Figure 1. Instrument following structural integration and stabilization.

The Research and Treatment of a Late 18th-Century Lyre Guitar: A Collaborative Effort

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Abstract: An eighteenth-century French lyre guitar (a variant of the familiar European guitar) was examined and treated during 1995–96. Visual and technical analysis revealed that extensive adhesive and material failure had occurred overall, leading to severe deformation of the wooden plates comprising the instrument, and the loss of decorative as well as structural elements. The treatment of the instrument relied on a careful balance of conservation and crafts techniques and this paper focuses on details of these techniques. The treatment was informed by the multidisciplinary approach inherent in objects conservation, which is ideally suited to the composite (and functional) nature of musical instruments.

The subject of this paper is a lyre guitar, an unusual and obsolete musical instrument. The guitar is part of a private collection in Delaware. The circumstances surrounding the acquisition, use, or even storage of this instrument are unknown prior to 1989.

The instrument was made in Paris, probably between 1790 and 1815. The nameplate identifies the maker as N. Mareschal, a builder of pianos, guitars and other stringed instruments. He was active from the late 1770s through the first decades of the nineteenth century. The main structural materials used are: a softwood, visually identified as spruce, for the top, and Brazilian rosewood for the sides and back. Both of these materials are very typical of guitar construction at the time. For the decorative elements, Mareschal used gold in the ormolu crossbar (or yoke), ebony in the surface decoration, ivory in the banding (or purfling), and shell in the top inlay. The result is a richly ornamented and quite attractive object. *(fig. 1)*

The lyre guitar was a fashionable adjunct to the taste for neoclassical design that swept Europe during the late eighteenth and early nineteenth centuries. These guitars achieved a brief but lively popularity, particularly in France, between the years 1770 and 1840. The design married the "U" form of the ancient Greek *kithara* to the hollow soundbox and fretted neck of the contemporary European guitar.

Called "furniture instruments" because, when not in use, they were meant to be displayed as reminders, in form, of the ancient past, lyre guitars are also referred to as "ladies' instruments," indicating perhaps not so much the gender of the players as their amateur status.

A great number of these instruments were produced, but professional musicians and critics of the period were generally disdainful of the type. Not only were they difficult to play because of the unusual shape, but the tone was muffled and dull when compared to that of a normal guitar. In 1801, an unidentified writer for the *Musical Times of Germany*, in an article entitled "A Few Words on the New French Lyre" summed up most professional reaction when he stated, "I can truly say that this lyre guitar is barely fit for strumming second-rate accompaniments."

Prior to the 1770s, and the advent of the lyre guitar, the European guitar was strung with ten strings arranged and played in pairs, called courses. The double strings increased the volume produced by the small soundboxes of the instruments. Gradually, during the last quarter of the eighteenth century, builders dropped the five courses in favor of five, and later, with the addition of a bass 'E,' six individual strings. In his book, *The Classic Image: European History and Manufacture of the Lyre Guitar*, Stephen Bonner makes the assertion, based on period publications, that the greatest single influence on guitar makers to incorporate a single bass string in their designs was competition from the lyre guitar, which had always used six strings. If this is the case, then we can look to the designer of the lyre guitar as an early influence on the development of the modern six-stringed guitar.

Around 1785, a pamphlet was published in Paris entitled “Announcement to Musicians and Amateurs of the New Lyre Guitar Invented by Mareschal, Luthier of Paris.” In this pamphlet N. Mareschal, as the title states, is credited with the invention of the lyre guitar. Mareschal is an enigmatic figure in the world of musical instrument builders. There are very few of his instruments extant. In fact, when Bonner published *The Classic Image* in 1972, he knew of only two existing guitars by Mareschal, one in the City Museum of Helsingborg, Sweden, and one in the collection of the Royal Conservatory of Music in Brussels. The instrument that is the subject of this paper is a previously unknown third Mareschal.

In sum, lyre guitars are generally of interest in the history of musical instruments because of the possible influence they had on the form of the modern guitar. And this particular lyre guitar is of interest because it is a new addition to the remaining body of work from the possible originator of the type.

