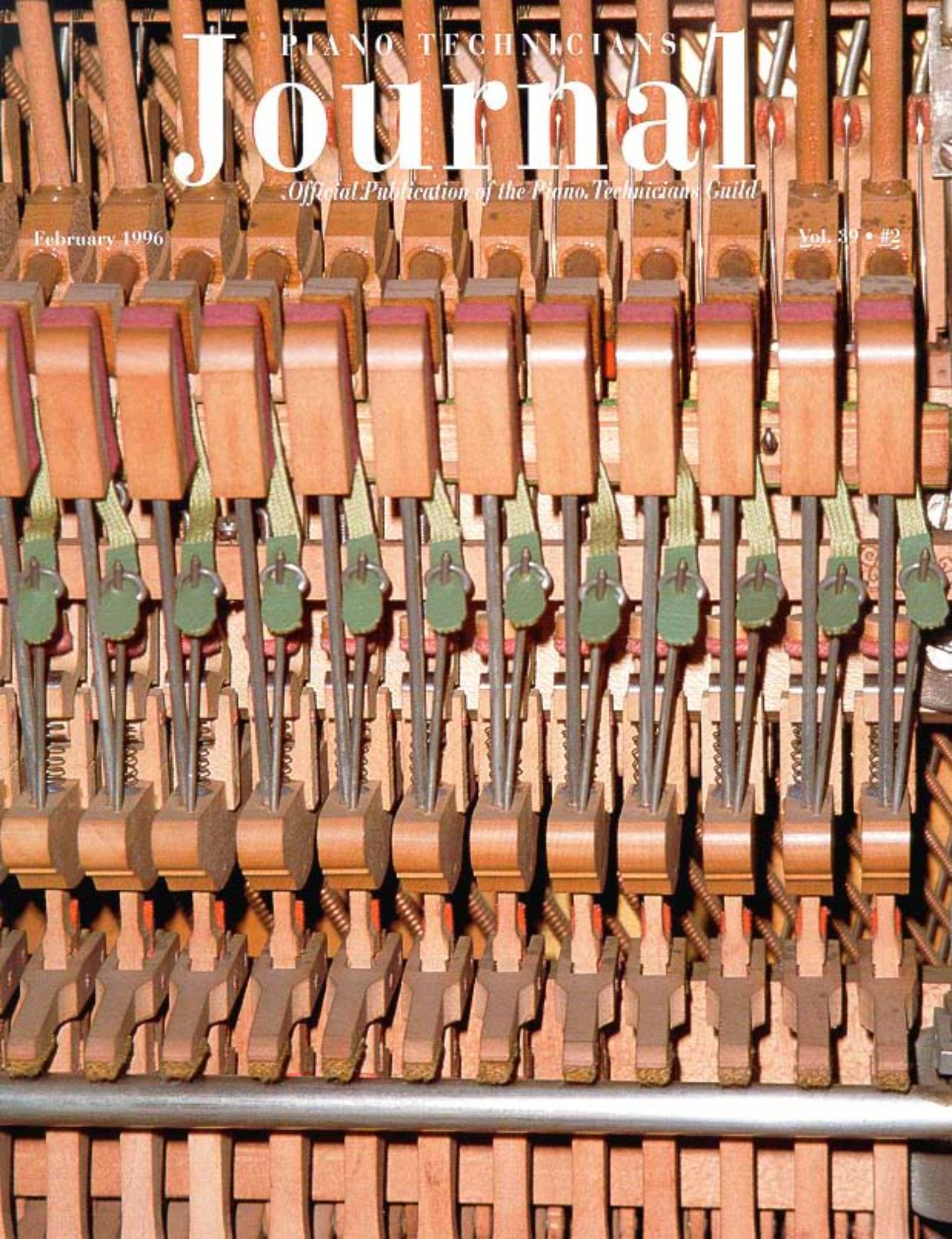
PIANO TECHNICIANS

Journal

Official Publication of the Piano Technicians Guild

February 1996

Vol. 39 • #2



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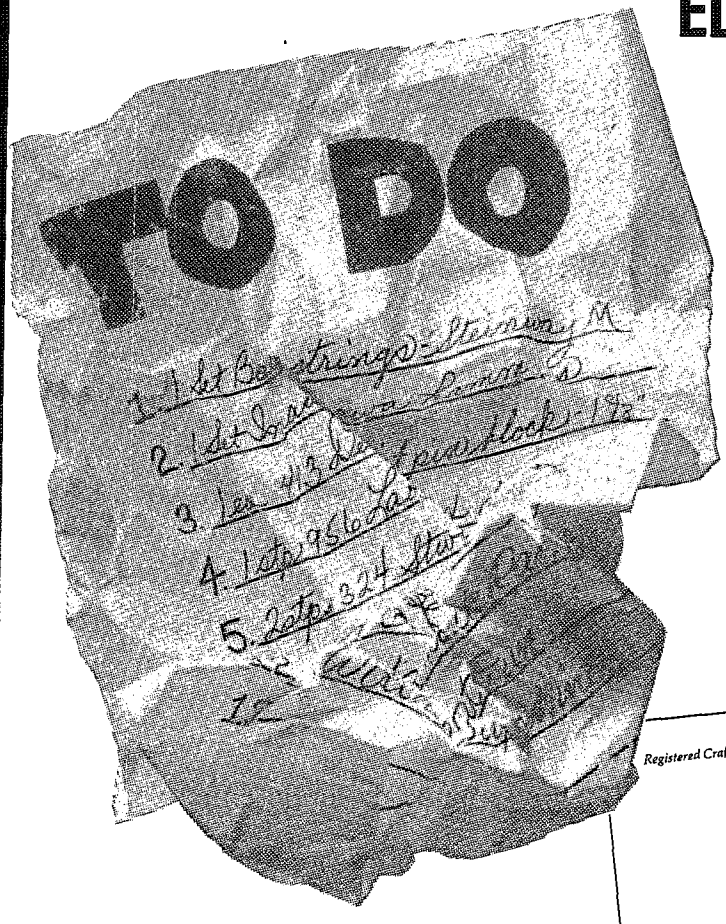

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PIANO TECHNICIANS
Journal
Official Publication of Piano Technicians Guild

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Piano Technicians Journal welcomes unsolicited materials, photographs and ideas from our readers. Please submit by mail or FAX. MicrosoftWord 5.1-Macintosh format preferred. We'll acknowledge all submissions and return those we can't publish. DEADLINE: No less than 45 days before publication date (i.e., September 15 for November issue) Send materials and letters to: *Piano Technicians Journal*, Managing Editor, 3930 Washington, Kansas City, MO 64111-2963.

Subscriptions
Annual subscription rates: $85 (US)/1 year; $155 (US)/2 years; Single copies: Current year/$10; 1 year/$5; back copies/$2 if available. Piano Technicians Guild members receive the *Journal* for $45 per year as part of their membership dues.

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Editorial Perspective

Are We Endangered?

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

It was late, too late for visitors, when the doorbell rang. Standing on the front porch was my old colleague, Ben Marcato, RPT.

"We've got to talk," he said as he walked past me into the living room.

