

Case study  
on the restoration  
of the  
1735 Richard Bridge Organ  
at  
Christ Church Spitalfields

Manual & Pedal Soundboards

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## Choir and Great Soundboards

### Condition before restoration

Due to the condition of the glue the tables had come away from the soundboard grids over about 75% of the total surface.

The condition of the table of the treble Great soundboard showing the table having come away from the grid



The detached table of the treble Choir soundboard



The bars and outer rails making up the grid had become detached from each other, causing the bottom and top surfaces to be very uneven.

The soundboard first dismantled had little structural integrity left after removal of the table



### **Construction of the Choir grid**

The grid is constructed following the usual English tradition. A front and Back length-rail of oak with glued on pine spacers between the bars. The side-rails are of pine with oak cladding, the bars and fillings-in are of pine.

### **Choir Wind box**

The side rails and wind bar are of pine. The wind bar is dove tailed glued (unfortunately) and dowelled into the sides.

The bottom board is of oak. Evident are the original burn holes for the pull-down purses. These purses were replaced by J.C. Bishop in the early 19th century. The purses were made in strips of leather of approximately 16" - 19" long and 60mm wide.

Pallets of pine 12 of 260mm long and 16 of 237mm (shortened from 247 at some stage).

The bottom of the grid was found covered with parchment from 1811. The pallet surface was found covered with paper. After removing the wind bar the surface touching the grid was found to have leather residue on it which was not removed in the 19<sup>th</sup> century restoration. We have come to the conclusion that the original covering of the grid was likely to be leather and not parchment or paper as first suspected.

## Problems with the grid

The oak front rails of the Choir grids had been drilled to take a side-slider which was added by Gray & Davison. The drilling of these holes had severely damaged the fillers glued against the inside between the bars.

The drilled front rail of the grid (note the battens holding the brass strip on the bottom board)



The filling pieces between the bars were cross-glued with the front and back rail. These rails have shrunk in the width and the filler pieces in the length direction of the rails. This caused them to be too long and protrude beyond the height of the grid. The problem this causes is considerable as the fillers have a tendency to split the table away from the grid. Also because they shrink in the length direction of the end-rails, they invite runnings along the end-grain of the bars from groove to groove.

The bars were fitted only very loosely to the end-rails. They needed to be fixed in place so that the bottom of the bars would be flush with the end-rails for ease of truing up later on.

The problem which presented itself, as was found out tackling the first soundboard, was that too much dismantling would result in the risk of a pile of wood on the workshop floor. A method had to be thought of which allowed the grid to be stabilised before all the sections of table were removed.

## Remedy

The bearers of the Choir soundboard (about 5.3mm thick) are a mixture of oak and mahogany. The mahogany ones date from the Gray & Davison rebuild (signed H Monk 1851). These had to be removed first. They were nailed onto the table with thin tapered nails.

The tables are made up out of 7 planks of quarter sawn oak which are between 4"– 5<sup>1</sup>/<sub>2</sub>" wide and about 7.3mm thick. Plank number 1 and 7 were removed first to allow access to where the bars meet the end-rails. The remainder 5 planks still gave the grid sufficient stability for the operation.

Holes for 4mm dowels were drilled under an angle through the end of the correctly positioned bar into the rail on both sides of the grid, top and bottom side. These were injected with hot animal glue and dowels were hammered in.

Stabilising dowels and new fillings-in glued in



Keeping in mind that the organ would have to function in a building with modern heating standards, It was eventually decided that the fillers would be replaced with new ones, again of pine, with the grain corresponding to the length of the rails instead of across it. The holes in the front rails were plugged with appropriate size oak plugs.

Restored Choir soundboard grid and pallet box

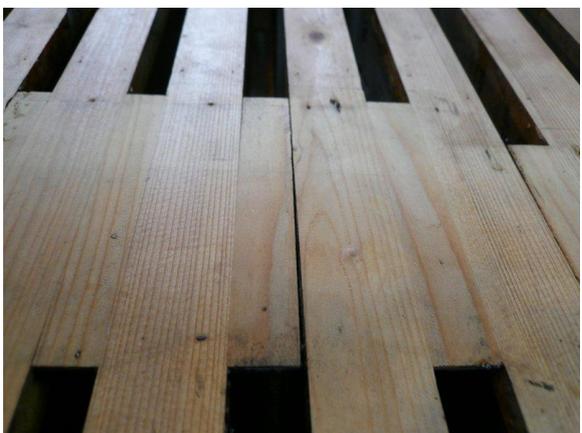


Brass pallet springs (18<sup>th</sup> century?)



The splits between the fillings-in under the pallet tails and the bars were repaired by splicing in pieces of pine. All repairs of this kind were done with the use of hot animal glue.

Evidence of significant shrinkage



Repairs in progress



After the integrity of the grid was restored, the 5 planks making up the remainder of the table were carefully removed by tapping them loose from the inside and prising them away from the bars with wedges.

The sections of table were cleaned from nails and old glue after which splits were repaired.

The sections were positioned onto the grid in the end-bars with short square-ish dowels. These were reused again to help positioning them whilst re-glueing.

The grid was now prepared for the re-application of the table. The surface of the bars had to be straightened into one flush surface on both sides. This was achieved with the help of a large hand plane and a weighted sanding block. Any bars which were too low under the surface were built up by glueing on veneers. This was done to minimise the loss of old material in the pursuit of a flat and level surface.

