

The Arnold Dolmetsch clavichord of 1896–7
in the Edinburgh University Collection:
a restoration report by John Barnes

Introduction by Peter Bavington

John Barnes (1928–1998) was the curator, from 1968 to 1981, of the Russell Collection of Harpsichords and Clavichords, part of the University of Edinburgh Collection of Historic Musical Instruments. He was also the owner of an important private collection of keyboard instruments, a skilled and active maker and restorer of such instruments, and an articulate writer on organological subjects. In 1989 he completed the restoration of the collection's Dolmetsch clavichord and submitted this report to his successor as curator (Dr Grant O'Brien). It was published in the *Quarterly of the Fellowship of Makers and Researchers of Historical Instruments* (FoMRHI) in January 1990 as communication No. 961.

Anyone who restores an antique musical instrument has to reconcile two aims which are sometimes in conflict: the need to preserve the accumulated evidence of old musical and craft practices embodied in the instrument, and the need to put it into good playing condition. The view has been advanced that restoration is undesirable because it destroys evidence which future generations should be able to interpret for themselves. John addressed this question in an influential article entitled 'Does Restoration Destroy Evidence?' in the April 1980 issue of *Early Music* (vol. 8 No. 3). While not ruling out restoration altogether, he emphasized that it should not be an automatic choice, and that restorers should use methods which as far as possible were reversible and did not destroy evidence.

In order to promote discussion about such issues and to disseminate best practice, John encouraged the circulation and publication of restoration reports, and the present report is one of a number by him that were published in this way (regrettably, few other restorers have followed his example). It contains detailed descriptions of several techniques of what might be called 'conservative restoration'. Its interest, however, is very far from being merely technical: it is also a forceful expression of John's own beliefs about the clavichord, which he thought was still a widely misunderstood instrument at the time he was writing.

The subject of the restoration was one of the first group of six clavichords, made by Dolmetsch in the 1890s, which initiated the revival of clavichord making. Accordingly, John takes the opportunity to include in the report a concise history of this revival: he establishes that Dolmetsch's model was a Hamburg instrument by a member of the Hass family, which was fairly closely copied; he then shows how his later work developed after this excellent beginning, departing from historical models and – because of the enormous influence of his work – causing other makers to go even further in the same direction. John compares the resulting clavichords with the 'deviant' style of mid-twentieth-century harpsichords, now almost totally discredited. Furthermore, he puts forward a robust criticism of Dolmetsch's own ideas about the true role of an artist-craftsman (expressed in 1929).

It would be possible to contest some of the ideas contained in this report. What makes it so interesting to read, however, is the clarity and vigour with which those ideas are expressed, and the unique way in which detailed technical discussion is combined with a broad view of the subject.

Following restoration, the clavichord has been heard in many performances, and John's view that it is a fine instrument that deserved to be heard has been amply confirmed.

The BCS thanks Sheila Barnes and Edinburgh University Collection of Historic Musical Instruments for permission to reproduce this report.

History On the 18th December 1929 Arnold Dolmetsch wrote about the earliest group of his clavichords as follows:-

“In 1894 I began making clavichords, copies of a fine large instrument in my possession. The first went to Mr Fuller Maitland; Sir George Grove secured the second for the Royal College of Music; Herbert Horne decorated the third with inscriptions and paintings; it is now in a museum in Italy. The fourth is in my possession.

These instruments succeeded well, but I understood that copying other people’s work, the best training for a beginner, should only be a step to higher achievements. The masters did not copy one another. Feeling that I had imagination and skill, I endeavoured henceforth to realize my own ideals.”

There are references to these clavichords in Margaret Campbell, *Dolmetsch: the man and his work*, London, 1975, on pages 26, 68, 76, 82, 83, 87, 111 and 124. A price of “£40 or less”, presumably for these clavichords, is mentioned by George Bernard Shaw (*ibid* p 82).

The prototype for these instruments was formerly thought to be a Hoffmann of 1784 now in the Yale Collection (see Russell Collection Catalogue p 51), but this tradition is probably due to confusion with the later series of clavichords made when Dolmetsch was working with the Chickering Company (1905–11). In a letter to Belle Skinner (May 11, 1908, *ibid* p 237) Dolmetsch asks \$1000 for the Hoffmann clavichord and says “I suppose you would have no objection to my examining it, in case of need, for my new clavichords are made practically on its model, and I might want to refer to it later”. This reference to his *new* clavichords seems to imply that those of his earlier English period were different. In fact, the design of the present clavichord is so close to that of J A Hass as to leave no doubt that it is a Hass copy.

