PIANO TECHNICIANS
Journal
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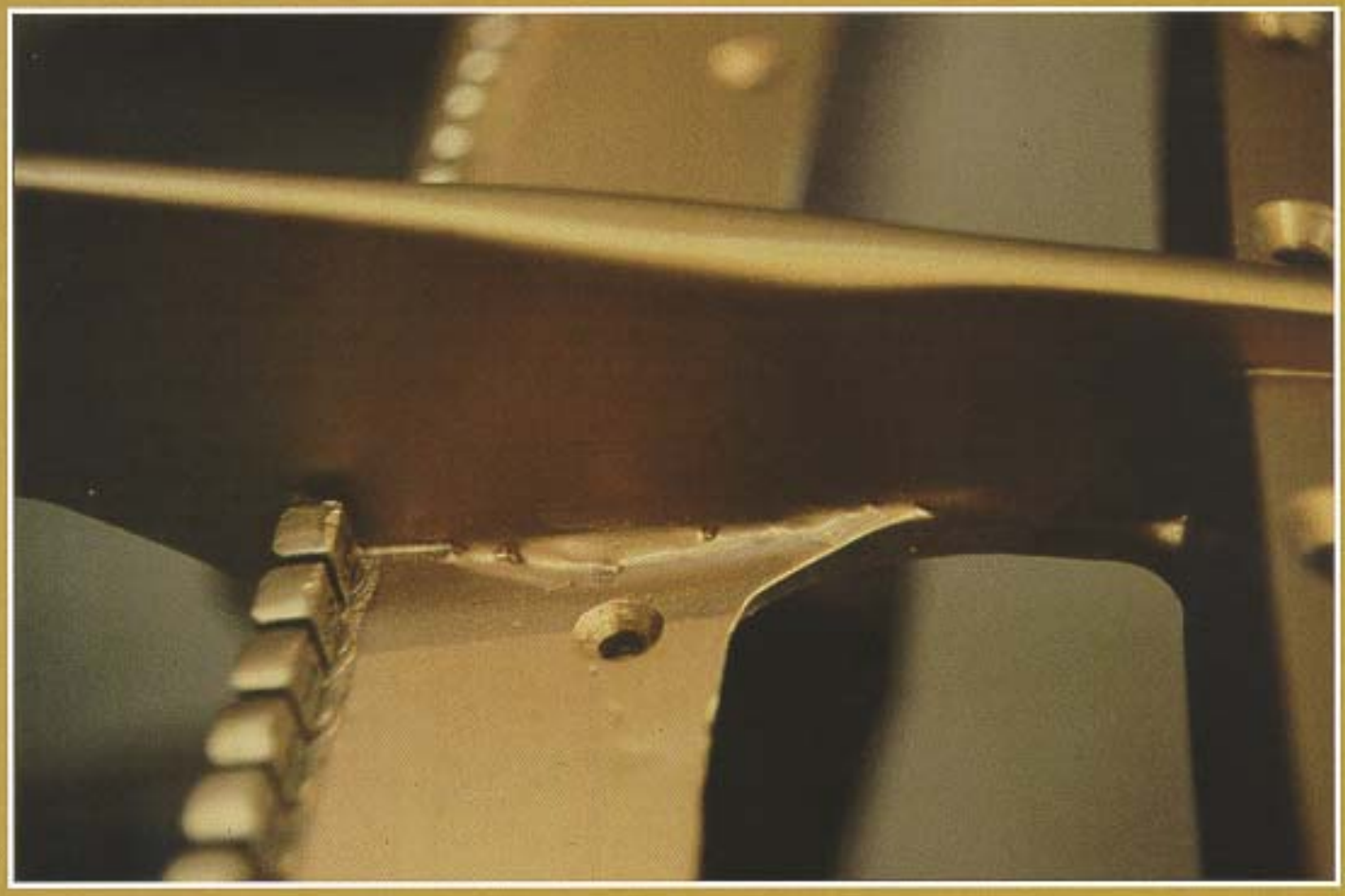

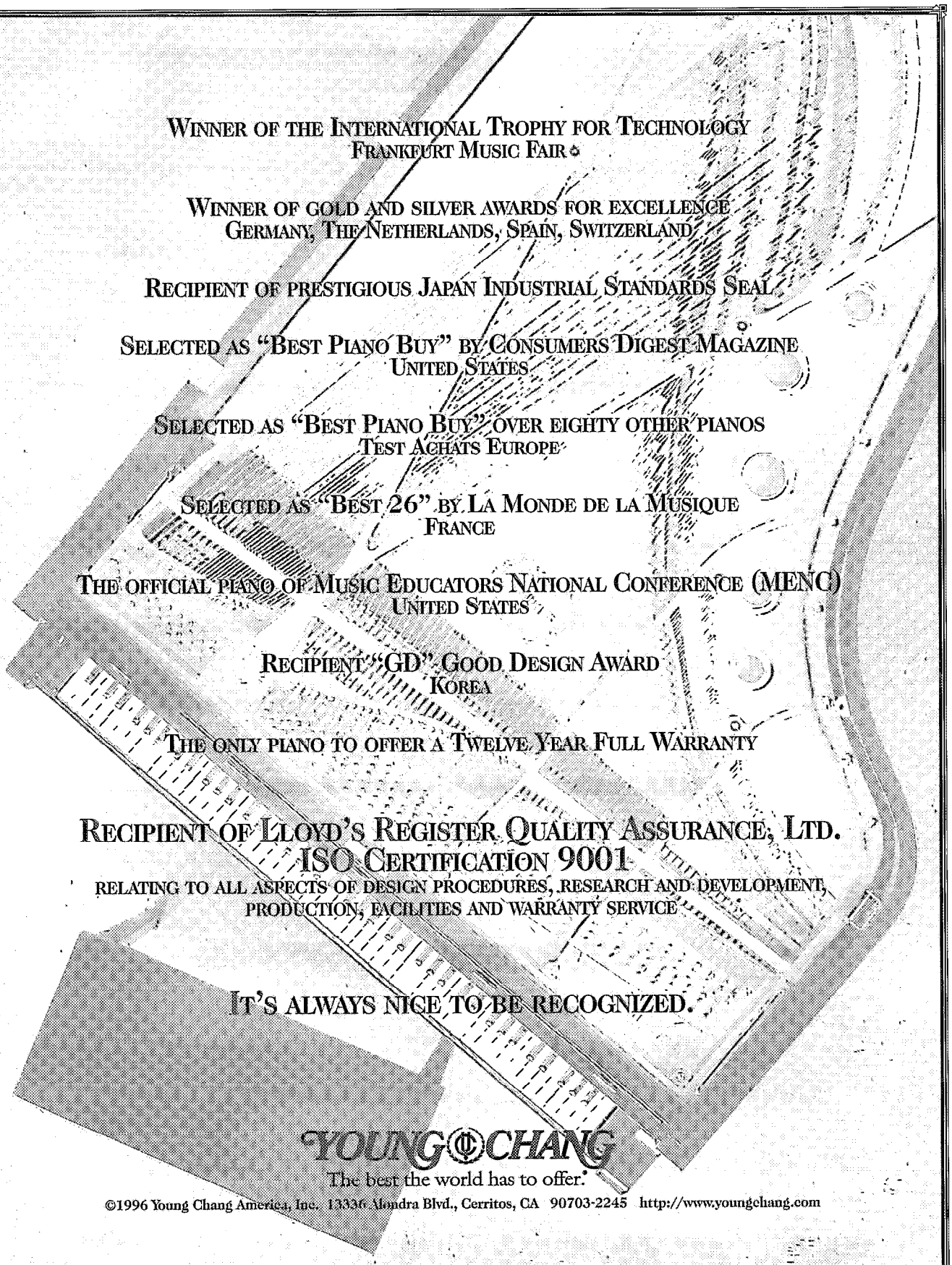

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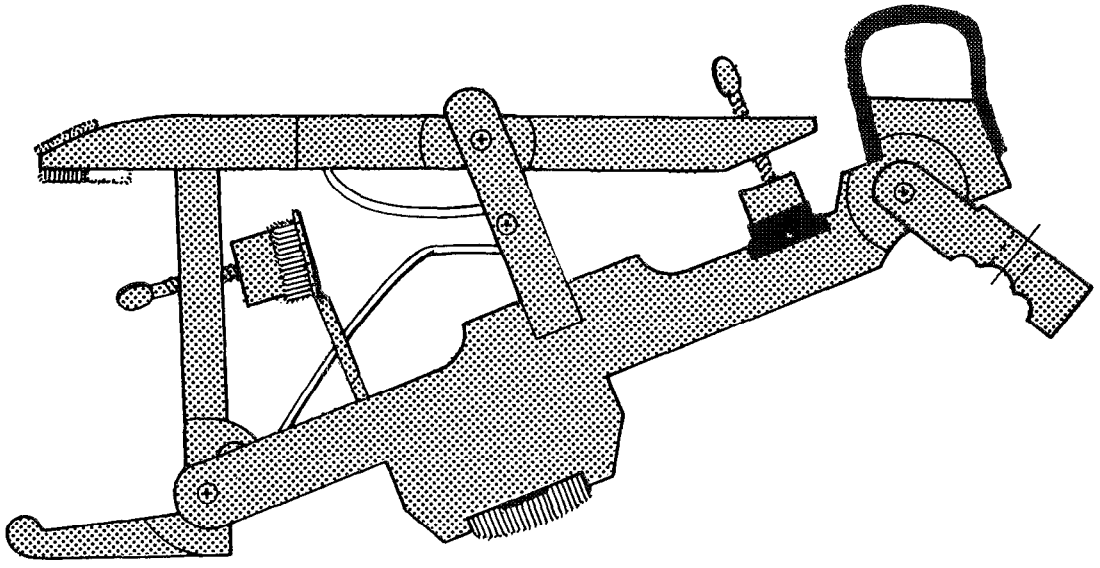

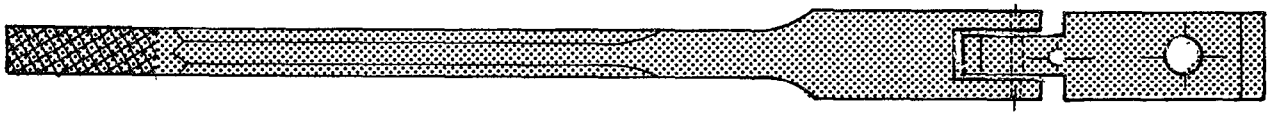

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PIANO TECHNICIANS
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Larry Goldsmith
Publisher/Executive Director

Steve Brady, RPT
Editor

Del Fandrich, RPT
Newton Hunt, RPT
Chris Trivelas, RPT
Contributing Editors

Joe Zeman
Director of Communications

Sandy Essary
Director of Member Services

Jerri Dowdy
Assistant to the Executive Director

Catherine Wilane
Director of Finance

Midge Sheldon
Advertising

Home Office
Phone: 816-753-7747
FAX: 816-531-0070

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Editorial Perspective

Roll Over, Cristofori

Steve Brady, RPT
***Journal* Editor**

The past two or three years have produced a spate of new books which should interest piano technicians. I plan to review several of these in this column over the next few months. One of the most important (especially to those who deal with historical pianos) is *The Early Pianoforte*, by Stewart Pollens. Associate Conservator of musical instruments at the Metropolitan Museum of Art in New York City, Pollens is perhaps best known for his study of the 1720 Cristofori piano housed at that institution, in the *Journal of the American Musical Instrument Society* in 1984. Over a period of 15 years, Pollens was able to examine all of the pianos in the world known to have been built before 1763. The present volume deals with the history of the piano up to that year.

In the opening chapters of the book, Pollens asserts that stringed keyboard instruments with *piano e forte* existed some 300 years before Cristofori's invention. As proof, he cites a manuscript of Henri Arnaut of Zwolle dating from 1440. Pollens says:

"... there is sufficient evidence to indicate that keyboard instruments with touching (clavichord), plucking (harpsichord), and striking (pianoforte) mechanisms coexisted as early as the beginning of the 15th century, though for some inexplicable reason, the striking mechanism, whose existence is documented in the Arnaut manuscript, fell into disuse. Aside from disconnected and unheralded reintroductions, this method of activating the strings remained in obscurity until Bartolomeo Cristofori's brilliant invention of the pivoted hammer and escapement mechanism around the year 1700."

The Arnaut manuscript contains descriptions of four action mechanisms in use at the time, the fourth of which sounds suspiciously like an early piano action: "... when the key is struck and meets an obstacle above near the strings, this piece jumps against the strings and after it has touched them falls back...."

A review of *The Early Pianoforte*, by Stewart Pollens, Cambridge University Press, London: 1995. 297 pages, numerous black and white photographs, line drawings, and tables of measurements. $84.95 (U.S. currency).

After a presentation and analysis of the Arnaut manuscript, including Arnaut's original drawings and the text of the manuscript in both the original Latin and English, Pollens examines some of the "unheralded reintroductions" of *piano e forte* instruments in 15th- and 16th-century Italy.

Cristofori is still the focal point of the volume, with a substantial chapter (based on Pollens' 1984 article) on Cristofori's pianos. Subsequent chapters explore the "Florentine school" of piano building following Cristofori, trace his influence upon piano building in Germany and the Iberian peninsula, and explain the origins of piano building in France. The photographs and drawings which accompany these chapters show structural features (including some X-ray photos) and action parts from the actual pianofortes; numerous tables contain information such as string lengths, striking points, wire diameters, and case and keyboard measurements.

The book's six appendices include the full, original-language texts (with English translations) of several important documents, including Scipione Maffei's article of 1711 about Cristofori's "nuovo inventione," and the notes from Maffei's interview with Cristofori.

To my knowledge, this book is simply the finest technical history of the early piano ever published. The research is exhaustive and meticulous, the writing is clear, the illustrations, photographs and tables illuminate the text admirably, and the documentation is ample. I recommend *The Early Pianoforte* without hesitation to all who have an interest in the origins and early development of the piano. It's well worth the $85!

Please submit tuning and technical articles, queries, tips, etc., to me:
Steve Brady, Journal Editor
205 McGraw Street
Seattle, WA 98109
Fax: 1-206-285-7610
E-Mail: sbrady@u.washington.edu

FEATURES

COVER ART

RPT Bob Hohf concludes his series on rebuilding Bechstein pianos with a look at cracked plates and making repairs like the one on the cover of this month's issue. For more information see his article beginning on Page 18.

COLUMNS & COMMENTS

DEPARTMENTS

IN ADDITION

PIANO TECHNICIANS **Journal**

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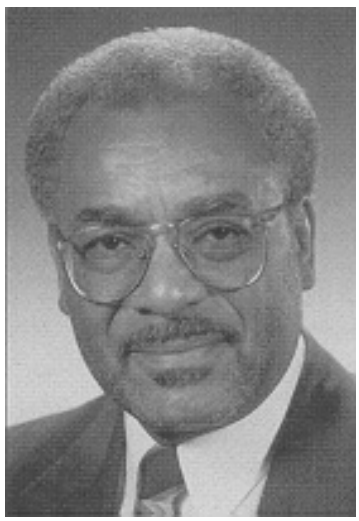
Changes



PTG President
Marshall B. Hawkins, RPT

Do you realize we have been writing "19XX" (whatever the year happens to be) since we learned to write? There are actually few people around now that can write their birthdate as 1899 or before. The fact is that in just a few short years we will begin a new millennium. We will no longer be able to write the date in the only way we have ever known to write the date. That is a large change. Have you ever gone into the new year and found yourself continuing to write last year's numbers for a while until the new habit sets in? That's a small change compared to writing "2000."

Change. What a word! There are quite a few different meanings in the dictionary for just this word alone. For our purposes here, however, we will think of this word "change" in this manner: *To make different, to alter in appearance, to pass from one phase to another, to become different, to go through all the variations of any process.*

When you stop to think about it, that is what is going on all of the time. We cannot escape from it. From the time we open our eyes each day until we close our eyes at night we are constantly witnessing "change." And think of this ... even as we sleep our body is changing.

So, what is all the big deal being made about the year 2000 you may ask? Is it not going to be just like any other new year? That is, when the clock strikes midnight we will simply begin another new year. While that is certainly true and correct, there are many, many, *many* more dynamics at work when we change (there's that word again) from one millennium to another.

We can count on the fact that there will be fantastic emotion surrounding this special event. The excitement alone is bound to be overwhelming. After all of the celebration is completed the year will continue on and we will settle down after a bit and get on with our lives. Nevertheless, we will for sure be greatly impacted by the incredible dynamics at work. As a matter of fact, we are beginning to experience some of those dynamics even now.

For example think about how many changes will have to be made throughout the world to deal with the systems and machinery presently programmed to automatically change daily, monthly, and yearly which will have to be adjusted. Let your mind run free for a moment and you will quickly get the picture of what a *gargantuan* job this is.

As we move closer to year 2000, we will no doubt be pulled along with the ground swell of energy and activity moving in that direction.

Whether you have a love for history or not it would certainly be well worth your while to take a look back in time to those years leading up to 1900. There are many light histories around which provide us stories of those years leading to and through the early years of the 20th century.

A good place for us as piano technicians to focus would be on those composers that bridged the years on either side of the *big change* from the 1800s to the 1900s. Some names quickly come to mind ... Ravel, Debussy, Villa-Lobos, Kopland, Bartok, Schoenberg, Hindemith, Menotti, Rachmaninoff, Sibelius, Stravinsky, Mahler, Rimsky-korsakov, Scriabin and to end this list of only a few, I will mention Erik Satie, who was perhaps less important as a composer but of much greater influence because he was the one who showed that younger generation of composers a different direction to follow.

Before I end this message, let us look for a moment at the two great periods that preceded the 20th Century. The Classical period of the 18th century and the Romantic period of the 19th century. You will immediately relate Haydn, Gluck and Mozart with the Classical period and Beethoven bridging the two periods. Even though we are approaching a change of millennium we all know that much of the music that will be played on the pianos we prepare daily reaches back over many years. So, as piano technicians we will continue to deal with change because that seems to be the one constant.

The 2nd GPA
Dublin International
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Dublin, Ireland
All Six Prize Winners selected Kawai.

The 42nd ARD International
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First Prize Winner selected Kawai.

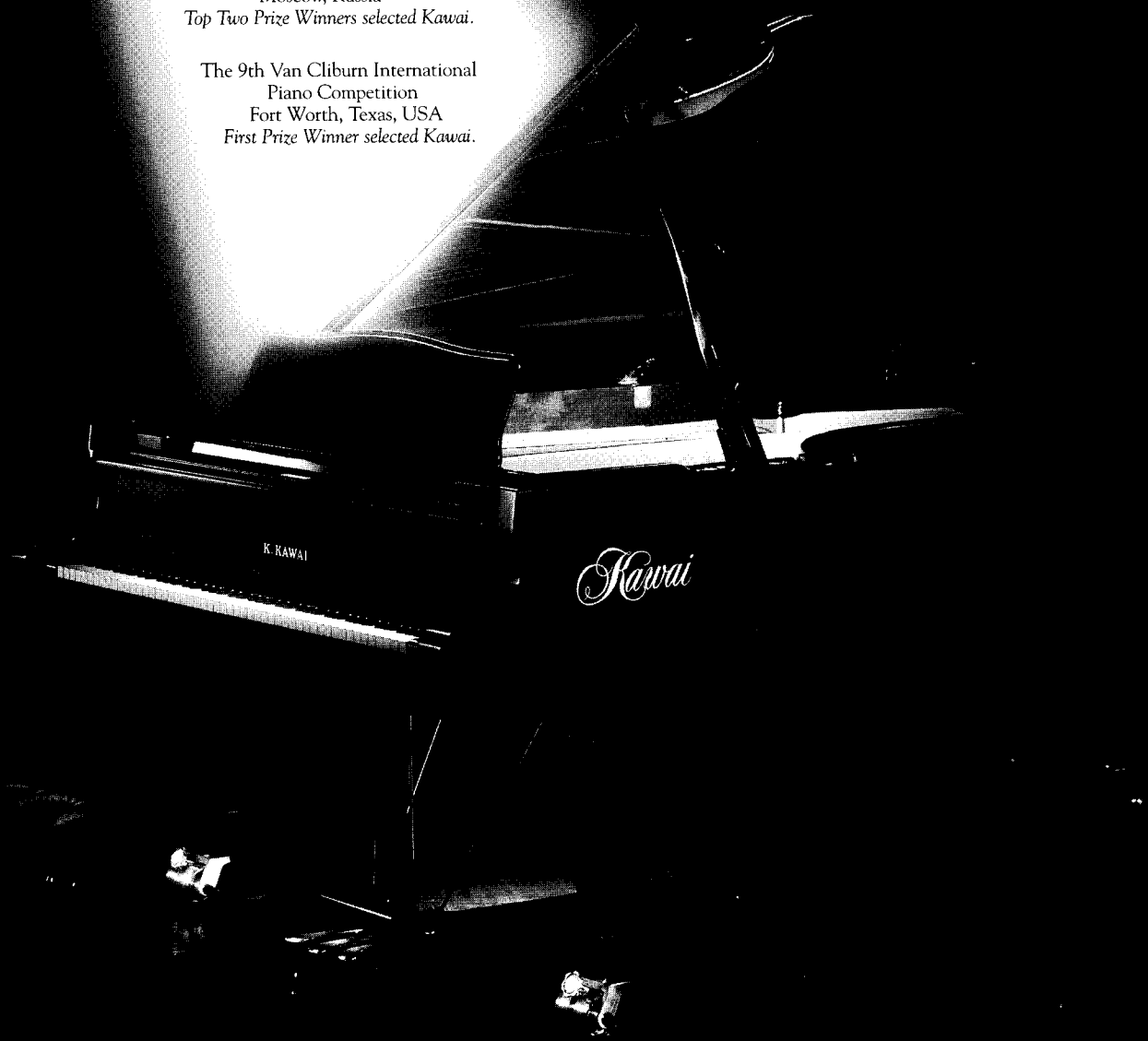
The 45th Ferruccio Busoni
International Piano Competition
Bolzano, Italy
First Prize Winner selected Kawai.

The 11th Santander
International Piano Competition
Santander, Spain
First Prize Winner selected Kawai.

The 2nd Hamamatsu
International Piano Competition
Hamamatsu, Japan
First Prize Winner selected Kawai.

The 10th International
Tchaikovsky Competition
Moscow, Russia
Top Two Prize Winners selected Kawai.

The 9th Van Cliburn International
Piano Competition
Fort Worth, Texas, USA
First Prize Winner selected Kawai.



It's becoming a familiar refrain.

Letters

Still More on Tuning Instability Due to Humidity Change

Fred Sturm contends the bridge rises (on a grand) when humidity increases. Darrell Fandrich contends the bridge elongates when humidity increases. Fandrich states for the bridge to change pitch as significantly as measured during a humidity rise, the amount of rise would be 1/2 inch. Mr. Sturm states Mr. Fandrich's math is incorrect.

Mr. Sturm found that placing a .109" bridge pin under a tenor string would increase tension in the string to approximate a pitch change caused by humidity.

This morning I conducted my own experiment which I readily admit is considerably less than scientific.

I have a (1938 or thereabouts) Francis Bacon upright in my shop. The first plain tenor strings is C# 29, gauge 20, approximately 38.8" long (speaking length). I drove a hardwood wedge between the back post and the soundboard rib located within 1 1/2 inches of the bridge pin terminating the speaking length of the above string. I noted the different marks on the wedge where I had driven it. I measured the pitch of that string (up to correct pitch having been recently tuned) before and after driving the wedge. There was no change in pitch. I then added a .95" key cover to the back of the wedge and drove it in again stopping just short of the marks simply because the soundboard was showing signs of breaking away from the case. I still found no measurable change in pitch. Actually, it appeared the pitch decreased in frequency rather than increased. This is certainly possible when downbearing is less than zero.

