

## Bringing Back a 1790 Longman and Broderip Piano



Occasionally we will encounter a piano that is well past the stage of simply being restored, but not necessarily so far gone that it should be broken up for parts and then the remains scrapped. The opportunity we present here was much nearer the scrap pile than a candidate for restoration, but every restoration/conservation advocate should put his skills (at least once) towards what can only be described as a basket case!

I had the opportunity to purchase a 'Plain-Jane' Longman and Broderip square, probably made by Culliford and Co., serial number 1926 and so from ~1790, then in the UK, for the price of the name cartouche. Shipping to the US was made easier as there was not a scrap of ivory or other banned materials on the thing. It had sat in the warehouse of a collector for some years, and the garage of a restorer for more, and had arrived on the scene having seen much water and woodworm action over the years, largely from when it served as one of four walls of a chicken house (dung removed long before shipping to the US!) In particular, the bridge was loose from the soundboard, which in turn was partially out of the case along with the wrest plank. Nothing remained of any of the damper or buff stop mechanisms, half the damper levers, and 11 hammers. All remaining leather was scrap, nor was there any cloth remaining in the action. All the springs for the Geib escapement were fragile or missing, but the vellum hinges for the escapement levers was still intact and strong! Amazing stuff, it is always the

last to go. There was no lid, the case was in very poor finish condition and the stand was bare, and had been patched many times. All brass had been salvaged away.









The owner provided a set of ivories from a salvaged piano, and a pile of contemporary tuning pins, in less than usable condition as received.....



But as we will see in the hardware page, missing pins are easily made, and old ones usually clean up nicely. These were put in a rock tumbler with some fine builder's sand and tumbled for 2 hours to remove the remains of the wire, then taken to the wire brush in the drill press (wear a mask!). Though a little pitted, they clean up nicely for future use, and roughish pins hold wire coils like nothing else!





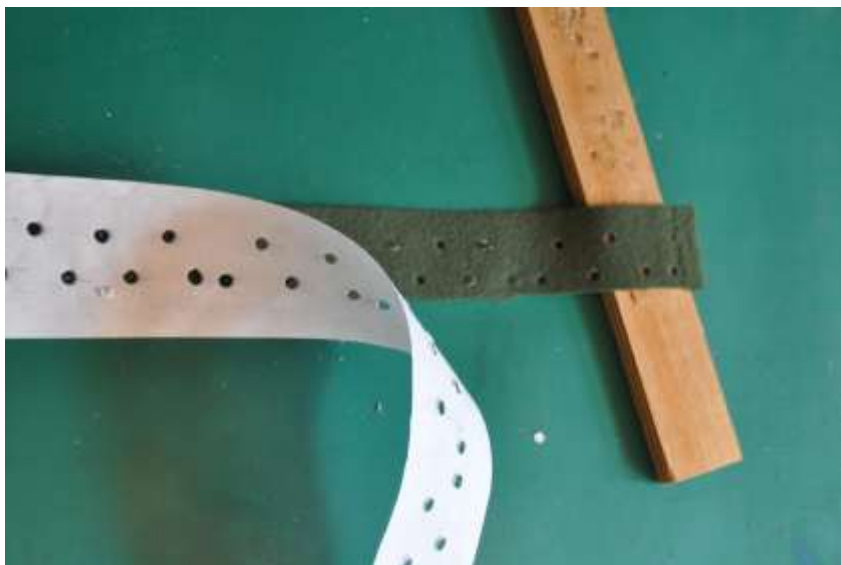
We began by addressing the action. Two names are located on the action, in ink the name Shal(beck?) on the right top of the frame, and W. Wallis stamped in two places on the f3 key.

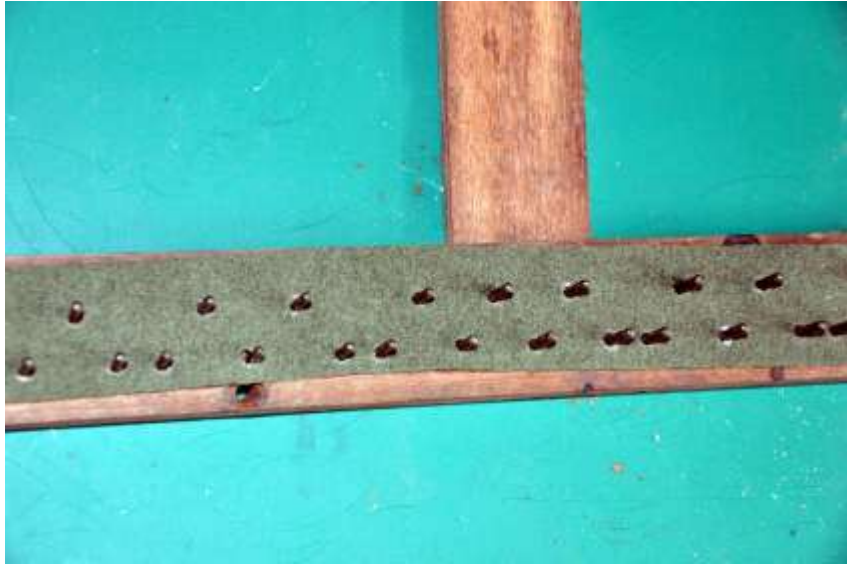


The action wool was replaced as shown in other restoration diaries on this site in the usual way. First the frame is cleaned up and readied, and missing pins replicated and replaced (2 pins for the key guides on this one). Then wool obtained from Graham Walker (see Links page) was applied as shown.



