four screws that hold the case together and these are removed and the top taken off. All we need to get to is the gear set, which is stacked up on top of the servo. Carefully observe how the gears nest together as we will be taking some gears off and hopefully replacing them in the same order. On most servos we will have to remove a center or idler gear in order to remove the main output gear. Remove the main output gear, which is the gear, that projects up through the case and the servo arm mounts to. This gear also connects to the “pot” shaft, which is mounted directly below it. We will need to disconnect the “pot” from the output gear. On most servos there is an insert that fits into the output gear that rides over the “pot” shaft. This can be popped loose with a hobby knife. Different servos may have different methods of attaching to the “pot” shaft so inspect your servo and determine how the attachment is made. Our desired end result is to allow the output shaft to move without moving the “pot”. If the “pot” does not move then the servo will never “re-center” itself and will just keep moving as long as the transmitter stick is held. Only when the transmitter is put back to “neutral” will the servo stop moving. Most output shafts have a stop block molded onto them that will not allow the gear to turn full circle. This block must be trimmed off using a sharp knife so that the gear can turn full circle freely. Also inspect the gear and make sure that the hole the arm mounting screw fits into goes all the way through the gear. If not drill it out so that a 1/16” wire fits easily through it. While the output gear is off we must modify the output shaft of the “pot”. This shaft has flats on it that engage the output shaft. Using a file, saw or motor tool trimmer cut a slot in the end of the shaft. At this point we can re-assemble the servo gears and check for smooth fit. Put the top back on and put the screws in. We now need to make an adjustment tool. Take a piece of wire (the type of wire that comes with a radio control “clevis” on the end of it is ideal) and file the end into a flat screwdriver shape. This tool will fit down the center of the output gear when no arm is attached and will fit into the slot we made earlier in the “pot” shaft.

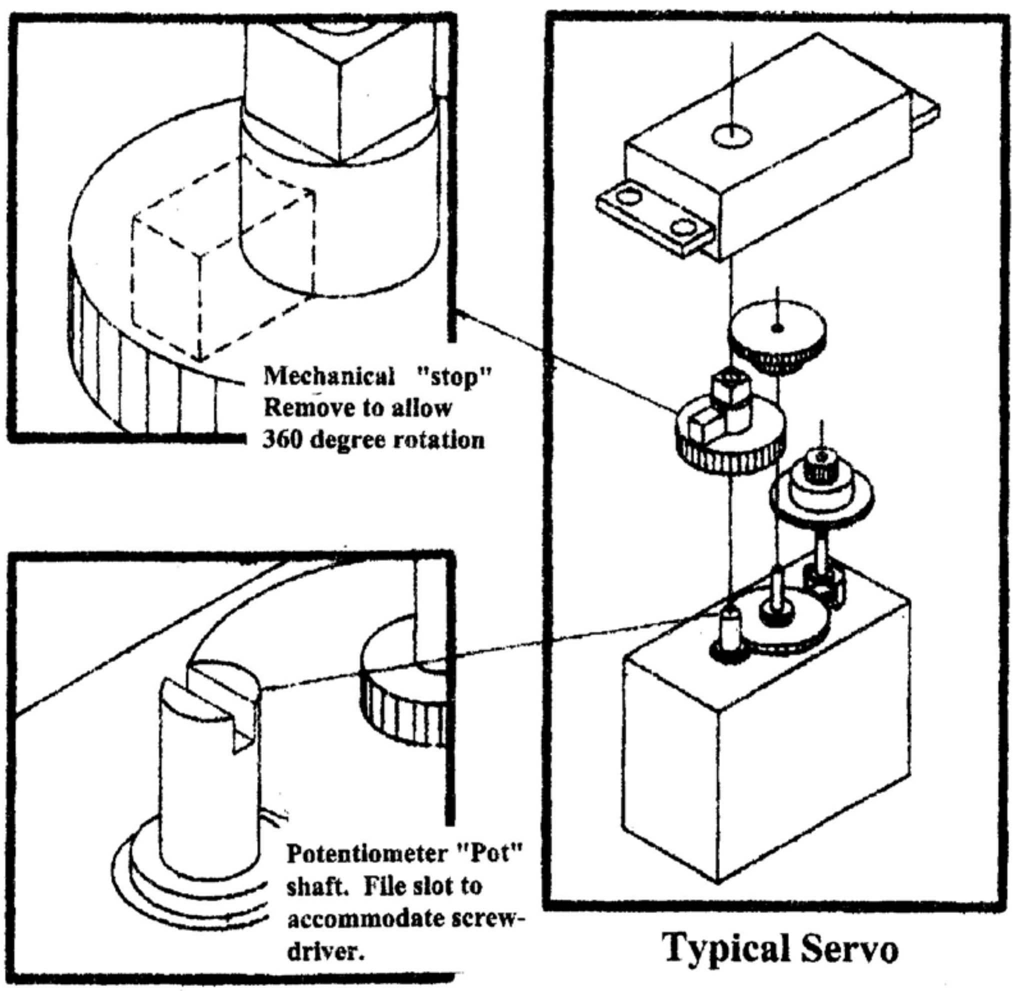
Hook up your modified servo to the receiver and turn on everything. Move the stick on the transmitter and observe the servo. It should move with the stick, slowly with a little stick movement and fast with a large stick movement. It should stop when you release the stick. If it does not stop insert your “tool” into the servo and turn the “pot” until the servo stops moving. We now have a full circle servo that can be used for many different things, moving turrets, making winches, etc. Oh yes it is a good idea to mark this servo as modified so you won’t use it as a normal servo.