Levelling of the bars by glueing on veneers



Sanding the top surface of the grid flat (Great soundboard)

The Table sections were glued back in place with a cold hide-glue (Titebond). This allowed enough time to clamp the sections securely and evenly onto the grid without the glue drying out.

Clamping the sections of table onto the grid until the glue is dry using screwed clamping boards



When the table sections were glued back in place, there was still evidence of shrinkage between the boards, sometimes over one millimetre.

The gaps were routed out to about a millimetre into the top of the bars with the smallest possible size router bit. Well-fitting pieces of seasoned oak were glued in thus restoring the table into a continuous wide plank covering the whole of the grid. In numerous places there were also still splits showing up in the table. They

were also routed out and filled with the appropriate material. This was all in all a very time consuming business.

Routing away the splits and joints in the table



The routed out slots are filled in with seasoned oak



After the restoration of the integrity of the table a preliminary flattening took place to remove the pieces of oak standing proud of the table. The soundboard was then turned up-side-down and liberally painted out with hot glue and left to dry. The soundboard was turned over again and the table was flattened to a fine tolerance. After this the bearers were nailed back on using the salvaged old nails and some new ones. The restored sliders were pinned on and the whole surface was again flattened to a fine tolerance. After this process both sliders and bearers are of equal thickness.

The process of flattening sliders and bearers of the Bass Great soundboard with a weighted sanding block



## Technical Data Choir

Length of Bass soundboard 59<sup>1</sup>/<sub>2</sub>" (1510,5mm).

Depth 803 - 804mm

Length of groove 744mm

Height of groove about 83mm

Thickness oak length-rail front 22.8mm and back 24.1mm

Thickness fillers spacing out bars <sup>1</sup>/<sub>4</sub>"

Length of 12 bottom pallet openings 263mm

Length of top 16 pallet openings 237mm

Lengths of fillings-in 89 and 114mm (thickness 4.2 - 4.5mm)

Pallet springs of brass (18<sup>th</sup> century?)

## Groove and bar measurements (Grooves underlined)

45.9; 38.8; 47.2; 31.4; 46; 28; 47.8; 27; 45.1; 25.4; 43.9; 25; 39.3; 26.7; 41.4; 23.1; 35.5; 28.5; 36.1; 21; 35.8; 18.1; 33; 19.8; 33; 15.8; 32.1; 18.4; 30; 14.7; 27.8; 12.1; 27.8; 14.2; 26.1; 15.5; 25.9; 14.2; 24; 17.8; 24.8; 16.2; 23.6; 14.3; 24.8; 14.4; 25.1; 15.7; 26; 17.2; 23.9; 14; 23.3; 16.7; 24.4; 12.6; 45.5

## General details

The sliders of the Stop Diapason; Principal; Flute; Mixture and French Horn are of oak The rest (including the bearers) are of mahogany. The thickness of the sliders before the restoration was between 5 and 5.4mm. This is likely to have been slightly thicker originally as the ends hanging over outside the soundboard are between 5.5 and 6mm thick. The slider stops are oak dowels of 6.5mm (bass soundboard) and 7mm (treble soundboard)

The Pallets of the Choir are the same pattern as on the Great, i.e. with an angled front. One has to come to the conclusion that these pallets most likely date from when the Great pallet slots were widened (we don't know when). All the Choir pallets were shortened by 10mm at some stage in history. Some from the tail end some from the front. This caused the need for a correction of the position of the pull-down point and the spring hole. This had been done incorrectly causing the pulldown wires to go under an angle through the bottomboard causing unwanted friction. It was decided to correct these faults and to reuse the existing Choir pallets.

Two pallets unchanged, top one shortened at front (note the forward position of the pulldown and the corrected spring hole)



Where the fronts are intact one can measure an angle of  $85^{\circ}$ , a pulldown eye about 69mm from the front and a spring position of 89mm from the front.