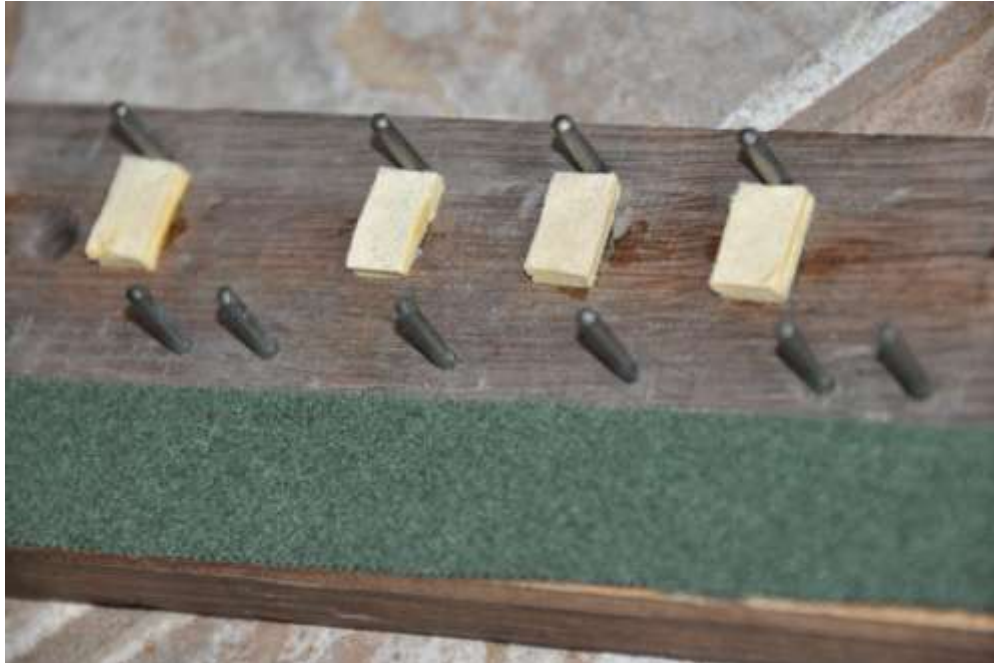
A pattern of the balance pins and guide pins is made as a rubbing on paper, straight pinned to the wool, and the holes punched, just slightly oversize.



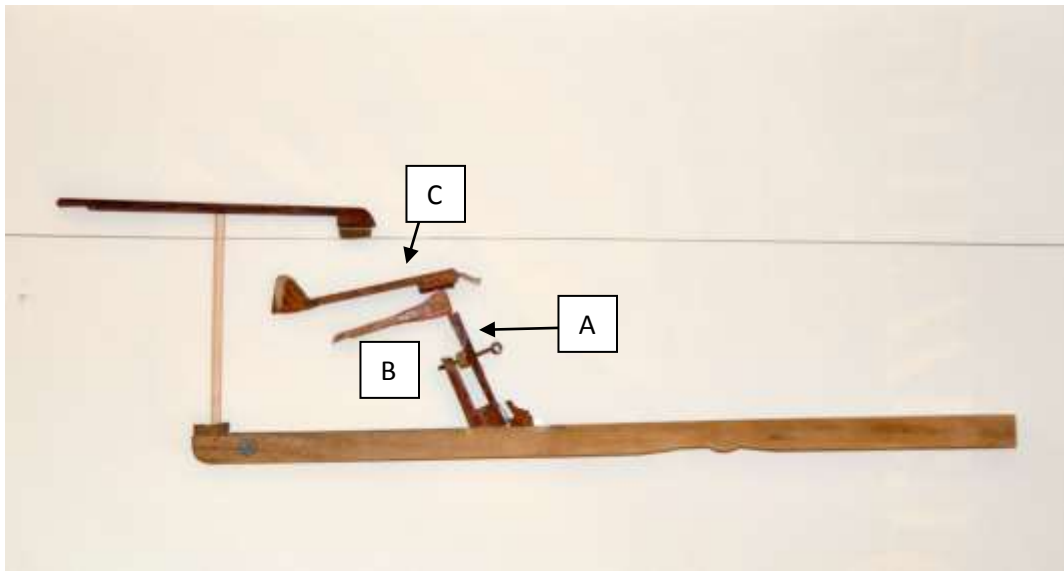
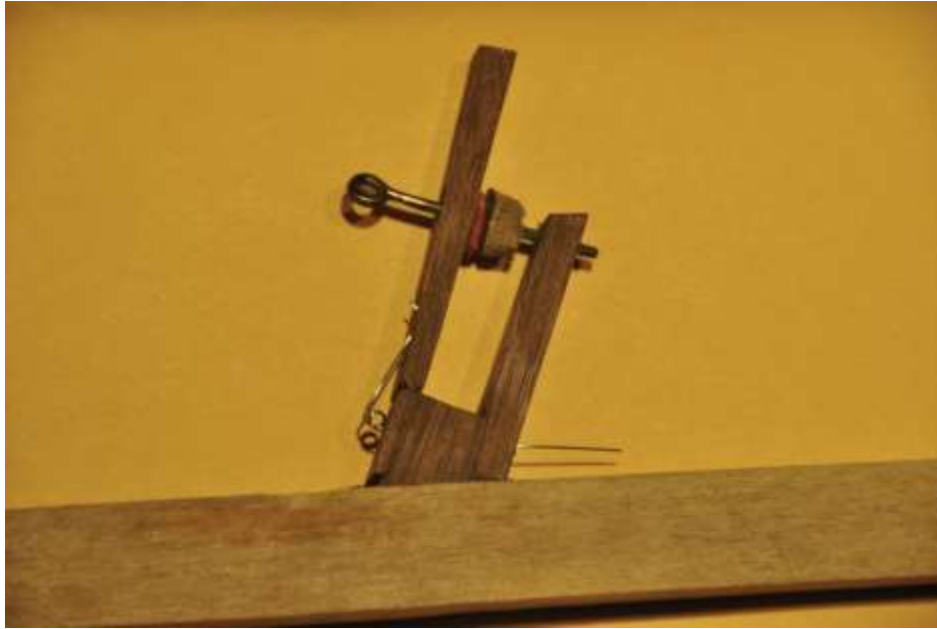