The second major use of servos is as motors. For this use I prefer the ¼ scale or giant scale type servos, not just for the motor size but mostly the electronics on the bigger servos are beefier and can take more power. Remember that most servos are designed for intermittent operation and using one as a motor can run it at a high load for a long time, which can really heat up the electronics. I have burned up the electronics on a small servo using it as a motor. The procedure is somewhat easier than a continuous motion modification. Open the servo by removing the screws and removing the case top. Remove all of the gears. On most servos the motor gear is under a plastic hood. Cut this plastic away using a razor saw or a sharp knife and expose the motor drive gear, this is usually a small brass gear. As this gear is to small to directly attach to a shaft, we now have to make an output shaft adapter. I have used two methods for making an adapter. For the first method I use a piece of brass tubing that just fits over the gear and cut a piece of this about ¾” long. I next get several pieces of nesting tubing that fits inside of this tube and reduces the size to 1/8”. I cut these pieces about ½” long, nest them inside the main tube and insert a piece of 1/8” brass rod. This rod should be about 1 inch long. Solder this assembly together such that you are left with a cavity about ¼” deep in one end (that fits over the motor gear) and a brass shaft out the other end. We now need to fasten this adapter to the motor gear. I have found that CA glue works very well. I get thick CA glue spread liberally around the inside of cavity on the shaft adapter but not so much glue that is will run out when the parts are joined. I spray the motor gear with CA accelerator and holding the servo upside down (that is with the motor gear facing down) I push the shaft adapter onto the motor gear. It is important that no glue runs down into the motor as this will ruin your whole day. Hold everything in alignment until the glue sets and it should be fine. I have done several this way and have had no failures yet but since the mounting gear is so short there is always the possibility of a failure. Simply glue the adapter on again.

The first method makes a very long adapter which can create space problems in certain models. Recently I have tried a second method by soldering an 1/8" brass rod directly on to the motor gear. I use resistance soldering (an soldering method in which the heat is generated by the electrical resistance on the parts to be soldered, sort of like low powered welding) which generates a lot of heat in a very small area and have made good joints on the small gear. A large standard soldering iron would probably give enough heat to work also. It can be a real challenge to get the shaft exactly centered on the gear but I have gotten close enough to be usable. The heat of soldering has not had any effects on the servo yet and on one servo I soldered and unsoldered the shaft three times before I was happy with the results. If I can devise a jig to hold the shaft centered I will solder all of my future servo motors as the end result is a really short compact unit.

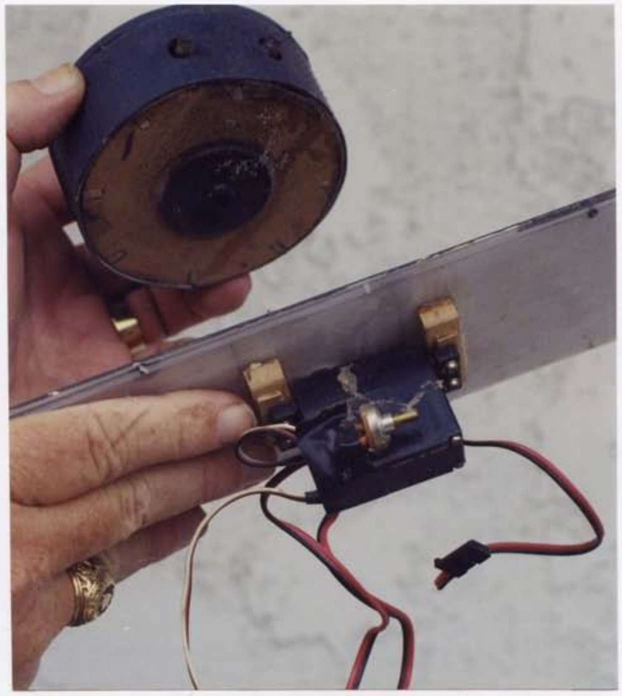
I usually glue an extension shaft made from brass tubing onto the "pot" shaft so I have an easy trim control. You can leave the top case off the motor if you want but I usually drill a hole for the motor shaft to come out of and put the case back together. Makes a neat installation. Again hook up the servo to your receiver and turn the system on. Check for operation as before, adjusting the "pot" shaft until the motor stops turning with the throttle lever at neutral. If it all checks out you are ready for installation.

I think a few words about using a servo as a motor are in order. Although you will be able to control speed and direction of the servo with the throttle stick do not expect this system to behave like a separate motor and speed control. The servo will have a very small speed range, going from barely moving to full speed with a small movement of the transmitter lever. There are ways to fix this characteristic but they are way beyond the scope of this work as they involve changing electronic components and adding additional parts to the basic servo electronics board. Additionally a servo motor without a gear reduction is a low torque, high speed motor. Be aware that the standard props available will probably be too high pitched to work effectively with a servo drive. They will load the system down and cause excessive battery use and heat. I use ¾" to 1 ¼" props on my large scale servo motors but I make my own shallow pitch props. These motors like to run fast with small load and a shallow pitch prop allows this and also helps solve the small speed range problem. A shallow pitch prop running at high speed does not move a heavy boat very fast so we can run our motors at the faster speeds and still get realistic movement from our models. I usually mount my servo motors with hot glue or one of the sticky goo type adhesives. There is not a whole lot of torque on the system and this allows the motor to be easily removed if needed. I use silicon fuel tubing to connect the output shaft of the motor to the prop shaft of the model, which is usually 1/8".   The current large scale servo of choice is the Hobbico CS-80 which is a real brute with large motor and beefy electronics. As of this writing I get them from Tower Hobbies for only $24.99, a real bargain.

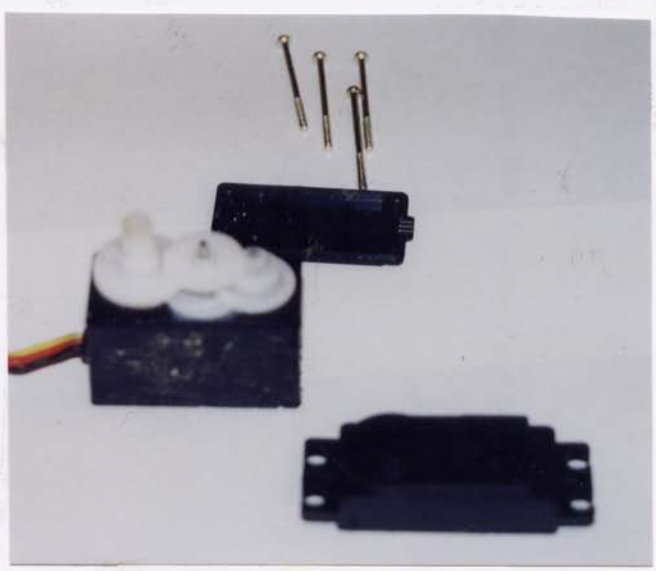


Typical Servo

Modifying



Typical servo / turret application



Servo component parts

8 Cannons and Fire Control

S. Lund

I have talked seemingly in a glowing manner about this feature throughout many of my contributions to this book. Let me pause at this time and make this point; one must **approach** adding this feature to your models **with extreme caution!**

First of all, the black powder used to achieve the effect is an explosive. And when we start to work with the substance **and** electricity, we have a potentially dangerous situation. So, just plan from the beginning to always keep the powder in small quantities, keep it isolated from any and all sources of ignition, and always wear eye protection when handling it.

