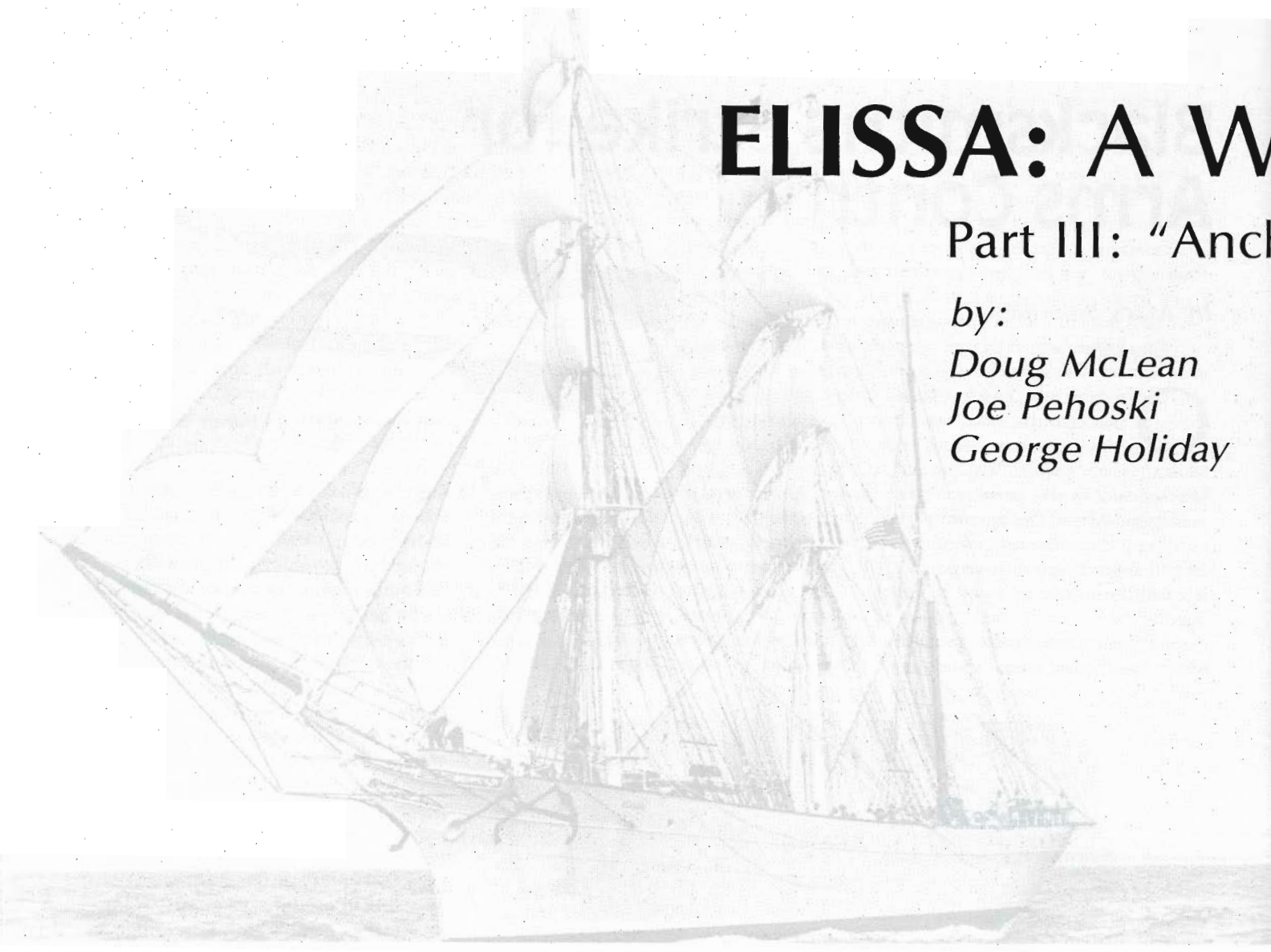


ELISSA: A W

Part III: "Anch

by:
Doug McLean
Joe Pehoski
George Holiday

In October of 1980, the first blacksmith shop was set up at the site of the Elissa restoration. The shop was equipped with a Centaur fire pot in the top of an empty 50 gal. oil drum; an electric Buffalo blower from a ceramics kiln; an unlimited supply of high grade coal from McDonough Iron Work—left over from the 1940's; a well-used 350 lb. anvil on a tree stump; a loaned 6" leg vise; a 4' × 6' steel table; tongs (2 pair); vise grips (often used as tongs) and a 7" angle grinder. Everyone—carpenters, riggers, caulkers, painters, finishers, etc.,—was working under the same conditions and making do with the equipment provided. Fortunately, this situation improved as funds became available. Working in a field filled with red ants, steel spars, wire rope, construction trailers, wooden spars, wood working equipment, and alot of what appeared to be junk, made the sight look like a shanty town. Spirits were nonetheless high and the work progressed steadily.

