Steinway Touch and Service
Touch and Tone

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There is an incredible amount of cumulative knowledge and resources at Steinway. Kent worked with Baldwin before Steinway. Although Baldwin was not deemed to be number one, it certainly was one of the best companies out there. Bosendorfer, Kawai Shuagurer, Fazioli, Yamaha PFX, and Steinway are all top tier. How would you describe Steinway? Versatile, wide dynamic range: it is a musician's piano. Yamahas are very easy to tune; it is a technician's piano. Fazioli is easy to play; it is an engineer's piano. The Sheguru Kawai is a technician's piano because it is easy to work on, and it sounds wonderful.

To be a Steinway artist, the artist must own a Steinway; Steinway does not give things away. Steinway has been able to deliver consistently to pianists. The Steinway piano has a broad personality and a wide dynamic range like the human voice. Steinway pianos have a wide variety of personalities so that artists can select the variation that suits them. Steinway also has unique representations: both the New York and the Hamburg Steinways. Steinway can challenge your skills. Every piano we go to is our current teacher.

T all goes down to the people who make the pianos. When the economy dropped, Steinway went down to about 40%; now it's up to about 60%. Rather than laying off workers, they reduced hours in order to keep their experienced people. Institutional sales have gone up. China is the growing market in the world. Everywhere else in the world there is no growth aspect; the rest is simply maintaining. Hamburg's is the Eastern Hemisphere, including China; New York is the Western Hemisphere. Notice how many Chinese students are in America. China is having a music educational boom, and they are sending their students over here to learn. These students are developing their comfort zones on the NY Steinways. In South America the ties are closer to Europe.

Steinway stock prices are up. The future of Steinway: Mr. Kim owns 30%-40% of Steinway stock. Mr. Kim owns Samick. The band distribution of Steinway is being sorted out from the corporate Steinway. Sohmer, Ludwig drums and other sections are beginning to be bought out. This has opened the door to what will happen to Steinway piano. Samick recently put in a bid to buy ownership of Steinway piano; this was strictly a leverage position. Currently there are currently no plans for Steinway to be bought or moved.

To be a performing artist, it takes a lot of performances to support a family. People are listening critically – something the performer has no control over. When a pianist sits down to play the piano, the focus is on the playing, not on the piano. If the piano is maintained properly it will play consistently and will become the vehicle for the music, not an obstacle. Steinway pianos must be serviced continually.

Prime Directive

- The piano should be transparent vehicle for the creation of music.
    - A piano should be unobtrusive yet inspiring.

- If the pianist must focus on the piano instead of the music, the piano has failed.

Because Steinways are more highly scrutinized than other pianos, they must be serviced more frequently. There are several aspects to check often, such as the glides.

1. There is no lemon piano.
2. A problem is the result of misdiagnosis or service, not the piano.
3. The technician is the conduit who brings the pianist and the piano together.

Most performers of other kinds of instruments can work on their own instruments. Pianos require a technician. What is the concert life of a concert piano? When would you retire a concert piano and put it into other use? Generally concert Steinways are relegated to smaller halls after about eight years. Restoration is applied to pianos older than 34-40 years. Often concert pianos are ultimately bought by the performers. Concert pianos are comparable to race horses. Thoroughbred race horses are good for about three years. Even when these horses are put out to pasture, they would leave the other horses in the dust; however, if that same horse were put up against other race horses, it would have lost its edge. In contrast, the average age of an institutional piano is over forty years.

An eight-year-old piano will have had the hammers four or five times. A Ferrari race car completely replaces the engine after every race. For a concert piano, there is no time to season hammers, so they need to be made correct right away.