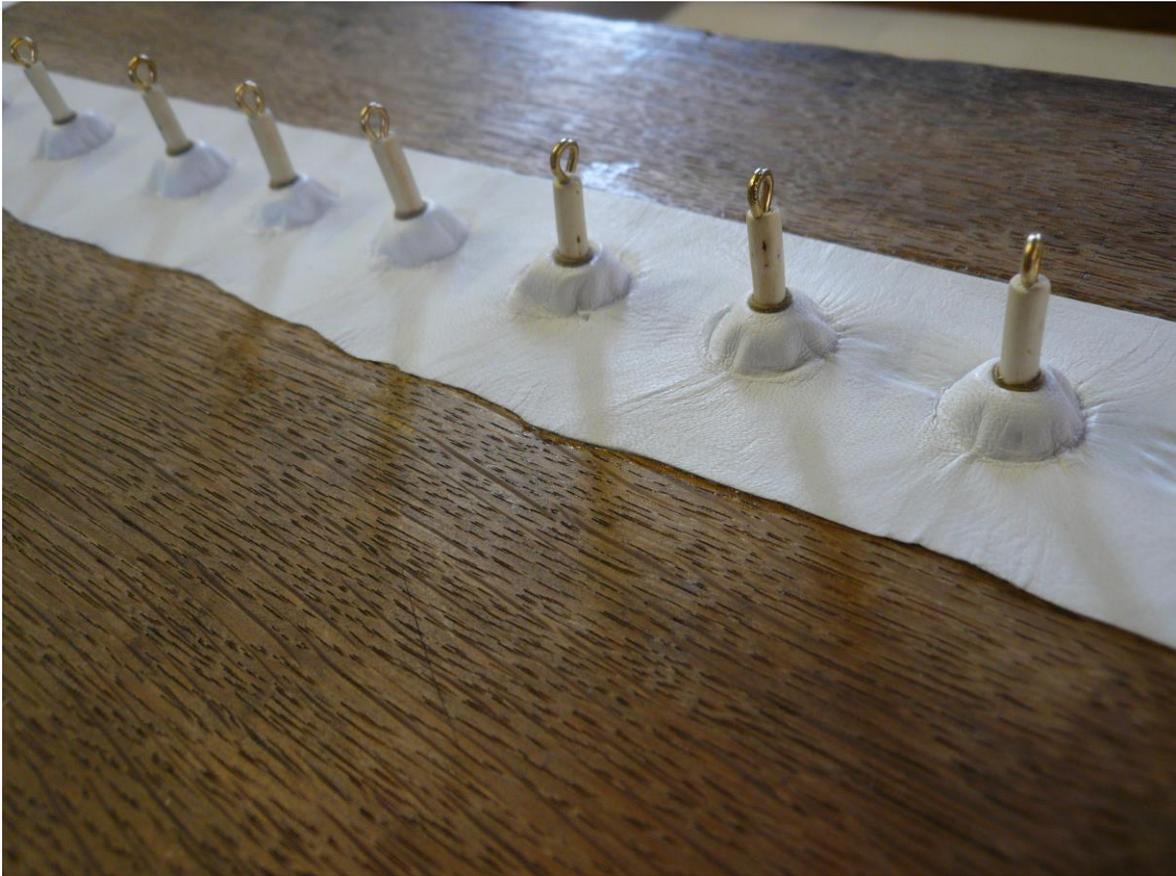
### **Pulldowns**

The Brass strips were removed in favour of the reinstatement of leather purses using the surviving burned pockets in the top of the bottomboard. The details were copied from the surviving leather purses in the Choir soundboard from the 1764 George England organ in Gravesend.

The new pulldowns inserted through the newly formed leather purses



Leather pulldown purses with willow dowel covered pulldown wires



### **Table holes in Choir bass soundboard**

#### Stop Diapason

36x17; 35x17; 32.5x17; 31.5x17; 30.5x15; 30x14.5; 30x14.5; 27x14; 24x13;  
23.5x12; 21.5x12; 21.5x10.5; 17.5; 17; 17.3; 15.3; 15; 15; 13.1; 13; 13; 12.6; 11.8;  
11.6; 10.3; 10; 9.2; 9.5

#### Principal

30x14.5; 27.5x14; 24.4x12.5; 24x13; 22.5x11; 17; 17; 17; 15; 15; 15; 13; 13.1;  
13.6; 14; 12.1; 12.1; 10.2; 10.2; 9.5; 9.2; 9.2; 9.2; 9.4; 8.3; 8.3; 8

#### Flute

29.7x14.4; 26.8x13.7; 23.7x11.6; 24x12.9; 22.8x11.5; 22.1x11.2; 16.5; 16.5; 16.6;  
14.6; 14.4; 14.4; 12.6; 13; 13.2; 13.4; 13; 11; 10.9; 10.9; 11.1; 10.5; 9.8; 9.4; 9.4;  
9.3; 8.4; 8

#### Fifteenth

16.5; 16.5; 16.5; 15; 15; 14.5; 13.5; 13.5; 12.8; 12.8; 12.5; 11.8; 11.3; 11; 10.8;  
10.8; 9.8; 9.8; 9.8; 9.8; 9; 8.8; 8.8; 8; 7.5; 7; 6.4; 6

## Mixture

26.4x13; 26.3x13; 26.2x13; 26.4x13; 26.4x13; 23x11.7; 22x10.8; 21.8x10.3; 21.8x10.4; 21.8x10.4; 22x10.3; 19x8.5; 18.9x8.7; 18.8x8.6; 18.9x8.3; 18.8x8.4; 18.8x8.6; 18.8x8.3; 18.4x8.5; 18.6x8.4; 18.8x8.8; 18.7x9.1; 18.6x8.8; 18.4x8.8; 18.6x9; 18.5x9; 18.2x9; 18.2x8.2

## Quintadena (CC# - # enlarged)

18; 18; 18; 25x18; 25x18; 25x18; 25x18; 26x18; 18x18; 18; 18; 18; 18.1; 18; 18; 16.3; 16.3; 16.3; 16.2; 16.3; 16.3; 16.3; 16.3; 16.5; 16.5; 16.5; 16; 17

## Vochumane

18.4; 18.3; 18.1; 18.1; 18.4; 18.4; 18.3; 18.5; 18.3; 18; 18.5; 18.4; 18.1; 18.4; 17.9; 16; 16.1; 16; 16.4; 16.1; 16.4; 16.2; 16.7; 16.2; 16.2; 16.4; 16; 17.1

