Turbocharging your service calls

Introduction

Why have this class? Students and fellow technicians who watch me work ask how I got so fast at what I do. I really don't think I'm fast, nor do I try to be! But I can usually do most of the following in about 1 1/2 to 2 hours:

- Pitch raise (12 - 15 minutes)
- Fine tune the piano (30 - 35 minutes)
- Remove lost motion in uprights (10 - 15 min)
- Drop and letoff in grands (10 - 20 minutes)
- Raise hammerline in grand (4 - 6 minutes)
- Clean (everything but soundboard, 8 to 12 minutes)
- Basic improvement of regulation and voicing

Now that I do things more efficiently it has allowed me to give the client something free every time. I give them a pitch raise, a cleaning, minor regulation, etc. and I nearly always get a tip, or a handshake or hug at the local grocery store! And it really didn't cost me anything but a small bit of time. Oh, and I also charge well up front, so any time for "extras" has really been paid for.

What are some things that can help you become more efficient? (Jim's tips)

1. Develop an acute awareness of time, but in a "relaxed" way.

A. Inner game of Tennis story (Relax)
B. "Slow is fast" (guitar playing story)
C. Watch someone who is really fast, but solid. It's "second nature".
D. Every now and then, time everything you do!

2. Eliminate (or reduce) "time robbers" and "Slippery slopes"

A. Telephone (Put on "message")
B. Not having the right tool or materials exactly where they should be
C. No shows
    1. Call the day before. Most people appreciate a reminder.
    2. It rarely happens, so don't get uptight about it and lose a good client
    3. If it happens twice, give the client to someone else!
D. Doing work beyond the scope of the visit (Slippery slopes)

3. Cut down time with the client without seeming like you're in a hurry

A. Make sure you're on time, be friendly, but get right to work
B. You can do a lot while you're talking to the client:
    1. Open the piano, tighten the bench, adjust the pedals (multitask)
    2. Check out the piano with them there (The "2 minute interview")
    3. Have them play and/or write the check while you're putting tools away
C. Until you achieve "turbocharge speed", don't chit chat much. Later you can.

4. Decrease your tuning time (This is usually hard for beginners.)
   A. Terry Niimi statement (20 minutes).
   B. Don't force it, but just relax and let it come naturally
   C. Find systems that work (Video on PTG)
   E. Things to consider:
      1. Single mute system. Find a system that works for you.
      2. ETDs are like "Da Vinci's little marks". (2 statements)
      3. Your tuning lever (Advantage of ball)
   F. If you can't decrease your tuning time, focus on the other "stuff"

5. Learn to regulate quickly
   A. Find the best tools, that work the best for you (Examples)
   B. Have a routine, but know the principles of regulation so you don't "linger" on less important steps. (Know how to prioritize) ("The Art of Compromise")
   C. Learn to distinguish what is regulation and what isn't. (Avoid "slippery slopes")
   D. Learn "speed skills" when regulating (It takes years to go to all the classes!)
      1. "Rolling knuckles" examples
      2. Feeling the knuckle rub for rep lever height
      3. Feel the key for lost motion (along with rub back, and slow release)
      4. "Wholesale" methods on uprights (Give handout)
   E. Avoid time wasters in regulation (Here are a few)
      1. "Getting lost" with glides
      2. Removing lost motion one at a time
      3. Painstakingly traveling upright hammers when they aren't too bad
   F. Set a realistic goal, if it is the first visit. Realize that if a piano needs more work you may need to come back. In one or two visits you can nitpick more.

6. Find "your rhythm" (This is a big key to efficiency in repetitive jobs)

7. Dangers to avoid while trying to become more efficient
   A. Crappy work in general (Never sacrifice quality for speed!)
   B. Bad, unstable unisons (Always check everything) (20 second press)
   C. "Putting off" the client
   D. Overworking!

8. Institutional work and shop work tips (Shauna is like my "dental assistant")
   A. "Dance" with assistant
   B. Become machine-like

9. Time saving tools and tips (Classes are full of tips. Take Isaac Sadigursky's classes!)
   A. Baggie of punchings
   B. Yamaha key leveling stick
   C. Regulating pouch
   D. My tuning lever
   E. Bring extra damper felt. Trust me!
   F. Keep tools with jobs (Isaac)

Turbocharge Tips
Checklist

Main Points:

1. Becoming faster is more a matter of efficiency of time than of speed
2. Reduce time wasters
3. Less "chit chat": Work while visiting with client, but be friendly
4. Develop efficient techniques and systems. Practice them.
5. Time yourself, but relax and let speed come. Don't force it.
6. Find your "rhythm"
7. Hire a "Shop Monkey"
8. Keep tools and supplies grouped, and never "look for stuff" again!
9. Always remember the reasons for becoming more efficient:
    a. More time
    b. More money
    c. Less stress
    d. Better stability due to "practised" systems
10. Dangers to avoid:
    a. Inferior workmanship
    b. Unstable unisons
    c. "Putting off" the client
    d. Overloading your life!

Techniques:

11. Tuning: muting systems (One mute)
12. ETD/Aural: Using the best of both worlds
13. Movement of tuning lever
14. "Listening fast"
15. Position of tuning lever (and your body)
16. Combine "Impact" method with smooth pull
17. Consider tuning bass last
18. "Rolling knuckles"
19. Feeling knuckle rub
20. Drop: the "bounce check"
21. Dip: the under the key tool
22. Glides: slight adjustments for seasonal changes
23. Capstans: "Aftertouch adjustment screws" (slight only)
24. Setting glides

Tools:

25. Ball end tuning levers
26. The Terry Otake string lifter
27. The Yamaha key leveling stick
28. "Hands Free" gauge
29. Tool pouch
30. 8" tweezers, modified (And how to use them)
31. Reverse tweezers
32. Clear ruler
33. Masking tape
34. Modified Hart spring tool
35. Groove in screwdrivers
36. Easing wedge
37. Hammer filing paddles (10 minutes)

See Jim's tool box

Piano Triage
2015 PTG Convention
Denver, CO
Gabriel Granitz, RPT

TRIAGE:

…the assignment of degrees of urgency to wounds or illness to decide the order of treatment of a large number of patients or casualties.

YOU HAVE ONE SINGLE OBJECTIVE:

Make the most DIFFERENCE within a given period of time.

Tough Questions

- How efficiently do I work under pressure?
- How quickly can I create a plan of action?
- Can I remain focuses in my work while someone is looking over my shoulder?
- Am I comfortable taking risks?
- How do I deal with frustration?
- Do I know when to say 'That's it!"