Guidelines

1. **Play the piano**. Get to know its current condition. Determine a feel for its potential. Listen to its tonality and overall dynamic range.
    a. Play a note softly, and then continuously louder and louder until it reaches its cap. When do the high partials start to come in?
    b. Check for sensitivity of touch. What really defines the tone is how softly you can play. Can it be done consistently? Take the note so softly that the jack itself plays the note – a hint of a whisper of a ghost of a sound.
2. **Listen to the pianist.** Take time to ask leading questions. What does the pianist want? It is very hard to describe tone and touch. Sometimes when people describe "tone" they really mean "touch," or *vice versa*.
3. **Talk with the pianist.**
    a. If customers ask you if something can be changed, always answer "yes."
    b. Don't explain in too much detail what you are going to do. First, it doesn't matter. Second, if you do you are opening up a can of worms.
    c. Servicing the customer is 50% of why we are there. We have to get them into their comfort zone.
    d. Tuning is one of the best diagnostics that we can do.
    e. Before changing anything, know where you are starting from.
    f. Find out how they play and what they want.
    g. There are two categories of customers:
        i. The primary pianist has a direct link with that particular piano. What they want will dictate what we do.

ii. A venue has a multitude of pianists playing on the same piano. In this case, maintain the piano as closely as possible to the specifications.

The Bread Crumb Trail

- Measure the **key dip** and record. The pianist directly feels the key dip.
- Measure **touch-weights** on sample keys. Pianotek carries Andre Balduc's white sliding scale from 10 grams to 80 grams; this tool makes measuring down- and up-weight quick and easy. This tool is accurate to within a gram. Check C1-C6.
    - Write down the measurements on a piece of paper.
    - Define if the issues are friction or mass.
- Measure **sustain** times, both by plucking the string and by playing the hammer.
    - Place a mute, pluck, and time the ring. Write it down.
    - Play with the hammer and record the time.
    - Play three sample notes: D5, C5, and D6.
    - To increase sustain, tap down on bridge pins, check the hammers, the string levels, the back-checks, examine the regulation and alignments.
    - When timing sustain, when do we decide is the cut-off time?
    - False beats are more a tuning issue than a listening issue.

Piano Prep and Evaluation

- **Tuning** is an excellent way to evaluate ta piano.
    - There is no need to repair a piano that will not stay in tune.
    - Pitch raise or lower to correct pitch. Standard tuning requests are for A=440 or 441. Allow two tunings for every cycle of change – two up and two down.
    - Seat the strings on the bridge so they are at the correct termination point.
    - Tune to A=440 (or desired pitch). Pitch has varied from 435 to 457.
    - Climate change affects all pianos. However, why are some pianos more stable than others? Often bigger pianos are less stable than the smaller ones. When Baldwin bought Wurlitzer, they found that the Wurlitzer piano soundboards were multi-laminated Sitka spruce with a radius of 270 – flat and stiff. While these pianos were incredibly stable, they didn't sound very good.
- Check **damper** efficiency and pedals.
    - Damper timing is critical for sensitivity, consistency and touch.
    - What knocks pianists for a loop is when the damper timing is inconsistent; the same applies for voicing. Pianists need consistency for predictability.
    - Timing of the dampers to the pedals is more critical than timing with the dampers to the keys. It is nearly impossible to lift up all the fingers off the keys at the same rate, whereas the damper tray used as a jig for setting damper timing creates smooth even seating.

- Two felt mutes are the best tools for testing damper efficiency. Felt is softer and won't deflect the wire.

- **Strings**
  - Set and seat the strings
    - Rather than tapping, massage the wire. The contact area is so miniscule on the bridge that it is very easy to damage the wood. Brass is softer than steel.
    - Rub a flat agraffe on the strings. Use a drill chuck with a handle on it; this adapts to the diameter of any stem. Place the threaded agraffe stem into the collet.
    - Setting the strings is usually a first-time prep procedure. It depends on the climate. Do this maybe once a year. Use a hygrometer.
  - Level the strings
    - Lower frequencies are much more affected by phase cancellations than higher frequencies. When we voice hammers we voice out the higher frequencies; phase cancellation headphones eliminate the lower frequencies.
    - By leveling all three strings we eliminate the phase cancellation as much as possible, which brings up the lows but gives the impression of bringing up the highs.
    - The best tool is 45-46 thousandths music wire with a hook at one end and attached to a lever on the other end. This tool provides a lot of control. Slide the hook back and forth so as not to kink the wire. While this is not the only tool to use, it is quick and safe.
    - The natural tendency of the wire is to bow down. The only reason to lower strings is if they have been raised too far. There is a good tool for this – an aluminum bar with a fulcrum. Be careful so as not to kink the string.

