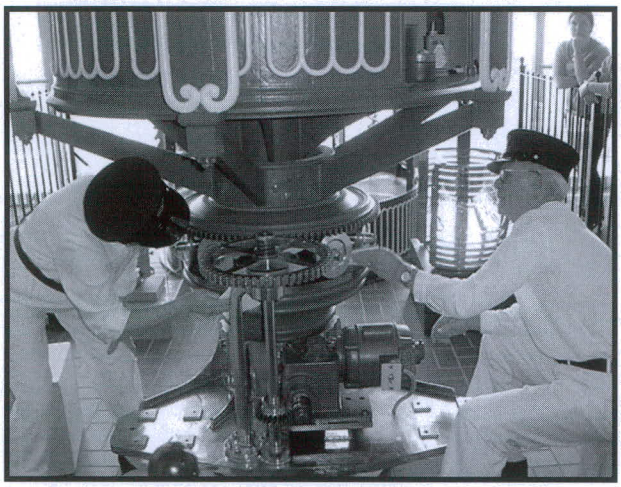
Reprinted from the U.S. Lighthouse Society's The Keeper's Log – Fall 2004 <www.USLHS.org>

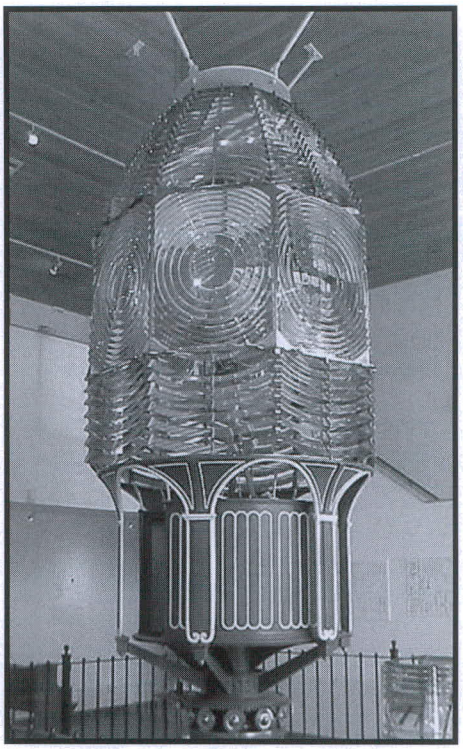
Fresnel Lens Restorations At The Ponce De Leon Inlet Light Station

By Ed Gunn & Ellen Henry



Left – Volunteer interpreters portray the 1931 keepers of the Cape Canaveral Light Station as they demonstrate the lens maintenance routine.

Right – The completely restored, Cape Canaveral Light Station's 1st order lens on display in the Lens Exhibit Building at Ponce Inlet Light Station.



The Lens from Cape Canaveral

Our entry into the Fresnel lens restoration business came about as a result of the foresight of our executive director, Ann Caneer. In the early 1990s, Ann learned that the rotating first order lens at Cape Canaveral had been so damaged by vibrations from nearby rocket launches that it was soon to be removed from its tower. The Ponce de Leon Inlet Light Station's Board of Trustees agreed to make an offer to take the lens, restore it for display, and to build a lens exhibit building to house this important artifact.

In 1993, the Canaveral lens arrived here and we embarked on what would turn out to be a series of Fresnel lens restorations and a major new area of expertise for our staff.

As it turned out, the Canaveral lens restoration was the perfect introduction for us. The lens was still in its tower, and prior to removal, each piece could be identified and recorded, giving us all the information needed to take the lens apart and reassemble it after the conservation and restoration procedures. Since this lens would be restored for display only, these procedures could be a little less complex than those demanded by a restoration to optically correct function.

One of the biggest concerns in a Fresnel lens restoration is the replacement of missing glass. The Canaveral lens was missing several bullseyes and some dioptric prisms. Acrylic was used in some areas because of the difficulty and expense of replacing the missing prisms with optically correct glass. The Corning factory had tried making replacement glass for this lens and found that a single prism could cost as much as $5,000!

Another issue to be confronted in lens restoration is how to deal with the corroded metal parts of the lens assembly. For the Canaveral lens we chose a painstaking and gentle hand polishing procedure that took thousands of hours to accomplish.