Keys to Success

- Know the expectations of the pianist.
- Know your skill sets.
- Know your times for certain procedures.
- Don't sweat the small stuff.
- Go for the big-ticket items.
- ***Don't freak out!!!***

Three Major Focal Points

- Silent, effective, and reliable pedal and damper function
- Clear and focused tone/sound
- Friction

Common Problems Found on All Grands

- Loose tuning pins
- Loose, wobbly pedals
- Damper pedal travel set too short
- Dampers lifting too early with the key
- Damper up-stop rail set too high or low
- Excess friction
- Key frame knocking/bedding issues
- Hammers on rest cushions
- Part alignment, loose hammer heads, broken parts
- Unseated and unleveled strings
- The list goes on…

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Necessary Technical Skills for Piano Triage

- 30 min. pitch corrections/tunings
- Damper and pedal work
- Tracking down friction
- Key bedding (front, back, and balance rails)
- Regulation
- Pinning
- Hammer reshaping
- Mating hammers to strings
- Hammer re-hanging
- Voicing and tone building
- Improvising on the fly

Rewards of Performing Triage

- The pianist is happy
- The audience is happy
- The faculty is happy
- The students are happy
- You become the hero
- Your bag of tricks constantly grows
- Your confidence grows
- Your fears decrease
- Reputations are made
- And many more benefits…

<u>30 Minute Triage</u>

- Arrive early
- Get the pedals to work
- Focus your tuning from the tenor break up to G6/C7
- If it's close, just touch up unisons
- Be observant as you tune
- Don't become frustrated…just do the best you can!

John Legend/Sade Concert

- Yamaha Artist Service C3
- Tuning was very close, focused mainly on the middle temperament and unisons
- Increased the pedal travel so the underlevers cleared the key stroke
- Took up pedal lost motion
- Tightened lid hinge screws…was about to fall off
- Removed a pen from the action cavity

One Hour Triage

- Crank out a solid pitch correction/tuning – 30 minutes
- Adjust the pedals – 5-10 minutes
- Lubricate the front rail pins – 8 Minutes (2 min. for fallboard and key up-stop rail removal/install)
- 10 minutes for "Stuff"

Three Hour Triage

Yamaha G3

- 40cent pitch raise
- Seat strings
- Vacuum and lubricate key frame and action cavity
- McClube 444 all key pins
- Ease balance rail holes
- Teflon powder knuckles
- Strap hammers
- Shift key frame right 0.020"
- Bed key frame
- Minor parts alignment
- Mate hammers
- Key level was ok, but touched up key dip
- Back checks (were checking ¾" plus)
- Lower spring tension
- Center jacks (approx.25)
- Jack position/rep. lever height
- Let-off/drop
- Hammer line for 0.040" after touch
- McClube 444 damper wires
- Delay damper key timing (from ¼ to ½ blow)
- Damper tray timing
- Adjust pedal travel/lost motion
- Lower damper up-stop rail
- Touch up tuning and voicing
- Submit the bill

All Day Triage

The Heavy D in Michigan

- *Arrived 4 Hours early!!!*
- 200 seat, 3rd floor ballroom/recording studio
- Great sound and tone (1990's, Renner hammers/shanks)
- Felt Heavy, but measured light
- Hiring pianist scheduled a 5-day recording session, to allow for rest periods
- Addressed friction at every point possible
- Filed hammers modestly, leaving the string grooves
- Touched up the regulation (key level, let-off/drop, blow, etc…)
- Removed Touch-Rail System

- Measured slightly heavy, but felt significantly lighter
- Never stitched a needle
- Pianist recorded 70% of repertoire on first day

Armageddon

The D That Didn't Work In Tennessee...literally!!!

- 450 seat auditorium, Van Cliburn winner
- Started at 10 a.m. Monday, had to be finished by noon Tuesday for artist rehearsal
- *Dead as a post* in sound and tone
- *Every* rail screw was loose, hammers and reps going everywhere
- Aligned parts to function vertically before a 30 cent pitch raise
- Shifted action frame right 0.060" (including back action)
- Cheek block locating dowels sheared off (2 were already MIA)
- Re hung hammers D5-C8 in an S curve for strike point
- Juiced hammers
- Tightened cheek block screws while meeting guest artist
- Broke two hammers off 15 minutes before the doors opened

Friction and Noise Points

Appropriate Lubricants and Other Techniques

Pedal System

- Pedal pivot pins	Teflon Powder, McClube 444, SuperLube
- Pedal pivot felt bushings	Teflon powder
- Pedal rod holes	Teflon powder
- Pedal rod grommets	Teflon powder
- Pedal guide rail holes	Teflon powder
- Pedal rod tops	Teflon powder, clean the gunk off first
- Trap lever felt/leather	Teflon powder, SuperLube
- Trap lever pivot pins	SuperLube
- Pitman dowels	Teflon powder
- Pitman dowel guide holes	Teflon powder

Key Bed

- Left stop block felt	Elmer's Slide-All
- Key bed dogs	Elmer's Slide-All
- Back rail segment	Elmer's Slide-All
- Front rail segment	Elmer's Slide-All
- Glide bolt dowels	Elmer's Slide-All
- Glide bolt paths	Elmer's Slide-All
- Shift arm head plate	Elmer's Slide-All
- Shift spring arm(s)	Elmer's Slide-All, clean the gunk off first

Key Frame

- Left side of frame	Elmer's Slide-All
- Right side of frame	Elmer's Slide-All
- Shift arm head plate groove	Elmer's Slide-All
- Key frame dogs slots	Elmer's Slide-All
- Cheek block pins	Elmer's Slide-All
- Cheek block locating plates	Teflon Powder
- Front rail pins in frame	Thin CA Glue, wire cutter bites
- Balance rail pins in frame	Thin CA Glue, wire cutter bites
- Steinway half-round dowel holes	Teflon powder
- Steinway monkey guides	Teflon powder

Back Action Assembly

- Pitman dowel felt/leather	Teflon powder
- Pitman hole	Teflon powder
- Damper tray pivot pins	Teflon powder, McClube 444, SuperLube
- Damper tray pivot pin block holes	Teflon powder
- Damper tray spring cushion	Teflon powder
- Underlever arm bottoms	Teflon powder
- Underlever action centers	ProTek, McClube 444
- Underlever spring slots	Teflon powder, No. 2 pencil
- Underlever springs	Steel wool

Keys

- Front rail pins	McClube 444
- Front rail mortise felts	Teflon Powder
- Balance rail holes	Teflon powder
- Balance rail pins	McClube 444
- Balance rail mortise felts	Teflon powder
- Capstan thread holes	CA glue (thin),
- Capstan heads	McClube 444
- Back check wire flutes	CA glue (thin),
- Back check leathers	Wire brush, fine sandpaper

Action Stack Assembly

- Heel cloth	Teflon powder
- Repetition flange centers	ProTek CLP
- Jack centers	McClube 444
- Repetition spring arms	Steel wool
- Repetition spring slots	No. 2 pencil
- Knuckles	Teflon powder
- Shank flange centers	ProTek CLP
- Hammer tails	Sandpaper (medium grit), checkering file
- Steinway Sostenuto brackets	Teflon powder

Damper Wires

- Guide rail bushings	Teflon powder
- Damper wire corrosion	Steel wool, McClube 444
- Damper head wire slots	CA glue (medium or thick)

Supply and Part Kits

Lubrication Kit

- McClube 444 Liquid, 8 oz. can
- Teflon powder, 3 ½ oz. jar
- ProTek CLP Lubricant
- VS Profelt
- Super Lube grease
- Elmer's Slide-All
- Artist brushes
- Hypo-oilers, 2 oz. & 4 oz. w/tips and caps

Damper Felt Kit

- D damper felt set
- Guide rail felt strips
- Scarlet adhesive-backed name board felt
- Key end-felt strip
- Tray felt strip
- Upstop rail strip
- No. 7 bridge pins (approx. 75)
- No. 8 bridge pins (approx. 75)
- Barrel and screw assortment
- Razor blades
- Fine scissors
- Flex-Cut knife

