

# BCS TANGENTS

The Bulletin of the  
Boston Clavichord Society  
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## Clavichord Tuning and Maintenance

By Peter Bavington

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Reviewed by Peter Sykes

**C**lavichord *Tuning and Maintenance* is a long-awaited must-have book for every person owning or building a clavichord. It brings together for the first time a wealth of practical tuning information (with just enough of a theoretical basis to ground the information without complex mathematical explanations), and is richly supplied throughout with drawings, diagrams, and tables explaining everything very clearly. Written in a friendly, conversational tone, it will go far in encouraging clavichord owners to take care of their instruments rather than to shy away from the possibly onerous duties of tuning and maintenance.

The first part is devoted to tuning, with chapters outlining the tuning of unisons and octaves, setting temperaments, the history and theory of temperament, and the special issues of fretted clavichords. The second part is devoted to maintenance topics, with chapters discussing general environment and care, replacing broken strings, dealing with sticking keys, listing, tangent voicing, “knocks, rattles, and squeaks &c.,” and special issues concerning the overwound strings often found in the bass. The third part outlines different tuning schemes that can be used for different types of clavichords—for multiple-fretted, triple-fretted, diatonically fretted, and unfretted clavichords—along with twenty different temperaments and how to set them. The fourth part is a reference chapter, with a list of sources and materials for clavichord maintenance, a table of ratios for fretted clavichords, a book list, and a glossary of terms.

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## Ergonomics of the keyboard

Renée Geoffrion

Renée Geoffrion of Pierre Buffière, France builds clavichords and performs on them. This is part 1 of a two-part article. It has been translated by Beverly Woodward. Please note that the term “key front” is given a different meaning than the usual one in this article, as indicated in the accompanying diagram on p. 6.

**T**he keyboard is the point of contact where the connections between a musician and an instrument are forged. Oddly, little attention is devoted in musical education to these bits of wood, even though they contain many secrets and important suggestions for the development of technique, particularly at the clavichord.

By definition, the keyboard serves to delegate the production of sound to a mechanism. The soul of the musical instrument resides in the nature of the mechanism, that is, the type of sound production and its relation with the interpreter.

The keyboard is also the fruit of the conception of the builder who has probably reflected together with a musician regarding what would facilitate playing and be most agreeable for the musician, while at the same time respecting factors imposed by the functioning of the instrument. In general, evolution proceeds from antecedents to consequents and musical instruments are no exception. Each new instrument is generally composed of elements that belonged to already existing instruments, perhaps organized somewhat differently, perhaps with some new element added. The builder cannot present the musician with an instrument that is new in all regards without the risk that it will be rapidly rejected, the linkage between the instrument and the musician being too complex to invent all at once. The new instrument should rely on a technique already acquired by the musician, a technique that can be modified to suit the new instrument.

As suggested by Hans Hickmann,<sup>1</sup> the clavichord seems to have inherited the technique of the portative organ and probably its keyboard as well. It is in fact

the fruit of the adaptation of the keyboard of the portative organ to the monochord, a theoretical string instrument which was not played, but used for establishing pitches. In the early days of the clavichord, one notes both in the treatises and in the iconography a playing position which today seems entirely inapt. But this perhaps is suggestive: this position with the wrist very low and the fingers curved certainly does not permit virtuosity, but it does allow for maintaining good control over the pitch, which is not a negligible difficulty when the strings are at a low tension, and an even greater one when it is necessary



Detail from *Virgin with Child on the Throne* (1535/40), artist uncertain<sup>2</sup>

to play several notes at once. Our newborn probably started its career in a role that was more melodic than harmonic in following its ancestors, the monochord and the portative organ. In my view it is probable that the augmentation of the number of strings

and of their tension provoked the evolution towards a higher wrist position. This development, followed later by the lengthening of the key levers, permitted a more harmonic and virtuosic manner of playing. The greater the tension of the strings of the clavichord, the greater the dynamic range of the instrument and the easier the control of the pitch, even though the production of sound necessitates greater energy.