In 1989, this Mareschal guitar was discovered in Delaware stored in an unused office standing on a window seat above a radiator. The object had been stored in this location, in an uncontrolled climate, for an unknown length of time. As a result of the severe conditions of its storage (widely fluctuating temperature and relative humidity), the condition of the instrument was generally very poor and extremely unstable. The following is a summary of the damage to the instrument:

Many, in fact most of the glue joints had failed, notably the side-to-base joint and the neck-to-body joint. The top wood had shrunk across its width causing splits to open at the thinnest points, namely the rabbets for the edge binding. Dimensional change in the substrate had caused pieces of veneer at the headstock, neck, and top inlays, as well as applied decoration to come loose. The same problem had resulted in the loss of approximately 10% of the shell and ivory edge decoration. There were numerous open cracks in the thin wood on all sides of the soundbox. The back was particularly distorted. *(fig. 2)* Both soundholes would have originally contained pierced ornaments called roses. The Mareschal instrument had lost both of these soundhole roses. They had been replaced by rosewood discs in a previous attempt at repair. Not only were these discs aesthetically jarring, but they were acoustically incorrect as they defeat the purpose of the soundholes which is to allow sound waves to be freely transmitted from the interior to the exterior of the instrument. Finally, the metal elements of the instrument had also suffered from extreme environmental conditions. One of the ormolu eagle head decorations was detached, but still intact. And under magnification, green copper alloy corrosion products were clearly visible beneath the gold overlay in the ormolu yoke.

The owners of the instrument were interested in a treatment that would prevent any further deterioration as well as restore the object to an aesthetic

Figure 2. Back before treatment. Note failed neck and side joints, and split in back plate.

state that would allow exhibition. A three-phase treatment was proposed and accepted. The phases were:

One: Structural Reintegration and Stabilization
This phase consisted of: partially disassembling the instrument, reconforming the wooden elements, repairing cracks, and reassembling the instrument so that it is stable and capable of withstanding proper storage and/or exhibition conditions. This phase was concerned solely with conservation, that is, the stabilization of the object.

Two: Aesthetic Integration of the Front
Because the owners of the instrument would like to display it in their collection, it was decided that the first concern for improvement of the appearance of the guitar should be the front. This treatment involved: cleaning of the top by mechanical means, chemical cleaning of the ormolu yoke (with a 5% solution of formic acid), and replacement of loose or missing decorative elements (including the soundhole roses).

Three: Overall Aesthetic Integration
This final phase involved not only cleaning of the sides and back by mechanical means, but also such details as: fabricating matching sets of bridge pins and tuning pegs, and locating a suitable set of strings to give the instrument a completed appearance.

Treatment of the object was begun in the objects laboratory of Winterthur Museum in February of 1996, and completed the following June. Since this was a long and complicated treatment, it is not possible here to go into great detail regarding all aspects of the work. With this in mind, I will detail the steps involved in the first phase of treatment, that is, structural reintegration, and end with a summary of the aesthetic work that followed.

Removal of the Back
Although daunting, this initial step was essential for the successful completion of the treatment. Following consultation with Stewart Pollens, conservator of musical instruments at the Metropolitan Museum of Art, and Scott Odell, formerly Head of Conservation at the National Museum of American History, the following procedure was decided upon:

Reagent grade alcohol was injected into the already open areas of the back-to-side joint, and gentle prying pressure was applied with a microspatula. The alcohol fully dehydrated and crystallized the remaining hide glue, and the pressure allowed the joint to separate. This procedure was successful, and the back was removed with virtually no damage to existing material. This procedure could only be attempted because there was no finish on the instrument, and the use of alcohol was therefore not problematic.

Once the instrument was open, the interior was cleaned by brushing dust into a screened vacuum cleaner hose.

Reconformation of the Backplate
With the back removed, the process of reconforming the plate could begin. Many stringed instruments have arched back and/or top plates to add strength to the soundbox. In the case of this guitar, the back was arched approximately 0.4 cm over 35 cm. The backplate itself had not only lost this arching, but had, segmentally, detached from the remaining back brace and "curled" backwards in the opposite direction.

The process used to reconform the back to this arch was gentle humidification of one side of the wood by use of a blotter dampened with deionized water and separated from contact with the wood by a sheet of thin Goretex. This was followed by a period of slow drying. The procedure was performed in much the same way as a paper conservator would approach flattening a page or print. The Goretex allowed vapor phase water to pass to the wood, thus humidifying the material without actually wetting it. Once the back plate had been cycled through three overnight humidification/drying phases, it was relatively flexible and generally planer. At this point, it was placed, under pressure, in a curved form that had been built using the radius of the existing curved back brace as a model. The back was left to dry in the form, wrapped in polyethylene, overnight. *(fig. 3)*

This entire procedure was repeated several times over the course of a week, at the end of which the back was well arched, and stable in that shape. The open cracks were glued closed using hot hide glue, the loose original brace was reattached, and a new