Damper Pedal Kit

- Steinway pedal Teflon bushings
- Steinway pedal leather bushing disks
- Steinway leather disks (trap work)
- Steinway Raviolis
- Yamaha pedal bushings
- Leather belt material
- Stop felt material
- Medium scarlet action cloth
- Cut-tacks
- Razor blades
- 3/16" nail punch

Glue Kit

- Loctite® Super Glue Gel Control
- Loctite® Super Glue Liquid
- Loctite® Super Glue Extreme Time Control
- Titebond Mold & Trim 8 oz.
- Elmer's Wood Glue

Key Level Kit

- WNG leveling stick
- Bent-tipped serrated tweezers (6")
- Small scissors
- Clear Lockables 7 compartment bin
- Punchings:
    - .001" clear
    - .002" tan
    - .003" white
    - .005" green
    - .007" pink
    - .010" blue
    - .015" thin brown card

Key Dip Kit

- Dip blocks:
    - .380"
    - .400"
    - .420"
- Jaras Sharp Level Tool
- Bent-tipped serrated tweezers (6")
- Clear Lockables 7 compartment bin
- Punchings:
    - .003" white
    - .005" green
    - .007" pink
    - .010" blue
    - .015" thin brown card
    - .025" medium brown card

Pinning Kit

- Center pin punch
- Flush cut pin cutter
- Gram gauge
- 'Mannino' broaches
- Pins: 18-23, including half sizes
- Tapered reamer (rarely used)

Hammer Shaping/ Filing Kit

- 60 grit paddle file
- 80 grit paddle file
- 120 grit sandpaper strips
- 220 grit sandpaper strips
- 320 grit sandpaper strips
- 600 grit sandpaper strips (rarely used)

Hammer Re-hanging Kit

- Heat gun
- Modified VISE-GRIP (model 8R)
- Hammer shank reducer
- Fine flush cut saw
- Tapered hammer reamer
- Flex-Cut knife

String and Tuning Pin Kit

- Oversized pin assortment
- Pin block jack
- String assortment (12 ½ - 21)
- Hammer
- Small VISE-GRIP (twisting)
- Coil setter
- Tuning pin crank

Spare Parts and 'Stuff' Kit

- Large Glad bag
- NYI Steinway tenor shanks
- NYI Steinway treble shanks
- NY Steinway 15.5mm knuckle shanks
- NY Steinway 16.5 mm knuckle shanks
- NY Steinway tenor reps
- NY Steinway treble reps
- NY Steinway Teflon tenor shanks
- NY Steinway Teflon treble shanks
- NY Steinway Teflon reps
- Renner Steinway shanks
- Renner Steinway reps
- Knabe/Mason/Baldwin shanks
- Knabe/Mason/Baldwin flanges
- WNG carbon fiber shanks
- Various other reusable parts

Other Stuff

- Extra long screw driver
- Dawn dish soap mix
- Small vacuum

Triage Checklist

Initial Walk-Up – 5 minutes

- Overall pitch of piano
- Overall tone of piano
- Overall playability
- Missing strings
- String seating at bridge
- Loose/wobbly pedals
- Loose pedal lyre and sticks
- Pedal function and adjustments
- Damper tray timing
- Damper upstop rail gap
- Action shift noises
- Front rail key pin friction
- Aftertouch feel
- Action friction feel
- Key level
- Key bedding issues

Action Assessment – 5 Minutes

- Action debris
- Key bedding
- Action shift
- Tight balance rail holes
- Action screw tightness
- Action part alignment
- Action center friction
- Shank travel
- Hammers off the rest cushions
- Hammer condition
- Hammer strike point

Regulation Assessment – 5 Minutes

- Blow distance
- Let-off
- Drop
- Key Height
- Key Dip
- Aftertouch measurement
- Crushed jacks
- Spring tension
- Spring corrosion
- Dirty spring slots
- Knuckle condition
- Jack alignment to knuckle core

Full Service List: 1-2 Days

Pitch Correction/Initial Tuning
- A-440
- observe
- make notes, prioritize, and stratagize

Seat Strings
- hitch pin
- rear duplex segments
- rear bridge pin
- bridge cap
- front bridge pin
- tuning pin-to-front duplex segment
- front duplex-to-V bar segment
- bottom of V bar
- massage plain wire speaking lengths
- level strings in Agraffe sections
- 30 minute pitch correction

Keyboard
- bed keyframe
- remove action stack and key upstop rail
- vacuum keys
- remove keys
- vacuum keyframe
- McClube front rail pins
- ease balance rail holes, if needed
- reinstall action stack
- clean action cavity and lubricate
- recheck key bedding
- level naturals
- set natural dip
- set sharp dip limit
- determine and set sharp height

Action Stack (removed)
- shape hammers with paddle (if necessary)
- strap hammers with 120 and 220 grit sandpaper strips
- re-pin hammer flanges (if necessary)
- re-pin wippen flanges (if necessary)
- clean repetition springs and spring slots (if necessary)
- center jacks in the window
- Teflon powder knuckles
- vacuum action stack
- reinstall action stack
- determine if juicing and/or hammer re-hanging is needed

Regulation

- travel, burn, space hammers and shanks
- align hammers to strings (shift keyframe, if necessary, and check back action and Sostenuto dowel alignment)
- mate hammers to strings
- align wippens to knuckles
- set back checks
- adjust repetition spring tension
- adjust jacks
- set repetition lever height
- adjust let-off
- set drop
- set hammer blow distance for proper after touch (0.040" – 0.045" after touch)

Pedal System

- McClube damper wires at the guide rail holes
- re-time damper underlevers to tray at ½ hammer blow
- travel damper wires
- adjust lost motion in damper pedal
- set damper pedal travel stop
- adjust damper upstop rail
- adjust shift pedal and shift stop
- adjust Sostenuto

Final Tuning and Voicing

- tune to A-440
- voice to room/ concert hall
- left pedal voice

TIPS and TECHNIQUES

Tuning/Pitch Correcting

- Use an Electronic Tuning Device (ETD) – *unromantic, but very fast and accurate.*
- 12 o' Clock Skitter – *position the tuning hammer between 2 o'clock and 3 o'clock*
- **Palm-Bump the Tuning Hammer – *if the pitch lowers, the pin is not set!!!***
  Why do they call it a tuning 'hammer'?
- Strike the key only 3 times per tuning pin – *shifts your focus towards **Feeling** the pin move in the block, and allows for greater tuning pin stability*
- Strive for 30-munite tunings/pitch corrections – *more time to fix other stuff*

Keyframe

Bedding

- The pianist can ***Feel*** bedding issues immediately – *a 'bouncy' action feeling, excessive dip, lack of aftertouch, loss of power etc…*
- Pound the stretcher – *if you hear 'knocking," the glides are probably set too high*
- Silently depress middle C and tap directly over the key pin – *if you hear "knocking," the glides are probably set too low*
- Extra-long flat-blade screwdriver – *invaluable tool for checking back rail bedding. Flee markets usually have them dirt cheap*
- Back rail "knocking" – *small, veneer shims (glued to the action risers) can help to eliminate "knocks" at the back rail*
- Check for 'hidden' glides – *Yamaha, especially*
- Check for caved-in balance rails on Steinways with Pratt-Read keyframes – *tip the action vertically on the keybed and place a straight-edge on the bottom side of the keyframe. Pay close attention to the 5th and 6th octave area, as there should be a gap. If the straight-edge rocks, you'll need to veneer the back and front rail and/or remove balance rail material.*