Another caution; **projectiles? - absolutely not!** I tried an experiment with one of the gun tubes on the bench using the small amount of powder used to produce the smoke, loaded a single piece of lead birdshot, and aimed it at a piece of bond paper 24 inches away. The result was the shot going cleanly through the paper and expending itself against the far wall of my garage with a loud report. It was clearly evident that the shot was capable of damaging an eye or any other soft tissue.

Likewise, one has to be very careful about using the correct type of powder. The wrong kind (which we will cover later) produces a loud "bang". Doing such a thing in a public park is not a wise thing. In fact here in the LA Basin where I live, it is apt to get you thrown out of the park, get you **return fire**, or both.

One final disadvantage to the whole process is that you wind up with black powder residue inside your model. This substance is sulphurous and highly corrosive. So, even though many of my models have this feature, I only exercise it rarely. You may want to consider the same approach. All that said, we'll now discuss what you need to do to make it all work.

The essential elements of the system are the gun tube and mounting system, the ignition source, and the "fire control" system. The first item will vary with the two ship configurations, and the actual space available within the individual ship design. The second and third items are common to both configurations.

My most successful gun tubes have been made of 1/4 inch thick walled aluminum tubing. The material is the right size, sturdy enough, and is easily worked. In addition, you can get brass tubing to plug it in to for mounting the guns in the casemate application.

I have used several methods to close off the breech end. One method is to insert an ignitor (I'll cover that later) in the breech end and then stop it up with a wad of beeswax. Since there is no projectile, there is very little back pressure. You get some gas/residue leakage into the ship, but not a lot. You then load the powder and wadding in from the muzzle end, and hook up the ignition leads.

Another closure method (both of these have been used successfully on Monitor types) is to use a transverse mounted block, pinned in place. This is shown in the photo of the USS Monitor’s turret interior. I recommend this method for turret installations, because it is the neatest and less prone to gas leakage.

The most gas-tight arrangement is the one I used on the Richmond. This involves soldering stubs of brass tubing to brass nuts. The aluminum tube plugs into to tubing and is fixed in place with a drop og CA glue or E 6000. The nut is then rethreaded to take a model airplane glo plug, which provides ignition. With this arrangement, you have the most gas tight breech as well as the most reliable and maintainable source of ignition.

Now, would be a good time to address the issue of ignition. I use two types; pyrotecnic and electrical. While they are both actuated electrically, the pyrotecnic method is the simplest.

I use ignitors that are sold by Estes for model rocket application. They are a simple loop of nichrome wire with a chemical tip of material similar to that used on ordinary matches. When current is applied, the wire heats up through resistance, and sets off the ignitor. This can be done with as little as 6 volts. These are the simplest approach, but require the gun to have the breech block removed and a new ignitor wired in, before each succeeding shot. To ease this somewhat, I have found that thin copper tubing makes a good connector for the ignitor wire. These ignitors are, of course, “leaky” and messy, due to the necessity to have a removable breech plug.

The glo plug method is the most maintenance-free because it doesn’t require servicing after every shot. It remains sealed and connected. All you have to do is pour in more powder and install some tissue wadding (lightly-don’t pack it in or it will go “bang”), and it is ready to fire again.

The principal disadvantage to this method is that the glo plug needs high amperage to glow hot enough to ignite the gunpowder. To get that amperage, you have to use NiCad batteries rather than the lead-acid type. And the bigger (i.e. “D” cells vs “AA” or “AAA”) the better. Besides the batteries themselves being a monetary investment (about $5, or so, each) you also need to have a charger to keep them in service.

Speaking of ignition, lets talk about gunpowder for a bit. What you want is the **coarsest** grade you can find. By this, I mean FFFg (usually referred to as **musket** powder) rather than FFFFg (referred to as **pistol** powder). And if you can get FFg (**cannon** powder), that is all the better. The finer grain the powder, the tighter it packs, and the louder the “bang”. The best substance to use that **will not** “bang” at all is called Pyrodex. The problem is that it is hard to get reliable ignition with the glo plug method. You will have to experiment to come up with the best solution to match your own ship and your own expectations.

Back to mountings for a bit more. One issue with the casemate ironclads is how you install/mechanize the mounting of the guns. Here I speak of choosing between guns “fixed” directly to the structure of the casemate, or made to slide into fixed tubes and made removable, along with their accompanying wire harness. For ease of servicing and maintenance, as I pointed out earlier, I’ve found the second method to be preferable.

Most Confederate ironclads made use of rifled pivot guns at the bow and stern, with three ports for each gun. The Richmond class had one to two guns along the sides (there were six ships in the class, and there was a lot of variation between them). This results in the actual Richmond having four guns to fire, with eight actual gun ports available. The fixed tube/removable gun arrangement works just fine in that case.

For mounting the guns in the turret configuration, all one has to do is carve a block to the right mounting height (in the lower third of the oval port) and glue them in place. I use a thick glue called “E 6000" for this. It can be found in craft stores and is used for mounting and making costume jewelry. It is slow drying, remains flexible, and can be pried loose without damaging the surface. I also use it for mounting servos and other components (most of them, in fact) in the interiors of my boats. The “forgiving” nature of the stuff is a very attractive feature. It will melt or distort some plastics though, so experiment with it first. This method is suited to either breech closure method described above.

Once you have a functional and mounted gun suite, you can progress to the “fire control” system you’ll need to fire them by remote control. The solutions to this problem range from crude to somewhat sophisticated. It simply depends upon your inclination and the complexity of the system to determine your approach.

