Harpsichord & fortepiano

Vol. 14, No. 2 Spring, 2010

Musical Instrument Research Catalog
(MIRCat)

MODIFYING MODERN HARPSICHORD DAMPERS

TO REGAIN HISTORICAL SONIC AND MAINTENANCE BENEFITS: A DO-IT-YOURSELF APPROACH FOR OWNERS

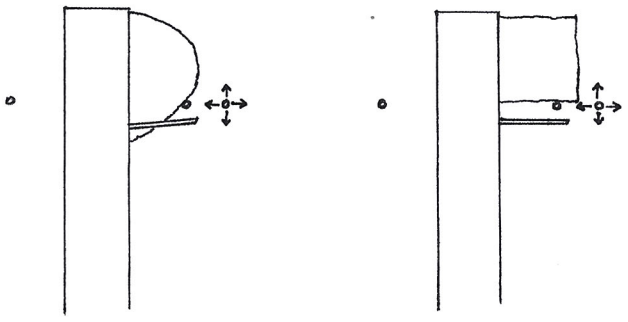
By Paul Y. Irvin

When harpsichords began to be produced again in the twentieth century after almost a century's cultural absence, many features and performance intentions of the modern piano appeared in them. These features included steel strings, metal frames, cases with open bottoms, and heavy blocks of felt used as dampers as seen in Pleyels, Neuperts, Morleys, Sperrhakes, etc. Most of these features have almost disappeared now with the interest in historical methods of construction. However, although, the flag-damper-in-a-slot now used in most modern harpsichords and in antique restorations, appears to resemble one kind of historical damper, it usually retains more characteristics of piano-inspired dampers than the qualities the original makers designed their dampers to have. This article will first briefly describe the properties of historical dampers and their considerable sonic and maintenance consequences compared to the common modern damper approach. Then I will describe a simple method that harpsichord owners can use to modify the common firm, slot-held flag damper in order to regain the historically intended benefits. Explanations of the historical evidence will be found in the Appendix at the end of this article.

Historical Benefits and Features

Without reliable written records it is impossible to state the motivation of makers who have been dead for 200 to 400 hundred years, but we can examine the consequences of their decisions from such details as string spacing, plectra lengths, damper slot depths, the required characteristics of cloth, etc. (discussed in the Appendix). It turns out that the consequences of using historical dampers rather than typical modern firm and/or rectangular ones are: quicker, quieter and more complete damping; much decreased need for maintenance; and, on multi-register harpsichords, additional tonal colours as well as increased resonance from sympathetic vibrations (the "cathedral effect"). Given the amount of historical evidence for them it would seem natural, and even a requirement, to use historical-style dampers on copies of historical harpsichords, and also certainly on restorations of antique harpsichords. But even where strict historicity is not of interest to a harpsichord owner, the musical and maintenance benefits make the historical approach to dampers very desirable to have on any harpsichord.
First, it is important to understand that there are two major features of the historical harpsichord damper that are essential to get the results expected historically, along with a third factor that also helps damper performance as well as regulation ease. These three factors are damper shape, cloth properties, and damper grip.

The typical historical round or slope-sided shapes achieve several functions which the modern rectangular damper generally cannot: they simultaneously damp the horizontal as well as the vertical vibrations of the string for quicker and more complete silencing; they reduce the possibility of interfering with the vibrating strings of opposing facing jacks (especially important where these strings can have a large motion as in the bass); and these shapes reliably leave the strings free to vibrate sympathetically when the register is moved to the off position, a prominent characteristic of historical harpsichord sound that is missing when rectangular dampers are used in singles and doubles.



[Fig. 1: Drawings of vibrating neighbour string clearances for a) historical and b) rectangular dampers. All drawings are to scale with typical historical string spacing.]

In contrast, **the modern rectangular shape** is intended to rest on the string in both the on and off position of the register. To do this the register movement must be very small (especially if typical historical string spacing is copied – see Appendix).