Since mentioning downbearing, I have found no piano with positive downbearing in that area, at least on the many I have rebuilt.

This piano was tuned about one year ago and sent to Ridgecrest to be sold through a music store there. The humidity in Hesperia and in Ridgecrest remains low throughout the year, seldom above 50 percent and only then during a rain. I do not heat my shop. The temperature in November is 30 degrees to 90 degrees, often on the same day. I assume this piano in Ridgecrest was heated, but perhaps with a similiar variation. I'm sure the thermostat was turned down at night. I guess the humidity averaged 20 percent to 30 percent year round at both locations.

I tuned the piano again yesterday, temperature 50 degrees, humidity 30 percent. Both tenor and upper bass were sharp by approximately one cycle (6-8 cents, I judge), A=440 was unchanged from last year. Every note below A=440 was sharp well into the bass section. Everything above A=440 was flat. An area in the high treble was over 1/2 tone flat. This may have been a reflection of a major pitch raise one year ago. I do not remember temperature and humidity a year ago, but probably the same as yesterday or very close. The piano was in my shop when I tuned it one year ago.

I have difficulty accepting either Mr. Sturms's or Mr. Fandrich's findings. I have theories which are difficult to test or prove. I do not think a definite answer will be found even by careful measurements, too many and too fine.

— Ken Churchill, RPT

May I beg your indulgence for one final (I hope) letter in this seemingly interminable series? (Actually it is two series of letters, one between myself and Del Fandrich, the other between Darrell Fandrich and me. Since the basic theme of both has been humidity change and its effect on tuning, and since there has been overlap due to the two to three month publishing lead time, the casual reader may have had trouble distinguishing between the two). This is in response to Darrell Fandrich's letter in the December *PTJ*.

Darrell's original article appeared in the July *PTJ*. In it (to simplify considerably), he observed the effect of stiffening the plate/soundboard/back connection of Wilh. Steinberg upright, noting that this reduced considerably the pitch change induced by humidity change. In addition, he offered detailed observations about longitudinal versus vertical displacement of strings. To simplify considerably, he concluded, on the basis of calculations involving Young's modulus of elasticity, that change in vertical displacement (movement of the bridge "up and down") could not explain the variance in pitch induced by humidity change.

The calculations, presented in abbreviated form in the footnotes, predicted that a vertical movement of 1/2" would be required to change pitch by 20 cents. Humidity change can induce pitch changes up to about 60 cents in either direction, while to the best of my knowledge, 3/16" to 1/4" is the maximum a bridge will move up and down. Therefore, if Darrell's calculations are correct, vertical movement of the bridge would be a fairly minor factor in humidity-induced pitch change, since it could only account for pitch changes up to 10 cents or so.

These figures — 1/2" to produce a pitch change of 20 cents — didn't sit well with my common sense or experience. I guessed a 1/2" vertical displacement would break a string, but in the mean time would have raised pitch well over 1/2 to a full step (100-200 cents), based on experience pushing on strings with a brass rod to stretch them. I decided to check Darrell's calculations. As Darrell pointed out in his December letter, there were some errors caused by missing symbols (lost in electronic transmission) and possible glitches in the editing process. Thanks, Darrell, for clearing those up.

I must say, though, that I am skeptical about Darrell's claim that an exponent somehow dropped a degree in value during the transmission/editing process. The exponent in question, appearing in the final formula of his note 2, is used to calculate a formula in note 3, which is off by that same degree of value, a factor of ten. I believe Darrell simply made an error in his calculations, and that in all likelihood his conclusion that a 1/2" bridge rise will produce a 20 cent pitch rise is off by a factor of ten as a result. It should show that a 0.05" bridge rise will produce a 20 cent pitch rise.

The calculations to get from the formulae in notes 2 and 3 to the result Darrell got, where 1/2" rise in a bridge produced only 20 cents in pitch rise, are very complex, involving trigonometric functions for front and back of bridge, and 12th roots to convert from tension to hertz to cents — a bit beyond my calculator, software, and inclination to complete myself. I would certainly welcome a more

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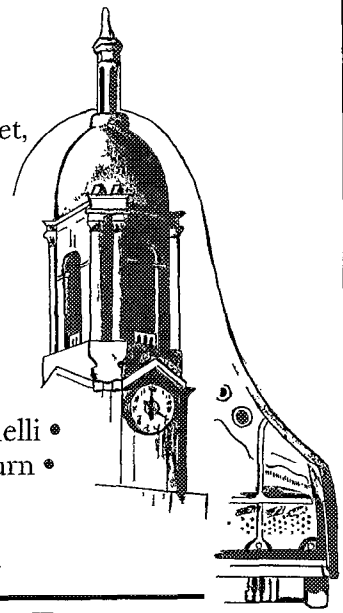
Pennsylvania State Convention
April 3-6, 1997



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Tips, Tools & Techniques

TT&T "Babying" the Glue

1. When I buy hide glue, I empty the bag of glue crystals into a can that was used for powdered baby's formula. (Similac™, Prosobee™, Isomil™, etc. Most of these cans are 14 oz. and a pound of glue still fits ... don't ask me how.) The open-and-close plastic lid combined with the scoop they provide is perfect. Evenly measured glue every time without spilling one crystal. If you drop the can, the lid will ***not*** pop off. Even if you can't find a can and have to buy one and throw the formula out, it's the best $6 tool you'll ever buy.

2. When I mix up a batch of glue, I use a cleaned-out baby food jar. I stir it with a hammer shank. If I don't have a baby at the time, I'll spend the 33 cents, eat the applesauce myself, and use the jar. I'm not brave enough to try the peas and carrots!

3. As for the expensive glue pots, I've never seen the need. I bought a small coffee cup warmer at K Mart for $5. I sit the bottle of glue on it and it keeps the temperature absolutely perfect. When I'm done, I throw the bottle away. No mess ... ever.

Try this method, and I think you'll like it. It's cheap, neat and extremely organized.

— Ron Shiflet, RPT
Phoenix Chapter

TT&T Dust-Free Spraying

Probably the hardest thing to accomplish when refinishing is to establish a dust-free area in which to spray. No matter how much I try, I always find the odd pocket of dust! Now, thanks to the good folks at Sherwin-Williams, there is a wonderful petroleum-based solvent that acts as a dust magnet and keeps it from becoming airborne again. Called "DustFree™," it comes in liquid form by the gallon. Spray it into the air and it attracts dust in the air and lets it settle to the ground where the ol' shop vac will suck it right up. Don't use too much, or you'll find the floor a mite slippery! Cost is around $35 or so, and a little goes a long way.

— Bob Bartnik, RPT
Richmond Chapter
(Reprinted from The Richmond Update)

TT&T Wedge That Prop!

Some time ago, Tom Harr gave us a tip on lid props that I'd like to share and enlarge upon. There are many spinet panos out there with lid and music desk connected. Often, when these are raised using a conventional prop they are still not high enough for the tuning hammer to clear. Tom's suggestion was to use one or two fat rubber wedges to add height (see Figure 1). This works very well and, being rubber, the wedges don't slip out.

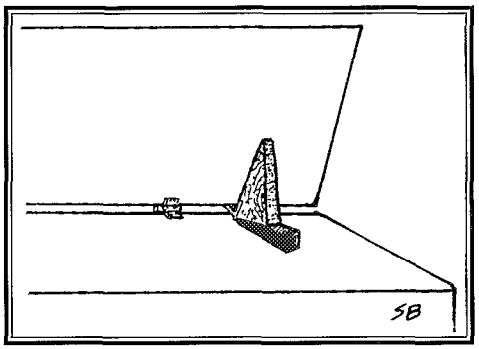

Figure 1

Sometimes with these pianos, and even with some consoles, you cannot get the lid prop in the tall way, as in Figure 1, so you put it in horizontally. The prop likes to slip out unless you've put a tack or other sharp object as advocated by some technicians (Figure 2).

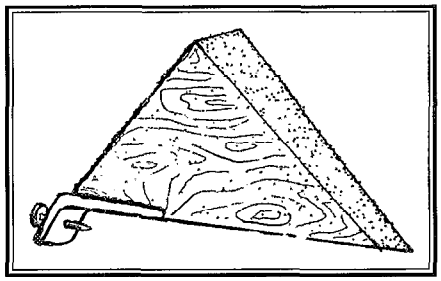
Figure 2

An easier method, less likely to mar the piano, is to take those two rubber mutes and insert them as in Figure 3. I sort of came up with this on a whim while trying to keep the lid from falling on my head as it wanted to do. I'm sure you've all come across these demon-possessed pianos. Thanks to Tom, who inspired the use of the humble rubber wedge.

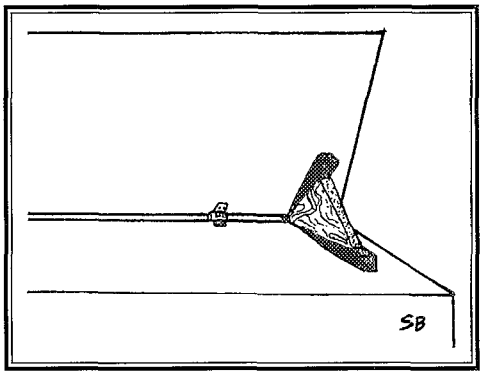

Figure 3

— Kim Fippin, RPT
Columbus, OH Chapter
(Reprinted from the Columbus Chapter newsletter)

TT&T Business Card Tricks

All hail the unheralded business card! This little piece of cardstock has many more uses than simple advertising of your business. It can be used for a shim to prop out a too-tight keyslip or as a stop-gap plug for a stripped screw. Punch a hole in a tiny section and it makes an emergency key punching. You can even split it into thinner stock with your fingernail, knife or razor blade.

In a pinch, it becomes a mini-mixing board for tiny amounts of epoxy. It is a ready receptacle for your glue so you

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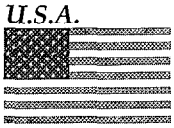

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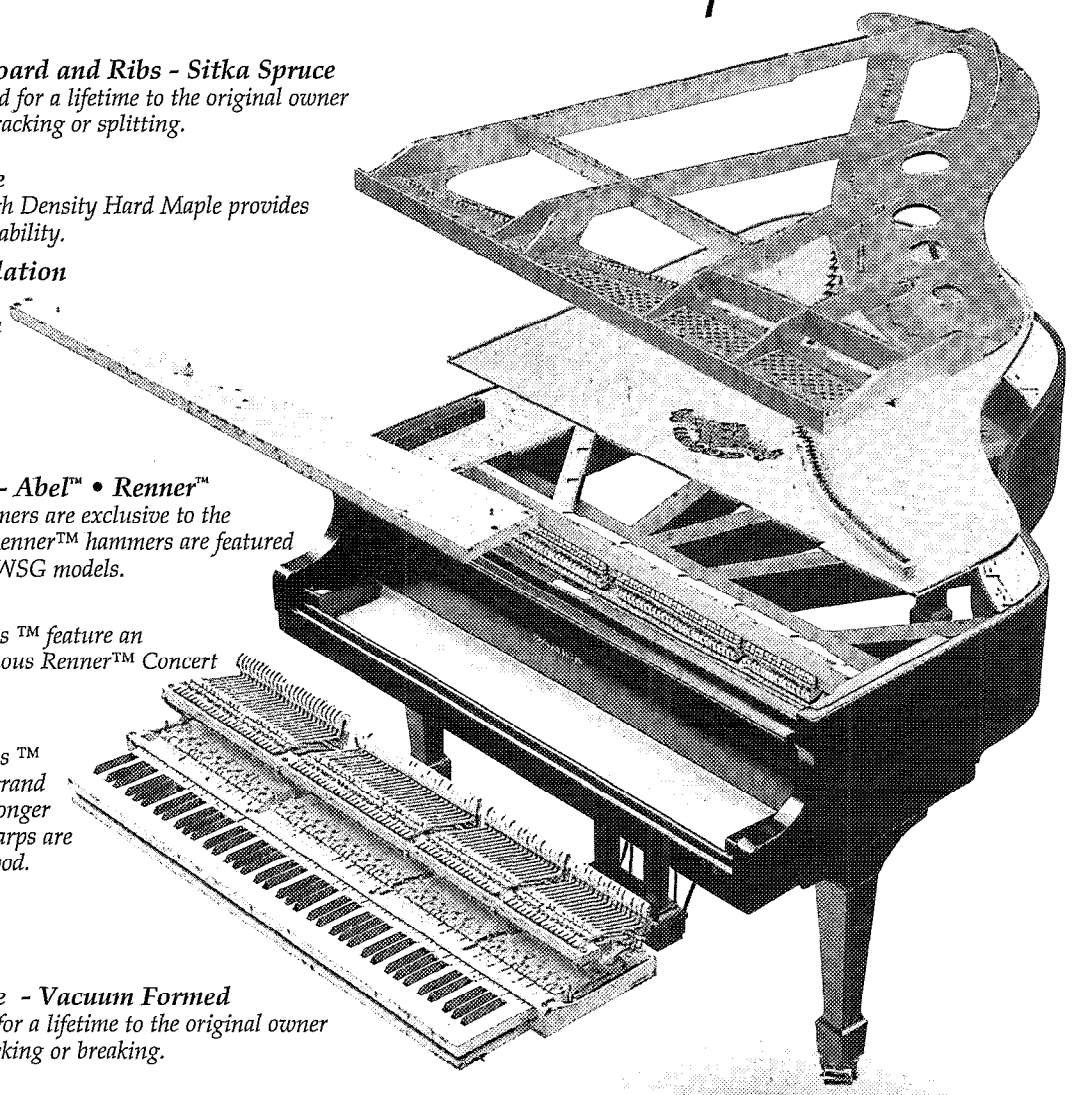

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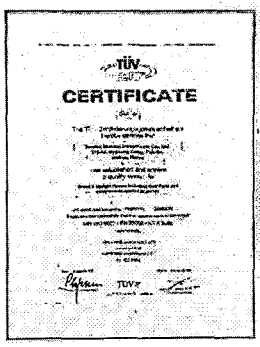

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SAMICK

Q & A/Editor's Roundtable

Q: Billings Flanges

I'm rebuilding an upright action that uses Billings flanges (See Figure 1). I'm wondering how to go about traveling the new butts. (I've never replaced an entire set of these.) The old ones don't appear to have any travel paper on them. I had expected the new ones (purchased from APSCO) to be a bit more precise.

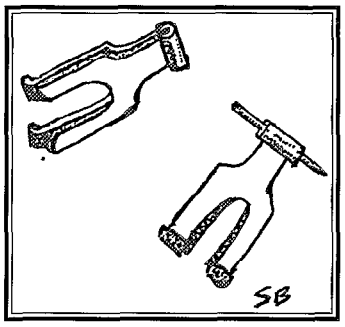

Figure 1 — Two brass Billings Flanges, one with center pin.

Can the metal clips be twisted, or should I sort them by whether they travel to the left or right? I've got the action rails stripped down except for guide hammers (and dampers) at the ends of each section. I screwed the new butts onto the rail, and they're all over the place. I'd appreciate any help available. Thanks.

— Gordon Large, RPT
Mt. Vernon, ME

A: ***Horace Greeley, RPT:*** My question would be: are the new butts to be used on the old flanges? If so, look to major problems with age/wear on the flanges themselves, i.e., traveling. There were, however, several styles of the Billings flange in use at various times, so one size does not fit all. Someone used to make an upright action stack kit. Perhaps that would be another solution.

Newton Hunt, RPT: Traveling in the wrong direction is caused by an out-of-alignment center pin. It occurs to me that if you have a set of grand damper holding pliers you could grasp a butt over the ends of the center pin and gently bend the flange thus aligning the center pin.

There also may be enough room between the butt bushings to grasp the brass from above and twist the brass without stressing the pinning. If a damper bending tool will not fit (I cannot remember the amount of space there) you could make a bending tool from an old screwdriver or some such item.

Steve Schell, RPT: It is possible to travel Billings flanges. As I remember, it requires two pairs of fine-nose pliers. Grab the narrow portion (near the centerpin) with one pair of pliers, hold the tongues of the lower portion with the other pair, and ***crank*** on it to bend the flange in the direction it needs to go to correct the traveling.

Greeley: Agreed, please remember that you are working in three dimensions. My preference is to use duckbill parallel pliers for the pair used to hold the tongues. Also, painful experience suggests that one do this with a "disposable" center pin in place; the hole through which the pin passes in the folded metal needs all the support it can get, even when using a new flange. Unfortunately (or not, depending on your point of view), most of the instruments which used these things are now long since out of production.

Schell: Installing new Billings flanges in an old action is the way to go, as the old ones often crack at the top, especially if someone has installed an oversize pin along the line. These flanges were a great idea, one of many which have passed into the archives of piano history.

Greeley: This is especially the case if someone (obviously an RPT would ***never*** do this) has done any "alignment" by twisting the butt and/or hammer whilst the same was still installed in the instrument.

The correct repair for a worn Billings flange is either to replace the tongue/center pin, or to rebush the butt, as necessary. As both of these methods are neither efficient nor expedient, new flanges are preferable, if available.

Schell: Earl Billings, now deceased, owned the Billings Baldwin piano dealership here in Long Beach, Calif. He mentioned to me on more than one occasion that it was his grandfather who invented and patented the Billings flange.

Greeley: Earl was a true gentleman of the old school. Tall and stately, I don't think I ever saw him (in the store) without a coat and tie. He always had words of encouragement for some of us young (then) whippersnappers. Fond memories of a bygone day. Thanks, Steve.

Q: Removing & Replacing Keyframe Pins

I am working on a piano that has been slightly water damaged. The balance and front rail pins are slightly rusty. Seems to me replacing them would be the way to go. They don't cost that much. I pulled one each of the two kinds of pins. They were difficult to remove. Any tips for easy/safe removal and what is the best way to put them back in the holes without marring them? Thanks.

— Dick Day
Marshall, MI

A: ***Tom Seay, RPT:*** I just did that same job yesterday (front guide pins only). Removing the pins is difficult, however you do it. I used a large pair of vise-grips, with which I gripped the pin at its bottom. Twisting the pliers from left to right (12:00 to 3:00) as I pulled up seemed to give me the best results.

Clean and lightly sand the front rail ***before*** you replace the pins. It's much more difficult to do afterwards (ask me sometime how I know!).

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I used my drill press to press the new pins in place. I clamped a piece of plywood large enough to hold the keyframe onto my drill press table. Doing this allows you to slide the keyframe along under the quill. I also rigged up a fence along the back of the extension table. I extended the jaws of the chuck fully and used that surface to press down on the top of the pin. It didn't seem to mar the top of the pin at all, at least not on my drill press. Your actual mileage may vary, of course. Set the depth stop to where you want it. Make sure the sides of the pin are oriented properly, and then put it in the hole and press down with the quill. Slide the keyframe along to the next hole and repeat the process. This will put all the pins at the same depth in the keyframe. The alternative is hammering the new pins in, which works okay, but you sacrifice a bit of accuracy and most of your hearing. You can use the same process for the balance rail as well, although I probably would turn the glide bolts up into the keyframe just to be sure that they weren't in the way.

Newton Hunt, RPT: If the corrosion is down inside the wood you may wish to heat the pin before removing it. This should loosen them enough to remove without risk of breaking one off. If one does break off there is a screw removal tool, a tube with saw teeth in the reverse direction. They are available in most woodworkers catalogs. The new pins can be driven in with a light hammer so as not to flair the tops, or a wooden mallet will work well also. If the pins go in too loose you can use a PVC glue to hold them in place.

Norm Barrett: The easiest method I have found to remove key pins is to pry them out using side cutting pliers to grip them and a hammer shank or something similar as a fulcrum resting on the rail to pivot the pliers on so the lifting force on the pin is straight up. This will give you great leverage and it is not difficult to lift them straight up so you do not do damage to holes. I like the idea presented of using a drill press to insert the new pins, but another way is to drill a hole in the center of a hardwood dowel equal to the height that you wish the pins to stand. Using this dowel as a driving punch all the way to the rail will leave the pins standing the exact distance that the hole was drilled. These two ideas would be a lot easier to demonstrate then to describe, but I hope that you can visualize how I do this.

Fred Scoles, RPT: Another method that can also work well to install the new front or balance rail pins is a bench-mounted (hand operated) arbor press; the type with the arm which you move up and down to press the pins into place. Be sure to control the installation depth. Sometimes the new pins are a little smaller diameter (about 0.0001" difference) than the originals. To give the new pins a tighter fit in the rail, simply steam the open holes in the rail after removal of the old pins. Then allow the rail to settle for several days before installing the new pins. The steaming should take no more than five minutes per rail.

For old pins that are difficult to remove, I have clamped a vise grip or small C-clamp to the top of the old pin; then used the upright hammer remover tool between the rail and the C-clamp. This works for me as it removes the toughest pins easily without any chance of placing side stress on the wood. One could easily motorize the upright hammer remover by attaching a small variable speed drill, power screwdriver, or Foredom with flex shaft to the screw shaft on the upright hammer tool. This might save the hands and speed things up.

Allan Gilreath, RPT: One thought, even though I've used the dowel with a stopped hole drilled in the past, a piece of 1/4" aluminum or brass rod with a dimple drilled in the end and chucked in the drill press might align easier and avoid any damage to the top of the pin since the material is softer than the pin.

Q: Let My Hammer Go!

Every couple of weeks I encounter a piano that loves my tuning hammer — that is, the pins seem to grab the tip so that it does not slip off easily. The extra motion to reach down and pull the tip loose wastes time and has to be done gingerly so as not to disturb the pin setting. It does not appear to be associated with a tight fit, as there is usually a little wobble even so. Could it be the effect of wear over the past 40 years (Hale hammer and tip from about 1955)? Powdered Teflon in the tip does no good.

Is it in the surface characteristics of my tips plus the tuning pins? Anyone have a solution?

— Bill Maxim, RPT

A: ***John Elving, RPT:*** Don't know what it could be, but it also happens to me with either my APSCO hammer and tips, or my Mehaffey impact hammer. Must be the pins. It also doesn't seem to be the size of tip that matters. It seems to happen with either the #2 or #3 tips (I generally use a #3 tip on both hammers). Hope someone else has an answer and solution to the problem. Maybe what we need is the Metwrench socket system seen on TV that grabs the sides of the tuning pin instead of the corners.

Newton Hunt, RPT: Oversized pins will do that to a #2 tip. Try a #3 next time at that piano.

Barb Barasa: The only time I have encountered this problem, it seems to be on middle-aged spinets and consoles, usually Wurlitzers in my old turf, and upon closer examination, some of the pins seemed to have been smushed on the top when they were pounded in. In other words, there was a very rough ridge as if the metal somehow gave under the pressure of the pin punch whacking it. Doesn't seem possible, but that's what it looked like. And the hammer would get hung up on the rough edge. (Couldn't have been very good for the inside of the tip, either.)

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Q & A/Editor's Roundtable

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Don Rose, RPT: If this is happening regularly it may be that your tip needs replacement. This seems to happen faster with my impact lever. I also find strangely enough that if I give the tip a "rest" of some weeks the problem disappears, at least for a while!

Jeff Hickey, RPT: Perhaps you simply have a 'magnetic' personality. Seriously! If you have a bit of play in the tip, and the pin won't let go, you might want to de-gauss the metallic portions of your tuning implements.