On the second page of accompanying photos, you can see the entire range, starting with my first effort, the Saugus. All I did in her case was have a servo arm move right or left from center to close the selected ignition circuit. I was using a three channel HITEC unit and the third servo was controlled by a knob that could be slewed right or left from a center position. The added advantage of the knob was that it was not easily bumped or activated by mistake, as might have been easily done if it was connected to one of the control sticks.

The more sophisticated approach to firing two guns is the one used in the Monitor. Here, the servo arm trips a microswitch in each direction. This is a much more easy to adjust and reliable system. And it looks neater and cleaner too.

In the case of the Virginia, with its ten guns, the complexity goes way up. Usually, one only has a maximum of two servos available for fire control. This was the case for that ship.

In order to fire four broadside guns on each side, I was forced to resort to firing them in pairs. The pairs were wired to two sets of microswitches for each side's guns. There are two types of switches used for each side. These are visible in the accompanying photo. The servo arm first trips the long-lever microswitch to fire the first pair of guns (I chose #s 1 & 3 for a staggered effect). If one continues to push the control stick in the same direction, the tip of the lever trips the second microswitch, and fires the remaining two guns (#s 2 & 4). You can fire the pairs in stages, or you can just throw the stick all the way over and fire a four-gun broadside. **That** can be impressive!

In addition, the pivot guns fire off a separate servo. Their "opening shots" and "parting shots" are really effective to add dramatic effect to a demonstration or mock battle.

One last side note on this "most complicated" system. If you try to fire two glo plugs from the 6 volt system, they will not glow hot enough to ignite the powder. If you install a second 6 volt pack in series, it **will** ignite the pair, but it will burn out the glo plugs of the singley fired pivot guns.

So, your choices with a glo plug ignition system are to "juice up" the voltage to fire the pairs of guns and refrain from firing the pivots, **or** to disconnect one of each of the paired guns and fire them singly on 6 volts. Another choice (which I haven't tried yet) would be to tap into the series-wired 12 volt battery pack at the 6 volt point to power just the pivot guns. Yet another choice is to use the **pyrotecnic** ignitors, instead. Starting to sound complicated? It certainly is to me.

Some of the arrangements I have tried have have been so complicated that they have reminded me of the wiring harness on an old MG sports car I owned years ago. Some of them have also proven to be as unpredictable and unreliable as that of the MG.

In conclusion, I'd say that these systems can be very spectacular to behold .... when they work. And, as I think I have shown, there are plenty of factors that go into **that**!

9 The Super Monitors

S. Lund

Typical of practicing any activity, this aspect of ship modeling (ironclads) has continued to “grow” on us. The first way was that the size of the fleet steadily expanded to where it is portrayed in this book. The 1/72 scale that they are modeled in has kept the storage/display aspect at a (barely) manageable level in our homes/offices/garages. So naturally, with us never being able to “leave well enough alone”, the next logical step would be for the models to grow in **size**.

In 2002, Verlinden, a model company specializing in high quality resin-cast miniature figures and dioramas, came out with a 1/35 scale model of the Monitor’s turret. It didn’t take me long to get around to purchasing a kit to study and gain insights from. It also didn’t take long to realize the tremendous potential for detailing that a model of this size offers. Of course, our quickly growing enthusiasm for the project nicely blinded us to the severe strain that they would come to pose in logistics, handling and storage. More on that later.

We obviously couldn’t build **two** models of the Monitor, so we came to the conclusion to build the “first and last” of the types of the class. In the case of Bill’s part of the project, we felt that the Canonicus class monitors represented the zenith of the wartime single- turret ships, and the Saugus was typical of her type. We also had a substantial amount of scale data and plans on hand, since I had already built two ships of the class in different scales.

In the case of the Monitor, there was much more to come. I had amassed quite a bit of material on her for building my Dumas model as I was first getting into the field of modeling the ironclads. For a model of that size, it was adequate. But, for a model so large that the observer can literally “count the rivets”, a lot more information was needed. I soon hit on the logical source.

Happily, my intense interest in the Monitor and ironclads in general has led to an ongoing research project for several years now. In the course of my studies, I have managed to visit the sites of three of the four ironclads that have been at least partially preserved. In addition, I have made an effort to visit other museums on the east coast that house related artifacts. In so doing, I’ve seen everything from the Monitor’s captain’s liquor decanter, armor, anchor, and drive shaft from the Virginia, guns from the Tennessee, to armor from the Monitor’s deck. All in pursuit of details pertaining to the ironclads and their technology.

The premier site of this whole endeavor has always been the Mariners Museum in Newport News, Virginia. Since 1987, it has been designated by the National Oceanic and Atmospheric Administration as the repository for archives and artifacts from the Monitor. To date, they presently house over 1100 artifacts recovered from the wreck.

I have visited the facility four times in the last eight years in pursuit of further knowledge and to view some of the choicer artifacts such as the prop, engine, and turret as they were recovered. In the course of all this I have made local friends and become a member of the "Friends of the Monitor" organization.

The museum is now constructing a "Monitor Wing" to the facility to display the artifacts and a full size replica of the actual vessel. In recent years, they have hosted an annual weekend event around the anniversary date of the Battle of Hampton Roads (March 9) to raise money. These events feature lectures by museum staff and noted historians, tours of pertinent historical sites, and social events. The opening of the new wing is scheduled to be held in conjunction with that celebration in 2007.

With knowledge of all this, I felt that a model of the caliber and size that I was planning might be of some use in an upcoming event. To that end, I contacted the USS Monitor Center Campaign Coordinator, Ms. Kimberly Hansin and enquired as to the feasibility of the two large-scale models figuring somewhere in their program. The idea was met with an enthusiastic response and we were invited to visit and discuss the whole issue further. The result was a visit to the museum in September of 2004. In the course of visit, we met with the Museum Education Coordinator (Tangela Shepard), the Monitor Center Curator (Anna Holloway), and Archivists Lester Weber and Gregory Cina.

