Grand Damper Regulation

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(Notes by Dean Petrich)

Different manufacturers have different ways of doing adjustments from each other. Most manufacturers get the damper system adjusted so well that we don't have to do anything. Tuning is actually much more difficult than damper work. Often technicians think dampers are difficult because they don't often need to do much with them.

Doug brought some damper models for demonstration. There are eight different adjustments for the wire alone, and each adjustment affects everything else. Take a damper wire and bend it back and forth until it breaks so you know the tolerance of the metal. Steinway insists that the damper wire be firmly placed in the head so there is no play. If the head is loose on the wire, tighten it up with a little epoxy or fresh superglue. Breathe on CA glue because moisture speeds up the process. Doug carries a kit of thick, medium and thin CA glue with him.

Steinway builds their damper guide rails with the cloth intentionally sized with the hole bigger than the wire so there is play in there. Possibly the reason is that the damper wire won't hang up if there is moisture during a concert. Yes, if feels great to have zero play ideally, but for performance pianos it is wise to have the hole a bit forgiving. Steinway puts a little pressure on one side of each damper wire. When assembling a damper system, Steinway takes time to line up all the damper felts how they will look before gluing them on. This slight pressure does help. However, it could be possible to find a little more pressure than what is ideal.

We might not notice this pressure until the nickel oxide is rubbed off the wire and the damper starts working more slowly. Test by pressing the key how much pressure there is. Often if you find one damper wire hanging up, more than likely the whole section is adjusted the same way. Since the action is already out, it doesn't take long to go down the whole set and check each one.

Sometimes there is pressure on the side of the damper guide rail hole because the wire is actually angled. In fact, all of them might be crooked. If you don't need to change something, it's probably better to leave it alone. Change one thing on a damper and several other things will be changed. Particularly new pianos from the factory that might look "off" could be there for a reason, because factory damper installers know a lot more than most technicians.

Look at the excellent quality of the agraffe drilling on the newest Steinways. The spacing between strings on any piano is not always perfect. In the factory it is more important to have dampers look perfectly spaced than to have them work perfectly. Sometimes the dampers are tilted so they look square. Most customers go by looks. The same goes with travelling hammers. When people look down they look for the evenness of the keys and the hammers rather than exactly where they are striking and how they are travelling. Don't fix it if it ain't broke. Yet, sometimes dampers do need to be adjusted.

There are six points of adjustment.

1. Tilt bend
2. Moves spacing left or right
3. Travel bend, after the head comes out of the strings and you pump the pedal does it go straight up and down or move
4. Bottom is the pressure against the guide rail hole
5. Rotational twist of the head

6. Set screw

The Steinway factory uses only three tools for adjusting dampers.

1. Damper hook for the space between bends 1 & 2. If you're skilled you can change both bends at the same time. Otherwise, do one at a time. It's not like a screwdriver and twisted; it is more of a arc.
1. Oger Tiny duckbill pliers: unscrew and remove the damper, hold the section of the wire with the pliers, and press the bend into the wire with the thumb

Clean & lube worn damper wires

1. If the damper wires are worn, use Flitz to clean & polish them.
2. Lubricate with McLube
3. Wet the damper guide rail cloth with McLube

To replace one single bushing felt:

1. Cut a piece of guide rail felt to fit
2. Remove the action and the one damper that has the bushing missing
3. Roll the felt and stick it up into the hole from underneath, with the seam towards the front, toward the player, so the pressure is not right on the seam
4. Poke a capstan wrench up into the hole and work the felt up into place.
5. Replace the damper and action

To replace an entire set, cut strips long enough for about ten holes at a time. If the felt is longer than that the felt will wear as it is pulled through all the holes. The factory uses a long strip, run it through, pinch it and let it spread top or bottom. Take a screwdriver that is bigger than the damper wire, grind the end off, and guide the felt in.

If the bushing has closed down a bit, remove the damper and work the hole from both the top and the bottom with a capstan tool.