In all periods, even today, there are a variety of criteria for the evaluation of clavichords. Some players seek instruments that are light and easy to play, while others seek

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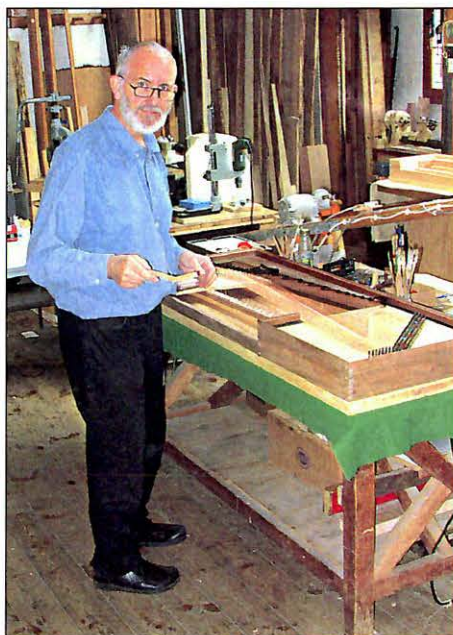
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(Bavington, continued from p.1)

North American readers will feel a pang at Bavington's opening statement that clavichords usually need tuning only four times a year; perhaps in England this is true, but not here. But this only makes the usefulness of this book greater. Anyone building a clavichord from a kit will produce a better instrument from having read this book along with the kit instructions. Anyone owning a clavichord will tune it better and be more ready to address any maintenance problems from having read this book. And anyone wanting to understand the clavichord from a technical viewpoint will have a much clearer picture of this very special instrument from having read this book.

The Bavington book can be purchased from the Boston Clavichord Society for \$35, including shipping and handling. Ω



Peter Bavington in his workshop

## Joan Benson Visits Indiana University

Wendy Gillespie, Chair of Early Music, Indiana University

In early October, at the invitation of the Dean of the Jacobs School of Music and the urging of several Bloomington friends, Joan Benson emerged from her peaceful life in Oregon for two weeks of intense involvement with gifted keyboard students at the Early Music Institute of Indiana University.

Joan had been kind enough to locate a fine Dolmetsch-Chickering clavichord for Indiana to use in her classes and lessons. Keyboard technician David Jensen prepared it on short notice, and also offered a clavichord of his own making.

The students' first exposure to this unfamiliar keyboard instrument and its special playing technique left many heads spinning. The intensity of Joan's teaching opened the students' minds to a recon-

sideration of all their keyboard playing. As anyone familiar with the "terroriste of the pianissimo" can attest, a lesson with Joan Benson is never a neutral or passive experience!

As part of her visit, Benson was featured in a nine-hour video, scheduled to be condensed and released. It shows her in action with talented students and in discussions with colleagues concerning the clavichord and her fascinating career. The Early Music Institute's Focus Records plans to issue a CD retrospective of Benson's performances based on both new material and old recordings.

The editor thanks keyboardist Hsuan Chang, an Indiana U. graduate student and budding clavichordist, for bringing to her attention Joan Benson's visit to the Early Music Institute. Ω

## Corrections: Yearsley/Sykes Review

In our previous issue, David Schulenberg reported on the duo-clavichord concerts performed by David Yearsley and Peter Sykes last March. Schulenberg writes to apologize for the inaccurate chronology which he gave for several of the works of C. P. E. Bach played by Yearsley. The Rondo in C minor (W. 59/4) was composed in 1784 and published in 1785, whereas the Rondo in E-flat (W. 61/1) was written in 1786 and published in 1787, as was the Fantasia in C (W. 61/6). The latter was the final piece in Bach's sixth and last collection of pieces

"for connoisseurs and amateurs," but the preceding piece, the Fantasia in B-flat (W. 61/5), was composed after it in 1786, and in 1787 Bach wrote one more fantasia, the famous work in F-sharp minor (W. 67). All dates of composition are from the catalog of Bach's estate that was published in 1790, two years after his death. The catalog, known in German as the Nachlaßverzeichnis, lists nearly all his known works, with dates and places of composition; it was intended to serve as a catalog of music available for sale from the composer's widow and daughter. Ω

## TANGENTS

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# The BCS at the Boston Early Music Festival 2007

The Boston Clavichord Society has the status of a "colleague" at the Boston Early Music Festival. As a result, we do not need to go through the fringe event process in order to offer BEMF-related events during the week of BEMF. This year we decided to present Peter Sykes on pedal clavichord and Margaret Irwin-Brandon on clavichord in back-to-back recitals at First Church in Boston. The well-attended recitals, which took place on June 13, were preceded by a buffet luncheon.