Out of all this came and agreement that we would come to the Mariners Museum for the 2007 opening, bringing and demonstrating the "Super Monitors". In addition, we would bring at least six of the pertinent 1/72 scale models, give demonstrations, and conduct lectures on related subjects. In return they pledged to provide answers to questions and make material and personnel available to aid in ensuring the technical accuracy of the models. My wife and I were shown such marvels as the original blueprints of the Monitor, the recently acquired ones of the Virginia, as well as those of the Casco class shallow-draft monitors. In addition, I was subsequently supplied with a CD containing the Museum's blueprints of the Monitor itself. All in all, this was pretty heady stuff for me, as well as a mandate to "do it up right" when it came to making the model as accurate and impressive as possible.

With the project officially underway, it was time to decide which set of plans to use. As I mentioned earlier, there are several sets of plans available, but the Sumner Besse set offered in the Mariners Museum's book "CS Ironclad Virginia and US Ironclad Monitor" is considered by most to be the best published to date. Bill scanned them into his Autocad® system, scaled them up to **1/32** scale and printed out full sized copies of all that was required. For Saugus, we were able to use the excellent drawings found in the "Warship Profile #36" previously mentioned.

I mentioned earlier that the Verlindin kit was in 1/35 scale, and that we had originally started our planning around using that scale. Both 1/32 and 1/35 scale are popular in plastic modeling and make available a wide range of figures and accessories usable for detailing models of this size. Given the variation of heights one sees in the average crowd, both scales can be used pretty much interchangeably.

In the meantime, we had come to realize that the Verlindin kit was not accurate enough to be used on the actual models. It is in fact about ¼ inch too short and about 3/8 inch too wide. When one looks at the problems involved in correcting the faults and the impact on the plating and bolt head patterns on the exterior, it gets to be too much trouble. So, we felt that we were no longer tied to the scale of the Verlindin kit that we could more evenly weigh the advantages of the two scales.

The swing vote came when a friend (a musician and not a modeler) told me about a firm in Southern California that made plywood tubes in various sizes, used for drums and other musical instruments. To my delight I found that they made an 8 inch diameter tube and would cut the stock to length. I bought a 12 inch section and it yielded two turret blanks and a slightly shorter section that I was later able to use as a test article for developing the plating, bolt patterns, the method to drill and shape the gun ports, and assist in working out the geometry of the turrets inner workings. On the Monitor, when the 0.040 styrene armor plate is applied to the exterior surface, the turret diameter works out almost perfectly to the 1/32 scale dimension. Thus, the scale was decided.

The basic hull/raft structure for both ships followed the same pattern. The bottom of the rafts and the Monitor's hull bottom were fabricated from 1/8 inch plywood "door skins". This is one of the many examples where sheer size of the project sends you to the lumber yard rather than the hobby shop. The ribs tie into the raft bottom and the hulls are suspended beneath the raft. The hull of the Saugus was built with a conventional protruding keel, whereas the Monitor's flat bottom has a non structural "false keel" strip affixed to it.

The hull of the Saugus, with its streamlined shape lent itself to planking in the conventional way. The Monitor's rather crude and angular shape (designed for ease and rapidity of manufacture rather than hydrodynamic efficiency) allowed me to simply sheet over the sides with 1/8 inch balsa. Balsa is suitable enough in this application because the sides are not structural and the entire hull was later fiberglassed.

The box made up of the top, bottom, and sides of the raft make up the primary load bearing structure of these craft. The ribs and hull structure are strong enough to support them when they rest on their keels. The cradles that they rest in for transport and display bear primarily against the raft bottoms. The strength and rigidity of the rafts really comes into play when it comes time to wrestle these beasts into and out of the water. The Monitor is heavy and awkward enough with its 65 pound weight and 5 ½ foot length. But the 7 foot Saugus weighs in at 125 pounds. Since the only practical way to hoist them in and out is by having one crew member lifting at the bow and a second at the stern. The bending loads on the rafts are tremendous.

With all this in mind, careful attention was paid to making the upper and lower raft surfaces and the ribs of the toughest and thickest material practical. The structure is tied together with one-piece ribs, heavy balsa blocks at the side/bottom/top junctures and using the previously mentioned 1/8 inch plywood for the rafts bottoms. The result has been a highly rigid structure that has shown no signs of weakness or cracking on either model.

The top decks are 0.092 Lexan® supported on ½ inch square basswood beams. The beams tie into the balsa blocks in the raft. The Lexan is a strong, temperature and moisture-stable material that takes paint and epoxy adhesives well. With it, it is possible to make very precise and tight joints that allow a minimum of leakage as the water inevitably washes over the deck.

The deck “armor” is 0.040 styrene. It is applied in strips, staggered “brick” fashion, with subtle gaps left to allow for temperature expansion. The shape and size of the plates is accurately portrayed because I was able to get the dimensions from a real artifact. The Mariners Museum has one on display, and it was duly measured and documented on one of my visits. The access hatches in the deck allow for work on the interior and have their seams staggered to disguise the outlines. For details that are recessed into the deck, such as coal scuttles and the “deadlights” over the living quarters, their cavities were drilled through the styrene with flat-bottomed Froeschner bits of the appropriate sizes. I obtained the metal covers for these openings from Dromedary Shipbuilders Supply in all three of the sizes required.

The deck plates in the museum have bolt holes punched in them, but the bolts are barely discernible in the photos showing the deck. This is due, I suspect, to the fact that they were at least partially countersunk and that flat-headed rather than round-headed bolts were used. In addition, it has been mentioned that some sort of tar was used on the deck. The effect is a mostly smooth appearance with some small “bumps” visible. Having drilled and set over 3000 escutcheon pins to duplicate and round-headed bolt heads visible on the turret and raft sides, I decided that trying to apply a similar number of small bumps or indentations was just too much.

One thing that is normally not considered on small models comes into play on a craft of this size. The chocks and bitts normally just glued in place for show must be made fully functional. To that end, metal castings were used throughout and they are tied into the structure with 1/8 inch brass rod. Due to the effort it takes to get the models in and out of the water, the tendency is to leave them in the water. So, functional moorings become a necessity when the model floats dockside for hours on end.