Check your local Radio-Shuck for a de-magnetizer or head for the local electronics shop and inquire about a one-time de-gauss of the affected portions. (... or mebbe you'll need to call NASA for use of the room-size de-gaussment equipment used on satellites before launching. Ask for an appointment, and walk ***yourself*** into the room. Okay?)

PS — If you have one of those 'magnetic pick-ups' for loose screws dropped inside a piano. Keep your hammer and tips ***away*** from it. Right? Exposing steel to a magnetic field will eventually affect it, if they are in physical contact ... it's even quicker.

Willem Blees, RPT: Even though the problem only happens on some pianos, it could be a cracked tuning tip head. I had the problem you mentioned, but only on some pianos, and not others. I looked very closely at the tip, and discovered a small hairline crack. What effect it had I am not sure, but when I changed tips, the problem went away.

I am guessing that because of the crack, the tip became "out of round," or "out of star." In other words, the tip wasn't exactly a star shape any more, and I guess this was causing the tip to get stuck on the pins. Like I said, just guessing, but the problem went away when I changed tips.

Richard Bittner, RPT: Do you tighten plate screws with your tuning hammer? The tool I am talking about fits in your tuning hammer bit and you can tighten plate screws with it. This is bad news because it will tear up your tuning hammer tip and make it difficult to use on tuning pins.

Maxim: Thanks, guys. I appreciated the many quick responses. After sending the post, I tuned a one-year-old Petrof studio piano that hung my #2 tip moderately on some of the tuning pins. One of the replies suggested magnetism, which certainly could be introduced by the thousands of small impacts against the tuning pins over the years; however, magnetism, it seems to me, would be equal with each pin, and only some bothered, some more than others.

Since it was a European piano (tendency for smaller pins), I decided to experiment, and tried my #1 tip (rarely used over the years) and had no difficulty removing from the tuning pins; however, the tip would not go fully on to the pin and I kept feeling as though it was sliding off while tuning. My #3 tip (which I have used a fair amount after hearing recommendation for that size from Newton Hunt.) did hang on some, but not as much as the #2.

Could wear be the factor? Worn key bushings can cause keys to hang, why not tuning hammer tips? After reading Willem's suggestion, I will look for hairline cracks. Thanks again for all your input.

Rob Kiddell, RPT: I have to agree with one of the previous postings (you know who you are!) regarding the flattening of tuning pins from being driven into the pinblock by ***extreme*** forces. The mushrooming effect on the normally rounded tuning pin top seems to result in tuning hammer stickitus, an annoying syndrome that usually results in the tuner using both hands to remove the tuning hammer from the offending pin, despite the fact that there is side-play in the tip contact with the pin. Check the top of the pins on the next sticking unit, you may find this to be the case. Also, remember that the pin tops (and the hammer tip) are tapered, and mushroom-headed tuning pins interfere with the usually smooth fit of the tip to the pin, despite the size of the tip.

Solution? File the pin back to tapered status (drawbacks: difficult and time consuming), or go to the factory and let 200 psi out of the compressor used to pin new pianos. Drawbacks: difficult, time-consuming. Advantages: deeply satisfying.

Letters

Continued from Page 8

complete rendering of the entire series of calculations involved, from Darrell, or from someone else who is mathematically inclined.

At any rate, I have convinced myself that the figures I quarrel with — 1/2" vertical rise to produce a 20 cent pitch change — are fallacious, in part by doing the rather crude experiment I described in my letter in the November, 1996 *PTJ.* Those results showed that a rise of a bridge in the 0.05" range could produce a pitch rise of 7.5 to 12.1 cents, while a rise in the 0.1" range could produce a pitch rise of 16 to 32 cents. This, as I pointed out in that letter, is at least in the general vicinity of a factor of ten different from what Darrell predicted by calculation.

My intention is not to distract from Darrell's main thesis — that longitudinal movement may be a significant factor in humidity induced pitch change. Rather, I commend him for bringing this possibility to our attention. I simply wish to argue against Darrell's assertion that vertical movement is at most a minor factor. It is unfortunate that errors in calculation and in printing accuracy have clouded this otherwise excellent contribution to our collective knowledge.

—Fred Sturm, RPT

Darrell Fandrich Responds

It is unfortunate that the misprints in my original article seem to have distracted Fred from its main purpose, which was to point out an *additional factor* of longitudinal expansion affecting the low tenor along with the usefulness of string elongation to relate soundboard-bridge movement to pitch change. I quite agree with Del Fandrich's assessment of tuning instability in the February 1996 *Journal.*

Fred's conclusions that there are errors in calculation rather than misprints in my July 1996 article would seem

Letters

understandable given that he is comparing his measurement of an actual piano to my calculations and finding a difference of about a factor of 10 — the same factor of error contained in the exponent of the elongation equation as printed.

However, Fred compares his measurements of bridge rise in the range of 0.05" for a pitch change of 7.5 to 12.1 cents to my mention of a 1/2" bridge movement for a 20 cent pitch change, that was presented as an example of an absurd extreme (the string involved is the bottom tenor F33 of Note 6):

Note 8, part 2: "If it is assumed that bridge-soundboard movement is perpendicular to the strings, with no longitudinal movement, and that the strings do not slip through the bridge pins, bridge rise for 20 cents sharp will be slightly over one-half inch, with tail tension at about 427 lbs., 109 percent of breaking strength, and speaking length tension at about 161 lbs., for a tension differential of about 266 lbs. But the bridge obviously does not rise half of an inch. Nor do string tails break with a 20 cent rise in pitch, but slip through the grip of the bridge pins at a tension differential of far less than 266 lbs."

Also, Fred claims that I concluded that changes in vertical displacement (up and down movement for a grand) "... could not explain the variance in pitch induced by humidity change," — "... that vertical movement is at most a minor factor."

I did conclude that vertical movement by itself did not explain *low tenor* pitch instability. I did not assert that "... vertical movement of the bridge would be a fairly minor factor in humidity induced pitch change." On the contrary, I believe soundboard motion perpendicular to the string plane is the primary factor in pitch instability.

— Darrell Fandrich, RPT

[EDITOR'S NOTE: The errors in the notes to Darrell's article appear to have resulted from a combination of electronic "scrambling" and oversights in proofreading. Darrell did send corrections to the notes prior to publication, but the corrections were inadvertently omitted. We apologize for any confusion which may have resulted from this error. — S.B.]

Tips, Tools & Techniques

Continued from Page 10

can smear it under loose veneer. It will substitute for a key level: set it across three or four keys and sight down across the front; keys too low or too high will cause a gap to be readily visible. A fold here and there and it becomes a key-height gauge. Pencil or pen marks with appropriate records will make the humble business card a mini-notebook for your rebuilding notes. When you remove a hinge, the card forms a quick-and-dirty method of storing the hinge screws until needed. All hail the humble business card! Come up with some ideas yourself!

— Bob Bartnik, RPT
Richmond, VA Chapter
(Reprinted from The Richmond Update)

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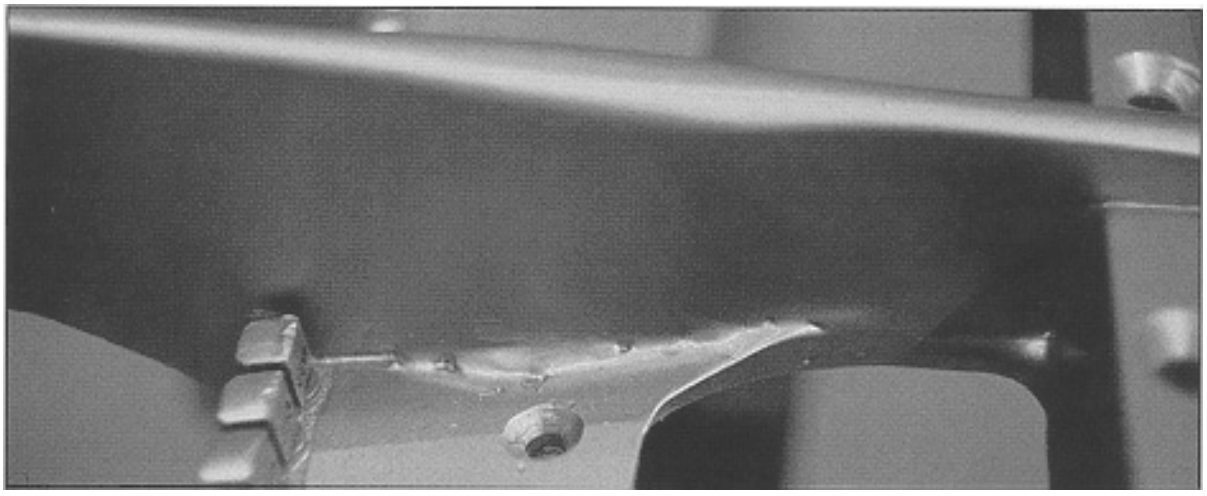

Bechstein Pinblocks — Part III

By Bob Hohf, RPT
Milwaukee Chapter

"My cat eats mice and has green eyes." This was the opening statement of a recent game of Telephone at our house. For those who haven't played this game in a while, here is how it works: children sit in a circle and one whispers a secret in his neighbor's ear. Each child in order then whispers what they heard in their neighbor's ear until the circle is complete. What the last child heard is then announced out loud and compared to the original secret. In this case, the game was attended to with the greatest concentration. Finally, the last child announced the secret: "Batman is nice and wears green pajamas." This got a good laugh all around because everyone knows that Batman is not nice (just look at his face) and that he indulges his insomnia by staying out all night cruising in funny costumes. There was no surprise at how the secret had changed; experienced players know a secret has never been passed from mouth to ear in this manner and survived intact.

Thus the lore of the piano business. The origins of the vast majority of what is known about pianos is in time out of mind. Written documentation has been sketchy at best and often of questionable accuracy. Information which has been passed on by word of mouth over the generations takes on the cast of mythology, and, as such, cannot be taken at face value. Stories must often be evaluated at a symbolic level in order to wring from them their underlying truths.

However, we do have an immutable record to refer to: the pianos themselves. Or are they immutable? Rebuilders examine old instruments in minute detail and listen carefully for the faint whispering of secrets. We look for signs and hieroglyphs in the hope of gaining insights into the shape of long-forgotten plans and ideas. It is often the mutability of a piano which is the most revealing. Changes often occur over a period of many years. It is these changes that show the strengths and weaknesses of early planning. It is the information contained in these changes that is the rebuilder's big advantage over the builder.

A crack in a piano plate indicates that a change has occurred in the instrument at some point since the piano was made; no reputable maker or dealer will knowingly let a piano go with this flaw. There are few problems which can develop in a piano which elicit such dread as a cracked plate. The most prevalent attitude among technicians is that cracked plates are unrepairable and pianos which develop this problem have arrived at the end of their serviceable careers.

Attitude is Everything
— Official bumper sticker, Milwaukee County Sheriff

This attitude is a result of the mythology created by the verbal transmission of the lore surrounding pianos; the occurrence of cracked plates is rare, and few technicians have seen enough incidences to draw conclusions based on their own experience. There is, of course, underlying truth to the mythology, and the technician faced with this condition would be very imprudent to ignore the warnings. But prudence does not prohibit advancing in the face of danger, and every few decades in a rebuilder's career, he or she may be required to do just that.

What Can Cause a Plate to Crack?

There are some possible causes of plate cracking which provide easy explanation and give the technician the option of a quick exit. A crack can be caused by a defect in the plate casting or by improper design and engineering. Both of these situations certainly occur in pianos and both should be considered unrepairable problems. However, in this article we are discussing cracking of plate bars in one of the world's finest pianos, and, while there certainly must be some Bechsteins with defective castings, this is probably not common enough to explain a characteristic cracking problem. And, while the engineering in Bechsteins may be such that it makes cracking more

common that in other fine pianos, not all Bechstein plates crack. These are two reasons to approach the problem of a cracked Bechstein plate with the attitude that there is a cause for the cracking which can be located and corrected.

Figure 1 shows a cross-section treble view of a Bechstein pinblock and plate looking toward the bass and including a cracked plate bar. The characteristic cracking occurs at the front edge of the open tuning pin fields, then stops part way up the plate bar. It is the stopping, which is of critical importance in diagnosing the problem. The fact that the crack stops indicates that the stress which caused the crack has been relieved. Even though the bar is in a weakened state, there is no longer enough stress to cause further cracking. It can also be observed that the pinblock spans the section of the plate bar that is cracked. Therefore the stiffness of the pinblock should contribute to the structural strength of this part of the piano.

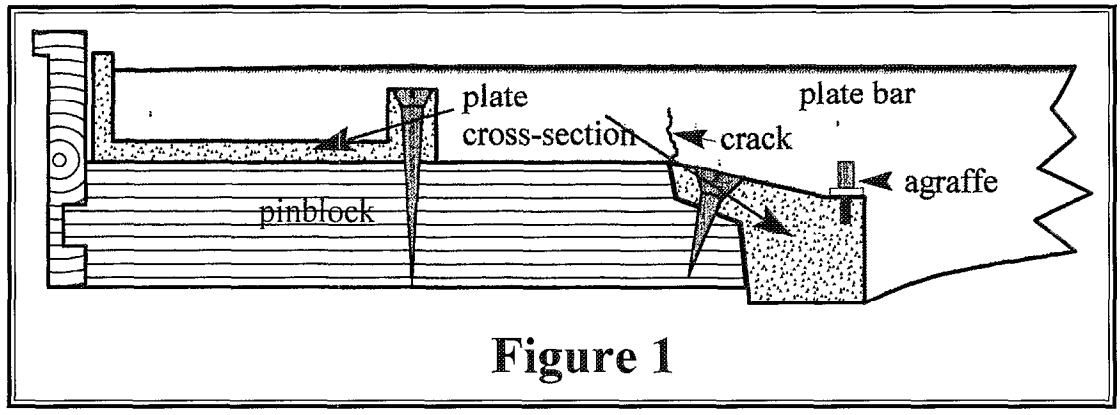

Figure 1

Finding the Problem

When unraveling a problem so deeply imbedded in piano mythology, one must attempt to think it through from the very beginning. There are two conditions which must be met in order for a plate to crack: first, the cracked member must be under greater stress than it has the strength to resist, and, second, this stress must be tension; a plate member under compression will not crack. Figure 2 shows the uncracked portion of the plate and includes the force components which must be present to produce the crack causing tension in the plate bar. Areas of compression, zero stress, and tension are represented by "+", "0" and "-" respectively. Compression on the top of the bar and tension on the bottom indicates that, at some point in between, there is zero stress.

Figure 3 shows the stress changes which occur after cracking. The forces which act on this portion of the pinblock-plate system remain the same, but the crack relieves the tension in the plate bar resulting in zero stress at the point of the crack. However, the necessity of supporting the forces does not disappear, and, in this case, must be transferred to the bottom of the system. The tension effectively moves from the bottom of the plate bar to the bottom of the pinblock. If the support of the tension did not move to a different part of the system, the cracking would not stop and the plate bar would break.

The rebuilder, of course, must adopt the attitude that this is a repairable problem. There is no point in proceeding with a repair unless an abnormal and correctable condition can be located. This set of mind may be difficult in view of years of conditioning and prejudice which have been created by exposure to the existing lore regarding cracked plates. Successfully adopting this attitude by no means assures a successful repair, but at least it makes success a possibility.

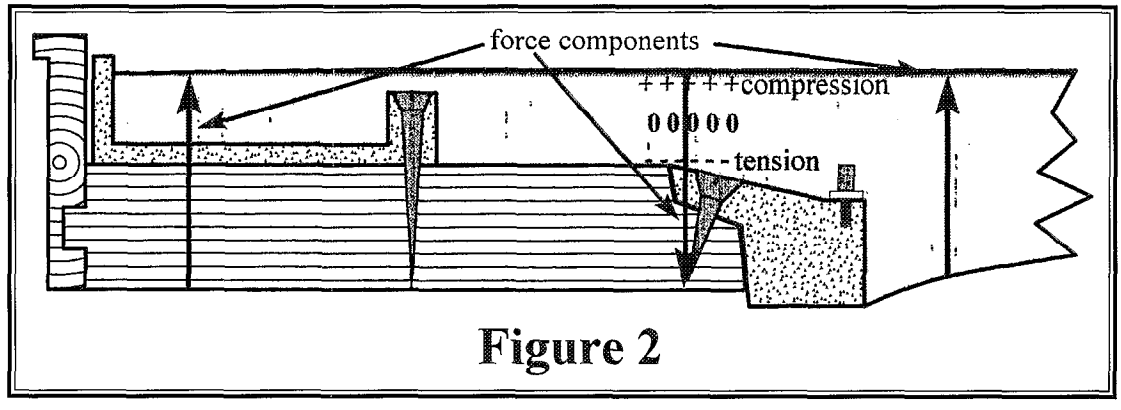

Figure 2

There is nothing abnormal about a downward component of force at the front of the pinblock; the leverage action of the string tension on the tuning pins accounts for this. But repair requires that we find something abnormal which caused the downward force to focus stress on the cracked part of the plate bar. Inspection reveals that this may be the weakest part of the plate due to the thinness of the bar at the front of the tuning pin fields and the nearly right angle corner the plate casting must make on the underside of the bar. The corner causes a focus for stress and is a prime location for the start of a crack.

Careful disassembly of the piano revealed several other items of evidence. Letting down the string tension allowed the cracks to close perceptibly. Pinblock height above the keybed was carefully monitored as the plate screws were slowly turned out in order to determine whether angle of the pinblock as mounted in the case was contributing to the downward force on the plate. There was no movement of the pinblock as the screws were released. There was also no problem with the fit of the (almost) vertical surfaces of the pinblock against the plate flange as measured with a feeler gauge.

However, since the pinblock spans the cracked area of the plate bar, the process of cracking implies some movement of the plate relative to the pin-

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Bechstein Pinblocks — Part III

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block. I then hypothesized a condition which could allow the necessary movement. Figure 4 shows a space between the stepped "screw" surface and the plate, along with the force components, and the areas of compression and tension before a crack has formed. The plate screw into the stepped pinblock surface is left out for clarity.

Figure 5 shows the crack which forms to release the tension in the lower part of the plate bar. The resulting movement of the plate relative to the pinblock is limited by a new contact point between the plate and the pinblock. The space in Fig. 4 allows only limited movement of the plate relative to the pinblock, and, when the space is taken up, the compressive strength of the pinblock resists further movement, limiting the crack. It is the ability of the pinblock material to resist compression which stops the downward movement of the plate.

This hypothesis assumed that there was a misfit between the plate and the pinblock which created a space at the stepped area. I tested the hypothesis by applying dabs of epoxy paste to the step of the pinblock and release agent to the plate, then reinstalling the plate and allowing the epoxy to set. Even with the plate screws tightened, there was a distinct space between the pinblock and the plate along this surface, as indicated by the thickness of the cured epoxy. I accepted this as evidence of the likelihood of the hypothesis being valid.

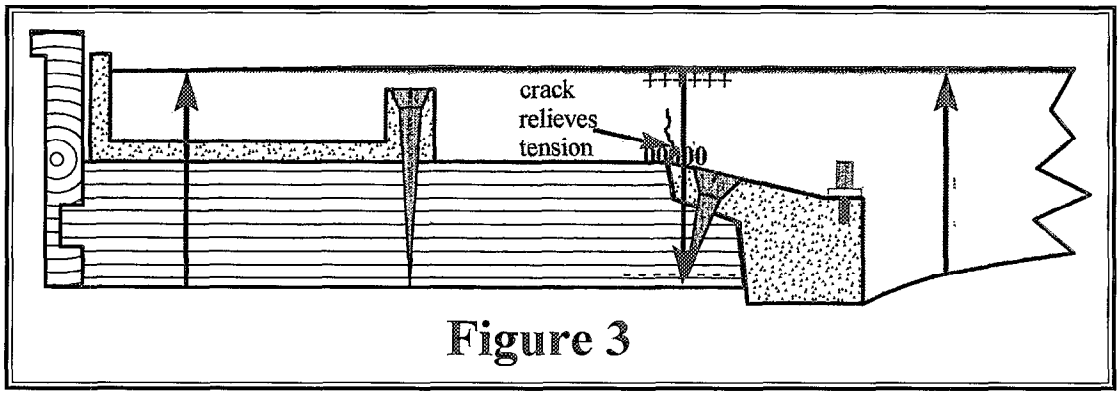

Figure 3

Repairing the Problem

As mentioned before, there is no point in proceeding with the repair if a probable and correctable problem cannot be found. If the stress which caused the plate bar to crack is not eliminated, it is very likely that, even after repairing the plate, it will crack again. This is, in fact, exactly what happened to the Bechstein in question. Removing the finish from the cracked areas of the plate bars revealed that the bars had been brazed by the first rebuilder. Apparently, when the piano had arrived in the shop it had the two cracked plate bars. To repair the cracks, the original rebuilder had ground away the cracks and filled the ground areas with brazing. When the new pinblock had been made and installed, and the piano restrung, the cracks reformed right through the brazing. The space left between the screw surface of the pinblock and the plate flange allowed movement of the plate relative to the pinblock. A close fit between the pinblock and the plate on all surfaces eliminates the possibility of movement. The pinblock and plate then become a structural unit which has much greater resistance to the stresses imposed by the string tension than the plate alone.

Welding the Plate

There are few topics in piano technology which are buried in more misinformation than welding plates. Cast iron can be welded. High-quality cast iron which has cracked can be made as strong as original, or stronger, by welding. The difficulties in welding a piano plate stem from the fact that the localized heat of the welding process can create localized stresses in the plate. Cast iron expands when it is heated and contracts when cools, and when this expansion and contraction occur in a small area, the resulting internal stresses themselves can cause recracking. Ideally, the entire plate should be heated before welding and then carefully cooled when the welding is done. But, even if someone in your neighborhood has such an oven, the cost of using it for this purpose would be prohibitive.