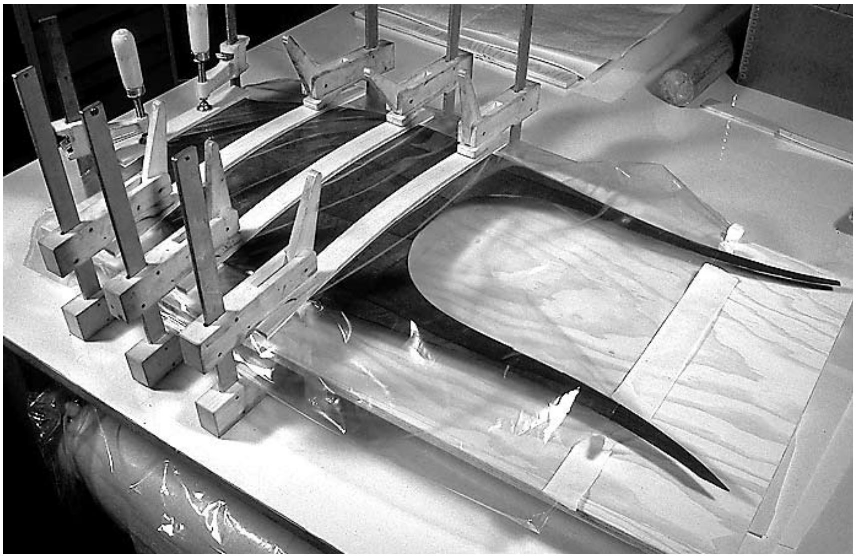

Figure 3. Back plate in clamping form.

brace was fabricated to replace a missing second one. The new brace was made of spruce, as was the existing one, and shaped generally like the existing brace with the exception that the end scallops were more pronounced, as they would be in a modern guitar, than those on the eighteenth- century brace. This was done in order to differentiate the two braces and avoid future confusion as to which is the original.

Reconformation and Reassembly of the Base-to-Side Joint

The same blotter and Goretex method was used to bring the splayed side back into position against an interior block for gluing. This procedure was repeated four times over a period of a week, allowing the blotter to dry completely each time. At the end of that period, the side could be brought into contact with the interior block with very little clamping pressure. The joint was glued up using hot hide glue.

Reconformation and Reassembly of the Neck-to-Body Joint

Because the original design of this joint relied solely on adhesive and lacked any mechanical joinery, it was predestined to fail. The joint consists of the two sides sandwiched between a small interior block and the heel of the neck. When the adhesive holding the sides to the neck failed, they began to spring back into the soundbox, pushing the block out of the way. As a result, the neck was completely detached from the body, and was held in place primarily by a small nail driven into the core of one side of the yoke in an earlier repair attempt. Removal of the neck was therefore a simple matter.

Again, the blotter and Goretex method was used to ease the sides back into shape for regluing. In this case, however, it was essential that the reconformed sides be very close to a 90° angle to the top. Since the neck was built in the same plane as the top, any deviation from this, such as would occur if the sides and top were not at a right angle, would result in the misalignment of the headstock and yoke assembly. It would not be possible to reassemble the neck under these circumstances.

In order to assure a square neck joint, a block was milled to a right angle and clamped to the work board that the guitar lay on. The sides were then clamped to the block while the top was weighted down to the work board. *(fig. 4)* In this case, the blotter/Goretex/polyethylene sandwich was applied simultaneously to both the interior and exterior of the sides. This resulted in very good conformation after only two humidification cycles and the reglued joint forms an approximate 88° angle to the top.

Closing and Stabilization of the Splits at the Top-to-Side Joints

As mentioned previously, the edge splits occurred due to shrinkage of the top across its width. Since the two lateral top braces were cut longitudinally, they had not shrunk and, as a result, were slightly longer than the top was wide. It was therefore necessary to slightly reduce the length of each brace just beneath each edge split. The gap in the brace could then be closed allowing the split in the top to also close. Once this was accomplished, the splits could be glued. The closed brace gaps also had the effect of reducing the overall length of the brace. A great deal of thought was given to this problem before a final procedure was decided upon. While acknowledging that the outline of the instrument was changed slightly due to the removal of original material, I feel that this step was ultimately necessary in order to stabilize and, yes, “save” the

Figure 4. Neck joint with blotter and Goretex clamped to right-angle block.

object. The gaps in the braces were made using an X-acto micro saw with a kerf approximately 0.25 mm in width. In all, three discrete cuts were made in the two top braces. All of the cuts closed well, as did the splits, and were glued using hot hide glue.