## Recital by Peter Sykes

Reported by Sylvia Berry

Peter Sykes' recital was his first public performance on a recently acquired pedal clavichord. Probably many in the audience had never heard a pedal clavichord; perhaps never even heard of a pedal clavichord. Author Joel Speerstra, however, has made a convincing case for the return of the pedal clavichord, not just as a practice instrument for organists, but as a concert instrument in its own right.<sup>1</sup> Speerstra has built a replica of a 1766 German pedal clavichord by Johann David Gerstenberg and he argues that one of J.S. Bach's most beloved organ works, the *C minor Passacaglia*, BWV 582, might actually have been meant for an instrument like the Gerstenberg.

Although the Gerstenberg has two manuals, Sykes used only one manual clavichord in addition to the pedal instrument. The pedal component was built by Charles Wolff of Canton, MA in 2006. Unlike the Gerstenberg, it has only the 16' register and no 8'. The manual component was built by Clifford Boehmer of Cambridge, MA in 1983 and is modeled after a Hubert clavichord of 1784.

The program was evenly divided between works of Dietrich Buxtehude (1637-1707) and of J.S. Bach (1685-1750). The pairing was especially appropriate, since Buxtehude was one of Bach's greatest influences. Sykes began with Buxtehude's *Magnificat primi toni*, BuxVW 203, a brilliant work which opens with contrasting upward-moving figures for each of the three

voices in turn. The pedal entrance came last, and the audience almost gasped at the first sounds they heard from the pedal component. At this first pedal entrance, it was clear that part of the excitement of this concert was getting the chance to see the feet of a great organist at work. Each variation is a fugal treatment of a verse of the canticle, and on a clavichord voicing is possible, so that we hear each entrance clearly. The upstairs chapel at First Church proved to have a wonderful acoustic for this instrument, as those in the very back could hear the softest dynamics perfectly clearly.

The other two Buxtehude works on the program were *Auf meinem lieben Gott*, BuxVW 179 and the *Ciacona in E minor*, BuxVW 160, a wonderfully regal work which we know that Bach studied.<sup>2</sup> One of the qualities that a performance on



Peter Sykes' pedal clavichord. Photo by Peter Sykes

a stringed keyboard instrument provides is an immediacy of rhythm that can sometimes be missing on the organ. In the *Ciacona*, Sykes' rhythm was rock-solid and the work marched forth triumphantly with each variation spinning out like a force of nature.

The trajectory of the second half of the program was quite similar to the first, beginning with Bach's *Partite diverse sopra il Corale "Sei gegrüßet Jesu gütig,"* BWV 768. This chorale partita is the grandest of all of Bach's chorale variation cycles for the organ. The first six of eleven variations are manualiter, while the remaining variations are pedaliter. Like the Buxtehude *Magnificat*, this is a work that in an organ rendition would be colored by different

registrations for each variation. Through his dynamic control and rhythmic savvy Sykes made each variation's individual character shine forth on the pedal clavichord. This work was followed by the lovely chorale prelude *Allein Gott in die Höh sei Her*, BWV 663. Although Bach specified it to be played on two manuals, Sykes managed it on the single manual, bringing into relief the beautifully ornamented tenor melody of the chorale tune.

The program closed with Bach's *C minor Passacaglia*, BWV 582. As Speerstra points out, a clavichord performance of this work has a built-in crescendo as each variation becomes more elaborate. So it was in this performance. Sykes employed the same narrative way of playing that he had used for the Buxtehude *Ciacona*, creating increasing excitement with each variation. When he finished it seemed that he had totally won over the audience to the pedal clavichord. Ω

<sup>1</sup> Joel Speerstra, *Bach and the Pedal Clavichord: An Organist's Guide*, Rochester University Press, 2004.

<sup>2</sup> Speerstra speculates that secular ostinato pieces such as this *Ciacona* and Bach's *C minor Passacaglia* may well have been meant as house music, to be played on an instrument like the Gerstenberg. It is a fascinating idea, fleshed out by Speerstra's tracing of the history of both the passacaglia and ciacona from Spain, where they originated as guitar pieces.

## Recital by Irwin-Brandon

Reported by Alan Durfee

Margaret Irwin-Brandon is well-known to BCS audiences, as she has performed several times for the society. Although based in Massachusetts, she has been increasingly peripatetic since stepping down as the director of Arcadia Players Baroque Orchestra. In May she inaugurated a new harpsichord by an Argentinian maker, Leopoldo Perez Robledo, in a recital in Buenos Aires where she will return next season to play the *Goldberg Variations*, and in July she played and taught in the Skalholt Summer Music Festival in Iceland.

