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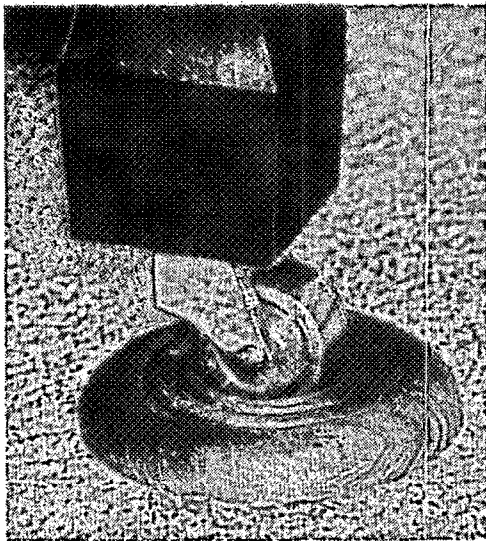
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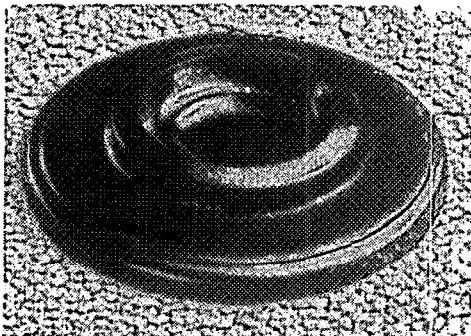
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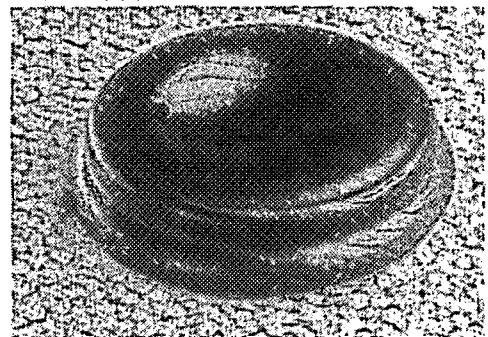
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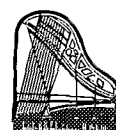
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Editorial Perspective

The Measure of Music

By Steve Brady, RPT
Journal Editor



A review of *Measure for Measure: A Musical History of Science* by Thomas Levenson. Touchstone, New York, 1995. Paperback, 351 pages; 33 black & white photographs and illustrations; bibliography by chapter; full index. \$14.00 US, \$19.50 Canada.

Thomas Levenson opens this book with the story of his visit to the North Bennet Street School in Boston. He had gone there to find out what was meant by "well-tempered" in the *Well-Tempered Clavier* of J.S. Bach. After a lucid demonstration by our own Bill Garlick, Levenson left with an insatiable desire to know more about the science of music, and, of necessity, about the history of scientific thought. *Measure for Measure* is the result of his search for this knowledge.

Although much of the book isn't directly about music, the underlying theme of all the investigations and explanations is music. Levenson's take-off point is a pair of chapters about order and perfection in the arts, explaining the experiments of Pythagoras and describing the harmonic series which lies at the heart of Western music. From there, however, Levenson's chronicle ranges from alchemy to optics to Newtonian physics to nuclear physics to chemistry to modern medical science. In all this, his interest is in the instruments used by scientists as well as those used by musicians. "This book turns on the element that links the instruments that serve either scientists or musicians. For both, instruments serve as extensions of human capacities. These extensions augment our own abilities, but of necessity do so narrowly. A microscope extends our sight, but confines our vision to an ever more confined field. A harpsichord allows us to pluck particular pitches, but we are confined to the

notes its strings define."

The background exposed by Levenson's inquiries throws his subsequent studies of cello-making (my own favorite chapter) and automated instruments from mechanical music boxes to MIDI keyboards into sharp relief. Levenson notes the coincidence of Newton, Bach, and Stradivari reaching "the pinnacles of their professions at almost exactly the same moment in history," describing how their ideas sprang from the same philosophical, artistic, and scientific currents which were sweeping through Europe at the time. I suppose only a curmudgeonly piano technician like me would object to his omission of Cristofori from this pantheon of 18th-century geniuses!

Measure for Measure is a fascinating book. Levenson's writing style is direct and accessible, filled with anecdotes to delight, cogent explanations to instruct, and literary allusions to inspire. His description of our history through the binocular lenses of science and music enriches the reader. In his own words, "We grasp for the knowledge that enables us to describe, for in description we seek and sometimes find revelation. The ultimate revelation is that which leads us to ourselves, to some sense of who we are, where (in the largest sense) we live, and how we have come to pass." I highly recommend *Measure for Measure* to all with an interest in history, science, or music. If your interests include all these things, you'll enjoy the book that much more. ☐

Please submit tuning and technical articles, queries, tips, etc., to me:

Steve Brady, Journal Editor

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COVER ART

This month's cover photo by Sara Matthews shows two difference possible sets of tools a technician might use in repinning a grand hammer flange. See RPT, Dan Levitan's article beginning on Page 17 for details.

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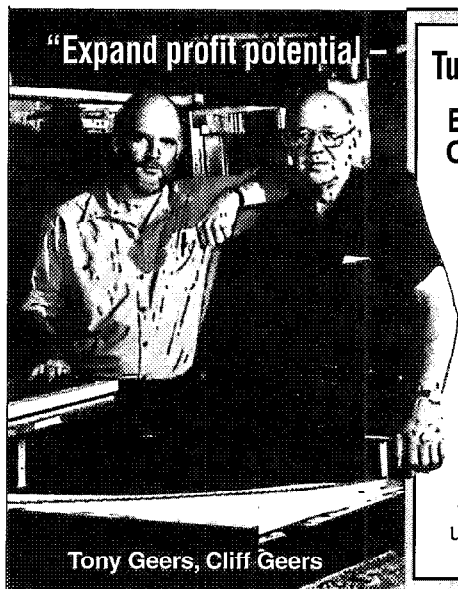
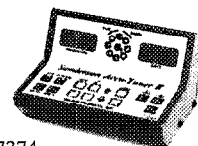
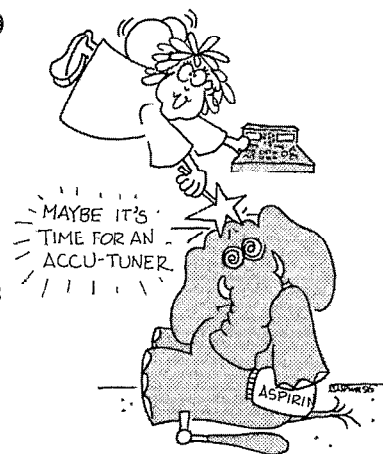
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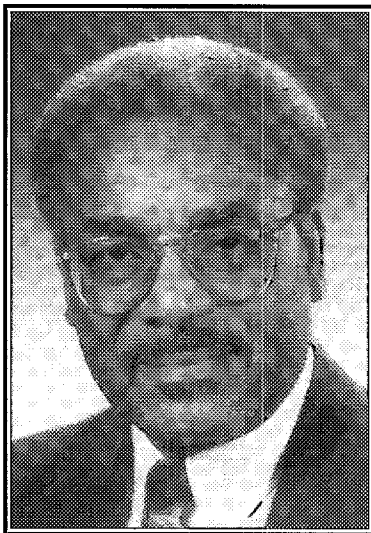
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President's Message

This is Our 40th . . . Will You Be There?

By PTG President, Marshall B. Hawkins, RPT

In thinking about the many things that go into making up the Piano Technicians Guild Annual Convention & Institute, it is not too difficult to miss something. It takes a lot of organization and planning, many letters, a large number of phone calls/e-mail/fax transmissions, etc. to put it all together. Add to that a substantial expense and a tremendous amount of just plain old hard work to put on this affair for a thousand or so folks looking for what will be offered.

Go one step further and consider this aspect of the planning and preparations: the involvement of the piano manufacturers, the suppliers of various tools, piano parts and related materials. For the manufacturers there is the time and expense of putting into place a number of instruments for display as well as other uses. Now consider the number of personnel needed. Think back to when you were putting together a budget for your own trip to Orlando and make this comparison. Add to that the various costs associated with exhibit booths, furnishings, handout literature and the overall time required for staffing the booth. Some companies bring in a guest artist to perform on their pianos...others arrange to have distinguished experts from other countries join us in our activities as well. Still others sponsor receptions and parties during the course of time we are together.

Why do you think they are willing to do this? It seems to me that they see the Piano Technicians Guild as a worthwhile organization and value the friendship and goodwill of our members who are deserving of their support. At one time few technical experts were members of the Guild, but now we find that many of the technical experts have developed their skills through PTG programs and contacts. Nowhere else can these companies reach such a specialized group of technical people all in one location. Nowhere else is there such a concentration of people who genuinely care how well the manufacturers design and make pianos. The benefit of visibility and goodwill that comes from participating is perhaps as important as anything else.

There are no doubt some who may take the cavalier attitude that it's just business for these companies, but allow me to suggest that thought be given to how much detail and expense goes into putting the displays together. Think also how important it must be to those people to have the opportunity to show their products to you, the technicians in the field.


As you have read in recent months, our institute team, led this year by Wally Brooks, has put together a tremendous

array of classes you simply can't afford to miss. Being present at this annual gathering, the most important function of the year for piano technicians of all skill levels, needs to be a main priority. If it is not yet a personal priority, you may need to review your goals and make it a priority today. Step forward and join those from around the world who realize this is where the action is. Join those who already know why their income continues to increase.

This is our 40th Anniversary and the attendance is expected to surpass the 30th Anniversary. That year we set a goal of 1,200 participants and we came within 40 or 50 of reaching the total. I feel sure we can surpass that number this year in Orlando. Will you be one who helps that happen? The choice is entirely yours.

All of your expenses do represent quite a sum of money. However, you will make it back threefold when you put all that you will learn into practice. Add to that the enrichment you will gain from the personal contacts and friendships which will surely be fostered during this time of exchanging ideas.

Any effort toward continuing education, regardless of the chosen field, has some expense involved ... both monetary and personal sacrifice. I believe you will benefit tremendously when the decision is made to take part. How does one on a limited income handle this expense? You must first realize that the expense you incur is absolutely worth every penny and much more! Once that is understood, it is a matter of looking positively at your situation and doing what you must do to continue on.

My suggestion is that if you have not previously planned for this event, sell something or borrow the money. Going into debt to further your education is a serious commitment to your future. While this may sound a bit tough, I am very serious. The benefits to be gained by attending the classes and functions designed for you are many. This yearly event is truly worth whatever sacrifice you must make. There is something for every person who attends and you will be glad you made the decision to be there. 

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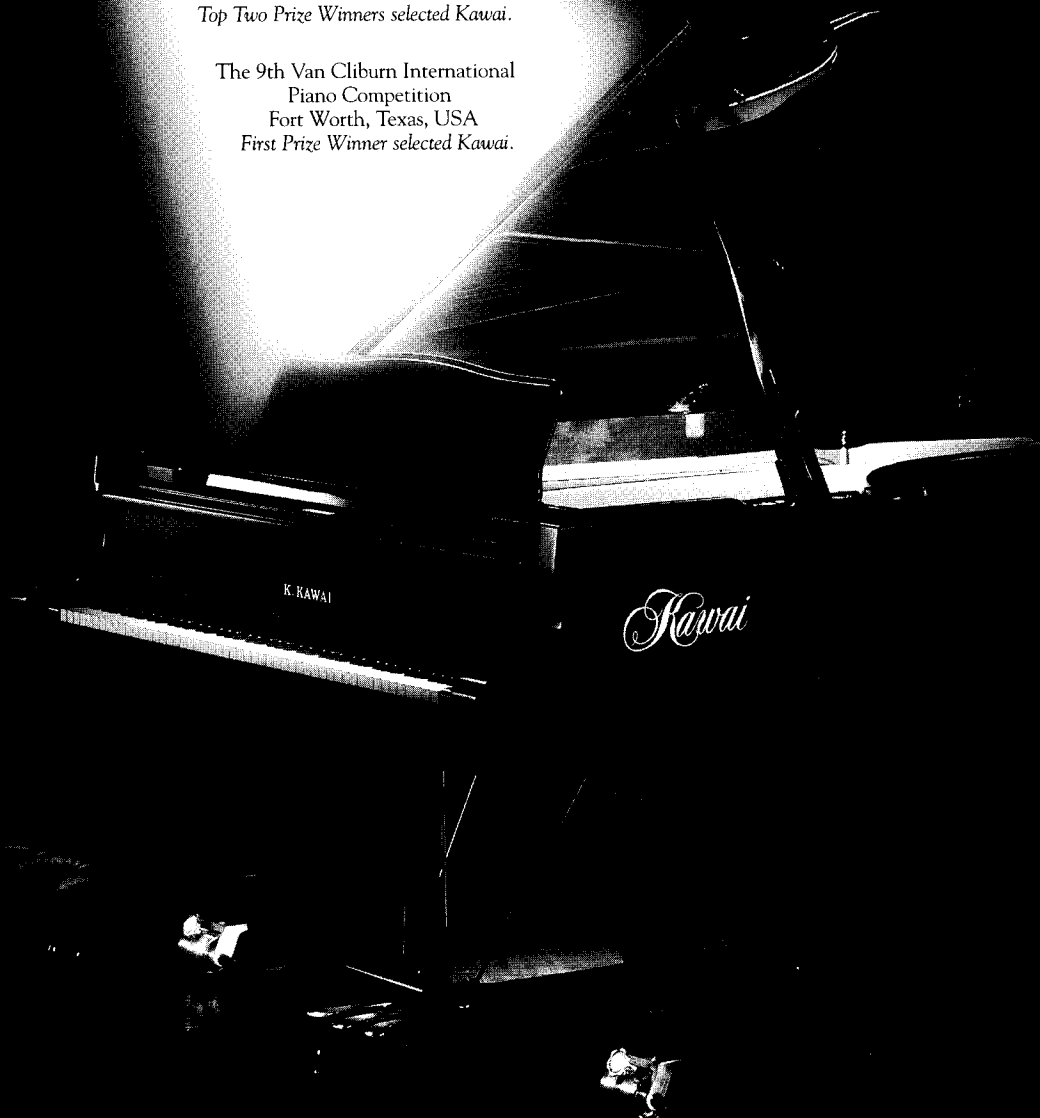
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The 9th Van Cliburn International
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First Prize Winner selected Kawai.



It's becoming a familiar refrain.

Clarification & Correction

I read Fred Tremper's January 1997 *PTJ* article with interest because I am a proponent of the ideas he presents and practice them daily. The purpose of this letter is to point out an error (maybe a typo) and also to suggest an improvement in one area of the article for the tech that is just learning these concepts.

Error: Page 36, 2nd column, 7th line from the bottom. The word "slower" should be "faster."

On the same page in the 1st column (lower half) he describes his method of achieving what he calls a just 4:2 octave using the test note D4. His advice to *lower* D4 to produce a contracted P4th and an expanded P5th, I think, is bad advice (albeit correct). Ultimately the D4 at the conclusion of tuning the temperament will be sharper, to produce the reverse. That is, an expanded P4th and a contracted P5th. So why not be more comfortable and consistent with proper tuning techniques of expanding 4ths and contracting 5ths? I suggest that the D4th testing note should be placed higher for the 4:2 A3-A4 octave to produce an expanded 4th and a contracted 5th. The principle of equal beating is still true in this circumstance.

An analogy that clarifies my suggestion is as follows: Assuming that you are right handed, I would not advise you to fix a loose shelf by tightening the bracket screws with your left hand. This suggestion would indeed tighten the shelf, but this procedure would be uncomfortable and contrary to your standard method of handling tools with your right hand.

I hope that I have provoked a further interest into this subject and I would enjoy any feedback.

— Howard Rosen, RPT
Boynton Beach, FL

Fred Tremper Responds:

Thank you for your letter in which you point out an error in the article that appeared in the January issue of the *Journal*. You are quite right: on page 36 you correctly pointed out that when the minor third is contracted, the beat rate increases. I would like to blame someone for the error, but I can't; it wasn't a typo, it was what I wrote. What I should have said is, "Lower A3 until A3-C4 beats somewhat lower than C4-A4."

Your other point can be open for discussion. Yes, if D4 is *raised*, the

same number of beats would occur if you had lowered D4 the same amount. The check for the octave would be just as valid. I had two reasons for writing what I did. First, it is easier to give just one method rather than also including an alternate; second, for some reason, and I don't know why, the beats appear to me to be more clear when D3 is lowered. Maybe it is my imagination. I confess I have gotten into the habit of lowering D3. I certainly will give your suggestion a try.

Let me thank you for your response. It is good to know that at least one person read the article.

— Fred W. Tremper, RPT
Morehead, KY

In Response to Leon Vieland, PhD.:

Thanks to Leon Vieland for a most interesting and well-thought-out article (See Page 24 of this issue.) highlighting the effect of string slip as bridge movement alters the pitch of strings. As Leon correctly notes, I neglected the factor of downbearing in my article. I left it out to avoid getting even more complex, and my point could be made without considering it. But downbearing is certainly a factor, and Leon covers the subject far better than I could.

Leon's analysis exposes yet another complexity, which I would like to hear more about from him. With reference to the graph of Pitch Change vs. Bridge Rise, he notes that "for two degrees total downbearing, a 20 cent rise follows from a bridge rise of 90 mils." But this 90 mil bridge rise would change the downbearing to over 3 degrees for this particular string, if 2 degrees was the starting point of bridge rise for this calculation. It would be interesting to see other areas of the scale exposed to the light of Leon's graph.

— Darrel Fandrich, RPT
Stanwood, WA

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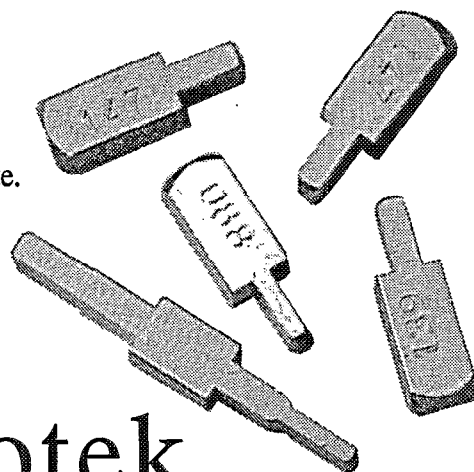
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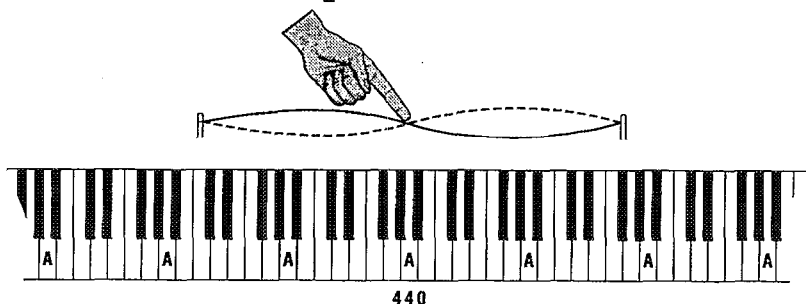
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Tips, Tools & Techniques

TT&T

Bringing the Mountain to Mohammed

Needling hard hammers in a vertical piano can be time-consuming and awkward. I finally made a tool that allows me to drive three needles (parallel to the molding) very deep and with accuracy. Plus, the action is left in place. The tool

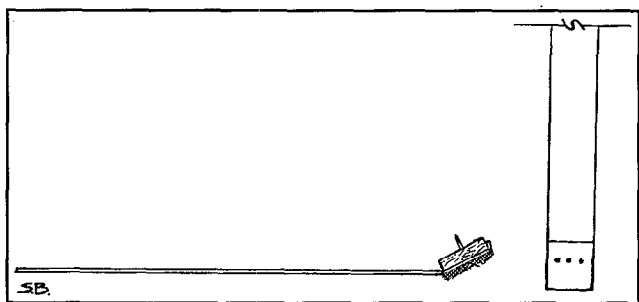


Figure 1 — Brass voicing tool for vertical pianos.

(See Figure 1) is fashioned from a strip of brass, to which I glued a small block of hardwood with three needles 3/16" long driven through small holes in the wood. On the back side I glued a square of bushing cloth.

The idea is to take the mountain to Mohammed. With one hand, place the tool against the strings of the unison and with the other, push the hammer into the needles at the precise spot desired. Using the thumb, I simply push the

tail of the hammer and this drives the three needles into the shoulder (See Figure 2). Then, strike the key and listen. If more needling is desired, I place the needles on the other shoulder and repeat. I have been able to improve the tone of a piano within a few minutes.

— Jack Cashion, RPT
Seattle Chapter

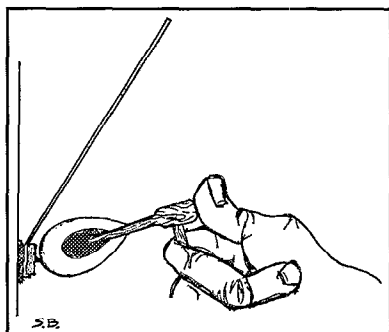


Figure 2 — Driving the hammer into the needles with vertical piano voicing tool.