During this time, a major fund-raising effort was in progress to raise the over 2 million dollars to reach our goal of completion by July 1982. A promotional event for 2000 people was set up to coincide with the stepping (installing) of the first mast on the ship. This marked the first visibly significant change in Elissa, her rig. The event proved to be very successful and funds soon accumulated which provided all the departments with desperately needed equipment and manpower.

Most of the first jobs for the shop were simple, such as forging 3" diam. steel rings using ¾" stock and making U-clips from ½" × 2". Our first major job was forging the dead eye straps. These are steel strapped around a wooden dead eye composed of lignum vitae block (the hardest known wood) which has been turned and drilled. The straps are then bolted to the top ring of the chain plates. This job was the first job that involved major production and the true abilities of the shop were established. Joe Pehoski came down from Salado for a few days and helped get the system for fabrication set up. We made several test runs of the bend to the diameter jig that we had

ROUGHT IRON BARQUE

ors Aweigh!"

constructed and found two heats to be optimum for the 20" to 27" straps. Because a 10" to 15" heat was difficult to achieve with the fire pot we were using, Joe suggested a new forge which would produce longer heats and this was later constructed. It was also suggested that we send the straps out to be flame cut to shape before we forged them, which proved to be a great time saver.

The straps varied in length to fit the 4", 6" and 7" diameter dead eyes. In order to bend the straps to the diameter required and have the flared drilled tabs fall in parallel, we first had to bend the tabs to a determined angle. We found that the strap diameters were not constant and circumferences varied ± ½". To compensate, we altered the point where the bends on the tabs were located. This required that each of the 72 straps be stamped for identification with its corresponding dead eye. Once this process was perfected, the job ran smoothly and was completed to the satisfaction of all concerned, giving the green light for all the work that we could feasibly handle.

The next phase of the work that was required was the rivetting, beginning with the connection of the top edge of the hull to the bulwarks (the steel plating and rails above the deck line). This job required that over 800 rivets be driven. Because the ship was in the water it was first necessary to construct hanging movable staging that would support the weight of the rivet man and a helper. We were able to acquire an old coal rivet forge from a donor, which we used in the first phase of the riveting operation. Later in the project the coal forge was replaced with a propane & oxygen furnace which proved to be much more efficient. Next we acquired three well-used pneumatic rivet guns. Authenticity required that the new rivets be peened in the same fashion as the originals; therefore it was necessary to have a number of our own dyes machined, more than one of which was accidentally shot out of the gun and into the bay.

The crew required for riveting ranged from three to four, depending upon the location of the rivets on the ship. One person manned the gun on the staging outboard and one manned the blocks and backing bar while another ran the forge, passed the rivet to the hole and helped back the rivet. All of this was going on with as many as 35 other workers on board who were having to listen to the intense noise of the rivet gun against the hull. The call of "hot rivet" was not too well received after a short time, but we carried on.