"Come on in, Ben," I said, but by then he was already sitting in my favorite chair with his feet on the coffee table.

"Steve, this *Scientific American* essay has got tuners buzzing all over the country."

"Oh, you mean the one on the 'endangered piano technician?'"

"Yeah, that's the one. People are taking it the wrong way."

"Well, Ben, I read the piece, and frankly, this James Boyk doesn't seem to think that highly of the everyday piano technician. He said something like, 'all technicians tune and regulate and file hammers, but few do these things well.' How are we supposed to take that?"

"They're missing the point, Steve. Boyk is alarmed at the scarcity of truly skilled concert technicians, and he's trying to take the case public."

"Whoa, wait a minute, fella. Does he have to denigrate the rest of us in order to make his point? I mean, not every piano tech is a Ben Marcato, but do we really need to be? What about all the RPTs out there working on Betsy Ross spinets for people who resent having to have the tuner come once every three years? Aren't these tuners actually over-qualified for most of the work they're called on to do?"

"Look," said Ben, helping himself to a handful of my popcorn, "for every over-qualified technician out there, you'll find a dozen who shouldn't be allowed to own tools, let alone use them. People read a book and think they're piano technicians. Most of them don't have a clue, and you know it."

"Ben, I think you're being unfair here. Boyk didn't mention anything about PTG and its certification efforts, its educational offerings, or anything at all to let people know how to find a good technician..."

"That's because he couldn't find a good technician for himself."

"Well, maybe he wasn't looking in the right places, or maybe he just doesn't want to pay the price for a good tech."

"That doesn't sound like the Jim Boyk I know. He knows what he's talking about, and won't accept less than the best."

"Wait a minute, Ben. You know this guy?"

"Well, sure, our paths crossed a few times when I lived in L.A. I've worked for him, and I personally think he's in a very select league when it comes to knowing what he wants in a piano, and how to get what he wants out of a piano. He could teach a lot of technicians some new tricks."

"But I still don't believe that there are no good technicians in the L.A. area to choose from. I know several personally who can..."

"He doesn't mean there aren't any at all, Steve. I think his point is that if you put all the piano technicians in North America in a big bag and shook them up thoroughly, then let nine or ten fall out at random, none of them would be capable of tuning and voicing a piano to his satisfaction."

"Well, who could tune at all, if they were all shaken up like that? Nyuk, nyuk!"

"Come on, get serious. Did you know that the piano tuning business in L.A. is dog-eat-dog? There are so many underqualified technicians running around with a diploma and a bag of tools that some RPTs are forced to advertise tuning rates like 35 and 40 dollars. The competition is horrific."

"Okay, Ben, but that seems to contradict what he said in the essay about only 30 new graduates from piano technology schools per year now. We've had over a hundred new members come into PTG in the past five months alone, and something

like 17 new RPTs in the same period. Boyk's figures seem way off to me."

By now, Ben was on his feet, pacing the floor and grabbing his head like Chris Robinson teaching a class. "Don't you get it?" he cried. "Of those hundred new PTG members, only a handful are actually taking training in a bonafide, resident program. The rest of them come from who-knows-where."

"Ben, settle down," I said, getting to my feet. "I know the situation is not great, but I think we're starting to turn the tide. The ratio of new RPTs to new members is on the rise. There's more good material in print now than ever before, and PTG's educational offerings are helping to take up the slack left by the shrinking number of schools. It'll take time, but I'm hoping to see a real renaissance in our field within the next several years."

Ben walked to the door and said, "I hope you're right. But a big problem we have in our profession right now is a general lack of humility. Most technicians don't realize how much they really have to learn. Until we fix that, no amount of 'educational opportunities' will help. I know that's a hard pill to swallow, but that's the way it is."

He opened the door and walked down the steps, then looked back. "I hope you'll give all this some thought," he said.

"Don't worry," I replied.

I watched my old friend lumber into the darkness. That was two weeks ago, and I still haven't stopped thinking about our conversation.

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PIANO TECHNICIANS
Journal
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Looking Back to the Future

While cleaning my office bookshelf I located my earliest copy of the *Piano Technicians Journal.* I began reading it to see how we compare today with how we looked 35 years ago. The copy just happened to be the May 1960 *PT Journal* Vol. 3, No. 5. As I glanced through the pages (there were 39 of them), it struck me how much alike and also how strikingly different the organization and times were then.

PTG President
Leon Speir, RPT

The cover page article is an editorial extolling the virtues of being a part of an organization. The writer states, "*Progress is for everyone, but there can be no progress without organized effort. Individualism can't do it.*" It is clear by the article and others scattered throughout the pages of the magazine that a major thrust was underway to increase the number of chapters and members in the Guild. On the back cover page is a list of *all* the Chapter Presidents, a total of 41. There were five regions, each with its own Regional Vice President. The officers included a President, Vice President, Recording Secretary and two Treasurers. In addition, PTG had 20 committees, one of which was "Value of Membership in PTG."

This young organization, called PTG, was clearly experiencing growing pains, but were the issues confronting PTG so much different then? The following excerpts are taken from an article by Wm. J. (Bill) Kelleher, Chairman of the Exam and Service Standards Committee:

> *"We must soon revise our entire membership system to remove the implication that a "rated" member is superior to a non-member. The argument that if a non-member isn't good enough to take our exam, we don't necessarily need him is no better than the non-member's argument that if PTG doesn't need him, he doesn't need PTG, either! The suggestion is made that PTG open its ranks to the extent that anyone may join and be recognized as a "member," (not apprentice, or probationary, or any other tag) entitled to certain genuine privileges ... that no member be classified for at least two years. PTG is big, but the piano service industry is bigger. To succeed, PTG must ... work to encourage the betterment of all ... without censure or discrimination. ... (P)eople in association with each other must ... rate or classify each other; but, for their own benefit and not for the benefit of anyone else."*

Can you believe PTG has spend 35 years dealing with these kinds of issues?

I am sure many of you are planning to go to Dearborn for the Annual Convention and Technical Institute in July (Paul Olsen is doing an outstanding job with this one. You really don't want to miss it). On page 15 of the May 1960 *Journal* is an ad for the 1960 Grand Annual Convention. The convention was held at the Schroeder Hotel in Milwaukee, Wisc. Room rates per day for one were from $6.50 to $10. Rooms per day for two were, double bed $10 to $16, and twin beds $12.50 to $16, and each room had a private bath!

On page 10 of the May 1960 *Journal*, the drawings of a string being tied into a knot caught my eye. You can actually learn to splice a broken string by reading this article! They hadn't even heard of **PACE** yet.

The Federal Trade Commission was clearly not considered as much of a threat as it is today. On page 11 these excerpts appear; *"My charges are: Raise 1/8 step, $12.50; raise 1/4 step, $15.00; raise 1/2 step, $20.00; a whole step, $30.00."*

Looking back over the past 35 years, we see examples of change that occurred which was outside our control. Many pianos were advertized that no longer are being produced. Prices for hotels have increased dramatically. What was then called "Women's Department" is now called the "Auxiliary." External environmental changes are sometimes dramatic and impact the way PTG must do business.