Pads for the accidentals are of buff leather, of which a few survived to guide the reproduction. The balance rail does not feature the cutouts for accidentals like Broadwood featured.





The escapement springs are simply 0.40mm music wire, bent to shape and inserted to make the escapement lever snap back quickly, but without undue force on the under lever that would slow the action.



The action is shown somewhat schematically above, using loose parts. The escapement jack (A) rises against the under lever (B) as the key is depressed, causing the butt of the hammer (C) to fly up under mechanical advantage. As the key lever continues the escapement jack moves past the front of the under lever, which drops back down to the frame and allowing the hammer to fall away from the string. In this way, lost motion is reduced to a few thousandths at most, and the action becomes very responsive.

We can do little better than to show Longman and Broderip's instructions for regulating this piano.

*Directions*  
*for the management of*  
**LONGMAN & BRODERIP'S**  
**Patent,**  
**PIANO FORTES**

Sold at N<sup>o</sup> 26 Cheapſide and N<sup>o</sup> 13 Hay Market  
**LONDON**

If the Hammers, by uſe, get unequal, take out the Fore Board, and, turn out the Braſs ſcrew-in the ſticker fixt in the Key, with ſmall Pliers, it will cauſe the Hammer to ſtrike ſofter; the contrary will of courſe make the Inſtrument louder.

Care muſt be taken that the Screw is not turn'd in ſo far as to cauſe the Hammer to remain up to the Strings, If they riſe within the Eighth of an Inch of the Strings it is ſufficient.

By paying a little attention to theſe Directions you may regulate the Tones to the greateſt exactneſs.

To take a Key out, preſs it down in front, and liſt it up beyond the Centre Pin, and it will come out with eaſe.

LONGMAN and BRODERIP Manufacture and Sell, Retail, Wholesale and for Exportation, all ſorts of Muſical Inſtruments, with every Article appertaining thereto, on the moſt reaſonable terms: alſo Engrave, Print, Import, and Sell, all the Muſical Publications of this Country and every other part of Europe.



Natural keys are drilled for the front key guide pin, a slight mortise cut into the top of the key, and a veneer slip inserted so that when the ivory key cover is applied there is no hole left which would allow the ivory to possibly form bumps and buckles at that point. In this case, the excessive water had loosened all of these slips. Each was re-glued, and replacements made for those lost over the years.



The ebony accidental keys were cleaned and given a light wax coating, and any loose accidentals re-glued. Ivory proved somewhat more of a challenge. Even with a complete set of good ivory heads and tails, the problem of the wide D tail (5 on this piano) must be overcome (see the page on key covers for details on this sort of issue). Through our restoration network, we were able to obtain some wide D tail covers to complete this job. Keep in mind that if you locate a source for ivory outside of your country, you must file for and complete the CITES certification for this to be legally shipped to you. If your piano is devoid of ivory a better approach will be to use the synthetic material also covered on the Key Covers Page of Square Piano Tech. This will allow the finished piano to move across borders as necessary without red tape. Strictly speaking, once old ivory has been trimmed to fit your piano, it essentially loses all antique value and the piano cannot be transported across national boundaries ever again. How strictly this will be enforced may be a moving target for you.

That said if we are to trim the ivory to fit we must have a technique. Fixture the ivory, to be trimmed to length, so that it cannot move, with such a fixture as a shallow pocket made up of slips of wood glued to create three sides. The ivory will fit in the pocket. Mark where the saw will travel each time at a 90 degree angle. Using a fine sharp razor saw, dribble a very little bit of water on the area to be cut and begin sawing with regular motions and limited pressure. The water lubricates the cut to keep it from binding in the saw. Old technicians sawed ivory this same way. Once the cut is complete, take out the ivory and dry it. The cut time is under 30 seconds, and this wetting will not curl the ivory.



The tails of each key get a layer or two of long wearing leather that the damper lift sticks will push against. The under-lever rail gets a thin flannel underlayment so the under-levers do not click on the rail. The rear under-lever cover was missing and was remade to size in mahogany, rebating out the bottom to clear the rail supports. None of the original brass rail nuts (6) were still present but are easily cut from brass stock and drilled and threaded to accept the post threads. The rear half of this cover is given a wool touch cloth for the hammer heads to fall against. We now have the action completed, and initial regulation set up, so we can return the action to the piano.

