Servicing the Vertical Piano
Steinway Action Parts
New Piano Lines
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10/6/04
PTG

Servicing the Vertical Piano

Whatever piano people buy, that purchase is a big investment. Point out benefits rather than deficiencies. Any time a parent invests money into piano lessons, congratulate them for a wise investment. Learning music, especially at an early age, results in a noticeable increase in an individual's:

Concentration
Coordination
Confidence

Pre-Tuning

- *Talk* to the pianist before doing anything. Get a sense of what they want from the piano.
- *Tuning* (an excellent way to evaluate a piano. There is no need to repair a piano that will not stay in tune) When tuning, don't break away from the tuning process when you see something wrong. Make a note and complete the tuning. Check relative pitch
- Check the *relative pitch* of the piano – both overall and from section to section.
- Check the *plate bolts* for tightness (125-175 in/lbs)
- Examine the *string condition* for rusty strings or broken strings. Warn the customer ahead of time.
- *Pitch-raise* or lower to correct pitch.
- *Seat the strings* on the bridge. Massage the strings rather than tapping. This will stabilize the pitch, lengthen the sustain, eliminate false beats, and create a more solid transfer of sound through the bridge to the soundboard. Lightly tap the bridge pins down. By making sure they are securely seated in the bridge will increase the sustain and the body of the tone.
- *Tune* to A-440.

Tone and Voicing

- Tone – change the tone only upon request to avoid surprises with the clientele. Voice first, then regulate, then tune. Demanding customers are most sensitive to the tone and the touch. As long as the unisons and the octaves are good you're OK. Differences in voicing and regulation are much more noticeable.
  - Check for evenness of voicing throughout the scale.
  - Calibrate any changes to the tone with the 5^{th} and 6^{th} octaves. Voice for the maximum power. Then you can always back up if necessary.
  - The goal is to develop dynamics in the piano. Make sure that the piano plays very softly. Often what defines how loudly a piano plays is by how softly it can play. The dynamic range is what pianists appreciate.

Touch and Action Performance

- Tighten representative action **screws**. If several are loose, this is the time to discuss climate change with the customer.
- Check **touch-weight**. Both down-weight and up-weight must be viewed as a composite measurement. Viewing one without the other diminishes the benefit of the assessment.
  - Dime 2 g, penny 3 g, nickel 5 g.

    - Keep adding until the jack touches the button for down-weight. For up-weight, put a stack of nickels on the key and you have a visual graph that is easy to visualize.
- Check the **front and balance rail** condition. A maximum of 10 mm sideways play is tolerable, Front play of key, 1/32" is maximum side-to-side play. To lubricate key bushings, use McLube 440 liquid and saturate the felt, or spray ProLube. By lubricating particularly the front rail bushings you get the most benefit is a short period of time. When a piano is being played the keys are being pressed in all directions. The player can feel the front rail friction. Eliminating this friction is noticeable.
- Treat **action centers** if necessary. If you have less friction in your centers, the up-weight will increase. Most pianists are more concerned with upweight because this is the speedometer of touch. The better it follows their fingers, the faster they can repeat. With a dense impregnated felt Steinway is able to decrease action center friction. ProTek CLP doesn't seem to react as consistently for the Steinway's teflon-impregnated action centers. Use one drop of straight methanol and let it set for a few hours. This methanol will swell up the bushing cloth. As it dries it will recede and will reduce the friction. Sometimes this needs to be done twice. Don't do this just before a concert, because the action center will freeze up initially.
    - Types of **alcohols**:
        - Methanol (wood alcohol- poisonous)
        - Ethanol (grain
        - Denatured alcohol (ethanol, sold in hardware stores)
        - Isopropyl alcohol (petroleum) rubbing alcohol with fragrances
- Check for ringing **dampers**, damper follow-through, and pedal efficiency. People who select concert grands want the ambience of after-ring. Steinway has created a room with tiny microphones programmed for various types of rooms, like a night club, a cathedral, a living room, etc. so the pianist can hear the same piano in different environments.
- Check the **key level and the key dip**.
- Evaluate the **let-off and checking** on sample groups of keys. Pianos change the way children do. Things change very gradually and you get accustomed to them.
    - Check the pedals for squeaks. Make sure that the pedals are lubricated well b ecause there is a lot of friction from heavy components moving against each other. For such heavy use, these parts need more of a grease than a thin lubricant. These are good for case squeaks, benches, around the toe rail, pedal mechanisms, etc.
        - Super-Lube (automotive)
        - Cork grease (band instruments). Cork grease lasts longer than VJ Lube, which is normally vaseline and talc. (Daryll's recipe for VJ Lube: Bees wax with a healthy dash of transmission fluid.
- **Case** and appearance
    - Check and tighten representative case screws
    - Check areas that may vibrate
    - Lid and lid props
    - Caster ferrules
    - Fall boards and hardware
    - Front caster floating above the floor
- Color **nicks and scratches**. By carrying a touch-up kit you will endear yourself to your customers.
- Check for **keys binding** on the key slip. Check to see how much tolerance there is. It might change with the weather. If it sticks with the slightest nudge, shim it. When a customer calls with sticking keys, ask if it is just naturals, or if the blacks stick as well. Check for debris, especially new pianos from the factory.