## Cremona

18.3; 18.2; 18.1; 18.4; 18.2; 18.3; 18.3; 18.4; 18.3; 18.3; 18.3; 18.4; 18.4; 18.3; 18.2; 16.8; 17.2; 17; 17; 16.8; 17.1; 17.1; 17.3; 17.7; 17; 17.1; 17.1; 17

## French Horn

18.1; 18.6; 18.6; 18; 18.1; 18.1; 18.4; 18.6; 18.3; 18.2; 18.4; 18.5; 18.4; 18.4; 18.3; 17; 17; 17; 17; 17; 16.9; 17; 17.1; 17.1; 17; 17.2; 17.3; 17

## Slider seals

Although there was originally no leather on the slider tracks and no grooving in the table to prevent runnings, the today modern heating practice in the Church dictated that some form of slider seal was to be used. This would guarantee a stabile wind supply to the pipes which is necessary for stability of regulation and tuning. Also do slider seals allow for some distortion of the sliders or upperboards without this immediately presenting a mechanical problem. The material used for these seals in this case is Liegelind, a man-made cloth-like material.

## Upperboards and Rackboards

The upperboards and rackboards of the Choir are made of oak. The thickness of the rackboards varies from 8 to 10mm. All original upperboards survive and two rackboards, that of the Mixture, Quintadena and Vochumane, had been replaced and were made new in oak. Each rackboard is supported with only 6 rackpillars.

Several stop changes were evident while looking at the upperboards. Some had been given veneers to take pipe tips of a new stop in a different place to where the original pipes had stood. The Mixture upperboard had in the treble been reduced to single rank, while in the bass large conveyance holes were feeding off-notes. (the Mixture was replaced by JC Bishop with a Dulciana which must have been conveyanced into the bass of the stop Diapason)

Conveyance holes in the Choir Mixture upperboard and leathered-over treble holes



After removing the leather it was found that about 60% of the old toe holes were intact giving a good indication as to the composition.

The second upperboard from the front had a veneer glued on it to take the old Back Open from the Great from CC upwards (alteration by Gray & Davison 1851) on slider number 4. Although this slider and the upperboard holes above are no different from the three other reed sliders, it is believed that this is the only slider on the soundboard which could have originally accommodated the Quintadena, called Flute or Flute cfaut in later accounts of the organ (was this a revoiced Quintadena?). To judge by the holes in the slider below CC the compass of this stop is unlikely to have extended below  $c^{\circ}$ . Although accounts of the organ give the number of pipes for a Flute Cfaut (formerly Quintadena) to be 56, suggesting that the stop on this slider was full compass, the holes below CC are much smaller than the equivalent holes in the 4' Flute on the same soundboard. This suggests that the slider holes below  $c^{\circ}$  down to CC were most likely enlarged in 1851 by Gray & Davison to accommodate the old Back Open Diapason from the Great down to CC.

The second upperboard from the front with the veneer removed showing grooving (alteration?).



Upperboard number 1(front) has also two stops on it. This upperboard is the only reed upperboard on the Choir which has provision for reed stays. This was a good reason to believe that the Vochumane would have been the 3<sup>rd</sup> stop from the front on the second upperboard.

The whole of the first stop was very long ago covered with leather. This seems to confirm the information that the French Horn was originally prepared-for and not installed until 1779. The holes from GG to c<sup>#</sup> seem to have been uncovered more recently though because there was more glue residue on the upperboard. These holes are in an almost un-used or un-worn condition confirming that this stop originally started from d<sup>o</sup>. This decided that the French Horn must have stood on the front slider and the Cremona on the 2<sup>nd</sup> slider.

## Great Soundboards

During the dismantling and cleaning of the bottom of the grid, evidence was uncovered that all the pallet slots have at some stage been significantly widened by cutting away the sides of the bars. New wider pallets therefore replace the original ones.

A look into a widened groove. Note the original groove width behind the tail of the pallet.



These pallets are of the same pattern as those on the Choir and must date from before the treble compass was altered from d'' to f''.

The widening of these pallet slots can only have resulted in a much heavier touch without the benefit of extra capacity, as the original pallet slot capacity is already larger than that of the groove.