The damper lift and buff stop are missing, and must be remade. These are as shown, though many variations on creating a lift can be found. For L&B, this arrangement is not uncommon. It is made up of mating pieces with the angled ramps cut in to evenly lift the dampers. Material used here is pear or maple, though deal wood, oak, and mahogany are seen. These remain largely out of sight when in use. A layer of leather or flannel is used on top of the damper lifts to eliminate noise if lifted during performance. We will not add the final top cover to the damper lift until we have fitted the dampers to their attachment rail. This rail is part of a rack that lifts them clear for service to the damper lift and strings. The rack was first introduced at about the time this piano was made, to answer to complaints that replacing strings was bothersome if the damper rail must be unscrewed each time.

The soundboard and wrestplank were loose in the case, and all the structural support blocks were loose as well. These were easy to relocate, but in order to repair the soundboard it had to be removed from the wrestplank, and the top crown piece removed as well. This is done by simply packing wet towels about the wood pieces and allowing the moisture to seep in and full hydrate the glue, a process that can take several weeks or a few days, depending on the looseness of the part, and the quality of the glue joint. As always, these will be glued back with hot hide glue to facilitate the next repair in 200 years.

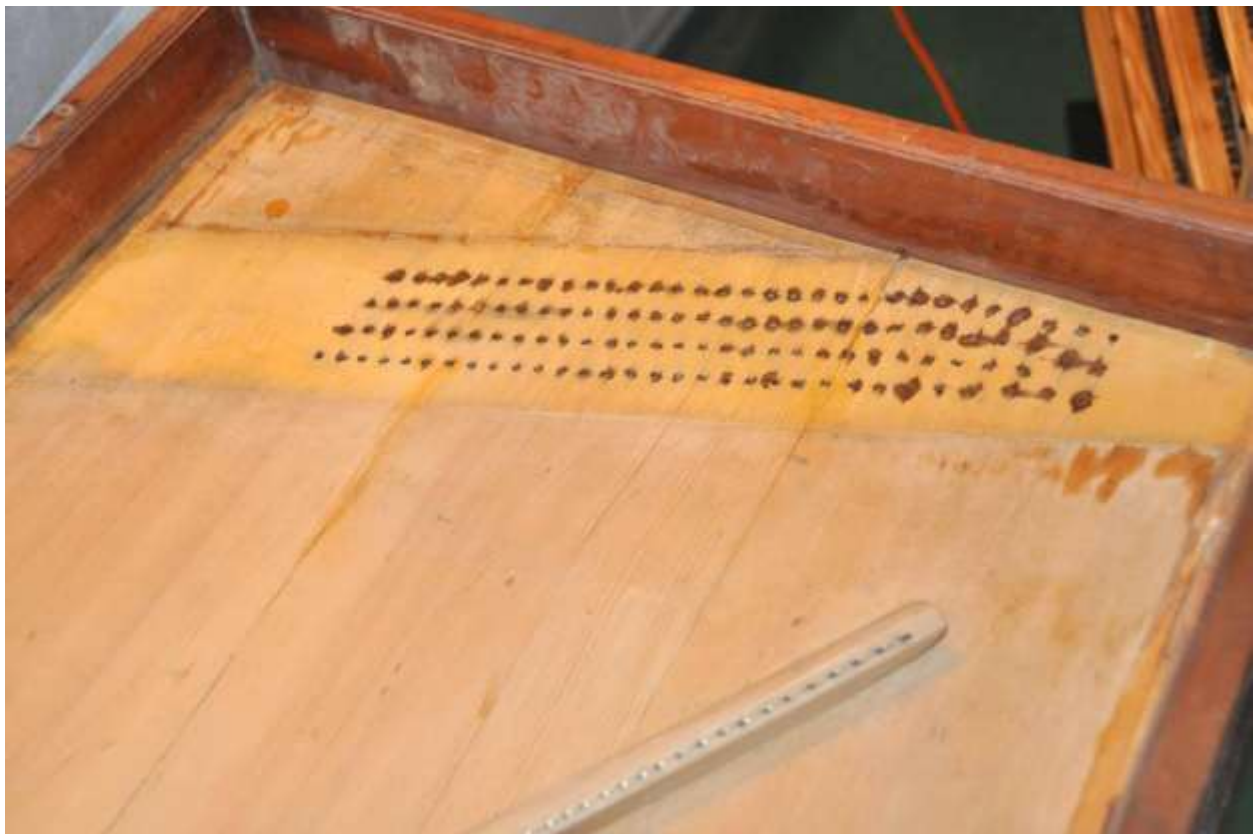
Loose rib ends were reglued, the soundboard seam separations brought back together and glued, then the seams were reinforced with fine linen about 1 inch wide saturated in glue and laid along each seam, and a missing corner of sound board material matched with a similar grain spruce to thickness and glued in. The wrest plank was warmed, glued up and clamped overnight, then the reinforcement pieces glued in and clamped. It forms a sort of puzzle piece construction that locks the elements in place against each other, and the glue simply keeps the parts from shifting.