TT&T

Lacquering Soft Hammers

I'd like to give a description of what happened to me about a year ago. I went to tune a lady's piano and in talking to her before the tuning I found out that some other technician had installed new hammers for her. However, they sounded like she was playing with Q-tips, very soft and not to her liking at all. The piano was an Acrosonic spinet and did not have the usual brilliance in the upper treble that most Acrosonics have. When she complained about the sound to the technician who installed the hammers he told her that they would sound better after the piano was played for a

while. A year had passed and she disappointedly said that there is no noticeable change and she plays the piano daily. I remembered a class that Steve Fairchild gave at a convention many years ago on hardening hammers. So I dusted off my notes and phoned her a price estimate to make those hammers ring out. She agreed to the price. Here's what my notes said about the Steve Fairchild Hammer Hardening Method.

- Make 4 mixtures of a lacquer & lacquer thinner solution as follows

- 20 parts thinner to 1 part lacquer (20:1)
- 15 parts thinner to 1 part lacquer (15:1)
- 12 parts thinner to 1 part lacquer (12:1)
- 6 parts thinner to 1 part lacquer (6:1)

Do not use water white clear lacquer. Use High solid clear gloss lacquer which has an amber cast color. Use a good quality thinner that matches the quality of the lacquer.

- Use 15:1 in the bass double strings
- Use 20:1 in the bass single strings
- Use 12:1 in the treble beyond the dampers
- Use 6:1 on the last four treble hammers
- Use 20:1 for the remainder

This is the treatment I gave the lady's hammers and I told her to let it dry overnight. The next day I received a call from her exclaiming that the piano never sounded so good, not even when it was new. I told her I wanted to check it out and maybe do a little voicing to even out the tone. When I got there I played chords from the bass on up and the piano sounded terrific! The upper treble sounded like bells. She was ecstatic and very appreciative. Me? I was walking on air. Thanks Steve Fairchild, wherever you are.

— Ted Simmons
Central Florida Chapter

TT&T

Stretcher Protection

When restringing a piano, it's important to protect the stretcher from scratches and other damage from tools. One

day, while trying to come up with more protection for the stretcher, my eyes fell upon a stack of sheet metal pieces about 9" x 11" or so. These were apparently left-over flashing pieces from a roofing job done on my house several years ago. I took the pieces to my

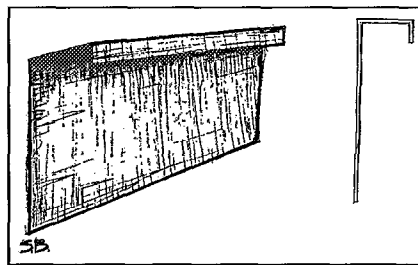


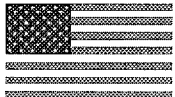
Figure 3 — Roof-flashing metal bent to clamp over moving pad and stretcher.

workbench, where I bent them as shown in Figure 1, and found I had just the thing not only to protect the stretcher, but to clamp the moving blanket in place over the stretcher. A set of four works nicely (See Figure 2). The metal is very

Continued on Page 16

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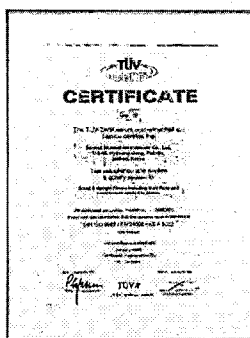
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Q & A/EDITOR'S ROUNDTABLE



Mysterious Action Problem

I have a customer with a Steinway & Sons 'M' with an elusive, mysterious action problem. First some background: It is serial number 490934 built in 1984. The action is cloth-bushed, except for a Teflon plug that holds the repetition spring in place. It has those screws with the reduced and knurled bodies (just below the head) that sometimes break. (This is irrelevant to the problem, but might help someone identify the action.)

The complaint is that, on occasion, apparently at random, certain keys won't go down. Or more precisely, they will go down but require an additional amount of force to start them. Typically, he will be playing a passage and the note or notes resist his touch. If he stops and goes back to those notes, they seem to work fine. Needless to say, the piano smelled me coming and played fine when I tried to duplicate his experience.

As he found the problem to be worse on notes C52 (C5) and D54 (D5), I began my investigation there. The only thing I noticed that was different about the action parts in that area was that the wippens seemed too far forward, i.e. the capstan had worn the wippen cloth very near the back of its length, and the jack tail was hitting the let-off button very near the front. I checked all pinning, lubed jack tops, and generally went over these two notes with a fine-tooth comb. I used travel paper on the wippen flange in order to move the whole wippen back just a bit. Put it back in, and of course it worked fine. But it worked fine for me before, so I had no confidence that anything I'd done was of any use. Tuned the piano and while checking it out after the tuning, I *thought* I felt a bit of resistance on G47 (G4). Going back to the note, I couldn't reproduce the sensation. At this point I had to leave, so I explained that I'd tried some adjustments and as I was coming back in two weeks to tune his upright, I could look into it again at that point.

Two weeks later he said it seemed much better, but G47 stuck on him—once. G47 didn't exhibit the same alignment problems I saw at the end of that section with C52 and D54. I did everything to G47 I had done to the other two notes, except shimming out the wippen flange.

That was a month ago. I just got off the phone with this customer and he said that just last Saturday A49 'blocked' on him. He went to the Steinway dealer here, who has sold him a Damp-Chaser (which I've been trying to do for a while now) but I doubt that this is a humidity problem. For the moment he's going to let the Damp-Chaser work for a while and see what happens.

The sensation I felt was as if someone had pushed a tri-chord damper just a bit down into the string and then tried to play the note, an initial resistance, then it lets go. I don't think that it has anything to do with the dampers, that's just a good description of what it feels like. You may have noticed, as I did, that it only seems to happen on the naturals. I checked out the keyboard and everything looks fine, keys moving as they should, not chucking.

Has anyone ever come across this before? It would sure be great to be able to come back to this guy with something

concrete. Thanking you all in advance.

— Aaron Bousel
Ormstown, QC Canada



Bill Maxim, RPT, Palmetto, SC Chapter — Have you checked the clearance between the hammer and backcheck to see if the backcheck catches some portion of the hammer as it starts (particularly on a hard blow, where action parts flex a bit)? I had one case where an intermittent blocking was due to the backcheck snagging the staple of an overly large hammer. Running up the capstan (blow distance needed shortening anyway) solved the problem.

I have also experienced backchecks grazing neighboring hammers and giving a similar resistance. Hope you find the cause and correction.

Mark Graham, Cleveland, OH Chapter — Perhaps the capstans need to be raised a little. If the hammers are too low, the backchecks can catch the hammer and block it at the very beginning of the stroke. I'd say either adjust the backchecks or raise the hammer line, at least on those notes.

David M. Porritt, RPT, Dallas, TX Chapter — I, too, have seen backchecks catching hammers that were too fat. If checking is very high, and hammers are very fat it can happen. The hammer bounces down hard enough to get caught. See if you can push a hammer down on the backcheck. I've only seen it once, but it can happen.

Jim Coleman, Sr., RPT, Contributing Editor — How much clearance is there between the hammer tail and the backcheck when the hammer is on its way up? How much clearance is there between the neighboring hammer flange center pins? Could there be a loose screw lying inside a wippen which may at times contact neighboring wippens? Or is there a loose key lead which at times may touch a neighboring key?

Doug Hershberger, RPT, South Bay, CA Chapter — It sounds to me like you could have backchecks that are too close on certain notes and they are scrubbing the hammer tail on the way up. You did not say whether it happened on a hard blow or not. It very well could be that it only happens on the naturals especially if the key dip on the sharps is different from that of the naturals. To see if this is what is causing the problem, slide the action out and hold the top of the hammer with a slight pressure and rock the key up and down. I would also carefully check the key dip. I hope this helps.

Tom Seay, RPT, Austin, TX Chapter — Try checking the butterfly spring in the balancier slot. We have many Steinways from that era at our school and have found instances of the spring actually digging a "hole" in the slot and causing excessive friction when the note is first played. Good luck.

Jon Page, Cape Cod, Mass. — My first thought is the front of the repetition lever hitting the hammer rail. Second, either end of the butterfly spring; the end may be catching on the jack or the wire may be bent wrong. Third, glue may have

Continued on Page 14

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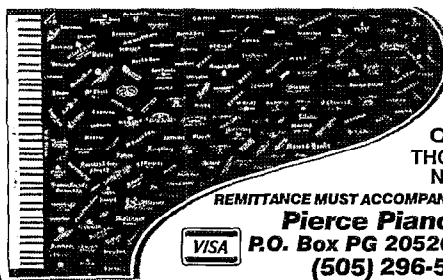
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Q & A/EDITOR'S ROUNDTABLE

Continued from Page 12

oozed out from under the key end felt rubbing the next key. I have found all of these from time to time.

Vince Mrykalo, RPT, Utah Valley Chapter — The thing that strikes me is it may be the geometry of the wippen heel/capstan screw contact point not being "in-line" with the line that connects the wippen center and key balance hole. If that contact point does not go through that imaginary line, there could be a lot of friction there to overcome.

Don Mannino RPT, South Bay, CA Chapter — Check for over-centering in this action. If the hammers over-center much, and you adjust the action for correct blow, let-off, drop, etc., you can have just the symptom you describe. Especially during fast repetition, the hammers will drop down below the regular rest position and the note will seem to jam. Tapping the key once or twice will encourage the jack to reset, and the note will then play normally again.

If this problem is just beginning to happen it can be hard to induce. If (maybe I should say "when") it becomes worse you will be able to duplicate it easily.

The gradual compression of the knuckle contributes to the problem, and I think is the reason it will gradually get worse.

The ultimate solution is to mount hammers that are bored for the piano's string height, but you can also set the regulation a little out of specs to improve things: lower the capstans until the hammer shanks are off the rest rail the proper distance (as per Steinway regulating instructions), then give extra key dip to provide enough aftertouch. This should get the piano playable. Bolstering the knuckles will help too, of course. As will increasing the rep spring strength or raising the backchecks a bit.

Of course, this may not be your piano's problem at all....

Newton Hunt, RPT, Contributing Editor — There is one thing that bothers me about this piano. The capstans are lifting near the back of the cushion. Check the following:

1. Use a thread of similar material and check that the drop screws are in a straight line. If they are not, the action frame is bent or the stack screws are pulling the frame off of straight. I have relocated the stack screws to straighten such a frame.
2. Check that the capstans are in a straight line. If not, relocate them.
3. If all is straight, then the capstans are mislocated and they should be moved. This involves some math, some weights, some measurements and re-weighing the action.
4. Counting the lead weights in the bass section should indicate something. If there are more than four, there is a geometry problem.
5. Check for key chucking, especially sideways. If the key bounces up on a ridge on the bearing this could cause excess capstan travel.
6. Check for loose pinning or screws in the wippen flanges. If the wippen relocates itself, this could move the jack toe to a different location of the let-off button or the knuckle or the capstan and cause regulation to be different.
7. I would also check spread action at each section end to see how closely it conforms to 4.4400".

8. Check that the wippen center pin is 3.75" above the key bed, the hammer pin is 5.75" and that the off-frame difference is 2.668".
9. Check that the knuckles are firmly glued into the shanks and that the hammer flanges are tight to the rail.
10. Check the pinning of the jack and repetition lever to verify they do not have free lateral movement at the knuckle.

Q:

Squeaking Knuckles

What is the best, and most permanent, way to silence squeaking knuckles on grand pianos? Thanks for any help.

— Anonymous

A:

Steve Schell, RPT, South Bay, CA Chapter —

The best approach I have found for squeaking knuckles is to remove any old lubricants which may be adding to the problem, then apply new, super-duper lubricants.

But occasionally someone has already gotten to the knuckles with some sort of tragic graphite stick. Remove old lubricants from knuckles by soaking them with naphtha (observe safety rules here for fire and breathing vapors), then rubbing off the contaminants with a terry cloth hand towel, repeating as necessary until they are clean. Allow several hours for them to dry thoroughly. If the repetition levers and jack tops seem gunked up, clean them also with a naphtha soaked rag.

The best lubrication I have found is a one-two punch combination of Teflon powder on the knuckles, and McLube spray on the rep levers/jacks. Raise the nap on the knuckles with a fine brass bristle brush, then apply generous amounts of the Teflon powder sold by Bill Spurlock. I used to apply it sparingly, then observed a friend really pile it on and achieve lower friction levels. Transfer the powder to the knuckle leather using a spare piece of leather which has had the powder sprinkled onto it and spread out gently. Rub it in well. Any sloppy looking excess can be vacuumed off. Spray McLube 441A (clear, super-slippery) on the rep levers/jack tops. It can be purchased directly from the company in case lots at 1-800-2MCLUBE.

This combination seems to work well and for a long time.

Richard Bittner RPT, Detroit-Windsor Chapter — I do the same procedure as Steve but I like to use dry cleaning solvent on the knuckles. If needed I will bolster the knuckles also.

Arnold Schmidt, RPT, Research Triangle, NC Chapter — When I was in school at the Piano Hospital in Vancouver, Washington, I was given a piece of soapstone. I have no idea where to obtain this stuff, but I am not really worried, because it never seems to wear out, but I don't know where to tell anybody else to get any. I have used it to lubricate knuckles, along with other such surfaces; it has always worked, and they have never begun to squeak again. I saw a piano about a month ago, on which I used it on the knuckles in 1990, and they are still not squeaking.

Continued on Page 16

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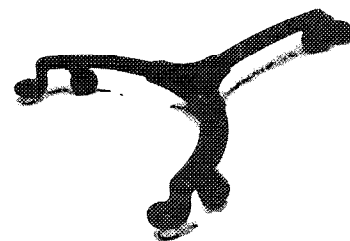
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Tips, Tools & Techniques

Continued from Page 10

malleable, and the angles of the top bend (about 2" long) and the short bend (about 3/4" long) can be easily changed to accommodate stretchers of different thicknesses.

— Steve Brady, RPT
Journal Editor

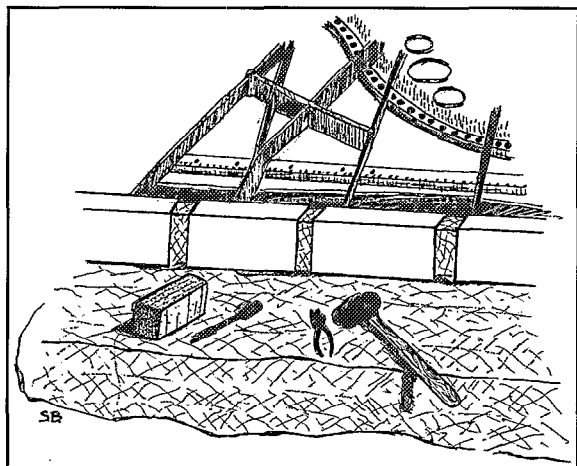


Figure 4 — Stretcher clamps in use on piano.

3/4" circles of heavy action cloth. Glue them together to make a punching at least 1/4" thick, then glue it on the end of the striker as you see in the photos. A front-rail cloth punching will do for this, though a bit soft for my taste.

If you have access to a lathe, turn a contoured handle. See Photo 3. The bulb gives the thumb and index finger some leverage. The side of the hand has leverage, too, bearing on the smaller flare at the bottom. A fitted handle doesn't need to be gripped as tightly as you would a dowel.

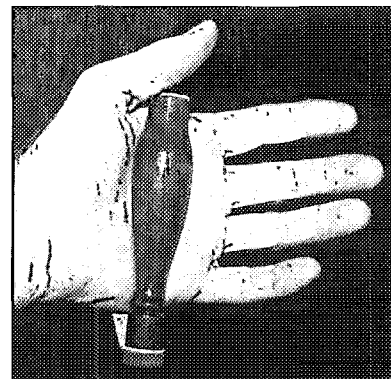


Photo 3 — Lathe-turned Key Striker.

In either case, you can wear the Key Striker through the whole tuning. No need to put it down. The strap keeps it handy while keeping it out of the way. You'll wonder how you ever did without it.

— Clair Davies
Bluegrass, KY Chapter

TT&T

The Davies Key Striker

The Key Striker is a *finger saver*. It's not necessary to hit any harder with it than you would with four fingers. Watch how you ordinarily execute a test blow, then do exactly the same thing with the Key Striker.

You *can* hit harder, of course. There's hardly a limit to the force you can apply with this tool. The point is that you can apply whatever force you want, and be very consistent, because sore fingers and joints will no longer be a factor.



Photo 1 — Davies Key Striker in use.

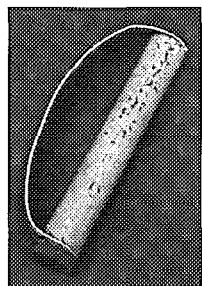


Photo 2 — Three-fourths-inch dowel Key Striker.

Although my lathe-turned model of this tool fits the hand better and is more comfortable to use, a serviceable version can be made from a 3/4" dowel. See Photo 2. Cut the dowel an inch longer than the width of your hand. Glue a strap of leather 3/4" wide and 8" long to one end. Glue on the other end while you pull the strap snugly around the back of the hand. After the glue has set, cut off any excess.

Use an arch punch to make two

Q & A/EDITOR'S ROUNDTABLE

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Fred Sturm, RPT, Albuquerque, NM Chapter — I agree microfne Teflon is the way to go. Having a good buckskin surface to start with is imperative. Sometimes the brass brush isn't adequate to do the job. I don't like the dry-cleaning operation — problems with the fumes and not so wonderful results for all the work involved in my experience (the dry-cleaning fluid seems to work as much dirt, etc. into the buckskin as gets cleaned off). I prefer to simply scuff sand the knuckles to remove any glaze a brass brush won't take off, or any graphite, grease, etc., someone else may have used. The worst squeaks seem to come on newer knuckles with a glazed surface, though. Don't want to remove too much leather, obviously, so go easy on the sandpaper, and fairly low grit (120 tops).

Applying the microfne Teflon goes easiest with a makeup brush. I use one with about 1/4 inch diameter of bristles, probably camel hair or the like. Jab it into the jar of powder a couple times, and the bristles become loaded with powder. Then dab knuckles individually, gently for the first one, then more vigorously for subsequent ones. A brush full of powder covers about six knuckles very well. Then brush the knuckles you just covered to spread the Teflon evenly. This is the most efficient way of getting the Teflon on the knuckles, and with a minimum of mess and loss of material. A paint brush would work as well, I'm sure. Hope this is useful. ☐

The New York City Tool Kit

By the New York City Chapter/Daniel Levitan, RPT

Last July, at the International Convention in Dearborn, Journal Editor Steve Brady found himself quizzing me about how technicians in New York manage to get their work done under the unique conditions of the city. His curiosity led our chapter to undertake a project in which we both surveyed our members about their work habits and held a meeting devoted to an in-depth discussion of our tool kits. The results are presented here. For many of us, the challenge of working with only the tools we can carry on foot adds to the interest of piano work. We hope that technicians everywhere will find some useful ideas in this article, and we look forward to hearing from you about your own streamlined approaches. — DL

Mater artium necessitas.
— Latin proverb

Good and evil. Prey and predator. The irresistible force and the immovable object. Throughout the ages, people have pondered the nature of these and other pairs of opposing forces and have marveled at the infinite variety of ways they are manifested in the world around us. As piano technicians, we spend our working lives in the grip of one such archetypal pair of opposing forces. On the one hand, we are called upon to perform a wide variety of precise mechanical adjustments on one of civilization's most complex and sensitive productions, the piano; yet on the other hand, piano owners, curiously, balk at the idea of bringing their instruments to a place where such delicate work should properly be done, namely, our workshops. As a result, piano technicians must at least occasionally make house calls, and in fact many of us do almost all of our work in other people's homes. The need to have all the proper tools with us at all times conflicts with the need to keep our tools portable, and the opposition of these two different necessities is, as the proverb says, the mother of the invention of each technician's tool kit.

Survival of the Slimmest

When we first start up our businesses, we pack up some tools and head out to work. Soon enough, we find ourselves

either unable to do certain procedures because we don't have the necessary tools or materials, or painfully slowed down because we can't find the tools we did bring in the jumble of junk that we'll probably never use. As time goes by, a Darwinian process of natural selection occurs right inside our tool kit as we organize and streamline it for greater and greater efficiency. Each technician's kit evolves differently, because each reflects its owner's training, personality, clientele, and technical interests. But the goal of each kit, unreachable but approached asymptotically as the kit evolves, is always the same: to have immediately at hand whatever tools and materials are necessary in as portable a form as possible.

This process of evolution is accelerated under certain circumstances. I think it's safe to say that most piano technicians travel to work in some sort of vehicle, be it subcompact car or spacious van. The vehicle, with its cache of backup tools and materials, gives the technician the option of packing into the home only a very small kit with a few basic tools. Imagine, though, a group of technicians, none of whom regularly use cars to get to their appointments, and most of whom don't own cars at all! This is the case in Manhattan, and it creates an evolutionary pressure that accelerates the streamlining of a tool kit.

A tool kit that functions well in a working environment like New York may not be ideal elsewhere, but there are some reasons why the principles of design reflected in such a kit can be profitably followed anywhere. For one, all technicians occasionally run into situations in which access to their vehicle becomes difficult or time-consuming, such as work in large institutions like schools. And even when your vehicle is parked out in the driveway, you can often do a better job when you have at hand the tools necessary for a wide variety of procedures. For example, if you are tuning a vertical, and you hear a faint click which you identify as a loose hammer head or loose hammer flange pinning, you are more likely to fix the problem if you can do so without the extra few minutes it takes to get to your vehicle, or without the psychological hurdle of stopping what you are doing long enough to make that short trip.