String lengths

	Hass 1761	Hass 1763	Dolmetsch 1897	
8ft				
<i>FF</i>	1471 mm	1473 mm	1461 mm	43%
<i>C</i>	1324 mm	1326 mm	1321 mm	58%
<i>F</i>	1209 mm	1213 mm	1207 mm	71%
<i>c</i>	1011 mm	1019 mm	1009 mm	89%
<i>f</i>	828 mm	834 mm	833 mm	98%
<i>c¹</i>	573 mm	565 mm	564 mm	100%
<i>f¹</i>	424 mm	424 mm	420 mm	99%
<i>c²</i>	289 mm	284 mm	283 mm	100%
<i>f²</i>	216 mm	212 mm	210 mm	99%
<i>c³</i>	145 mm	141 mm	132 mm	93%
<i>f³</i>	108 mm	104 mm	101 mm	95%
4ft				
<i>FF</i>	1110 mm	1117 mm	1107 mm	65%
<i>C</i>	915 mm	915 mm	915 mm	81%
<i>F</i>	786 mm	782 mm	782 mm	92%
<i>c</i>	611 mm		602 mm	106%

It is interesting to see how close a copy it is in many ways, showing that the clavichord revival started very much closer to 18th-century models than the harpsichord revival did. It is also interesting to notice the features that Dolmetsch did not copy. The most serious divergence was his substitution of front key guiding for the usual system of whalebone tongues in a wooden rack at the back. Front guiding tends to be noisier than is desirable in a clavichord. Hass' system of supporting the keys on two balance strings was also not copied, but Dolmetsch's system using balance washers, though not as positive and friction-free, is satisfactory. In place of several layers of woollen cloth used by old makers for the backtouch, Dolmetsch used two strips of green piano action felt with a combined thickness of 5.5 mm. This is rather hard and gives rise to noise as the keys drop back. It is not clear why Dolmetsch used bass tangents with tops much thicker than Hass. These are useful for open-wound covered strings and were used by Hubert for this purpose. Dolmetsch probably used covered strings for the 8ft *FF-BB*, as mentioned later, but the tangents do not correspond to these notes and are of 5 different thicknesses as follows: *FF-AA* 3.12 mm; *BBb-D* 2.49 mm; *Eb-G* 1.98 mm; *G#-c* 1.54 mm and *c#-f³* 0.88 mm. The tuning pins are handmade and are similar to Hass where they are visible above the wrestplank, with diameters of 3.3 mm from *d¹-f³* of the 8ft and 4.1 mm from *FF-c#¹* of the 8ft and all of the 4ft. Hass used three diameters in 1761, 3.4 mm from *f#¹-f³*, 4.1 mm from *FF-f¹*, both for the 8ft, and 3.2 mm for all of the 4ft. The actual Hass clavichord that Dolmetsch copied may, of course, have been different. Below the surface of the wrestplanks Hass' tuning pins were tapered and Dolmetsch's were parallel. Dolmetsch's pins were probably originally undrilled like Hass', but they now have holes which were probably drilled by Rhodes and Thomas, who probably also heavily scored the lower ends to improve the grip.

Dolmetsch has three transverse lines across the natural keys (Hass has four), but the sides are not rounded up to the first transverse line like Hass', being merely chamfered to remove the sharp edge. The carving of Hass' key tails is marked out by four transverse scribed lines, two of which remain as part of the decoration. These transverse scribed lines are missing in this clavichord.

The case is not quite as resistant to twist as Hass', in spite of Dolmetsch including a diagonal bar of beech which is absent in Hass' work. Consequently this clavichord has twisted a little more than most of Hass' instruments.

An interesting departure from Hass' design is the elongation of the 8ft bridge in the treble and bass past the lowest and highest bridge pins. Dolmetsch had probably observed the deterioration of sound which sometimes occurs near the treble end of old instruments where the bridge is cut off close to the top pin and had sought to avoid this defect.