The wrest pin holes were found to be relatively tight, but a drill at 3.8 mm was selected and each hole made about 4 mm deeper at this tighter radius, such that the tapered tuning pins might have a little more fresh material to grip.

Glue was made up with 5% urea to increase set time and the sound board glued in with padded nails, making sure of an even gluing bead around the perimeter. Once set, molding pieces were replaced or remade and glued in as well. This piano was missing the molding on the right case wall and the short stub at the right cheek. The other pieces provided may be original, as they did fit well.

There was no appreciable finish left on the case, so refinishing as an option was an easy choice for this one. Missing string banding was made up of holly and ebony and replaced, and on the left case wall, a missing divot of mahogany was replaced with a similar color and grain from old mahogany remnants, by gluing in the piece somewhat oversized, then cutting flush to the case side and top after the glue had dried. A quick application of the cabinet scraper and the resulting bit is filled and the case finished in Danish oil and wax.







### **Setting up and Regulating:**

At the pace that square pianos were being made in the large shops of Culliford and Geib, there would have been little time for much individual attention to each piano. I will contend that actions were made up in advance and mated to piano cases constructed to plan, such that regulation was simplified. However, we have written evidence that the part of the “finisher” was considered an art, and it was this finisher who was responsible for the final set up and regulation of the piano. Augustus Leukfield, a builder and one time partner of Geib, was singled out for his contributions to this operation, in contemporary publications. Specifically, the finisher makes sure the hammers are hitting only the pair of strings they are intended for, that the let off of the double action, or the travel of a single action is sufficient for a pleasant sound without blocking or hammer bounce, and that the dampers damp only their pair of strings but are set up to easily travel and effectively damp. Additional tuning, threading the listing cloth, and misc. adjustments are probably also included.

For the restorer who has a mystery box of assorted parts to return to service, it is not so easy. In this case, there was early evidence that perhaps not all the early hammers that we had were necessarily



from this particular piano, or numbered accurately, and the dampers were possibly a mix as well. The hammers required releathering, so each would need to be trimmed to strike accurately. In this case, it seems best to string and add hammers at the same time. The dampers are easier to manage with the strings already on so we set those aside for later.

Stringing a piano requires a series of string diameters from thinner to thicker, known as the scaling, which is covered in all the reports. For a 1790 L&B, a stringing schedule is easily found, but this particular instrument gave us its own clues here.

The hitch pins can be seen to form a set of groupings, and with a little work, these further translate into a string scale. This is compared with a stringing schedule suggested by David Hunt to the author.



Here is the overall layout of the piano, with an ever present Handbook of Historical Stringing Practice by Rose and Law at the ready.



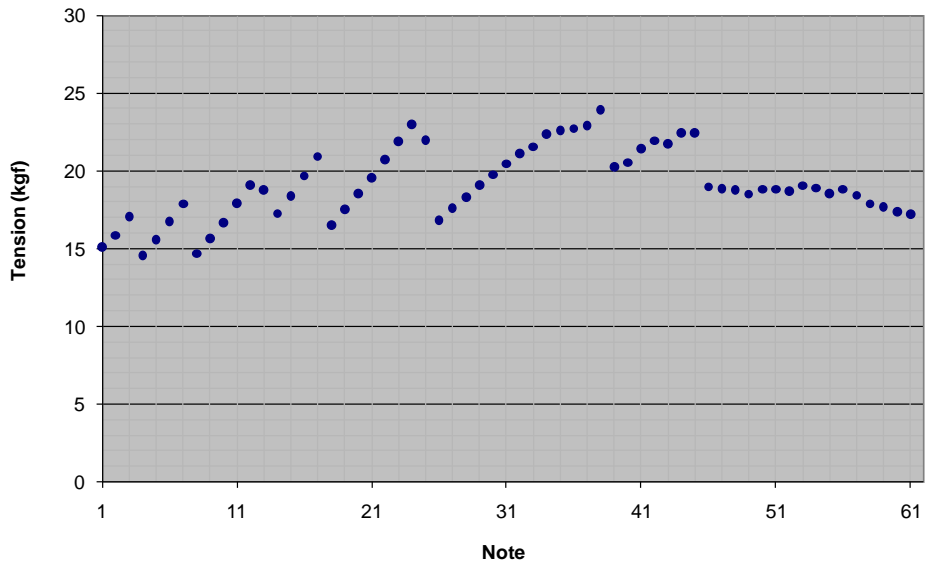
Scaling as suggested by hitch pin grouping			Scaling as suggested by David Hunt	
Note		Group diameter	Hunt	Dia
d2-f3	(46-61)	0.40	f2-f3 (49-61)	.40
g1-c#2	(39-45)	0.44	c1-e2 (32-48)	.44
f#-f#1	(26-38)	0.48	g-b (27-31)	.48
f	(25)	0.56	d#-f# (23-26)	.52
A#-e brass	(18-24)	0.56	c-d (20-22)	.56
F#-A	(14-17)	0.65	A#-B (18-19)	.60
F	(13)	0.70	F#-A (14-17)	.65
			E-F (12-13)	
C-E covered	(8-13)	0.6/0.3	D-D# (10-11) covered	.56/.30
GG#-BB	(4-7)	0.65/0.36	C-C# (8-9)	.60/.3
FF-GG	(1-3)	0.70/0.41	BB (7)	.60/.33
			AA# (6)	.65/.33
			AA (5)	.65/.36
			GG# (4)	.70/.36
			GG (3)	.70/.40
			FF-FF#(1-2)	.70/.40

The L&B (SN 1926, circa 1790) presents with distinct groupings of hitch pins, which clearly demarcate the transition of over spun to brass, and of brass to iron in the original. Iron strings leave a residual stain on the nut that is distinct from brass, so the iron to brass transition is an easy one to determine. We cannot know from residual evidence how the iron transitions went, but if they follow the same general pattern of diameter transitions that nearly all the period instruments were using, we are left to conclude that a scaling in suggested. In the iron and brass, we have one note set aside and it receives the next incremental thickness up.