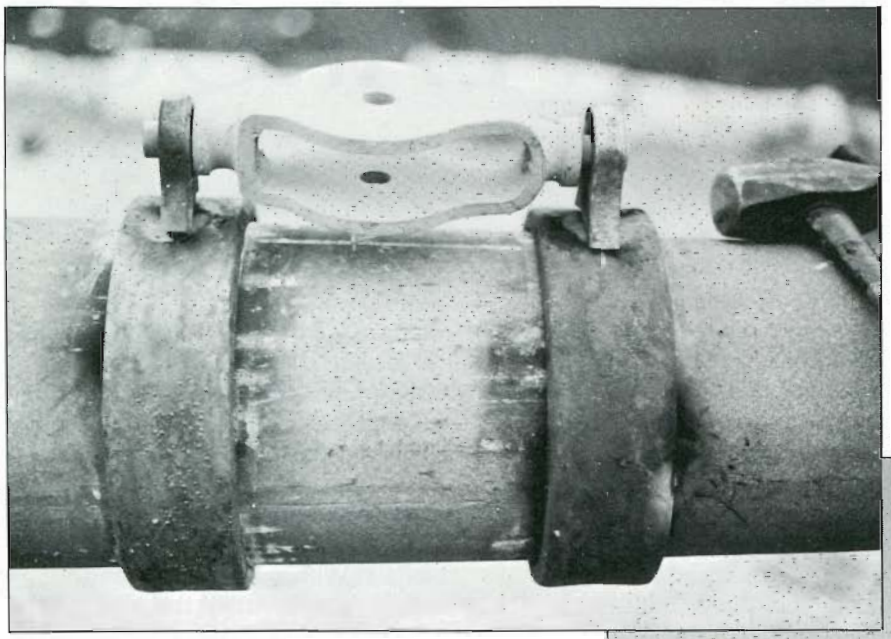
As the bulwarks riveting continued, it was necessary to align the chain plates that Joe had constructed with the original rivet holes in the hull, as well as punch and drill the chainplate pads in preparation for the 1" rivet. The holes were drilled and reamed to approximately $1\frac{1}{16}$" to allow for the expanded diameter of the rivet when hot. Once drilled and carefully shimmed to match the bends in the original hull, the chainplates were riveted to the hull, thus creating the anchoring device for the massive rigging to follow. With the bulwarks and chainplates installed the next phase was to prepare the masts. Each mast actually consists of three spars (called "cousins") that lap over each other to achieve the total height of approximately 103 feet. For this assembly, mast fittings (many of which were cast) had previously been fabricated by other companies.

In December of 1981 the Elissa, with lower masts installed, was towed down the channel to Pier 22, her permanent berth. The new site proved to be much better in many respects and soon after the move a new blacksmith shop was constructed.

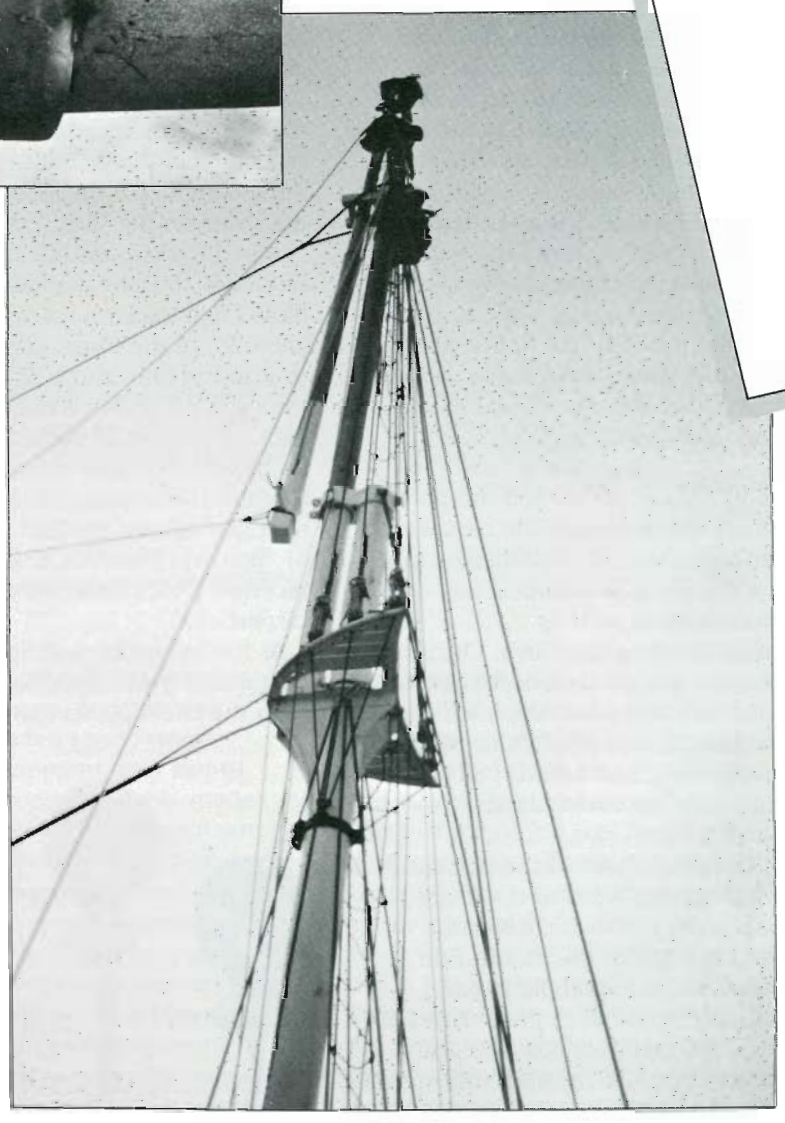
The first job in the new shop was working on the yard hardware. The yards (horizontal spars, 5 for each forward mast) required many fittings both for structural attachment and for the physical operation of the sails and their gear. Joe's shop dealt with most of the lower yard and attachment hardware — the heavier items. The shop at the site was responsible for all of the yard-arm hardware — bands, pivot blocks, fairleads, inner yard-arm bands, to name a few.