Irwin-Brandon's program at BEMF was taken from the *Musikalisches Vielerley*, a published collection of music written by several composers, including Carl Fasch, (BEMF, continued on p.5)



## The Restoration of a Swedish Fretted Clavichord

Tim Hamilton

This instrument was sent by its owner, Dr. Gregory Crowell, to my workshop for restoration. The instrument gave every appearance of being made in Sweden in the second half of the 18<sup>th</sup> century. When first examined, it seemed to be of entirely amateur construction. The case, however, was very dirty, with a thick encrustation on the floor of the base, in the corners, and even to a certain extent on the key covers. Once this was cleaned off, one could see more details of the workmanship. Although the keyboard and hitch-pin rails were not accurately made, the case was a very decent piece of work. The keyboard seemed to be contemporary with the casework. Therefore I surmised that the instrument was made by an amateur builder who had had a reasonable instrument to copy. Possibly this builder had the case made up by a local craftsman but did the rest of the work him- or herself.

In the next four paragraphs I describe the instrument as it was when I received it. There follows a discussion of the restoration process.

**Case.** The case was made of good quality pine and nicely constructed. The case sides were dovetailed together and fitted to the base with treenails. The base had a simple molding around the bottom, the paint of which was much rubbed—as though the instrument once sat on a stand with a shallow lip on the edge. A molding ran along the top inside edge of the case sides. The lid was a simple glued up board with breadboard ends. It was attached with a pair of unmatched handmade iron strap hinges. The instrument was closed with a fallboard hinged to the case below the keys with more modern hinges. The fallboard had a lock which fit over a key keeper on the underside of the lid. Although it was quite old, I did not think the lock original. There was a storage box for strings, tuning key, etcetera, with a simple pin-hinged lid fitted in the front left corner of the case. The keywell endcheeks and the box lid were veneered and cross-banded with the same type and thickness of quartersawn wood as the natural key covers. There was a

nameboard but no sign of a name. The case was painted and grained on the outside. The paint was of some age and could date from around the first half of the 19<sup>th</sup> century. The inside of the case was painted much more recently. The surface underneath this paint had a few slight traces of an older finish.

**Braces and frame.** The keyboard balance rail formed a brace for the bass hitch-pin rail and ran from there to the belly-rail where another piece of wood continued on from the other side of the belly-rail to butt up against and form a brace and support for the wrestplank. There was a narrow case



The restored clavichord. Photo by Gregory Crowell

liner to carry the soundboard. The two-piece wrestplank was originally made of oak, although part had been replaced with a crudely cut piece of maple. The wrestplank was housed into the sides of the case and supported on glue blocks.

**Keyboard.** The keyboard, which appeared to be made of linden wood, was not very well constructed. The key levers were roughly cut out and the tails poorly carved, although the key spacing at the front was accurate enough. The key covers were made of wood which I could not easily identify. There were no surviving key fronts. The keys were guided by their tails running into a rack glued to the front of the hitch-pin rail. The rack also was not well made. The spacing was a little off, and the vertical sides were not parallel, making some of the keys a little too loose or a little too tight at the bottom or top of their travel. The balance pins were iron, with string woven through them in place of a balance washer. Some of the balance holes were badly worn. The tangents were made of copper, sometimes so thin that a number of the tangents had buckled.

**Soundboard.** In the relatively recent past the soundboard was taken out and lost,

but the bridge and some of the soundboard moldings survived. I think that in its original state the soundboard was a simple rectangle, but at some time in the past a curved extension to the belly-rail was added. This took the form of a regularly shaped half oval built out over the treble keys. This oval was quite small and had a cross brace. When the soundboard was glued to it, this would not have made for a very resonant area and the sound would not have been improved to any noticeable degree. The case liner still had traces of soundboard wood glued to it, which gave an indication of grain direction.

However, it was not possible to tell if these were traces of a first soundboard remade with the extension or a later completely new one. The tuning pins were handmade. They were not very uniform in length or diameter, nor were they very round. One was missing.