## Restoring the pallet slot widths

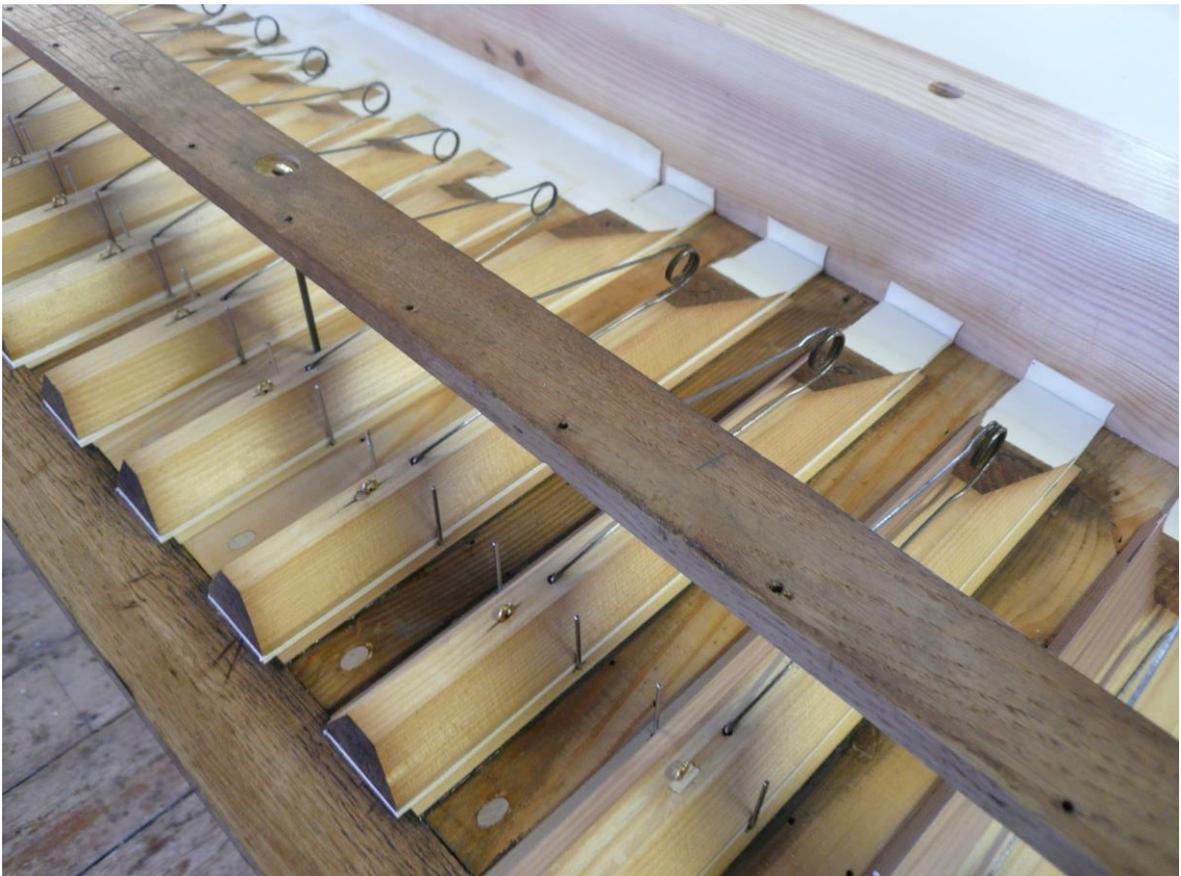
Prior to tackling the pallet slots the grid had to be stabilised Recycled old pine is let into the edge of the grooves



The pieces of pine clamped in position with wedges, allowing the glue to dry



The great pallet box restored (note the widened pallet slots filled in to their original width and the pallets adapted to suit)



It was not found to be practical to fill in the whole of the height of the bar, just in order to get rid of the slanting cuts widening the opening altogether.

The pallet slot widths have therefore been restored over a height of 20mm of the groove height. This allowed sufficient depth for the fixing of the guide pins.

The grid was in a very similar condition as that of the Choir soundboards. The table sections were also similarly detached from the grid.

These problems were remedied using a similar restoration method as with the Choir soundboards.

## Technical Data

Grid size

Length  $65\frac{1}{16}$ " (1652.5mm)

Depth  $58\frac{3}{4}$ " (1492mm)

Length groove 1397mm

Groove height 99 – 100mm

Groove height over oak fillings-in 94 – 95mm

Table thickness 11 – 12mm

The table consists of 6 boards varying from 6" to 11" wide.

The Windbox has an average depth of 340mm and is 91.5mm high.

There is a hole for a connector trunk of 252 x 69mm.

**Groove and bar widths** (Treble side, grooves underlined)

49.7; 33; 47.2; 31.7; 46.3; 29.1; 48.9; 29.8; 45.6; 28.7; 42.7; 27.5; 41.5; 25.7; 41; 23.3; 40.5; 23.4; 37.5; 21; 33.1; 18.2; 30.1; 18; 27.6; 17.3; 29; 15.6; 28; 15.7; 26.8; 14.8; 21.8; 14.8; 22.5; 14.4; 22.4; 14; 21.7; 14.2; 22.5; 14.5; 22.2; 14.8; 21.8; 14.7; 22; 14; 22.3; 14.1; 22.9; 14.7; 22.1; 14.2; 22; 14.7; 33; 20.2; 33; 22.4; 33; 26; 49.7

## General

Pallet slot lengths  $GG^{\#} - B = 276\text{mm}$

The remainder, including secondary bass pallets ( $GG^{\#}$ , BB, CC) is 230mm.

The original pallet lengths are likely to have been 11" (about 280mm) for the largest eight, and  $9\frac{1}{2}$ " (about 241mm) for the remainder.

The original overlap was 7 – 8mm (3.5 – 4mm each side).

The thickness of the original guide pins was 1.7mm.

The pallet springs are of steel and likely to date from one of the 19<sup>th</sup> century rebuilds.

The length rail on the pallet side has oak filler pieces of ¼" (6.4mm) thickness which are chamfered away to about 1.7mm thickness (running with the grain unlike in the Choir grid).

The original wind beam is 2" (51mm) thick.

The wind beam was sawn through in two places by Gray & Davison in 1851 in order to enlarge the wind box depth by adding a new wind beam approximately 433 mm away from the old one.

The old wind beams were replaced with new ones to restore the wind box to its original dimensions. The second Gray & Davison wind beams were left in place to help support the middle of the soundboards.