Many internal issues that were around in 1960 are still with us. The excerpts from Bill Kelleher show that membership concerns about categories and member numbers have never been fully resolved. The 1960 *Journal* pages also reveal that education has always been the primary thrust of PTG. A major part of the Journal is dedicated to informing technicians about methods of servicing pianos.

Can we learn from our history to guide us in planning for our future? The answer is, of course, yes. How we deal with the lessons of history will define the success or failure of future planning.

Some manufacturers improve their pianos because they have to. We do it because we want to.

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More on Duplex Scales

Del Fandrich's November article in the Designer's Notebook on piano power and sustain brought out a point that I would like to pick up on in the interest of piano tone. In his discussion of the value (plus or minus) of duplex scale tuning, he asserts that string energy is dissipated to some extent by the presence of the duplex string portions. He leads us to believe that it would be preferable not to have any secondary portions of the string beyond the speaking length if that were possible. Recognizing that it is not, however, he prefers minimizing the length of these segments in order to minimize their negative effect. But in my opinion there may be a guarded inference as well.

This assertion may be taken as an inadvertent inverted kind of affirmation of the power of the duplex scale. True, it may, according to Del's research, diminish the energy output level, but if the duplex segments are powerful enough to have one effect there is a latent inference that there may be other effects as well. Such an effect may be the influence the duplex scale segments have upon piano tone. If the duplex segments limit power, in a similarly logical manner we have learned from John Hartman's article that more downbearing can be inversely proportional to sustain, is it not possible that energy and quality exist in the same relationship?

In CFT Steinway's original patent of the duplex scale he claimed that by the introduction of this feature "the purity and the fullness of the tone of the instrument is improved." In speaking about the quality of tone of the new Steinway which included the full duplex scale, Hermann Helmholtz wrote to Steinway saying: "We cannot but admire the fullness and strength of the tone as well as the mildness and softness of the same, qualities which one rarely finds united."

So even if Del is right about the loss of a certain amount of energy due to duplex segments of the string, it does not eliminate the possibility that there is a concomitant benefit as well which may be a trade-off of energy for quality. It is apparent from the recent appearances of new duplex scale designs in some older instruments and a few revolutionary duplex designs in some new ones that others, such as Yamaha, Weber, Bosendorfer and Fazioli scale designers may share this point of view.

— Dan Franklin

More on Repairing Separated Piano Backs

I enjoyed the Q & A item on repairing separated vertical piano backs (December, 1995 issue). I'm writing to add some thoughts on the subject.

The tools you'll need for in-home back repair are:

- Three 0"- 8" extra deep throat drop-forged C-clamps (like Armstrong 78-408s or Wilton 408s; cost: about $50 each now; you need to check for 0" as the minimum closure because, starting at about 8", some C-clamps don't have full-length screws)
- Three pieces of 2" wide x 1/8" thick steel strap, at least 3" long, to use as backing plates for the clamps;
- Shop-Vac with crevice tool and 6' - 9' extension cord (you'll be plugging the extension cord into the wall and the Vac and the drill into the cord);
- A 3/8" drill
- Set of fractional drill bits 1/16" - 1/2"
- One long 3/8" drill bit, at least 12" (this will get you out of blind-drilling the holes next to the sides on some pianos by keeping your drill out in front of the sides)
- Center punch (for those new holes in the plate)
- Two 6" machinist's rules (for blind drilling, as we discussed)
- 3/8" drive socket set; one extra 3/8" drive handle; 1", 4", and 10" extensions; one - 9/16" deep socket if no deep sockets in set; 3/8" drive screwdriver accessories, like the Proto 5244 for slotted screws and the Snap-On FP 41B for Phillips
- 10 each of the following 3/8" hex head bolt lengths: 4", 4.5", 5", 5.5", 6" (the "Baldwin" size), 7", 8" (the latter two for old uprights), and flat washers, lock washers, and nuts. The 4" - 5.5" lengths will fit in a sectional plastic box, with one section left over for the washers and nuts. Cut some of the flat washers in half. The center bolt on a Baldwin Hamilton will cut through the edge of the center lid hinge, and you'll need half a washer to support the part of the bolt head that doesn't overlie the hinge.
- Flat probe to see how deep the separations are (the handle of a split mute works fine; a shortened soundboard steel would work okay, too; don't use your machinist's rules; they're not long enough).

Since plates are almost always cast iron, there's no need for lubricant when you drill through them; the graphite in the cast iron does the job just fine. Put the hose of the vacuum to the right of the hole you're drilling, since that's the way the chips will be heading when you pull the bit out.

Start your new holes in the plate with a 1/8" bit and go just all the way through the plate - until you see wood chips. Then go up through 4 or 5 bits until you get the plate hole to 3/8". It's much easier to enlarge an existing hole than to start with a big drill bit and try to hog it through. If you have to go through the cast names on the plate, you'll have to use more bits (smaller increments) so the drills don't grab on the uneven edges of the top of the hole.

As you drill out the wood for each bolt, don't push the drill through very far before you back it out and let the chips escape. Your Shop-Vac is going to miss some of those chips anyway, but the fewer you throw at it at once, the fewer it will miss. Slowing the drill down as you back the bit out helps, too. When you're through, you're going to have to check the treble and bass bridges and remove by hand every chip that got by you and is lodged in the bridge notches, so don't make work for yourself.

Put two flat washers under the head of the bolts that you run in from the back. If you use just one, sometimes it will cup under the pressure of the bolt head when you snug it up.

The fascia board on the back of the piano may crush quite a bit under the flat washers when you tighten each bolt. (It seems like the rule is, the cheaper the piano, the softer the fascia board). In some cases, the washers will cut

Continued on Page 12

TT&T Special File for Plastic Keytops

Nicholson makes a file for cutting plastic that we use on keytops. It seems to stay sharper longer than the metal-cutting files. The item is #06610, eight-inch plastic files. They come six to the box.

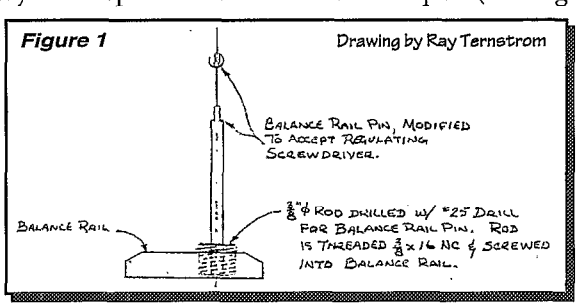
— Yvonne Ashmore, RPT

TT&T Key Height Regulation: A New Approach

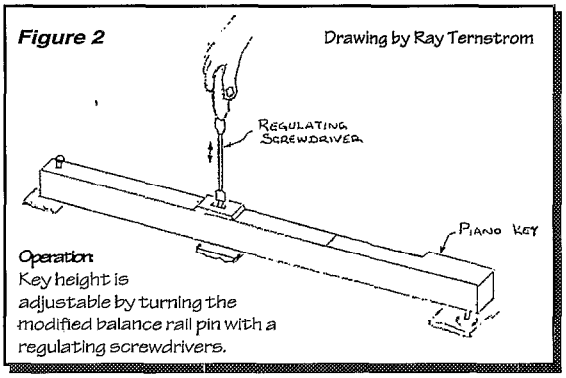
The first impression an artist has in approaching a well-crafted piano action is a perfectly leveled row of keys. Achieving this elegance involves the careful insertion of tissue paper punchings between the keys and the balance rail. This can be a time-consuming task only the most enthusiastic among us face eagerly. Without touching on other merits and demerits of paper punchings, it seems time to look at other options. What I would like to offer here is a simple screw adjustment to regulate key height.