The view of the copying of old instruments expressed in the quotation at the beginning of this report, i.e. that it is suitable training for beginners but should later give way to an individual style, is widely accepted. However, his statement that masters did not copy one another is tendentious and misleading. The established system was that masters trained pupils who copied their masters until they became masters themselves. Having become masters, they made small changes to the designs they inherited, mostly in response to changing demand, unless (like Cristofori for example) they were exceptionally inventive. The few inventive masters made big changes, corresponding to "sports" in the development of forms of life, but most changes corresponded very closely to biological evolution and occurred slowly in a series of small steps. Among craftsmen it is important to notice that they were usually proud to belong to an identifiable school of building working in conformity with current local designs. Even immigrant makers are usually found to have conformed to the practice of their adopted localities. Makers showed their quality in careful execution and good materials rather than in creating new designs.

The philosophy expressed here by Dolmetsch was very much that of the English Craft Movement in which William Morris was prominent. Copying was shameful, other than for beginners, and creativity was obligatory. Dolmetsch's period of copying seems to have come to an end while working for Gaveau in Paris and the clavichords he made in Haslemere (after 1917) had a 4-octave compass *C-d³*, with considerably reduced tensions and a seductively yielding touch.

The two strings of middle C on Dolmetsch no 6, strung according to the presumed original strings found on no 2 of 1894 (Royal College of Music, London), have a tension of 7.78 kg each at a pitch of *a¹* = 415 Hz (speaking length 564 mm, diameter .39 mm). The middle C strings on Dolmetsch no 36, 1922, at a pitch of 440 Hz have a tension of only 3.81 kg each (speaking length 454 mm, diameter .32 mm).

This is a large reduction and alters the character of the clavichord radically. It makes the instrument easier to play and makes it easier to produce vibrato, but considerably weakens the sound. Why such an instrument should have been preferred in the 1920's to those based on the more robust-sounding late-18th-century instruments is puzzling, but the most likely reason is that a *small* weak instrument seemed understandable and justifiable in their social context, whereas a *large* weak instrument (even though not quite so weak) seemed inadequate and rather ridiculous. If this is so, it confirms that it was no accident that

the early revival produced keyboard instruments which deviated from those of the 18th century. The change was deliberate and conformed to current musical demands.

The harpsichords of this period are seldom heard nowadays and present-day production is almost entirely in various old traditions. With the less popular clavichord, however, the deviation was less obvious and is not widely understood. The return to old models is not so well advanced, and deviant models are still in production and use, with lesser makers than Dolmetsch producing really feeble instruments in which heavy keys inhibit the sound still further and reduce the dynamic range. An ironic effect of this false tradition is that this instrument itself was restrung with thinner gauges than Dolmetsch used in 1897, making the sound weak and the touch squashy. It was mainly to return to the correct tensions that the present work was undertaken.

Previous work In 1951 J J K Rhodes and W R Thomas shimmed two soundboard cracks and repaired a break in the bellyrail with a new piece of wood attached with two screws. They also added a piece of thin plywood to the edge of the soundboard above the bellyrail which is glued and screwed down. They probably drilled the holes in the tuning pins and probably roughened the surface in contact with the wrestplank. All the tuning pins hold adequately, but some are rather tight and many are looser than is ideal.

Many of the keys had warped and these had been made to work in most cases by setting the balance pin so that the keyfront was tilted. The sides of two keys had been shaved, presumably because there was too little clearance between them.

Rhodes and Thomas replaced the original lid string, which had a coarse twist, as shown by the impressions in the top of the case where it had been trapped by the lid. They added three rubber buttons to the top surface of the stand to give the clavichord a three-point support, in order to allow for an uneven floor or a twist in the casework.

The strings which Rhodes and Thomas put on the instrument were as follows:-

8ft			4ft		
	core (steel):	close wrapping (enamelled copper):		core (steel):	close wrapping (enamelled copper):
<i>FF</i>	.21 mm	.31 mm	<i>FF-BB_b</i>	.18 mm	.11 mm
<i>FF#-AA</i>	.21 mm	.25 mm	<i>BB-D</i>	.18 mm	.08 mm
<i>BB_b</i>	.21 mm	.23 mm	<i>E_b-E</i>	.18 mm	.06 mm
<i>BB-C</i>	.21 mm	.19 mm		beryllium copper:	
<i>C#-D</i>	.21 mm	.18 mm	<i>F-G#</i>	.313 mm	
<i>E_b-F#</i>	.21 mm	.15 mm	<i>A-c</i>	.275 mm	
<i>G-A</i>	.21 mm	.12 mm			
<i>B_b-c#</i>	.21 mm	.08 mm			
<i>d-d#</i>	.21 mm	.07 mm			
	beryllium copper:				
<i>e-g</i>	.313 mm				
<i>g#-d¹</i>	.275 mm				
<i>d#¹-a¹</i>	.240 mm				
<i>b¹-f³</i>	.235 mm				

The total tension of these strings is about 500 kg, and Mr Thomas had left a note in the tool box that a pitch higher than about $a^1 = 414$ Hz might damage the frame. The case twist with these strings at this pitch was 4.5 mm. When the strings were removed the twist reduced to 2.0 mm.