Customer Education

- Record the temperature and the humidity every time you service a piano.
- Discus maintenance and cleaning.
- Provide service literature.

Touch-Weight

- **Weight resistance**: down + up)/2. (Target of 35-40 grams)

Friction resistance (down-up)/2 (target of 12-18 grams)
Down-weight should be 48-55 grams depending on model and pianist
Up-weight should be a minimum of 4% of the down-weight (ex. 50 grams downweightx40-20 grams up-weight.)

- **Springs**. Jack spring strength is critical. Strengthening jack springs increases the down-weight. This also increases the up-weight significantly. Hammer return springs are also important. Measure the spring diameters. Measure the touch-weight before and after. Know what the old measurement was before changing things.
- **Capstan dowels**. Move the dowel towards the strings to increase the touch. This increases the after-touch and increases the dip. Move the wire away from the strings decreases after-touch. This is a slight angle of motion, so that the capstan contact is barely changed at all.
- **Weighing keys acceptable on verticals.** A higher up-weight gives faster repetition. This makes it more responsive and more comfortable for the pianist.

Check for Noise Condition

- Hammer knocking on the rail
- Loose hammer heads
- Loose catcher stems are probably more common than loose hammer heads because most hammer shanks are knurled, whereas catcher stems are not.
- Glue on the jack stop felt
- Broken jack springs.
- Clicking bridle strap wires.
- Squeaking damper and hammer return springs.
- Damper springs squeaking in the coil. Separate the coils with a knife.
- Hangers rubbing. Hammer rail hangers or damper rail hangers might squeak. Use cork grease.

Steinway Parts

What, When, Where, How, and Why

Departmental Improvements

Steinway parts are a large industry. Kent did a survey to find strong and weak points. It used to take a long time to ship parts. There are thousands of parts. Since 20% of the items comprise 83% of the orders, these most popular parts are now on the shelves ready to go. In the past, the parts would have to be ordered and then made. Now the customer satisfaction is 95%. Steinway ran a second shift in the action department just to meet the needs. Maxi-ship shipping with UPS has streamlined things. Now they use biodegradable packing peanuts. This is a not a supply house. The key business is manufacturing, and Steinway supplies things that they manufacture for their own specific products.

Quality insurance engineers take samples and measure the parts towards specifications. If the factory sees that the specifications are becoming too wide, they can make corrections in the machinery before major changes happened. Before parts are shipped, there is a 100% inspection on all parts shipped. This results in high quality and consistency. Now parts are shipped within 24 hours rather than four weeks.

The parts department has been redesigned. Provide your email address and you will get a UPS tracking notice. There is new shelving and updated technology. This is now a one-stop shopping place.

The action department supplies parts for both actions and full piano restorations. The Steinway action department is the only full-fledged action department in the US.

The Hammer department manufactures all NY hammers t h the factory Currently manufacturing over 25 sets per day. Pre-hung hammer sets available. These are shipped at 5-1/8" manufacturing standards. If you have custom requirements, order the shanks and the hammers separately.

Hammer Shank CNC Manufacturing.

Two years in the development.

Provides accuracy and consistency of part to +/- .002"

Capable of multi-design fabrication. .Over $100million /year for machinery.