The restoration of this lens was completed in 1995, and it was installed in the newly completed lens exhibit building where it remains today on long-term loan. This lens rotates via a restored motor and carriage wheel assembly that requires weekly maintenance. This maintenance is regularly performed by our staff with the exception of occasional Saturday mornings when volunteer, costumed re-enactors appear as the old-time lighthouse keepers for a performance of "A Day at the Canaveral Light in 1931."

Ponce Inlet's Original Lens Returns Home

Plans for our next restoration got underway as the Canaveral lens was nearing completion. Our original fixed first order lens, built by Barbier and Fenestre in 1867, had been returned to us from the Mystic Seaport Museum where it had lain in storage since the late 1940s. This was certainly one of the most relevant artifacts to the light station, and we wanted to restore it for display. No one really knew what parts we had and what parts were missing, and everything about this restoration was a surprise.

Our first task, which took months, was to catalog every part and try to determine what we would need to replace. All in all, we would need to restore 17 prisms, the iron frame or armature that the bronze panels fit in, and the iron cabinet or base of the lens along with the steps that led to the lamp. It took a full two months to measure and dry fit all the prisms to find out where they went in the panels.

Since we had already completed one lens, we had an idea of how to assemble the frames. We also had photographs of a similar lens which was on display in the Oyster Museum at Assateague, Virginia. Staff members visited this museum and took numerous mea-

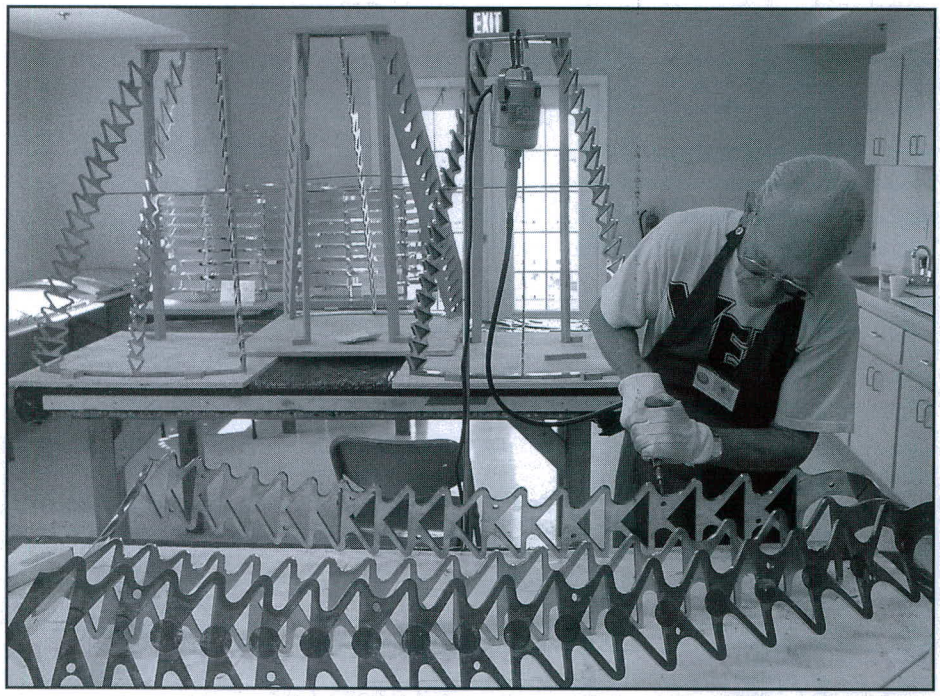
Reprinted from the U.S. Lighthouse Society's The Keeper's Log – Fall 2004 <www.USLHS.org>

surements of the lens components. A new iron frame for the lens panels had to be fabricated from the Assateague measurements. What this eventually taught us was that no two lenses are alike. Even though they were "manufactured," each lens is a truly unique artifact. The lens team made many careful alterations to newly made parts in order to get everything to fit correctly. New hardware had to be machined to replace whatever was missing, and many adjustments had to be made. The lens frame was assembled and the panels, without glass, were clamped into place. We had to adjust the diameter of the frame and relocate fastening points, fill holes and relocate them. Our lens, even though it appeared to be identical, was just a little larger than the one at the Oyster Museum! After dry fitting the panels, the frame received its final adjustments and was attached to the cabinet base.