There are two locations under a key that affect the front end of a key, the height of the back-rail and, of course, that of the balance rail. Keeping the function of the back-rail felt to set the capstan height as well as approximate key height we must decide how to make balance rail height adjustable.

The approach offered here is to place something like a capstan under the balance rail and dispense with the traditional imperative of fine adjustments with tissue paper punchings. Rather than a capstan, which might be as inaccessible as the stack of punchings, I have decided on a screw jack mounted in place of the balance rail pin, and this is mounted axially into the "jack" itself. This jack has been fashioned as one-half inch segment of a threaded 3/8 NC rod, drilled axially to accept an inserted balance rail pin (See Figure 1).



Balance rail pins are all extracted, leaving holes which may serve as guides for redrilling the balance rail 5/16" in diameter and deep enough for tapping to 3/8" NC x 1/2" depth. Then rail pins are ground with flat tips to fit a drop-screw regulating tool, and the bases of the pins are coated with hot-melt glue before being inserted into the "jack" bases only deep enough to leave the tooled tips exposed above each key for access by the regulating tool. (SeeFigure 2)



With jack-pin assemblies screwed in place and fitted with cloth bushings to support the keys, it is now a matter of two or three seconds per key to achieve precise key height and accurate leveling.

— John W. Gibson, RPT

TT&T Pitch-Raising Safety Factor

How far one can safely over-pull the steel wires when pitch raising a modern piano is of great concern to many technicians.

Here is my system for determining just how sharp you can go. First, take the last fifth at the top of the piano (81:F7 and 88:C8) and measure the speaking lengths. 81:F7 must not be greater than three inches. 88:C8 must not be greater than two inches. Note the maximum length ratio of the two notes is 3:2 which also happens to be the ratio of a perfect fifth.

Next, proceed down the scale making sure the speaking length is not greater than double the octave above.
Example: 88:C8=2" 76:C7=4" 64:C6=8" 52:C5=16" Etc.
Example: 81:F7=3" 69:F6=6" 57:F5=12" 45:F4=24" Etc.

Following the above chart, you can safely raise the pitch up to 100 cents over 440 pitch. Of course, this assumes all other factors are equal: the strings are in good condition and the plate has no weak flaws. These lengths should hold the breaking point percent (at 100 cents sharp) in the 60 percent plus range or less. Considering the 1/5th overpull factor for pitch raising, you should be able to pull up a 300 cent flat piano in one shot. Of course, fine tuning would then follow.

— Steve Fairchild, RPT

Continued on Page 12

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

The 42nd ARD International
Music Competition
Munich, Germany
First Prize Winner selected Kawai.

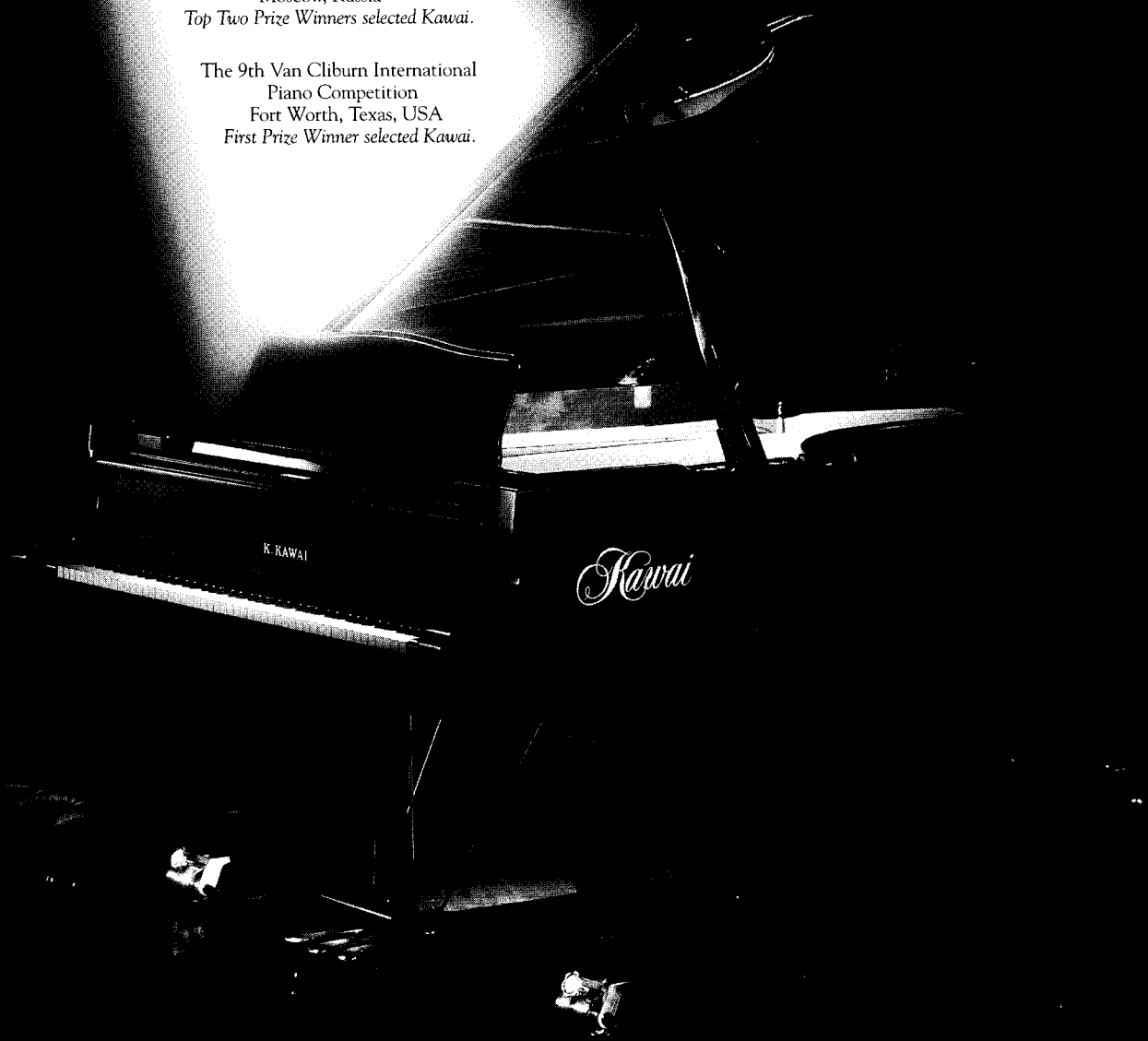
The 45th Ferruccio Busoni
International Piano Competition
Bolzano, Italy
First Prize Winner selected Kawai.