The present work The strings from 1951 were removed, keeping the tuning pins in order. The existing backtouch gave rise to some key noise because it was too hard. It had every appearance of originality, being attached by 5 tacks which seem never to have been disturbed, and there being no sign of previous cloth having been glued in place. The use of this material was an obvious error on Dolmetsch's part and it was changed with the agreement of the curator in the interests of better musical performance. Three thicknesses of woollen cloth were substituted, using the same tacks in the same holes but including a slip of paper recording the date and my name. The old cloth is returned for safe keeping.

The keys had had little use and were not much worn, but the fit of many balance and guide mortices was rather loose and the limewood of the keys had warped considerably in many cases, probably due to less than ideal seasoning.

The fit of the balance mortices was corrected in 35 keys by applying a coating of Seccotine (a water-soluble fish glue) to both sides, allowing it to dry and then filing to fit, using a fine flat needle file. Where necessary, a second application of glue was used to build up the required thickness, and filed when dry. The balance pins were then tilted towards the left or right by dropping a tube over them and pressing the tube to one side or the other until the fronts of the keyplates were all horizontal. In several cases the adjacent key had to be removed temporarily because the tails were touching.

The loose guide mortices were next treated in the same way, applying glue to one side of 17 keys and both sides of another 14 keys. The gaps between the keys were next adjusted to be even throughout the compass by bending the front guide pins.

After this was done 15 keys were found to be misaligned at the back and a further 4 keys were found to be noticeably twisted. In the case of two sharps, $G^\#$ and $g^\#1$, the best way of aligning them seemed to be by removing the sharp top, bending the guide pin to align the tail and then regluing the sharp top in a suitable position. In all the other cases, the key was held firmly at the balance point in a horizontal position between the wooden jaws of a cramp, with masking tape round the balance mortice for protection and with a vertical piece of wood held firmly just touching the tail of the key on the side away from which it was to be bent. A wedge was then inserted to bend the tail of the key through the desired position and somewhat beyond, fixing the key in position giving about 3 times the desired bend. Steam was then played round the key over a length of about 90 mm behind the balance point, and maintained for about 1½ minutes. The key was allowed to cool and the wedge removed, to see if the key had received the desired set. If the tail position needed further adjustment the wedge was inserted again and steam re-applied. The keys that needed twisting were treated in a similar way, twisting the tail through about 3 times the desired angle of correction, fixing it and applying steam. If the first treatment did not produce an untwisted key the treatment was repeated. In this way all the keys were made to lie in their correct positions.

Finally the key fronts were levelled by using cloth washers of several thicknesses with assorted paper washers underneath.

While the tuning pins were removed a rubbing of the "string-plan" was made to enable detailed comparisons to be made with plans of Hass instruments.

Two sources of information were drawn upon for deciding the gauges of the 8ft strings to be tried. Since the instrument is a fairly accurate copy of Hass' design, the gauges marked on Hass instruments are obviously relevant. The equivalent diameters are those given by Grant O'Brien, *Organ Yearbook XII*, p 160, 1981. In 1968 I was privileged to work on Arnold Dolmetsch's clavichord no 2 of 1894 for the Royal College of Music and measured the strings which I presumed to be original before replacing them. These two stringing lists are given in the Table on page 5, together with the adaptation of Hass' list for the gauges supplied by Malcolm Rose. The fourth column gives the stringing which was finally adopted.