Survey Results

Our New York City Tool Kit Survey was mailed last December to our entire chapter membership of 68 technicians, of whom 21 live in Manhattan, where parking is notoriously difficult and living spaces small, expensive, or both. The other four boroughs of New York City—Staten Island, Brooklyn, Queens, and the Bronx—are home to another 15 of our members. Access to the city from these outer boroughs can be quick and inexpensive by subway. The rest of our members live outside of New York, where

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living and parking conditions are more typical of the rest of the country.

We asked our members to fill out the survey only if they ever accepted piano service calls in Manhattan. We received 22 responses. Slightly fewer than half of these — 10 — came from Manhattan, and six each came from the outer boroughs and from outside the city.

Eighty per cent of the technicians in Manhattan said that more than 90 percent of their field service business took place in Manhattan. In contrast, half the technicians living outside the city said that Manhattan service made up less than five percent of their business.

Getting Around

Of the technicians living in Manhattan who responded to our survey, only 30 percent own cars. Of those in the outer boroughs, 66 percent own cars, and of those outside of New York, 100 percent own cars.

Of the technicians living in Manhattan, half said they spend 15 to 30 minutes getting to their first Manhattan job of the day, and half said they spend 30 to 45 minutes. Not surprisingly, it took technicians outside Manhattan much longer to get to jobs in Manhattan, with a third saying it took them over an hour.

We asked what means of transportation technicians used to get to Manhattan. All the Manhattan residents said they almost never traveled by private car to their first job. Instead, they routinely travel by subway, bus, or on foot. (Unfortunately, we neglected to ask about bicycle use, but several of our members are known to use them routinely.)

In contrast, almost all the technicians who live outside the five boroughs use private cars to get to their Manhattan jobs.

To go between jobs in Manhattan, though, only half the technicians who live outside New York travel by car. The rest leave their vehicles and use public transportation and their feet. Piano technicians in New York seem to be just as—shall we say, thrifty?—as their colleagues elsewhere, for most avoid the use of the more expensive taxis. By far the most typical time spent traveling between jobs in Manhattan for all the technicians was 15 to 30 minutes, and a few technicians (who elsewhere in the survey said they had been working in Manhattan for many years) said they had cut their typical travel time between jobs to less than 15 minutes.

Bringing it Along

We asked our members how they carry their tools, and found that while tool boxes were the unanimous choice of those who live outside the five boroughs, even when they work in Manhattan, for city dwellers shoulder bags are the hands-down favorite. Tool boxes are apparently both too bulky and too heavy for easy transport on foot and on public transportation. Also, many pianos in the city are located in large apartment buildings that have doormen to greet and announce all guests. Many of these buildings require that trades people use a separate service entrance. Most techni-

cians prefer to use the regular entrance—not only is it more dignified, it also is usually a great deal faster. Shoulder bags will pass by the doorman, but a tool box will likely mean a trip up the service elevator.

Other choices of bags for Manhattan residents were briefcases (1), backpack (1), and tool box (1). Two respondents routinely carry both a shoulder bag and an additional bag; in one case, a tote, and in the other case, a briefcase. The weight of the bags ranged from ten to twenty pounds, with the one poor soul who carries a tool box (plus an electronic tuning device) hauling over 20 pounds.

Briefcases and shoulder bags tie as the favorites of technicians from the four outer boroughs. Most manage to keep the weight under 20 pounds. Technicians from outside the city, who are used to using cars, routinely bring into the city not only their tool boxes but also another bag or two; half of them wind up carrying over 20 pounds. (Keep in mind, though, that most of these technicians are outside their usual service areas when working in Manhattan, and so are motivated to be very well prepared to avoid a return call.)

Interestingly, the use of electronic tuning devices, which do add weight and bulk to a tool kit, seems to be only slightly reduced in the city. Sixty percent of our Manhattan respondents use them, compared with 15 percent of those from the outer boroughs, and 75 percent of those from outside the city.

Being Prepared

We asked how well-prepared technicians felt they were to address unusual situations when they were doing ordinary field work in Manhattan. We divided piano service into seven areas: tuning, string repairs, action repairs, miscellaneous structural and wood repairs, regulation, cosmetic work, and appraisal.

Cosmetic work was across the board the area that technicians felt least prepared for on a routine basis. For Manhattan residents, the area in which they felt next least-prepared was structural and wood repairs. Most Manhattan technicians felt well-prepared to do such complex appraisal work as examining the mating of the grand block to the plate flange, measuring bearing, or measuring balance weight. In contrast, technicians from the outer boroughs and outside the city felt that they not were routinely well-prepared for this kind of work, but most felt better-prepared for structural and wood repairs than their city colleagues. One possible reason for this discrepancy might be that the city dwellers are more used to return visits, and so need to be able to take measurements and assess a situation carefully in order to bring the appropriate tools on their return call.

Being prepared for an unusual tuning situation, such as unusual tuning pin sizes or plate strut configurations, was a lower priority for the Manhattan technicians than for those outside the city, as was being prepared for string repairs. Tuning tips and tip wrenches are heavy, as are most stringing tools, and a Manhattan technician might be more inclined to make do for the moment, while taking notes to help remember to bring a more suitable hammer or tip, or to make a more complete string repair, at a subsequent visit.

Being prepared for action regulation and action repair

was a high priority for all the technicians. This is not surprising, since most regulating tools are small and lightweight, as are most supplies for action repair.

Just Say No

How do the technicians who work regularly in Manhattan manage to get the job done? Sometimes, the answer is simply that they don't. At our chapter discussion of the New York City Tool Kit some technicians said they routinely packed only the most basic tools, just tuning hammer, mutes, and a fork, with perhaps a screwdriver, a pliers, or some glue thrown in. Any problem at all out of the ordinary requires for these technicians either a referral to another technician or a return call.

Both these options are probably exercised more frequently in New York than elsewhere. Because there are simply more pianos and more piano technicians here than in other parts of the country, specialization into smaller niches is both more attractive and more feasible. A technician in New York renting a small apartment is less likely to set up an extensive shop for occasional jobs than one outside the city who has access to a basement or garage. The expense of renting or buying shop space here can't be justified unless the shop is in constant use.

This ability to specialize also means that a technician may be able to target a certain clientele, such as recording studios, and focus his or her tool kit in that direction. Then, when unusual problems do arise, a return appointment is made and the appropriate tools and materials are packed for that particular job.

All our members admitted that to some extent making return calls was a part of their business approach, simply because it is impossible to be completely prepared for all situations. And, after all, our clients live in New York, too, so they understand the difficulty of carrying lots of tools and supplies. They also expect that things will cost more in the city, so if they have to pay for a return call that they might not have had to pay for elsewhere, they accept that.

That said, the stripped-down, minimalist approach seems to work best for technicians starting out in their careers who do a large amount of field work on new pianos for dealerships. The new pianos are less likely to have unusual problems and the technician's schedule is still free enough to allow a timely return call. For veteran technicians, there is more pressure to be able to perform such services on the spot. Return calls are more difficult to make in a timely fashion, and it is usually more cost-effective to address the problem immediately, charging extra if appropriate, and then to go on to the next job.

The Three M's

In order to be prepared for a variety of different challenges while carrying a practical tool kit, New York technicians seem to make routine use of a few basic techniques. None of these are particularly revolutionary, but by making small modifications month by month in their tools, most technicians find that over time they can make significant reductions in their tool load. Some of these techniques are

illustrated in the cover photo, which shows two different possible sets of tools a technician might use in repinning a grand hammer flange.

The first approach is to *Miniaturize*: to carry smaller tools that do the same quality job as larger ones. For the purposes of repinning, a smaller, lighter micrometer, pin vise, or flush-cutting nipper does just as good a job as a big one. Many tools can be made lighter without reducing their size simply by removing unnecessary metal with a bench grinder, file, or saw. And any tool that has a handle can be reduced in weight and size by cutting off the handle and adapting the shank to fit either a combination handle or a pin vise.

Another approach is to reduce weight and bulk by reducing the amount of *Materials* in the kit. The wooden center pin holder shown in the cover photo has many more pins than a technician would reasonably expect to use in a normal day in the field, and is also unnecessarily bulky. The homemade pin holder that replaces it carries just five or six of each size pin, as well as one homemade reamer for each size pin, and is about the same size as a credit card.

This approach to carrying supplies and materials is similar to the approach to manufacturing in another place where space is at a premium, Japan. There many factories don't keep a large inventory of materials on hand, but instead have them delivered as they are needed. The advantage to this system in a tool kit is that the materials tend to be handier and to take up less room; the disadvantage is that the supplies must be constantly replenished. And, as with the factory system, this system requires keeping track on a daily basis of those supplies that need replenishing.

The last approach, and the most interesting, is to carry as much as possible tools that have *Multiple* uses, or to invent new uses for the tools already in the kit. A six-inch ruler turns slotted drop screws; a mute's wire handle turns capstans; a Papp's mute holds a vertical jack tops away from the hammer flange; a dip block supports a wippen for grand jack spacing; a chopstick voicing tool inserts cork bridle straps; a 3X5 card acts as a guide for squaring up grand dampers; a grand fallboard key and a tuning hammer make a grand hammer extractor.

Sometimes existing tools can be modified to act as substitutes for other tools. For example, a pair of scissors-type hammer shank nippers can be opened out and slots filed into the ends of the handles at the appropriate sizes to make a capstans tool, or a six-inch ruler with a sliding clip can be outfitted with two more clips, each with the side tabs slightly bent, to make a versatile downbearing gage.

The parallel-jawed center-pin-extracting pliers in the cover photo can be completely replaced by a small center-pin punch if the punch is used in conjunction with two tools that most technicians already carry: a tuning fork and a tuning hammer. The area at the base of the tuning fork's tines makes a steady support for the flange, and the space between the tines makes an unsupported area into which the center pin can be pushed with the punch. If the pin is held too tightly in the bird's eye, it can be tapped out with the back of the tuning hammer. Then the base of the tuning fork makes a good support for reinserting the pin.

In this case, the procedure, repinning, can be done as quickly, easily, and professionally as before with fewer and lighter tools. Sometimes, though, a stripped-down proce-

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ture gives a result that is not as quick or is less professional. For instance, the center-pin punch could be replaced with a size eighteen pin, either mounted in the pin vise or used by itself. But the extra time involved in inserting and removing the pin from the vise, as well as the fragility of the pin and the uncertainty of the vise's grip on it, or the greater difficulty and risk to the flange of using the pin alone, may make the technician opt for carrying the pin punch. In each such case, each technician has to weigh the pros and cons of the situation and decide which set of tools to carry. Debates over issues like this go on constantly within each technician's tool kit, and made for some lively discussions at our New York City Tool Kit chapter meeting last January.

The Bags

The meeting began, naturally enough, with a discussion of the tool bag itself. As noted above, shoulder bags seem to be the bag of choice, and one of our members favored the type of shoulder bag used by the city's bicycle messengers. One, who does a lot of finishing work, uses a series of plastic shoebox-sized boxes stacked up and carried on the type of collapsible wheeled luggage carrier popular in airports.

Most members take a modular approach to their tools. Most have one tool kit that carries basic tools and supplemental kits that are carried as need be and hold the tools and materials needed for such non-routine operations as stringing, regulating, and pinning.

Inside the kit, tool palettes seem to be the favorite way to organize tools, whether purchased from the piano supply companies, from other tool supply companies, or home-made. The homemade palettes are, not surprisingly, the most compact, for they are exactly fitted to the particular technician's tools. Also popular are small zipper pouches, such as those found in camping stores, as a lightweight way of organizing loose tools and materials. Car stereo bags are also mentioned as a useful type of pouch.

Interestingly, almost everyone at the meeting makes room in their bag for a small umbrella and for reading material. New Yorkers walk a great deal and don't have the option of dashing to a car in case of rains. Also, using public transportation means a certain amount of time spent waiting and riding; freed from the necessity of watching the road, New Yorkers find they have more time for reading, or even doing paperwork, between jobs. In taxis, it's even possible with a cellular phone to do a good deal of telephone calling while en route to the next job.

Pencil Pushing

Reading matter may be a necessity for New Yorkers, but paper is heavy, and so most members try to reduce the amount of business paper they carry with them. Some skirt the problem altogether by not keeping records, but most find record-keeping important enough to justify the weight and space involved in keeping track of piano data as well as the names of children and pets, or the times when parking is and is not allowed on the street. Most do carry their appoint-

ment books with them, and as you can imagine, they tend to be small. Billing pads and record books tend to be small as well. Some even favor the pocket-sized mini-computers to keep track of client data and appointments. One member uses a computer to print out 3X5 cards each day with the day's appointments. One keeps a small spiral notebook for the day's notes and transfers them to larger, more permanent storage at the end of the day. Regrettably, few find they have room for brochures, technical bulletins, and the like.

New York technicians are no different from those anywhere else in having to set up work areas in the homes of their clients. Since carrying a small folding table is not an option in New York, some popular workbench substitutes include the kitchen table, the floor, the piano bench, or, on a grand, the lid or key bed. Some of our members carry pieces of cloth to protect these alternative workbenches, some borrow sheets or blankets from their clients for that purpose. The folding keyed extension for grands is a popular item when more extensive action regulation is called for, as are action extensions for verticals. One member pointed out that a grand action can be rested on the key bed vertically on the front rail, giving access to such distal parts of the action as the wippen flanges; but this is definitely a position that requires a great deal of caution to avoid scratching the stretcher or, worse, letting the action drop altogether.

None of our members carry vacuum cleaners when on the job in Manhattan; all borrow them as necessary from their clients. Other appliances that get pressed into service from time to time include hair dryers and even toaster ovens.

The Basics

Some basic tools that most of our members seem to fit into their kits include two or three drill bits; some sort of saw, such as a small backsaw, a hacksaw blade (which can enlarge screw slots and also doubles as a straightedge, among other things), or the saw blade of a pocket knife; a file; a hammer (the type that fits into a combination handle is popular, and one member treasures his half-pound rubber mallet); a knife (one member carries a small square piece of cutting board material as a cutting surface); a razor; and, for most, a pair of scissors.

Some members carry a few generic fall lock keys; others find such locks can usually be picked with a small flat blade. Some basic materials that seem to be part of most of our members' kits include a few pieces of leather and action cloth and some flanges, hammershanks, and bridle straps. Some carry sandpaper, although most press their hammer files into double duty here. All seem to carry some yellow glue, but only a few carry white glue as well; about half carry contact cement, and only about a third CA glue. Almost all carry some sort of center pin lubricant and some sort of heavy lubricant such as VJTM; about a third carry talc or powdered TeflonTM, but very few carry keytop cleaner or tuning pin tightener. One technician makes extensive use of very small bottles, such as half- or quarter-ounce glass bottles and the small plastic droppers found in pharmacies to package eyedrops or milk digestants, and so manages to carry a wide variety of liquids in a very small space.

More than half our members make room for a few

Band-Aids™ in the kit. Many keep small amounts of tape such as masking tape handy either by rolling a few strips around a tool handle or by taping them to the side of a small parts box. Most routinely carry a cigarette lighter.

A Few Good Tips

When tuning, about half our members seem to get by with only one tip on their hammers; another half carry two tips; very few carry more. Mutes are a necessity of any tuning tool kit, but fortunately they are light and take up little space. And no one said they considered the factors of weight or bulk when deciding whether or not to use an electronic tuning device.

All the technicians seem to carry some needles, but few are routinely prepared for extensive voicing work. A few avoid carrying a voicing tool by using a heavy pin vise to hold a single needle; the vise, with different chucks, doubles as a drill and, of course, is handy in pinning work. Almost nobody regularly carries hammer hardener or a dedicated sugar duster, though one technician does so without overburdening his kit by using the small bottles with hypo tips used in the computer industry to refill inkjet printer cartridges. For hammer filing as well as general sanding, one member has made a small block of wood, about 1/2" thick and 3" on a side, with a different grade of paper glued to each side.

Wire bending is not a routine regulating operation, and many members opt not to carry wire bending pliers. In a pinch, two pliers can work in tandem to bend wires, and round-nosed needle nose pliers make reasonable grand damper wire benders.

Some interesting solutions to the problem of key leveling without the use of a four-foot key leveling stick came up in discussion. Some members have had some success with carpet thread stretched between keys #1 and #88. Many use a short straightedge and work section by section. One levels five naturals and five sharps, dividing the keyboard into four sections, and then levels each section using a twelve-inch length of .030" feeler gage resting lightly on the already-leveled keys, supported on its edge by a small magnetic strip glued to a rubber mute.

For string repairs, most of the technicians try to master splicing for on-the-spot repairs and then make a judgment whether to replace the string at another time or to leave the splice in place. Very few seem to carry, or even routinely to use, universal bass strings. For splicing, some simply take the coil off the tuning pin and straighten it out for use as their splicing wire, but most like to carry a few inches of a wide variety of wire sizes dedicated for splicing. Most carry a dummy pin and a pair of Vise-Grips for splicing as well, and use a small screwdriver blade as a coil lifter.

Quite a few of our members do routinely carry small coils of plain wire for complete on-the-spot repairs. We're indebted to Scott Jones of Steinway who has measured the maximum lengths of wire necessary for plain wire replacement on a Steinway D (see the accompanying table); carrying just this length of each size wire insures that almost any string replacement can be done on any size piano.

Very few of our members are routinely prepared to tap tuning pins, though several have done so on grands using the client's book collection to support the key bed. More

common is to tighten a loose pin by popping out the becket (the sharpened end of a capstan tool makes a handy awl) and turning in the pin a few turns. Pins are sometimes shimmed similarly; they are turned out, the sandpaper shim is put in place, and the pin is turned, not driven, back in.

Certain broken key repair procedures require the use of angle irons to clamp the key. Some of our members have had good luck using the keys on either side of the broken key as clamps and guides, separated from the broken key by a layer of wax paper and held in place against it with either rubber bands or lengths of elastic.

Hammer shanks are sometimes spliced using a special jig to cut both the broken shank and the new portion of shank at the same angle. Some of our members do this same repair in the field without the jig with almost the same degree of precision by using the jig to cut a few shanks in advance, then cutting the broken shank freehand in the field using a line drawn on a small piece of paper at the correct angle as a guide.

Our members also use a variety of techniques for doing structural work in the field that involves tipping a vertical or lifting a grand without using a dedicated piano tilter or lifter. Here in the city access to the bottom board of a vertical is commonly gained by two people who carefully tip the piano up onto its side. If a grand leg needs to be removed temporarily, the grand can be lifted by one person sitting in such a way that his or her legs straddle one of the piano's legs; the piano then is lifted with a calf press, and the piano bench (make sure it's sturdy!), with a few thick tomes from the client's library placed in a judicious spot on top, is slid under the elevated key bed or tail beams.

We of the New York City Chapter hope that you have found this brief glimpse of the tuner's life in New York interesting, and perhaps have even picked up a tip or two that may prove useful to you. We look forward to hearing from you with any tips and tricks you have for us—after all, we can use all the help we can get! ☐

Plain Wire Replacement String Lengths

Gauge	Length
13, 13.5	3'
14, 14.5	4'
15, 15.5	5'
16, 16.5	6'
17	7'
18	9'
19	13'
20-21	17'

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Of Mice and Men and Pianos:

A Look at the Hantavirus in Relation to Piano Technicians

By Norman Cantrell, RPT
Oklahoma Chapter

Rather than assume that we all understand the definition of a virus, let's look at some basic facts concerning their makeup. In other words, just what is a virus? Most of us are familiar with bacteria which are living organisms that grow and multiply. Some bacteria are quite safe, like yogurt, while others pose definite health risks when one is exposed to them. Viruses are considerably smaller in size than bacteria.

More than 500 flu viruses could fit onto the point of a pin.

Viruses are not necessarily living organisms. In fact they can lie dormant for extended periods of time, even years, and then re-emerge once they are disturbed. It is once a virus has entered a living being that it is able to multiply. "Scientists now define a virus as an extremely small, simple, infectious organism that can grow and duplicate itself only in a living cell."¹ This multiplication takes place in a "host." The host may or may not become infected with a disease, but often becomes a carrier.

Once a virus enters a human body a series of amazing events take place to keep one healthy. The white blood cells called lymphocytes begin to assess and defend the body against this viral assault. The lymphocytes are divided into several groups each with a different assignment. There are B Cells and T Cells which go on the offensive to both produce specific antibodies and expose the infecting viruses. These cells also develop memory cells whose job it is to recognize a re-infection by the same virus type. This explains why someone who has had a childhood disease like the mumps is usually immune for life. Since specific antibodies are needed to combat specific viruses, a virus like the common cold for which there are over 300 known strains is unlikely to ever be cured.