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.

Continued from Page 8

their way right through the fascia board until they hit the post, giving you that custom, countersunk look.

The potential softness of the fascia board is the reason for using the hex head bolts. You'll need to snug up your bolts about once a year forever, and square-shouldered carriage bolts may start to turn in the fascia board after a while.

Bolt up all the posts even if only two show separations. If you just pull those two together, when next year rolls around, the odds are at least 50-50 that some if not all of the others will have popped open. It won't take long to put those other bolts in, especially compared to the wasted time you'll spend lugging your tools in and out again next year.

— Martin B. Tittle

PACE Lessons Appreciated

I would like to express my appreciation to Michael Travis for his PACE tuning lessons. I especially appreciated Lesson #25, on refining the bass. For a long time, tuning in the bass has been like walking through a minefield for me, and though I have not perfected my bass tuning, this lesson was a big help to me.

I now have a better grasp of the priorities, what I am doing, and why I am doing it. Now all I need is more practice.

Again — many thanks to Mr. Travis, and I wish him well in his future endeavors.

— Raymond Johnson,
Capitol Area, NY Chapter

Tips, Tools & Techniques

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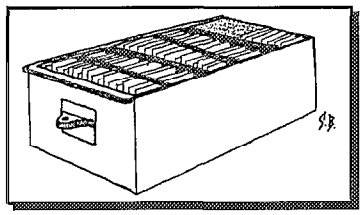
TT&T

Storing Used Ivory Heads

The most efficient way I have found to store used ivory heads is on their ends. If you put the shoulder-joint end up, you can instantly see the:



- Height/length
- Type/gender (A, B, C, etc.)
- Width
- Thickness
- Color

I have a lot of used ivory heads, so I store mine in plastic drawers from a parts organizer cabinet. The cabinets with the larger drawers (4 1/2" x 2 14") high work best. I use one for each type of key: A, B/E, F/C, D, and G.

The rows of heads on end are separated in each drawer by cardboard. I keep any empty spaces filled with foam rubber so the heads can't fall. Each row has about 75 heads in it and you can get five rows in a drawer.

— Yvonne Ashmore, RPT

Q — Bluing Metal

I'm faced with the need to re-blue about two dozen roundhead screws from the pressure bar of a 1876 Steinway upright. Locally, I've not been able to find anyone who does this work (except a shadowy individual who works through a gun shop every few months or so!) and so wonder if I can just do it myself. Does anyone have experience in this?

The only "reasonable" recipe I've found so far involves melting a quantity of potassium nitrate (saltpeter), which happens at about 600° F, and dipping the polished and cleaned screws into it for a few moments until the desired shade of bluing is achieved then washing them in cold water.

I can imagine there could be severe hazards associated with this process (like explosions) and so have not yet attempted it. The screws in question are unique in that they possess extra-high rounded tops of a sort I've never seen available today, so I'd like to re-use them. The deep blue of the screw heads contrasts nicely with the brass of the pressure bar.

—David Parkhurst

A — From Mark Story, RPT

Heat the screws with a MAPP gas, oxy/propane, or oxy/acetylene torch (propane alone isn't hot enough) to "cherry red", then quench them in linseed oil. I've used this technique for several years, and have been extremely satisfied with the color, both shade and evenness. The secret to consistency in color is consistency in the heating process.

A — From Bob Davis, RPT

Gun bluing sounds like a good choice to me. Bluing by heating is a treatment used to soften or "temper" steel to a specific hardness. I would use it for cosmetic effect on a part under stress (like pressure bar screws) only with due regard for its potential effect on the strength of the parts.

Steel is *annealed* by heating to about 600° F, I think, and then slowly cooled (large castings are often buried in sand). This makes it soft for easy bending, machining, etc. It is *hardened* by raising its temperature again, then rapidly quenching it in oil or water. This makes it hard, resistant to denting, and brittle. A small amount of resilience is introduced by *tempering*, which leaves it tough without quite so much brittleness as the hardening. This tempering is done by slowly raising the temperature of the metal. Different oxides form at different temperatures (also depending on the alloy), each with a characteristic color.

If the raising of the temperature is done carefully (not too quickly) the color is a terrific thermometer. (Tempering is just like cooking a turkey — if you cook it at 1000° the outside will get done very quickly but the inside will be raw.) Anyway, the metal passes through a light straw color, then darker straw, then very pale blue, then a couple of shades of darker blue. Each "tempers" the hardness of the steel a greater amount, until finally it can become too soft (like annealing).

By the way, all this has to be done particularly carefully on items of varying or graduated thickness, like knives and chisels. It is also why grinding a blade too enthusiastically can ruin its ability to keep an edge — there is a fine line between too hard and too soft on an edge tool. The heat of power grinding can easily soften the edge of a blade beyond the ideal. Blades are very carefully tempered. The body of a chisel is often treated to be softer than the edge, so it will absorb some of the shock of a mallet. In fact, with experience, one can blue a chisel first in the fat part, then let the heat run into the edge and just barely temper it.

Well, enough of that. As my Uncle Milton used to say, "I've already told you more than I know."

In Conclusion

Thanks to all who offered solutions to my query concerning the bluing of pressure bar screws. I tried a number of the suggested techniques but eventually settled on one which I don't believe was mentioned, yet produced the richest and deepest and blackest blue — without a hint of brown — and so I'd like to offer a report:

I simply heated the polished and super-clean screws carefully in the flame of a propane torch (any clean heat source would do) until the temper colors showed in the shade I desired and then I dipped them immediately in cool water and dried them off.

The tricky part (art?) is learning to control the application of heat and judging when to stop. Careful and uniform polishing before heating proved to be essential and the finest finish yielded the deepest and purest colors. The hue (assuming uniform polishing) is directly determined by the temperature to which the steel is raised — not by the length of time it is exposed to that temperature. As the temperature rises the color (a product of oxidation) changes through a very predictable spectrum. The first color to show (at the lowest heat) is a light straw which progresses to a dark straw and then on through several interesting shades until purple is reached, then blue, then peacock, and finally the coloring returns to plain steel. Any increase in temperature beyond this will begin to produce incandescent coloring and may affect the crystalline structure of the steel.

Ideally, all the prepared screws would be placed together in a heat-treating oven and carefully heated to exactly the same tempera-

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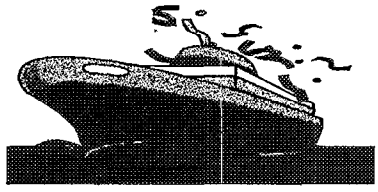

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ture, thus ensuring the greatest uniformity. Nevertheless, I found that with careful manipulation and a little practice I was able to achieve reasonable consistency.

I held each screw by means of a six-inch piece of iron wire coiled a bit at one end so as to wrap around the threaded portion and engage a few threads. I formed the rest of the wire to be straight and hold the screw's axis in line with the wire's axis, thus I could rotate the screw by rotating the wire. This made it easy to control the heating.