Leveling Keys

Naturals

- Start by vacuuming the back rail cloth – *a good cleaning does wonders*
- The WNG key level stick works great – *offers flat and crowned options, very light weight*
- Make sure the hammer shanks are off the rest cushions – *easily overlooked and huge waste of precious time*
- Always bed the key frame first – *often times a key level issue is a bedding issue, which will save you a lot of time and frustration*
- Ease the balance rail holes – *if they are too snug, a stable key level is next to impossible*

- Place the new punchings under the front rail cloth punching – *the thick cloth punching will hold the paper punchings securely and they will not fall out while maneuvering the action*
- Limit yourself to two passes – *one pass will make big improvements. Each additional pass eats up time and reduces your gain vs. effort.*

Sharps

- Set sharp height after setting sharp dip limit – *see below*

Setting Key Dip

Natural Key Dip

- Keep 0.380, 0.390, 0.400, and 0.420 dip blocks with your punching kit – *having the right dip block for a given action will greatly speed up your dip setting time*
- Use small strip bins for storing punchings – *the lids lock, keeps you organized, and they travel easily*
- Raise the damper up-stop rail and wedge the damper tray up as far as possible – *allows for an unrestrictive key dip **feeling***

Set Sharp Dip First

- Set the sharp dip to at least 1mm above the natural key height – *pianists often mention **feeling** the edges of neighboring natural keytops, as well as a deep **feeling** of the black keys*

Now Set Sharp Height

- Set the sharp height after setting the sharp dip limit – *prevents buried sharps. The Jaras tool works great, just remember to firmly tighten the collar.*
- Pianist rarely complain of the sharps being too high – *keep this in mind, as the sharp height might exceed ½" for an even aftertouch in some cases*

Hammer Shaping

Shaping

- Make a 7" x 1" x ¼" wooden paddle with 40 or 60 grit sandpaper – *may take some getting used to, but with a little practice an entire set of hammers can be reshaped in about an hour*
- Remove the stack, turn it around, and use the keybed as a table – *the key bed height is almost always the correct height for an ergonomic filing*
- Lay a cloth over the repetitions – *catches the felt fibers and makes for easy cleanup*
- Work one section at a time – *breaks up the boredom*
- Work one side at a time – *you'll find your groove, and each hammer will be evenly shaped for a more consistent and professional look.*

Strapping

- Use sandpaper strips backed with masking tape – *best results are had with strips that are just slightly wider than the hammer. Excessively wide strips are difficult to manage and the edges of the hammer can easily become rounded.*
- Leave just a shadow of the string grooves – *allows for more efficient mating to the strings*

Strings

Seating Procedure – From Tim Coates, RPT

- Hitch pin – *seat string firmly around hitch pin and to the plate*
- Rear duplex segments – *gently tap twice on both sides of the duplex bearing point. Helps to equalize string tension.*
- Rear bridge pin – *watch for downward string movement and stop tapping when the string no longer moves. Usually only two taps are needed, and with adequate lighting you can see the sting crown downward from the half-bridge point*
- Bridge cap – *tap very gently five times, rear pin to front pin*
- Front bridge pin – *two gentle, yet deliberate taps.*
- Tuning pin-to-front duplex segment – *helps to equalize string tension*
- Front duplex-to-V bar segment – *helps to reduce duplex noise, equalizes string tension, and improves tuning stability*
- Bottom of V bar – *helps to clarify the tone. A short 3/8"maple dowel works great.*
- Massage the speaking length - *downward string massaging will help to lower the inevitable pitch increase back to normal*

String Leveling

- Use an old single bass string and rubber tubing to make a string hook – *easily fits in your kit, has virtually no weight, and is exquisitely ergonomic*
- Mother Goose tool – *small, compact, and very useful. Helps to create a professional looking and perfectly straight hammer line after mating. Place just in front of the Agraffed damper heads*
- Level the middle string by ***feel*** – *the finger is more accurate than the eye or tool*

String Replacement

- Pre-coil the new string – *usually 2 ½ turns with a pin crank on a spare tuning pin will put the becket in the same quadrant as the others (4 o' clock position) once up to pitch. And, you'll only have to back the pin out one full turn (aim for the becket holes to be at 9 and 3 o'clock)*
- Use a coil lifter and a coil seating tool – *invaluable tools for making the results look like factory work*
- Stabilize the string – *the more you can stretch and stabilize it from the beginning, the faster it will become stabile*

Mating Hammers to Strings

Procedure

- Make a hammer hook from 20 gauge wire – *extremely cheap tool to make*
- Wedge the damper pedal up – *eliminates calf and ham string strain*
- Use a No. 2 pencil – *lightly pull the hammer to the string, pluck all strings behind the damper heads, and lightly mark the hammer on the muted strings*
- Shave the marks off with the paddle – *very quick and usually only two passes are needed*

Pinning

- ***Feel*** the broach – *the felt bushings may not be sized equally*
- Stick with one supplier for pins – *they are slightly different in actual gauge size, and mixing pins will slow your pinning time*
- Set up in 'assembly line' mode – *constant tool change devours precious time*
- Cut both sides of pin, parallel – *makes for a more professional look*
- Hide your mark– *pencil the final pin size underneath the shanks, between the knuckle and birds eye*
- Clean rep. springs & slots when pinning wippen flanges and rep. levers – *just makes sense*

Dampers

Timing

- Wedge-up the damper tray – *loosen/ tighten screws with one hand, gently seat the damper head with the other. Use pliers to correct the twist.*
- Use an upright spoon bender for underlevers with spoons – *cut the shank to avoid contacting the plate*

Muting

- White action cord – *small cuttings inserted into tri-chord felt helps to mute the left and right strings*
- Shift the guide rails – *humidity swings and transport can cause dampers to bleed. If dampers bleed consistently on the right or left sides, loosen the guide rail screws and shift the guide rail towards the problematic strings.*
- Check string level – *unleveled strings frequently cause dampers to bleed*

Noise

- Damper swish – *all pianos have a swish sound, some more than others. Trimming the felt with a sharp scissors just below the string groove can help greatly.*
- Check the guide rail hole friction – *often sounds like damper swish. Use McClube 444 and pressure bend as needed to reduce the noise.*

Tools

- Small, rotating head screw driver – *allows you to keep forward pressure while tightening the barrel screw. It greatly reduces slipping off the screw head, which eats up valuable time.*
- Shaff wire bending tool – *slender tool, travels well, quickly rotates in the hand, and allows you to **feel** the wire bends. It is an extremely valuable tool when working with soft damper wires.*
- Steinway head bender tool – *comfortable bulged handle, case hardened tip, but may not work some pianos with larger wire diameters*
- Medium size pliers – *often times the rubber grips slip off. I CA glue them on. Also works great to tighten barrels screws with gummed or thin slots.*

Voicing

General Voicing

- Listen to the bass/tenor break tone change – *Stw. B's can be tough, but D's have better tone transition.*
- Start from the highest Agraffe and move down – *felt-mute the middle and left string and chopstick-voice the right string, as necessary.*