- **Balance Rail Hole**
  - 146 thousandths
  - +.003 MAX tolerance
  - McCaster-Carr 4-fluted chucking reamer. Pianotek's price is actually lower. This is a .148" key easing reamer.
    - There are 4 blades. A 90 degree turn has less effect than a 360 degree turn. However, wood bounces back. We are not just pressing back the wood. If we compress it back too much we damage the wood. It we don't compress it enough, it will bounce back to where it was. By removing material from the key, we change it: it's all a matter of how much material we remove. Fine incremental changes are accurate and give a lot of control.
    - Sometimes easing the balance rail hole is not enough. Use a balance rail cleaning blade.

Key Frame Bedding
The Foundation of Regulation

Steinway key frames are designed on a slight arch from front to rear with the balance rail raised. To help insure that there is only contact between the glide and the keybed. By scooping out the keybed the adjustment is the same, but it makes it important to regulate in the piano rather than on a flat workbench.

Check the **glides**. Turn all balance rail studs to prevent them from raising the key frame (unless you shouldn't).

- How to tell if the glides are down too far:
  - Front rails are knocking
  - Unicorda stiff
  - Too much after-touch
  - Can't get the action out
- Balance rail
  - Lift up on the glides and knock. Is there contact? To get in the ball park, tape a ruler to the front of the keybed. Adjust the glides.
  - Steve likes to turn the end ones up, turn the other glides so they knock, then turn them up so they don't knock. Go back and do the next one over so they all match. If you're not careful you could turn your glides too far on the ends.
  - Kent checks the front rail with the cheek blocks screwed down and the glides up. Because the keybed has a downward crown and the keyframe has an upward crown, the glides will always knock. This adds friction to the front by having it slightly sprung. We know these pianos will go to places with many weather changes. By having the keyfame slightly sprung down in the center, there is a safety net where it won't knock. When checking the keyframe on the ends there should be no knocking. On the front of the keyblock there is a little paper. By lowering the keyframe guideframe plates with s slight bit of sanding, a small adjustment can be made.
  - Put the ruler at #1, turn the glide until knocking is gone. Go to #2 and adjust until knocking is gone, but it will lift when lifted. Do the same with #3. Always check the one you did before to see if you changed the adjustment when you were doing the current one.
  - Shift the action back and forth. Are you getting knocking with and without shift? Depress both the sustain and the sostenuto pedal when checking knocking.
  - Feet away from the pedals and adjust the glides.
  - Depress the pedal and there will be knocking.
  - Adjust with a 2-3 minute turn.
  - Step on the sostenuto and the soft pedal and there will be knocking because the key bed is flexing. This flex can be measured with a tool. The key bed will deflect about 2 thousandths of an inch. With the sostenuto pressed, it will go down another thousandth.

Back-checks

What affects back-checking height? The key dip. Once the dip is set, go right back and set the checking. Set the hammer blow distance also.

Totally regulate one in the bass, one in the tenor and one in the treble. Set the blow, then dip, then the back-checks. Reference your backchecking from the floor rather than the ceiling. If checking should be ½" from the string, it should be 1-1/4" from the hammer line. Rest a 1-1/4" light piece of spruce gauge on several hammers at once.

Tails have been lengthened

With shorter checking there is loss of power but faster repetition. With longer checking there is more power but slower repetition. Optimal checking is between ½" and 5/8".

Back-check radius in the NY is 68 degrees, and the Hamburg 70 degrees.

Hammer tail radius is an ellipse and varies from 2.75 to 4.25 degrees. Steinway uses about 3.5 degrees. It is easy to decrease radius, but very hard to increase it.

With the back-check straight up, there should be about 1/8th from the bottom of the tail and the back of the backcheck, with the key depressed, from the bottom of the wire and with the back-check wire straight.

Beck-check height and angle is critical for fast repetition. The distance between the top of the back-check to the bottom of the hammer tails with 1/16" before wire bending when the shank is parallel to the strings and the key is depressed.