In May of 1993 in the Four Corners region of the United States a young Navaho man became suddenly and unexplainably ill. Within three days he had died. He was up to this point a very healthy young man and even an amateur athlete. This raised the level of curiosity among the attending physicians. Their interests were sparked even more when it was discovered that his fiancée had died mysteriously just two days before under similar circumstances. The autopsies revealed a very similar malady which had not been encountered before by medical science. Researchers quickly

responded and discovered a total of 17 similar deaths in the region. This prompted involvement by the National Center for Disease Control and Prevention. Their quick action resulted in linking this to another known virus called the Hantaan Virus. This virus, found mainly in Asia, was discovered near the Hantaan river in Korea. The major difference between the Asian variety and the type found in the U.S. was that the Asian type was linked predominantly to kidney infections. The mortality rate also differed greatly with only a 15 percent mortality rate in Asia as compared to an initial rate near 60 percent for its American counterpart. The American infestation did not seem to affect the kidneys, but rather attacked the lungs. Thus the U.S. variety has been named Hantavirus Pulmonary Syndrome.

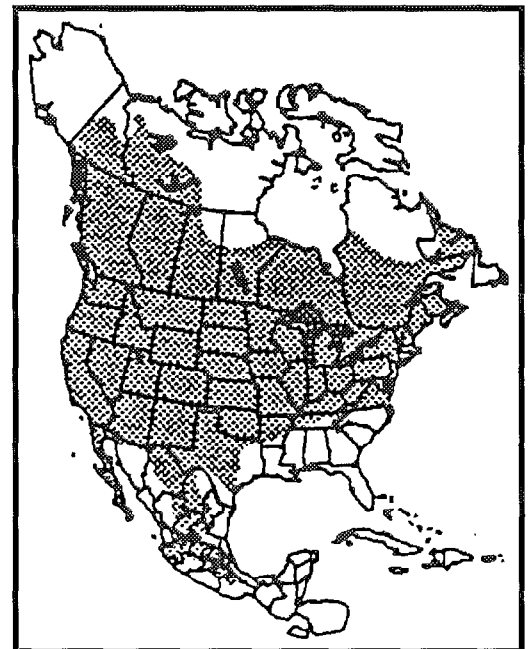
Since the Asian variety had been known to have been spread by contact with rodents as early as the Korean conflict in the 1950s a similar link was suspected. Working with Navaho tribal elders it was discovered that the spring of 1993 had received unusually heavy amounts of rainfall resulting in an abundant crop of Pinion nuts. The abundance of Pinion nuts had allowed for a literal explosion in the Deer Mouse population. This link was confirmed and the host organism had been identified. This all took place within 30 days from the initial death of the young Navaho man.

Once the Deer Mouse host had been identified, a search was then launched to see if any other rodent relatives were carriers. It has been determined that such a link does indeed exist

among other rodents including rats, chipmunks, and other families of mice. The Deer Mouse habitat includes most of central Mexico and most of the continental US and Canada. The disease is spread when persons come into contact with feces, urine and saliva of infected

rodents. The dust stirred up when cleaning infested areas can be inhaled, allowing infection to begin in the lungs.

Once a person becomes infected, there is usually a one to five week incubation period before symptoms begin to develop. The problem is that the symptoms are very similar to many other common ailments. The most frequent symptoms include fever (101 degrees and over), chills and muscle aches. Other frequent symptoms include headaches,



nausea and vomiting, abdominal pain, diarrhea, cough and a general feeling of illness. Some patients will develop shortness of breath, dizziness, back or chest pain and even sweats. Because these symptoms are so general and similar to other illnesses, if you suspect an infection due to rodent contact you need to seek medical help immediately and inform your physician of your exposure. Immediate treatment is needed because once the virus manifests itself into a full-blown illness, death can occur within five to seven days.

When you seek treatment it is best if you are referred to a hospital with a very complete and up-to-date intensive care unit. The problem this poses is that most people with a high risk of exposure live in rural areas. Most rural hospitals are simply not equipped to handle the care required. Currently there is no known cure for Hantavirus! There is not a specific test your family doctor can perform to diagnose Hantavirus. However, the CDC and the State Department of Health do have proper diagnostic capability. This makes informing your family physician all the more important to allow him or her the best chance for properly diagnosing the disease. The only medical care you will receive will be in the form of "support therapy." This is care designed to combat secondary infection and treat symptoms rather than providing a true cure.

Obviously, the best defense against this virus is knowledge and prevention. As we all know, pianos seem to have a magnetic effect in drawing mice to them. Pianos pose several unique challenges when dealing with a potential infection. The problems encountered include bare, unfinished wood composing the keys and action parts, along with small corners and crevasses into which mouse droppings can fall. When cleaning an infested piano, one should start by wearing rubber gloves. The inside of the piano will need to be sprayed with a disinfectant. Some literature suggests a mixture of household bleach and water. The problem with this mixture in pianos is the corrosive nature of bleach on metal parts like key pins and strings. A better disinfectant would be rubbing alcohol sprayed directly from a pump-type sprayer. The infested areas will need to be wetted thoroughly in order for the disinfectant to kill the virus particles. The balance one will need to achieve is to wet the infested areas thoroughly enough to kill the virus without causing additional problems to glue joints, key bushings and action centers.

The reason for wetting the area is twofold. Besides neutralizing the virus, the wetting keeps airborne dust from being spread during the cleanup process. Once the area has been sprayed, the waste material can be removed. Using a vacuum cleaner is inadvisable because of the risk of contaminating the entire home. Remember that virus particles are much smaller than dust particles and most vacuum cleaners only succeed in removing large trash and re-distributing dust around the home. A small, disposable paint brush can be used to facilitate moving the waste from the corners and under the keyframes. The waste materials and the brush need to be placed in a plastic bag. Seal the bag. A double bag would not be overkill. Dispose of the bag with caution.

Once the materials have been disposed of, wash the gloved hands with disinfectant. Remove the gloves and dispose of them. Thoroughly wash the hands with soap and water. Your exposed clothing should be washed with hot water and laundry detergent. Adding bleach will help eliminate the contamination. The clothing should be dried on a high setting. Investment in a disposable paper jumpsuit

is also a possibility. Do not keep food or open beverages in the area when you are cleaning.

If you think these precautions are a bit of overkill consider that medical researchers working to find a cure for this disease are under even more stringent precautions. Workers handling human tissue samples are at Level 3 which includes rubber gloves, face goggles, and sterile paper jumpsuits. Technicians performing research on live animals and live virus samples work at Level 4. At this level, a sterile isolated lab is used and technicians work in a Biohazard suit, a space-type suit with a separate oxygen supply and are completely out of contact with the virus.

Once you have removed the infestation from your customer's piano you can offer the following additional advice to keep a future re-infestation from occurring.

Keep the home clean

- Wash dishes
- Clean counters and floors
- Put pet food and water away at night
- Store food/garbage in containers with tight lids

Prevent mice from entering

- Seal holes (mice will not chew through steel wool)
- Clear brush and grass from around homes foundation

Control mice outside

- Encourage natural predators
- Elevate hay/wood piles/garbage cans and locate 100 feet from the house
- Store feed in containers with tight lids

Haul away junk


- Don't stir up and breathe dust²

Because of the relatively recent discovery of this virus and its high mortality rate, education is one of the best defense strategies we can offer. Don't be afraid to be firm with your customers when discussing a mouse-infested piano. You are not trying to oversell a questionable service. You are helping to prevent serious illness both to yourself and your customer. After all, they live in the home with the infested piano.

Notes:

1. Howard and Margery Facklam, *Viruses* (Twenty First Century Books, 1994), p.9.
2. *A New Hantavirus*. Atlanta, GA.: The Centers for Disease Control and Prevention, 1993. 1/2 VHS, 57 min., color.

Other Sources:

- *Current Medical Diagnosis and Treatment 1997*, 36th ed., Appleton & Lange, 1997
- *Everything You Need to Know About Diseases: Consumer Reference*, Springhouse, PA: Springhouse Publishers, 1995.
- *Professional Guide to Diseases*, 5th ed., Springhouse, PA: Springhouse Publishers, 1995.
- Coleman, Wendy S., MD "Reed Organ Restoration and the Hantavirus." *ROS Bulletin*, Vol. XV, No. 1 (Summer 1996), 25-26. 

The Effect of Bridge Movement on Tuning Stability

By Leon Vieland, Ph.D.
Princeton, NJ

In light of the ongoing discussion (and disputation) of this subject in the *PTJ*, I have made some calculations in an attempt to clarify the situation. The principal result is surprising but simple; while Darrell Fandrich's calculations and analysis (July, 1996) are entirely correct, the formulas which appeared in the notes to his article are not, as properly pointed out by Fred Sturm (Jan., 1997), who was led naturally to some skepticism about Fandrich's conclusions. The matter is not simplified by Fandrich's corrections of the original text, in which the coefficient in the equation for elongation is brought to conformity with Sturm's value, but the error in the functional dependence on the string diameter is again misstated (Dec., 1996). Perhaps the correct formulas reside in the depths of some computer, and stubbornly resist exposure to print. In any case, I have extended Fandrich's analysis in a way that I think will be of interest.

The starting point is the familiar result for the vibrating string, which states that the frequency is proportional to the square root of stress (tension/unit area), and inversely proportional to the length. The symbol S will be used here to represent the variable T/d^2 , or $\pi/4$ times the usual stress. Then

$$(1) \quad f = k \cdot S^{1/2} / L$$

The effect on f of a change in speaking length (at constant tension) can be given more or less by inspection. A one per cent change in L , ($DL/L = 0.01$), produces a one percent change in f , of opposite sign. Since one semitone is a change in f of 5.95 percent, we have

$$(2) \quad \phi = -17\% \Delta L$$

Note that, the constant k is immaterial. Near the bottom of the treble bridge, which appears to be an area of special interest, the strings are about 35-inch long, so a longitudinal shift of 0.1 inch produces a five cent de-tuning.

With regard to the large changes in stress accompanying small changes in the wire length, as opposed to the speaking length, we make use of the elongation equation,

$$(3) \quad (L - L_0)/L_0 = .044 \cdot S$$

where L_0 is the length at zero stress, and .044 is the reciprocal of Young's modulus, in the appropriate units. This gives a fractional change accompanying a small distortion of

$$(4) \quad \Delta S/S = (22.7/S) (\Delta L/L)$$

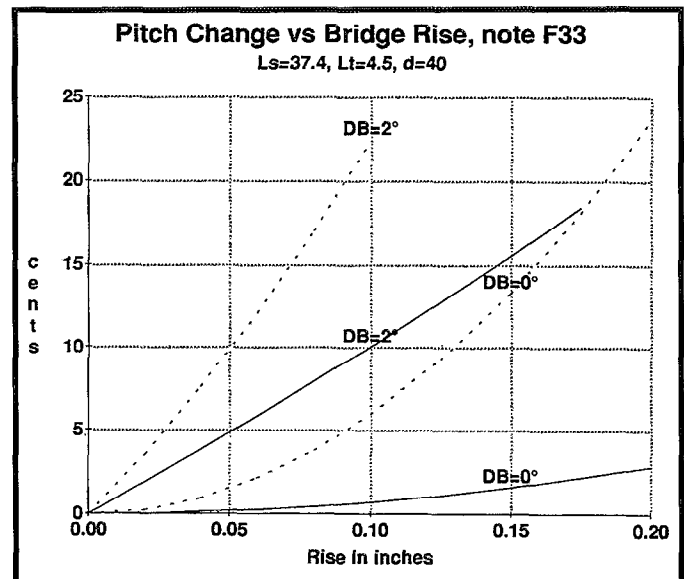
Since for a typical string of interest, S is slightly less than 0.1 in these units (pounds per mil squared), we see that the proportionality factor in (4) is about 250. Reasoning as above, but now with the relative change in frequency (i.e., change in the logarithm) one half as large,

$$(5) \quad \phi \approx 2000\% \Delta L$$

The coefficient here is string dependent, strongly so at the transition to wound strings. Thus the frequency is sensitive to those very small changes in piano dimension which lead to a change in wire stress. One sees that a change in length of 0.01 percent, or four mils in a 40-inch string gives rise to a 20 cents effect, as obtained by Fandrich. This is a daunting sensitivity when one thinks of a piano having to stand in tune, or perhaps even worse, of having to tune it. As made clear by Fandrich, if such a dimensional change is accompanied by the string slipping

past the bridge pins so as to equalize the tension in the speaking portion with that in the tail, the effect will essentially disappear. Thus low friction is important to compensate for the large effect of small longitudinal shifts. The overall problem of seeing the effect of incremental changes in bridge position and height is readily modeled on the computer, but for those who might be interested, the relevant algebra can be instructive. Representing the string as originating at the agraffe, rising over a zero thickness bridge, (like a violin string), and terminating at the hitch pin, one can find ΔL from simple geometry (Pythagoras gets the credit once more). With x representing the distance between agraffe and bridge, and y the bridge height, the speaking length of the string is given by $L_s^2 = x^2 + y^2$, with an analogous expression for the tail length. Allowing x and y to vary slightly, such that x is given by $x_0 + \Delta x$, etc. and solving the equations, leads to (approximately)

(6) $DL/L = 2Dy \cdot a/L + (Dy^2/2L)(1/L_s + 1/L_t)$, with $L = L_s + L_t$, where 2α is the total downbearing angle in radians (1 degree = $(\pi/180)$ radian, and $\alpha = \alpha_s = \alpha_t$). The meanings of this equation are really quite simple. The first term on the right contains the downbearing, so that if there is none, it is identically zero. This appears to be the case solved by Fandrich, which therefore neglects an important term (for most pianos, I hope). Note that there is no term in Δx . This is because this is the solution for total string length, and ignores friction, as mentioned above. That is, implicit in the solution for the whole string is the fact that the tension is everywhere equal. The other limit, of perfect pinning, is solved for by considering the equation for the speaking length alone. Also, note that the term in L_t dominates the second term, since $L_s \gg L_t$, so that the magnitude of the frequency shift is strongly dependent on the tail lengths. The build up of stress in the tail is of course self-limiting, because the string slides across the bridge, and because a significant increase in downbearing is acting on the soundboard. Finally, since the Δx terms are unimportant, even in the presence of downbearing, which couples the two motions, the overall solution can still be neatly



separated into two parts: a longitudinal effect which is very strong, but only quantifiable with knowledge of the friction of the bearing points, and the vertical component, which is graphed below for the string Steinberg #33 analyzed by Fandrich.

Two pairs of curves are given; the case of no downbearing, and a total downbearing of two degrees. The lower curve of a pair represents the result one expects in the absence of slip past the pins, while the upper is the limit of no tension differential. In order to see the relation to the results of Fandrich, consider the DB= 0 degrees case. He quotes Note 8, #2 (July, 1996), in order to produce a pitch rise of 20 cents, an elongation of the speaking length of .004", and a tension difference across the bridge pins, if there is no slippage, of 266 pounds, requiring a bridge rise of over one-half inch. This is precisely the solution for the zero downbearing case in the absence of slippage that I get by assuming the tail length to be $4\frac{1}{2}$ ", the other variables being given. (This would be an extension of the lowest curve on the graph.) As Fandrich notes, slippage past the pins surely takes place, and this is not a realistic solution, but a limiting case. On the other hand, assuming no friction, the solution is given by the upper curve of the pair, where we see immediately that a much smaller rise of the bridge leads to the same pitch change. As Fandrich notes, this point on the curve could be reached, in the case of perfect pinning, by a small longitudinal motion towards the hitch pin which would equalize the tension. In other words, without knowledge of the pinning forces, one cannot separate out the effects, except insofar that vertical bridge movements of this magnitude should be measurable.

For two degrees total downbearing, a 20 cents rise follows from a bridge rise of 90 mils. In this case the differential tension

in the absence of slip is less than 20 pounds, so that frictional considerations may be important. That is, if no slip takes place at this differential, the pitch rise is about nine cents (lower curve); thus the vertical contribution to the change in pitch is between nine cents and 20 cents, independent of friction. The same rise and tension consideration for the no downbearing case would give only a one cent rise. And so on.

When the end of the treble bridge closely approaches the plate, the effects shown here can be one-third larger because of the smaller tail length, and will vary strongly moving away from the end. Sturm's explanation of the relative insensitivity of wrapped strings on the treble bridge (Nov., 1996) is correct, but it is better to leave the breaking strength out of it, as it is not directly material. Quantitatively, the coefficient in Equation 4 (and 5) has in it the term $1/S (=d^2/T)$, and it is hardly possible to design adjacent plain and copper wound strings where this term is much less than a factor of two lower for the wrapped string. Adjacent wound/plain strings are certainly of particular interest to measure, since the bridge deflections may be taken to be about the same.

Finally, I would like to get in a few words on an unrelated subject. In the very same *PTJ* of November of 1996 there appears an excellent article on tuning by, I confess modestly, myself. It is not an article on tuning theory, but the description of a very simple yet powerful tuning procedure, applicable to all pianos with equal ease. It was hoped to elicit dialogue and challenges, which I would greatly welcome. Since my address and telephone number were inadvertently deleted from the publication, I will try again. I am at 62 Snowden Lane, Princeton, NJ 08540; 609-924-8709; and lvland@bellatlantic.net.

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An Essay on the History of Tuning, Part IV

By Skip Becker, RPT
Northeast Florida Chapter

Baroque Times

As the 17th century began, the new astronomers looked at the skies with their new telescopes. They saw no sign of Aristotle's crystal spheres, let alone the angels propelling them. This was more than a little disconcerting for some because it was still possible to fall into theological error; the new century was only a few weeks old when Giordano Bruno was burned at the stake for advocating heliocentricity. But by the trial of Galileo Galilei in 1633, the Roman church could only displace the new sciences into Protestant countries. The 17th century is regarded by historians as the "watershed century:" superstitious times before, and finally, modern times after. Speculative concerns were being filtered out of all the new sciences.¹ Chemistry emerged from alchemy, mathematics from numerology, astronomy from astrology, even philosophy from theology. People looked to the sky, and still assumed that there was a connection between what happened in the heavens and what was happening on Earth, but just what that connection was, was becoming a matter of doubt. Only music, based in the science of abstract numbers, yet so profoundly able to affect the senses, seemed to be enduring proof of that connection (clusters of notes were known as "constellations," not chords or inversions). Music, and especially the nature of temperament, was a favorite subject of the best minds of the 17th and early 18th centuries.²

Music scholars want to make the same assumptions about tuning in the baroque; some form of barbaric meantone at the beginning, and finally, perhaps with the arrival of Bach, civilized equal temperament reigned at the end. With rare exceptions, books on music history need to be rewritten. It is true that by the end of the baroque, keyboard tuning was quite civilized, perhaps even perfected with an elegance which was lost in the 19th century, but (and it is my hope that this is no surprise) Bach never composed for equal temperament. He would have known about it, but the very idea of equal temperament would have been at cross purposes to all of his assumptions about music.³

True Tuning History

In the baroque era (~1600-1750) keyboard tuning, which had begun as a quest for just intonation, was fully devoted to the enhancement of key coloration. The musicians thought that their tuning had tapped the source. As Mersenne put it: "Aron's (1/4-comma) keyboard tuning is one of the greatest sources of beauty and variety in music." Heinichen adds: "For this reason I would not even support

the invention of the long-sought clavier in just intonation were it to become practical."

For us, the term "meantone temperament" (not coined until 1810) is now used in a general sense to denote any renaissance or baroque tuning, and assumed to be the 1/4-comma meantone of Pietro Aron. The comma referred to is the 81/80 comma of Didymus (syntonic), who first reported it. Beginning with C, (the overwhelming majority of tuners started their temperaments with C; F was the closest second) and extrapolating perfect 5ths, the fourth 5th in the series is E, which is a full syntonic comma above the 5/4 C-E 3rd. If the progression of 5ths is tempered sufficiently and evenly to produce a pure C-E (in other words tempering out the syntonic comma over the extrapolated 5ths) one was tuning the 1/4 comma meantone.

There were many varieties of meantone, usually carefully refined on monochords by the new *musici*: 1/4 (Aron's), 1/5 (determined in 1707 by Saveur to be the most common for "ordinary musicians"), 1/6 (the Telemann system), 4/25, 1/7 (the baby wolf makes this a very usable temperament), 2/7 (Zarlino and Robert Smith's equal harmony temperament), 1/9, 2/9, etc. The fractions refer to the amount of the comma which is divided among the 5ths. But, as always, there was the difference between what the theorists were doing with monochords, and what the generality of tuners could accomplish by ear. Such scientific temperaments were popular to the extent that they supported key coloration.