Juicing Hammers

- Don't be afraid to juice – *it's ultimately reversible*
- 1 part lacquer, 4 parts acetone – *acetone flashes off faster than lacquer thinner, and best results are had with an overnight dry time, if possible*
- Slap the hammers firmly on a voicing block – *a checkering file works great, reduces your needling time, and can be used for several other purposes*

Spray-Can Lacquer

- Easily found at big-box stores – *no need to dilute, just make sure it's clear…and not black!!!*
- Use masking tape and newspaper – *just so the strike point is exposed ($1/8^{th}$ inch)*
- Dries in roughly 30 minutes – *great time for attacking the pedals and damper system*

Hammer Re-hanging

C 8

- Find the strike point – *with bass cheek block in place, slide the keyboard inward and outward at the treble end while playing several notes. You'll find the spot where it projects the most.*
- Modified VISE-GRIP, model 8R – *initially designed for sheet metal working, this tool will greatly speed up the re-hanging process.*

The Steinway "S" Curve

- 5^{th} and 6^{th} octave – *if the tone "whistles," slide the action in and out and you may discover that the tone becomes clearer, and has greater focus and projection.*
- G5-Bb5 is usually the most problematic – *Find the sweet spot and test the neighboring hammers*
- Heat 4-5 glue collars at a time – *minimizes tool swapping. Just be sure to not BURN the shanks. The hammers will easily pop off.*
- Don't fret about the weird look of the curve – *tone clarity and projection trumps a straight strike line*
- Clean, re-hang, and trim the ends of the shanks – *a fine, flush-cut saw works very well*

In-The-Field Touch Weight: A misnomer

- PianoTek weight set – *approximately $110, but well worth the price. It travels easily; measurements are exact, and much faster than using the wing-nut device.*
- Address friction – *measure the down and up weight before and after addressing friction; you'll be amazed with the change. Lubricate everything you can.*
- Reset damper key timing – *takes roughly 20 minutes, solves several pedal issues, and the pianist **feels** the difference instantly*
- Increase damper pedal travel – ***feeling** the additional weight of the damper underlevers at the end of a keystroke lends itself to an action **feeling** heavier than it was designed. Felts compress overtime.*
- Reduce mass in the hammers – *a technique of last resort. Use your best judgment.*

The Grand Damper System: From the Foot Up

Gabriel Granitz, RPT
2015 PTG Convention
Denver, CO

Pianists have three connection points to the piano: the feel of the keys, the feet touching the pedals, and the sound waves vibrating the ear drums. After servicing a piano, the technician will usually receive compliments regarding the piano's action and tone; rarely will the pianist comment on the pedals…unless something is wrong. From the pianist's perspective, the entire grand damper system (consisting of hundreds of parts) is viewed simply as "the pedals." If the pianist notices a problem with "the pedals," where do you start? The aim of this presentation is to familiarize the technician with the internal workings and individual components of common grand damper systems.

The 11 Major Components of Grand Damper Systems

1 - Lyre Construction

- Pedal Box
- Posts
- Top Plate
- Attachment
  - Bolts/Screws
  - Locking Plates
  - Cams/ Wedges

2 - Various Pedal Assemblies

- Steinway
- Mason & Hamlin
- Baldwin

3 - Pedal Rods

- Adjustable
- Non-Adjustable
- Pedal Guides

4 - Lyre Sticks

- Fixed Length
  - Sockets
  - Shims (felt, leather, cardboard)
- Adjustable Length
  - Capstans
  - Capstans with Bridge Pins (Baldwin)
  - Socket Cups

Pedal Maintenance Go-Kit

A small pedal kit is an invaluable tool when a pedal repair is needed. With this universal kit I'm able to resolve 95% of most pedal problems within minutes. This clear 9" x 5" x 1 ¼" case can be found at nearly every hardware store, keeps everything organized and travels easily, especially in my checked luggage.

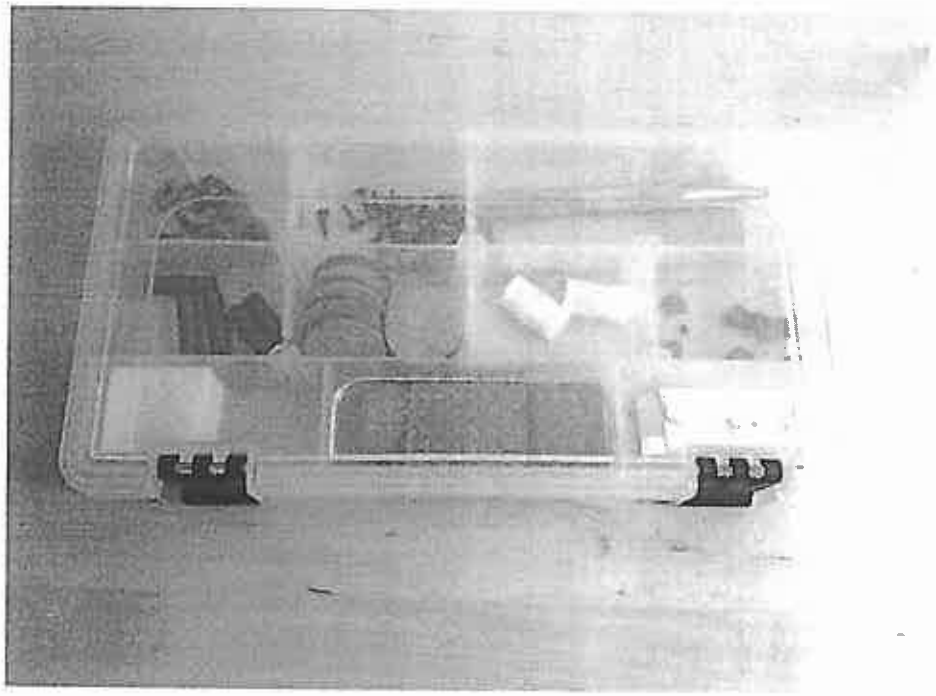


Figure 1: Pedal Maintenance Go-Kit

Contents:

- (12) Steinway Pedal Pivot Rod Leather Disks – 15/32" x 3/16" x 3/32"
- (6) Steinway Trap Work Round Leather Disks – 1" x 7/32"
- (3) Steinway Pedal Cushion "Raviolis"
- (6) Steinway Pedal Pivot Rod Teflon Bushings
- (6) Steinway Pedal Rod Rubber Bushings
- (6) Yamaha Style Pedal Bushings
- (3) Belt Leather Strips – 1" x 3" x 1/4"
- (3) Hammer Blocking Felt Cubes – 1"
- (6) Razor Blades
- (1) Nail Set Punch – 3/32"
- (30+) Cut Tacks

Repairing Failed Pedal Lyre Joints

Every technician will encounter pianos with failed pedal lyre joints. The most common signs of joint failure are visible gaps between the lyre posts and the upper and lower components.