If the register moves too much, dampers may drop off their strings in the off position and then cause the register to resist being pushed back on again, or the forward lower corner of the damper may get so close to the neighbouring string that it is in the way when that string is vibrating, thus causing a muffled sound (especially a problem in the bass). This close distance can also often restrict the amount of plucking force that can be used in an instrument. Since with the modern approach the dampers always silence all the strings, single- and double-manual harpsichords sound drier than when equipped with historical dampers. **The more resilient historical damper cloth** smothers the string vibrations without rebounding, thumping, buzzing against, or otherwise strongly resisting its encounter with the string. This greater historical resilience allows a significantly larger range of efficient performance. If the damper is set slightly lower or further out than is optimum, the cloth shape just temporarily deforms slightly, allowing the jack to come to rest on the key and the string to stay in its rest position. This resilience makes adjusting double dampers - so that both of them are in contact with the string - very easy (see Appendix). Compared to using the typically stiffer modern cloth, the historical self-adjusting softness gives quieter silencing of the string, less resistance to register movement, and tolerance for a wider range of humidity conditions without the need for adjustment of dampers. Since **modern rectangular dampers** were intended to rest on their strings in both the "on" and "off" position, a rather **stiff cloth** (such as piano centre cloth, which sometimes is red on the outside and white in the middle layer) was needed; this was in order to maintain clean edges and sharp corners to reduce possible interference with other strings and to be strong enough both to maintain its shape when just a small portion of it is in contact with a string in the off position, and to stand up to the fairly strong grip needed to hold this hard cloth accurately in position.

This stiff cloth can cause the damper to make a buzz as it comes into slow contact with a vibrating string, or a thump as it drops on a string, or even to sound a tone when it rebounds quickly off a string during fast playing. If this style of damper is set too low or too far out in a tight slot, the jack can end up hanging by its damper, thus causing several possible problems:
a) Eventually, the stiffer damper can set into a distorted shape and compromise its ability to damp accurately
b) The vibrating string over time can wear a notch in the damper at the point where it meets the unyielding cloth
c) A curved, but stiff shape can push the string slightly away from the plectrum when the damper descends. This can cause inconsistent plucking performance (particularly where dampers are set very close to the plectra level as with back 8' and 4' jacks).
If the **damper slot** does not **grip** well enough, a stiff damper can be knocked out of position

from the force of hitting the string. If a damper slot grips too well, the collective resistance of a whole register of these stiff dampers can cause a register to spring back slightly from being turned completely off or on, causing "ghosting" or uneven plucking. Stiff dampers in firm grips have a very narrow range of efficient performance and need to be very carefully set, and also frequently adjusted due to both damper wear as well as case and soundboard movement caused by humidity changes. When the damper grip itself is somewhat resilient, as in historical slot and damper matches, the range of effective performance is significantly increased, and the need for regulation is decreased.

Regaining Historical Benefits

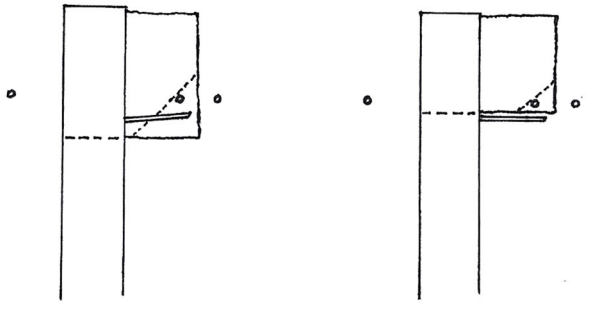
Naturally, making a harpsichord with appropriate damper cloth cut to efficient shapes fitted into properly sized damper slots is the ideal, whether to recreate historical practice or to create a harpsichord with more musical possibilities and fewer maintenance needs. If your harpsichord already has such dampers, congratulations, and enjoy! But in order to achieve these historical benefits in harpsichords not originally built with this approach, owners might have to replace all their dampers, or possibly even all of their jacks, if certain features are missing. This latter remedy, in turn, would necessitate new plectra, voicing and regulation, and more cost and work than most people would want to undertake.

However, the increased resonance, the added registral colours, the quieter, quicker and more complete damping, and the decreased maintenance provided by historical dampers can be largely realised without so much expense and work, and usually without even replacing the present dampers –simply by using a pair of small scissors and the following guide.