Lubrication

- Lubricate the key frame pin guides with a heavy body grease
    - Cork grease
    - Superlube.
- ProLube tends to gunk up with repeated application.
    - It also seems to stay wet, which would attract dust.
    - Alcohol and water seems more consistent, while ProLube lubricates
- McLube 44
    - Use McLube in this order:
        - Front rail pins
        - Balance rail pins
        - Capstans
        - Backrail felt
    - Problems with McLube
        - Miscolors
    - Stinks
    - Places to lubricate
        - Cheek Blocks
            - If there is knocking or clicking, the metal plates can be adjusted.
            - Close the plate in by knocking with a hammer – 2thoughsandsths of an inch.
            - Shim the plate.
            - The plate might not wear the same on both sides – front, back or equal wear?

- Slide the action in and wiggle. The front will always kick out.
- With a bastard file the fit can be adjusted.
- Take the block out and tap it

Regulation Considerations

Essential Considerations in Regulating for Maximum Control

- It is essential that action parts be aligned properly
- Check representative keys for touch-weight specs.
- Keys must be level and square.

Jacks and Knuckles

- The height of the jacks in the windows must be set for the proper movement and must return under the knuckle.
    - We want it to share support with the knuckle and the under-lever system and to return.
    - Why do we want the jack to share support with the knuckle and the under-lever? If not, the hammer line will keep changing.
    - Turn the screw in 15 minute increments. Go a little too far, then back up to where you want it.
    - Some hammers will wink, some won't, but it will be shared and consistent.
- Knuckles can be tefloned to minimize friction and ensure maximum repetition. Remember to burnish the knuckles after applying Teflon. Adjust first, then lubricate.
    - Ecsaine is supple, consistent has along wear life, and the deer favor it. Ecsaine has a knap but no grain. It also does not need to be lubricated. "Ultra-swede"
- Repetition spring tension should be set for a firm, steady lift – little or no kick should be evident
    - You don't want to feel the key kick you back
    - Adjustments are made at the coil, not by bending the wire. Keep the curvature of the spring wire consistent.
    - Steinway's specs are 1-3 grams of resistance
        - The angle of the wire as it goes into the receptacle of the jack is critical
        - The friction is important for capture.
        - There should be 6-8 grams of resistance in the center pin
- KuckLjack
    - One of the hardest things to do is to see the jack with the knuckle core.
    - The most critical aspect is the timing when the jack touches the knuckle.
    - Clip the tool onto an adjacent jack for a visual gauge for the next jack.

Key Dip through "Drop"

- Set **Dip** at .400"
    - Set sharp dip for same after-touch for naturals. Blacks are set at ½" above the naturals.
        - Don't lower black dip so they get buried in the naturals: set at 15/32nds.
        - Place wedges under the keyframe to set dip.
- Set **hammer blow** distance at 1-3/4" to 1-7/8ths
    - The blow might need to be raised a little to achieve proper after-touch.
- Adjust **back-checks** for a ½"-5/8" checking distance . Avoid too close or too far.
- **Let-off**
    - The vibrational pattern of the strings can be utilized to fine-tune the let-off later.
        - If you're not getting this, go back and look again.
        - What we want to see in let-off and drop is about 1/16" from the strings for let-off.
        - What is the diameter of a bass string? It is the vibrational diameter, no the static diameter.
    - Set let-off using a damper wire (about 1/16th). Attach a damper dowel for the handle of the tool so it won't drop between the strings.
        - Adjust up until the hammer blocks
        - Turn the screw down slightly.
        - Using the strings as a let-off rack is far more accurate than any gauge.
            - Adjusting by sound and touch is the best way to work.
- **Drop** is 1/16" from the let-off.
    - It is critical for a crisp feel for the jack, let-off and the rep lever stop (drop) to occur simultaneously.
- Check for playing off the **jack** (whispering tones.)
- **Hammers**
    - Steinway went to a heavier hammer because artists wanted more.
    - By moving the knuckles back and adding heavier hammers, the keys needed more lead.
    - Hamburg has traditionally had a heavier hammer and has already figured all this out.
    - The Hamburg repetitions and shanks and flanges are interchangeable. However, the down weight is heavier and the up-weight is lighter.
    - The hammer on the D is heavier felt. This is not significant in the weight, but is in the density. This requires more lacquer without changing the dynamic range.
- **Hammer shank/rest felt**
    - Clearance between the rest felt and shank should not exceed 5/16"
    - Excessive space may allow jack to catch in front of the knuckle.
        - This would be caused by
            - hammer wear
            - new hammers
            - stack height

        - different diameter knuckles
        - plate height variation
    - If the plate height is set too high, the hammers follow the plate. To correct
        - Raise the back of the stack, which might then throw off the geometry
        - Add more felt to the hammer rest cushion
        - Drop the plate
        - Build up felt as needed.