The pulldown purses were made in strips of leather of 56mm wide in the Bass soundboard and 52mm in the treble.

There are slider stops in the form of blocks glued on the sliders on the Bass side and the very Treble side of the soundboards determining the slider movement against the side of the table.

### **Great Bass Soundboard**

The condition of the table was somewhat worse than that of the treble soundboard, in that there were more splits in the individual planks. Otherwise the condition was similar.

The fillings-in under the wind beam showed more signs of shrinkage than those of the treble soundboard.

### **Points of interest**

The Bass face board has quite likely undergone three phases:

- 1 With oblong hole of 134x60mm with a wind trunk nailed against it (quite likely the original Swell feed as there is no evidence of any other way to get wind to the Swell).
- 2 With a wind trunk fitted by means of a screwed flange (3 screws) to feed the Swell or the pedal pipes ( CCC – DDD<sup>#</sup>) added by Lincoln?
- 3 The hole is blocked off and leathered over. (Gray & Davison made a new Swell with its own new wind supply and separated the pedal wind from the manuals.)

Trunk hole in Bass soundboard faceboard blocked up and opened up (note the moved positions for screws)



### Possible order of grid manufacture

- 1 Glue oak boards together in order to form a table.
- 2 Flatten and straighten by plane.
- 3 Mark out the bar and groove widths by scoring the underneath of the table.
- 4 Glue on bars with oak spacers in between to form grooves (the end-bars have a 5-6mm thick veneer of oak).
- 5 Plane up the end-grain and the fillers flush to be able to glue and nail on the oak 41.5mm thick length-rails.

### Holes in the table (GG<sup>#</sup> side)

The spacing on the soundboards is such that most of the pipes on the soundboards are standing straight above their hole in the table. Apart for some of the bass pipes, grooved off pipes and of course the Mixtures, the size of the holes in the table would have originally corresponded with the size of the holes for the pipe tips.

Cornet

21x12.2 (c' – d''')

Front Open

31x19.5; 29.2x18.5; 27.4x18; 27x17.5; 26x16.8; 24.4x16.5; 23.7x16; 18.7; 18.3; 17.7; 16; 15; 14; 13.5; 13.8; 13.7; 13.7; 12; 11.5; 11.3; 11; 10.1; 10.1; 10.3; 10.2; 10.3; 9.7; 9.6

Front Principal

18.5; 18.5; 16.5; 16.8; 16.1; 14.5; 14; 13.8; 13.8; 13.1; 12.2; 11.7; 11.7; 11.3; 10.1; 10.1; 9.7; 9.6; 10; 10; 10; 10.2; 10.2; 9.9; 9.7; 10; 9.9; 9.9

Back Open

32.8x19.8; 30x18.5; 28.1x18.1; 27.4x17.5; 26.2x16.8; 23.4x16.5; 23.9x15.7; 18.4; 18.4; 18.6x16.5; 16.1; 15.1; 14.3; 14.1; 13.5; 13.8; 13.1; 12.1; 11.3; 12.9; 9.9; 9.8; 10.1; 9.8; 9.8; 10.2; 9.9; 10.2

### Stop Diapason

31.7x19.4; 29.4x18.5; 27.8x18; 27.5x17.5; 26.2x16.7; 24.5x16.5; 23.8x16; 18.5; 18.3; 16.9; 15.2; 14.1; 13.7; 13.7; 13.1; 12.4; 11.8; 11.3; 11.3; 10.2; 9.9; 9.7; 9.5; 9.2; 9.2; 9.2; 9.5; 10.1

### Back Principal

26x16.6; 24.7x16.5; 23.6x15.9; 17.5; 16.8; 16; 15.5; 14.8; 14.7; 14.4; 13.8; 13.4; 12.2; 11.6; 11.1; 10.8; 10.7; 9.9; 9.9; 9.7; 9.6; 9.2; 9.4; 9; 8.9; 9; 9; 9.3

### Twelfth

15.2; 13.8; 13.3; 13.4; 13.1; 12.9; 12; 11.4; 10.9; 10.2; 10.2; 10; 9.8; 9.1; 9.2; 8.8; 8.9; 8.7; 8.7; 8.7; 8.8; 8.8; 8.2; 8.6; 8.5; 8.6; 8.6; 9.1

### Fifteenth

13.3; 12.1; 12; 12.2; 12; 11.8; 11.3; 11; 10.7; 11; 10.1; 9.7; 9.6; 8.5; 8.8; 8.8; 8.4; 8.3; 9; 8.6; 8; 8; 7.1; 7.1; 7.1; 7; 7.1; 7.1

### Tierce (altered holes underlined)

13; 12; 11.8; 11.8; 11.5; 11.7; 10; 10; 9.6; 9.1; 8.6; 9.6; 9.5x16.5; 8.9; 9.3; 9; 8.9; 8.7; 8.4; 7.9; 7.7; 7.4; 7.3; 7; 7; 7; 7.4; 7.3

### Larigot (altered holes underlined)

13; 12.2; 11.8; 11.3; 11.1; 9.8; 9.7; 9.7; 10.4; 9.9; 10; 9.2; 9.1; 9.5; 9.1; 8.9; 8.4; 8.8; 8.1; 8; 7.8; 7.8; 8; 8.4; 8.1; 8.6; 8.2; 8.8

### Sesquialtra

22.3x12.4; 21.7x12.3; 21.3x12.2; 20.5x11.7; 19.7x11.5; All other holes much enlarged, originally 19.1x11.3

### Furniture

18.8x11.2; 18.2x11; 17.8x11; 17.5x10.5; 17.2x10.2; 16.4x9.8 – top A handful of holes have been enlarged in the tenor and lower-middle range.