As this was being done, part of the restoration team was at work on cataloging the prisms and recording the damage to each. And, a search for a new source of glass for the seventeen missing prisms began. That search led us all the way to the Czech Republic where we were able to locate a factory that could cast and polish Crown glass prisms. The patterns for these prisms were made here from measurements of originals and from Light House Service archival drawings. It took nearly a year to get this glass, and when it arrived, more machining was required to get the pieces to fit.

The first order lens has three silvered reflector panels at the back of the lens. The copper backing for these had been painted at some point, and we had to remove this paint to restore the lens to its original condition. A conservator was hired, metallurgy tests were done, and a plan for the safe removal of the paint was devised. Many weeks went into the painstaking removal of this paint. We also tested various products and techniques for corrosion removal on the silvered side of the reflectors, and this process was also carefully applied.

Corrosion on the bronze panels of the Canaveral lens had been carefully removed in thousands of hours of hand polishing. We spent many hours debating about the removal of corrosion. Should we let it remain and risk further damage to the metal? Should we hand polish and risk removing tiny amounts of the original surface? Or, should we use a chemical process if a safe one could be found? After a time of testing and investigation, we determined that



Above – A lens restoration team member works on the prism panel frames of the old 1st order Ponce Inlet lens.

Right – Several members help raise the Ponce Inlet 1st order lens armature.

Below – Ponce Inlet volunteers inserting prisms into the frame of the 1st order lens.





Reprinted from the U.S. Lighthouse Society's The Keeper's Log – Fall 2004 <www.USLHS.org>

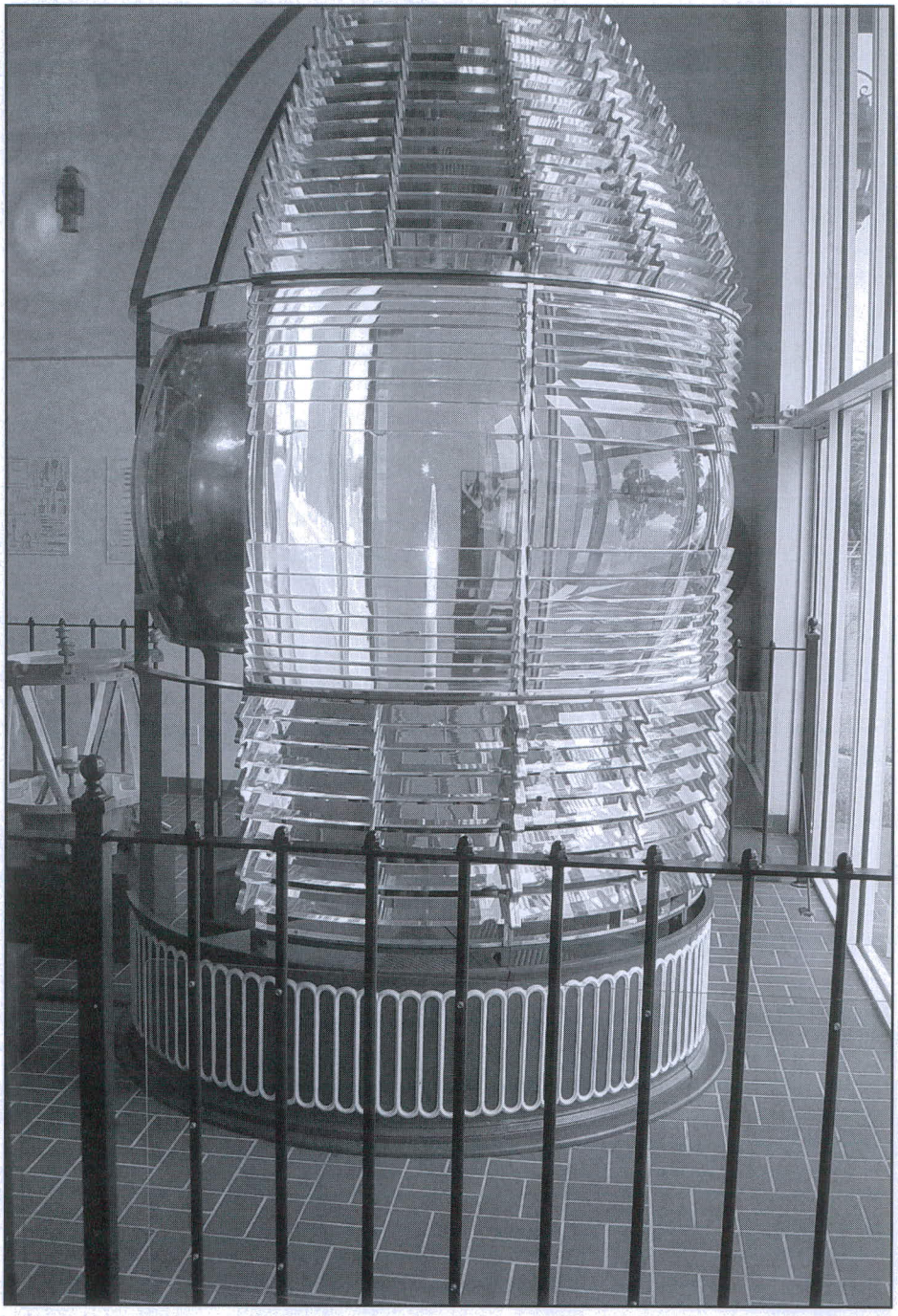
we would choose a chemical process for the Ponce first order lens that was much less invasive than hand polishing. Heavy, active corrosion existed in many frame joints on this lens, and the chemical process we chose safely and quickly removed this and stabilized the corroded joints. This procedure was fast compared to hand polishing, but it was complex, with a precise timing of the chemical baths, a constant monitoring of Ph levels, a light brushing to clean the surfaces, and a neutralizing bath to follow.