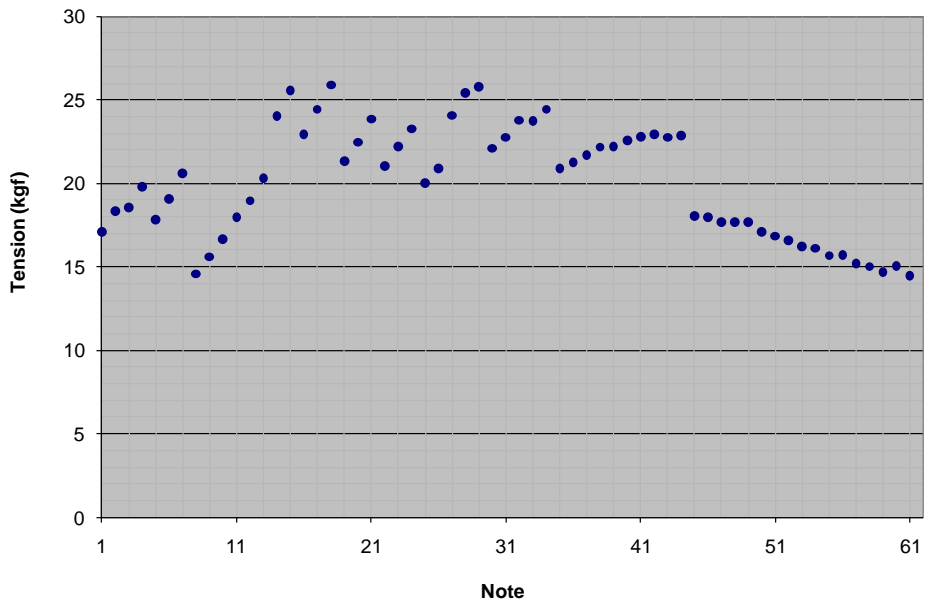
In the table above and graphically presented below we can see the result of a proposed scaling for this piano based strictly on the distinct groupings presented. The result is at least as intelligent as a Broadwood from circa 1784-1790, and while not so even as the suggested scaling by David Hunt, perhaps reflects the shop tradition for this instrument?