The yard-arms themselves are made of Douglas fir, cut and turned in Oregon, with a gradually tapering diameter from center line to the ends. Once we received these spars our carpenters shaved

Dead eyes and dead eye straps.



Outer yard arm bands and pivot block assembly for lower yard arm.

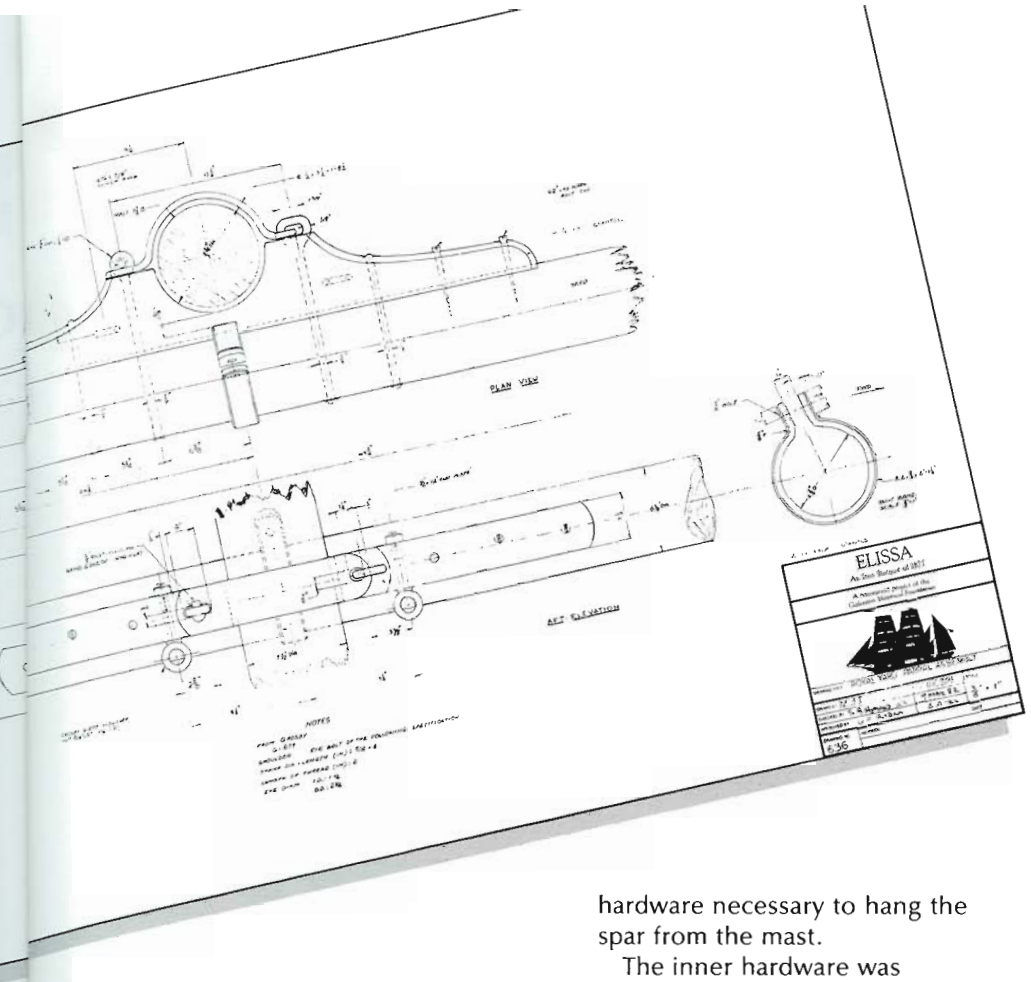


Stepping of the tagalant royal mast.

and planed the spars to the finished diameters required. We then determined the actual location of the band on the spar and measured the diameter at that point. Very often the two ends would vary slightly in diameter. The jig for making the bend would always be made to fit the larger diameter and once the band was forged to the jig it was hammered cold to reduce it to its proper dimension.