### Trumpet (altered holes underlined)

18; 18; 17.8; 24.4x18.1; 20x16.5; 20.7x17.7; 27x16.2; 15.3; 24x15.4; 13.9; 23.3x14.3; 13; 13; 22x13.3; 13.1; 20.5x14; 13.3; 19.7x13.2; 13.1 – top

### Trumpet (altered holes underlined)

18; 18; 17.9; 20.7x19; 20.9x17.3; 19.2x18.8; 15.7; 15.2; 14.2; 13.7; 13.5; 13.3; 13; 13.1 – top

### Bassoon (altered holes underlined)

22.8x19; 22x17.3; 20x16.7; 14.2; 13.8; 13.6; 16.1; 15.7; 14; 13.8; 13.2; 13.3; 13.2; 13.1 – top

### Clarion (altered holes underlined)

20.5x18; 20.8x16.4; 20.4x16; 14; 14.2; 13.1 – top

The alteration of holes in the soundboard, have been done at different stages in its history.

The enlarging of the round holes in the soundboard (through burning) may have been done by Gray & Davison in 1851.

The enlarged oblong holes in the Sesquialtra, Furniture and the Front Trumpet seem to be reasonably fresh, suggesting changes after 1851.

Extra holes made to enable the compass to be extended from d''' to f''' were filled in. Enlarged holes were left as they are, when this didn't pose a change in their original function.

Enlarged holes of the Sesquialtra, Furniture and Front Trumpet (slider 4, 5 and 6 from the right)



### **Upperboards and Rackboards**

The upperboards and rackboards of the front stops on the soundboard (up to Fifteenth) were found in a reasonably original state.

The upperboard originally belonging to the Tierce and Larigot, had undergone an enlarging of many tip holes, in order to allow for new stops with a larger wind use. Only in the very Bass the original tip holes and rackboard holes had survived.

One half of an original rackboard hole in the middle range of the Tierce had survived, probably due to its close proximity to a rackpillar. The size of this hole suggested strongly that the original Tierce would have been of the same scale as the surviving Twelfth.

Tierce and Larigot rackboard (note the half surviving hole)



Great rackboards in hospital (note the rectangular rackpillars)



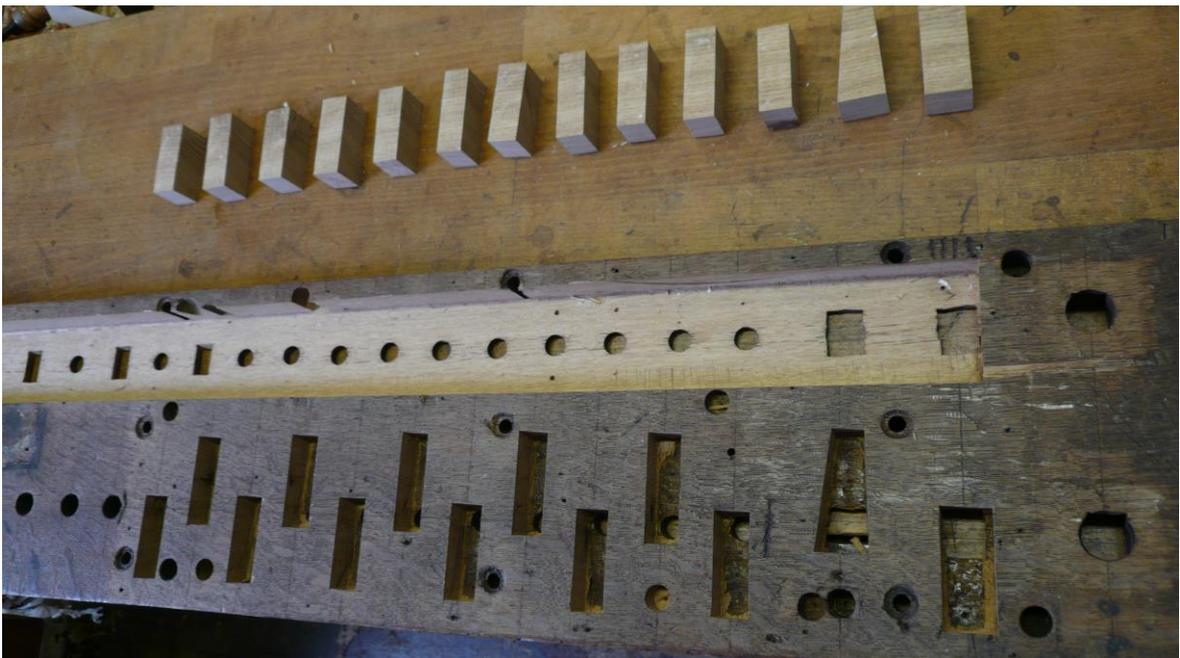
The upperboard for the two Trumpets had possibly been altered the most by Gray & Davison.