Since the thickness of the top at the splits was less than one millimeter, and there were areas of loss in the top beneath the inlay, it was deemed necessary to provide backing for the glued splits on the inside of the top. The backing consists of strips of basswood, milled to a triangular profile measuring 2.5 mm on a side and glued in place at the interior junction of the top and sides. The backing strips were steamed prior to installation to facilitate fitting to the curved sides. Basswood was selected because it is very flexible, but is also out of keeping with what materials would be expected in a musical instrument such as this. In other words, this material is easily identifiable as being not original to the instrument. In addition, the date and place of work was written in pencil on the center right backing strip prior to reassembly. The reinforced top-to-side joints are stable and quite strong.

A long crack in the top was also reinforced at this time using a traditional instrument repair technique. Small, pyramid-shaped cleats were glued in place spanning the crack which had been previously clamped in plane and glued. The cleats were laid cross grain to the top wood—the theory being that they will counteract humidity changes, and thus not allow the crack to reopen.

Reattachment of the Back

Fitting the newly conformed back in place was straightforward enough, but required a number of dry runs to establish a procedure before making an attempt with adhesive. The final assembly was a matter of quickly applying a total of 28 clamps before the hide glue began to gel. *(fig. 5)* The result is quite acceptable and, although the arch of the reattached back is not absolutely fair, it is much more representative of the original appearance than was previously the case. *(fig. 6)*

Reassembly of the Neck

It became clear that many aspects of the phase two treatment could be more readily performed while the neck was off of the body. For example, the ormolu yoke was much more accessible for cleaning under these circumstances. Therefore, the neck was not reattached until its phase two treatment was complete.

Aside from the neck assembly, phase one was now complete. In addition, the cleaning of the top and

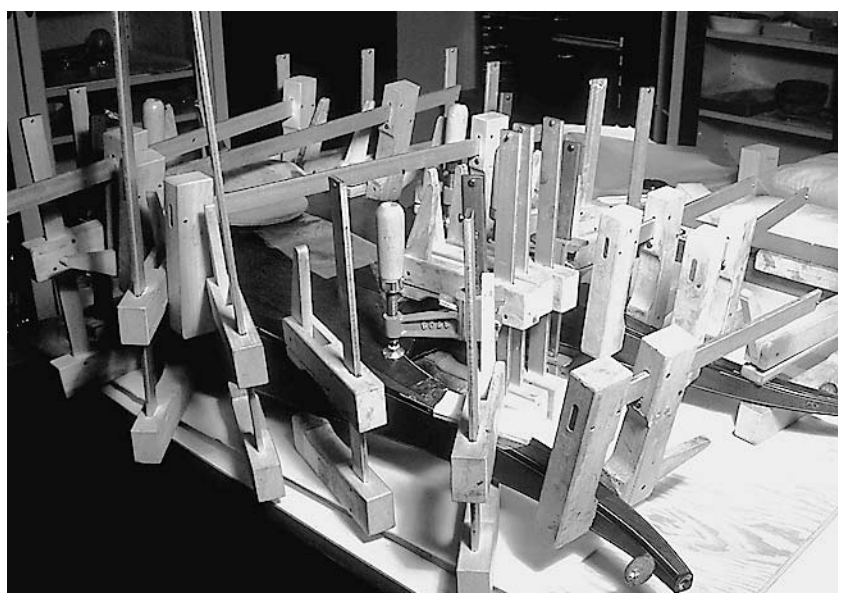

Figure 5. Back plate gluing setup.

Figure 6. Back following reconformation and re-attachment.

back, phase two and three steps respectively, was finished. Both top and back were cleaned using vinyl erasers, and the back was lightly coated with carnauba wax to unify the appearance of the surface.

At this point, the instrument was stable, and capable of being handled as well as stored. As such, the conservation treatment of the object was generally completed. The remainder of the treatment involved the restoration of the object to a visual state in keeping with the intent of the builder. This involved the restoration of the instrument's decorative details.

The first detail to be addressed was the lost oak leaf surface decoration. The original is of carved ebony. The time involved in carving a replacement piece was prohibitive, so, after isolating another element of the original from the soundboard with siliconized Mylar, a mold was taken using Dow Corning 3110 RTV silicone rubber. The mold was distorted to approximate the shape of the missing piece, and a replacement was cast using pigmented Epo-Tek 301 epoxy. The replacement was then trimmed to fit and set in place using Acryloid B-72. The replacement initially had a slightly glossy appearance in contrast to the rest of the oak leaf element. However, following a light application of wax, this difference in surface reflectance disappeared.