The main points to keep in mind as we retro-fix for the benefits of the historical damper are the sloped or rounded shape, an increase in the resilience and give to the damper's engagement with the string, and a proper amount of grip (not too tight, not too loose) between the cloth and the damper slot. Please read this entire section through at least once in order to understand the various relationships involved and the appropriateness of them for your instrument before you begin any modifications of your dampers.

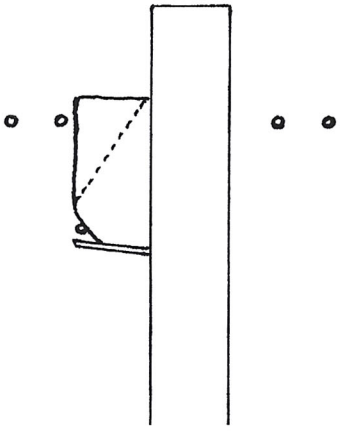
Shape: I find that a pair of cuticle scissors works well for trimming damper cloth. If your dampers are very thick, or very dense, you may need to use a stouter pair of scissors. Cut a slanted or curved lower edge on your present damper so that, in the on position, it meets the string at approximately a 45-degree angle. This angle of encounter damps the horizontal and vertical vibrations of the strings simultaneously and equally, and, when properly positioned, leaves the string undamped when that register is turned off. (If, when a properly damping jack has its register turned off and the jack drops a little bit, then it is set too low in its slot and needs to be raised.)

If your jacks have angled plectra, you should be able to shape the bottom damper edge all the way back to the damper slot as in historical practice. If the damper slots of your instrument do not go below the level of the plectra and if your jacks have horizontal plectra (rarely found on historical harpsichords), you may need to keep the curve just at the end of the damper on the back 8′ and the 4′ jacks where the plectra need to rest closer to the strings.



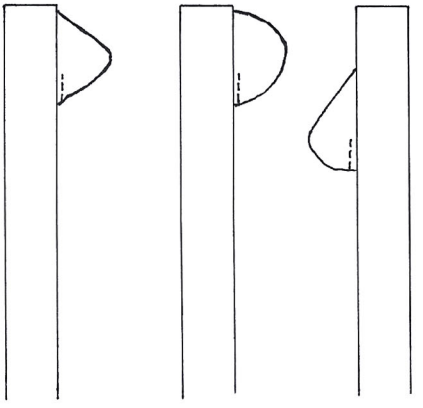
[Fig. 2 Drawings of bottom shape – a) for jacks with angled plectra and deep damper slots, and b) for horizontal plectra with slots cut even with the plectra.]

Especially with 4' dampers it is also good to slant or curve away the upper corner of the damper to ensure clearance with the 8' string above, particularly if typical historical string spacing is used on your instrument. Since this upper cut also makes the end of the damper somewhat more giving and less stiff in its engagement with the string, you may find it useful to do this to the 8' dampers as well.



[Fig. 3: Drawing of 4' damper top cut for 8' string clearance, and increase of resilience. Note typical historical 1.0 mm spacing of 4' string from 8' strings spaced 2.5mm apart.]

Resilience: The purpose here is to create a damper that does not actually hit the string upon descending but only smothers its vibrations. Probably the quickest way to significantly increase the resilience of a somewhat stiff damper is to make a short upcut (with the cuticle scissors, or with the knife used for voicing) on the lower edge of the damper close to the jack (but not right against the jack, since you may want to adjust the damper deeper into the slot sometime). This cut might be 1/4 to 1/2 way up the damper, depending on the size, stiffness, and thickness of the damper, and on the size of the string vibrations it has to silence. Start the cut small and increase it until you get the desired effect of smothering the vibrations with virtually no impact against the string. Reducing the strength of the connection of the damper to the jack with this upcut will result in the far edge of the damper being more independent and flexing a bit this way or that, depending on the damper's height and distance adjustment. As long as this bending is not excessive enough to result in permanent distortion, or interference with other strings, its effect will be to increase the range over which the damper will work effectively without needing adjustment for case and soundboard swelling or shrinking due to humidity changes.