The first step in successful welding is to find a good welder with plenty of experience with castings. While any certified welder should know the process, academic understanding is no match for seat-of-the-pants experience. In rural areas it may be easier to find the right welder than in urban because a rural welder must frequently repair cast parts of the farm equipment. My neighbor, who is a farmer and does his own welding, was able to give me the name of the best welder around. He

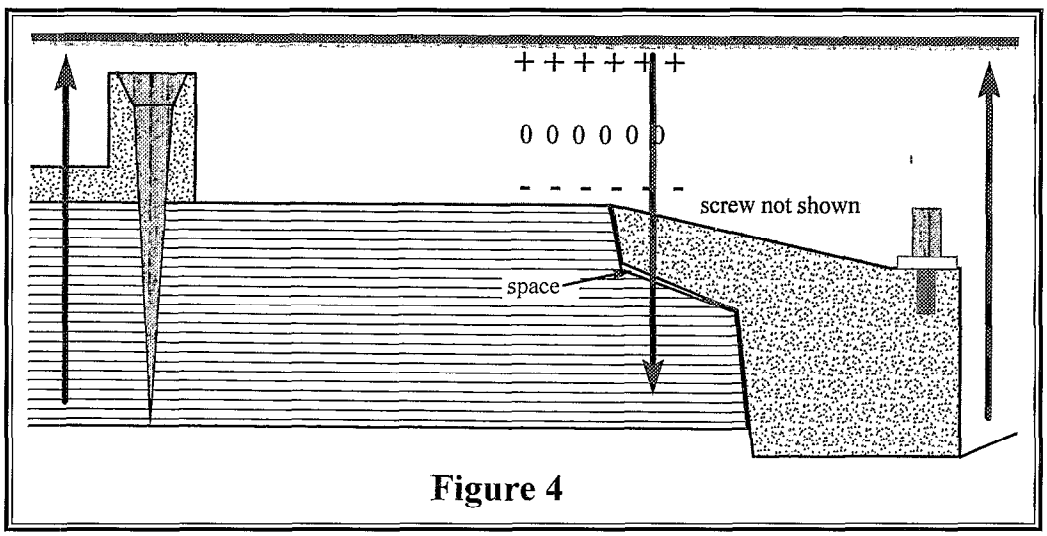

Figure 4

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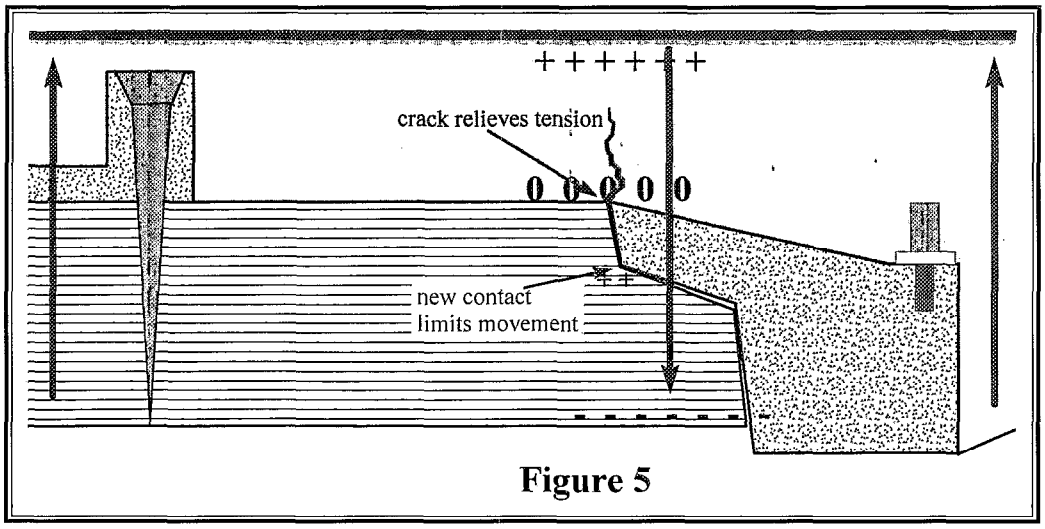

Figure 5

turned out to be a welder I already knew and who had done a number of jobs for me in the past. He had extensive experience welding all sorts of cast iron including successful repairs to cracked engine blocks, which are generally considered difficult or impossible to repair. I knew he was the one for the job.

The plate must be held immobile during the welding to prevent any change in shape from heat. The old pinblock can be used for this purpose. Cut out a section of the old block which spans the cracked plate bars and which includes the plate screw holes as in Figure 6. Molding this piece to the plate with epoxy will make it a perfect fit, and when it is in place, will hold the plate absolutely rigid. The areas of the block immediately underneath the cracks may be chopped out to provide access during welding.

The iron in the vicinity of the crack must be ground away so that the cracked area of the plate bar may be reconstructed out of new material. The area ground away should extend well into the step on the underside. The reason for this is that the crack formed where the stress focused at the corner between the plate bar and the step. The weld joint between the old cast iron and the new material should not be near the corner where the stress focuses. Therefore, grind the iron back so that the entire corner extending back into the step is reconstructed out of new material. Because of the thinness of the plate in the stepped area and the location of the plate screw holes on either side of the plate bar, this may involve reconstructing part of the screw surface of the plate, redrilling, and countersinking new plate screw holes.

The welding rod to use for this repair is 99 percent nickel. It is quite expensive at about $250 for a five-pound box. This rod produces a very strong bond with cast iron. It also has the property of elongating when it cools, which helps prevent the building up of internal stresses. Nickel is also harder than the iron. This hardness becomes very apparent during drilling and countersinking.

The welding process is, of course, critical to the success of the repair. This is where having the right welder is so important: care and patience are absolutely essential. Since heat must be kept at a minimum, only a small amount of new material may be added to the plate at a time. As each new bead is applied, it should be tapped with a hammer as it cools to assist in the elongation and eliminate stress in the bead. Then, my welder says, "I walk away from it," allowing the plate to cool completely before applying the next bead.

When the welding is completed, the plate must be reshaped by grinding. Grinding also creates heat, so it must be done slowly and carefully. The bottom surface of the plate bar and the shape of the stepped area will have to be recreated. These surfaces should follow the original shapes as closely as possible since they will have to be bedded to the new pinblock. When grinding the sides of the plate bars, keep in mind that thicker is stronger, and removing material reduces strength. I left on as much material as possible, while still allowing for clearance of the strings. This meant altering the tuning pin patterns slightly to accommodate the thicker plate bars. I made no effort to grind the sides of the plate bars smooth, but rather filled and shaped the welds with auto-body filler before refinishing the plate.

The Pinblock

With the plate repaired, the construction of the pinblock can proceed as in a normal repair. We have referred several times to the importance of correcting the problem which caused the plate bars to crack. It is the fitting of the pinblock to the repaired plate which makes the correction. The stepped part of the plate flange must have positive contact with the screw surface of the pinblock in order to relieve the stress from the plate bar in front of the open tuning pin fields. Molding the pinblock to the plate with epoxy as described in last month's article can provide the certainty of this fit. A rebuilding project such as a Bechstein with cracked plate bars involves considerable time and expense, and the repair does not succeed or fail until the piano is strung and tension is put on the strings. With stakes as high as these, the technician should make every effort to stack the chips on the side of success.

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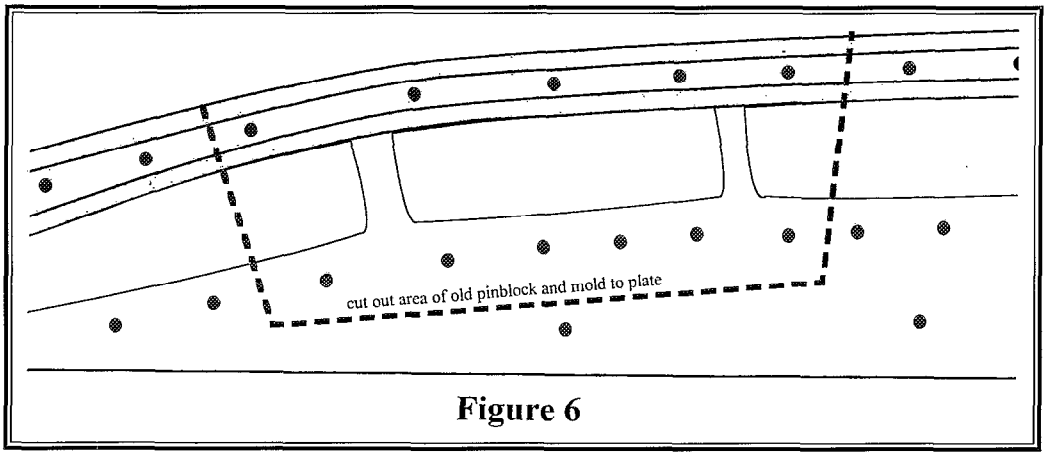

Figure 6

Bechstein Pinblocks — Part III

Continued from Previous Page

Special Case

It seems very likely that the cracks in the plate bars of this Bechstein model B were caused by a mis-fitting pinblock replacement. A poor fit between the plate flange step and the screw surface of the pinblock allowed the plate movement which resulted in abnormal stress in the cracked bars. But does this mis-fitting account for all instances of the characteristic Bechstein cracking where the original pinblock is present? The question actually becomes, "Were the craftsmen in the Bechstein factory frequently guilty of poorly fitting the pinblocks to the plate flanges?" My opinion, based on the general level of craftsmanship evident in the pianos, is that the original fit was probably carefully and properly made. However, the original pinblocks were made of relatively few laminations of beech and were far more compressible than modern multilaminate blocks. As shown in Figure 5, it is the resistance to compression of the screw surface of the pinblock which prevents movement of the plate and, thus, the cracking. My guess is that even a closely fit beech block can compress gradually under the pressure of the plate flange. This gradual movement over a period of years could explain the case where an aging piano "suddenly" develops cracks.

The compressibility of pinblock material is revealed by comparing the size of the tuning pin hole to the diameter of the tuning pin: the smaller the hole drilled for a 2/0 pin, the more compressible the material. Today there are several types of high quality pinblock material available; not all are multilaminate. Rebuilders will certainly have their own reasons for their preferences. However, I recommend using the highest density material possible in replacing German pinblocks, in addition to the practice of molding the pinblock to the plate with epoxy. This gives a greater certainty of long-lasting success in these pianos with unusual stress requirements.

Conclusions

In my early days of studying piano technology, I heard an "old timer" say that if someone claimed to be a craftsman (this was in days before craftspersons), he checked them out by asking if they carried a pocket knife: no knife, no craftsman. "Then I ask to see their knife, and if it's sharp I know that he (sic) is a good craftsman." He cast a smug eye across the group, knowing at that moment he was the only one who qualified. I shrunk in horror under his gaze, trying to remember where my pocket knife was and the condition of its blade. When I arrived home that evening, relieved that I had not been required to make public the emptiness of my pocket, I dug my pocket knife out of the dresser drawer, sharpened it as best I could, and put it in my pocket, secure that I was now ready for the test. During the next several years, I used the knife to clean my fingernails and peal a few tough oranges, but its main function was to wear holes in the pockets of my pants. Then, one day high in the Sierra Nevada range, it slipped unnoticed through the hole it had made and found its way to the ground, where it remains to this day. I haven't replaced the knife; I simply don't need it.

Life was much simpler then. The old timer has long since left us and I am well on my way to old-timerhood. In those days, pinblock replacement was considered a very radical repair and the techniques were just being developed by the more adventurous technicians. If the old craftsman had ever replaced a pinblock, he certainly had never replaced one in a Bechstein. This is not to say that he didn't have the skills necessary to do the job; the craft of rebuilding pianos simply had not developed to the point where most technicians considered the repair possible.

Piano technicians are privileged to work on instruments with such a long and venerable history. However, the craft of rebuilding pianos is a relatively recent chapter in that history. While we should not lose sight of our debt to those who developed and built the instruments we have today, it is our responsibility to continue the traditions of development and innovation. Today's piano rebuilders have a unique position in the history of the piano: never before has there been such a huge body of fine, aging instruments in need of all kinds of repair. Many of these pianos date from the "Golden Age" of piano making, and they contain a record of not only the dreams and innovations of the makers, but also the weaknesses and failures. Rebuilders should carefully study the strengths and weaknesses of these instruments, and approach their work with a respect for tradition, without being shackled by prejudice. As the radical continues to become the routine, the craft of rebuilding will undoubtedly develop new repair procedures which have not been thought of today. It is largely up to the rebuilders to maintain the piano as a living and evolving instrument, and to nourish the attitude that the best are yet to come.

Notes ...

1. Please refer to "Bechstein Pinblocks" in the December, 1996, and "Bechstein Pinblocks II" in the February, 1997 issues of the *Piano Technicians Journal* for more detailed descriptions of Bechstein construction.
2. These forces are consistent with Figure 2 of "Bechstein Pinblocks."
3. This is a simplification of what is actually occurring since some of the force components and stresses present in the system are being ignored. I believe that greater detail would make the matter at hand unnecessarily complicated.
4. "Good Vibrations," Nick Gravagne, March, 1992, *PTJ.*
5. "Bechstein Pinblocks," Hohf, December, 1996, *PTJ.*
6. Even before string tension was released, the cracks were barely more than hairline.
7. In the interest of keeping the problem solvable we assumed that the pinblock was too stiff to bend across the cracked area.
8. At this point I should mention that this was not the original pinblock, but a high-density, multilaminate replacement. Except for the lack of attention to the fit of the stepped surface, the installation of the new block was well executed. In view of this, one may object that this piano was a special case and that the conclusions being drawn do not apply to the case of a cracked Bechstein plate in a piano with the original pinblock. I will return to this point later in the article.
9. Brazing is a welding process using brass and is not the recommended method for piano plates.
10. If the pinblock is properly fit to the plate, there should be little or no tension in the cracked areas of the plate bars. Therefore, one may wonder whether a well-fit pinblock would have prevented the brazing from cracking, or whether a Bechstein might be effectively rebuilt even without repairing the cracked bars. This latter idea pushes the limits of my faith in the hypothesized cause of the problem. Prudence and aesthetics require strengthening the bars and repairing the cracks.
11. Since the Bechstein Model B we were repairing had already been brazed, the entire area of the old repair had to be

ground away. This may have required a larger repair than would have been necessary the first time through. However, if the welding is carefully done, a large part of the plate can be reconstructed. Strength of the repair is the primary goal, so don't hesitate to reconstruct a larger area in order to accomplish this objective.

13. Much is revealed about the composition of the metal during welding. The welder said that the cast iron in the Bechstein plate was the best that he had ever welded.
14. This process was discussed in "Bechstein Pinblocks II," *PTJ*, February, 1997.

An Essay on the History of Tuning - Part III

By Skip Becker, RPT
Northeast Florida Chapter

The Renaissance of Music

From the end of the "middle ages," we advance into the time known as the "Renaissance" (the term is of recent device — those living in the 15th and 16th centuries never heard it), which means "rebirth." It was the revival of the ideals of ancient Greece, which was considered by Renaissance times to be a pre-Christian Golden Age. There was new art, new literature, and new music; all imbued with an optimistic new spirit. In fact, "new" has become a technical term used by historians to identify the work of this 200-year period. "New" is probably not exactly accurate to describe the "new" music, which had existed for centuries, but without benefit of clergy. The church *musici* disdained the music of jongleurs, troubadours, and bards (traveling musicians whose entertaining performances in part retold the old pagan tales, and in part functioned like newspapers). Previously, music not constructed according to strict Pythagorean rules was ignored, or interdicted (there was even a Papal Bull in 1324) as a "disturbance," and soon died away. But the influence of the church was waning. Power and influence shifted to a new rising merchant class, who enjoyed and were eager to support the new arts.

Music permeated society in ways it never had before. Rare was the town without its own band. Musicians made a good living, formed professional societies, and could afford to experiment with new styles. New musical theorist/composers (non-clergy *musici*) emerged, whose concerns were essentially practical. Collections of sheet music became a standard fare of the newly discovered printing press (huge quantities survive, and were soon followed by tutorials, or "how to" books for the mastery of any imaginable instrument). Rhythm now copied the meter of the poetry being sung, rather than the "metaphysical numerology" of church chants. Melody and harmony were based on beauty and emotional effects, rather than abstract ideals.

The new music flourished, but the "old" music, and the thinking that produced it, did not suddenly die. During the Renaissance, the two music schools existed side by side. The great theme of Pythagoras, however distorted by centuries of "refinement," had several centuries to run before it was regarded as mere superstition. People still thought that the world was flat, that the sun and planets spun 'round (though now encased in sonorous crystal spheres, propelled by angels, and each sphere producing a tone in a manner similar to producing a tone by circling a damp finger on the edge of a wine glass), and created a harmony only perceptible to the mind; but these days were numbered. The classical thinking of the "old school," which historians call "metaphysical scholasticism," became increasingly "speculative" concerns. Even the work done by church *musici* began to schism. Theoretical or Speculative ideas were separated from those of practical music application. *Musici* still wrote speculative treatises (*Musica Speculativa*), but they were now separate from, and soon overshadowed by the many new treatises on *Musica Practica.* Any final resistance to the new music was swept away when the "merchant princes," who loved the music and supported the musicians, accumulated sufficient power and influence to become popes themselves. All the underlying philosophies of the classical world were analyzed, for the first time in a millennium, with the clear light of reason. "The world is coming to its senses, as if awakening from a deep slumber," wrote Erasmus (1466-1536).

The church *musici* had early on transmuted the Pythagorean ideal of a "higher purpose" for music, to ennoble humanity, into the idea of the "highest" purpose: praising God. Clergymen had been fearful that without the previously understood higher goal, music would deteriorate into "self-serving sensuous beauty." In the powerful new music of the Renaissance, the worst fears of the old *musici* had been realized. In 1425 Giovanni da Prato wrote of the new music of blind organist Francesco Landini:

"No one had ever heard such beautiful harmonies, and their hearts almost burst from their bosoms ... As a thousand birds were singing among the verdant branches, someone asked Francesco to play the organ a little, to see whether the sound would make the birds increase or diminish their song. He did so at once, and a greater wonder followed: for when the sound began many of the birds were seen to fall silent, and gather around as if in amazement, listening for a long time; and then they resumed their song and redoubled it, showing inconceivable delight, and especially one nightingale, who came and perched above the organ on a branch over Francesco's head."

Natural Scale

Renaissance music is best known for the close harmony which developed, founded in the newly discovered (or newly revived) "natural scale" of Just Intonation. For the first time, the mathematically pure intervals of 3rds and 6ths, major and minor, were sung (the church had interdicted those intervals, but was by Renaissance times too busy suppressing major schisms to be able to suppress major 3rds). Harmony, previously only an abstract thought, was suddenly here, in the new music. Intonation in the new music needed to be accurate (some madrigal scores clearly differentiate between D# and Eb, A# and Bb), and even vibrato was severely restricted, because even a little change in pitch would destroy the "dulcets" (sweet harmony), which were its essence. The human voice, capable of great modulation, could transpose this new harmony to every key. The fixed-toned keyboard instruments could not.

"'New' is probably not exactly accurate to describe the "new" music, which had existed for centuries, but without benefit of clergy."

New Science of Music

As the new *musici* tried to construct the "natural scale" on the chromatic

keyboard, they discovered new problems with intervals. Perfect 3rds were essential to the new music, but an octave constructed of three contiguous perfect thirds (C-E, E-G#, G#-C) falls short of the necessary 2:1 ratio by nearly half a semi-tone.[1] They also found four perfect contiguous minor 3rds exceed an octave by nearly a full semi-tone. In addition, just intonation on the fixed tone chromatic keyboard creates a tonality center (usually the key of C). The harmony available is perfection itself, but modulation is severely restricted. This must have been the most vexing problem of all. Just intonation on the chromatic keyboard is harmonious for only about half of the available intervals. Accompaniment with voices, or even playing in keys remote from the tonality center was impossible. The new *musici* tuners, in the true spirit of their age, responded most appropriately to these problems. Rather than recite the classic music theories of the past, they sought to understand these acoustical anomalies.

For the first time since Pythagoras himself, music and tuning systems were analyzed with reason, and the new science of music began: the science of acoustics, founded on the modern laws of harmonics. The impressive body of information accumulated by these new scientists was presented by Mersenne in his *Harmonie Universalle*, in 1636. (See *Tuning: Etc.* Chapter 5).

"... more than once I have felt like laughing when I saw musicians struggling to put a lute or viol in tune with a keyboard instrument...." (Giovanni de' Bardi).

Keyboard Tuning

The early Renaissance tuners tried to make as many intervals as possible pure (mathematically and acoustically). They were trying to imitate vocal just intonation, but only half of the keyboard intervals could be made musical. They discovered that with the application of tempering, harmoniousness could be increased to about two-thirds. They still used the progression of 5ths as the basis for determining notes, but now the 5ths were narrowed, or "made grave," with intention of producing pure 3rds.

They realized that the closer the 5ths are to just, the further away are the 3rds. We don't know if they tuned any 3rds directly, but we know they checked their temperaments by listening to 3rds and 6ths, usually in both major and minor triads, for the proper "color." In the 20th century, we no longer have the environmental conditioning to listen to triads, but we do listen for the color of intervals, and we call it "beat rates." Using experience and aesthetics, these early tuners achieved a remarkable and sophisticated temperament, with ten "equal beating" 5ths (they thought that equal beating intervals were equally tempered) and corresponding "fine 3rds." It became so standard that it didn't have a name: it was the keyboard tuning. We know it today as Meantone.[2] We don't know where or when it was first devised, or even if it was the work of an individual or a group. The tuners who developed it didn't write about it; yet it seems unlikely that they would have been illiterate. They were probably members of a musician's guild, which would have had a tradition of secrecy, and most likely it was simply too dangerous to commit to writing. Musicians who composed, or even performed the new music literally "risked their souls." As late as 1461, some musician's guild documents concern pleas for musicians "to receive the holy sacraments and be treated like other Christians."

First "Modern" Writing on Temperament

The first writings about temperament come from the church *musici*. The first indication that temperament in tuning should even be employed comes from the influential Franchinus Gaffurius, in 1492, the year the Earth was proven not to be flat. Although Gaffurius was an old school *musici*, and normally favored Pythagorean intonation, he did construct a scale diagram based on just 3rds and 6ths. He gives no instructions for its application to a stringed keyboard, but does mention that some organists diminish their 5ths by "a very small and hidden and somewhat uncertain amount." Grammateus, in 1518, was the first to write about tempering Pythagorean tuning by determining semi-tones with a means other than progressive 5ths. He merely favored reviving an ancient Euclidian method for averaging the string lengths on a monochord, but it was sufficient to get him in "hot water" with his superiors.

The first written description of meantone comes from Pietro Aron in 1523. Aron (1490-1545) was a practical church *musici*, who rarely touched on the speculative at all. He would probably be embarrassed to discover that we have ascribed meantone to him. The first written description of it does come from Aron, in 1523, but it is an observation of an already standard temperament, with suggestions for its implementation. He, like Gaffurius before him, took pains to uphold Pythagorean tuning as the theoretical standard. But his description, and his instructions for tuning meantone (in his Toscanello) reveal that he must have tried this temperament, at least a time or two, himself. "He sympathetically reported the practice of his time in detail and his treatises are possibly the most valuable of his generation" (*New Grove Music*). He was also the first of the *musici* to insist that his work be published in Italian, defying the tradition for "learned *musici*" to publish only in Latin.

Multiple Tunings

Although much of Renaissance music was *a cappella*, and utilized the scale of just intonation, the growing popularity of instruments created the musical necessity for a compromise in scale, so that vocalists could sing in harmony with instruments. Consorts with keyboards were especially problematic.

"... it is necessary to take great care in combining these instruments, for not all of them are tuned according to the same tuning, the viol and lute being tuned according to the tuning of Aristoxenus, the harp and gravicembalo (harpsichord) making their modulations with other intervals. And more than once I have felt like laughing when I saw musicians struggling to put a lute or viol in tune with a keyboard instrument ..." (Giovanni de' Bardi).

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An Essay on the History of Tuning - Part III

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Resolving these differences in tunings was important to the Renaissance *musici.* As the virtues of Pythagorean and just intonation tuning were being debated, the ancient compromise tuning of Aristoxenus, equal temperament, was revived, and became standard on the immensely popular lutes. Lutes are fitted with fretboards, which produce ascending semitones. On the earliest lutes, the frets were equally spaced, which may visually look like "equal-size" semitones, but actually caused semitones to increase in size as they advance up the fretboard. There may even have been some serendipitous 16th century harmony when a lute was accompanied by a "well-tuned" clavichord (which also produces large semi-tones). *Musici* were still mathematicians (and astronomers), so as their mathematics improved, the string divisions (fret distances) approached the exact proportions of equal temperament. In 1581, Vincenzo Galilei recommended the 18:17 ratio, long known to theorists, which yields a semitone of 99 cents (virtually indistinguishable from our 100 cent semi-tone). The exact string lengths were first published by Mersenne, in 1636. Lute tuning was the best solution for consort music, but was considered to be incompatible with keyboard tuning.

> "The result ... was 'a beautiful interwining in which the eye could take pleasure in seeing the same games that the ear hears.'"[1]

An aural method for attaining the lute tuning on keyboards did not exist until the 20th century.[3] Pythagorean tuning, or especially the Pythagorean temperament, served as a substitute.