Marin Mersenne

Marin Mersenne (1588-1648), a remarkable blend of free-thinking monk and old school *musici*, was a moving force in early baroque times. His cell was a popular meeting place for intellectuals, and he corresponded with all the new scientists and philosophers, (Descartes, Hobbes, Huygens, Galileo) many of whose ideas found their way into his work. His greatest work, *Harmonie Universelle*, is encyclopedic. The title is accurate; the subject matter is everything. It is largely a speculative work, which attempts to reconcile the ever-widening gap between practical sciences and the theoretical (historians call this neo-Platonic). Mersenne was a neo-Pythagorean (baroque *musici* all were), and, like Pythagoras, he believed that good science and good theology were one. He believed that there was order in the universe, and that the new sciences, using empirical evidence and scientific method, would discover about it what they could. On the practical side, he performed important acoustical experiments with vibrating strings, was the first to properly identify the nature of partials, and he investigated the nature of echo with early attempts to measure the speed of sound. His writings also helped establish a fledgling "modern" astronomy. "He contributed to the theory of tuning and temperament through a synthesis of knowledge of earlier

systems." (*New Grove Dictionary of Music*)

Mersenne's tuning instructions for harpsichord and organ were part of *Harmonie Universelle*, which was published in Paris in 1636. The instructions were of great interest, and word spread rapidly. Butler's translation of Mersenne was available to the English the same year. *Harmonie Universelle* was poorly edited, but it must have been widely read, if we can draw any conclusion from the continuous clarifications, corrections and apologies published over the next few years. It's quite possible that, unlike Aron, Mersenne never tuned a harpsichord; that he was transmitting instructions from, perhaps, instrument maker Jean Denis. In any event, the English used a system based on Mersenne, but with a different interpretation of some terms and procedures than the French had, perhaps due to the translation (what did they mean by "too strong a 5th?"). No musicians in England advocated 5ths larger than pure. In the next generation Christian Huygens (1629-1695), best remembered as a Dutch physicist and astronomer, published his set of 1/4-comma instructions in 1661. In England, 1694, William Holder published an-improved version of Mersenne's instructions, indicating that some 5ths were tuned "as much as 1/4-comma flat" (suggesting that not all 5ths need be evenly tempered, or even equal beating). Gottfried Keller's instructions, published posthumously in 1707, were the first to recommend tuning 3rds and triads directly. Roger North, along with his tuning instructions in 1726 (similar to Gottfried's), suggested that the best results can be obtained by first singing the interval, and listening to chords for "elegance." No one wrote about listening to beats (anything faster than 5 or 6 bps was considered an incomprehensible buzz), until the end of the baroque. Robert Smith, in 1749, published the first instructions for using beats, but only on 5ths, and only on organs, where the beat-rate could be counted over a 20-second burst. He felt the gentle tones of the harpsichord died away too quickly to count beats. He knew enough about harmonics to understand that beat-rate was a function of pitch. Since there was no standardized pitch, his tuning instructions included trials with three different beat rates, and tests to determine if the organ was pitched low, middle or high.

The old tuning instructions might seem a little vague to us. Gradations of tempering were usually expressed as "a little flat," "flat," "very flat," or "as much as ye ear will bear." Tuning instructions, coming as they did from people best remembered as astronomers and mathematicians, could have been much more precise. But the tuning instructions were written to help ordinary musicians, who wouldn't have known what to make of, say, aurally flattening a 5th "by 1/6 comma." For the generality of tuners (the best of which were harpsichord makers), the doctrine of affections was the guide. They simply used the rule of thumb: "Make the 5ths grave, and the truth shall reside in the 3rds." This was the baroque philosophy of tuning, based on the belief that 5ths could take unending amounts of tempering, whereas the same amount of tempering would ruin a 3rd. Robert Smith proved this mathematically in 1749 in his attempt to revive meantone tunings, which by his time were already out of fashion. To get an idea of what these baroque tunings sounded like, try Jorgensen's instructions in *Tuning*, Chapter 14.

Usable Harmony

The popular keys in baroque times were C, G, D, A, E, F, Bb, and Eb. The goal of tuning was to render the corresponding triads as harmonious as possible. Whatever temperament was used, these chords were the checks (usually sung "do-mi-sol" in the order listed). Tuning for these popular keys usually incorporated three sharps (F#, C#, and G#), and two flats (Bb and Eb). These chromatic notes were tuned "true," which is to say, F# was a true F#. It would not function as Gb (there is nearly 1/2 a semi-tone between enharmonic partners such as F# and Gb). And there were rules: sharps could only be tuned from other sharps (beginning with F#, determined from the diatonic note B). Flats could only be tuned from other flats (beginning with Bb, derived from the diatonic F). Because the eight popular keys were tuned directly, the remote keys (the term "unpopular" was never used) were comprised of "default" notes, left over from previously determined triads.⁴ The popular keys of meantone temperament contained a great amount of harmony — side by side with four remote keys, which were full of wolves and generally considered unusable.

Any meantone temperament is a mixture of "good" keys and "bad." Today, it is faulted as impractical because of this restrictive nature. If the temperament included G#, there could be no key of Ab. The resultant G#-Eb "5th" is a very unmusical diminished 6th (28 cents wider than a just intonation 5th). The G#-C 3rd is a full grown wolf of some 36 cents. In compensation, perhaps, there is a haunting melancholy found in F minor, the gift of a very narrow F-G# minor 3rd.

There is the popular misconception that because each key was "tuned differently," a key change in the music would necessitate retuning the instrument. This was simply not the case, and this misconception is actually a double misunderstanding. Firstly, the tonality center (favoritism to the popular keys) created the "different tunings" for each key, but within a single temperament. Key signatures were chosen for their particular sounds (affects), not retuned in just intonation (the antithesis of the doctrine of affections). Secondly, there was some discretion allowed in setting temperaments. The key signatures of the music performed would have determined how many sharps or flats actually went into the temperament. Tuners had to be mindful of the disposition of that final crunching 5th. Did you want an Ab, or a G#? You could have both, but then you would have had to forget about Db, or C#. The discrimination employed in "laying the wolf" has contributed to the above misconception.

Some bold musicians found expression in the minor 3rds which were really augmented 2nds, major 3rds which were really diminished 4ths, and 5ths which were really diminished 6ths (all considered by us to be wolf intervals) which exist in meantone temperaments. But most musicians simply avoided the remote keys where these wolf intervals lurked. Early baroque keyboard literature indicates most composers were simply content to play in the popular keys. In fact, some provincial clergy tuned their organs in just intonation; happy with the good keys, and wanting none of this "tempering business" at all. Restrictive as it was, ingenious musicians knew how to take advantage of what was available in meantone tuning. Rameau redefines "usable

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An Essay on the History of Tuning, Part IV

Continued from Previous Page

harmony" quite nicely in an anecdote preserved by Norman Lebrecht:

As a young organist in Clermont, Rameau longed to get away to Paris to have his *Theories of Harmony* published but could not persuade the cathedral authorities to release him from his contract. One Saturday at morning service, however, he played only two chords before leaving the organ loft, banging the door. No one was surprised: they thought he was angry because the organ-blower had not turned up. But at the evening service there was no mistaking Rameau's intentions as he played all the most painful discords. Connoisseurs at the service said only Rameau could have played so horribly.

The organist was reprimanded; he replied that he would continue to play that way until his contract was canceled. The elders of the community gave in. Over the next few days he played magnificently, surpassing himself at his last service with such delicacy, elegance, force and harmony that all in the congregation appreciated the loss they were about to sustain.

The New Tuning

Ingenuous or not, we can be sure all musicians wanted more usable harmony. Circulating temperaments, such as Pythagorean or ET, were known, so the idea of a circulating temperament which supported key coloration became a quest of the baroque *musici* (who were by this time a very knowledgeable group). Before the 17th century ended several varieties of new tunings emerged. Differing styles developed geographically, culminating in national trends. The French tended to use a system which strongly favored pure 3rds, but left four diminished 4ths howling and some 5ths larger than pure. A circle of German theorists (including Werckmeister, Neidhardt, Meckenheuser, Sinn, Goldbach and Mattheson) tended to increase the size of their 3rds as the keys became more remote. This German technique enhances individual key character and helps muzzle the wolf intervals. Both French and German systems closed the circle of 5ths, but unique to the French *temperament ordinaire* were 5ths slightly larger than pure (which you would get if you followed Mersenne's instructions). In England, in 1731, Peter Prellieur's instructions reduced the circulating bearing plan to 18 notes. William Mans'ur, in 1747, included the usual "trials" of major chords and inversions, plus listening to minor and diminished triads as well. This type of ear discrimination has been lost to us since the 19th century.

Of course, there were debates over the virtues of the "old" and "new" tuning, yet another "temperament war." To complicate the issue just intonation was still common. Its advocates, such as Robert Smith, claimed key colors were merely the accident of inflicting just intonation on a 12-note scale.⁵ And there were still some clerics tuning Pythagorean, debating "senses versus reason" after all these years.⁶ Fontanelle wrote in 1711: "After these motley combats, one system will be victorious. If fortune favors the best system, music will gain thereby a real advantage." Most musicians considered the new tuning to be a great improvement. Circulating temperaments became known as "good tunings." In 1721 Alexander Malcolm reported that circulating

temperaments were surpassing meantone in usage. The philosophy of tuning had changed again. Along with it, the tuner's rule of thumb had to change, too. By the end of baroque times, the new rule was: "The 5th will not bear to be reduced below the true accord, as much as the 3rd can rise above it (from Handel's tuning instructions)."

It should come as no surprise that around this time the task of tuning was becoming too much for some musicians. Roger North's writings in the 1720s reveal the first presence of professional tuners in England, who were employing circulating temperaments. North personally saw no reason to distort key color just to improve-seldom used keys, but he did admit that they were good tuners. He further reports that they were setting temperaments by listening to 5ths for beating, which he understood to be "slow quavers."

Equal Temperament in the Baroque

Mersenne's *Harmonie Universelle* also contained the first proper ratios of equal temperament, and so he is one of the persons suggested as the "father of equal temperament." But for Mersenne, ET was the tuning of Aristoxenus, designed for the lute, and incompatible with keyboard tuning. He does mention a Jean Gallee, the only person known to Mersenne to have put such a tuning on an organ or spinet. Gallee was the earliest advocate of ET on keyboards, but in the mid-17th century he had one tough row to hoe. He traveled to Paris in 1645, advocating ET, trying to influence instrument makers. Not surprisingly, those who heard a demonstration were horrified. Gallee told a dumbfounded Jean Denis that perhaps he wouldn't be so vehemently against it if he were accustomed to the sound.

Music scholars prefer to begin the history of ET on keyboards with Frescobaldi, who, they say, recommended it for keyboards in the late 1630s shortly after Mersenne published his book. Actually, he only recommended it once; for the tuning of the organ in a renovated apse around 1640. G.B. Doni gives us the malicious details of this event in a letter to Mersenne: when Frescobaldi made the recommendation, he was under the influence of an "old man dressed in rags," who knew "nothing except how to play the harpsichord." This mysterious stranger had come to Rome, where he was creating a stir by advocating equal temperament. His mesmeric hold on Frescobaldi was furthered by "frequent and gratuitous beverages" immediately prior to the recommendation. Doni prevailed upon Cardinal Barberini to ignore the advice; the organ was inaugurated in 1640, tuned in Mersenne's meantone.

Jean Phillipe Rameau

The first bona-fide endorsement for ET on keyboards came from Jean Phillipe Rameau (1683-1764), some 12 years after the publication of his *Theories of Harmony* (often considered to be the basis for modern acoustics, with Rameau its "father"). Rameau was a fascinating character, and a prolific *musici* of the first order. His life was full of creativity; music, opera, and theoretical treatises. Towards the end of his life, he regretted the time he had devoted to musical composition, because it took time away from his theoretical thinking. In his later writings he sought the cosmic principle from which music descended; through harmony, leading to unity (very speculative stuff). Near the end of his life he was ennobled. He told a friend: "I have

more taste than ever before, but I no longer have genius." On his deathbed he found the energy to reproach the priest for his bad chanting.

The endorsement of ET was a complete about-face from his earlier work, which was so eloquently devoted to the doctrine of affections and needs to be taken seriously. In his *Harmonic Generation* of 1737:

He who believes that the different impressions which he receives from the differences caused in each transposed mode by the temperament now in use heighten its character and draw greater variety from it, will permit me to tell him that he is mistaken. The sense of variety comes from the intertwining of the keys and not at all from the alteration of the intervals, which can only displease the ear, and consequently distract from its functions.

Rameau went a step further, and gave instructions for tuning ET: simply begin with any note in the middle of the keyboard, tune a circle of 5ths, flattening each slightly, and dropping octaves appropriately. If the final 5th closed the circle, one was tuning ET. We can only imagine the difficulties in tuning true ET with such instructions. Of course, in 1737, ET was nothing new. His contemporaries recognized it as a method advocated, and later retracted, by Louis Couperin (*Le Grande*). The Germans knew ET as one of their circulating temperaments. But because of the strong endorsement, 18th-century ET did become associated with Rameau (another person suggested as the "father" of ET). His ideas were obviously prophetic, and highly influential in later times, but he was quite out of step with other musicians in his own time. He attacked the treatises on music which had appeared in the new French *Encyclopedie*. He was bitterly attacked in return by the authors Rousseau and D'Alembert, both very able theorists and temperament-makers. This led to an infamous temperament war which spilled over into all of their music, opera, theory and eventually into the French newspapers. It was known to the public as the "War of the Buffoons" (buffoon was a play on words involving the *buffo* opera style).

A much more representative view of ET in baroque times was held by Neidhardt (1732):

Most people do not find in this tuning that which they seek. It lacks, they say, variety in the beating of its major 3rds and, consequently, a heightening of emotion. In a triad, everything sounds bad enough, but if the major 3rds alone, or the minor 3rds alone, are played, the former sound much too high, and the latter much too low.... Yet if oboes, flutes, and the like, and also violins, lutes, and gambas, and the rest, were all arranged in this same tuning, then the inevitable church- and chamber-pitch would blend together throughout in the purest way. Thus equal temperament brings with it its comfort and discomfort, like blessed matrimony.

The Problem with False History

Good tunings have created the impression that ET was in common practice much longer than it really has been. To be sure, larger than pure 3rds and circling 5ths are characteristics shared with ET. To add to the confusion, the "good tuners" did embrace the philosophy of "equalizing the 5ths." Although a crude sort of theoretical ET could be obtained

with Rameau's instructions (or with a monochord), it seems unlikely that there could have been anything like true ET in common usage before there were accurate instructions. The first such instructions were published in 1911.⁷

The major problems with temperament interpretation began in the 1770s with Marpurg, who interviewed Kirnberger and misinterpreted his statement that Bach taught him to tune all the 3rds sharp. Marpurg assumed that Bach tuned all 3rds equally sharp; therefore he tuned in ET. Helmholtz believed Marpurg; he published the fallacy, and music historians have been getting it wrong ever since. Kirnberger, Bach's most devoted student, also said, "any good temperament should not interfere with the variegation of the keys." Marpurg didn't pay attention to this, or perhaps, his conception of ET included key color.⁸ For baroque tuners (continuing for tuners well into the 20th century, for that matter), the philosophy of "equalizing the 5ths" was by no means exclusive of key colors. Rameau's instructions would have been considered quite useful, in the way an artist might sketch a subject with charcoal before applying colors. Templehof, a disciple of Kirnberger, adds that without such expressive resources (key colors), "music would be nothing more than a harmonious noise that tickles the ear, but leaves the heart slumbering away in a disgusting indifference." This is pretty strong stuff, and clear evidence that it was the obligation of tuners to use the doctrine of affections in setting temperaments. The purpose of music was not to "tickle the ear," but to affect the heart and soul. This doctrine was the basis for early opera, and the unquestioned assumptions of later baroque composers such as Handel and Bach. Of course, to say that the music of Handel and Bach affects the heart, or is filled with cosmic vision, is merely to state the obvious. They knew what they were about. All the baroque Masters were old school *musici*, still inspired by the unscientific view that the world has a soul; and the soul of the world is harmony (Plato).

It is significant that the great baroque composers such as Scarlatti, Handel, and Bach were also the *virtuosi*. Players understand the importance of tuning better than anyone. The baroque Masters tuned their own instruments (Kirnberger said Bach could tune a harpsichord in 15 minutes. Handel wrote tuning instructions). Their music was crafted to induce various emotional states, or "affects," and invoke spiritual inspiration. Such magic required the ritual of the tuning wand. We can be sure that they were very meticulous in crafting the "harmonic toolbox" so necessary to their work. A wonderful proof of the world-view enjoyed by Bach comes from another musical anecdote preserved by Norman Lebrecht:

A group of beggars used to whine in a series of dissonances which Bach thought contained an interesting set of intervals. He first made as if to give them something but pretended he could not find any money. As their complaints rose to a high pitch, he gave them several times a very small donation which slightly lowered their cry. Finally, he gave an exceptionally large sum which, to his delight, produced a full resolution of the chord and a satisfying cadence.

Notes

1. Francis Bacon (1561-1626) introduced the "scientific method" in his *Novum Organum*, and Rene Descartes (1596-1660) published his *Discourse on the*

Continued on Next Page

Altering the Stretch — Part II

By Jim Coleman Sr., RPT
Contributing Editor

Additional stretch

In the last article we showed how to increase the A4 stretch number in order to program a wider stretch not only in the A3-A4 octave, but throughout the entire tuning. When this is done, it provides a wider jump between B4 and C5 where the SAT switches from tuning by the 4th partial to tuning by the 2nd partial of C5. We will show how it is necessary to decrease this jump to keep smooth continuity across this break. This will require resetting the pitch a little on the sharp side at C5.

If one programmed page 1 of memory to reflect the tuning generated by the actual measured stretch numbers and page 2 to reflect the tuning generated by the altered stretch number of A4, then it can be seen that there is a wider difference between the readings of B4 and C5 on the second page. Here are the numbers taken from the example from the Part 1 article (April, 1997 *PTJ*):

	F3	A4	C6
Page 1 FAC #'s were	8.0, 8.0, 8.0	B4=12.2, C5=3.0	diff.=9.2
Page 2 FAC #'s were	8.0, 8.5, 8.0	B4=12.9, C5=3.2	diff.=9.7
			=====
			.5
The B4 readings are for its 4th partial.			
The C5 readings are for its 2nd partial.			

In order for the C5 of page 2 to fall in line with the normal curve of the change in page 1 from B4 to C5, it is necessary to increase the sharpness of C5 of page 2 to reflect the difference between B4 and C5 of Page 1. The above figures in this case as shown above will require a resetting of the pitch at C5 an amount equal to the difference of the two differences, i.e., .5 cents. It just happens in this case that the amount for reset (.5 cents) is the same amount that our A4 stretch number was changed. It will not always be the case however, but where the stretch numbers are close to this example, you could just use the same reset value as you used in your deviation of the A4 stretch number. In practice, it is good to write down these

deviations or re-settings so you don't get confused. In fact, it is good to write these down on your service record for reference the next time you tune the piano.

There is another place in the treble where a change from using the 2nd partial to using the 1st partial or fundamental to tune occurs. This is between B5 and C6. This, however, turns out to be rather inconsequential as the numbers below show:

	B5	C6	Difference.
Page 1	10.8	4.0	6.8
Page 2	11.1	4.2	6.9
			=====
			.1

There is one other place where a change of partial occurs, and that is between B2 and C3. B2 utilizes the 6th partial for tuning, whereas the C3 uses the 4th partial. Where the stringing scale is smooth through this area, it is rather simple to reset the SAT to accomplish a smooth transition when an alternate value for A4 has been used. Here is how the numbers work out:

	B2	C3	Difference
Page 1	1.4	-2.4	3.8
Page 2	1.3	-2.4	3.7

Here again in this case it seems rather inconsequential. But to establish the principle it would be necessary to subtract the .1-cent correction. In some cases where the three FAC numbers are quite different, it may be necessary to do this type of

change.

Just remember, at the 6th partial change, one should subtract the difference as computed above or in your own example. At the change from 4th partial to 2nd partial at C5 one should add the corrective amount.

Altering the High-Treble Stretch

Next, we will discuss the altering of the C6 stretch number in order to provide extreme sharpening thereby making the triple octaves sound better. This will also help the octave-5th and the double-octave-5th at the expense of the wider single octave and double octave sound.

So far, we have discussed the effect of

altering the A4 stretch number of the three FACs. One can take this to an extreme, but I would suggest going no farther than an additional 1 cent stretch, for this will provide a single octave stretch of 1/2 bps or more. This gets close to the limit which one can tolerate in the sound of the center single octave.

If more stretch of the high treble is desired, then altering the C6 stretch number is required. For an example of this, let us create a Page 3 tuning using the FAC #'s 8.0, 8.5, 8.5. We then find a comparison between Pages 1, 2, and 3 as follows:

	C5	C6	C7	C8
Page 1	3.0	4.0	13.8	43.8
Page 2	3.2	4.2	14.7	44.4
Page 3	3.2	4.2	14.7	46.6

Now please remember that in increasing the stretch of A4 by .5 cents, it was necessary to reset the SAT on the sharp side by .5 cents at the note C5 and another .1 cent at C6 so that the real values of the above should be:

	C5	C6	C7	C8
Page 1	3.0	4.0	13.8	43.8
Page 2	3.7	4.8	15.3	45.0
Page 3	3.7	4.8	15.3	47.2

Since the stretch is based on an exponential curve (steeper and steeper climb to the right), there is not any difference at note C7 in this example, but if one uses a higher additional stretch like 2 cents for C6, you will see a more dramatic change in the numbers as shown in Page 4 where the stretch numbers are: 8.0, 8.5, 10.0.

	C5	C6	C7	C8
Page 1	3.0	4.0	13.8	43.8
Page 2	3.7	4.8	15.3	45.0
Page 3	3.7	4.8	15.3	47.2
Page 4	3.7	4.7	15.5	54.0

For pages 2, 3, and 4 the corrective resets of .5 cents at C5 and .1 cents at C6 have been included due to the change of the A4 stretch number from 8.0 to 8.5.

Now for an extreme example, let us take a 1-cent change at A4 and a 2-cent change at C6. Our FAC numbers will now be 8.0, 9.0, 10.0 and we will program this on page 5.

Let us see first of all what the change in the A4 number creates. We will compare Page 1 with Page 5 in respect to the locations where the partial being used

changes.