Functions of the Hammer shank CNC Machine

Cuts slot for flange
Drills center pin holes
Tapers shoulder
Turns the shank diameter
Knurls the shank

Action Center Inspection

Flanges are 1-3 grams of resistance. Let's say your measurement shows 3 grams of resistance. What if one center measures 6 and the other measures 0. How do you measure consistently the resistance? By deflection. This device provides a measured amount of deflection and calculates the resistance on a computer. This shows if each side of the flange meets the criteria.

Genuine Steinway Parts

The integrity of the name on the fall board is directly related to the quality of the parts. If you are going to rebuild a Steinway, use Steinway parts.

Modern Hammers

- Heavier than in the past because the heavier maple molding is heavier than walnut, mahogany, etc. There is a lot of waste with mahogany and walnut because they tend to chip. Artists tend to like a heavier hammer. With the new hammers just the tails are tapered, not the entire body.
- The tails are longer by 1/8" which enables higher checking.

Shanks and Flanges

1. Pre-84 – knuckle 0.46" closer to the flange Used from pre 1900-1984.
2. NYI parts and Hamburg parts are same specs (5/8" knuckle core front to center pin (specification convergence)
3. NYI drop screw is back approx. .050" from HH position As long as the drop screw has contact with the repetition lever this distance is insignificant. The drop screws are all the same size as the Hamburg, which gives great consistency in the repetition.
4. Knuckle size is the same for the three configurations
5. The NYI flange is thicker than the HH

Repetition Styles

The NY and HH are the same dimensions. Pre-84 jack center is out 1 mm further. The nice thing about working with Hamburg and New York is that one is the testing ground for the other. Rather than going through expensive testing, they have years of testing to compare. The restoration center sees all kinds of configurations. Now they will change old capstans to the modern configurations. As long as the glide profile of the capstan on the repetition felt had good contact, minor changes were insignificant. Vertical spacing is consistent on all models. In fact, on the desk of the management of the restoration center there is a repetition from the 180000s pinned to a modern one. They are the same.

Comparison Through the Years

Since through the years Steinway has used the metallic rail, the design has not changed. In older pianos some of the holes for the action rails were slightly larger when soldered in, which might create a 1/32" variation. The rails are all exactly the same. Steinway has been consistent for years. Changes come slowly to Steinway because they have long been Number One and they want to preserve their reputation.

- Between 1881-1980 there was no change in the distances between the flanges and the repetition
- 1927: same. Cosmetic changes
- 1943: same.
- 1964: same. Teflon years.
- In 1984 the knuckle was moved back 1/64" to match the Hamburg measurements. They found this move to be beneficial to the touch of the action. This also removed to reduce the number of leads and increase the weight of the hammer.
- In the early 1990's Steinway introduced the NY Improved
    - Included a minor change in the jack location to align better with the knuckle. The heel was angled to reduce capstan friction
    - Longer hammer tails for better rep
    - Improved processed in production
    - Better calibration with the heavier hammer mass.

Leverage Ratio Considerations

These statistics are available on the Steinway web site.
We're looking for a ratio of 6.7 or less for total system distance leverage
Total system force leverage
Key ratio. The key ratio, by design, has always been 2:1.
Repetition ratio
Shank ratio
Calculated hammer weight

Touch weight scenarios with current hammer mass

- Choices: NYI or Hamburg shanks & flanges? Let's say you're going to keep the pre-84 shanks and flanges and not replace the repetitions. Stick with pre-84 parts and the up-weight might not be desirable. It might be better to go with the NYI. The Hamburg might even be better. Kent made a chart to help determine these factors. Hamburg parts are heavier and have more center-pin friction.
- The restoration center used to stick with keeping the parts with the era of the piano. Now there is one change. If the action geometry has not changed, the only thing different is the increased mass of the hammers. Heavier hammers alter the touch-weight enough to merit a switch to using NYI parts. Restore pianos to today's standards.

Recommendations

- Use the NYI parts to improve the touch weight of an action to bring it to today's performance standard. This will significantly maximize weight measurements.
- This is particularly important when using modern Steinway hammers
- (heavier ham
- If the let-off buttons "top out", then install let off buttons (part #5070) to allow more adjustment, instead of trying to add mass to the keys or to get the touch-weight down.