**Restoration.** Although the preceding description of the clavichord is written in the past tense, a great many features were not changed. Having made the decision to restore this clavichord, the most serious questions were whether to remove

the soundboard extension, to remove the quite modern paint on the inside of the case, to change the thin copper tangents for brass ones and, finally, whether to change the poorly made part of the wrestplank for something stronger, better fitting and more in keeping with the intentions of the maker. After discussion with Greg Crowell, it was decided to do everything on the list.

After the instrument was cleaned and examined, I disassembled the case. As shrinkage of the baseboard had sheared some of the treenails and the glue joints had failed, the sides were removed as a complete rectangle and then taken apart. It was now possible to remove the wrestplank from its housing. The case sides were then partially reassembled onto the base. A new piece for the wrestplank was made in European oak. The whole plank was placed back into its housing and the rest of the case reattached to the bottom. Next, the soundboard supports and other frame members were repaired and re-glued, as were both parts of the hitch-pin rail. Some iron nails and two bolts used to attach the hitch-pin rail and wrestplank were reinserted into their original holes.



The keys that were very warped and twisted were first put back into the clavichord to check for spacing and leveling, then straightened and leveled as required. The worn balance-pin holes were bushed in linden wood. The keyboard rack was quite noisy. As most of the keys were loose and rattled in their guides, the ends of the keys were bushed with thin strips of soft leather, which reduced the action noise. New brass tangents were made.

A new soundboard was designed. The one that worked best was from 2.2mm to 3.0mm thick with two cutoff bars. Once the soundboard was installed, the instrument was strung. The handmade tuning pins were difficult to use and space, as they were so irregular. A special tuning lever had to be made for them. The tuning that basically fitted the fretted keyboard was "the equal beating restrictive regular noncirculating almost one-fifth ditonic comma meantone temperament using Gottfried Keller's tuning rules of 1707."<sup>1</sup> Nevertheless not all the fretted octaves could be brought into tune with the tangents in their original position, as the guide rack was not made accurately enough. That this had clearly caused problems in the past was revealed by the fact that some of the tangents had been moved, sometimes more than once.

When strung up and tuned, the instrument proved to have a pleasant sound with decent volume. Ω

<sup>1</sup> Owen H. Jorgensen, *Tuning*, Michigan State University Press, 1991, 58.

#### Case dimensions

Length 1520 mm. Width 423 mm.

Height 120 mm.

Case sides 15.7 mm. average thickness

Base 27 mm. average thickness

Lid 19 mm. average thickness

#### Keyboard

Three octave span 485 mm.

#### Key cover lengths

Naturals 37 mm.

Accidentals 86 mm.

#### Key lengths

Bass 138 mm. front to balance point

220 mm. balance point to tail

Treble 138 mm. front to balance point

1231 mm. balance point to tail

#### Bridge

Treble, height 13.9 mm.

width at base 17.9 mm.

Bass, height 12.7 mm.

width at base 17.9 mm.

The string gauges used are calculated on a tension of A 430hz

Note	Length	Diameter	Material
C	1260mm	.60mm	Red brass
C#	1220mm	.60mm	"
D	1189mm	.56mm	Brass
D#	1160mm	.56mm	"
E	1131mm	.56mm	"
F	1099mm	.52mm	"
F#	1069mm	.52mm	"
G	1040mm	.48mm	"
G#	1010mm	.48mm	"
A	982mm	.48mm	"
A#	955mm	.48mm	"
B	923mm	.44mm	"
c	896mm	.44mm	"
c#	868mm	.44mm	"
d	840mm	.40mm	"
d#	816mm	.40mm	"
e	770mm	.40mm	"
f	753mm	.40mm	"
f#	748mm	.40mm	"
g	694mm	.36mm	"
g#	663mm	.36mm	"
a	636mm	.36mm	"
a#	614mm	.36mm	"
b	586mm	.36mm	"
c'	558mm	.36mm	"
c#'	534mm	.36mm	"
d'	509mm	.36mm	Iron
d#'	497mm	.33mm	"
e'	462mm	.33mm	"
f'	436mm	.33mm	"
f#'	417mm	.33mm	"
g'	393mm	.33mm	"
g#'	376mm	.30mm	"
a'	350mm	.30mm	"
a#'	328mm	.30mm	"
b'	314mm	.30mm	"
c''	291mm	.30mm	"
c#''	280mm	.30mm	"
d''	260mm	.30mm	"
d#''	240mm	.30mm	"
e''	228mm	.30mm	"
f''	206mm	.30mm	"
f#''	197mm	.30mm	"
g''	180mm	.30mm	"
g#''	174mm	.30mm	"
a'''	158mm	.30mm	"
a#'''	152mm	.30mm	"
b'''	138mm	.30mm	"
c'''	127mm	.30mm	"
c#'''	120mm	.30mm	"
d'''	113mm	.30mm	"
d#'''	102mm	.30mm	"
e'''	93mm	.30mm	"
f'''	85mm	.30mm	"