	B4	C5	Diff.	B5	C6	Diff.
Page 1	12.2	3.0	9.2	10.8	4.0	6.8
Page 5	13.0	3.2	9.8	12.4	4.1	8.3
	===			===		
	6			1.5		

As a result of this, it is necessary to reset the SAT at +.6 cents when you get to C5 and an additional 1.5 cents when you get to C6. You can see the exponential increase over the resets for the .5 increase of the stretch number for A4. Now let us apply this change to the readings of Page 5 in the following comparison.

	FACs	C5	C6	C7	C8
Page 1	8, 8, 8	3.0	4.0	13.8	43.8
Page 2	8, 8.5, 8	3.7	4.8	15.3	45.0
Page 3	8, 8.5, 8.5	3.7	4.8	15.3	47.2
Page 4	8, 8.5, 10	3.7	4.7	15.5	54.0
Page 5	8, 9, 10	3.8	6.2	17.0	55.5

From the above, you can see that varying the A4 stretch number makes more difference than varying the C6

stretch number except in the upper top octave. You can apply these above principles on any piano if you desire to change the amount of stretching of the octaves.

Compressing Octave Stretch

There is one other type of change for the treble which needs to be addressed and that is where you wish to compress the octaves for some reason. One example that comes to mind is in taking the PTG test. Since one of the test requirements for the top octave is that the notes be tuned in simple 2:1 fashion, that is, where the fundamental of C7 is in tune with the 2nd partial of C6. For this purpose, one could decrease the normal C6 stretch number which in turn would decrease the cents especially in the top octave on an exponential basis. The location of C6 would normally fall within the tolerance range anyway, but by choosing a slightly smaller number for the C6

stretch value, it would, in effect, tend to flatten out the normal exponential upward curve from C7 to B7.

Here is an example of decreasing the C6 stretch number by 1 cent:

	FACs	C5	C6	C7	C8
Page 1	8, 8, 8	3.0	4.0	13.8	43.8
Page 6	8, 8, 7	3.0	4.0	13.8	39.2

A much simpler way to tune the top octave for PTG test purposes would be to tune C7 to the 2nd partial of C6, and continue in like fashion up to B7. It is my opinion that those who do the master tuning, should use this same method since there is the *arbitrary* requirement that the examinees be judged on this basis. Aural tuning *in this area* brings with it more variance than does electronic tuning.

In the next article, we will explore the possibilities of varying the F3 stretch number and its effect on the bass and tenor areas. ■

An Essay on the History of Tuning, Part IV

Continued from Previous Page

Method for Properly Guiding the Reason and Finding Truth in the Sciences, which recommended a new beginning: doubting everything, and proceeding with only what could be demonstrably proven. These works provided the basis for all our modern sciences.

2. Bacon, Descartes, Leibnitz, even Newton, all experimented with temperaments. Newton wrote formulas for some 15 musical scales, using logarithms some 100 years before Johann Lambert (to whom historians give priority).
3. See Jorgensen's *Tuning*, Chapter 2.
4. The notes in the diatonic scale of Ab would have been: G#, Bb, C, C#, Eb, F, and G.
5. On a 12-note system, Smith preferred Zarlino's equal harmony temperament. To accommodate just intonation, he wanted at least 17 notes in his scale, although most advocates of JI called for 55 octave divisions.
6. In 1701, Louis Saveur identified the "Chord of Nature," which was the chromatic scale based on string harmonics (just intonation). The ratios are all pure, and in whole numbers. For speculative *musicians*, this gave the power (and position) of reason to just intonation, which knocked Pythagorean tuning out of the box.
7. The first useful instructions for tuning ET came from Norman C. Miller, a Guild member from Lincoln, Nebraska. William Braid White thought the material was "novel," and he published the calculations in 1911.
8. Marpurg's temperament equalizes the 3rds at the expense of the 5ths; most of which are -4.0 cents, but F#-C# is -7.9 cents, nearly 1/3 comma narrow. This is more than "ye ear will bear." Marpurg couldn't figure out what to do with the diesis either.
9. The description "harmonic toolbox" was coined by Ed Foote. ■

The Tuner's Life

"Some Old Guy"

By Horace Greeley, RPT

Off and on, I had the great pleasure of tuning for Jorge Bolet, truly one of the great musicians/pianists of all time.

He took some time dying of emphysema, and during his bad spells, spent time in a "rest home" near where I lived. I had not seen him in some time, and it came to pass that a friend asked if I would consider donating a tuning to this convalescent home for "some old guy." It was a '71 Wurlitzer. You can imagine the condition. Well, I had given my promise, so I replaced some strings, fixed a few broken keys/dampers/you-name-it, did some tuning ... in general, just tried to make it comfortable. As I was packing up to leave, someone started to play Chopin Op.28. I turned and saw Bolet.

I tuned there several times after that, just doing what I could. He always played. Then he smoked and we drank coffee. The last time I saw him, it was clearly to be the last time. I worked. We talked. He played. He played the Bach-Busoni Chaconne, the Chopin Op.28 (again) and few nocturnes, and ended (!) with the Liszt Tannhäuser Overture transcription. I cried. I almost am right now with the memory of it.

Some time later, I was teaching at a convention, introducing some recordings I think to be representative of differ-

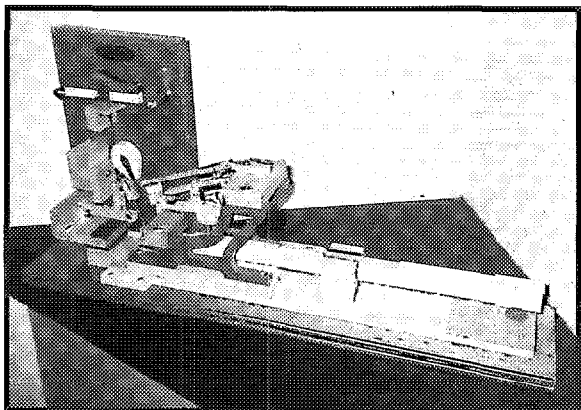
ent styles of recorded piano, etc. One of Bolet's recordings figures there. As I was doing this, Ben McKlveen told me that Bolet had died just days before. I am quite afraid that it brought me to a complete stop for a bit. I just put on the recording and let folks listen.

I will never forget the faces of those folks in the hospital — most of them just waiting to die. Wanting to die. No one really caring. And then, this music! Yes, like the ruins of Rome, a mere glimpse (at times) of former glory. Yet, at other times, the full power and majesty of an artist at his peak of technical prowess and sensitivity of expression. The inspiration reflected in the care-worn faces of the aged audience ... everything ceased ... the phones miraculously went on hold ... pagers were silenced.... Time ... ah, yes, time ... stood still — *no*, went back! — and age no longer mattered. The final chords sounded, as they do for us all. But just one more time ... just once more to be transported to such a place ... by such inexpressibly beautiful music....

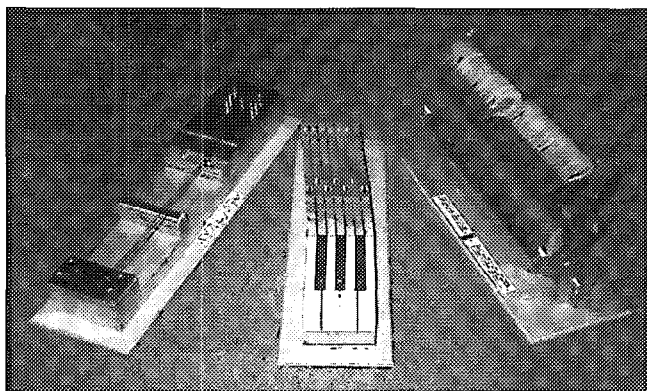
And yes, I still do this kind of work — at times in preference to things for which I know very well I could make a good deal more money. There's just something about a well-voiced D-Major chord, though.... ■

Exam Action Models, Jigs Now Available

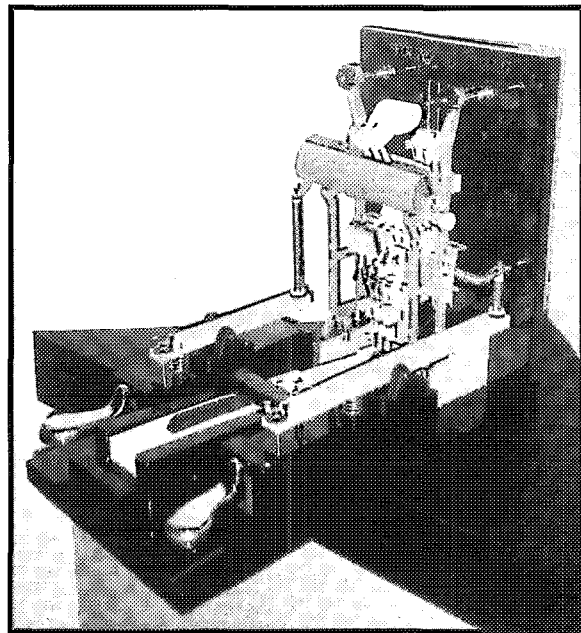
The new Renner and Young Chang action models which are the official PTG Exam models are now available for purchase.



The Renner action model is for the grand part of the Technical Exam. This is a one-note action model designed for accuracy and dependability. The cost for these models are \$225 plus shipping and handling and may be ordered directly from Renner. We thank Renner and Lloyd Meyer for this venture.



STRINGING JIG (LEFT) — Constructed of pinblock material throughout, designed for two three-string unisons with agraffes, stainless bearing rod, steel hitchpin and laminated bases. Instruction label included. \$125 plus shipping. **KEY JIG (CENTER)** — Seven keys mounted on original frame section with new key pins, bushings removed. Laminated Base. Instruction labels attached. \$35 plus shipping. **HAMMER JIG (RIGHT)** — Ten-note bass, 10-note treble, mounted on original rails and brackets, laminated base. Standard flanges. Instruction labels attached. \$65 plus shipping. **GRAND HAMMER SHANKS AND FLANGES (NOT SHOWN)** — Ten provided, with instruction labels, when ordering a complete set of jigs. Note: All instruction labels are of laminated card stock, for durability. When ordering a complete set of jigs, all labels are complete for the repair section of the RPT Technical Exam. All jigs constructed by the South Central PA Chapter.



The Young-Chang three-note action model is for the vertical part of the Technical Exam. The cost for these models are \$150 plus shipping and handling and may be ordered directly from the Home Office. This project was started by Don Mannino, and finished by Phil Glenn. We would like to thank them for their work.

To Order —

Renner Grand Action Models:

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Weston, CT 06883
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3930 Washington
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(816) 753-7747
(816) 531-0070

Repair Jigs:

Keith Bowman, RPT
717-5997782

Also Available from the Home Office —
Kimball Action Models. The price for these models is \$50 plus shipping and handling.

WHAT GOES ON THERE - National Office Notes



ALLAN E. POLLARD
Executive Secretary

Just how high can the cost of piano tuning and repair go without restricting to the higher income groups the use of the instrument?

While we find it difficult to set a certain level as the safe maximum we conclude that it would be determined largely by the degree of importance people place upon **self-produced** music in the home.

Through the magic of the present age we can purchase "packaged" almost every need of our complicated existence, from Brown and Serve Biscuits to a packaged symphony. Some might argue from this that the day of the individual musician, the home performer, has passed, as seems to have passed the day of the bride who can cook.

But such is not the case. There is growing up in our world an expanding multitude who have a fierce determination to "Do it yourself," even to producing its own music. The indications are that more people are studying the piano today than ever before in the history of the keyboard carrying harp.

Every piano technician, dealer employed or self employed, should daily remind himself that he must encourage in every way he can this return to self-accomplishment in music. He must remember constantly that as long as he in a piano tuner, **MUSIC IS HIS LIFE.**

LETTERS THAT CROSS THE EXECUTIVE SECRETARY'S DESK

An inquiry from the Michigan Employment Commission asking about courses of instruction in piano tuning.

A letter from a Wisconsin tuner who had to drop his membership because of sickness but now wishes to reinstate.

Letter from a man who has developed a process for rust-proofing metals and who is trying it out on piano strings

and tuning pins. He believes it improves the tone of a string.

Letter from Louis Berman, 1240 Stillwater Drive, Miami Beach 41, down in Florida. Louis wants to see a chapter down there. So do we. So we'll all work on it. Send him your Applications for Membership, you Florida pitch raisers.

Letter from Gaylord Wright, who is Godfather of the Alberta Chapter newly chartered at Calgary. Gaylord would make a good Texan. To him distance means only progress from where he was to where he intends to be.

A letter from G. R. Bell of Washington, D. C., who is interested in piano sales. He has been reading back issues of The Piano Technician given to him by his father, A. R. Bell, of Garner, North Carolina. The senior Mr. Bell will be 78 on April 29th, and has been tuning pianos since he was 16. Happy birthday, Suh! You have earned it.

Letter from Margaret Billerman, secretary to The International Association of Convention Bureaus. Miss Billerman and her boss, J. S. Turner, probably know more about holding conventions than anyone else in the country—except Les. Hoskins and Bob Lutzen (heh! heh!)

Letter from Bob (Live) Wire of the Indianapolis, Indiana, Technicians. Bob, with the help of some other good Hoosiers and one member from Ohio, has been sparking a lot of improvement in the Indianapolis Fee System. There are a lot of pianos to tune in Indianapolis, and Bob has been looking at the new automobiles. To look at beauty is to desire it!

Letter from Floyd Orr, who is doing some teaching. Good! At least good for anyone fortunate enough to study under him.

Letter from Arthur Hajek, Great Falls, Montana, telling of his trip to Calgary for the Alberta Chapter Charter Night. Calgary is 356 miles from Great Falls and Arthur and his wife drove up and back. It looks like "neither storm nor snow nor ice nor—what have you—" can keep those guys up there from going where they aim to get to.

Here's one from Gale Foehner, who tunes around Rochester, N. Y. Gale says, "Well, I went and bought another car, a station wagon with lots of room, but I couldn't get those old decals off, so here's some money for two more. And also send me three copies of the February '57 Piano Technician. A very good article about prices in there which

I hope will take effect on some of the boys. I got mad after the January convention (in London) and raised her up to \$10.00 and got two dealers to go along. Haven't had too much trouble—because I don't care—. If they want to get somebody else they can go—ahead. If they want me, they're goin' to pay \$10. Well—, I'll see you at the convention in Philly."

Gale has discovered what attending conventions will do for a guy. Makes him mad sometimes—and he raises his prices just for the heck of it—and makes more money thereafter.

Letter from George Brasch, our travelling Regional Putter-Oner. George and Mrs. B. (his Duchess) have just returned home from about 5000 miles of convention travel. George is also on the Nominating Committee for the 1957-58 slate. If any of ye have Favorite Sons let him know.

Letter from Donn Foli, or Vauvouver, B. C., another new Canadian member. Canada is growing fast. They have more than water-power up there.

And here's a rather sad letter from Thomas J. Osterhaus, Piano-tekner, Stokkaveign Sta, Stavanger, Norway. Mr. Osterhaus is experiencing a progressive trouble with his eyes which is forcing him to curtail his reading—reluctantly—of The Technician. We are as sorry about this as he is!

A note from Harold Marsham, tuning department, N. Bennett Industrial School, Boston. He says, "The magazine you send us is read by from eight to ten pupils each month beside myself."

Here's one from down under: 129 Mitchell St., Stockton on N. S. W., Australia. "Please send me full information about your magazine, The Piano Technician, to which I may be willing to subscribe. Yours faithfully, G. R. Chapman." (Our magazine really does circle the globe. We certainly are not hiding our light behind a border line.)

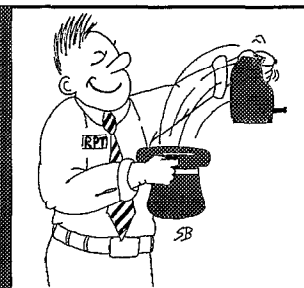
Preliminary work on the Philadelphia convention is beginning to fill the Exec. Sec's desk. Anyone with suggestions for this convention better get them in now. This will likely be the last National Convention ASPT will hold—as ASPT. So we aim to make it a Cling-Clanger. Write your ideas to the National Office or to Robert C. Mann, Convention Coordinator, 223 Lexington Avenue, E. Lansdowne, Pa.

Well, the mail's open to everyone. There's nothing to stop YOU from writing to us—but you.

THE PIANO TECHNICIAN, May, 1957

Grand Illusions ...

The Page for Serious Cases



Health Crisis Averted

(Atlanta, GA) — Earlier this week the Center for Disease Control solved two mysteries surrounding the recent incidence of the rare Moroccan Colic. The first mystery was what a disease normally confined to the nomadic population in arid southern Morocco was doing in this country. The second was why it should be showing up initially among a small group of US piano technicians.

The "Rockin' Colic," so-called by US Army soldiers first encountering it in World War II, is actually a mild gastrointestinal distress, whose distinguishing symptoms include greatly elevated ammonia levels in underarm perspiration and a lavender cast to the eyeballs. "Its gastrointestinal effect is not much more than that of say, Polish cuisine," explained Dr. Amy Baugh of the CDC. "But we're keeping a close watch on this microorganism because if its ability to bloom suddenly and profusely after indefinite periods of dormancy in adverse environments. This little darling can lay idle for months on a grain of desert sand and then literally explode inside the lower intestine of a camel who happens to sit down on that grain of sand." Dr. Baugh continued, "If this ability to spring into action following extended dormancy were transferred to a bug posing a serious health threat (as opposed to a minor embarrassment), we'd be in big trouble."

The CDC's meticulous detective work followed a trail leading

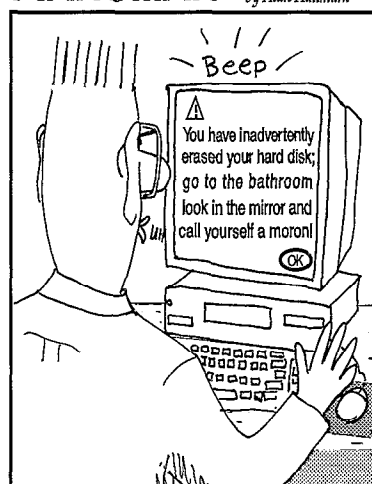
from the 200 United States piano technicians reporting the disease, back through the spit-activated glue of imported bushing cloth, to an immigrant worker at the Renner factory in Stuttgart, Germany. Dr. Baugh observed, "Apparently, this employee's training included the use of indoor plumbing, but not the need to wash thereafter."

A statement from Renner GMBH was issued by Preston Latimer of Renner, USA, (the importer of the contaminated cloth) insisting that, "At no time was there any danger to the public at large." The bushing cloth is now being gamma-irradiated, a process already in place for the English leather currently flooding the EEC. Mr. Latimer also offered informally that "washing your mouth out with alcohol before and after each activation of the glue should dissolve any worries."

(WallEyes News Service, c/o Bill Ballard, RPT)

PIANOMAN Adventures

by Alan Hallmark



©1997 BASS/HALLMARK

"Pitch Creep"

Back when Johann Sebastian Bach was living in Leipzig it was not unusual for him to dread going across town to play on the organ at another church. He could never be sure what pitch the organ would

The Hammer Line

be tuned to. You see, there were no pitch standards back then so (pardon the pun) pitch was "catch-as-catch-can." He might find their mid-C pitched high, or it might be a low-C flat (also known as B) or whatever. This was frustrating for all composers and instrumentalists, (not to mention tuners), so sometime during the mid-1800s there was a convention in Paris where everyone decided that the international standard for the A above mid-C would vibrate at 435 cycles per second. This was great, especially for piano tuners. Eventually, however, something known as "pitch creep" began to occur, i.e., orchestras and conductors increasingly wanted the "brightness" of a slightly higher pitch level, so A would be set somewhat higher. To the relief of piano

tuners around the world, there was another convention sometime after the turn of the century where the standard for the A above mid-C was set at the current 440. But, "pitch creep" has shown itself again with many orchestras playing at 442 or, in the case of some German groups, as high as 446 cycles per second. One wonders when this cycle (bad spun) will be broken?

Seasonal moisture shifts provide another kind of "pitch creep." This is no problem for piano tuners. We love this. It is not unusual for piano tuners to get down on their knees during a dry period (monetarilyspeaking) and pray for a radical moisture increase like a monsoon or something to stimulate business. A prayer might go something like this: "Please Lord, let the firmament pour forth, let the heavens rain down upon us and moisturize our instruments of praise. Then Lord, please make the dry winds of Arabia take forth our moisture content down to say 18 percent relative humidity, thus shall your servant be fruitfully employed." This is highly desirable "pitch creep."

But this is not the "pitch creep" that this article is really about! The real "pitch creep" is a person! He or she is the cus-

tomers that checks our tuning after we are done. Typically, when we first arrive, the piano sounded like it had its last tuning around the time when Moses led forth the Israelites from Pharaoh, so it was no pleasure to work on in the first place. But we finish the job and we are somewhat proud of the improvement we have made. But then, in walks the "pitch creep." The true "pitch creep" will play a few notes then announce, "It doesn't sound right." The conversation will proceed something like . . . {Piano Tuner} "Well, what seems to be wrong with the sound?" {Pitch Creep} "Ehh?" {Piano Tuner} "What do you mean (sir, madame), what is it that seems to sound bad to you?" {Pitch Creep} "Speak up sonny!" {Piano Tuner, whose voice is now louder} "What's The Matter With It!" {Pitch Creep} "Just a minute, I have to adjust these hearing aids." It is then that we realize that the customer cannot hear. We will never know what the true "Pitch Creep" expects to hear from their instrument! And, there are several variations on Pitch Creepism but, (Warning: bad pun coming) it is this kind of "Pitch Creep" that can be the deaf of us!