Back-checks then and now

- The current back-check was introduced in the 1980's. The diameter of the old wires 98 was smaller than the current ones. The new bigger wires are thicker, so the holes don't have to be plugged and re-drilled. Also the wires are stiffer. The new hammers are 2/10ths of 1 gram lighter.
- How to set back-checks. Install them so they are at a height of 1/16' base between the top of the back check straight up from the bottom of the hammer tail. Then give them a 68-degree bend backwards.

Damper Underlever Assemblies

- Since the Steinway scales have not changed, ordering a complete assembly is far quicker and easier than adjusting or replacing individually. As the old one resides in the action, measure the distance from the side of the old assembly to the side of the cased. Then when installing the new assembly, place the new part at the same point and everything will line up. This entire replacement process, including replacing the dampers, can be done within two hours. Use punchings for spacers.

- Comparison of assemblies from the past. Older ones had springs, up until the 1980's.. Steinway changed from springs to leads because the artists liked it better. They noticed the difference in the touch. Now with the graduated weight system they all like the touch quite a bit better. Even after the 40's the flanges were glued onto the rail. Hamburg still does. Now NY screws them on.
- The distances were crucial. The leverage is the same, except for in the less efficient distance in the 60's. The ideal distance is 3-1/2" A good rule of thumb is to set the tray so that the front of the lever is 1/8-3/16" from the back cheek block.

Technical Contacts
- The web site has all contacts.
- The hand-out is a spread-sheet that provides recommended figures for all adjustments. This is a guide, although the final goal is what the artist wants.

The Boston and Essex Pianos

Why did Steinway introduce new piano models? They realized that not all dealers and owners can afford a Steinway. Those customers are going to buy something. Why not design a product that costs less? Through other manufactures and suppliers they decided to produce pianos that were affordable for different categories. They analyzed discretionary income of various types of consumer groups, the costs, etc.
- Market demand
- Supplying an instrument to fill a need. What's the key for a company to succeed. If the company fulfills a need it will make a profit.
- Responsibility to the dealers
- Control of the design and the quality. These pianos are all designed in-house. Steinway specifies the mateirla, the quality, the training, and the total identity and manufacture of these pianos.
- Kawai makes the Boston. Young Chang makes the Essex.

The Boston Niche
- Design
- Material: MDF materials using engineered materials such as in the lid.
- Methods Once the parts are assembled the rest is hand-made. Mass-produced. More machinery. Voicing is always done individually
- Result: consistency

Designing the Piano
- Sizes and number of styles
- Tone Characteristics
- Scale tension
- Action geometry
- Costs/Market Placement
- Materials
- Production Facility Capacity and Overhead
- Continuity within the family of product lines

Inharmonicity increases as the tension goes down on a string. Performance, not serviceability, drives the design of the Steinway piano.

Steinway Design Technology
- Computer-aided design. The Boston-Essex scales were designed totally new
- Availability to study historical design documentation
- Accessibility to proprietary information
- A wealth of Steinway grands to use as tone and touch standards.

Scales

- Soundboards Both Boston and Essex pianos have tapered soundboards that are derived from the diaphragmatic Steinway design.
- Pinblocks. 90 degress instead of 45
- Lower string tension. High-tension scales have a lot of attack but shorter sustain. With lower string tension, the sustain lasts.

Structure

- Pressed crown like NY.
- Ribs are pre-stressed.
- Bracing: radial pattern.
- Rim construction: 2-pieced construction is a major cost savings as the piano travels around the factory for 9 months of the year. Since re-work is very extensive on the finish, by setting the parts off to the side time is saved. Instead of the maple rim, the rim is a soft mahogany laminate since volume is not as important.

Action

- Same rosette configuration
- Aluminum rails.
- Angled repetition heels on
- Consistent use of all maple parts.
- Same action spread.
- Sostenuto mounted on the belly rail instead of on the action.
- Bass wood instead of spruce keys.
- Octagonal shank, vs. round shanks on NY

Hammers

- Boston, mahogany, Essex: hornbeam
- Boston, Essesx, and Hamburg pianos are hard-pressed. The NY is soft-pressed, with the tone built up with lacquer. Lacquer seems to preserve the tone than with hard-pressed.
- Pear-shape

Upright Backposts

- By increasing the mass of the backposts, the strength was greatly increased
- These pianos are used a lot in institutions

Steinway has added a totally new line of pianos into the world.