[Fig. 4: Drawings of different damper shapes with upcuts to increase resilience]

This upcut technique also makes it easier to install a second damper on a jack for those strings that need quicker or more complete quieting than one damper can provide, either because of strong string vibration, as can occur in the bass, or due to a single damper coming down on the nodal point of a strongly vibrating overtone, in such a case leaving that overtone sounding while the rest of the sound is damped. For both of these situations, a second damper can be glued directly to the damper on the opposite side from the damper slot. (For plastic jacks use rubber cement and roughen the plastic surface before gluing with a small piece of sandpaper, an emery board, or a small file.) The second damper should be aligned slightly lower than the already-working damper, just to be sure that it is low enough to do its job. After the glued-on damper has dried, the damper is shaped both top and bottom like its partner, and then an upcut is made to ensure enough resilience so that both dampers will contact the string when the key is released. By this means, neither damper holds the jack up off the key and prevents the other damper from settling on the string and completing its job.

Grip: The objective here is to hold the damper reliably in position without either a powerful grip that crushes the cloth and makes it

unnecessarily difficult to adjust, or with too loose a fit that allows the damper to be pushed out of position while playing, but ideally to provide a range of give to the damper in its slot so that it can adjust to small changes in the position of the strings. (If you have lived with your dampers satisfactorily in this regard for a while and the first two changes above are working well enough, you can skip this step.) An overly tight grip can often be found with plastic jacks since their smooth surface (even when teeth or ridges are present) makes it difficult to grip the cloth. Frequently when owners find their dampers moving around in the smooth slots they fit thicker damper material.

This response often just flexes the damper arm outward at the top and gives a tight fit on the bottom of the damper and a loose fit at the top, so that the damper pivots away from the string upon repeated contacts. If your jacks' damper slots are sized to grip the cloth very tightly, you may want to fit thinner, softer cloth to begin with and then shape and upcut as necessary, as described above (or the shaping and upcut modifications might be all that is really needed to achieve the historical benefits). If the slot is too smooth, or just a little too loose to hold the cloth well, the friction can be increased by applying a thin coating of rubber cement onto one or both sides (as needed) of the edge of the damper that inserts into the slot, and allowing it to dry before the damper is reinserted. If there is a problem with dampers pivoting up because they are tight in the bottom of their slot but loose at the top, the rubber cement can just be applied to the top half of those edges. In most cases a thick coat of cement is not needed; only the introduction of the rubber's greater friction is required for gripping, so do not try to put on too much.

Summary

There is much evidence embedded in the features of historical harpsichords that reveals the working shape, resilient cloth, and resilient grip used in historical dampers. There are almost no extant antique dampers that are not round or slope-sided. So, unless some contrary evidence appears, or all the present evidence discussed here can be reasonably reinterpreted otherwise, there appears to be no historically defensible reason to continue using rectangular, and/or firm, and/or tightly held dampers for the majority of antique harpsichords, or their copies. There are, however, many good historical, musical, and maintenance reasons to use historical dampers in any harpsichord, whether of historical or modern design.

Understanding the very useful performance consequences of historical damper designs makes it obvious why the historical makers did the extra work needed to make them, rather than making the easier stiff, rectangular damper.

The historical harpsichord makers evolved an integrated system of features and materials that efficiently achieved their intentions as to how a harpsichord should sound and work. The understanding of some of these interrelationships was lost during the break in harpsichord manufacture in the nineteenth century. Modern sound and performance assumptions were applied during the 20th -century rediscovery of harpsichords and restorations of the antiques; these new assumptions resulted in changing the sonic and performance characteristics of historical harpsichords.

Closer inspection of the historical evidence as a system, rather than as individual parts, can reveal possible original intentions, while subsequent judicious modifications to current practices can bring us closer to realising the intended historical sound and performance qualities. Applying this system approach to dampers reveals a way of modifying modern rectangular harpsichord dampers that can provide a more resonant sound, expand timbral possibilities, and reduce maintenance while getting us, in the twenty-first century, closer to the sound and playing qualities enjoyed historically.

I wish to acknowledge very grateful appreciation to Richard Troeger, Ken Eschete and Carol Linne for their ideas and suggestions that made this article better organised, more balanced, and easier to understand, and to all the researchers who uncovered all the early keyboard information that made this paper possible.

[Ed: There is an appendix to this article entitled " **Historical Evidence for Historical Damper Qualities"** *which explains in further detail, which can be found at* publications.earlymusica.org*]*