When the time for final assembly of this artifact came, and we began by building a wooden base to level and cushion the newly manufactured cabinet. The cabinet and iron frames had been primed and painted with a special paint that was developed to match the original "Light House Service green." The frame was put together and bolted to the cabinet, and the prisms were mounted. Each prism was held in by means of small wedges that were glazed into place. Since this lens would be for display only, it was not necessary to actually aim each prism. The glazing had to cure and then was painted with a special coating to extend the life of this compound, and we were fortunate to have some special consultations with the glazing compound's manufacturer on this subject.

The lower catadioptrics were mounted first. We then built scaffolding to gain access to the upper catadioptrics and to protect the lower lenses as we worked. After the uppers were mounted, the scaffolds were removed and the dioptrics and reflectors were mounted. As everything was tightened down, stresses on the prisms and frames were carefully monitored. This restored lens is also on display in our Lens Exhibition Building and makes an excellent visual comparison with the Canaveral rotating first order lens.

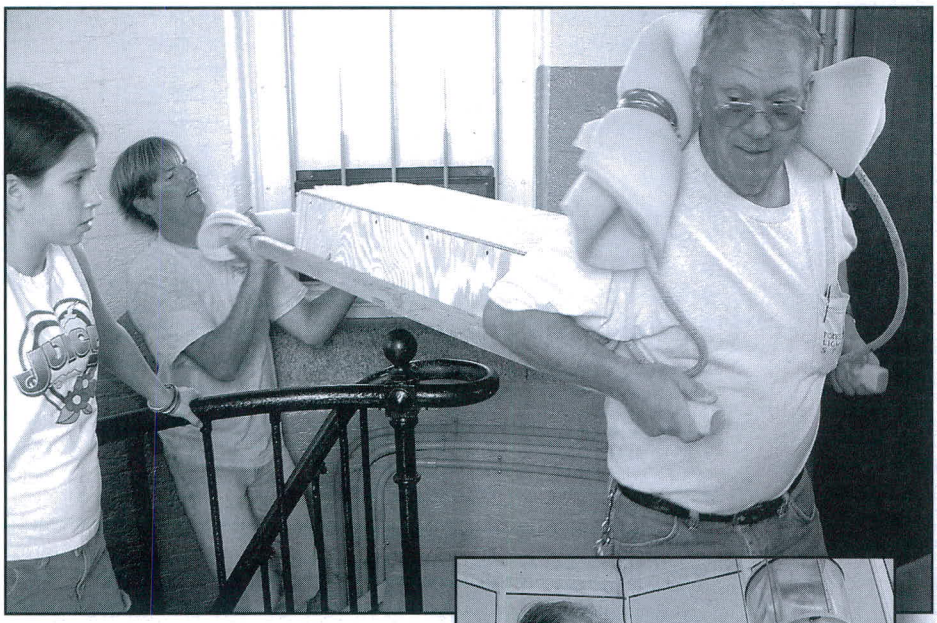
We Restore the "Second" Lens that Served Ponce Inlet