The turrets started out with the aforementioned plywood drum blanks. To this was added a sturdy bottom of ¼ inch plywood. Working in this scale, the exact dimensions of the exterior become a critical issue. Different sources call out the well known 20 foot diameter as the inside or the outside dimension. Consulting the museum-supplied data, it turns out that 20 feet was indeed the interior dimension and the thickness of the armor determined that of the exterior. This was an issue because of the Monitor had 8 inch armor and the Saugus had 11 inch armor on the turret and 8 inch armor on the pilot house. In that regard, the 0.040 styrene “skin” worked out fine on the Monitor, but a layer of 3/32 balsa under the styrene was necessary to make the Saugus’ turret come out right.

To get the correct bolt head pattern, I used actual photos rather than drawings. This allowed me to duplicate some of the slight misalignments and irregularities visible to even the casual observer of the famous photographs taken in July of 1862. A cardboard pattern of the same thickness as the styrene plating was wrapped around the turret blank, cut to the exact length, and then divided into 24 equal segments. The copy of the turret photo showing the pattern was then blown up to the exact size on the Xerox. From that, I made a template of the bolt head pattern and plate joints. I scribed the vertical lines defining the plates on the styrene before gluing the skin to the plywood, and then marked the bolt locations in pencil through the template.

The skin was attached with contact cement applied to both surfaces and allowed to dry for 15 minutes before putting the surfaces together. I recommend this method for attaching all the exterior plastic plating because it allows a little movement while the pieces are put into their final positions and it is flexible when dry to allow for the heat expansion mentioned earlier.

When I attached the turret skin, I deliberately left off the last panel. This is because, no matter how hard you try, you are unlikely to get the length of the single strip of plastic wrapped around the cylinder to come out precisely right. The last panel can be cut to exact size and become indistinguishable from the rest. I positioned it on the back of the turret to make it even less noticeable.

It might seem as though I spent an inordinate amount of effort on the exterior of the turrets. This is exactly right, because the turrets are easily the most distinctive features of these ships and are certainly the most photographed aspect of them. To that end, I took pains to duplicate the dents that show up in the photographs of the Monitor’s turret. In addition, to duplicating the ones visible in the photos, I was also able to add the ones that have been discovered in the course of the turrets recovery and preservation. A museum archeologists was kind enough to take me on a guided tour of the turret exterior at a time when the tank containing it was drained, pointing out all the known dents. He took delight in pointing out a particularly large dent on the back of the turret. It is thought that it was “friendly fire” from the USS Minnesota that the Monitor was seeking to protect. An interesting side note, I’d say.

As mentioned earlier, the bolt heads are individually drilled and set escutcheon pins. It took over 800 of them for the turret alone. It was a lot of trouble, but I think the end result justifies the effort. Using that method, I was even able to duplicate the two broken bolts shafts that are visible in the dents next to the starboard gun port. Admittedly, that might be taking things a bit too far in some aspects, but I wanted to do justice to the immediate detail of the information that has been so kindly supplied to me by the museum staff.

An unexpected bonus of detail appeared from using the plywood material for the turrets. The actual articles were construed of one inch laminations of rolled plate iron, stacked to make up the desired thickness of armor. The thickness of the plates was determined by the manufacturing technology available at the time. The plywood blanks we used have seven lamination of close grained birch veneer. So, in the case of the Monitor, when the styrene skin is applied, the result is the correct eight laminations of plate. In the case of the Saugus, the 3/32 addition thickness required was made up with three separate laminations of 1/32 inch balsa, resulting in the correct eleven laminations. This laminated effect has proven to be quite noticeable along the tops of the turrets and in the gun ports. We further enhanced the effect in the “weathering” process with a thin wash of black paint to pick out the detail.

Inside the turrets, we have had the guns machined from aluminum, using the Verlindin guns as patterns. Only the forward 2/3 of the gun is scale. The remainder to the breech is left as a uniform smooth tube for ease of mounting. They are bored all the way through in order to facilitate the “live” firing feature described in another chapter. And of course, the Monitor’s guns have the names “Erickson” and “Worden” applied to them.

The guns are mounted on blocks of wood which travel on tracks made of brass tubing. They are run in and out by direct drive from opposite ends of the servo arm of one of Bill’s favorite Hoobico CS-80 servos. A very simple and robust solution to what could be a fragile and temperamental system.

Incidentally, as you view the inner workings of the turrets and the mechanism beneath that propels and controls them, you are looking at the ingenious work of coauthor Bill Hathaway. His professional engineering ability and extensive modeling experience have continually enabled him to solve the many complex problems that have emerged in making these models come to fruition. We have found, time and again that the increase in size and the ambitious type and number of operating features has caused the complexity of the project to increase exponentially. Bill has always come through with the most compact and practical ways to solve each new problem.

The turntable and drive mechanism that the turrets rest on are identical for both models. The only difference is the height of the supports of the roller bearing “lazy susan” that the turret rotates on. A servo trips a toggle switch to move it in the desired direction and microswitches triggered by a mechanical stop at the bottom of the turret stop it at its limit of rotation. Because of the need for wires and tubes to communicate with the turret interior, it is only allowed to rotate about 340 degrees. This has not proven to be a noticeable problem at all, since neither vessel has the need to fire directly astern. The Saugus had permanent vent and smokestack aft, as did the Monitor after November 1862 overhaul at the Washington Navy Yard.

Other important feature on the top of the turret had to be replicated but made removable for access to its interior. The top grating is reported to have been made of railroad rails laid with spacing between them to allow the passage of air and light. Perforated plates were said to have been laid over this when battle was expected. We have left off the plates and shown the rail effect to give the turret top “texture”. The rail effect was achieved by gluing Plastruct 1/8 inch “I” beam stock to a sheet of 0.040 styrene with 1/16 inch spaces left between them. The two sliding hatches were installed and made functional to aid in removing the top piece. In addition, a socket tube was installed in the center of the Monitor’s grating to receive the awning support pole.

The distinctive awnings were sewn from thin sailcloth by Bill, after carefully working out the size and shape of the gores using his autocad program. Its bottom is affixed to a thin wire hoop to hold its shape and give a surface to attach to the stanchions. The stanchions are fashioned from cast davits supplied by Dromedary and are (after some slight rework and shaping) absolutely accurate in size and shape. I say so, because I carefully measured and photographed the Mariner’s Museum’s artifact to ensure that I’d get it right. As I said earlier, because of the turret’s “high profile”, I am keenly aware that even the smallest detail is wide open to scrutiny.