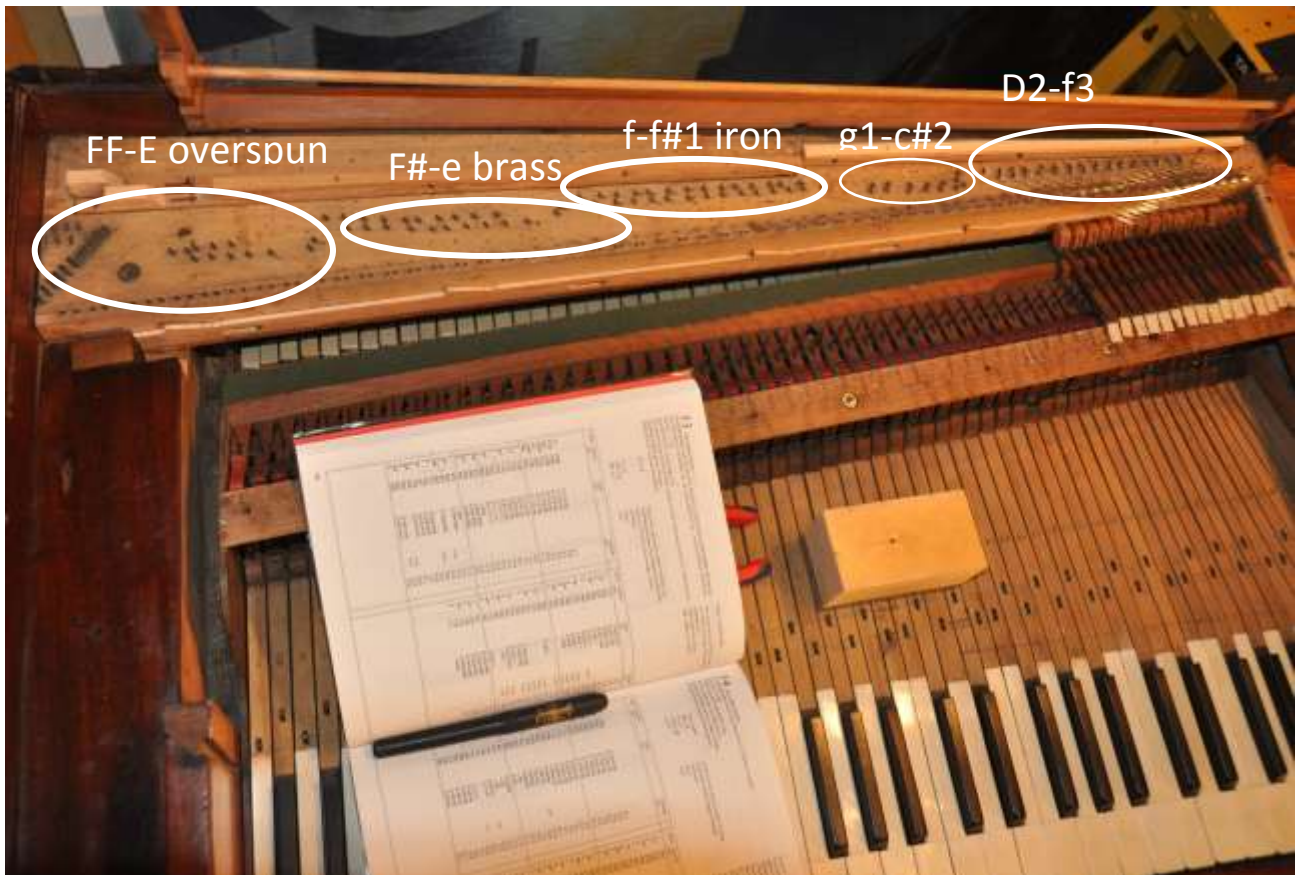
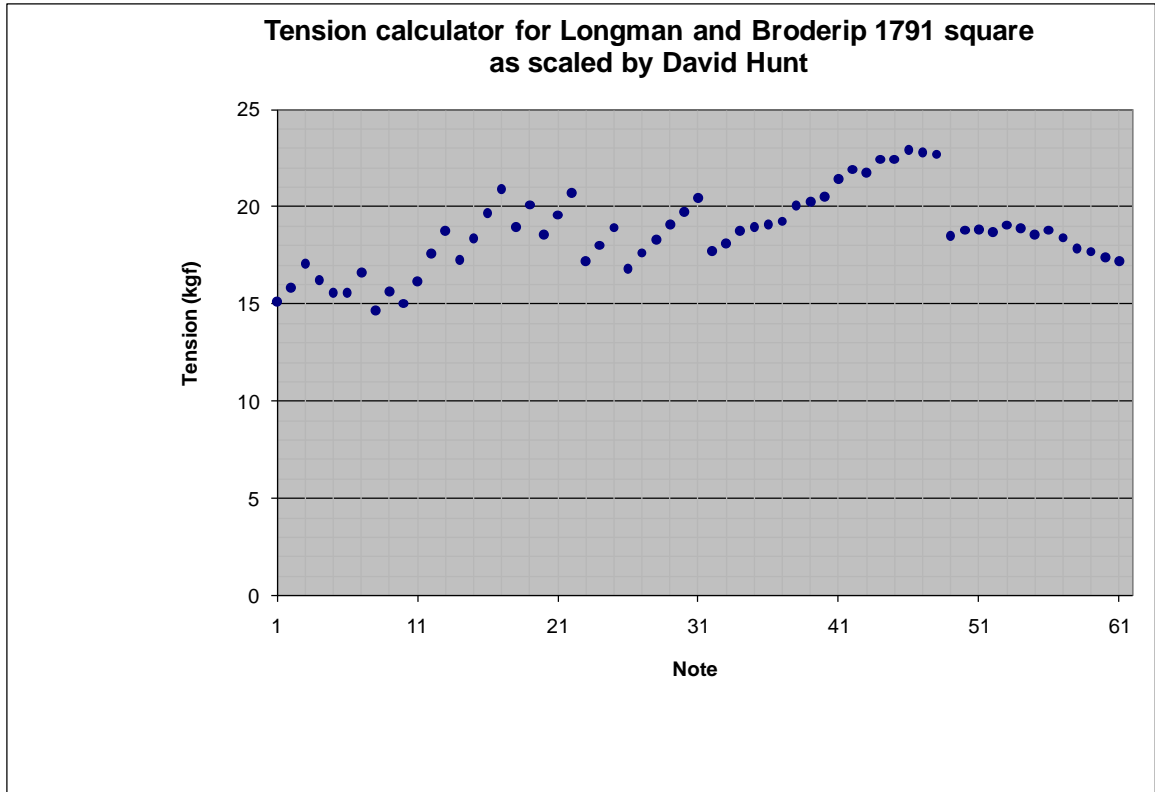
We should point out that David Hunt was convinced this grouping was an artifact of avoiding the damper lift holes, but a quick examination of the layout shows that this could have been achieved with less arranging of the hitch pins, and still clear all holes. Earlier pianos had the hitch ahead of the damper lift, but by locating the hitch pins further back, we have a more stable engineering arrangement.