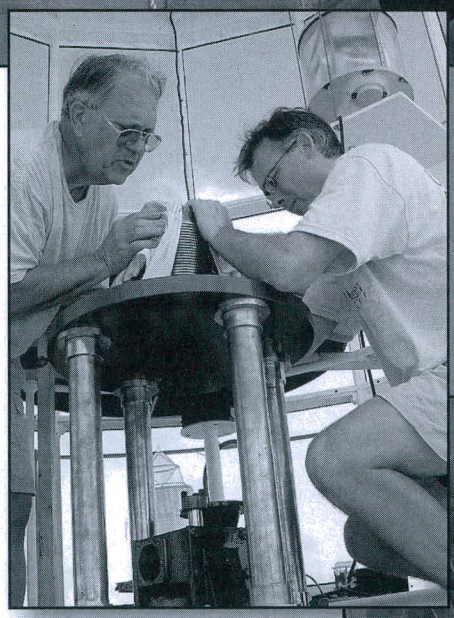
Our latest restoration is perhaps the most exciting for us, since we have taken our second "original" lens and put it back in the tower as an optically correct and functioning lens. In 1933, the Light House Service decided to change our characteristic, and plans were made to install a rotating third order lens in the tower. The light at Sapelo Island, Georgia, was being discontinued, and their Barbier, Benard and Turenne third order lens was sent to Ponce Inlet.



The fixed 1st order Ponce Inlet lens on display in the lens building at Ponce De Leon Inlet Light Station. All photos in this article courtesy of the Ponce Inlet Light Station.

Reprinted from the U.S. Lighthouse Society's The Keeper's Log – Fall 2004 <www.USLHS.org>





In 1970, the Coast Guard decommissioned the Ponce Inlet tower in favor of a skeletal tower on the opposite side of the inlet. The third order lens was removed from the lighthouse and eventually sent to the Coast Guard Academy Museum. In 1973 this lens was returned to Ponce Inlet for display at the Light Station which by then had been acquired by the Town of Ponce Inlet. In 1982, condominium construction blocked the light on the south side of Ponce Inlet, and the Coast Guard asked that the light be reestablished in the original tower. A modern beacon was installed, but it had been everyone's dream to restore the third order lens to function.

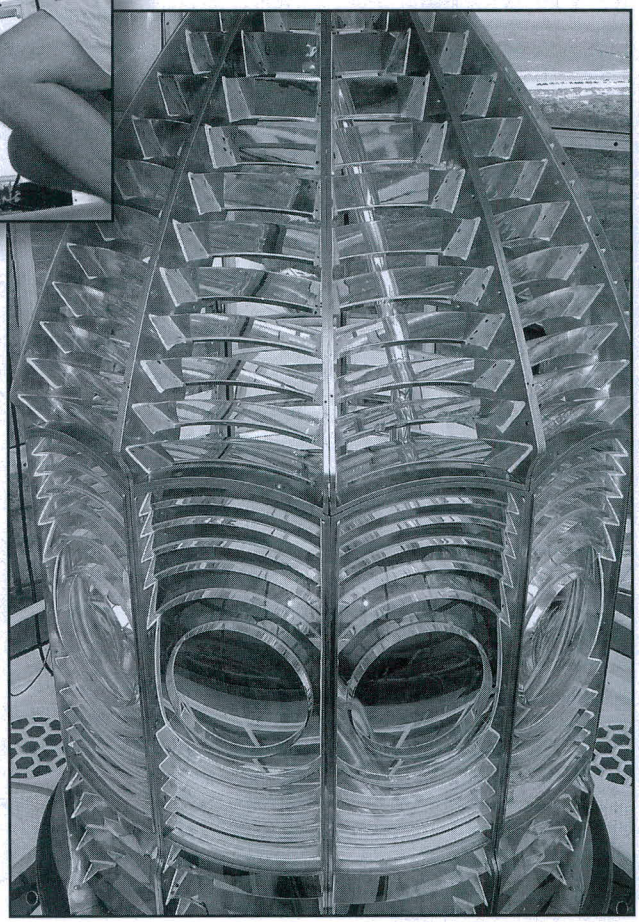
The restoration of the third order, rotating lens to optically correct function took over two years. We faced many of the same problems we had in the past including the location of a good source of glass. We needed to replace 54 optically correct prisms, and we would have to devise a method for accurately aiming them.