Lubricating damper levers

1. Alcohol and water, mixed 50:50 and let it air dry
2. Protek
3. Steinway bushings are sized in methyl alcohol. Put a drop on each bushing. It will resize the bushing. The lubricant will firm up and stay there.
4. Re-pin slightly loose
5. If there are more than one or two that are tight, check the whole set
6. McLube

Voicing

1. Squeeze two wires together more; check the hammer voicing after squeezing
2. Tilt the head left or right
3. Lightly saw the division between the tri-chord felts with a razor blade held with vice grips. Pianotek sells boxes of 100 razor blades at a good price.
4. Shave the fuzzy whiskers off the sides with a fresh razor blade

5. To eliminate the oinking damper, the tri-chord wedge is the cause. String clean Damper felt in good shape Use 150-120 grit sandpaper, pull the paper under the flat felt. Soften the flat felt by removing the crust. Favor the flat.
6. Tilt the damper so the flat contacts the strings first. Tilt the head too far, then ease it back with the fingers a few times until the sound goes away. Use this tilting technique right at the end after getting everything else. Adjust the tilt by ear.
7. Have the strings been leveled? Is the piano in tune?

Pedal

Watch closely as the damper comes off the string. If there is a noticeable shift on that one and not the others, determine if that one is the only one off or if that one is good and all the others are off. Don't consciously put a tilt on the bass dampers.
The lift with the pedal is done with the capstan. The lift of the lever is done with the spoon.
Steinway wants the sostenuto to feather rather than be even so it's not noisy.

Adjust the tray by setting the pedal rod in place to align the wooden under-levers.
Set a shim under the key and press down the key until the thumb matches the adjacent key with one hand, and at the point they match the other hand should feel the damper starting to move.
Set the pedal rod in

Set Screws

Set the screws gently the first time.
The second time, tighten them more with a screwdriver after the dampers are aligned.
The third time if your lift is wrong, you can pry the wire out of the hole with pliers. If you need to twist the damper after the third tightening, instead of rotating the wire in the hole you are actually twisting the wire. Plant your foot on the pedal and run your finger on the backs of all the dampers to make sure none of them turn.
The earlier it lifts the heavier it feels, the later it lifts the clunkier it feels. An early lift makes legato easier because the dampers stay up a little longer.

Thumping

The leverage in the pedals in the small pianos happened in the
The damper system is close to the pedal in the small pianos. The pitman/lift rod is direct, so the dowel moves just about the same as the pedal rod. In the B the point is farther back, and the D is even farther back. Therefore all the small pianos used to have a heavy pedal. Now the trapp lever for the S, M, L, O, and B are all the same. The recess points are all the same. The pivot blocks are turned around so there is now more control over the pedal and the pedals are a lot lighter to push. To eliminate the thump, build up the cross felt so they won't drop as far; then re-drill and move the pivot point. Get nylon inserts and copy what is in the piano. Then they won't thump.

Strumming is due to the felts landing at the same time.

- Tilt each damper slightly so the wedge comes up while the flat is still touching, it can't make any noise.
- Trim the ends of the wedges.

Floating pitmans

- do not make noise
- have no friction
- make regulating easier

Captive dowels come up at more of an angle, causing more friction which results in squeaking. Although captive dowels are the original Steinway design, it is easy to drill some holes and to reconstruct the pitman to float.

Down to the Wire

Grand Damper Regulation
Class Hand-Out
Doug Wood, RPT

Dampers have a bad reputation for difficulty among many piano technicians. This seems to be true for several reasons. First, it is hard to get any practice without getting into trouble. Second, the difference between "almost right" and "really right" is often the difference between a damper "working hard" and "hardly working." Third, most of the adjustments are done on a single soft brass wire.

In fact, there are at least eight different adjustments to the damper wire that may need refinement in the field! Each adjustment affects the others to some extent, and all require very small changes.

There are three adjustments of position:

- Timing, adjusted at the damper top flange screw
- Spacing side-to-side, so the felt blocks are over the string properly
- Spacing fore-and-aft, so the damper set looks good, and the felt blocks do not sit on string nodes

There are three "attitude" adjustments:

- Roll (tilting the damper head side to side)
- Pitch (do both ends of the damper head lift at the same time?)
- Yaw (does the head rotate as it comes off the string at the wedge felts, and is it parallel to the strings with the flats?

The two other adjustments are:

- Bearing (pressure) on the guide rail bushing
- Angle of travel through the guide rail bushing

There are other adjustments in some damper systems, including separate adjustments for key and pedal lift, with a spoon and capstan. One can also adjust the sostenuto tabs by shimming or hot-pressing their stop felts, and by gently bending the wire fore-and-aft at the top of the under-lever.