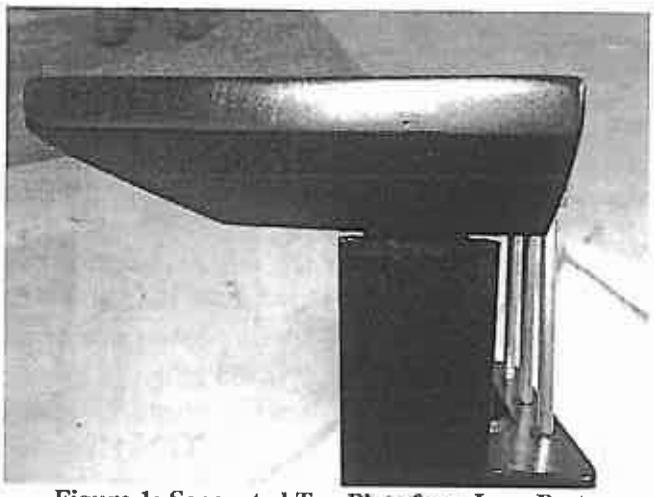


Figure 1: Separated Top Plate from Lyre Posts

Unfortunately, most lyre joint failures are not readily visible, and symptoms include: unstable pedal regulation, untraceable squeaks, clicks, or groans, unstable key frame bedding, and changes in lyre stick stability. Once diagnosed, the lyre should be repaired in the shop.

Typical Lyre Reconstruction

Figure 2: Knocking the lyre apart

In this scenario, the top plate of a Steinway lyre has become separated from the posts. Once in the shop, a moving blanket on the floor becomes the perfect work bench; one that protects the finish on the lyre.

Using the foot as a stop, the top plate can be removed using a wooden punch and rubber mallet with alternating, firm blows to the post tenons.

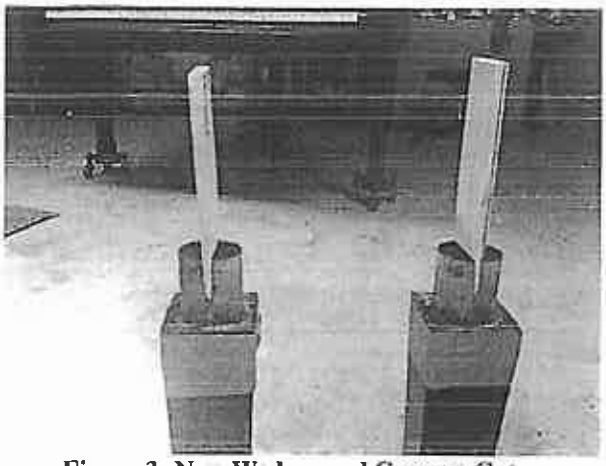


Figure 3: New Wedges and Grooves Cut

With the top plate removed, the original tenon wedges have been removed using a band saw, allowing space for newly made wedges.

The new wedges should only fit approximately 2/3 of the way into the fresh-cut wedge slots; otherwise, they will become useless in securing the joint.

Masking tape applied flush with the joint edges helps greatly when cleaning glue squeeze-out.

Figure 4: The Glue-Up

A modest amount of Titebond I wood glue is plenty, since the tenons will produce glue squeeze-out after being firmly pounded in. Make sure enough glue is applied within the grooves.

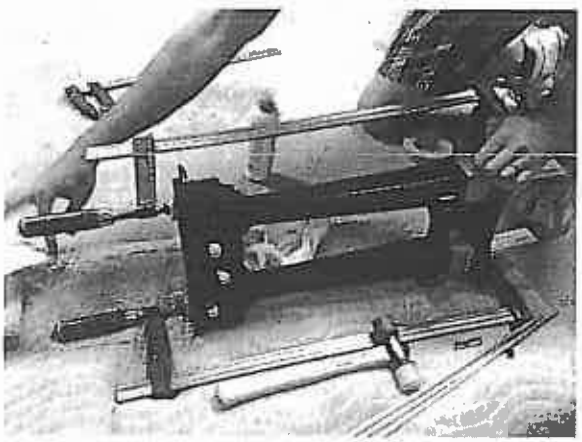


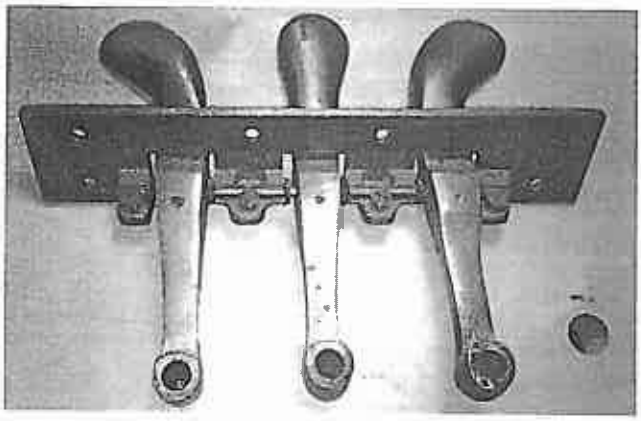
Figure 5: The Clamp-Up

After the top plate is clamped, and the wedges firmly pounded in, use a flush-cut saw to trim the wedges. Immediately clean the glue squeeze-out and remove the masking tape. Let sit overnight, before reinstalling.

The Steinway Pedal Assembly

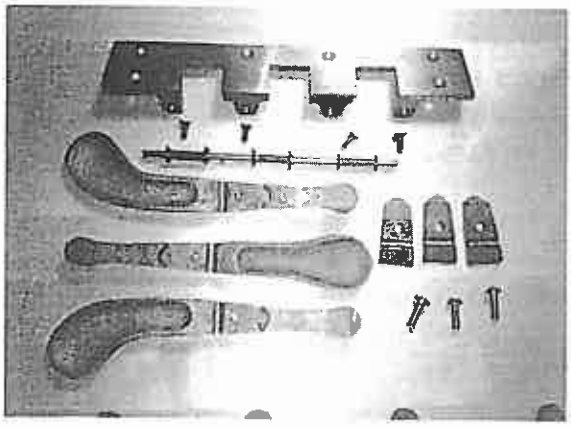
The Steinway Pedal Assembly is perhaps the most complex of all pedal designs. Two versions exist: felt-bushed and Teflon-bushed pedal pivot rods. The Teflon bushing is far superior in longevity, but the felt-bushed pivot rods can remain 'tight' for a several years under moderated use.

If the pedals become "sloppy," simply tightening the machine screws will correct most issues. When dealing with worn felt bushings (older models), it is best to upgrade to Teflon bushings.



Virtually unchanged for over a century, the Steinway Pedal Assembly design has proven itself for durability.

Figure 1: Steinway Pedal Assembly



The Steinway Pedal Assembly consists of 30 individual parts:

- (1) Pedal Face Plate
- (1) Pedal Pivot Rod
- (3) Pedals (left, middle, and right)
- (3) Pedal Locking Plates
- (6) Pedal Pivot Rod Leather Disks
- (3) Pedal Pivot Rod Teflon Bushings
- (3) Pedal Locking Plate Machine Screws
- (4) Pedal Pivot Rod Screws
- (6) Pedal Face Plate Screws [not shown]

Figure 2: Steinway Pedals Disassembled

Steinway Pedal Assembly Maintenance

Maintenance is quite simple, and usually requires only screw turning with a medium/large sized screw driver.

With the lyre attached to the piano, dislocate the pedal rods from the pedals, remove the six Pedal Face Plate Screws and pull the Pedal Assembly out. Normally, only the Locking Plate Machine Screws need to be firmly tightened. It is good practice to check the tightness of the Pedal Pivot Rod Screws.