Up-stop Rail

- Use the sharps as the guide to adjust the up-stop rail
- Calibrate the pedal and the key lift for the same amount of lift
- Use sharps as the guide
- 1/16" play with the key depressed

Steinway Voicing

Lower tension lacquered hammers for NY Steinways

- Designed with a felt desnsit5y which allows for lacquer to be absorbed.
- Single needle at or near crown most effective
- Effect of needle radiates minimally
- Additional stiffness added by lacquer

Tension and compression hammers (Hamburg, Boston, Essex)

- Initial pressing produces more stiffness than required
- Needling ads resilience
- Voicing techniques use shoulder and crown needling, multiple needles
- Effect of needling radiates out from needle

Since the needling affects the Hamburg hammers on a wider radius than on the NY hammers, the question is which tone we prefer. On the top hammers, align the hammers so we never miss string #1. However, on the tenor align the hammers to miss string #1. Optimally it would be useful to have the choice of hitting or missing that string. What happens in that moment of transition as it just goes through? What is the down side of hitting string #1? The ethereal effect of missing that after-ring is missed. The advantage of hitting string #1 eliminates the oinking. If the hammers are properly aligned to the strings very consistently, you can do both – hitting and missing string #1. How can all the hammers be shifted and actually have all the hammers miss strings #1? This moves the strike point to another string. The trick is to move the hammers so the strings are hitting fresh felt. Pianists like pedal depth. The magic number is .045" which is the distance the hammers need to shift. How do you gauge this distance? Make a steel gauge at .045" and set it between the left of the action and the stop block. Now adjust every hammer to the edge of the strings. Remove the shim and the hammers are adjusted just right.

Steinway & Sons World-Wide Technical Reference Guide

Steinway's technical reference guides are downloadable as .pdf files that can be enlarged to show tiny details. This book is well worth its price.

Hammer Filing and Shaping

Lacquer

- Now Steinway dips the entire uncut hammer blocks into lacquer, and leaves them over night with the felt up.
    - This avoids cupping when the hammers are cut apart.
    - The hammer is yellow because of the hammer.
    - Hamburg brushes on their lacquer with a 1:8 or 1:10 ratio.
- Actually lacquer hardly increases the weight of the hammer at all.
    - One part lacquer to three parts solvent, comparing lacquer thinner to acetone.
    - Saturating the hammer added only .5 gram to the hammer weight. With the thinner it took longer to evaporate, but the weight ended up the same. Don't get either of these on your skin.
    - The lacquer used in the factory is 12% solids.
- Keytop and acetone (preferably don't use)
    - Pound in the hammers about 5 or 10 minutes after adding the solution.
- Where to lacquer
    - Strike point increases the attack tone – the initial splash tone.
    - Shoulders are a heavier application to add lower partials and to bring in high partials.

Break left corner

With a very light stick filing gently "break" the sharp, left-sided corner of the hammer. This will allow the hammer to easily clear the left string when the shift pedal is applied and minimize noise on the left edge of the hammer when the una corda pedal is used.

String Level and Hammer Fit

Raising string up is a very import part of voicing.
Slide the pulling hook along the string toward the player. Test by blocking the jack and hammer against the string.

1. Level the strings
2. Fit the hammer to the stings by filing as necessary.
3. You can feel string level with your fingers. There are also tools to use.
4. Single string filing.
5. Make a pencil mark where the hammer may be too high. A thin strip of 180-grit felt on a transparent plexiglass paddle will carefully get the hammer to fit the string.

Voicing & Needling

- Chop Stick Voicing
  - The needle goes in about 3/16”
  - Allows quick touch-up voicing very quickly.
  - Single needle allows individual string voicing.
  - We don’t want to voice down a hammer that is already soft. We just want to eliminate the zinging.
- Shift Voicing
  - Multiple needles

Adjust keyframe shift screw.

Refer to the manual for details. Once you adjust that screw, all the hammers will hit correctly

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