THE FOUNDATION

Good regulation in the damper system requires a good foundation, just as it does in the action. This includes assuring that the following are in good shape:

- Trap-work and pedals
- Key end felts
- Tray felt (top) parallel to key end felts
- Under-levers in good shape (centers, springs, leads, etc.)
- Wires smooth and clean, right length, tight in heads
- Guide rail bushings OK
- Damper felt blocks in good shape

Any shortcomings in the foundation will become more obvious as the regulation of the damper system is refined.

A note on tools:
In this class, three tools do most of the work:

- Damper hook
- Large duck-bill pliers with serrated jaws
- Wire bending pliers

These tools are in use in the Steinway factory in New York. Note, however, that in the Hamburg factory, the top wire bends are made with small, smooth-jawed duck-bill pliers.

THE REGULATION

It is particularly important to regulate dampers in circles of refinement. Start by sizing up the overall picture. Does this system need a major "pitch raise?" If so, be sure to check the foundation. While gently pumping the sustaining pedal, look at the dampers just as they rise off of, and fall back onto, the strings. Damping efficiency is highest when the dampers drop directly and smoothly down to the wires.

A good place to start regulating is at the lowest wire bend (#4). This bend controls the bearing on the guide rail bushing. A small amount of pressure usually works best. Too much slows the dampers; too little allows the heads to wobble. This adjustment affects the others relatively little, unless it causes the bearing to change from one side of the bushing to the other. Choose the side that gives the best head spacing and travel.

The correct the top lower bend (#3), if needed, so the head moves straight up and down. Adjust the top bends (#1 and #2) to get the felts to drop onto or between the strings without moving side-to-side as they contact. Improve roll, pitch and yaw. Several passes through these adjustments will work most efficiently. In order to get one adjustment really right, the others must be nearly perfect. Each time through gets the set of adjustments closer to ideal.

What to adjust:

Bearing in guide bushing	4
Travel	3
Head spacing	1, 2
Yaw	5
Roll	2 or 1
Pitch	1

Repeat several times, then reset timing (6) and yaw (5).

THE VOICING

Even when the regulation is nearly perfect, there may be shortcomings in damper function. For leaks, where one wire is damped more slowly than another, or one partial sings through, do the following:

- Check string level
- Space strings to match tri-chords
- Check tilt (roll and pitch)
- Check travel (top lower bend)

THE ICING

There are some small details that will put the final polish on the system:

- Visually improve head spacing by compromising slightly on travel or head angle
- Visually improve head heights by spacing wires and/or trimming felt
- Check sostenuto tabs (in line up and down, and fore and aft, but not perfect or there will be too much noise on release)
- Trim tri-chords carefully, if necessary
- McLube (1725) guide rail bushings, key end felts, and under-lever bottoms: very smooth!
- Offset dampers: check timing and location of felt blocks
- Set the stop rail and pedal stop felt close
- Wires buzzing on strings or heads hitting plate:
    - Check bearing in guide bushings
    - Change travel slightly
    - Change which side of guide bushing has bearing
    - Set stop rail close
    - Last resort, set a curve in wire above guide
    - May have to trim head (be sure to make it black!)

DAMPER SYSTEM INSTALLATION
(notes from Steinway seminar, Jan. 1992)

1. Sort heads and felt blocks, cut tenor heads
2. Glue up felts
3. Tighten flange screws, check pinning
4. Locate holes for end blocks, mark for lift dowel and shift screw
5. Mark, drill, bush guide rails
6. Drill for dowel in tray bottom and shift screw leather
7. Install under-levers, check spacing, etc. before drilling cross-block
8. Screw in pivot blocks
9. Install return spring
10. Install stop rail
11. Hammer wires in
12. Make hooks
13. Bend tenor wires, cut felt to fit heads
14. Set touch at 1/8" key dip, use unbent wire in mid-treble to set tray
15. Set lift dowel length
16. Install dampers
17. Trim wires
18. Rough in lower bends (may need to go through hooks once first)
19. Regulate 3 -- bass, middle, treble – to check tray vs. key lift
20. Regulate
21. Refine
22. Reset timing for final setting
23. Run finger across the backs of all the damper heads to make sure all screws are tight.