Tension graph for 1790 L&B as suggested by hitch pin groupings



Tension calculator for John Broadwood 1784 square







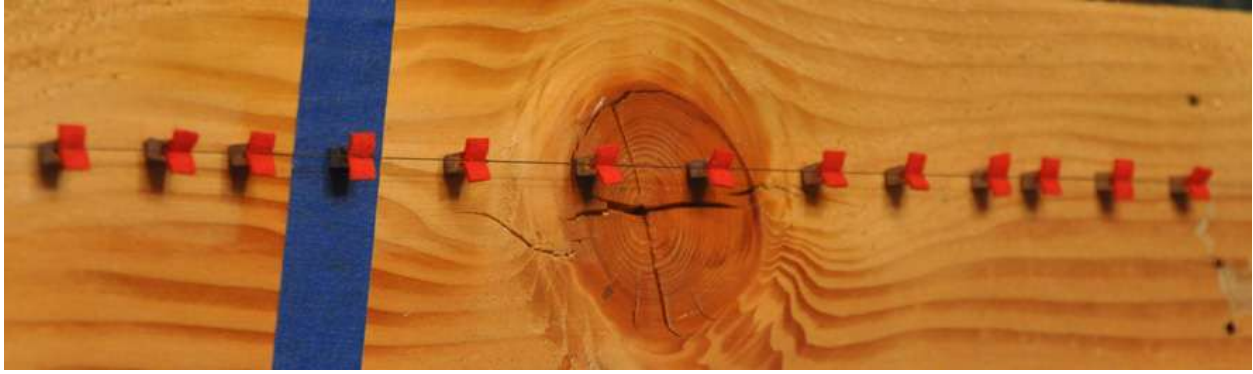
The piano was then strung from treble to bass, adding a pair or two of strings, then gluing on the hammers into place, setting the hinge placement to avoid the next hammer while hitting as close as possible the intended pair. The leather was left a bit over wide, and is trimmed back at an angle front and back to achieve the striking wedge desired, as was done originally. As suspected, not all hammers were from the piano, or numbering was suspect at least, but with slight adjustments they went back into place reasonably correctly.

Hammers need to fit neatly onto the hammer rail, without too much hinge exposed, and this is an operation where we will fit them plus or minus perhaps a fraction of a mm or so. Too near the hammer rail and they will bind on travel and not strike the string freely, too far from the rail and they become floppy and will not produce a good sound each time. Just right is where, with the hammer rail cover screwed on, we can just barely see the hinge. Up front, I will state that this was not always possible on this restoration. Getting the hammers to set right did mean that a few hinges show more than the perfect neat line, but not to the point of having any twist that would create a floppy hammer. Against the standard shop practice of a neat string line appearance, we have come up slightly short, but operationally, we have succeeded.

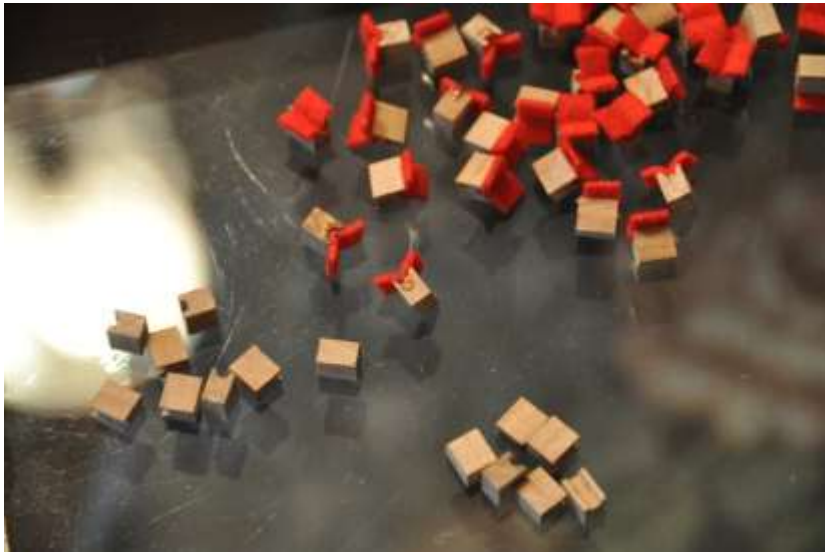








Dampers come in two basic varieties, the 'stacked pad' and the twin-fold flannel. We chose the twin-fold as it is generally found on late 18<sup>th</sup> C squares, and works effectively, but either approach might be historically accurate for 1790. By the mid-1790s we typically see only the flannel type. Shown being glued up with a taught wire for holding while the glue dries.





The damper hardware is described several restoration reports, and [squarepianotech.com](http://squarepianotech.com) carries a description of making these parts. In general, the screws for the damper controls, which are always originally made so the tuning wrench can be used to remove them, are easily forged from hex bolt heads to a convincing degree of accuracy.







The old hardware for the damper swing arm is repaired and cleaned, the swing arm was reconstructed from the evidence found in the original, and the assembly returned to service.





Once the pieces are flowing back together, the project wraps up rather quickly. The original stand needed some repair and replacement of the mahogany veneer, done from another early recycled chest of the period that was too far gone to save, replacement bolt covers and castors from Optimum Brasses purchased, and the reinforcing struts on each leg remade and glued in per another example with original stand struts. The piano can then be placed on the stand and tuning and hammer/damper regulation made. The end result is a convincing little square, now returned to playing currency.

The Geib double action gives a very different feel from the older single action, and more control in my opinion over forte and piano. The typical construction of the 1790s double action leaved the top of the escapement jack bare, but later Clementi would cover these in thin book plate leather with the hair side (smooth) out for a very silky operation. This design would serve in America for another 40 years.

Now all that remains is to make a proper mahogany lid, which will be documented in these pages and an update provided.













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