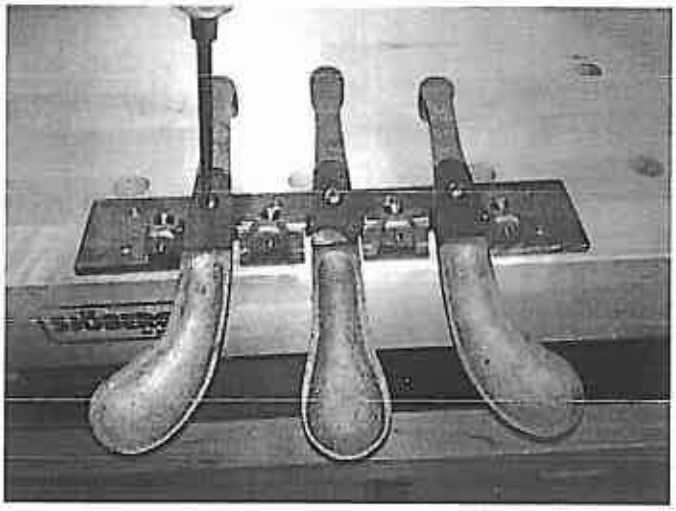


Figure 3: Tightening the Locking Plate Machine Screws

If the Pedal Assembly has felt bushings, inspect them for durability. If the bushing cloth is in good condition, adding Teflon powder can help to prevent wear. However, if the bushings are moderately or severely worn, replace them with high quality action cloth or install new Pedal Pivot Rod Teflon Bushings.

Tip 1: The edge of a work bench or table is very useful and allows for over of 90° of rotation of the pedals.

Tip 2: Be aggressive when tightening the Locking Plate Screws. They should feel firm under rotation. The trap work, shift, and damper tray spring loads will override the seemingly excess friction and the player will feel confident with a solid set of pedals.

Steinway Lyre Box Bottom Piece and Pedal Cushions "Raviolis"

After several years, the Steinway Pedal Cushions become compressed and "clunky" in sound. Simply inserting bushing cloth (or similar material) will help mask the noise, but only temporarily. The only long-term solution is to replace the "raviolis."

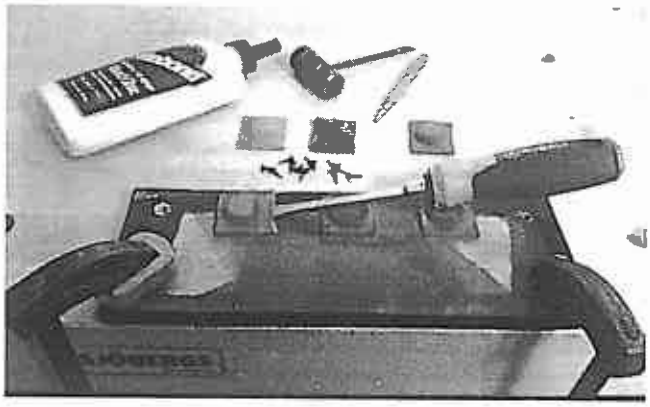


Figure 4: Removing Old "Raviolis"

Simply remove the lyre from the piano and remove the bottom piece. Clamp the bottom piece to a workbench or table and remove the old "raviolis" with a medium-sized screwdriver.

Tip 1:

When installing new "raviolis," orientation matters. They are not square!

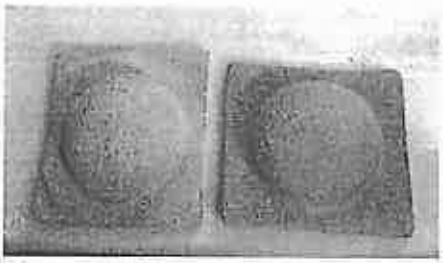


Figure 5: New "Raviolis" are not square!

Figure 6: "Mind The Gap (1/8") "

Tip 2:

"Mind The Gap!" The "Raviolis" are usually recessed 1/8" from the back of the bottom plate.

Tip 3:

Use the existing tack holes to aid in alignment. A small amount of Titebond Mold & Trim glue, a 3/32" nail punch, and a small hammer are invaluable tools in your pedal repair kit.

Friction and Noise Points

Appropriate Lubricants and Other Techniques

Pedal System

- Pedal pivot pins	Teflon Powder, McClube 444, SuperLube
- Pedal pivot felt bushings	Teflon powder
- Pedal rod holes	Teflon powder
- Pedal rod grommets	Teflon powder
- Pedal guide rail holes	Teflon powder
- Pedal rod tops	Teflon powder, clean the gunk off first
- Trap lever felt/leather	Teflon powder, SuperLube
- Trap lever pivot pins	SuperLube
- Pitman dowels	Teflon powder
- Pitman dowel guide holes	Teflon powder

Key Bed

- Left stop block felt	Elmer's Slide-All
- Key bed dogs	Elmer's Slide-All
- Back rail segment	Elmer's Slide-All
- Front rail segment	Elmer's Slide-All
- Glide bolt dowels	Elmer's Slide-All
- Glide bolt paths	Elmer's Slide-All
- Shift arm head plate	Elmer's Slide-All
- Shift spring arm(s)	Elmer's Slide-All, clean the gunk off first

Key Frame

- Left side of frame	Elmer's Slide-All
- Right side of frame	Elmer's Slide-All
- Shift arm head plate groove	Elmer's Slide-All
- Key frame dogs slots	Elmer's Slide-All
- Cheek block pins	Elmer's Slide-All
- Cheek block locating plates	Teflon Powder
- Front rail pins in frame	Thin CA Glue, wire cutter bites
- Balance rail pins in frame	Thin CA Glue, wire cutter bites
- Steinway half-round dowel holes	Teflon powder
- Steinway monkey guides	Teflon powder

Back Action Assembly

- Pitman dowel felt/leather	Teflon powder
- Pitman hole	Teflon powder
- Damper tray pivot pins	Teflon powder, McClube 444, SuperLube
- Damper tray pivot pin block holes	Teflon powder
- Damper tray spring cushion	Teflon powder
- Underlever arm bottoms	Teflon powder
- Underlever action centers	ProTek, McClube 444
- Underlever spring slots	Teflon powder, No. 2 pencil
- Underlever springs	Steel wool

Keys

- Front rail pins	McClube 444
- Front rail mortise felts	Teflon Powder
- Balance rail holes	Teflon powder
- Balance rail pins	McClube 444
- Balance rail mortise felts	Teflon powder
- Capstan thread holes	CA glue (thin),
- Capstan heads	McClube 444
- Back check wire flutes	CA glue (thin),
- Back check leathers	Wire brush, fine sandpaper

Action Stack Assembly

- Heel cloth	Teflon powder
- Repetition flange centers	ProTek CLP
- Jack centers	McClube 444
- Repetition spring arms	Steel wool
- Repetition spring slots	No. 2 pencil
- Knuckles	Teflon powder
- Shank flange centers	ProTek CLP
- Hammer tails	Sandpaper (medium grit), checkering file
- Steinway Sostenuto brackets	Teflon powder

Damper Wires

- Guide rail bushings	Teflon powder
- Damper wire corrosion	Steel wool, McClube 444
- Damper head wire slots	CA glue (medium or thick)

EFFECTIVE EFFICIENCY IN FOUR HOURS

Yamaha Corporation of America

July 17, 2015

What makes this approach effective is the "surprise" element. The customer is surprised, and that leads them to accept your recommendation for the next step. Each step must incorporate an element of surprise, until you have won the customer over to regular maintenance that might not be quite as surprising, but keeps the piano in top form.