One of the two Trumpets was substituted for a two rank mixture, whilst a second trumpet was replaced with a much larger scale Posaune 8'. The both required the need for significant grooving and a veneer on top of the upperboard.

The upperboard of the two Trumpets showing evidence of stop changes



The upperboard for the trumpets being restored to its original function by piecing in non-original grooving



The partly repaired upperboard with rackboard on top

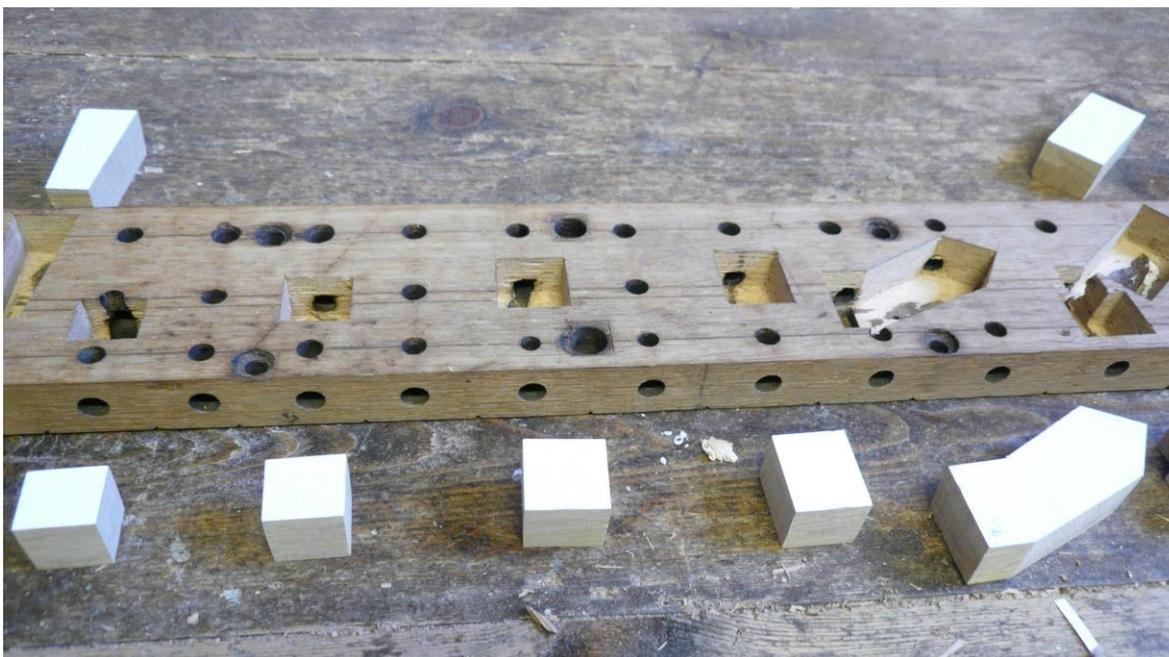


In an early 20<sup>th</sup> century rebuild the furniture and the mixture were replaced with one 16' Bourdon from G ( $10^{2/3}$ ). Each slider would supply every other note in turn. This resulted in the furniture receiving a veneer and large holes and grooves being drilled into it to take the wooden pipe feet.

Furniture upperboard with veneer removed showing grooving and wooden pipe foot holes every other note



Upperboard prepared for the filler pieces to be glued in



As can be seen from the above image the cross-drilled holes connecting the three holes of one note are still to be covered, as originally, with a strip of white leather. In the Choir Mixture upperboards these holes are still plugged with the original cork.

The rackboards of the Sesquialtra, the Furniture and half the width of the rackboard for the two Trumpets were missing and had to be made new.

### Upperboard screws

Many of the original upperboard screws have survived (the majority on the Great), but some had been replaced in the 19<sup>th</sup> and 20<sup>th</sup> centuries. All screws went back in exactly the same position as where came from as is essential for hand-made screws. For this purpose a wooden block was made with as many holes as there were screws, so they could be stored in the same relative position on the block as their position on the soundboard.

The screw block containing the Great screws



A typical example of a Bridge upperboard screw



The old cheese-head screws have a very rough, uneven underneath of the heads, so every time a screw is tightened up the wood underneath it gets worn away. For the further preservation of the upperboards, thin pipe-metal washers were put under the heads of all the original screw heads.

### **Swell soundboard**

The Swell soundboard was made in the traditional way using the same materials and method as was likely to be used by the original builder with the only difference that the filler pieces are included in the length-rails and not glued on.

A table was made out of oak, flattened and cut to size. The grid pattern was scored into the bottom side and the outer frame and bars glued onto the table with hot glue.

The Swell soundboard under construction



Swell bottomboard with pulldown purses



## The Lincoln pedal soundboards

Two of the Lincoln pedal soundboards could be incorporated into the restored organ; a five-note soundboard, serving the pipes GGG - ### and one two-note soundboard serving CCC and CCC#.

Through the significant weight, the flanges on which the pipes stood were quite often split. These flanges were strengthened and given a slider for the ease of regulating the wind flow into the pipes.

CCC and CCC# soundboard during dismantling and after restoration (note the leathered pallets close against leather)



The five-note soundboard showing the very large pallets



Strengthened toe-blocks with new regulation sliders