Because these details are removed and installed frequently, it was necessary to make them fairly robust. The stanchions are (12 on the Monitor and 24 on the Saugus) are set into a ring of 1/8 inch soldered brass square tubing that fits snugly inside the turret rim. Thin fishing leader cable is threaded through eyes at the top and midsection of the stanchions/davits and secured with CA glue. With all this metal, it would have been great to solder all the components together. Unfortunately, the “Britannia Metal” that the davits are cast from melts at precisely the same temperature that solder does. The CA glue is more than up to the task. However, the finished unit is every bit as strong as a soldered wire basket that my wife displays flowers in. To date, I haven’t had any problems with it in operation.

The craft are both powered by identical Johnson copier motors, with Astrofile belt drives, and fed by 12 volt, 7.5 amp gel cells about the size you see on small motorcycles. This gives us hours on end of reliable service, without the need to worry about battery endurance. And before you ask……….no, we never considered using **steam** power. The receivers use their own dedicated battery packs, as do the gun systems. In the latter case, we use a 4.8 volt gel cell or Nicad pack. They are only good for about a half a dozen shots because a tremendous current can drain incurred heating up the high-resistance nichrome wire ignitors.

Moving on to the exterior, the props are fabricated using 3/16 wheel collars with sheet brass blades. Happily, the real Monitor’s prop is currently on display and was duly copied. We have contemporary drawings of the Saugus’ unit, as well. So, we’re pretty satisfied with the fidelity to scale of those items. I also fabricated a display unit of the Monitor’s anchor because the real thing was also on display.

The same drawings that showed the props of the two ships also showed the skeg and rudder arrangements. We constructed the rudders from laminations of Lexan and simulated the rivets with strips of 0.010 styrene embossed with the correct pattern. The skegs and other supporting struts were soldered together from brass rod and square brass tubing. The overall effect is realistic looking and quite robust as well.

The stuffing boxes are made up of the usual Vaseline-filled tubes with retainer collars at each end. These items have proven to be trouble free, never leak, and are easy to inspect and service.

Most of the exterior details on the turret and deck are removable. Their general fragility and the difficulty of man handling the boats into and out of the water has dictated that issue. When two people are struggling with getting a fragile and heavy model in or out of the water, they shouldn't have to worry about breaking little parts off, as well.

In the case of the Monitor, this practice has had an added benefit. The vessel had three distinct configurations during her short career. By changing removable parts, I am able to portray all three of them. At her combat debut at the Battle of Hampton Roads in March of 1862 (just days after her commissioning), the only things projecting above her deck were flagstaffs, turret and pilot house. After the battle, the damaged pilot house was repaired, a sloping glacis was added to it, and the removable vent and smokestacks were reinstalled. She retained her dark color till August when she was painted gray by her crew. Her final configuration was achieved when she went in to the Washington Navy Yard for her one and only overhaul. She emerged from that with numerous internal improvements to her interior and machinery, and sporting a "bullet shield" of sheet iron atop the turret a permanent, telescoping smokestack and taller vent stacks.

The completed models never really got to have official "maiden voyages" as would have been befitting of the products of such a big effort as these were. Because of the need to develop the propulsion and steering systems as well as work out the ballasting, the models were put into the water at various stages in their construction. In fact, they didn't even have decks fitted the first time they were floated.

By the time the completed, sealed and ballasted models got some "sea time" on them, a number of interesting things had come out. First of all, because of their size and weight, it was quickly found that they handle more like real boats than models. When they are underway the inertia of their weight makes them respond to the rudder very sluggishly. If you suddenly throw the rudder over, you are more likely to see the bow yaw and the boat continue on roughly its original track. If you want quick response to the rudder, you have to give it a burst of throttle to get prop wash to act on the rudder. Only then, will you get a satisfactorily tight turn.

The Monitor’s hulls’ poor hydrodynamic design with its extreme overhang at the stern makes for an almost comical effect when tight turns are attempted. Because it has no true keel, relatively shallow draft and the hull is only ¾ length of the overhanging raft, it tends to “skid” in turns. The effect of trying to turn sharply is like trying to do so in a car on ice. The Saugus, on the other hand, has a very efficient hull design. It handles much better in all aspects and is faster than the Monitor even though it uses the same motor and prop. This is in fact, how the real ships performed. Saugus could steam up to 9 knots whereas the Monitor could only make 6 on essentially the same engine power.

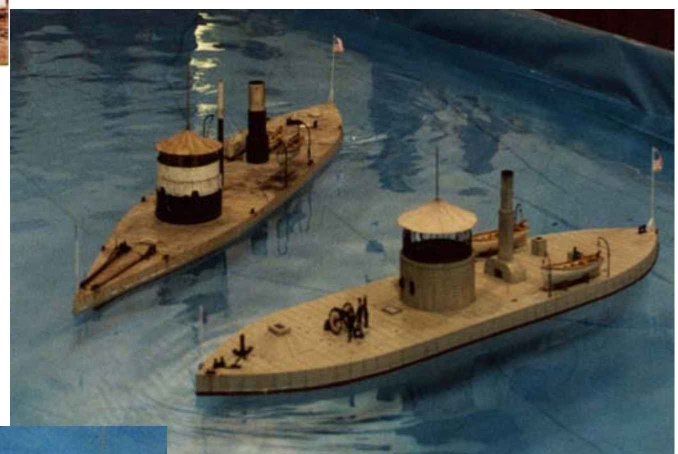
We found it necessary to cast some very flat ballast weights so as to minimize their impact on the available interior space. The Monitor took almost 40 pounds and the Saugus took well over 60 pounds to bring them into trim and riding low in the water as they must to look right. The low freeboard (less than an inch in both cases) has resulted in water being shipped from waves washing over the low decks. We had anticipated this, and both models have bilge areas for the water to collect in. All the radio components are located up in the raft overhang area at the stern, so a little water in the hull really doesn’t bother anything.