(BEMF, continued from p.3)

Johann Philipp Kirnberger, Carl Heinrich Graun, C.P.E. Bach, J.C.F. Bach and J.E. Bach. The collection was modeled after earlier publications with similar titles (*Musikalisches Allerley*, *Musikalisches Mancherley*) that were published without editorial attribution. But this collection, published in 1770 in Hamburg, bore C.P.E. Bach's name as editor. (It is currently available in facsimile from OMI Editions.) Although the majority of the music is for stringed keyboards, the collection also contains songs, organ pieces and chamber music for various combinations of instruments. True to the concept of showcasing the most "modern" ideas in music, the keyboard pieces have dynamic marks, so one may assume they are intended for the clavichord or the fortepiano. Interestingly, one of the songs is a clavichord song, the singer portraying a player addressing the clavichord directly as confidant and consoler. ("Du Echo meiner Klagen, Mein treues Saitenspiel...") "You echo of my woes, my faithful strings..."

Irwin-Brandon performed on a 1908 Dolmetsch-Chickering clavichord. This is one of a group of clavichords made in the Chickering factory in Boston by Dolmetsch that he modeled after a 1784 clavichord by Hofmann in his possession at that time. (The Hofmann instrument is now in the Yale Collection of Musical Instruments.) Irwin-Brandon played an ingeniously arranged selection of pieces from this collection: two fantasias (one by Johann Ernst Bach, the other by C.P.E. Bach) three sonatas (one each by Carl Fasch, Johann Christoph Friedrich Bach, and C.P.E. Bach), an arrangement of a symphony by C.P.E. Bach, and three polonaises ("alla polacca") by J.C.F. Bach and C.P.E. Bach. The variety of styles ran the gamut from light and pleasing dance pieces to tightly argued sonatas, tender adagios, and stormy fantasias complete with "a piacere" arpeggiated sections. Although theoretically intended "for amateurs," a great deal of technical prowess is required in much of the music, and all was performed with style and flair. The fantasias were notated without barlines (in certain sections of the J.E. Bach fantasia and throughout the C.P.E. fantasia), and Irwin-Brandon's fiery sense of dramatic improvisation brought forth the spirit of the music most vividly. The performance was like a delightful visit to the music room of an eighteenth-century musical connoisseur. Ω

(Geoffrion, continued from p.1)

the most dynamic instruments. All those who have taught the clavichord know well how unequal students are vis-à-vis the clavichord and how varied the choice of a clavichord for an apprenticeship can be. One notes that the weight of the arm facilitates the production of a clear tone and that the most physically frail pupils must work to optimize the usage of arm weight while those with heavier forearms need, on the contrary, to guard against playing sharp.

The evolution of the form of the keyboard is linked in many ways to transformations of playing technique. Let us consider several basic parameters that are in a close relationship with the manner of playing: the position of the balance point, the length of the keys, the length of the key front (distance from the very front of the key to the beginning of the accidentals), the octave span and the dimensions of the accidentals.

The balance point is very close to the keyboard on all clavichords, which implies a relatively short lever. Practically, this feature compels the interpreter to hold his or her fingers as close as possible to the edge of the keys, since the difficulty of producing a sound increases rapidly as the fingers advance inwards. The last third of the keys (near the nameboard) only serves for resting the fingers, not for playing.