Revived Scales of Ancient Greece

Undoubtedly the apex of Renaissance musical science was the Florentine group of prominent composers and theorists (*musici*) who used to meet in the salon of Giovanni de' Bardi. They were known as the Camerata. They collaborated in the first experiments to imitate the music of the ancient Greeks, and their work led directly to the birth of opera. For them, the music of their day (though splendid in its own right) seemed to lack the miraculous healing powers of the music of Pythagoras(!). Ancient Greek music was simple diatonic monody (a song with lyre accompaniment), and so they thought that their own polyphony must be too complex. One large irony in the history of music is that their attempt to simplify music led to the birth of the most extravagant and opulent form yet devised. Yet all opera is based on the single voice Aria.

Temperament was a burning issue in the late 16th century, and the debate brought about the first feud in the new science of music, (perhaps the first "temperament war") between Gioseffo Zarlino,[4] and his rebellious student Vincenzo Galilei, a leading member of the Camerata, and father of the famous astronomer. Both these men made extremely valuable contributions to musical science, and both were pioneers in equal temperament. The arguments went something like this: Zarlino thought that Nature was superior to art; so that a natural instrument, such as the voice, should have a natural scale, such as just intonation, to express itself (at least for *a cappella* music).

Galilei persuasively advocated equal temperament for all music; the voice was no different than a violin; all scales were "man-made," and therefore no scale was superior to any other. It is unfortunate that the bitterness of their feud, especially on the part of Galilei, may have robbed them both of a more prominent place in history.

Zarlino (1517-1590) had some interesting ideas about equal temperament, involving equal harmony. On modern keyboards, as previously noted, equal temperament major 3rds are tempered 13.7 cents wide. This leaves all minor 3rds very narrow (-15.6 cents). No equality there. Zarlino thought the "least damage" to overall harmony would be done by diminishing the major 3rds about 3 cents from just (he did not concern himself with the remote keys). His temperament yielded narrow major 3rds (negative 3rds are quite an unusual sound), but he did achieve an ingenious equal harmony, especially suited for experimental keyboards constructed with more that 13 pitches per octave. (See *Tuning*, Chapter 105)

Vincenzo Galilei

Vincenzo Galilei (1533-1591) made valuable contributions to the science of music, and acoustics, yet has somehow eluded the place in history enjoyed by his famous son. He reports on the tuning in his time, and notes that constant exposure to the new tempered 5ths had "corrupted human ears," in effect "ear-washed" people, and they were now conditioned to prefer the narrow intervals to the just. He performed numerous musical and acoustical experiments, and supported the theory of coincidental harmonics (listening to coinciding harmonics is an important skill for modern tuners). Galilei illustrated it graphically, with pendulums set at speeds to correspond with the ratios of musical intervals. The result, he says, was "a beautiful intertwining in which the eye could take pleasure in seeing the same games that the ear hears."

His most valuable and far reaching experiment revealed the true relation between string tension and pitch. By doing so, he shattered a Pythagorean legend. According to the disciple Iamblicus, Pythagoras experimented with four ropes of equal length and diameter attached to four different weights: six, eight, nine, and 12 pounds. When the strings were plucked, the intervals produced were the 4th, the 5th, and the octave. This is the same simple inverse proportion obtained by dividing the string in ratios of 3:4, 2:3, and 1:2. And this is all wrong, proved Galilei. Simple ratios work for for dividing the string length, but, for example, to obtain an octave by adding weight, mere doubling was insufficient. If the string length ratio is 1:2, then the weight added must be in inverse square proportion (4:1). To create the 4th- 5th-octave series, the weights would need to be in ratios of 16:9, 9:4, and 4:1. String diameter also affects pitch in inverse square proportion. An octave can be produced at the same string tension by reducing the diameter of the string by a factor of four. This experiment was exceptionally good empirical science. The reproducible results dealt a devastating blow to classic music theory, and the entire Trivium, but Galilei chose to attribute the error to "overzealous" disciples (who wanted Nature to behave as they expected), rather

than the Master himself.

Experimental Keyboards

For the bold *musici* of the high Renaissance, the emergence of equal temperament did not end research or debate on musical scales. They examined all "27 tunings that the ancients had, and the seven modes that they called harmonies" (Bardi). Some favored the enharmonic scale, and in an effort to accommodate it, succeeded in adding a few notes to the keyboard by altering the "sharps." On instruments with "split keys" the chromatic notes (although usually just D#, sometimes also A#) were divided transversely. The front half would play Eb, and the back half play D#. These modifications added usable harmony, and aided in voice accompaniment. In 1607, the ultimate experimental keyboard, called the "archicemballo," was constructed with 32 divisions per octave (it came with a tetra-chord, or four monochords for tuning).[5] A few theorists and composers swooned over the harmonic possibilities available on such a keyboard, but only one archicemballo was built. "Split keys" were still incorporated on some harpsichords into the late 18th century, but such instruments were the exception. Fortunately (or not), for us, those scales which could not be readily implemented on the common 13-note octave did not gain much popularity. Tuners, after all, made a living playing music, not tuning instruments. Like their ancient counterparts, most Renaissance musicians thought that the enharmonic scale was too difficult to tune, and therefore impractical. By and large, musicians were unwilling to give up the standard keyboard, which had, in fact, become so standardized that historians often have trouble determining in which century, or even which country, some common clavichords were made.

This is quite remarkable for hand-made instruments (the influential and cosmopolitan instrument-makers' guilds were responsible for this "quality control").[6] The Renaissance era is defined by this type of "unification." French, Italian, German and English music styles were as similar as their instruments. The development of national styles is what marks the beginning of the next musical era, which historians call the Baroque.

Colors of the Keys

The most important development in temperament during the Renaissance (and probably the least understood by 20th century musicians) was key coloration. Key coloration, or the "character of the keys," does not exist in equal temperament, or Pythagorean intonation either.[7] It is present only when a scale is composed of unequal steps (irregular temperaments). Key coloration in meantone temperament was a fortuitous happenstance, and the cause was the standard tuning techniques of Renaissance tuners. Keyboards "grew up" in the key of C, and tuners tended to show favoritism to the popular keys, which meant setting intervals as close to pure as possible. This favoritism created a tonality center, and the attendant colors (unequal steps) which it produced were enhanced by another commonly employed tuning technique: intervals were set to be "equal beating," rather than equally tempered.[8] Ozanam records the phenomenon:

"Whatever precaution we might take in tuning our instruments to render all the chords equally harmonious, there is always left therein some inequality that causes us to notice a *je ne sais quoi* of sadness or gaiety, of the melodious or the harsh, which (in turn) makes us distinguish one key from another."

The different "feelings" of each key were known as the "affections," and the study and use of key character was consolidated into the "doctrine of affections." The implications of this startling serendipity extended well beyond keyboard tuning. This "doctrine" of temperament transformed the very basis of music in general, and entered into the fabric of daily life. Shakespeare uses the metaphor in the opening of his Midsummer Night's Dream[9] (1598):

Theseus: Hippolyta, I wooed thee with my sword,
And won thy love doing thee injuries,
But I will wed thee in another key —
With pomp, with triumph, and with reveling.

Rameau gives us the best description of the four major modes of feelings in 1726:

"For it is good to note that we receive different impressions from intervals in keeping with their different degree of alteration. For example, the major 3rd, which in its natural state (the pure 5:4 ratio) excites us to joy, as we know from experience, impresses upon us ideas even of fury when it is too large; and the minor 3rd, which in its natural state transports us to sweetness and tenderness, saddens us when it is too small."

"For the bold musici of the high Renaissance, the emergence of equal temperament did not end research or debate on musical scales."

The affections became requisite for a good tuning (in effect, the tail wagging the dog). Common temperament thus made available to musicians a veritable artist's palette of affects or emotions (24 modes worth, in fact), which, as Rameau points out: "Knowledgeable musicians know how to exploit."

The Origins of Temperament

To understand the significance of this development, it is necessary to trace the origins of the word temperament, which is a "medical" term, arising from the Pythagorean notion of "musical medicine." To the ancient Greeks, temperate meant "that which is controlled (or affected) by music" (*New Grove Dictionary*). Moving the emotions (affects) of the audience was a well refined art of Greek orators, who, as we have seen, used a combination of music and rhetoric. As previously noted, in the Pythagorean concept of *musica humana*, the human nervous system was likened to the strings on a guitar. Later disciples reasoned that the "human guitar" had four strings, tuned to the "human tetrachord." No one doubted (do they now?) that people respond to a sad song, or a happy one, in the way an open string on a guitar will vibrate in sympathy to an appropriate external pitch. Medieval "physiologists" (although it was very un-Pythagorean to separate the sciences), in particular Galenus, refined this notion, concluding that people were actually

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An Essay on the History of Tuning - Part III

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composed of four humors: sanguine (cheerfulness), melancholia (sadness), phlegmatic (calmness or serenity), choleric (excitability). Each humor corresponded to a string of the human tetra-chord. Each person had a unique, often changing, mixture of these humors (usually one was dominant), and the aggregate composition determined one's basic characteristics, or temperament.[10] Imagine the surprise of the musicians when a serendipitous accident of their tuning produced four major modes of feeling, which corresponded directly to the four humors. And how appropriate the term "temperament" was to describe the collection of moods contained in the musical scale!

Music became the model (and envy) of the other newly emerging arts and sciences. With such specific and quantifiable tools, it seemed that music, with its affects, could be brought into the realm of reason, and studied scientifically. Renaissance experimentation, by *musici* such as Zarlino and Galilei, tended to affect "simplicity" and "nobility," usually one emotion at a time. Baroque experimentation went to the limits—painful agony, and exuberant joy. Baroque musical composition became much more complex, but each "movement" of a complex work was devoted to a singular affect.

Notes ...

1. The shortfall of the 3rds is known as the "lesser diesis." Most historical temperaments have a residual of that large G#-C 3rd. The excess of four contiguous minor thirds is the "greater diesis."
2. Meantone is another term of more recent device, first used by Robert Smith, years after the practice of meantone had died out.
3. A keyboard could be tuned in a rough form of equal temperament by matching the tones on a lute or monochord. Most tuners "tuned by ear," and avoided "tuning aids" of this sort.
4. Zarlino is described by Oliver Strunk as "easily the most influential figure in the history of music theory from Aristoxenus to Rameau."
5. The diatonic keys on the archicemballo were ordinary enough, but the sharps were split into four parts. There were also additional narrow keys between E and F, and B and C. These narrow keys were also split, so the instrument could play both E# and Fb. The tuning tetra-chord included diatonic, chromatic and enharmonic scales.
6. According to the regulations of the Instrument Makers Guild of Saint Luke in Antwerp, 1557, a supplicant became a "free master and guild brother" only after submitting a test harpsichord. It was "taken to the chamber of the above guild, where the prescribed assessors, in the presence of the deans and sworn councillors and that of two or three free clavicymbel (harpsichord) makers, shall inspect and test same, and declare upon oath whether or not the test piece was well and truly fashioned, in the correct shape and proportions, and in accordance with its nature being sound in tone and properly quilled and strung."
7. It is disheartening to read in many modern sources that key coloration doesn't exist — an apparent "psychological" phenomenon, or a dementia from superstitious times. As Jorgensen points out, we are literally discussing the "Lost Sounds of Music."
8. Equally tempered intervals have beat speeds which increase as the interval moves up the scale. In theoretical ET, the 5th F3-C4 beats at .59 bps. One octave higher, F4-C5, the bps is doubled. Intervals tempered to be equal beating are necessarily different sizes.
9. See also *Merchant of Venice*, V. i. 49-88.
10. Early surgeries and "bleeding" were attempts to "balance the humors." This type of medical thinking continued well into the 19th century (George Washington died shortly after his last "bleeding").

Prepping Vertical Pianos for Fun and Profit — Part 2

By Ernie Juhn, RPT
Long Island-Nassau Chapter

This time we will assume that, no matter who pays for it, it is worth doing a good "prep" job. A little more about the paying end of it later.

Important Preliminaries

Tightening plate screws will assure better tuning stability for any piano. Even screws in metal action rails do loosen up during the climatic yo-yo effect, so tighten action screws. When hammers wear and become grooved, it may be too late to find that the string marks are not centered on the crown of the hammer. When these grooves are so far off center that one mark is practically on the edge of the hammer, it will produce a very unpleasant sound. Consequently, the tone quality of the piano may become very "uneven" within a rather short time. So, checking hammer spacing while prepping is a good investment. Remember the customer purchased this instrument and expects flawless performance.

The Keys

Don't forget that sticking keys, slow action, etc., are disturbing to the customer as well as to technicians and should be avoided. Pushing the key slip toward the keys will reveal possible sticking in the future due to the key slip being marginally close to the keys (see Figure 1). With the sustain pedal depressed, depress as many keys as possible at one time and release them — watch for slow returning hammers. That might disclose tight center pins. Lift up the fronts of the natural keys: if they "stay up" higher than the rest, the key centers are too tight.

Checking the Jacks

One of the most commonly forgotten little tricks when prepping verticals is checking for sufficient lost motion for the jack to return to its resting point on the butt felt. Depress (a section at a time) as many keys as you can and release them very slowly. Now — while watching the jacks carefully — very slowly push the hammer rest rail forward. If some of the jacks "fall into place" there is not enough play. Adjust the capstans so the jack falls freely back on the butt felt when the key is released slowly. Another way to check for sufficient play for the jack to drop back into position is to make sure that the hammers "follow" when the hammer rest rail is pulled back (slightly compress-

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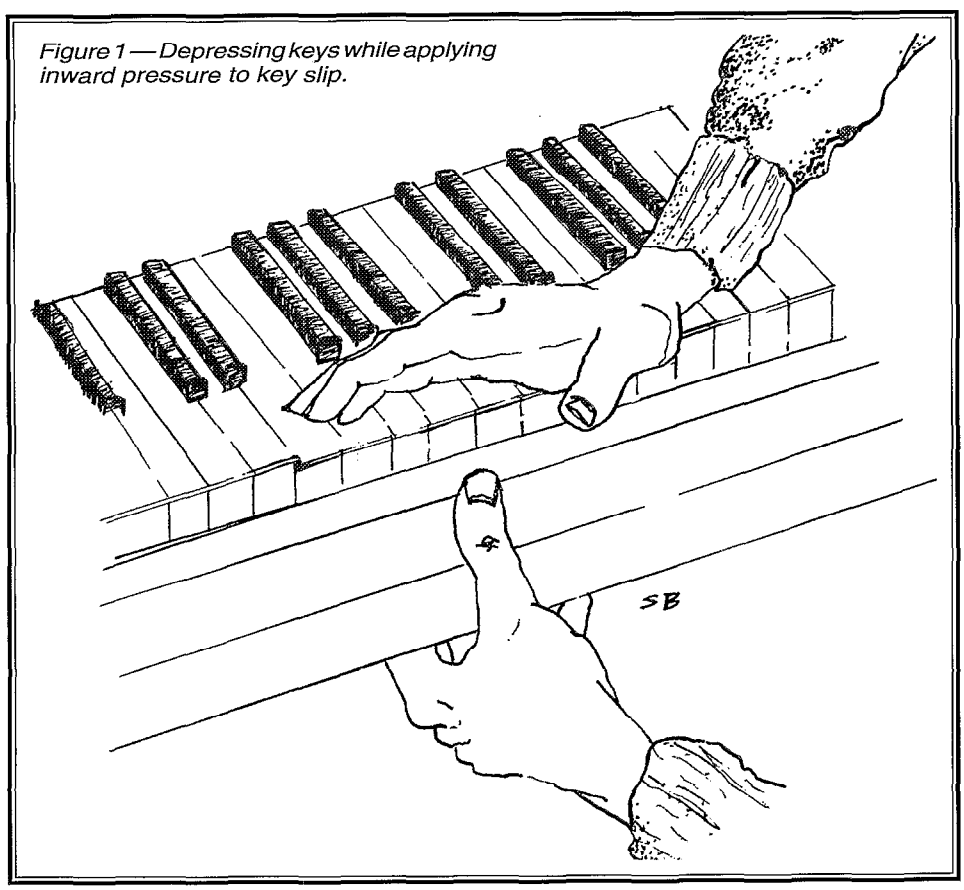

Figure 1 — Depressing keys while applying inward pressure to key slip.

Prepping Vertical Pianos for Fun and Profit — Part 2

Continued from Previous Page

ing the hammer rail rest felt). When prepping pianos with let-off rails which also double as jack-stop rails, make sure that there is about 1/8" play between the jack and the felt on that rail when the keys are depressed (see Figure 2). That will prevent "hanging up" of keys when repeated rapidly. This adjustment may have to be made even if it means to deviate from the rule that the tender of the jack should contact the let-off button exactly at the center.

Pedals

Well-operating pedals are another must in the "prep" business. Even beginners will immediately spot minor deficiencies in the operation of pedals. Let's start with the sustain, or right pedal. Some lost motion in the pedal rod/pedal lifter rod adjustment is necessary for proper muting. On vertical pianos the middle pedal can have different functions depending on the various brands. Some manufacturers may use it for "bass sustain" which, of course, is obviously just part of the regular "sustain" pedal and should be treated as such. In the case where the middle pedal is used to engage a muffler felt, the most important adjustments are to make sure that the muffler felt does not interfere with the hammer action while in the "off" position as well as covering all keys in every section of the piano while engaged. Finally, the "soft" or left pedal in most verticals lifts the hammer rest rail forward to decrease the hammer blow and thereby decrease power. As a rule, the movement of the left pedal should be limited so that the hammer rest rail is positioned about half way of its normal distance. There should be some kind of a mechanical stop (like a piece of hammer felt). Bridle wires should be adjusted in such a way that the keys don't "drop" when the left pedal is depressed.

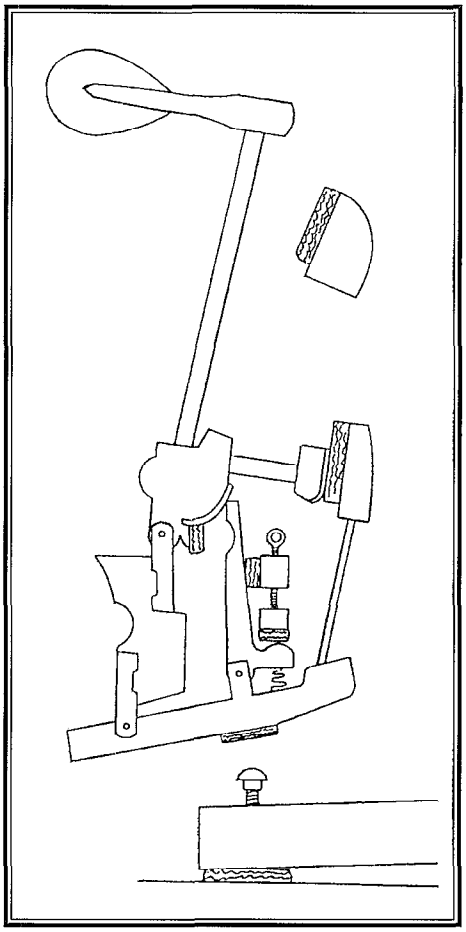

Figure 2 — Here the jack is trapped between the butt and jack stop rail after a hard blow. Jack stop rail (let-off rail) needs to be moved away from jack.

Tuning

Obviously, tuning is part of prepping the instrument. We all know how important it is that the piano arrives at the customer's home fairly well tuned. Keep in mind that it will be much easier to maintain some tuning stability if all the pitch raising (or pitch lowering) is done prior to delivery.

The Business of Working With Dealers

Suppose the dealer who sold this piano is of the variety that does not believe in "prepping" pianos at all. I still feel that all the above-mentioned steps should be performed during the first service call. It might be diplomatic not to say anything to the customer and "just do it." After all, there is a pretty good chance that during the sale mention was made that the instrument will be thoroughly checked out and serviced before delivery.

At this point, I would like to touch upon some items involving the business end of "prepping" for profit. Obviously, if the dealer is willing to pay the price, all is fine. Unfortunately, quite frequently that is not the case. One way some dealers are "making up" for the low fee they are paying their technicians is the philosophy that the technician can keep the customer and build up his clientele. This may work well for some and not for others. Bear in mind that big cities are quite different from small towns. I would, however, like to impress upon you that technicians have been known to purchase customers from retiring technicians. Many tuner/technicians pay quite a lot for advertisement in newspapers and yellow pages. In the case of a "first service call," the chances to gain a new customer are quite high. If treated properly it is almost guaranteed.

There are, however, dealers who insist on keeping the customers. Some of them even give their customers a "specially worded" warranty which guarantees them repeat business. It is pretty obvious that if you are working for a dealer who subscribes to this philosophy, you will need to charge accordingly; in this case the dealer is "your customer." The fact that we are dealing with more than one tuning should be given some consideration, but probably not more than you would give a school.

Finally, a word about doing the "extra work." By now it should be pretty clear that thinking ahead will pay off in the long run. There should also hardly be any doubt that the chances to keep customers are quite high if we follow some of the simple rules outlined above. In any case our aim should be a satisfied customer no matter who it is — a piano owner or a dealer.

Working With Keys

Key Balance Hole Repair

By Newton Hunt, RPT
Contributing Editor

Key chucking, the fore-and-aft movement of a key, causes noise and changes the key's contact point with the wippen and, therefore, changes the action geometry. This movement can be felt by pianists and is most disconcerting. There are a number of repairs for this condition:

- Steaming to swell the wood,
- Glue-sizing the hole,
- Using a thin blade to cut a kerf and insert a piece of veneer,
- Using fiber inserts,
- Enlarging the hole and replacing with new wood.

The first three are very useful, effective and quite simple and fast. Next to last is an old procedure fraught with many problems, which leaves us with the last item. When the holes have become so enlarged or damaged that the first three will not realize a proper fit, then more radical surgery is a necessity.

Ralph Onesti, RPT, sells a set of tools which makes this repair sure, accurate, reasonably quick and of a high quality.[1] There is a set of 25 graduated round feeler gauge/guide pins, a cutter for the keys, a set of keypin-sized drill bits and a large plug cutter. The procedure is quite simple.

Using the graduated gauge pins, sort the keys into sets where a given guide pin will fit into the balance pin hole just a tiny bit snug. The corresponding gauge pin will become the guide pin for the respective key group. You may wish to write the gauge pin letter on the key to prevent confusion later.

If there are keys with massive damage so that a gauge pin will not center in the hole, the key can be placed in the keyframe with neighbors to align properly while sitting on a snug fitting paper punching of .015" or greater glued onto the bottom of that key. This will provide an adequate guide for the pin and cutter. Selecting the proper drill bit for the size of the balance pins, insert it into the plug cutter, centering properly.

Select some nice wood with a close grain such as poplar, soft maple, lemon (naturally lubricous), walnut or a hard pine like old yellow pine, cut thin slats about 3/16" thick by 2" wide. Using the plug cutter, cut ninety or so wooden washers.

Select a piece of wood slightly wider then the keys and clamp this into a drill press vise at the same angle as the balance rail pin is to the key when half depressed. Set it into the vise as deep as possible so the jaws of the vise provide a cradle for the key.

Select the first group of keys with its attendant gauge pin. Insert the pin into the key cutter, tighten the screws and chuck it into the drill press and check that the keys will fit under it and the cutter will not hit the vise jaws. Set the depth of cut so that the cutter cuts a nice notch in the shallow part of the cut. The guide/gauge pin will center the key (having some free movement) and the cutter will cut out a circular recess in the bottom of the key perfectly centered and sized to receive one of the washers previously cut.