Because of the size of the material (⅝"-¾" × 3"-4"), all of these forgings were first forged to a ring; then pre-cut and drilled tabs were arc welded to the rings to create the clamp band. For a properly fitted clamp band the steel should bind on a spot 6"-10" below the desired mark. Then the band is driven onto the mark with some compression (1/16"-⅛") and is clamped with the bolt — if it fits well it compresses the wood ⅛"+, enough to seat. The tabs, when clamped, should line up parallel with a tolerance of 1/16". Most of these bands then had hardware attachments (rings, etc.) that were full-penetration welded, ground and filed to cover the construction method. This additional welding also caused distortion of the band, so further fitting was always necessary.

Besides the clamp bands, there was also a number of cut solid bands which involved a more careful fit. First the band was formed to the diameter needed, then driven to the desired mark just shy of the actual mark. The driving on of the band expanded



the opening as the taper of the spar inversed. Once at the desired location, shims were tack welded in the space to maintain that diameter. The band was then removed and the gap filled with a filler piece and welded. For the final fit of the closed band, it was heated enough to expand its diameter. The bands were then quickly driven onto the mark (so as not to burn too much wood) and quenched. The quenching quickly contracted the ring, seating the band on the spar.

The project was now coming around to the final stretch. In seven months the ship had to be complete for her re-dedication in July. With the deadline fast approaching, the pressure was on. From that point on the work was all upward, producing all the fittings for the upper yard arms. As the spars were finished they were moved to the outside of the shop for the bands and hardware placement. The last set of spars to be worked on were the royal yards (the highest). These spars required the outer arm bands as well as the hardware necessary to hang the spar from the mast.

The inner hardware was constructed to act as a gate — when open the yard could be taken off the mast or put on the mast. The inside diameter of the fitting was larger than the diameter of the mast. Due to the fact that this yard, like the two below it, is a hoisting yard — when the sails are not set the yards are in their lowered position with the sails furled and tied to the yard. When the command to set sails is given, all hands must go aloft and loose the sail on the yard; then with all hands on deck, the upper three yards are manually raised by lines from the deck (requiring 6-8 men).

The shop began producing fittings rapidly, trying to keep up with the carpenters and riggers. Everyone had to hold up their end or the schedule would be set back accordingly — and there was no time for set backs. The confidence that the administration had in the abilities of the shop increased considerably. The technical blueprints that were once required before a job could start had evolved into quick sketches on a scrap piece of paper with estimated dimensions. The shop was doing additional small jobs not anticipated, such as forging caulking irons for the caulkers and forging and tempering tools for the carpenters.

An incredible sense of pride developed in all of us. Our jobs, we knew, would end on the Fourth of July with the christening of the ship. Finishing the remaining fittings, tools, etc., continued until a week before the christening when we were asked to tear down the blacksmith shop to make way for the completion of the site. It was a difficult task but it was the inspiration I needed to open my own shop and business in Galveston.

With the job ending, the feeling was not one of bitterness about losing a job, but one of sadness that the end of such a process was at hand. Although the work and the personalities involved were not always wonderful, what had been going on for two years was quite remarkable. It was the opportunity of a lifetime to join some of the finest craftsmen in the country and meet the challenge of restoring a once beautiful ship like the Elissa to her original condition. That dream was finally realized on July Fourth, 1982, with the second christening of Elissa. Breaking the bottle of Champagne on the iron hull was the culmination of many dreams.

The subsequent sea-trial in September of 1982 was the crowning glory. To actually sail the vessel with only the Gulf breeze for propulsion, to see this technology and all the efforts finally at work, was breathtaking. If all goes according to plan, the Elissa will begin her first ocean voyage to New York City for the Tall Ship Parade at the re-dedication of the Statue of Liberty.

Soon to come on the Public Broadcasting System is a documentary film on the Elissa and her rebirth.