One nice aspect of this method is its easy reversibility: if you overdo it just repolish the screw, removing the offending colors, and reheat again.

This method will only work on steel.

— David Parkhurst

Q Moldy Bass Strings

I'm working on a 6'2" Mason & Hamlin that was restrung five years ago. The customer then moved to an extremely humid and moldy home. He has moved again, but the result is a bright greenish-blue mold on most bass strings. In the past few months that I've been on the job, the mold has dried somewhat. I would appreciate any ideas or suggestions as to what can be done for these strings.

— Debbie Fier

A From Steve Brady, RPT

My first reaction to your question was, "But mold doesn't grow on bass strings!" It seemed to me that perhaps what you were seeing was verdigris, the bright blue-green corrosion which occurs on copper and brass as they oxidize. I put the question out to the Internet group, "pianotech," and only one respondent (our good colleague and former *Journal* Editor, Jim Harvey) reported ever having seen real mold on bass strings. To quote from Jim's response:

"I've seen mold on bass strings twice. Both were in colleges. Note: if you have no symptoms other than bass strings, the following is probably invalid.

In the first, there was a ground water problem, i.e., moisture coming up through the foundation of the old auditorium. (This didn't do the pipe organ any good either!)

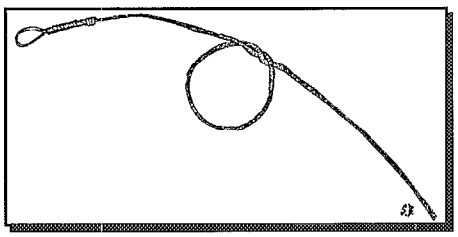
In the second, the auditorium is only five years old. In this instance, the contractors installed the chiller "backwards" (I don't know how this can happen), causing it to add moisture instead of removing it. The results being that the piano thinks it's in a rain forest. Sample humidity readings: 54 percent in the parking lot (sans climate control); 87 percent at the piano — same day, five minutes apart.

In the former, the entire piano was producing penicillin, case and all. In the latter, only bass strings and some plate areas. In both, a host of other related problems."

So, getting back to your question, Debbie, maybe it really is mold, or maybe the strings had actually gotten wet and oxidized.

If cost is not an issue (and perhaps even if it is), replacing the strings is probably the best and easiest long-term cure. All the anti-fungal solutions I know of would be corrosive to the strings, and verdigris (as we know from the old Steinway action centers) can be quite stubborn. However, some clients and some technicians will, for various reasons, want to pursue a more conservative course. The final result of the more conservative course may very well be that you end up replacing the strings anyway, but for what it's worth, here are some ideas to consider.

If whatever it is is very dry, try brushing it off with a suede brush (the kind with brass bristles) and vacuuming up the stuff that comes off. Unless it got deep inside the windings, that should be all you need to do. How do you know if it got deep inside the windings? Listen to the tone produced by the strings in question. Does it sound as good as the tone on the unaffected bass strings? Or does it sound tubby and short? If the tone sounds bad, you can try the old-timers trick of "whipping" the bass strings. To do this, loosen the tension on each string just enough to enable you to remove the loop from the hitch pin. Tie a loose overhand knot in the string, and roll the knot up and down the length of the string (see illustration). Re-attach the hitch pin loops — remembering to put a twist in each string, in the direction that will tighten the windings — and pull the strings back up to pitch. The tone should sound clearer and longer.



If this approach doesn't work, or if the tubbiness returns after a time, try applying trichloroethane 1,1,1 (available at drugstores as Energine® Cleaning Fluid) to the affected areas with a stiff brush like a toothbrush and working it in vigorously. You'd want to have the action removed and some heavy fabric or plastic under the strings to catch the drips, and you want to make sure you're working in a well-ventilated area, because this chemical emits toxic fumes. This approach has been known to liven dead bass strings by dissolving the contaminant and flushing it out of the windings.

If this doesn't work, you've exhausted your options and will need to replace the strings.

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Q Why Do Pianos Go Out of Tune the Way They Do?

William Braid White stated that the soundboard rises during periods of high humidity, causing the middle notes of the piano to go sharp. Probably 90 percent of today's technicians still believe what I consider to be a highly illogical truth.

After Don Galt's survey showed certain notes going sharp as the humidity raised, I made my own experiments. Some pianos seem worse than others, so I selected one of the worst (whose brand name is now forgotten) to test. The first tenor note on the treble bridge went four cycles (my estimate) sharp of the bass note one octave below. The first tenor strings were plain, gauge 20 or more. At the point where they crossed the treble bridge, I measured a distance of only six inches from the rim to the bridge. True, those strings angled toward the middle of the keyboard, but the bridge was not close to the middle of the soundboard! Those strings that were in the middle of the soundboard were unchanged.

So, Dr. White has not explained to my satisfaction why that area of the soundboard, near the case, should expand while the rest of the soundboard remains *in situ.*

— Ken Churchill, RPT

A From Del Fandrich, RPT

Mr. Churchill is apparently referring to the explanation of why pianos go out of tune that is found in "Appendix 1 — Why Does a Piano Go Out of Tune" in the book, *Piano Tuning and Allied Arts, Fifth Edition,* by Dr. William Braid White:

Sensitiveness to Atmospheric Changes

"Unfortunately [the construction of the piano] is extremely sensitive to all changes in temperature and barometric pressure. Thus, in summer time, throughout the greater part of the country, there is much moisture in the air most of the time, and rain is frequent. Wood, under these conditions, swells up, nor will any kind of coating protect a wooden sound-board from these influences. On the contrary, when the heat is on during the colder months, the air in the rooms becomes much drier, owing to the evaporation of moisture, and failure to keep on hand open vessels of water, flowering plants or other moisture retainers or humidifiers. Consequently the moisture in the soundboard rapidly passes off, the board shrinks, the strings slacken down, and the pitch drops.

Continual Variations

"Now it is perfectly evident that even where conditions are not extreme, and even in climates which have only a comparatively short range, this process is continually going on. Every change of a degree in temperature, or of one-tenth of an inch in a barometer, has its effect. The soundboard of the piano, then is always rising and falling through short distances, and constantly, therefore, suffering variations in its ability to hold the strings up to proper pitch. On the other hand, if the piano be neglected, and unless it be tuned at least once every change in season, say four times a year, during Spring, Summer, Autumn and Winter, it will not stand in tune."

Unfortunately, there are a lot of details missing from the above question that could be important in discovering precisely what was happening in the piano Mr. Churchill was monitoring. Knowing the make and model of the piano in question would be helpful. Lacking that, specific information about the stringing scale, the number of notes in the bass section, the rib scale, the grain angle and thickness of the soundboard, the height, width and type of bridges used, their contour (i.e., their shape, or curve), how much downbearing existed at various points of the scale, etc., would have to be available before an informed opinion of what was going on in that specific piano could be given. All of these factors, and more, will affect how any given piano will react to changes in temperature and relative humidity. It would also be useful to know precisely how sharp the pitch was going — as measured against an accurate standard such as the *Accu-Tuner,* and at intervals throughout the whole scale, not just at the lowest note of the tenor bridge — since it is almost certain that the pitch of the strings located at other points along both the tenor and bass bridges was also changing. It could actually have been going flat in a couple of spots. Although surely no area of the piano would be changing as much as that last unison set on the tenor bridge at the bass/tenor break in a traditionally designed grand piano.