(By Terry Greene, RPT, Hampton Roads, VA Chapter)



Tune Up Your Skills In Orlando

Becoming a better tuner brings self-confidence, faster and better tunings, more enjoyment at your job, and ultimately more money. How can I become a better tuner, you ask? That's right. Attend this year's Convention and Institute in Orlando and take in the many classes geared to improving your skills.

There are classes for the beginner as well as the advanced, for those who want to improve technique and for those who want to become more knowledgeable in theory. There are classes for aural tuners as well as electronics tuners and classes on pitch raising as well as the physical attributes and limitations of the tuning lever. There are even tutoring sessions that will assist you with various individual problems or questions and you will have the opportunity to gain practical hands-on experience with a non-threatening qualified tutor.

There will be tuning classes that have proven to be interesting and informative and have been taught at past conventions. These include: "The

Digital-Aural Tuner" taught by Dean Reyburn, "Understanding the Use of Partial" by Fred Tremper, "Aural Tuning Techniques" by Virgil Smith, "Inharmonicity — Theory and Practice" by Dan Levitan, and "Let the Piano Tell You" by Jack Stebbins. If you have not taken in any of these classes I recommend you do. They are packed with valuable information that is presented by some of the most interesting and knowledgeable instructors PTG has to offer.

We have also added some interesting and refreshing new tuning classes which include: "Advanced Tuning - Aural & Visual" taught by Jim Coleman, Sr. This class will cover advanced stretch control, dealing with scaling problems and discussion of high level aural and visual techniques.

"Pitch Raising Without Pain and Suffering" by Isaac Sadigursky. In the field, most tunings require a pitch correction. Isaac will discuss raising pitch considering the plate, strings, bearing points, tools and pitch raising techniques.

"Tuning: Strictly for Beginners" by Jim Coleman Sr. This class is geared for those with little or no experience in tuning. The basics in theory and practice along with hearing and determining beat rates will be discussed.

"The Tuning Lever" by Keith Bowman. Keith has been studying tuning lever design and hand and lever compatibility for quite some time now. He custom makes levers to suit the individual and his experience and findings will be presented in this informative class. This class will show how tuning levers can minimize fatigue and maximize efficiency. This class will review the mechanics and geometry of tuning and will discuss ergonomics and posture, tool maintenance, modification, repair and replacement.

If this isn't enough, you may be interested in watching the two titans of the tuning profession square-off in a demonstration of their skills. Virgil Smith, an aural tuner and Jim Coleman, Sr., an electronic tuner, will match skills in the "Great Tune Off." Watch their techniques, learn from their demonstrations and judge for yourself who creates the best tuning.

This is only a small part of available classes. There are new classes and changes in class format that should make this convention refreshingly fun as well as educational. We encourage you to attend and take part in this great event.

— Paul Olsen, RPT
Assistant Director

Please Don't Send Your Chapter Newsletter to the Home Office

Chapter Services Committee members and the RVPs will be judging the newsletter contest this year, not the Home Office.

Thank you,
— Kim Fippin, RPT, Chapter Services Chair

Want Some Help Upgrading to RPT?

We've got it! At this summer's Institute in Orlando we'll be helping you to prepare for the technical exam with our Vertical and Grand Regulation hands-on courses. You'll be guided through the process in a step-by-step fashion. Get the feel of taking the test and at the same time learning a thorough procedure of action regulation. We'll supply the three-note action models and regulation tools (or bring your own tools). All

you need to provide is yourself and your thinking cap. The classes are available on

a first-come, first-serve basis to any PTG member with an interest in upgrading their regulation skills. These three-hour classes will be given once only, and because of the nature of the class, enrollment is limited to 24. Each class is offered at the low cost of \$35. Look for sign-up information on your pre-registration form.



Time is Now for Retirement Investing

Well it finally happened: in 1997, and future years, we will be able to invest \$2000 in spousal Individual Retirement

ECONOMIC AFFAIRS COMMITTEE

Account instead of the *wimpy* \$250 allowed for past years. I hope you are investing as much as possible each year because the retirement years come mighty fast and you need to be as prepared as possible.

Social Security payments that you will receive at retirement just *will not* be enough to support you as you are accustomed to.

Here is a little history on Social Security:

- 1935 — President Roosevelt signs the Social Security Act.
- 1937 — Payroll tax set at one cent on the dollar for a maximum annual deduction of \$30 each for employees and employers.
- 1940 — Ida May Fuller receives the first monthly benefit check for \$22.54.
- 1950 — The first tax increase; states get the option to cover state employees.
- 1956 — Disability insurance added for workers ages 50 - 64.
- 1960 — Disability at any age authorized.
- 1961 — Early retirement for all workers at 62 (with reduced benefits) approved.
- 1965 — Medicare established
- 1969 — Social Security included in the federal budget.
- 1975 — Beneficiaries given annual cost-of-living adjustments (COLAs) linked to the Consumer Price Index.
- 1977 — Benefit formula revised; taxes raised to avoid a shortfall.
- 1980 — Disability benefits cut.
- 1981 — President Reagan appoints a bipartisan commission to find a new financial fix.
- 1983 — Social Security moved off budget; COLAs delayed; payroll taxes for self-employed pushed up; retirement age to be raised; up to 50 percent of high-income recipients' benefits taxed.
- 1993 — Up to 85 percent of high-income recipients' benefits taxed with the additional revenue channeled to Medicare.
- 2012 — Payouts projected to exceed contributions; interest on trust fund tapped.
- 2019 — Payouts projected to exceed contributions and interest; trust fund tapped.

- 2029 — Trust fund depleted. Tax revenues pay only 77 percent of benefits.

If you are counting on that crutch to get you through your retirement days you will be badly let down. You need to be investing not only the \$4,000 that is now allowed for married people, but more each month. It will become easy if you start deducting that percentage (5 percent - 10 percent - 15 percent, or whatever your goal is) on a regular basis. Starting today can make a big difference. The earlier you start a plan, the greater your savings can grow through compounding. I know you have the house payment, car payment, utility payment, phone payment, grocery payment, and whatever else you are paying on, but if you begin a system of investing a percentage of your income each month, soon it becomes automatic and you will be surprised how the money will mount up over the years.

Stocks and bonds are having a *heyday* right now. The Dow is over 7,000 (at the time of this writing) and still climbing. Mutual Funds are at an all-time high in money invested. The above-60 age group

is the fastest growing population (just look at our own membership), and opportunities that we never dreamed about are available to us. It is an exciting time to be alive. Electronics are moving at such a fast pace that it is hard to keep up. Every time you buy a new computer it is almost obsolete before you get it home. The electronic keyboards are so advanced that they don't even resemble the models of six or seven years ago.

If we resist change we fall behind very rapidly because change is the only constant that we have. I hope that 1997 will be especially good to each of you. You will start, or add to, an investment plan. You will set some definite financial goals. You will work out a realistic budget. You will pay off some of those credit cards and work at getting debt free in 1997. You will be a happier person to be around, and by now you have made those reservations for Orlando to gain new knowledge this year. I have confidence in you.

— Gary A. Neie,

Chairman, Economic Affairs Committee

Hearing Tests & Health Classes

The Ears Have it in Orlando

I know what you're thinking—please, no stories about that famous mouse with the big ears. But permit me just one: Did you see the cartoon about the tourist who was wearing a newly-purchased set of ears? He says, "It may be my imagination, but I think I can hear better already."

Well, we can't promise you'll hear better after a trip to Orlando, but if you take advantage of what we've lined up for the Institute, you'll certainly know more about ears in general and yours in particular.

For starters, there will be hearing tests provided by an audiologist from the Central Florida Speech and Hearing Center. You can get so much for so little; only 5 - 10 minutes of your time and \$15 will give you an accurate picture of the status of your most important tool. And the results will be printed for you to take home. You can pre-register by calling Sandy at the Home Office or you can register on-site if space is available.

The health classes this year will highlight three very different and important aspects of piano technicians' health.

Continuing with the theme of ears, Robert Fifer, Ph.D., an audiologist from

the University of Miami, will be a featured guest instructor. His class, "You Should Hear What You're Missing," will explain the effects and prevention of hearing loss, and how the ear responds to loud noises. We'll learn how the ear changes as we age, and how these changes might affect our livelihood and quality of life.

Aging affects much more than our ears, of course, and piano technology can be rough on our bodies. John Foy will tell us all about "Avoiding Aches and Pains: A Healthy Approach to Piano Technology." There are ways to minimize the physical stresses of our work, and John will discuss specific strategies to keep us healthy and strong so we can continue to thrive in business.

And finally, along the lines of what-you-don't-know-*can*-hurt-you, Doug Wood will guide us through the hazards and benefits of various chemicals we encounter in our work. "Chemistry for Piano Technicians" will cover safety issues as well as the efficacy of often-used chemicals. This class can shorten your learning curve—and chemicals are one area where we *don't* want to learn from our mistakes!

— Evelyn Smith, RPT
Assistant Director

Welcome Our New RPTs

REGION 4

493 Western Michigan

Jeff D. Hall
3608 100th S.W.
Byron Center, MI 49315

REGION 5

631 St. Louis, MO

Kenneth M. Gerler
12425 Parkwood Lane
Black Jack, MO 63033

REGION 1

041 Maine

James W. Sexton
105 Main Street
Orono, ME 04473

151 Pittsburgh, PA

Kenneth A. Hand
8179 Ohio River Blvd., #22A
Pittsburgh, PA 15202

191 Philadelphia, PA

Stuart A. Wells
216 County Claire Lane
Aston, PA 19014

191 Philadelphia, PA

Mimi Robinson
514 Addison Court
Philadelphia, PA 19147

REGION 2

212 Baltimore, MD

Ellen N. Martin
2971 Park Avenue
Manchester, MD 21102

335 Sarasota-Ft. Myers, FL

Catherine N. Allen
31 Michiana Drive
Terra Ceia Island, FL 34250

Phil A. Bondi
2323 Dez Prado Blvd., #13
Cape Coraz, FL 33990

381 Memphis, TN

Danny L. Tassin
P. O. Box 168
Milan, TN 38358

Kenneth B. Licht
3270 Shohorn Drive
Lakeland, TN 38002

REGION 3

771 Houston, TX

Robert R. Mendenhall
9075 Gaylord, #65
Houston, TX 77024

John D. Slavick
743 Oxford
Houston, TX 77007

New Members in March

Paul L. Choate
5737 Avenue R.
Galveston, TX 77551

REGION 4

452 Cincinnati, OH

Jonathan J. Ralinovsky
172 E. Herman Street
Yellow Springs, OH 45387

462 Indianapolis, IN

Scott Smith
2030 Raible Avenue
Anderson, IN 46011

489 Lansing, MI

Paul D. Minert
316 Windy Bluff
Flushing, MI 48433

REGION 5

553 Twin Cities, MN
Edith A. Lampman
807 Oak Street
Hudson, WI 54016

581 Minn-Kota, ND

Jon S. Gaugert
754 W. Lake Cowdry Rd, NW
Alexandria, MN 56308

641 Kansas City, MO

Roger A. Riffie
1413 SW Third Street, Apt. C3
Lee's Summit, MO 64081

REGION 6

851 Phoenix, AZ

Judy A. Ethington
11148 E. Villa Park St.
Chandler, AZ 85248

Wendell R. Smock
1708 W. Charleston Ave.
Phoenix, AZ 85023

950 Monterey Bay, CA

Tracy D. Tucker
316-26th Avenue
Santa Cruz, CA 95062

—Passages—

In Memory

*Camille O. Morin
Edmonton, AB*

All seminars, conferences, conventions and events listed here are approved PTG activities.

Chapters and regions wishing to have their function listed must complete a seminar request form. To obtain one of these forms, contact the PTG Home Office or your Regional Vice President.

Once approval is given and your request form reaches Home Office, your event will be listed through the month in which it is to take place.

Deadline to be included in the Events Calendar is at least 45 days before the publication date; however, once the request is approved, it will automatically be included in the next available issue.

CALENDAR OF EVENTS

May 1-4, 1997 **NEW ENGLAND / EASTERN CANADA
REGIONAL**

Ramada Inn, Portland, ME
Contact: Joseph Bacica (207)846-0966
P.O. Box 1575, Portland, ME 04104

May 3, 1997 **NEW MEXICO ONE DAY SEMINAR**
Univ. of NM, Albuquerque, NM
Contact: Les Conover (505)255-0658
4805 Central, NC, Albuquerque, NM 87108

May 9-10, 1997 **UTAH INTERMOUNTAIN SEMINAR**
Snowbird Resort, Salt Lake City, UT
Contact: Judy Rapp, (801)298-7875
1151 West 400 North, W. Bountiful, UT 84087

July 23-27, 1997 **PTG ANNUAL CONVENTION
& TECHNICAL INSTITUTE**
Radisson Twin Towers, Orlando, FL
Contact: PTG Home Office, (816)753-7747
3930 Washington, Kansas City, MO 64111

October 11-12, 1997 **TEXAS STATE**
Ramada Hotel Downtown, Ft. Worth, TX
Contact: David Reed (817)735-4420
4004 Lovell, Ft. Worth, TX 76107

October 18-19, 1997 **NYSCON — Ontario Province**
Radisson Hotel, Corning, NY
Contact: Donald McKenchie (607)277-7112
1660 Slaterville Rd, Ithaca, NY 14850

October 23-26, 1997 **NORTH CAROLINA REGIONAL**
Embassy Suites Conv. Center, Greenville, SC
Contact: Don Valley (864)574-6165 or (864)574-1201
P.O. Box 844, Fairforest, SC 29336

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Louisville, Ohio

AUXILIARY

E X C H A N G E

Dedicated To Auxiliary News and Interests

Donations Aid Auxiliary Agenda

Look how far we've come in 100 years. Here's a quote from my 1997 calendar for May:

"It's had a lot of ups and downs since the Dow Jones Industrial Stock Average first appeared in the Wall Street Journal. Composed of a group of "representative" stocks, it was designed to reflect the trend of the vast majority of stocks. — May 26, 1896."

And we hit the 7,000-mark just a month ago! I wonder what the founders of the stock market would think of that organization today if they were here. I also wonder what the founders of the PTGA Auxiliary would think if they were with us today. Where are we going and what is our agenda? What will we be like in 60 years when we are one-hundred years old?

As I started to write this article on March 6, 1997, I was stopped by a telephone call. It was Kathleen Booth from Canada no less. I was so happy to hear from her as they have not been able to attend convention for several years now. She was concerned about our welfare and if we were affected by the flood of this last weekend. I assured her that we were further away from the mighty Ohio River and up in the mountains, but that the ground around us was certainly filled with enough water to last several months. We had a little rain damage after high winds blew off several shingles from the roof, but it was certainly nothing like those unfortunate people are having in Falmouth, Ky., and up around Northern Kentucky.



Phyllis Tremper
PTGA President

I've had a basement flood twice with three feet of water while in the Chicago area and thought that was bad, but to have your whole house inundated with water and mud must be just awful. To lose all of your children's pictures and your precious belongings to water damage is just unbelievable. If any of you have a mind to help, I'm sure the American Red Cross and those other agencies that help disaster victims would appreciate your donations.

Speaking of donations, I would like to thank all of those who have given to our own Auxiliary Scholarship Fund this year and years past. Some of you who don't have a chance to attend conventions will never see or hear where your money is going, but rest assured it is being spent wisely. As you know, we use the state teacher's agency of the state where convention is being held that year, to name our winners. They select the top college and high school pi-

ano winner and we honor those two every year with a \$600 and \$400 scholarship, respectively. Our own Helen Pearson has volunteered to attend the competition on June 14, 1997 in Lakeland, Fla., to give the awards to the winners.

Now there is one problem. May I ask your help—all of you. Paul Cook was going to have the scholarship store at the California State Seminar in February last, but the woman who sells the items could not come as her mother was very sick and she had to attend to her. I had asked Paul to bring a few things to the Orlando convention but he is still not sure, at this writing anyway, if he and Claudia will be able to attend the Orlando convention. So, please, I ask you, if you can at all help us with your donations to the scholarship fund, send your check to the Kansas City office in care of Catherine Wilane and mark it for the Auxiliary Scholarship Fund. Catherine will see that the money gets placed in the proper account. You can make it in honor of a friend or relative or pet, living or deceased. Anything over \$10 will be printed in the *Journal* as a thank you. If you wish your donation to be anonymous, tell Catherine in your letter. Please give what you can afford—but give. I thank you.

This donation will certainly *Put a Little Music In Your Life*. Our life would be very dull without the arts—but they need your support. Ask your friends to help out, too. They will know it's for a very good cause. Thank you.

FOR SALE



SANDERSON ACCU-TUNERS from Authorized distributor. Consignment sale of used Accu-Tuners and Sight-O-Tuners or new Accu-Tuner customers. Call for details. Rick Baldassin, 801-292-4441.

ACTION PARTS AND HAMMERS for the rebuilder. Highest quality Encore, (by Abel) and Nu-Tone (Knight) piano hammers. Try the new refined Tokiwa Action Parts (now some of the finest action parts made today). For the classic American piano sound, we recommend Encore hammers on walnut moldings. Encore hammers are made to the strictest specifications of Wally Brooks by the Abel Piano Hammer Company of Germany. Quality boring and shaping. We also specialize in pre-hanging grand hammers on new shanks for a \$109.00 pre-hanging fee. Write or call: Brooks, Ltd., 376 Shore Road, Old Lyme, CT 06371, Phone: 800-326-2440, FAX 860-434-8089.

ENJOY over 150 stories in "TOONER TALES-Funny And Amazing Stories From Piano Technicians." Send \$11.95 plus \$3.50 shipping to: Ken Burton, 3715 7 Ave. NW, Calgary, AB, T2N 4J1

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GRAND PIANO STRING covers. Are you ready for an item that can keep the piano clean, prevent corrosion, improve tuning stability, make your clients happy and make you money besides? Custom made, it rests above the strings, covering soundboard, tuning pins and plate for complete protection inside the piano. Made from finest quality woven wool, available in black, light brown, brown, burgundy, and white. Personalized name applique also available. No inventory or investment required. For free brochure and samples call: Edwards String Covers, 240 Old River Lane, Box 646, Brookdale, CA 95007. Phone (or fax) 408-338-4580.

CLASSIFIEDS

Classified Advertising rates are 35 cents per word with a \$7.50 minimum. Full payment must accompany each insertion request.

Closing date for placing ads is six weeks prior to the month of publication.

Ads appearing in this publication are not necessarily an endorsement of the services or products listed.

Send check or money order (U.S. funds, please) made payable to Piano Technicians Journal, 3930 Washington, Kansas City, MO 64111-2963.

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PianoDB & PianoDB 95 - DATABASE FOR WINDOWS. MS Access 2.0 & 7.0. Easy to use graphical interface-Manage Clients, Pianos, Service Notes, Suppliers, Supplies-More. See it on the Internet: <http://www.dcalcada.com/> \$250 ken hale@dcalcada.com D C A L C O D A (916) 272-8133, Send for Infopacket, 126 Doris Dr., Grass Valley, CA 95945 (Ken Hale, RPT).

"SALE OF PIANOS" — All models and styles. Specializing in players, art case and conventional pianos. Floor ready and as is pianos available. We also specialize in one of a kind and hard to locate pianos. Call collect Irv Jacoby 1-800-411-2363, 216-382-7600/FAX 216-382-3249. Jay-Mart Wholesalers — Pianos since 1913.

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<http://ourworld.compuserve.com/homepages/ptools>. Tremaine Parsons, RPT; 916-333-9299.

DOING YOUR OWN KEYTOPS? For resurfacing your keys, the newly re-designed PETERSON Router Guide is now the finest, fastest and most accurate system going. Also, removes fronts slick as a whistle. \$125 plus \$7.50 S&H. Peterson Piano Service, 11530 North 6000 West, Highland, UT 84003. (801)756-9786.

PIANO COVER CUSTOMMADE to your specifications. Rehearsal covers now available. Specializing in custom colors and fabrics. Call or write for brochure. JM FABRICations; 10516 Ohop Valley Extension Road, Eatonville, WA 98328, 360-832-6009.

New from PROTEK: *ProLube* Spray Lubricant. Protek *ProLube* is an advanced state polymer lubricant. Designed around the successful CLP formula, *ProLube* is for higher friction areas like the keyed and frame, shift and sostenuto mechanisms. Great for front and balance rail keypins and anywhere you would use a spray lubricant. Provides long lasting durable lubrication with virtually NO ODOR! With the addition of *ProLube* along with CLP and MPL-1, Protek offers safe, high tech task specific tools for every lubricating need. Ask for *ProLube* at the supply house you do business with.

WONDERWAND: Try the Tuning Lever you read and hear about. Enjoy Less Stress; Better and Faster Tunings: \$65.00 p.p. Wayne Saucier, RPT, 26 New York Ave., Wayne, NJ 07470.

PIANOS - Yamaha and Kawai grands \$1850 and up. 23 Steinway grands and verticals. Large quantity of used American grands from \$700 up. We buy pianos. Ed's 504-542-7090.