With some hide glue or Titebond™, put some glue around the edges and flat areas of the cut in the key and snap a washer into the key with the grain running parallel with the sides of the key.

Use a sharp knife or chisel to remove most of the excess material, and a router with a trim bit to finish the sides of the keys to a perfect trim. With a minor setup on a router table, the excess material can be removed to form a perfect bottom for the key.

Ease the new wood until the key slowly returns to rest from a lift of the front with enough weight at the capstan to lift the front of the key to its rest position. A perfect fit, capstans, key fronts and key ends in a nice straight line. If one does happen to be out of line, enlarge the hole and glue on a punching and re-cut the key. No problem.

I realize this operation requires a shop and power equipment that may not be available to all, but for anyone doing high-quality action restorations and key rebushing, this is an essential part of any procedure.

Key Button Repair

I needed to rebush a set of keys on an older Steinway D that had been rebushed by someone else and not quite to my satisfaction. After removing the bushings and setting up to rebush, I found many small cracks in the key buttons going well back. I had no desire to replace the buttons but could not rebush split buttons, so what to do?

I finally arrived at the notion to reinforce the buttons with iron-on veneer. I had enough for the sharps (maple) and enough for the naturals (walnut), but not enough for the whole set. After pondering I used both, with the result that the keys are bushed and feel great.

Iron-on veneer can be used in many places in piano work, like reinforcing

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Working With Keys

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the sides of a repaired broken key or to rebuild the inside of a mortise. The list is only limited by your imagination. This material is available from most woodworkers catalogs and stores. Lay in a supply soon. I like to get one 9/16" veneer and cut it to my needs. Just a few feet will last some while.

Key Weights

David Stanwood has proposed that the purpose of key weighing is to arrive at a balance weight which removes friction as a factor (*PTJ*, October, 1990, pp. 16-18; November, 1990, pp. 16-18). One method of achieving fine control of balance weight is to remove unwanted lead weights, plug the hole and relocate the leads as needed by drilling new holes for them. Another method, actually David's, is to remove unwanted leads and replace only portions of a weight into the same hole. Old weight holes need not be plugged, just releaded.

Please read David's articles for a full understanding of the theory and practice of balance weighing and the new metrology, and watch for forthcoming articles on balance weighing graphs and charts to be used by non-computer-users.

Removing the Original Leads

Key leads are almost always inserted from right to left. Many weights are tapered so that they tighten up as they are inserted. This makes it simple to tighten them up later if they become loose. For these, the weights should be removed from left to right to prevent splitting the key stick. For the weights that are inserted and then swaged into place the same procedure holds true.

For Steinways, where the weight is inserted into a blind hole in the key, I use a spade bit slightly smaller than the weight being removed with the blade parallel with the grain (drill press not running) to prevent leaving a mess of the wood.

For those with no blind holes, I press the weights out with a smaller Forstner bit to help prevent tear-out on the other side of the key if the weight comes out slightly tipped. I have a block of wood with a 3/4" hole drilled to allow the weight to come out, and another hole drilled at more than a right angle to allow the weight to fall into a box at the side of the drill press. You must offset the entry hole to the edge of the block to allow the notch of white keys to snug up to where the notch protrudes to the right (some five out of eight).

In both cases, I use the drill press to press out the weights, a vise to hold the block and the block to help prevent or minimize tear-out on the other side.

Making and Using a Weigh-off Tray

Take a nice 1" x 3 1/2" x 4' piece of soft wood. Set on a keyframe and mark the natural keypins along the center of the edge of one side then mark the other edge for the sharps. Using a 5/8" Forstner or spade bit, drill holes along the length of the board at each key pin location about 3/8ths the width of the board deep.

Take this board to the band or table saw and cut it in half lengthwise and you have a tray into which to place leads for each key. I put thin strips of wood at the edges of my tray and put hinged risers on the back side so it is at the same height as the hammers at rest. I place the tray at the far side of the action so it is easy to relate a slot to a particular key.

By placing the lead weight over the hole from which it came and using a set of up and down weights, calculated and arranged for a particular balance weight, from which friction has been removed as a factor, I will remove as much lead as is needed to bring the balance weight down to what I want. I weigh out the whole keyboard placing each weight in its respective slot on the board.

David Stanwood sells sets of gram weights ranging from 15 to 65 grams with a tray to hold them in a setup for a particular balance weight.[2] After the weigh-off (a subject covered by David in previous articles) it is time to reinsert the weights into their vacated holes or to insert more weight into new holes.

Installing Thinner Weights

By using a set of large diagonal cutters it is possible to remove as much lead as needed, so you may end up with a very small piece of lead to reinstall. As an alternative, I have a simple fixture that is a block of wood tapered along one side with three 1/2" holes drilled to accommodate three lead weights. By setting up a fence on the band saw, I can slice the weights into six pieces of varying weights to help in the selection of a weight.

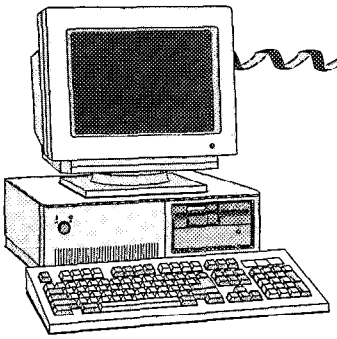
I use a 1/2-ton arbor press (a one-ton would be better) to press the weight into a disk which just fits into the old hole. If it is not a Steinway, I have a small piece of brass, 1/2" by 1/4", which I have screwed to a small metal plate. This plate goes under the key with the brass inside the key and the lead on top. Another 1/2" piece of brass is inserted into the hole from the other side and the press swages the lead into place. I do like to make sure the weight will stay in place, so I use CA glue to insure permanence. If the weights are glued with care, they can still be removed nicely if necessary. On Steinways the procedure is the same except I use the bottom of the hole in the key as the resting place for the weight, with it also CA-glued in place. If the weight is oblong, be sure to place the long side parallel with the length of the key to help prevent splitting. Do not use hammers or other violent procedures; they will split keys.

I like to use 38 grams as an average balance weight. I have used 40 (too heavy) and 35 (too light). Two extremely critical factors in key weighing are the weight of the hammers and the geometry of the action (new shanks). Before committing to a set of hammers and shanks, weigh the old and the new, check the up and down weight of the old and new, and see if there is enough room to place more lead in the keys. I do ***not*** recommend more lead in keys, rather I would prefer to remove some of the lead and will arrange the weight of the hammers and the geometry of the new shanks so I can improve the inertia of the action by removing more lead than I replace.

My stepfather used to yell at me to get the lead out. Well, I'm trying, I'm trying!

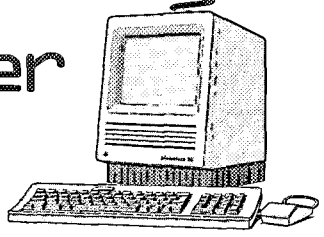
Notes ...

1. Ralph J. Onesti, 1317 Mac Dade Blvd., Woodlyn, PA 19094. 610-833-1657
2. David Stanwood, RFD 340, Vineyard Haven, MA 02568. 508-693-1583



E-Mail

The Great Equalizer



By Bill Springer, RPT
Hawaii Chapter

Electronic mail, or E-mail, has got to be the greatest communication tool since the telephone. Unlike a phone call where we must be there to answer the call not knowing who's on the other end, E-mail allows us to communicate when we desire, where we desire, and with whom desire! Like conventional mail (affectionately called Snail Mail or S-Mail) we send E-mail to an address, but we don't need to lick stamps or stand in line at the post office to be sure we have the correct postage and/or declaration forms filled out. In fact, aside from connection time (a few seconds per message) there is no additional cost to send the mail! Why not just send a fax instead? It costs money for the call, you may have to worry if your message was readable at the other end, and you need a dedicated fax/phone connection or some ingenious line-sharing device to receive the answer by fax.

Sending a Message

All right, let's send a message to Bob Pianoman (a fictitious name, I hope <grin>). We are going to create and edit this message off-line using the software provided by your server and send it later in an automated "send-and-receive" mail session. The exact procedure may be different but every mail program has a way to "send" or "compose" a message. For now, we'll skip the address and subject lines and move right into the body of the message.

We start off with a friendly greeting like, "Hi Bob," or, "Greetings Bob, <return> Glad to hear you're on-line. Say, I read your article in the *Journal*..." And so forth. To close, we have a simple, "regards," or "TTYL," (Talk To You Later) and our name. We may also add a "signature line" with a clever quote, a web page address, or a plug for your business. Hopefully, this quote changes fairly often as everybody gets to read this whenever you send a message <grin>. At a minimum, when sending mail to a newsgroup or listserv, include your name and possibly where you are from, as this information may or may not be done automatically. It is considered rude when asking for advice not to include this information about yourself.

The next step is very important: ***Proofread Your Message!*** We check for typos, of course, but more importantly; are these words a proper reflection of our thoughts? Unlike talkin' in person or via the phone, E-mail has only words and the occasional "emoticons" (see Table 1), to portray our true feelings. One result sometimes encountered by not proofreading is called the "flame" response. This is the term used to describe a rather direct, knee-jerk reaction from someone else (who perhaps didn't proofread either) with a differing opinion. Over the internet these flames can sound very harsh, especially to "net novices," and can escalate quickly into "flame wars." 'Nuff said.

Addressing the Mail

Example address: ecc@ptg.org. While they are at first a bit intimidating, E-Mail addresses are much shorter than S-Mail addresses and can be stored in the computer's "address book" for future reference. The address has three parts. First is the name, "ecc" (electronic communications committee) followed by the @ ("at") sign. Next comes the domain name, "ptg." Last is the type of server, "org" (organization), "com" (commercial), "edu" (educational), "gov," etc. Upper and lower case letters are not essential, but can aid in the clarity of the address.

```
Address:
cc:
Attachments:
Subject:
—Message Text—
```

Figure 1 — A typical E-mail screen

Back to our mail message. Jump to the "Address" field and fill it in (see Figure 1). If the recipient's E-mail address is filed in your E-mail address book, you need enter only a short nickname in this field. Next move to the "Subject" field and choose a subject. This subject will appear next to the sender's name when received, so try to make this short and to the point. Imagine, as a recipient, having a list of say 30 messages. Which one do you choose to read first? The one that says "No Subject," or the one that reads "Free Piano"? Proper use of the subject line also allows us to sort mail by subject, and there are even some computer nerds out there with lots of mail who automate this process. The properly addressed mail with a proper subject can now be sent immediately, or perhaps grouped with other mail to be sent later.

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E-Mail, The Great Equalizer

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Sending and Receiving Mail

This is something we want the computer to do for us quickly. There should be an option for automating this procedure in the mail program. Select the "Send/Receive Mail then disconnect" or similar option in your program. The computer then logs on, sends and receives the mail and logs off as quickly as possible. Even with 30 messages a session this rarely takes more than two minutes (using a 28.8K modem). We can now browse through the new messages at our leisure.

Reading Mail

This is also something we do "off-line." Clicking on the "In" box, or "Readnew Mail," we see a list of messages with a subject and the name of the sender. Messages from Compuserve may have numbers instead of a name, but basically we can see who has sent us mail. We can now browse through and read the mail. We can also create folders for different correspondents or subjects and archive the mail we think valuable. I have several headings for technical discussions as well as a few personal files for people I converse with frequently. Don't be afraid to use the delete key!

Replying to mail. We've read through our mail and want to respond to a particular message. One easy way to do this is with the "Reply" button. This button fills in the address and subject fields and can "capture" the entire previous message. When used with proper "Netiquette" (etiquette on the net) this is a great tool. Including a portion of the previous message is especially useful when responding to a newsgroup or mailing list. On a mailing list there are usually several "threads," or different responses to one message, going on at the same time, so having a direct quote in the body of the response makes the response easier to understand. Some subscribers quote first and then respond, others respond and then quote. We can also copy/paste using the < symbol to separate the original text from our response. After reading some replies and seeing the conventions used, this all becomes clear and second nature. Please don't forget to proofread the replies before sending <grin>.

Table 1

Commonly used abbreviations and expressions:

```
TTYL Talk to you later
TTFN Ta ta for now
BTW  By the way
IMHO In my humble
     opinion
IOW  In other words
:)  Happy Smiley
:(  Sad Smiley
;)  Winking Smiley
:{) Smiley has a mus-
    tache
:{} Smiley has a beard
    and mustache
8)  Smiley wears glasses
```

Netiquette

A few words on Netiquette. Unlike a fax, E-mail either comes in readable or not, so the use of ALL CAPS becomes a form of shouting. This practice is very frowned upon, and "newbies" who use caps soon learn not to do this. Do make use of abbreviations and expressions to send a clearer message (see Table 1). Be sure if someone addresses a message to you in private, that you respond in private as well. By broadcasting publicly a private message you have betrayed an implied trust. Ask permission to quote someone's message if you intend to use it in a newsletter or other public media.

Subscribing to a Mailing List

One very important mail message is the one that gets you on the "pianotech" or "PTG-L" listserv groups. A listserv group is a mailing list where messages sent to the server are then sent out to everyone on the list. The pianotech listserv is hosted by BYU-Provo, is open to all, and involves discussions of technical piano matters. See Table 2 for details. Take special note that the subscribing address and the message address are different! Be prepared for lots of mail when subscribing to these lists. If this volume of mail is overwhelming, consider the digest option (See Table 2). When active, this option takes in chronological order the latest 20 or so messages, and sends out one long message.

Those of us who have been using E-mail and the internet for a while often find that there's something new, perhaps a better way to do things, a great new web site, or have a particular problem doing something. The Electronics Communication Committee wants your ideas, questions and comments. Please send your correspondence to: ecc@ptg.com. Happy E-mailing!

Table 2

pianotech

"Pianotech" is a mailing list dedicated to the discussion of technical piano tuning and repairs.

To subscribe to pianotech, address the message to: listserv@BYU.edu.

Leave the subject line blank or use "". In the message body type only the following:

subscribe pianotech Your Name.

(For example, I would type: subscribe pianotech Bill Springer)

When sending a message to Pianotech address mail to:

pianotech@byu.edu.

To set the digest option send mail to the listserv, Leave the subject blank again, in the body type only:

set pianotech mail digest.

PTG-L

The "PTG-L" list is hosted by PrairieNet (Illinois-Champaign-Urbana) and discussions revolve around PTG, its members and the organization. To subscribe, send mail to: listproc@prairienet.org

Leave the subject line blank or use "". In the body type only:

subscribe PTG-L Your Name.

To set the "digest" option send mail to the listproc, leave the subject blank again, and in the body type only:

set ptg-l mail digest.

So You Want to Be a *(Woman)* Piano Tuner

By Nancy Burkhalter
Laramie, Wyoming

Piano tuning is definitely not a mainstream profession for women. I only have to look at the surprise on people's faces when I tell them what I do. And it was certainly not mainstream when I entered the field in 1973. When customers called, they assumed I wasn't the tuner and asked for my husband. Many of them hung up after I told them I was the tuner.

My favorite call came from a man asking if I was blind.

"No. Why do you ask?"

"Because I know that blind tuners are better than sighted ones." I couldn't blame him for this commonly held but unwarranted belief, but by this time I had become a little hardened to prejudice. I fliply retorted, "I'll tell you what. I can't see too well without my glasses. Howz about I just take 'em off while I tune?"

Click.

The most harrowing experience occurred at the VA hospital near Cleveland. I had been working on contract around the hospital for several weeks by the time I entered one of the locked wards.

I was buzzed in and shown an ailing spinet in the visitor's room. I set about replacing several hammers and bass strings. Toward the end of my work, a patient, garbed in pajamas, shuffled up.

"Why, you must be the lady piano tuner I've heard all about," he said, as he put his hand on my shoulder. I feared the worst.

Brandishing my potentially lethal tuning hammer, I shouted, "Back off, mister." The nurse heard the commotion and quickly ushered the patient away. I was left with several visitors staring at me and a bad case of the jitters. I was so undone, in fact, that I poked myself with a bass string wire and blood gushed all over the floor. A little wound dressing and a tetanus shot shored up the pharmaceutical side of things, but I wondered if I had overreacted to this (probably) harmless inmate. I vowed to stay on the alert for guys in pajamas, or in any other apparel for that matter.

But, my suspicions and fears have proven unnecessary. My fellow male tuners have been unreservedly charitable with both their time and information. When I approached master tuner/technician Don Wilson in 1973 to be an apprentice he consented without delay. I even served as president of the otherwise all-male Columbus PTG chapter for a year.

What resistance I did encounter came from my mother. Having just paid a bundle for four years at a private university, she scoffed at the idea of her daughter becoming a blue-collar worker. Despite that opposition, I forged ahead with my plan and have never regretted it since. Becoming a tuner has taught me patience, perseverance, mechanical knowhow, and problem solving. I feel very independent and have never wanted for a job. In fact, I used my skills to put myself through several years of graduate school, borrowing nary a penny in school loans. I guess Mother didn't know best after all!

Back when I first graduated from college, the job market was very thin. The only one I could snag was a secretarial position in downtown Chicago. I was disheartened. Then one day, out of the clear blue, my boyfriend suggested I try piano tuning.

"A piano tuner?" I checked his demeanor. Dead serious. "But I don't have perfect pitch."

"I know a tuner without perfect pitch. Make some calls and see what it takes."

Within a week, I was an apprentice in Don Wilson's dark, dusty, cobwebby shop on the west side of Chicago, refinishing and repairing all manner of pianos.

Today, women seem to be much more accepted as competent tuners and technicians even if we are small in number. PTG statistics say we constitute nine percent of its membership. Despite its male domination, the profession still offers us what most others do not: equal pay, equal working conditions, and equal opportunity for success.

Speaking of success, take a look at the women I interviewed for this article. Barbara Pease Renner from Beachwood, Ohio, for instance, works almost exclusively for Telarc. She prepares pianos all over the world for recordings on its label. Christine Lovgren of Natick, Mass., teaches at the North Bennett Street Industrial School, a venerable piano tuning and repair training institute in Boston. She teaches tuning, tuning theory, regulating, and repair. Indianapolis-based Barbara Martin's business has thrived for 40 years, including an eight-year stint with the Indianapolis Symphony. At 70, she still works seven days a week.

The Tuner's Life

Christine Lovgren sampled many fields of study and work before she became a tuner. She pursued anthropology and archaeology at the University of Denver. Graduate work at Idaho State took her into the study of stone tools, but she found academia "too tedious." After that, it was off again to study elementary education to be followed by a few teaching positions. Then there was a gig at a ski shop in the back of a hardware store where she also put handles on golf clubs and strung tennis rackets. She found she enjoyed and excelled at working with her hands.

Her chance to turn that skill into a job came in her late 20s when she picked up piano lessons again. She reports being very curious about the blind man (!) who came to tune her piano. In a year's time, she was at North Bennett Street working toward her dream.

Unlike my situation, Lovgren's goal was welcomed. Perhaps because both her brother and father were engineers, "I was never discouraged (from doing what I wanted)," she says.

Within a year of her graduation in 1981, she was hired part-time as a teacher at North Bennett Street and became full-time when the director, who had hired her, left his post in 1984.

Her two children were born in 1986 and 1988, causing her to cut back to two days a week. Recently, she has worked at building a private clientele. She says she is not set up to do anything more major than action rebuilding in her shop, but that's okay; right now, her business and teaching are enough.

"I really like teaching," reports Lovgren. "It keeps me in touch with a lot of people. I love talking about tuning theory. It's also satisfying watching people 'get it.'"

Barbara Pease Renner (no relation to the hammer company) seems to have the dream job. She works mostly for Telarc,

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So You Want to Be a *(Woman)* Piano Tuner

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jaunting around the country and world prepping pianos for recordings. I'm still not sure how she gets through airport security with her tools, but it's a small price to pay for getting to tune in places like Scotland.

Her interest in tuning was first piqued while attending a boarding school that was "not well endowed," she says. "We were encouraged to take things into our own hands. My father bought me a hammer and mutes." When the tuner did come to the school, she plied him with questions but "he was not forthcoming," she remembers. "He believed in the mystery of piano tuning."

Pease Renner met with much opposition when she announced she wanted to become a tuner. Her father said that piano tuning was for "old German men with a limp and an accent." When she was denied entrance into piano tuning school two years in a row, she suspected that her father had gone to the director and convinced him not to accept her so she would finish her degree at Boston University as a Russian major. She was finally admitted the third time she applied (and finished college some years later).

Pease Renner admits to having a musical background but little proficiency. "I was sent out to [tune for] a recording for Vladimir Ashkenazy," she recalls. "I prepared the piano as well as I could." Then Ashkenazy asked if she would play for him. She thought it would have been presumptuous to play something from classical literature. So she belted out the Maple Leaf Rag. Ashkenazy then improvised something on the Maple Leaf Rag. "He thought he was being very funny," she remembers. But she was mortified. "Most of the time, I don't play for the artist," she admits. "I usually don't let myself get put on the spot, especially since I don't practice anymore."

> "They sent a girl piano tuner!" Then he apparently regrouped and said "Thank God! I was tired of [the old tuner.] You're a lot better to look at."

Pease Renner attended North Bennett Street with four other women out of 24 students. Even though the school never turns away anyone, it offers a money-back, two-week trial period to make sure students can handle the physical side of the business. While it's (theoretically) true that anyone with normal hearing can learn how to tune, and (given enough strength) remove an upright action, the tuner must have a long enough reach to grab the 4'4" frame. Pease Renner's 5'2" physique means she struggles every time.

No matter what the field, it possible that women do not sell themselves enough when it comes to bragging about their abilities. Pease Renner admits that she may not have conveyed the requisite bearing with one particular customer as much as her male predecessor. She tells of the piano owner coming downstairs as she was removing the top to prepare it for tuning. The customer was nonplused. "What are you doing?" She replied that she was getting the piano ready to tune. "Well," the customer declared, "the tuner who came here before never did that. He just sat and played."

Sometimes it doesn't matter what gender a person is if it means encroaching on the domain of another tuner, whether it be for territorial, egotistical, or chauvinistic reasons. Pease Renner remembers when Telarc sent her to Scotland to tune for a recording.

"The tuner was not at all happy about the fact the I'd been asked to come," she said. Apparently this gent had tuned the piano, but the artist was not satisfied. So he was removed, and boy, was he hot!

She describes him as a very traditional 30-ish Scottish guy who was not used to being put in his place, especially because of a woman. He kept heckling her, saying how pushy Americans are. "The more comments he made, the angrier he got," she reports. As time went on, his tone became so strident that she began to fear bodily injury. Just in the nick of time, "the roady came and took him out to get drunk. That's the only time anyone's been so nasty."

Pease Renner agrees with the other interviewees that the low female census in the profession is not due to discrimination within the field. Any discrimination has come more from lay people. Witness a Telarc producer's wisecrack when she showed up to tune one day: "'They sent a girl piano tuner!'" Then he apparently regrouped and said "'Thank God! I was tired of [the old tuner.] You're a lot better to look at.'"

Barbara Martin is a role model that all women should study. A tuner for more than 40 years, she has made a crashing success out of her business and has enjoyed every minute of it. She was living in New York and thought piano tuning would be a "nice hobby" to supplement her career as a folk singer. "I asked my father if I could borrow money," she relates, even though she had already secretly signed up for school. "He was very intelligent about it."

She first got the idea for tuning when she was a counselor at a music camp in New York when the director's brother came to tune the piano. Although you wouldn't believe it from her enthusiasm for the job now, Martin says she was not smitten by the idea at first. But soon she was one of two women of the eight students attending a six-week tuning school.