As received, the guitar was missing two of six tuning pegs, and had a mismatched set of six different bridge pins (the pins that hold the strings in the bridge). Following the successful outcome of the oak leaf casting, it was decided to use the same method to replicate the missing tuning pegs and make a uniform set of bridge pins based on the one original in the best condition. The shell elements on the replacements were painted using Liquitex acrylic iridescent and interference colors.

The losses in the headstock inlay were compensated using pigmented microcrystalline wax fills for the smaller losses, and cast epoxy for the large losses. The epoxy, again Epo-Tek 301, was cast to the thickness of the existing ebony inlay and set in place using Acryloid B-72. The cast epoxy was very easy to manipulate, and could be cut using a knife.

Many of the frets were missing, and replaced with wood painted to match the worn ivory originals. This was the final replacement detail for the neck of the instrument.

The final top details to be addressed were the soundhole roses. Following the removal of the rosewood discs, it could be seen that the original roses fit into a rabbet in the topwood around the perimeter of the soundhole. The top itself is about 2.0 mm thick, and the rabbets are half that in depth. It is clear that the original rose material was very thin. However, neither of the other two extant Mareschals have intact roses, so it was not possible to ascertain just what the original material, or for that matter, design, might have been. Therefore, it was decided to use wood as the material because it is most often seen in intact original roses by other makers, and use a six-lobed pierced design which is also commonly seen in extant lyre guitars. The design was taken from a French guitar by *Pons fils* in the collection of the Boston Museum of Fine Arts, and I would like to thank Darcy Kuronen, curator of musical instruments, for allowing me access to that instrument.

The discs for the roses were turned from European spruce, using a small jeweler's lathe. The discs were turned to the same thickness as the topwood, and rabbeted on the inside to match the sound- holes. The rubbing from the Boston guitar was, through the miracle of Xerography, reduced by approximately 15% to fit the smaller soundholes. The Xeroxes were then taped to the turned discs, the holes of the lobes cut with a brad-point bit, and the curves cut with corresponding gouges. The roses were then adhered in place using Acryloid B-72 and toned to match the top with Ciba-Geigy Orasol solvent soluble dyes. *(fig. 7)*

The issue of playability—always a consideration when dealing with musical instruments, as is use with other types of functional objects—was considered regarding this instrument. The question must naturally be approached on a case-by-case basis, although it is generally better to err on the conservative side. In addition to the conservators Stewart Pollens and Scott Odell, I have also collaborated with curators of musical instrument collections. Specifically Darcy Kuronen, previously mentioned, of the Boston Museum of Fine Arts, and Laurence Libin of the Metropolitan Museum of Art, concerning the question of playability. There is a unanimous feeling that the instrument should not be played. The addition of tuned string tension—approximately 100–120 lbs. of tension along the length of the instrument—would certainly have a distorting effect on the desiccated and brittle wooden material. Ultimately, the combination of string induced stress and handling while playing would result in the need for further conservation which can only reduce the value of the instrument as a document, something I have tried scrupulously to avoid in this treatment. Therefore, I put a set of period-style gut, silk and silver strings on the guitar, but only for the sake of appearance. They are arranged in such a way that only a light, straightening tension can be applied, and they cannot be tuned to pitch. *(fig. 8)*

While researching the morphology of French lyre guitar soundhole decoration, I came across an 1815 pencil drawing by J.A. Ingres of the family of Lucien Bonaparte, brother of Napoleon. The drawing is owned by the Fogg Art Museum. A female figure in the drawing is shown holding a lyre guitar which is nearly identical in all respects to this Mareschal lyre guitar. This is the only illustration I have found of a lyre guitar that shares any, much less most, details with this Mareschal. I think that it is safe to say that the instrument drawn by Ingres was also a Mareschal guitar. Peripheral research has also unearthed some tantalizing connections between the family of Lucien Bonaparte and the private Delaware collection that owns the subject of this paper. Could the instrument in the Ingres drawing and this Mareschal instrument possibly be one and the same? At this point in my research, I feel confident in saying there is indeed a possibility that this is the case.

Figure 7. Detail of new roses and cast epoxy oak leaf branch (right).

Figure 8. Instrument following treatment.

Acknowledgements

I would like to express my gratitude to Mike Podmaniczky of the furniture laboratory at Winterthur Museum, as well as Stewart Pollens and Scott Odell, all of whom have given thought-provoking input in working through treatment considerations. Also, Darcy Kuronen and Laurence Libin have offered valuable guidance in the historical pursuit of the elusive lyre guitar.

I would also like to thank Janice Carlson and Kate Duffy of the Winterthur Analytical Laboratory for performing the X-ray fluorescence analysis that allowed the yoke material to be identified as gold ormolu over a copper alloy substrate.

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