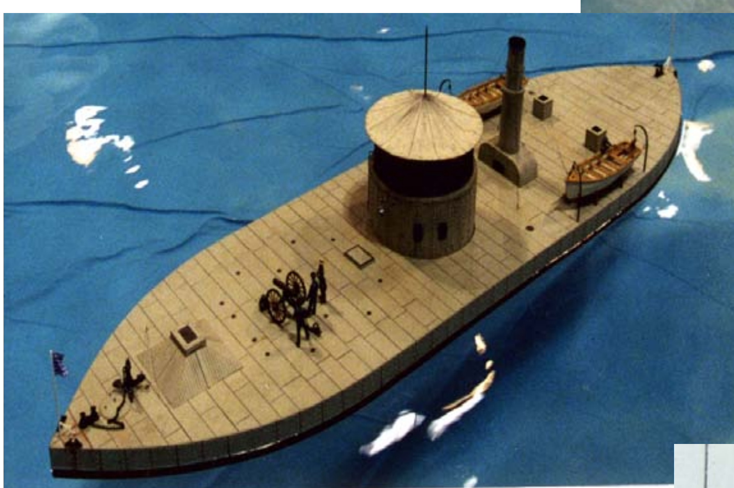
Models of this size are never really finished. Their sheer size seems to beg for constant modification and improvement. In the end, we have come to consider the models in a state of “finished but evolving”. That is that all the operating features are functional, but not necessarily in the final configuration that they will always be in. For instance, the guns initially fired blackpowder charges that are visually impressive, but required the model to return to the dock for reloading after every firing. That system was replaced with one that uses low pressure compressed gas to atomize a puff of talcum powder and sounds off with a sound chip that produces a very convincing “boom” with a slight echo. This enables one to “fire” up to 30 shots on a single CO2 cartridge. Likewise, the “burning rope” smoke system was “enhanced” by adding a controllable blower to increase its output at will.

We have also devised a number of details for display, some of which removable and some that are visible when models are underway. Crew figures on the turret top (they stay put), Dahlgren 12 pound boat howitzers with crews on both ships, and a military band (with recorded music) on the foredeck of the Saugus all contribute to “animating” the appearance of the models when they are in the water or on the display.

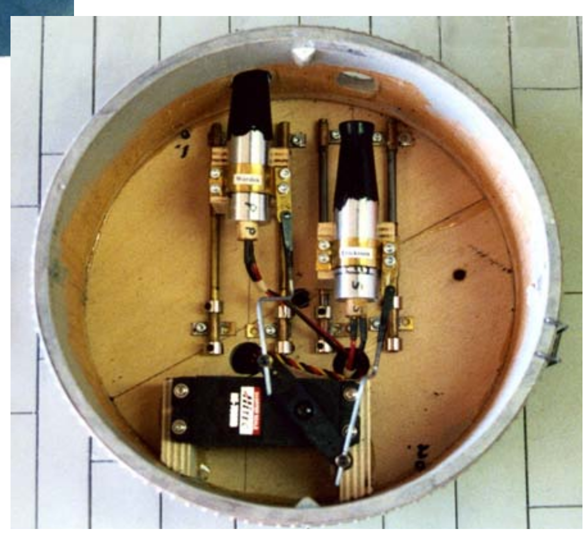
We exhibited them at local model events in the intervening time before the museum opening. This helped to work out all the “bugs” by the time the date of the event rolled around.

The “Old Navy” authors Steve Lund and William Hathaway with their Super Monitors.





The turret revolving mechanism is a module made removable for servicing.



10 Conclusion

S. Lund

First of all, let me state that what follows is only the conclusion of this book. It is hardly the conclusion of this activity for us and the friends we “drawn into” the project along the way. A better title for this chapter would be; “After all that, what next?”

As I stated earlier, it has continued to amaze us just how much material on Civil War ships is available. As a result, the original concept of limiting ourselves to 1/72 scale ironclads has gradually slipped away. Witness the 1/32 scale Monitors and the (non-ironclad) tug Set Lowe being added to the “fleet” most recently.

In 1/72 scale, some of the ships are pretty impressive. To that end, Bill and I have entered into the most advanced stages of planning to build the Kearsage and the Alabama. The models will both come out a little under four feet in length, counting the bowsprit and the spanker boom. Standing about 22 inches from keel to mast top, they should be pretty imposing in the water or on the display stand.

Future other candidates fro 1/72 scales being kicked around by ourselves and other members of the “Old Navy” include the Atlanta, Tennessee, Fredricksburg, Manassas, Cairo, Passaic, Keokuck, Chickasaw, and the Tyler.

In addition to building the new ships, improvements and innovations that have evolved as we have been building and inventing, have resulted in the necessity to go back and “refit” a number of models in the fleet. The improvements brought about by powering the whole ship form a single rechargeable battery could be fitted to two or more of my vessels. Likewise, the Dumas Monitor and the Galena could benefit from the space saving that “servo motor” propulsion has to offer.

As well as internal improvements, external “embellishments” are also in order. Fro instance, both the Passiac and Canonicus Monitors “grew” substantial hurricane decks, railings, and funnels, aft of their turrets in their post war service. That might add a lot of texture and character to their decks.

I addition, tow Canonicus Monitors were sold to Peru and outfitted with sails and bulkwards for their voyage around Cape Horn to their new owners. I’d be interested to see how my Canonicus would look and handle when so configured. I’d also be interested to see the reaction some of the other boaters when I show up with everything at the local “sailboat only” model pond.

So, as I stated in the beginning; “there is lots of fun to be had here.” And so it continues...........

Appendix A

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They can be reached at: 7527 Gilbert Rd., Bergen, NY 14416, (585)494-0027(Tel) (585)494-1369(Fax), or on the web at LoyalhannaDockyard.com

Thoroughbred Figures, 4106 Timberland Dr., Portsmouth, VA 23703,(757)686-1048. Web Site: www.Thoroughbredmodels.com. Offers a comprehensive line of high quality pewter wargaming (1/600 scale and N scale) miniatures of most of the ironclads. Useful information in the directions as well as a great chance to see what the ship will look like when completed.