The third order lens also required the complete restoration of the rotational mechanism, replacement of the motor and transmission, plus the design and manufacture of two missing doors. A refurbished lamp changer was installed, and the stalk that holds this had to be reproduced and mounted to the spider in our lantern room.

Our third order lens has six bullseye flash panels in the front, with reflector panels and two doors with reflectors in the back. This meant that the front of the lens was heavier than the back, and in order to have a balanced rotation we had to devise a system of weights that would fit on the rear of the lens. This required nearly 300 pounds of compensating weights that were too heavy to attach to the lens panels. Instead, we designed brass housings filled with lead that would fit on the platter beneath the lens.

This restoration also included the task of hand-carrying the lens up to the lantern room of the tower. Our tower is the second tallest in the country, with 213 steps to the top of what is essentially a 17-storey building. [Ed. Actually, the Ponce Inlet tower is the seventh tallest lighthouse in the country.] The staff devised some clever wooden cradles to carry the valuable panels, but nobody has fond memories of carrying the sections of the lens, the motor, and those 300 pounds of compensating weights! Throwing the switch on this lens was not only a proud and historical moment; it was also a relief and the completion of our most intense lens restoration to date.

With the construction of our Fresnel lens restoration facility and the years of experience our staff has acquired, a whole new direction for our museum has opened. We now offer lens restoration services to other institutions. To find out more, visit us online at www.ponceinlet.org.

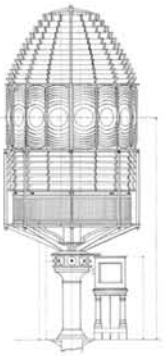


Top – Volunteers carry one panel of the 3rd order lens to the lantern room of the Ponce Inlet tower.

Middle – The rotational device for the Ponce Inlet Lighthouse 3rd order lens being installed in the lantern room.

Right – The restored 3rd order lens in operation in the lantern room of the Ponce Inlet Lighthouse.

Join the U.S. Lighthouse Society Today or Give the Gift of Membership!



Restoration & Preservation



Thomas Point Shoal Lighthouse, MD

The U.S. Lighthouse Society has donated to many lighthouse preservation projects throughout the U.S. Most recently we were honored by being presented with the Preserve America Stewardship Award from The White House for our restoration work at Thomas Point Shoal Lighthouse.

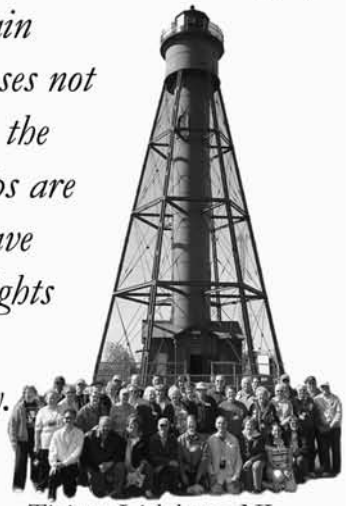
Help Support Our Important Mission!

Education



The Keeper's Log *magazine is the only one of it's kind and has been published quarterly since 1984. Receive this award-winning publication as a benefit of membership.*

The Society organizes domestic and international lighthouse tours. Many of our excursions gain access to lighthouses not normally open to the public. These trips are a great way to have fun, see lots of lights and learn about lighthouse history.



Tinicum Lighthouse, NJ

To learn more visit

www.uslhs.org

or

call Headquarters at

415-362-7255