She concurs with the other women tuners that she has never been treated condescendingly by other tuners. "I've been 'ma'amed' to death," she explains, and she did detect a certain approach toward her and other women at seminars. "There's a certain way these old geezers ask [women] questions," she says.

As with Pease Renner, Martin agrees that inspiring confidence seems to be more natural to men. She remembers being very meek when she became a tuner for the Indianapolis Symphony. Despite 20 years of experience, she would reply something like "I'll try" when asked to do a concert tuning. "The other guys would say, 'OK, let me hear it,'" she reports. "'Now go away and I'll fix it.' [Success] has more to do with the your type of personality and your forcefulness. You [must] approach a task as if you know what you're doing."

Martin chooses to deflect smart remarks about her ability with her own sarcasm. When Itzhak Perlman's accompanist broadcast rather loudly his skepticism about her abilities, Martin retorted: "I'll take care of that about as well as you'll take care of hitting all the right notes. Perlman shouted, "Touché!"

She admits (tongue in cheek?) that being a woman "has done a lot for keeping a piano clean — I clean stuff that doesn't matter. For example, I polish brass. Who's gonna see it? I am!"

I think Barbara Martin speaks for many tuners — both men and women — when she waxes poetic about tuning: "It's really unfair of me to have such a good life," she remarks. "It ought to be against the law."

"TECHNICIAN" SCORES AGAIN!

By George C. Eskholme, Sr.

Not long ago, I accepted a check from a client who had the reputation of being "slick." To be sure of the validity of the check, I took it directly to the bank on which it was drawn, and presented it for payment.

The teller eyed it dubiously. "I don't think he has enough in his account to cover this amount," he said, "but I'll find out." He found out: there was just enough.

"But you'll have to be identified," was his next remark, as he waved the money at me, just out of my reach. "Have you any identification with you?"

For this, I was not prepared. The cop on the corner knew me, but not my name; to him I was just "Hey, you!" Same with the bus driver. He knew my money was good, but whose money it was, he wouldn't say; he didn't care. Likewise the Greek in the "Bean Wagon."

Here was a deadlock! But suddenly a happy thought struck me! I had a copy of the "Technician" which the postman had handed to me as I left home that morning. On the bus, I had opened it, and found one of my articles printed therein, with my picture thrown in for good measure.

So I opened up the "Technician," showed the teller the article with my name under the title, and my picture underneath. "That's identification enough for me," smiled the teller, and handed me the money promptly.

Listen, fellows—send your submissions in, along with your picture, and have it printed in the "Technician"—you cannot lose!

There is a great similarity between girls and cars—a good paint job conceals the years, but the lines tell the story.

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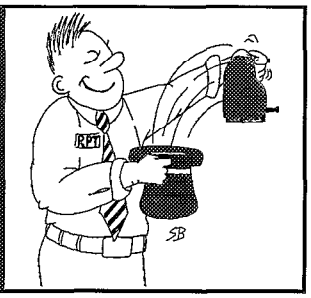
The Page for Serious Cases



The Piano's Contribution to Civilization

By Bob Bullok
Waukegan, IL Chapter

Part II of Part II

Pianos figured significantly in exciting history the 18th and 19th century. During the French Revolution, pianos were used to build barricades, without which the revolutionaries would have been easily defeated. These roadblocks used up the entire production of French pianos, and the industry never caught on again. Just as well. After The Revolution, none could afford to buy cake, much less a piano. Piano factories were eventually converted to the manufacture of automobiles that, like the pianos, were nothing to write home about. Before we write of the French as complete under-achievers, we must give them credit for a pair of magnificent contributions to western civilization; Bordeaux, as in wine, and Bardot, as in wow! Actually, a lot of pianos finally found their way to the "States," as the colonists like to call their new digs. The first piano that arrived here was an old Aeolian, circa Plato, that a Dutch cigar broker named Van Dyk bought for $24 in Honduras. He traded it in a deal to the Manhattan Indians for a small strip of land in New Amsterdam. This cabbage patch was to become some of the most expensive land in the New World and Van Dyk is thought to have been the first American real-estate magnate. If you've been to New York lately, however, you know the Indians got the better end of *that* deal. In Philadelphia, the Declaration of Independence was signed on the top of a Steinway "B." The lid sold later for big bucks because the signatures were so easily discerned in the finish. (Ben Franklin, a little hard of hearing brought "pins" instead of "pens" to the ceremonial signing.) The Steinway, sans lid, was used for years by Eugene Ormandy in Philly. Its remains were last seen standing in a corner of a bar in Brooklyn, having been converted to a harp after its wood had been scavenged. At Washington's Ford Theatre, having dispatched the "Great Emancipator," John Wilkes Booth stumbled over a Fazioli F 308 and broke his leg. The noble grand, therefore, played a part in bringing the coward to justice. Pianos have always been present in The White House, where each Commander-In-Chief had his favorite instrument at hand. Harry Truman, quite the ivory tickler, became incensed when a well-known gossip columnist said the First Daughter, Margaret, was vocally deficient. Harry wanted to put the wag in the hospital, but cooler heads prevailed. (The columnist was right.)

"The smaller, vertical instrument was ruggedly built, stood out of the way against a wall, and took terrible abuse in saloons from Kansas City to Deadwood."

Because of their bulk and weight, few pianos made it over the Alleghenies, much less the Rockies. The ones that did make it had wheels fitted to them by the Conestoga Company, then had the wheels removed when they arrived at their destination. These "reconverted" pianos never played well. Most of the West Coast pianos came from Los Angeles, courtesy of the some of Chang's descendants. They still do. A lighter modification of the cumbersome grand piano was adapted for use on America's frontier. The smaller, vertical instrument was ruggedly built, stood out of the way against a wall, and took terrible abuse in saloons from Kansas City to Deadwood. When these stalwarts became inevitably beer-soaked and untunable, they were hauled out into the prairie to form a series of piano "junkyards." Soldiers were sent to protect them from the Indians who, remembering the Van Dyk, would kill any piano they could find. A French engineer, Jacques de la Frogge, is credited with the idea of arranging the rotting hulks in a circle, thereby making them easier to protect. La Frogge called these interesting structures "pianofortes." Unhappily or happily, depending upon your heritage, most of these contests were settled in favor of the marauders. You won't find many pianofortes still around, except in John Wayne movies.

The honored piano survived all this mayhem and remains, to this day, a welcome addition to our lives. Plato would be proud to see all of the permutations his invention has assumed, from 9-foot Grande to the indestructible Acrasonic. This oversized music box has made a lot of people famous, from Mozart to Milsap, and those of us who build, tune and repair these wonderful instruments have been in select company, back through recorded history. It is my hope that this modest chronicle of the piano's historic sojourn helps you to appreciate the beloved focus of our craft even more.

PTG Review
Dedicated To PTG News • Interests & Organizational Activities
PIANO TECHNICIANS GUILD

Rebuilding Seminar Back for Orlando

The Rebuilding Seminar that was so successful in Dearborn in 1996 will be back with some new classes and instructors added for 1997. If your interests lie in learning to rebuild or just learning new ways to rebuild quality grand pianos in a shop situation, you won't want to miss these classes!

The seminar will consist of eight classes each given one time by some of the finest most successful rebuilder/instructors in the United States and Canada.

There will be no extra charge for convention registrants to attend these classes. You may attend one or all eight sessions. The classes will run Thursday, Friday and Saturday morning of the convention. This will leave open Saturday afternoon and Sunday morning for attendees with rebuilding interests to attend Bruce Hoadley's special six-hour class on Wood Technology.

Nick Gravagne, RPT, will give a class on one of the most critical parts of rebuilding teardown and reassembly with emphasis on proper measurements and setting downbearing.

If you are going to be successful in running a rebuilding shop, you won't want to miss Ralph Onesti, RPT, from The Rebuilding Authority give his class on the business of rebuilding. Ralph will cover subjects including estimates and appraisals, contracts, organization and promotion.

We will have two classes on pinblock replacement: one a complete installation class by Alan Vincent, RPT, from Geneva International, and the other a class on replacing fully-fit pinblocks with emphasis on removal and replacement by Andre Bolduc, RPT, from Bolduc Soundboard & Pinblocks.

Jack Krefting will give a class on efficient de-stringing and restringing. Jack is a first-quality instructor and experienced rebuilder and former

editor of the *Journal.* Jack will share his knowledge on how to do fast, efficient and quality stringing.

Soundboard repairs and finishing will be given by David Vanderlip, RPT. David will show you how to treat a soundboard and do quality shimming and repairs in an efficient manner.

If you work on quality pianos with soundboards boards that are not repairable and have interest in learning to replace them, you will want to attend the three-hour class by David Betts, RPT, on new soundboard construction and replacement. It will also include bridge capping and carving. As the head instructor at North Bennet Street Industrial School in Boston and an experienced rebuilder, David will have much information to share with you.

No rebuilding shop is complete without the knowledge to make jigs and fixtures to make fine woodworking repairs and installations. Shawn Hoar, from Shawn's Pianos, will show you how to make them and use them. Shawn will show you his many jigs and fixtures including one to fit the top of the pinblock while it is in the piano and also to set downbearing and shape bridges. This is a "no miss" class for the serious rebuilder.

If your thoughts and heart lie in quality grand piano rebuilding, the place to be July 24-27, 1997 is the Radisson Twin Towers in Orlando, Fla., at the 40th Annual PTG Institute!

— Wally Brooks, RPT
Institute Director

Orlando Tuning Class Overview

It won't be long and the PTG Convention & Institute in Orlando will be upon us, and for me it is the highlight of the year. It is a time when we can reunite with old friends, make new acquaintances, rejuvenate our enthusiasm, and learn the latest tips, techniques and theories in piano technology. An event like this comes only once a year, and judging from the slate of classes it will be one of the best conventions ever.

The classes and instructors chosen for this year's event are some of the finest you will find in the field of piano technology. Not only will there be interesting and educational classes, but there will be a wide variety, ranging from taxes to rebuilding. Even though the variety is vast, tuning is what we do and the tuning classes alone will be worth the registration fee.

The tuning classes are diverse, allowing for the varied interests and abilities. They will be filled with information that will help us to become more knowledgeable and skilled. How can I develop a better tuning with more efficiency? How can I tune with less fatigue? How can I tune more pianos in less time without loss of proficiency? These questions and more will be answered. Learn how to raise pitch in less time, how to determine appropriate beat rates for a given

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Ethics, Expectations & Marketing

By Keith Bowman, RPT
Chairman, Marketing Committee

For the better part of the past year, there have been a number of articles and published letters that have expressed opinions or concerns about various business practices. In a word — *ethics.* I thought it might be instructive to apply some marketing principles to this discussion.

We all have, to some extent, a unique approach to the manner in which we deliver our services to our clients. Therefore, we expect some differences in the way we evaluate conditions and itemize our work. This also means that our "packaging," or the way we group our work into unit prices, can vary. For example, one technician may offer, for a standard price, a complete service package that includes tuning, pitch adjustment, minor regulation or repairs, or other work as dictated. Another technician may charge separately for the tuning, a small repair and even a 45 second pedal adjustment. we each find our own comfort level; what works for us and our clientele.

MARKETING COMMITTEE

I believe that it is natural and healthy that we each have our own business style, as long as we attempt to provide excellent service in an honest manner. But because of these differences and *client expectations,* we can occasionally run into trouble. After all, it's what the client believes that has the most impact on your business success. Here are things to consider to avoid some of the pitfalls.

Education: By continually educating your client base as to proper piano care, you dispel incorrect assumptions, increase your credibility, and establish a higher acceptance level when making recommendations. I can back up what I tell my clients when I have a brochure or technical bulletin to provide a "third party" endorsement.

Mainstream vs. Slipstream: If you develop business practices that are similar to those of your competitors, it can help avoid problems. For example, I believe that it is a mainstream practice, at least in my neck of the woods, to charge extra labor for pitch adjustments. If a client questions this practice, I know that they will get a similar picture if they contact my competitors. This situation protects my credibility.

On the other hand, you may wish to intentionally be different from your competitors, to gain a competitive advantage by being distinctive. This can be a very successful tactic, but requires a higher investment in clienteducation.

Consistency: Whatever you do, it must be consistent. Decide what your time is worth, and apply it to all the service functions you provide. If you are consistent, it is easier to justify how you charge for services. Along with this goes a clear invoicing format.

Policies: Finally, and perhaps most important, is establishing policies for everything you do. Policies help to educate your clients about your services, and ensure consistency. If you work alone and know from memory and experience what your business policies are, it may not be necessary to have them in written form. If you are in a business with other people, written policies are critical; in fact a complete operations manual is a good idea. How do you react when you call a business and get a different price or procedure each time?

A policy statement is like insurance. It can protect you or the business you represent from potential problems — a preventative measure to save valuable time resolving complaints based on misconceptions. And like buying insurance, we all have a different risk level we're willing to live with.

Try this as an exercise; write down a list of all the potential problems or potential complaints you can think of, and then write a short paragraph that describes your position on each one. One issue that quickly comes to mind is the failed-service appointment. Do you charge no matter what? Do you charge only if the appointment is promptly rescheduled? Would you like to charge, but are afraid to?

Here is my personal position, which you certainly don't have to agree with:

1. Appointments are made in advance and my time is valuable.
2. When access to the scheduled work is denied, I lose money.
3. The client has some level of responsibility for that loss.
4. The client is subject to a service fee as a matter of policy.
5. I may decide to waive that policy for any reason.

The truth is, I almost always waive this charge when dealing with an individual, while I'm not nearly so generous with institutions. But I have the policy because I want the option.

You may want to make up a policy

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Orlando Tuning Class Overview

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piano, learn basic and advanced techniques on aural tuning as well as electronic tuning.

If you are a beginner and desire basic information that will set a foundation to help you become a concert tuner, we have classes that will fit the bill. How do you set a temperament? What are coincidental partials? How do you determine the beat rate for a given piano? What are advantages and disadvantages of various hammer techniques? These questions and more will be answered.

If you would like to delve into the intellectual side of this skill there are classes that will feed that hunger, get you thinking or make your head spin. What is a cyber tuner and how do you deal with inharmonicity are questions that will be discussed.

If that isn't enough, you can watch two of the best tuners in the country square off in a re-match to this summer's "Tune Off." Watch their technique, learn from their years of experience, and determine for yourself who does the best tuning.

This will be an exceptional conference you won't want to miss and for piano technicians the education and fun make it a great value. Make plans to attend and join in on the fun and education. You will be glad you did.

— Paul Olson, RPT
Assistant Institute Director

Ringing Up Long-Distance Savings

By Gary Neie, RPT
Chairman, Economic Affairs

Phone service just got more complicated the past few years. Do you remember the basic black phone that didn't even have a dial on it? You picked up the handset and told Molly (the phone operator) to connect you with Zeb down at the feed store, or Mrs. Betty Gilmore, "I think she is over visiting with Violet Hansberry or down at Jake Teebolt's." Talk about "Call Forwarding." We think it was invented in the past few years for an additional fee on your phone bill. We use to get all that service for $7.00 a month.

"Are you willing to switch? Do you want better rates? Do you want better service? Get your friends and family to join and we will give you the moon and all the trimmings."

Have you noticed how aggressively those phone companies are in getting your business? With all the hype, bells and whistles, who is right? It is getting harder and harder to know. However, I will try to sort out some of it for you. The facts are that AT&T has repeatedly increased its base rate, totaling 16 percent since 1991. Sprint and MCI have quickly followed suit each time, and we continually have fallen for all the promotional hype. It is reported that 24 million people have hopped from one carrier to another at least once in the past year because of offers of $25 to $50 dollars instant cash, 100 free minutes, some frequent flyer miles, or the many other offers that bombard us.

Now there are new companies vying for your business: Frontier, LCI International, LDDS Worldcom, and Matrix Telecom. They are coming so fast that there may be many more by the time this gets to print, but lets deal with these for now. Don't just dismiss the new kids on the block, remember it wasn't long ago that MCI and Sprint were the new kids on the block.

ECONOMIC NEWS & VIEWS

You need to tailor your phone service to the way you use your phone, even if you are now paying for basic service you may be able to save at least 16 percent by shopping a little. Let me try to make some sense of it.

AT&T (800-222-0300) has a couple of new plans. *True Reach Savings*: A volume-discount plan if you spend between $10 and $25 each month you receive 10 percent off base rates, customers that spent $25 or more per month get 25 percent off. *AT&T One Rate*: All out-of-state U.S. calls are billed a flat rate of 15 cents a minute.

MCI (800-444-3333) has at least three plans. *Friends & Family*: A volume-discount plan if you spend between $9.50 and $24.49 a month you get 20 percent off to MCI customers and 10 percent off to others. Spend $24.50 and up and get 35 percent off to fellow MCI users and 25 percent off to others. You also get a personal 800 number free. *Friends & Family Free*: Spend at least $10 a month and receive an hour of free calls to other MCI customers each month. After the first hour, all calls to other MCI customers are 50 percent off. Calls to non-MCI customers are billed at base rates. This one also includes a free personal 800 number. *True Rate*: All calls within the U.S. are billed at a flat rate of 14.5 cents a minute.

SPRINT (800-746-3767) has 2 plans. *Sprint Sense*: Out-of-state calls between 7 a.m. and 7 p.m. Monday through Friday are 25 cents a minute. Calls after 7 p.m. and on weekends are 10 cents a minute. You get a 10 percent refund at the end of the year if you remain a customer. *The Most II*: A volume-discount plan if you spend $30 or more a month. Spend $30 to $74.99 a month and receive 20 percent on base rates. Spend $75.00 to $149.99 and get a 30 percent discount. Spend $150 and up and receive a 35 percent discount.

Now for the new kids.

FRONTIER (800-783-2020) has *Home Saver*: Calls between 8 a.m. and 5 p.m. Monday through Friday are 22 cents a minute. Those after 5 p.m. and on weekends and holidays are 10 cents a minute. One important feature is that calls are billed on six-second increments. The "Big Three" bill on one-minute increments.

LCI International (800-860-2255) has *LCI All American*: calls between 8 a.m. and 5 p.m. Monday through Friday are 19 cents a minute; calls between 5 p.m. and 11 p.m. are 14 cents a minute; after 11 p.m. or on weekends are 12 cents a minute. These are also billed on six-second increments.

LDDS Worldcom (800-275-0100) has *Home Advantage*: calls from 8 a.m. to 5 p.m. Monday through Friday are 25 cents a minute. Calls after 5 p.m. and on weekends and holidays are 10 cents a minute.

Matrix Telecom (800-282-0242) has a couple plans. *Smart World*: calls are 19.9 cents a minute from 7 a.m. to 7 p.m. Monday through Friday, and 9.9 cents a minute after 7 p.m. and on weekends and holidays. *Association Advantage Plans*: These flat-rate plans bill all of your calls at either 11.9 12.9 13.9 or 14.9 cents a minute depending on usage. The rate amount is pretty well left up to the individual operator, you can ask for 11.9 and if they say no, ask for 12.9 and so on. Both of these plans come with a personal 800 number free.

Believe it or not the 800 number can be your biggest money saver. There are a lot more options available like, frequent-flier miles, cash back, internet service, prepaid calling cards and many more offers.

Check it out, you may be spending more than necessary on phone service and you can get a tailor-made plan that works better.

Ethics, Expectations & Marketing

Continued from Previous Page

statement that you include with other introductory materials to new clients, or, keep a copy with you to use as needed. You must judge how you inform your clientele about your policies without seeming overbearing or punitive. One technician I know has a statement at the bottom of the invoice which reads, "No tuning complaints considered after two weeks."

Conclusion: There is no one correct way to deal with failed-appointments, discounts, pitch-raising, string breakage and many other issues or client complaints. What is important is to have well thought out reasons for handling these situations the way you do, and when you execute your policies consistently, you greatly reduce the chances that your "ethical" behavior will be challenged.

Oregon Day '96

By Jeffrey T. Hickey, RPT
Eugene, OR Chapter

Ever wondered what it was like to be a service consultant for a large piano company? Are you curious about the job they do? The pianos they might service? The problems they encounter? Well ... you should have been at our yearly technical seminar! Our thanks to Yamaha International for sponsoring a unique and interesting technician's visit to our area. Teri Meredyth gave us full measure (... and beyond!) with this year's fascinating program. We've all attended programs with technical agendas, that's the point isn't it? We go to learn whatever is offered, from grand damper replacement to new ideas for hammer re-shaping, but rarely are we given the chance to peek inside the world of a 'piano technical consultant'. It was an interesting opportunity for all of us.

Rather than trying to specialize on any particular topic, the program actually was a 'Slice of Life' from Teri's perspective. We started with a little role-playing, with Keith Kopp as a studio owner 'hiring' her to do her best with a piano that had just been delivered for a taping session scheduled later in the day. The piano (a Yamaha C7 grand) had just spent the last several years on tour with a traveling musician, and sadly needed attention. It was clear that it had received minimal care throughout its career on the road, and would require some major work to bring it up to playability. But ... there's a time limit! The taping session is 'scheduled' for 6 hours from now! What choices have to be made? How far can you go? What's most important? These are the questions Teri deals with every time she's asked to service pianos out there in the "real world." Working in the LA area, she has both private clients (... including recording studios and university pianos) and her work as a service consultant to keep her busy. The Oregon Day program gave her a chance to share her world with all who attended.

This was a real test of her abilities, too. She had no chance to "preview" the piano, and it truly had spent the last few years on the road (somewhere along the line the artist-bench had been re-done. Ever seen a heavily overstuffed artist-bench wrapped in an Indian blanket? Strange tastes there!). The regulation was shot, the hammers pounded flat, masking tape adorned the areas where sound-techs had attached microphones, the soundboard and action coated with dust and dirt, there were particles of broken glass throughout the instrument (some party, eh!?), the strings rusty, and ... got the picture? This piano needed far more work than she had time to give it! When you add 20+ piano technicians asking questions and offering advice, you have some understanding of the tough job that Teri was handed. She carried it off quite admirably, and to the benefit of all who attended (... and the piano, too!).

My notes from the beginning of the session are quite complete. The opening gamut of; "What can we do? What can we ***not*** do?" is faithfully recorded. First, Teri helped us determine what our working parameters were: "No, we can't replace the hammers. No, we can't replace dampers or keyfelts in the time allowed. Yes, we can re-shape the hammers and voice 'em. Yes, we can clean the action, tighten the plate screws, and regulate as much as possible." What happened to my superb notes? Why wasn't the rest of the day detailed as neatly in my notebook? Simple. Everyone got up and pitched in!

Imagine the scene — technicians running out to their cars for tools and supplies. Knots of people surrounding the action, the case, and the lid while working, working, working. Throughout the day, Teri was as much referee as instructor while she helped lead the class through the piano's "face-lift," fielded questions, and sought to improve the piano's playability and tone while surrounded by her "helpers." It was a non-stop operation, and she handled it with the same precision and accuracy she gave to the piano. It really was quite a handful!