It is interesting to notice from the table that Dolmetsch's 1894 diameters below f are larger than the quoted equivalents of Hass' written gauge numbers. The explanation seems to be that Dolmetsch calculated these diameters in order to keep the tension approximately constant. The tensions for f , c , F and C are 7.56 kg, 7.92 kg, 7.06 kg and 7.88 kg respectively. Hass, on the other hand, gradually reduced his tensions towards the bass in this region of the compass, presumably to compensate for the gradually decreasing distances between the tangents and the hitchpins. These decreasing distances would otherwise cause the touch to become increasingly stiff. Hass' tensions, assuming the correctness of the quoted diameters, decrease from 7.18 kg to 5.91 kg over the same range $f-C$.

	Dolmetsch no 2, 1894, presumed original strings	Hass 1761, diameters by Grant O'Brien		Equivalent Hass, using Rose diameters	Adopted diameters
<i>FF</i>	covered	000	.71		covered
<i>FF#</i>					
<i>GG</i>					
<i>GG#</i>					
<i>AA</i>		00	.64		
<i>AA#</i>					
<i>BB</i>					
<i>C</i>	.67	0	.58	.56	.56 red brass
<i>C#</i>					
<i>D</i>					
<i>D#</i>	.58	1	.52	.52	.52 red brass
<i>E</i>					
<i>F</i>	.52	2	.47	.48	.48 red brass
<i>F#</i>					
<i>G</i>					
<i>G#</i>	.48	3	.42	.44	.44 yellow brass
<i>A</i>					
<i>A#</i>					
<i>B</i>					
<i>c</i>	.44	4	.38	.40	.40 yellow brass
<i>c#</i>					
<i>d</i>					
<i>d#</i>					
<i>e</i>					
<i>f</i>					
<i>f#</i>	.39	5	.34	.36	.36 yellow brass
<i>g</i>					
<i>g#</i>					
<i>a</i>					
<i>a#</i>					
<i>b</i>					
<i>c¹</i>					
<i>c#¹</i>					
<i>d¹</i>	.32	6	.31	.33	.33 yellow brass
<i>d#¹</i>					
<i>e¹</i>					
<i>f¹</i>					
<i>f#¹</i>					
<i>g¹</i>					
<i>g#¹</i>					
<i>a¹</i>					
<i>a#¹</i>					
<i>b¹</i>					
<i>c²</i>	.29	7	.28	.30	.30 yellow brass
<i>c#²</i>					
<i>d#²</i>					
<i>e²</i>					
<i>f²</i>					
<i>f#²</i>					
<i>g²</i>					
<i>g#²</i>					
<i>a²</i>					
<i>a#²</i>					
<i>b²</i>					
<i>c³</i>					
<i>c#³</i>					
<i>d³</i>					
<i>d#³</i>					
<i>e³</i>					
<i>f³</i>					

The gauges of the 4ft strings are not marked on Hass instruments and I did not record the diameters which were on Dolmetsch no 2. However there are 4ft gauges marked on the Fritz clavichord of 1751 (Victoria and Albert Museum, London) and these were followed for the Dolmetsch.

Fritz			Adopted equivalents using Rose diameters	
<i>FF-FF#</i>	gauge 3	.42 mm	<i>FF-GG</i>	.40 mm red brass
<i>GG-AA</i>	gauge 4	.38 mm	<i>GG#-BB_b</i>	.36 mm red brass
<i>BB_b-A</i>	gauge 5	.34 mm	<i>BB-A</i>	.33 mm yellow brass
<i>B_b-B</i>	gauge 6	.31 mm	<i>B_b-B</i>	.30 mm yellow brass
<i>c</i>	gauge 7	.28 mm	<i>c</i>	.27 mm yellow brass

The scaling of *c* in the 4ft is 6% above that of the 8ft at *c'*, and Hass may have intended a few of the top notes of the 4ft to use iron wire to avoid breakages. However, brass was found to be satisfactory at this scaling and pitch and was therefore used.

The covered strings on notes *FF-BB* found in 1968 on the 1894 clavichord are believed to be original. In this, Dolmetsch was not following Hass but may have been following Fritz 1751 who used a closely similar design to Hass but used covered strings for *FF-C* inclusive. I have followed Dolmetsch in the provision of covered strings, but their tensions are designed to fit in with those of the lower plain strings whose diameters are based on Hass'.