Although Dr. White's basic explanation was — and still is — fundamentally correct, it doesn't go quite far enough to explain the phenomena Mr. Churchill has observed. Neither did mine.[1] Soundboards do expand and contract as they absorb and desorb moisture. All wood does when the atmosphere around it changes and it is exposed to varying levels of relative humidity in its environment. In the process the amount of upward force the soundboard exerts against the string plane through the bridge indeed does change, forcing a change in the length of the piano's strings which then alters their pitch. These changes are rarely — if ever — uniform across the scale, however. There are a number of subtly interrelated factors that, when analyzed, should explain the irregular effect on tuning stability that accompanies the variations in temperature and relative humidity around the piano.

Soundboard Crown — Another Look

To begin, let's review the systems — and the opposing

forces acting on them — that are involved. The piano soundboard assembly is designed and constructed so that it is under constant stress. As installed in nearly all pianos, the soundboard panel is not intended to be flat. There is a slight curve — what we call "crown" — built into it. *See Figure 1-A.* This crown is obtained through one of several methods:

Compression Crowning — The soundboard panel is dried to a moisture content of approximately 4 percent and held at that MC as the ribs are glued to the back of the board. As the soundboard is then exposed to normal atmospheric conditions it tries to expand. Since its ability to expand is restricted by the ribs, it "bellies," or curves outward, away from the ribs. The curve is formed and held by the internal compression of the wood cells within the soundboard. The amount of this crown is somewhat unpredictable, depending on the initial moisture content, the final moisture content when it reaches equilibrium and the specific characteristics of the wood used in each specific soundboard panel.[2] The panel will expand until the internal compression of the wood fibers can no longer overcome the stiffness of the rib set.

Stress Crowning — The ribs are glued to the soundboard using curved cauls which force a crown into the assembly while the glue is wet. Due to the stress interface between the rib and soundboard at the glue line, at least some of this curve remains after clamping pressure is removed. The result is similar to the compression crowned soundboard described above. The curve is formed and held by the internal compression of the wood cells within the soundboard, but it isn't necessary to dry the wood out quite so much to get it.

Pre-crowned Ribs — The crown radius is machined into the rib prior to being glued to the soundboard. The pre-crowned ribs are then glued to the soundboard using cauls that curved to approximately match the rib. Using this method, most of the crown is formed and held by the curve in the rib. The crown is maintained primarily by the strength of the rib and relies somewhat less on the compression of the wood cells within the soundboard panel.

More often than not — at least in most of the pianos being built today — some combination of these methods is used. Once ribbed, the soundboard will have a set of bridges glued to the side opposite the ribs. The bridges may or may not be machined to a curve matching the surface of the soundboard. Finally, the completed assembly is glued to the inner rim of the piano. The soundboard is installed so that the upward curve of the panel goes up to meet the string plane.

The Soundboard as a Giant Spring

If we can ignore the acoustical properties of the soundboard for a moment, what we have just made is simply a large, irregularly shaped spring — the strength of which is determined by:

- The amount of internal compression of the wood soundboard panel. The more compression within the wood soundboard panel, the stronger the "spring" will be up to the point of fiber crushing. Beyond this, the spring's stiffness will begin to decrease as the wood fiber deteriorates.
- The number of ribs used, their cross-sectional area and shape and the stiffness of the material they are made of. In a purely compression-crowned soundboard assembly, the ribs will actually resist the formation of crown — they will

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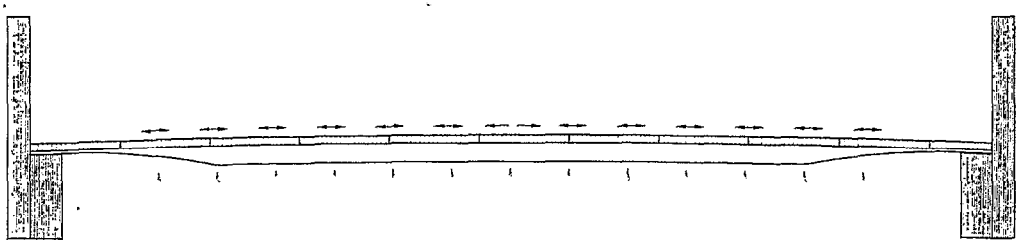

Figure 1-A.
When changing from a climate of low relative humidity (RH) -- with the wood stabilized at a low equalibrium moisture content (EMC) -- to one of high RH and a higher EMC, an unloaded soundboard panel will expand fairly evenly across the grain as indicated by the solid arrows. Since it is constrained on the bottom side by the ribs, it will instead try to bow -- or belly, or crown -- upward uniformly as indicated by the open arrows.

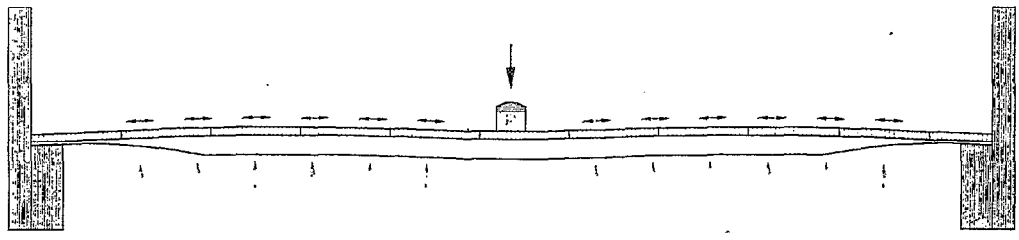

Figure 1-B.
When the upward mobility of the soundboard is restrained in a particular area -- as by the bridge(s) bearing against the string plane -- its movement will be restricted at that point but it will continue to belly upward in the areas away from that restraint. In this example, with the bridge located at approximately the center of the rib, the soundboard will bulge upward on either side of the bridge. The drawing scale is exagerated.

Continued from Previous Page

have started out straight and they would very much like to return to that condition.

- The curve, or crown, that was machined into the ribs prior to their assembly to the soundboard panel. Generally, even soundboard assemblies that depend primarily on pre-crowned ribs for their system crown will be built in such a way that there will be some degree of wood fiber compression in the soundboard panel at "normal" temperature and relative humidity levels — *see Footnote 2, again.* Most of the system crown, however, will be formed by the curve machined into the rib. Highly crowned ribs are generally capable of generating more spring pressure than are lightly crowned ribs.

These days, nearly all soundboard ribs are pre-crowned to some degree. Certainly, they should be. Assuming this to be the case, then the amount of spring pressure the soundboard assembly exerts against the string plane will be the combined total of that created through the internal compression of the wood fiber in the soundboard panel at any given moisture content plus that exerted by the stressed rib. The actual amount of spring pressure contributed by each component part will vary depending on the design of the soundboard, how much it is loaded by the string plane[3] — that is, how much it has been deflected from its static position before any string loading was applied — and the relative humidity at any given time. It's not really possible to generalize about the degree of spring pressure available from different designs since they can vary so much in so many different ways. Each design — in some cases, each instrument — may have to be analyzed separately. There are enough variations due to the inconsistencies of wood and the unavoidable deviations of construction as to make an accurate generalized analysis problematic under even the best of conditions. Good design practice should aim at the center of a predicted performance curve so that each individual sample will still fall within acceptable standards despite these variations.