In clavichords of the 15<sup>th</sup> and 16<sup>th</sup> centuries with the keyboard outside the rectangular case it would have been easy to make longer key levers while conserving the proportion of the balance point, but there seemed to be no need for that. By contrast, the octave span was at least as great as on modern pianos. Surviving instruments of that period have octave spans between 163mm (span of an average modern piano) and 169mm. This value was gradually reduced up till the 18<sup>th</sup> century. In 1750 most clavichords had an octave span between 154 and 160mm. This reduction in the width of an octave permits a more harmonic form of playing and creates a

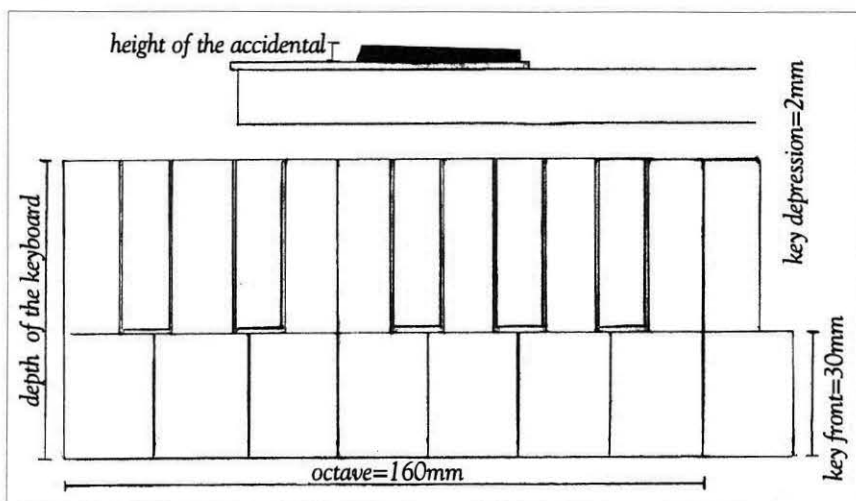
more comfortable proportion between the length and width of the key (it is very difficult to play chords on a keyboard where the keys are short and wide).

The length of the keys suggests a certain range of measurements for the key front which is a good indicator with respect to the position of the hand. With just a few exceptions this seems to be between 30 and 35 mm. until the 18<sup>th</sup> century. On such short keys the only way to place all the fingers, including the thumb, on the

than 40 mm. This permitted an evolution towards the recommendations of C.P.E. Bach and Türk with respect to hand position..

The minimal height of the accidentals is related to their height when depressed, which should be a bit higher than the height of the naturals. The majority of historical clavichords respect this principle, but one finds some where the accidentals are rather high. There is no advantage in making the accidentals higher than necessary other than to make the keyboard

of the clavichord resemble that of another keyboard instrument. The width of the accidentals tells us whether the keyboard has been conceived so that the naturals can be played in between the accidentals or not, which then affects the use of the thumb. Some makers have made the accidentals narrower on top than at the base in order to facilitate access to the naturals between the accidentals.



Anonymous Austrian clavichord, 1st third of the 18th C. Diagram by Renée Geoffrion

naturals is to hold the wrist low, a rather unnatural position which can only be used on an instrument with low tension, since the weight of the hand cannot be utilized in that position. One can hold the wrist higher, in a line with the forearm, if one advances some fingers into the spaces between the accidentals. This also is not possible except on clavichords of low tension and on condition that there is sufficient space between the accidentals, which is rare on 17<sup>th</sup> century clavichords, but found more frequently on the oldest clavichords with their greater octave spans. These two approaches certainly were prevalent in the early days of the clavichord. Another solution involved holding the forearm horizontal, with the thumb kept away from the keyboard, a fairly natural position permitting agility and force. Even though not ideal, this solution made it possible to play instruments of higher tension with dexterity and without too much effort (perhaps in the late 17<sup>th</sup> and early 18<sup>th</sup> centuries). It was only in the 18<sup>th</sup> century that keys were lengthened, particularly on unfretted clavichords, to a key front of more

Here my experience of modern construction practice confirms that musicians feel better with keyboards that resemble what they are used to, even if such a keyboard is not entirely coherent with the design of the rest of the instrument. One can observe that most copies of well-known historical clavichords have higher accidentals than the originals, and if they don't, the musician may well ask for higher accidentals.

A number of other parameters are worthy of consideration, such as depth of key depression, spacing of accidentals, and weight of the keys, all of which are involved in the construction of clavichord keyboards and directly related to the manner of playing. These will be the subject of part two of this article, my humble hope here being to shed a different light on the link between keyboard ergonomics and playing techniques. I also hope to inspire clavichordists to make use of a ruler in order to elucidate keyboard-related mysteries. Ω

<sup>1</sup> Bernard Brauchli, *The Clavichord*, Cambridge University Press, 1998, 255, 349.

<sup>2</sup> *Ibid.*, p. 74.