	Core	Winding	Pitch	Winding angle	Tension
FF	.36 brass	.40 copper	1.72 mm	54°	4.09 kg
FF#	.36 brass	.40 copper	1.88 mm	52°	4.30 kg
GG	.36 brass	.40 copper	2.07 mm	49°	4.52 kg
GG#	.36 brass	.40 copper	2.29 mm	46°	4.75 kg
AA	.36 brass	.40 copper	2.54 mm	43°	5.00 kg
BB _b	.36 brass	.40 copper	2.94 mm	39°	5.25 kg
BB	.36 brass	.40 copper	3.47 mm	35°	5.52 kg

The plain string diameters were based on column 3, but were modified empirically according to the feel of the touch and the quality of the sound. Notes *e³* and *f³* seemed to benefit from the thinner gauge and there seemed to be an advantage below *c²* in changing to thicker wire at points a few notes higher than is derived from Hass. Below *c*, the tension was allowed to decrease, following Hass rather than Dolmetsch, and the covered strings continued the reduction of tension.

After stringing, it was discovered that the set of the bridge pins on notes *FF-BB* was not ideal. These strings have reverse side-draft in Hass' design and for some reason Dolmetsch did not follow Hass in his angle of tilt of these bridge pins. Dolmetsch's pins were too nearly vertical to achieve good contact between the strings and the bridge. A close-fitting metal sleeve was prepared, to drop over the pins and bend them to a similar angle to Hass' bridge pins without damaging the bridge.

Some of the tangent heights above the key surface were found to be inconsistent, so some small adjustments were made so that the key dip with the key depressed just to the point of contact with the string varied smoothly from 2 mm at the top notes and 3.1 mm in the middle to 3.7 mm in the bass.

Dolmetsch seems to have used (and perhaps originated) an untraditional method of listing using white piano celeste felt (used on some upright pianos c1880 between hammers and strings for a soft-pedal effect). This was usually cut in strips about 50 mm wide and tucked down in small loops between the courses. For the sake of its appearance as a Hass copy, however, the traditional listing method was used, with a ribbon of red boxcloth woven between the courses.

The baseboard mouldings at each end of the case had become loose and were reglued. There was some casework damage, mainly to the baseboard mouldings at the front and sides, but the curator decided against having them repaired.

When the instrument was playable it was discovered that in spite of the tightening of the balance and guide mortices the keys were still noisier than those of a clavichord should be. With the agreement of the curator a trial was made on middle C of a bushing method for the guide mortices which is completely reversible. A pin was prepared having a diameter at the lower end of 3.17 mm like the Dolmetsch guide pins and a diameter at the upper end of 1.8 mm for the part on which the key slides. This left room in the existing mortice for a patch of doeskin on each side of the pin. The result is entirely successful and makes the key as quiet as that of a traditional back-guided key. If the instrument is to be used for recitals or recordings, as its fine quality justifies, I recommend that this alteration is carried out for all the keys.

The total tension of the present stringing is approximately 830 kg and this has inevitably twisted the case more than the tension due to the previous stringing. The twist after stringing at $a' = 415$ Hz was 7.3 mm.

This instrument is one of a group of instruments which holds an important position in the revival of early keyboard instruments and is an excellent example of the work of one of the most respected of instrument builders. However it also has a status as a Hass copy of fine quality which is remarkably true to its prototype. Its dual character as a Dolmetsch original and as a Hass copy has influenced the decisions which were made during the present work. The aim has been to produce the best playing qualities while working within the limitations of good conservational standards. The changes which have been made to Dolmetsch's known practice, i.e. the softening of the backtouch, the reduction of the gauges of the lower strings, the use of red brass in addition to yellow brass, the tilting of the 14 bridge pins, the substitution of traditional listing and the experimental bushing of one key, have all been performed reversibly and with the aim of making the instrument a better copy of the Hass.

The instrument was played by John Cranmer at the AGM of the Friends of St Cecilia's Hall and the Russell Collection on November 22nd 1989 and it is gratifying that its return to good order is in time for the 50th anniversary of its maker's death (February 28th 1990).

The following parts are returned for safe keeping in a labelled box:-

- Original front guide pin from key c^1
- Original green backtouch cloth (2 strips)
- Original or Rhodes and Thomas balance washers
- Possibly original felt listing (cream coloured)
- Possibly Rhodes and Thomas felt listing (white coloured)
- 2 leather tuning wedges (R & T?)
- R & T covered strings
- R & T black ribbon (run between guide pins of FF and f³)
- Note to tuners by W R Thomas dated Dec. 5th 1951
- Rubbing on tracing paper with dimensions marked

John Barnes
Edinburgh, December 1989