Some highlights:

1. The discussion on hammer voicing included input from several experienced techs and covered the spectrum from needling to steaming to alter a piano's tone. Teri advised us that sound-techs prefer a "bright" piano, as it gives them a more controllable sound to mix in the studio. She uses a weighted voicing tool with 3 needles, and sought to hear the piano tone "bloom" from her efforts. A too-hard hammer gives the piano a "closed" or "nasal" sound, and leads to odd partial "twangs" or other problems.
2. Clean the piano! Teri pointed out that most of our work is "invisible" to the owner, and shiny strings and clean soundboard may actually improve the client's perception of the work performed. Besides, she prefers a clean work area. Don't we all? This was when we found the shards, splinters, and glass-dust from some forgotten incident. Kudos to James Schmitt for having a can of naphtha in his car and for taking charge of cleaning the masking-tape glue residue from the lid, music rack, and plate (... an enormous improvement in appearance). Also thanks to the techs who scrubbed the strings with Scotch-Brite™ pads to remove surface rust.
3. Tech/Client Communications. Teri made clear the need for properly talking with the client. The client needs to understand what should be done, and what will be done before beginning any work. Be firm on any requests that may compromise the action's workability (... ask her how she knows!). Don't promise more than can be delivered, and deliver what you promise.
4. Do what needs doing the most. For this piano; Cleaning, re-shaping, voicing, and regulation. Most important tend to be: bedding the keyframe, blow distance, let-off, and drop. This particular piano had zero aftertouch throughout and was greatly improved by a neat trick; the Yamaha keyframe is slightly flexible and the balance rail can actually be raised (increasing key height and therefore dip) by careful adjustment of the glide-bolts. There's not too much play in the height, but you can get 1 or 2 mm from this technique.
5. Lightly sand shiny spots on the underside of the keyframe with 180-grit sandpaper. Removes problem squeaks!
6. Use a solvent brush to dust the

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INDUSTRY NEWS

INDUSTRY NEWS

Baldwin Trims Overhead

Baldwin Piano & Organ announced plans to reduce 50 positions from its salaried workforce at its headquarters in Loveland, Ohio, and at its factories in Trumann and Fayetteville, Ark., and Greenwood, Miss.

"Due to the loss of contract manufacturing for two piano companies earlier in the year, we [must now] get our overhead costs in line with revenues," said Karen Hendricks, CEO and president. "A key portion of this lost business was a result of Kimball International's decision to exit the piano business. We must focus our energy on our core businesses and not on the non-strategic contract music and furniture business."

[Excerpted (with permission) by Larry Fine, RPT, from The Music Trades, *January, 1997.]*

Young Chang Chinese Pianos Arrive

A year after opening a huge new plant in Tianjin, China, Young Chang is shipping Chinese-built pianos to the U.S. The three piano models are the first with a world-recognized name to come from China.

The Chinese-made Young Chang models include the U-121N, a 48" professional upright; the E-118, a 45" studio piano; and the E-109 compact 43" console piano. The pianos are offered in a high-gloss ebony finish.

"Our new line of pianos is a successful combination of quality materials and craftsmanship. This makes for a great selling piano," said Lloyd Robbins, executive vice-president of Young Chang America. "The expectations of our Chinese-made pianos was extremely high, and we truly met and exceeded those expectations, a year early."

The new Young Chang pianos are being built at a 750,000-square-foot facility that represents a $40 million investment. Company management expects the new Chinese plant to turn out 60,000 pianos in 1998.

[Excerpted (with permission) by Larry Fine, RPT, from The Music Trades, *January, 1997.]*

MTNA Executive Director and Foundation Director Appointed

Music Teachers National Association (MTNA) recently announced two appointments for top slots within the 24,000-member music teacher association. MTNA named Dr. Gary L. Ingle as executive director of MTNA, and Shirley Raut as director of the MTNA Foundation.

Ingle took over the executive director duties for MTNA in early December. He was most recently the executive director of Phi Mu Alpha Sinfonia and the Sinfonia Foundation, based in Evansville, Ind. Ingle has nearly 20 years of experience in the music education field and association management, and holds a doctoral, masters and bachelors degrees in music. His specialization is choral conducting, and is active in community arts and music organizations. Ingle is listed in *Who's Who in American Music, International Who's Who in Music* and *Outstanding Young Men of America.*

Raut served as executive director of MTNA for four years before taking over the duties of overseeing the MTNA Foundation, a newly created position. She started with the organization in 1988 as a meeting manager. Raut holds a masters and bachelors degree in music. Active in her community, she is a member and soloist with the Vocal Arts Ensemble of Cincinnati and works extensively with children's choirs in the Cincinnati area as a director and clinician.

PianoNet Website Provides Musicians with an Online Information Center

Dallas — The National Piano Foundation (NPF), in conjunction with Piano Manufacturers Association International (PMAI), announced recently that they have launched a comprehensive website (www.pianonet.com) which provides detailed information on the piano and the joys of playing piano for musicians and enthusiasts of all ages. Recognizing the abundance of piano and keyboard players worldwide, NPF offers PianoNet as an alternative free resource for information about the piano and represents a first stop for musically

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Oregon Day '96

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keyframe and felt punchings. A stiff-bristled narrow brush and vacuum can work wonders. Use 4/0 steel wool and McLube™ products on the pins. After removing dust and debris, spray pins and underside of the frame with McLube 1725™. Used CF-tool to open the balance rail openings slightly (... and breathing on them can tighten them if they're just a smidge loose). The keys worked very smoothly after this process (... I know because I helped lever them from the keyframe. Way too tight at the start, they almost fell into place after the treatment.).

7. String leveling worked on many of the "twangy" notes in the mid-range. Don't neglect hammer spacing and squaring before voicing.
8. Eat lunch! (Hey, the techs need their energy, too! Randy Potter has some great video footage of this technician gently nodding his head late in the afternoon, as Teri re-shaped the hammers in the grand. Did I thank Randy for providing the up-close video and full-size TV-monitor so those in back could see what was happening?)

There was more going on, and more information passed about, than these brief words can relate. I hope I've given you some sense of how much we learned, and how much we enjoyed Teri Meredyth's program at Oregon Day '96. Such seminars are a tremendous opportunity for all of us to learn something(s) new, aren't they? See you next year at Oregon Day '97!

Industry News

Continued from Previous Page

inquisitive minds.

"PianoNet is a celebration of the piano and the people who play it," says Don Dillon, executive director of the National Piano Foundation. People can visit PianoNet with questions and comments about the piano and piano instruction, and we'll direct them to the appropriate channels. It's a one-stop source for virtually all piano-related topics."

PianoNet (www.pianonet.com) is a full-service website which is operated by the National Piano Foundation and geared toward musicians and aspiring musicians who wish to learn more about the piano and the resulting positive effects of taking up the instruments. Whether searching for an inspirational video on the joys of playing, seeking tips for purchasing a quality piano, or learning the process of piano-building, one needs to look no further than this comprehensive website. PianoNet also provides a forum for musicians and enthusiasts to share ideas and experiences.

"Whether a musician is looking for a direct link to the world's best piano manufacturers' websites, or general contact information for a number of music organizations, PianoNet is the place to explore," continues Dillon. "It represents the ultimate online information booth."

While PianoNet represents a complete reference guide for musicians and piano enthusiasts, the site also offers an edutainment center for children titled "Kids Corner." In this section, kids can learn tips for beginners, read anecdotes from famous piano/keyboard players such as David Bryan of Bon Jovi and share ideas and questions with other young adults in NPF's PianoSource Kids forum. And, for those kids (or adults) who still haven't taken up the piano, PianoNet even offers contact information for the Music Teachers National Association, so everyone can find the ideal instructor to meet their specific needs.

PianoNet also offers a variety of print publications that can be ordered right from the website. Two of the most popular publications include "Your Piano and Its Proper Care," which provides tips for piano maintenance, and "How to Help Your Child Succeed At the Piano," which offers successful ideas for encouraging children to play the piano. In addition, PianoNet outlines a number of approaches to instruction for a host of varying disabilities, as well as results of research which depicts the various benefits piano instruction provides to the handicapped.

"PianoNet is an all-encompassing website," remarks Terry Lewis, corporate vice president, Yamaha Corporation of America. "Whether you want to take a virtual tour of a piano manufacturing plant, or just peruse a host of famous pianos from the Smithsonian Piano Collection, PianoNet will serve as your tour guide."

For more information, please visit the PianoNet worldwide website at http://www.pianonet.com; send email to the National Piano Foundation at npfinfo@pianonet.com; or call (972)233-9107.

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- PTG Tuning Exam Source Book

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CALENDAR OF EVENTS

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.

March 14-16, 1997 **PACIFIC NORTHWEST**
West Coast Tyee Hotel, Olympia, WA
Contact: Mitch Kiel (360)264-5112
11326 Patsy Drive, SE, Olympia, WA 98501

April 3-6, 1997 **PENNSYLVANIA STATE CONVENTION**
Days Inn, State College, PA
Contact: Fred Fornwalt, (814)942-1489
1333 Logan Blvd., Altoona, PA 16602

April 25-27, 1997 **WISCONSIN DAYS**
Ramada Limited, Madison, WI
Contact: Joel Jones, (608)833-1488 or
(608)263-1887
9 Springwood Circle, Madison, WI 53717

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 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

AUXILIARY EXCHANGE

Dedicated To Auxiliary News and Interests

Auxiliary has full Agenda in Orlando

Phyllis Tremper
PTGA President

Dear Members, I have much to speak about, so I will get right to it.

About Disney World — I suggest that those of you who are not going to classes sign up for a two-, three- or four-day pass at any of the parks. Call Sharlene Pitts at 407-397-4946 ahead of time. She will help you plan your stay at Disney World for as long as you want to be there. Be sure to mention that you are with the PTG Convention, and mention my name to her. She will call you right back to save telephone time.

About the backstage tour and Disney World — If you plan to go to Disney World on Friday and also want to take the backstage tour, remember the one-day fare is $40.81, and you will have access to the park for only a few hours before the tour. The fare for the tour is extra.

About the convention — As you know it will soon be upon us. I need to know the number of the people who will be taking the backstage tour. The tour will start at 12:30 p.m. on Friday and will continue until 4 p.m. We don't have to be back to the hotel until 8 p.m. for the concert, so we can have dinner at the park. Also, I need to know how many wheel chairs to be reserved for the tour. So, please fill out your convention registration as soon as you can, and remember, early registration is cheaper anyway.

On the convention — Our convention director, Wally Brooks, has scheduled a class on taxes on Saturday morning, from 8 a.m to noon. The speaker is well know in his field. His usual fee is $300, but we will be able to attend for only $65 — a real bargain. Everything you wanted to know about your taxes and about being self-employed will be discussed. There should be more publicity about him in upcoming issues of the *Journal*, so watch for it.

If you don't plan to attend this class, Wally has invited us to attend other classes on Sunday morning free of charge. These are all business classes as I understand it. Watch for more publicity on this event.

These classes have caused me to move the Installation of Officers to Thursday afternoon, after the scholarship winners concert. So Thursday is going to be a full day for Auxiliary activities. Don't plan anything for Thursday; it's all planned for you! I now realize the problem is that there is so much to do at convention, it's hard to choose what to do with your time!

I have heard it said that some RPTs don't know what we are planning for entertainment and don't know what the Auxiliary is doing during the convention. Please ask your tuner to read my articles, as I am trying to let everyone know what is going on. Short of taking out a page in the *New York Times* or *Wall Street Journal*, I don't know a better way to advertise our activities. As you know, RPTs are always invited to join us for our tours and activities, and they are invited to the scholarship winners concert, too.

Have you helped your tuner/spouse fill out the questionnaire that came with the January issue of the *Journal*? Please follow up on this as it means we can find out where the Auxiliary is going in the year 2000.

One more thing — We need donations to the scholarship fund. Please send your donations to Marilyn Raudenbush. These kids need our help and that is one of the reasons the Auxiliary exists, so let's hear from you with those checks marked for the scholarship fund.

Do we have your e-mail address and your birth month and day? If not, send that information to the home office in KC.

Now I also want to give you a warning: Beware the Ides of March! Get those income taxes started and filed. Remember, they once were due on the Ides of March, now you have until April 15.

Now that we have gotten this far into the calendar, winter is almost over, so in the time remaining, ***"Put A Little Music In Your Life."***

— Phyllis K Tremper
PTGA President

The Influencial Spud — Part I

By Beva Jean Wisenbaker,
PTGA Corresponding Secretary

Introduction

The theme for this year has been "Put a Little Music in Your Life." I don't play a musical instrument or sing, so I got permission from Phyllis to copy a book report I did for one of my home economics classes in college. I made an "A" on it (I forgot to mention in my autobiography that I graduated magna cum laude). The teacher liked my report so well, she asked me to give an oral report to my class as well as one of her other classes. At the end, I'll go over some of the questions I was asked by those classes. This book had over 600 pages. Now don't laugh when you learn its name. Can you imagine writing over 600 pages on that topic?

The History and Social Influence of the Potato

By Redcliffe N. Salaman

The place of origin of the potato is Peru. Much of the historical knowledge about potatoes comes from the pottery of Peru which has been excavated and studied. From the sculptures on the pottery it is theorized that the inhabitants of Peru had previously lived in the rain-soaked forests. Even people today who have gone into the forests testify of the literal terror which reigns there due to savage insects, jaguar, boa constrictor, puma, alligators, voracious fishes, and the silence that is ever present and can only mean extreme danger. The terror of the forest is what drove some of the people up into the mountains of Peru. The altitude in the mountains was too high and the weather too cold for either manioc or maize to be raised. It was here, however, that they discovered the potato. The potato made their residence on the mountains possible.

Their pottery reveals that the terror of the forests remained a real part of their lives. The jaguar is seen in some of the pottery. Much of the pottery is also shaped and decorated like potato tubers and reveals the importance that the potato played in their lives. It is here too that we find evidence of a fertility rite connected with the potato. The pottery depicts people with an artificial deformity consisting of a double hare-lip. The deformity is of varying extremes. In some cases the upper lip and the end of the nose are cut away while in others the lower lip is cut away also. In other instances the upper lip is split in the middle and the lip is rolled back and secured with thorns on each side. The theory about their reason for doing this lies in their belief in a potato spirit or god along with many other gods. They had noticed that the tubers with the largest eyes and biggest sprouts produced the best crops of potatoes. They felt compelled not only to let the potato god know what they wanted but also to *show* him what they wanted. Their mouths with the lips and nose cut away represented the large eyes of the potato, and their teeth thus protruding represented the big sprouts. In this way they felt that they were telling the potato god exactly what they wanted. A crop failure meant either starvation or emigration.

One method of preservation of potatoes was called chuno which made use of frost to make it. The best quality of chuno is snow-white and can be made into a very good flour. Chuno has been valued as bread has been valued to us.

The potato dictated the rhythm of their life which was a primitive peasant communism. The Spanish invasion destroyed the Inca civilization which had taken over, but the communal basis of the civilization was not destroyed. The Spaniards were quick to see the value of the potato in maintaining the subsistence of the slave labor in the silver mines, but it took them a few years to accept the potato for their own use.

There are several theories as to how and where the potato left South America and where it arrived in Europe. The author feels that it left Columbia not later than 1569 and reached Seville not later than 1570. The first record of potatoes in the Herbals is mentioned in 1596 by John Gerard. He ascribed their origin as being Virginian. Other writers unquestioningly repeated the information which has been proven by other evidence to be a blunder by Gerard. The potato was first referred to as an Irish potato by William Salman in 1710.

The potato is one of those items which has been used as an aphrodisiac. References to the potato began to accumulate in the 17th century. It was said to be good for exciting Venus, increasing semen, useful for invalids and aged, stop fluxes of the bowels, increase seed and provoke lust, cause fruitfulness in both sexes, stop all sorts of fluxes of the belly, good against impotency in men and barrenness in women, and the Burgundians thought it caused leprosy. In the literature of the Elizabethan and Jacobean dramatists the potato is included as an aphrodisiac along with such other things as cock-sparrows, oysters, eringoes (i.e. candied sea-holly), marrow, preserved dates, and dove brains. They were also referred to as stimulating endeavor and encouraging fortitude. Most of these references were probably to the sweet-potato. The Doctrine of Signatures applied to the sweet-potato was windiness and lust propelling. The Signature applied to the sweet-potato was transferred over to the common potato. The resemblance of the flowers of the potato to those of the poisonous nightshades and bittersweet led the people to believe that the potato was poisonous, too. The potato was the first food in Europe to be grown from tubers instead of seed, and it was also grown underground. The cultivation, behavior, and habits of the potato were unusual. The peculiarities of the potato created interest as well as superstition. The thought that it caused leprosy stemmed from the fact that the nodular tubers resembled the deformed hands and feet of those who had leprosy. They also believed that potatoes were the cause of scrofula (tuberculosis of the lymphatic glands). Samuel Engel in 1777 pointed out that in Ireland where the potato had become the chief food, these diseases were very rare. He also argued that potatoes were a sovereign cure against famine. In 1771 the Medical Faculty of Paris had given their verdict that the potato was a good and healthy food, not injurious to health, and of great utility.

(**Editor's Note:** *Beva Jean Wisenbaker's article will appear as a series during the upcoming months.*)

Correction

The chairperson of the Reconstruction Committee is Patrice Coleman, Jim, Jr.'s wife in Tempe, Ariz.

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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.

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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.

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.

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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 3PIANO TUNING COURSE

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

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WANTED

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

WANTED: Back issues of the Journal, particularly older issues (pre1965-would prefer complete set). Contact Michael W. Hart, P.O. Box 268, Corbin, KY 40702 (606) 528-8760.

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CAN YOU HELP? Would like to contact the Tuner-Technician who worked on the Piano for the Bill Grahams Fillmore East Theatre, Greenwich Village, NY in the 60's and 70's. Please write to: J. Kirsch, 4485 Baintree, University Heights, OH 44118.

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

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DISPLAY AD INDEX

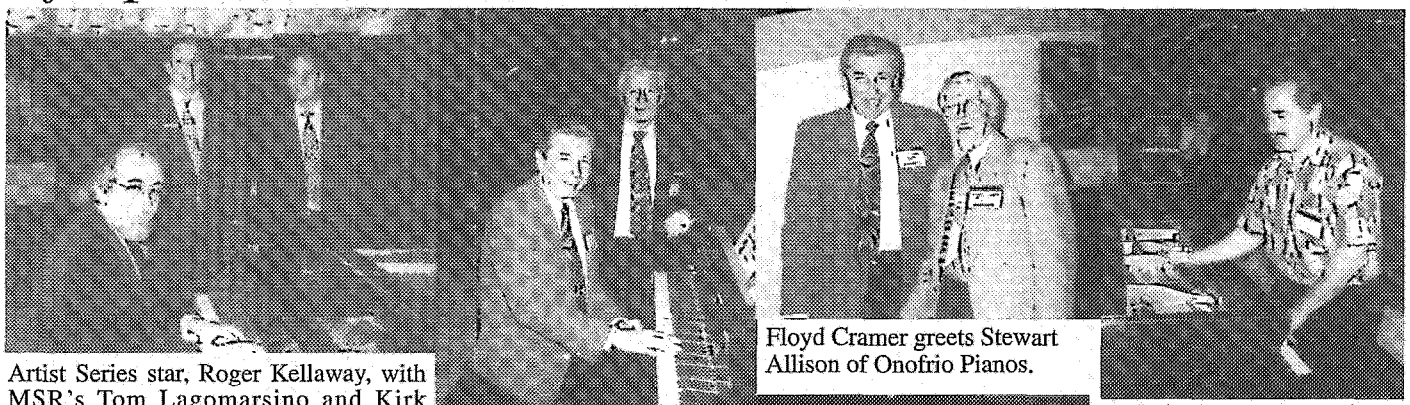
Piano Discussions™

March 1997

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

Winter NAMM '97

If a picture is worth a thousand words, here are 11,000



Artist Series star, Roger Kellaway, with MSR's Tom Lagomarsino and Kirk Burgett.

Floyd Cramer greets Stewart Allison of Onofrio Pianos.

Tuner/tech Dave Sposto helps ready a Knabe for opening day.

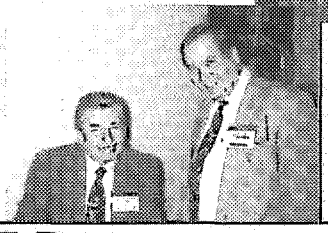
Floyd Cramer plays a Knabe while Mason & Hamlin's Paul Monachino looks on.

Artist Series stars Earl Rose and Judy Carmichael.

Tim Douglas, a Summer Spiff grand prize winner.

MSR's Gary Burgett (l) greets Artist Series star, Baldwin artist Wladimir Jan Kochanski and dealer Karen Winney.

Floyd Cramer and Dick Lucas of Dan Ferguson Music.



Floyd Cramer, Danny and Mary McBrayer, Roger Kellaway.

The legendary Paul Smith and Roger Kellaway before and during their duet on side-by-side Mason & Hamlins.

1997 Installation Training Schedule

Tech Training		*Continuing Education*	
Mar 17-22	*Apr 14-19*	*Mar 24-26*	*Apr 21-23*
May 19-24	*June 23-28*	*Aug 18-20*	*Sept. 22-24*

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

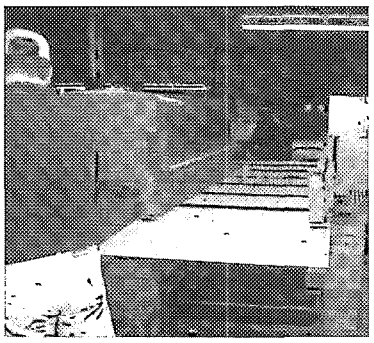
Yamaha Service March 1997

Last month, we discussed the elaborate climate control system at YMM (Yamaha Music Manufacturing) which ensures that each piano constructed by Yamaha is "perfect" and will withstand climatic changes throughout the years.

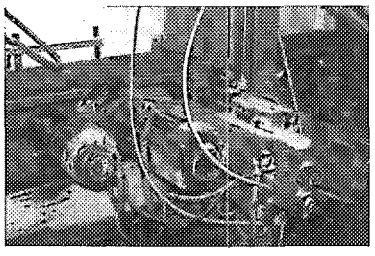
In this article, we discuss special machines utilized by Yamaha that cut and fashion wood to incredible tolerances.

Wood Work

The double end tenoner, for example, will simultaneously cut both edges of case parts to within 3/1000 of an inch on every cut, day in and day out. That's less than the thickness of a human hair! This machine can also be adapted—with other cutting blades—to profile the piece of wood into a beveled edge such as found on a bench or piano lid.

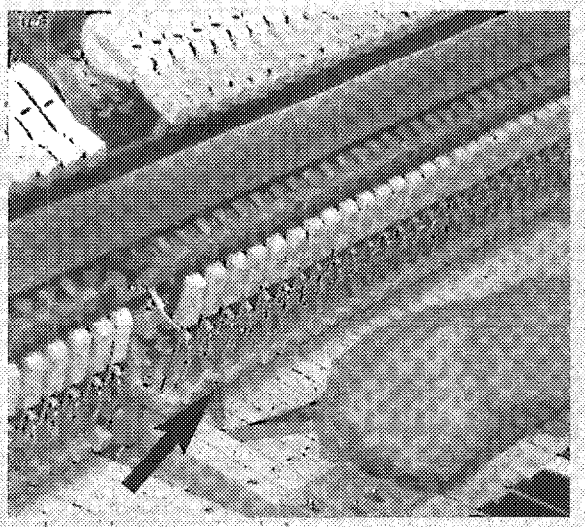


Because of Yamaha's precision, you can be assured that all case parts will fit correctly; no more key slips that have to be forced between the piano's arms, or upper front boards that have a quarter of an inch of play side to side.



The YMM "Tip of the Month"

If you have trouble finding and adjusting spoons, you might want to try a spoon bender like the one shown here. This tool works for most people because the thickness of each of the "prongs" of the tool is the same as the distance from the spoon to the flange. By inserting the tool into the general position and pulling back until the tool is stopped by the flange, it will be in correct position relative to the spoon. Then slide the tool upward until the spoon is captured between the two prongs. Sounds easy, doesn't it? It is.



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