*Bluthner 6'2" 1962 Ebony Satin, \$18,000;
*Knabe 6'4" 1925, High Polished Ebony;
*Schimmel, 6'9" 1976, Ebony Satin, \$14,900;
*Yamaha C-7, High Polished Ebony, \$16,000;
*Steinway A, 6' 1-1/2";
*Steinway 5'10" O, 1920, Light Mahogany, \$14,900;
*Steinway 5'7" M, 1926, Ebony Satin, \$11,995;
*Steinway 5'7" M, 1929, Ebony Satin, \$12,995;
*Steinway M, 1917, Mahogany, \$16,500;
*Steinway 7' B, 1900 Artcase, \$25,000;
*Baldwin 7', Ebony gloss w/Pianocorder, \$14,000;
*Fisher Bby Grand, 5'4" 1915 Circasian Walnut, \$4,895;
*Kawai Walnut 5', 1972 \$6,800.
Call SCHROEDER'S PIANOS for a complete list of used pianos, 800-923-2311.

FOR SALE—Replacement Reeds wanted for use in Parlor Reed Organs. Direct inquiries to: Paul Toelken-supplier, PO Box 25017, Prescott Valley, AZ 86312, (520)772-8914

REPAIR CHIPPED IVORY IN 20 MINUTES. "AcryliKey" ivory restoration system produces a strong, color-matched, nearly invisible repair. Kit contains material enough for 50+ repairs plus pigments, mixing utensils, sanding pads, and complete instructions. \$39.95 ppd. Richard Wagner, RPT; P.O. Box 1952 Lake Oswego, OR 97035 (503) 697-9254.

Members of the Piano Technicians Guild can have the opportunity to purchase direct Bosendorfer concert service pianos in select markets. These pianos are 3 to 5 years old in very good technical condition. The finish condition will vary from piano to piano and is sold as is. For more information call: Roger H. Weisensteiner at 800-422-1611.

FOR SALE — Piano Tuning and Repair Business. Northeast N.J. (Bergen County) Repeat business, most booked 6 months in advance. Mostly good quality grands. Full set PTG Journals, parts, tools and business phone number. Centered 10 minutes from G.W. Bridge and 25 minutes from Lincoln Center. Call Bud Willis 201-262-1369.

CALL VICTOR'S for largest selection of Fine Grands in USA. Over 400, all makes. Need Technician, 300 NW 54 St, Miami, FLA 33127, 305-751-7502.

ONE-HUNDRED YEAR OLD MASON-HAMLIN Stringer Concert Grand piano for sale. Excellent condition. Asking \$15,000.00. Call James or Annette Johnson in Boonville, Missouri at 816-882-8436. Will consider some trading for a keyboard.

SOUNDBOARDS, PINBLOCK MATERIALS AND TUNING PIN DRILL BITS NOW AVAILABLE FROM GENEVA INTERNATIONAL! Geneva International Corporation, exclusive U.S. distributors of Petrof and Weinbach pianos, is pleased to announce the availability of European spruce soundboard blanks, 7-ply quarter-sawn beech pinblock material, select hard maple Marion plywood pinblocks and 6 1/4" fast spiral helix drill bits. Get the best material at the best price! Call Alan Vincent at 1-800-533-2388 for pricing and more information.

SERVICES



STRAIGHT SIDES, SQUARE FRONTS and crisp notches are the benchmarks of our quality key recovering. Tops with fronts \$135 plus return shipping and insurance. Call or write for price list of our key restoration services. Yvonne Ashmore, RPT and Associates, 12700 La Barr Meadows Road, Grass Valley, CA 95949, 916-273-8800. M/C & Visa accepted.

PIANO PLATE REPAIR—The alternative to total loss or costly rebelling!! Welding of cracked or broken plates a specialty. Complete repair service offered. Call Bob Beck (RPT-New Jersey Chapter) (201)884-0404.

STEINWAY Action Frame Rails Resoldered, Replaced, and/or Repositioned. For price list write or call John Dewey Enterprises, Inc; 861 E. 2900 North Road, Penfield, IL 61862-9603, phone (217)595-5535.

SOUNDBOARDS INSTALLED, topsides rebuilt. Bridge-conformed, scale-diaphragmized boards with truly quartersawn ribs (sitka, eastern, or sugar pine). You send us the case, we'll return you a piano. Quality's the bottom line. David G. Hughes, RPT. 410-429-5060. Baltimore.

SENECA PIANO KEY. Quality key services at competitive prices. Sharps replaced, key bushing and the finest key recovering at any price. Write or call for price list and information on quick return of your key work. Seneca Piano Key, Ted Oberhaus, 4977 Frontenac Road, Trumansburg, NY 14886; 607-387-3095

REPLACEMENT SOUNDBOARD PANELS — North Hudson Woodcraft has been producing **QUALITY** soundboard blanks for over 100 years. We will custom build a spruce soundboard to your specs. Rib stock, shim stock, and quartersawn Hard Maple also available. For information and prices call: **NORTH HUDSON WOODCRAFT CORP.** (315)429-3105 - FAX (315)429-3479.

CALIFORNIA SOUNDBOARDS BY DALE ERWIN, RPT. Too many cracks? Flat Board? Lifeless tone? Stop! Let our complete restoration facility perform a soundboard transplant and breath new life into your Steinways, Mason Hamlins, etc. All boards are Bolduc panels and hand selected rib stock. 50-60-70 ft. curves? Custom press allows for variable curvatures. All board thickness and rib dimensions reproduced. Quality control assures a superior tonal outcome. For prices on complete bellywork or restoration, call (209)577-8397. Rebuilt Steinways also available. 4721 Parker Rd., Modesto, CA 95357.

KEYBUSHING: We use over 20 different sizes of Spurlock Precision Cauls. Send the micrometer measurement of the key pins and we will give you a perfect fit. Both rails high quality felt \$85.00 or leather \$95.00 plus return shipping and insurance. Write or call for price list of our key restoration services. Yvonne Ashmore, RPT and Associates, 12700 La Barr Meadows Road, Grass Valley, CA 95949, 916-273-8800. M/C & Visa accepted.

REFINISH PIANO HARDWARE in nickel, brass, or chrome. Metal finishing specialists for over thirty years. Parts shipped back to you in 2-3 weeks. Rush jobs can be accommodated. Whitman Company, Inc. 356 South Ave., Whitman, MA 02382. Ph. 1-800-783-2433.

www.Heartlandpiano.com. We're on the NET. it's plain to see/there's lots to find. and always free//look us up.to see what's new@HPR// we're there for you!Heartland Piano Restorations.

RESTORATION OF CARVED WORK, turnings, inlays, and marquetry, including repair of existing work and reproduction of missing pieces. Edwin Teale; 18920 Bridgeport Road; Dallas, OR 97338; 503-787-1004.

SIGHT-O-TUNER SERVICE: Repairs, calibration & modifications. Fast, reliable service. Richard J. Weinberger; 18818 Grandview Drive; Sun City West, AZ 85375. PH. 602-584-4116.

PIANO KEY SERVICE—

.075 Tops with fronts - \$105.00
.095 Premium Tops with Fronts - \$125.00
High Gloss Sharps (3 1/2") - \$50.00
Keys Rebrushed: Premium Cloth - \$85.00
Custom Keys Made - Call for Price
Many other services available. Call or write for price list. **FREE** return freight on pre-paid orders of \$75.00.

WALKER PIANO SERVICE,
554 State Route 1907, Fulton, KY 42041,
1-800-745-6819.

"We buy & rebuild Oslund Key machines. Missing parts replaced. New blades for sale. Charles A. Wilson, 1841 Kit Carson, Dyersburg, Tennessee 38024. Day 901-285-4046, Night 901-285-2516. E-mail: twilson@eccis.net"

TRAINING



NILES BRYANT OFFERS TWO HOME STUDY COURSES: Electronic Organ Servicing: Newly revised. Covers all makes and models — digital, analogue, LCT's, synthesizers, etc. Piano Technology: Tuning, regulating, repairing. Our 87th year! Free booklet; Write or call **NILES BRYANT SCHOOL**, Dept. G, Box 19700; Sacramento, CA 95819 — (916) 454-4748 (24 hrs.)

BILL GARLICK SEMINARS—Upgrade your skills at intensive six day resident seminars at Bill's home. Applications are invited for upcoming seminars in tuning, grand action regulation, historic tunings, harpsichord maintenance. Tuition includes instruction and use of facilities, private bedroom (share baths), breakfast and lunch. Write or call for information. Bill Garlick, RPT, 53 Weeks St., Blue Point, NY 11715; 516-363-7364.

PIANO TUNING COURSE -

7/7-25/97 Three-week hands-on instruction in Tuning, Regulating and Repairing Vertical and Grand Pianos. Instructor - RPT Arthur R. Briggs, (716)665-5699 and/or contact: Continuing Education, Edinboro University of Pennsylvania, Edinboro, PA 16444. Phone: (814)732-2671 or 1-800-526-0121.

THE RANDY POTTER SCHOOL OF PIANO TECHNOLOGY—Home Study programs for beginning students, associate members studying to upgrade to Registered Piano Technician, and RPT's wanting to continue their education. Tuning, repairing, regulating, voicing, apprentice training, business practices. Top instructors and materials. Call or write for information: RANDY POTTER, RPT; 61592 ORION DRIVE; BEND, OR 97702; 541-382-5411. See our ad on page 3.

NORTH CAROLINA REGIONAL CONFERENCE—October 23-26, 1997 Embassy Suites Resort Hotel Golf and Conference Center • Greenville, South Carolina. National and Regional Instructors along with Major Piano Manufacturers and Preferred Suppliers will be on hand for 2-1/2 days of comprehensive classes offering a full-range of piano service topics. In a supplemental all-day class Thursday, October 23, learn to design and build your own pneumatic soundboard and bridge presses. Bring your spouse and enjoy a get-a-way in the spacious surroundings of a luxury resort hotel. For more information contact Don Valley, RPT (864)574-6165.

VIDEOS



INSTRUCTIONAL VIDEO TAPES.

Victor A. Benvenuto. Piano tuning, \$50.00*; Grand Regulating, \$50.00*; Grand Rebuilding, \$100.00 (2)*; Key Making, \$50.00*; Soundboard Replacement, \$29.95*. (*Plus S/H). The Piano Shoppe, Inc., 6825 Germantown Avenue, Philadelphia, PA 19119-2113; Ph. 215-438-7038, Fax, 215-848-7426

SUPERIOR INSTRUCTIONAL TAPES

** All videos at one price, \$50 @ ** Beginning Tuning, Upright Regulation, Aural and Visual Tuning, Grand Action Rebuilding, Exploring the Accu-Tuner, Grand Action Regulation, Voicing, Pinblock Installation, A to A Temperament, Baldassin-Sanderson Temperament, Bass Tuning - 3-Ways. Superior Instructional Tapes; 4 W. Del Rio Drive; Tempe, AZ 85282; Ph. 602-966-9159.

PIANO TECHNOLOGY EDUCATIONAL MATERIALS. \$49.95 each reel—Vertical Piano Regulation, presented by Doug Neal. Presented by Cliff Geers: Plate & Pinblock Installation Part I, Plate & Pinblock Installation Part II, Wood Repairs, Soundboard Repair, and Grand Hammer Replacement. Add \$5 per order for shipping and handling. Questions? Call 712-277-2187. Mail orders to PTEM, 3133 Summit, Sioux City, IA 51104.

WANTED



WANTED!! DEAD OR ALIVE: "Steinway uprights and grands." Call collect, Ben Knauer, 818-343-7744.

WANTED - Yamaha PT2, 3, 4, or 100 electronic tuner. Gary 415-621-3904.

WANTED—Old ivories, complete sets or individual pieces. Especially "very old" fine grade, good to excellent condition pieces. I will pay a VERY good price! Michael W. Hart, P.O. Box 268, Corbin, KY 40702 (606)528-8760 or FAX (606)523-4361.

LOOKING FOR KEYFRAME with keyboard or if necessary, the whole action for an 88 key 6'1" Steinway A #121116. Call Leopold at N.Y. Piano Center at 1-800-642-5648.

WANTED: TINY PIANOS such as the Wurlitzer Student Butterfly or other small types. Call collect: Doug Taylor, 607-895-6278. I'll pay shipping!

PIANOS! PIANOS! PIANOS! !!!Free phone appraisal!!! Buying all types of usable pianos. Cash or bank check on pick up. Won't hesitate on price. Call us first for fast professional service. "Steinway, Mason-Hamlin command specialty prices." Jay-Mart Wholesale, P.O. Box 21148, Cleveland, OH 44121. Call Irv Jacoby 1-800-411-2363, or collect 216-382-7600/FAX 216-382-3249.

WANTED by PTG member/technician. A copy of the book "Historical Pianos." Please call 606-528-8760.

HELP WANTED



TUNER/TECHNICIAN WANTED.

Milwaukee area. Excellent opportunity for full-time employment with growing piano dealership/RPT. Work will include tuning, repairs & rebuilding. RPT or equivalent preferred, but will consider all applications. Very competitive pay plus benefits. Please send resume to: Carlson Pianos, 3701 Durand Ave., Racine, WI 53405.

TOOLS OF THE MASTER

*An opportunity to own tools used by
FRED DRASCHE in his 70-plus
years as a Steinway technician.*

Fred Drasche has donated his personal tools to the PTG foundation, and they will be available by silent auction and sale in the foundation booth in the PTG exhibit hall at the July 1997 PTG Convention in Orlando. All of the proceeds of the sale of Fred's tools will go to the PTG Foundation which sponsors scholarships and preservation of piano related materials.

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PianoDiscTM

May 1997

News From The World of MSR/PianoDisc, Knabe, Mason & Hamlin

PianoDisc

Free tech classes are money in the bank!

How would you like to make an investment that is virtually **risk free**? One that practically **guarantees you profit** for years to come? And what if all it would cost is your **time**? Would you be interested?

For one week every month, PianoDisc makes that kind of investment available to piano technicians, with its **Installation Training Classes**. Tuition is **free** and technicians from all over the world have discovered that giving one week to this hands-on, intensive training is probably the best investment they've ever made.

To attend, you must have a minimum of two years experience as a piano technician. Classes, usually kept to a maximum of 10 participants, are held at the MSR/PianoDisc factory in Sacramento, CA. One of Sacramento's fine hotels gives trainees an attractive group rate and offers shuttle service from the airport to the hotel, as well as to and from the factory each day. Continental breakfast is available at the factory and lunch is provided by PianoDisc each day as well.

Students are given hands-on training in all phases of installation: from cutting the slot in the keybed to troubleshooting systems in the field. Each receives installation guides, a history of all of our software and components, and information on all models of PianoDisc. They're also given a lengthy factory tour covering everything we do from engineering to editing our disks.

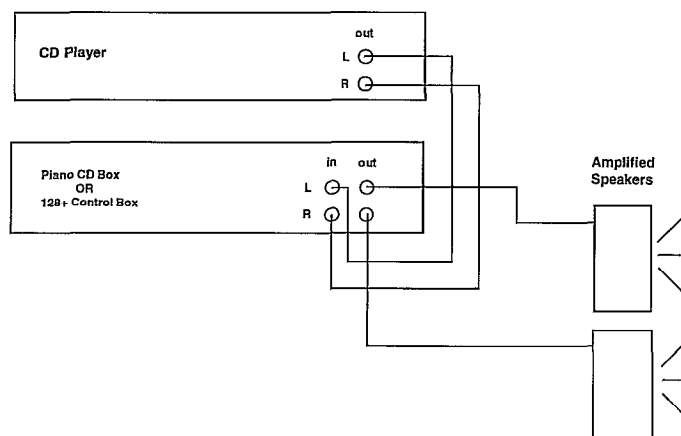
Once they've successfully completed the class, participants receive certificates which acknowledge them as Certified PianoDisc Technicians. They are encouraged to return for **Continuing Education Classes** each year thereafter, to fine-tune their skills, learn about any new products and upgrades, and further advance their knowledge of the system.

For more information about what may literally be **"The Investment of a Lifetime,"** call PianoDisc at (916) 567-9999.

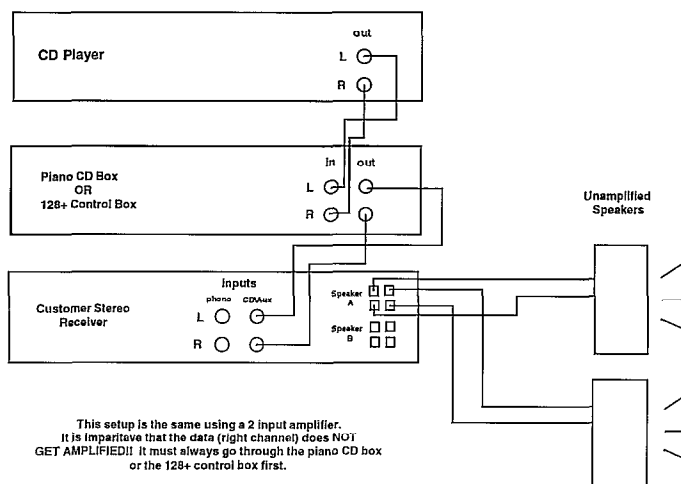
Set-ups for CD players at a glance

The following diagrams show the proper set-up for CD players with a PianoCD box, or a PDS-128 Plus control box, with amplified speakers or a home stereo receiver and unamplified speakers. If additional information is needed, Call PianoDisc Technical Support at (619) 258-1460 or (916) 567-9999.

Setup for CD player with a piano CD Box or a 128+ Control Box with amplified speakers



Setup for CD player with a piano CD box or 128+ control box, a home stereo receiver and unamplified speakers



INSTALLATION CLASS

MAY 19-24
AUG. 11-16

JUNE 23-28
SEPT. 15-20

MUSIC SYSTEMS RESEARCH

4111 N. Freeway Blvd. Sacramento, CA 95834
Tel: (916) 567-9999 • Fax: (916) 567-1941
www.pianodisc.com / e-mail: @pianodisc.com

CONTINUING EDUCATION

AUG. 18-20 SEPT. 22-24
OCTOBER 20-22

Tuition for the Installation and Continuing Education seminars is free, but a \$50 refundable deposit is required for confirmation. The PianoDisc Continuing Education seminars are restricted to PianoDisc certified technicians in good standing. For more information, call PianoDisc at (916) 567-9999.

Tech Gazette

Yamaha Service

May 1997

Last month, we discussed the finishing department and the air exchange system which is utilized at Yamaha Music Manufacturing.

In this issue, we will discuss another area of the woodworking department and also the "in-house" maintenance that YMM utilizes to support precision in all cutting tools.

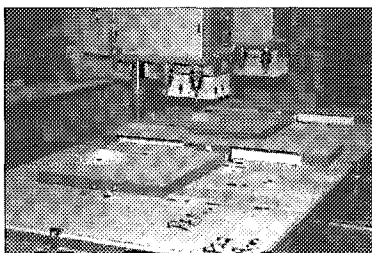
Numerically Controlled Routers (NCR) And Maintenance



Once the case parts for a piano are cut to their proper size by the double end tenor, other operations can be completed on the NCR machines.

Each individual NCR machine utilized at YMM is computer controlled. Each movement or operation that the router achieves is driven by a software program written at the factory for each individual operation.

The NCR machines cut out the unique shapes for music racks, cut vein lines in a shelf back rail or bore the holes in the case parts for later case assembly. Unique to the NCR machines is that all case parts are held in place by vacuum, and not clamps, which might mar the beautiful veneers.



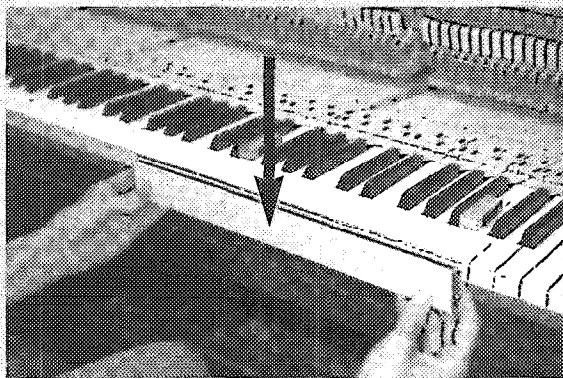
As sophisticated as the NCR machines are and as precise as they cut, maintenance of the cutting tools is just as important. As mentioned, Yamaha writes all of the software programs for the NCR machines and they also design and build all of the various cutting devices.

Instead of purchasing cutters from a vendor "off the shelf," then having to send the cutters back to the vendor for sharpening, Yamaha made a sizable investment and does all of this design and maintenance "in-house." A staff of four people daily maintain all blades, profile cutters and drill bits which are utilized in the plant.

The operations completed on the NCR machines and the maintenance provided for the cutting tools ensures the construction of perfect and consistent case parts that will fit correctly when the piano is finally assembled.

The YMM "Tip of the Month"

Using A Short Straight Edge. One of the rules of making fine pianos is to work efficiently. At YMM this translates to working with great accuracy. The use of a short straight edge offers several advantages. It is light and easily used. It can be utilized as a tool to straighten the leaning of the balance rail pins to make the surface of the key level and it can be "dropped" on the keyboard to find keys that are too tall. An added benefit for the piano technician is that it can be carried in a tool kit!



Stay tuned for next month's information from Yamaha Music Manufacturing.