What makes it efficient is planning. For that we have a very handy spreadsheet that will give us a clear view and a running record of the work that has been done, what remains to be done, and how we can delegate the time and other resources to do it. Remember that our eventual goal is a piano that is in top condition and will require only tuning and minor adjustments between installments of replacement parts. If we can institute a system of a "full service" maintenance schedule, we will have accomplished that goal for the long term.

Take as an example the 15 year old Yamaha C3 that has had nothing but tuning done over those years. Everybody likes the piano, but no one loves it the way they did when it was new. If there is a new musical director, that person may just tolerate the piano but would like something better.

We have all seen this piano, and we can all list a number of needed repairs and maintenance issues. To name a few: a lot of dust (Metro Vacuum ED500 DataVac 500-Watt 0.75-HP Electric Duster 120 volt), excess friction, loose parts, worn parts, strings off the bridges and action and dampers needing regulation.

First Installment

- ✓ In the first installment, clean and lubricate everything, with special attention to the pedals and trapwork.

- ✓ Blow out the soundboard and action cavity, and provide for smooth shift of the key frame.

- ✓ Replace worn pedal rod bushings, and clean and polish the pedal rods, action return spring, balance rail glides, key frame guides, etc.

- ✓ Check that pedals and trapwork are properly oriented, replacing pedal cushions and adding balance rail punchings to the pitman where necessary.

- ✓ Look for parts that are approaching the limit of their adjustment, then find out why, and correct it.

- ✓ Check action centers, parts alignment, and condition of the keys and dampers.

- ✓ Shim the key stop block to reposition the key frame for proper alignment with the strings, but caution must be exercised to avoid nasty changes in voicing, due to the new position of the hammers relative to the strings.

- ✓ Check for loose or binding action centers, and make certain that keys are relatively level, square and spaced.

- ✓ Check all the parts alignment and bed the key frame (with appropriate attention to key dip). Check for relatively even key dip.

- ✓ Quickly determine the strength of the repetition lever springs (troops snapping to attention), making gross adjustments as needed (gang evaluation/adjustment increases efficiency here).

- ✓ Set the hammer height, drop and let-off, and adjust repetition lever height and jack position as necessary.

- ✓ Set the hammer checking, key stop rail (only with action in piano), damper stop rail, shift pedal stop, and perhaps do some rough voicing of worst offenders.

At this point, the piano is dramatically improved from what it was, offering much more even touch and speed of repetition, and the pedals should work noiselessly and smoothly. For a pianist, this is a major step up.

Second Installment

In the second installment, our choices may be a little more difficult to manage. We are looking at dampers that lift way too early, so we'll get a significant surprise factor from fixing that, and we have hammers in serious need of shaping, also with the option of major noticeable improvement for the pianist.

Consider going with the damper work at this point, in part because of the magnitude of the change for the pianist but also because we will have to duplicate many of the things we did in the first installment if we go after the hammers now. The bigger bang for the buck is most likely in the damper work.

- ✓ Evaluate the overall condition of the damper felt at this time, looking carefully especially for tri-chord wedges that may need to be replaced. In a Yamaha piano, that is usually not necessary, but it frequently will be necessary to trim the wedges. You will find that the center pin flush cut end nippers are about the same width as the wedge felt, and produce a very nice result. If you adjust the damper timing without trimming the wedges, they will likely not clear the strings entirely, resulting in premature damping especially of the middle string of the unison. Further, keep in mind that the purpose of even damper lift is to provide for even damping, and that will not happen if you have wedges that reach well below the plane of the strings while at rest.

- ✓ While the dampers are out of the piano, take the opportunity to revisit the hammer alignment, let-off and (to a lesser degree) drop.

- ✓ This is also a good time to check the condition of the damper tray hangers, remembering that the tray is not lifted with even weight across so that the hangers can get beat up,

especially with heavy use. Move the tray laterally to check for noise and squeaks. Remove and re-pin as necessary.

- ✓ Check the underlever assembly, and especially the underlever weights. If the piano lives east of the Rockies the weights may well need swedging.

- ✓ All other aspects of action regulation are fair game for refining during this visit, but our surprise is coming mostly from the change in damper timing. The action is going to feel much lighter, and far more responsive. Also, as with a race car when you dial in the transmission, you are able to much better control the car. The dampers are a critical piece of the transmission of expression for the pianist, so the more finely they can be adjusted the greater control.

- ✓ One last note at this point is to check the string leveling. Yamaha pianos are not immune to changes in string level over time, so this may be a good opportunity. The only caution here is that it could result in some really weird voicing issues if the hammers are no longer mated to the strings, so proceed with caution.

Third Installment

In the third installment, consider re-shaping the hammers. The surprise factor here is obvious, but we need to be very careful in our approach. By this time, we should have established a substantial degree of trust with the pianist or piano owner, so our job should be a little easier. However, it's just at this point that we can most easily blunder (when our confidence is high, or in the words of the Author "pride goeth...before a fall" Proverbs 16:18). We need to have a clear understanding of what is possible with the hammers we have, we need to be able to communicate that to our customer, and we need to be absolutely sure that our goals and expectations are not only attainable but that they match our customer's goals and expectations!

Yamaha recommends individual shaping of the hammers with a paddle, followed by careful mating of the hammers to the strings. This is a job that takes experience to master and sufficient light to carry out (wear reading glasses if you need to). The combination of this and the voicing that accompanies it will probably eat up the four hours that we've set aside for this installment. Done well, the wow factor is huge. If we do have any time left over, we can use it up with refinement of regulation steps that have been affected by the "new" hammers.

Fourth Installment

In the fourth installment, we need to lay a solid foundation for future work, so it is at this point that we need to consider the key bushings and a refinement of key level and dip. If we do need to replace the key bushings we will remove the keys to the shop, of course. That job would constitute one four hour installment on its own.

We now are going to "flatten the road" for our race car. Yamaha recommends a white key leveling stick, and line of sight leveling, like the camera on stage. Yamaha front rail cloth is very high quality, so we will be able to feel very slight differences in dip. The combination of a very "flat" keyboard with a well-defined stop at the bottom of the key stroke will set the stage for easily discernable refinement of after-touch. From that we are now able to refine all previous steps of regulation with far greater accuracy, easily and quickly.

- ✓ Check balance rail for proper key bedding.
- ✓ Level keys with key stick at approximately 65mm (action stack in place if possible).
- ✓ Level keys with "line of sight", action stack in place.
- ✓ Set white key dip.
- ✓ Refine hammer height, let off and drop.
- ✓ Set black key dip.
- ✓ Refine all steps of action regulation.

For future maintenance we have now set a precedent with the customer, building a trust that we must respect and care for. We've created a piano that is powerful with a sweet control (remember the race car?), with both a wide dynamic range and a full palette of colors. Keeping the piano in this condition will require periodic infusions of everything we've already done, plus the occasional parts replacement – those hammers won't last forever, and the damper felt won't either.

It may be possible to establish a maintenance contract with the customer, and this would be a great time to do so. Yamaha recommends that you establish some sort of an odometer, so to speak; an example would be to figure something like 350 hours of use requiring four hours of maintenance. All this of course must be predicated on the type of use and the needs and expectations of the customer.