Strings are Springs, Too

Now, let's put a plate in our piano and add some strings. If the bridges have been sized correctly, their top surfaces will be just above a straight line running from the front termination and the hitch pin panel termination. When the strings are fixed front and back and scale tension is applied, they will be deflected from a straight line by the bridges. The spring pressure from the soundboard will be pushing up against the string plane through the bridges. Since the strings would like to revert to a straight line what we have created is another spring — actually a composite spring made up of a set of approximately 220 smaller springs — that is pressing down against the soundboard spring. These two springs are always in balance. The upforce of the soundboard will always equal the downforce of the strings.

It is a common misconception that pianos are designed in such a way that all of the strings — more properly, all of the unison sets made up of either one, two or three strings — of a given scale have approximately equal downbearing and should load the soundboard assembly uniformly. They don't. Or at least they shouldn't.[4] The upper tenor and treble sections of the bridge will be loaded somewhat much more heavily than will be the lower tenor and bass; hence, there will be more string deflection and more "spring pressure" in the middle and upper end of the scale than there will be in the lower tenor and bass.

String Deflection — How, Where and How Much?

The amount of force needed to deflect a string will vary according to several factors:[5,6]

The tension of the string — Assuming the length and the point of deflection to be the same, it will take more force to cause a 1 mm deflection in a string with a tension of 170 pounds than it will take to deflect a string with a tension of 120 pounds by the same amount.

The overall string length — The overall string length extends from the front termination centerline over the bridge to the rear termination. It will take more force to deflect a short string a given amount than it will take to deflect a longer string by the same amount.

The point of deflection — Both the speaking length and the back length — the distance from the bridge to the hitch pin or rear counter-bearing bar — will have an effect on the amount of force required to deflect a string by a given amount. If the point of deflection is off-center — closer to one end than to the other as is typical of most piano strings — then it is the shorter of the two distances that will have the greatest effect on the amount of force needed to deflect the string a given amount. With strings of equal overall length — say 500 mm — it will require more force to cause a 1 mm deflection if the deflection point is 100 mm from one end than it will if the deflection point is at the center of the string, a point 250 mm from either end. Hence, it is normally the back length that has the greatest effect on a strings resistance to deflection since it is nearly always the shortest of the two.

The pre-existing amount of deflection — If a string is already deflected by, say 1 mm, it will take somewhat more force to deflect it by an additional 1 mm than it took to deflect it the original 1 mm.

Soundboard Shape — The Ideal vs. Reality

Now, let's once more go back to the soundboard where we have yet one more popular misconception to deal with. It has long been accepted that the shape of the soundboard is that of a section cut from a sphere — that is, having an equal radius in all directions. It isn't, nor should it be. Even if the soundboard were contoured as a perfectly spherical section to begin with, once it is glued onto a piano rim — no matter how that rim is shaped or contoured — and loaded with the downforce of a set of strings, it will be twisted and warped beyond any recognizable shape. As the downforce of the string plane loads the soundboard assembly it will tend to depress the area immediately surrounding the bridges and bulges will develop on either side of the bridge area.[7] *See, again, Figure 1-B.*

The Bottom Line — An Example from Real Life

So, now maybe we can get back to the original question and analyze what will probably happen to string tensions (and hence, frequency, or pitch) in the different sections of a typical piano as the relative humidity goes from a low level to some higher level. The following evaluation is developed from an examination of a fairly typical 5'- 2" piano that just happened to be in our shop as this was being written. Since its design is so similar to many other pianos this size it will remain nameless. It's soundboard was primarily compression crowned and was installed in a fairly typical manner. The soundboard had developed a number of compression ridges and, of course, had their subsequent cracks. At the time this was written our climate was fairly moderate and the cracks are not open. They would have been a couple of months later as winter set in except that the soundboard will have become firewood by then. The soundboard grain angle runs approximately 45 degrees to the belly rail. The ribs run 90 degrees to the soundboard grain angle. There is no soundboard cut-off bar. The tenor and bass bridges are not connected. The bass bridge is suspended on a apron. The stringing scale is fairly typical for a piano of this size. That is, the string tensions average approximately 160 pounds in the tenor and lower treble sections and decreases to just under 120 pounds at the low end of the tenor bridge. With one exception, downbearing is fairly "normal." That means — without getting into actual numbers — it is fairly light at the low end of the tenor bridge and somewhat heavier in the middle and at the treble end. In this piano, the middle of the bass bridge is very heavily loaded — roughly two to three times what I would normally like to see. The bass string back lengths are fairly short.

So, what will happen as this soundboard takes on moisture? Let's examine it section by section: *(Refer to Figure 2- A through E. These illustrations are schematics of the rim and/or belly rail and the soundboard and bridges showing the forces involved and the resulting soundboard deflection. The arrows indicate the relative deflection of the soundboard from it's static condition at a very low moisture content to it's resultant condition at a very high moisture content. Each drawing follows the centerline of the indicated rib in each of the sections described and shows the approximate locations of the bridges along those ribs. Note that these schematics are for illustrative purposes only and are not drawn to exact scale.)*

Figure 2-A — The treble section. The soundboard area is fairly small and the ribs are fairly short. The soundboard is glued to the rim along the belly rail and the treble end of the rim. The soundboard will try to expand across grain (in line with the ribs), but this will be resisted both by the proximity of the rim and by a fairly stiff string section. String tensions are fairly typical for a piano of this type; that is, they are relatively low. But, the speaking lengths are fairly short as are the back lengths so the string plane will still be fairly stiff. The bridge will rise and the string's pitch will go up, but only slightly.

Figure 2-B — The upper-tenor section. The soundboard area is getting larger and the ribs are getting longer. The bridge is held down by a string plane that is still fairly stiff, but not so much as it was in the treble section. Even though the tensions are somewhat higher, the speaking lengths are much longer and the back lengths are a bit longer. As the soundboard expands across grain it will force the bridge up a little more easily and string tension and pitch will go up a bit more than it did in the treble. However, as the upward movement of the bridge is increasingly resisted by the string plane, the expanding soundboard panel will begin to force the ribs to distort. The soundboard panel will begin to bulge upward between the bridge and the rim and between the bridge and the belly rail.

Figure 2-C — The mid-tenor and upper bass sections. The tenor bridge is still roughly centered on fairly long ribs and the presence of the bass bridge is beginning to be felt. (An extension of the bass bridge foot just overlaps this rib.) Although the speaking lengths are now much longer, the back lengths are still fairly short and the string tensions are somewhat higher — in the 160 to 170 pound range. It would take more upward force than the expanding soundboard panel is able to develop to force the bridge up against the string

Continued on Next Page

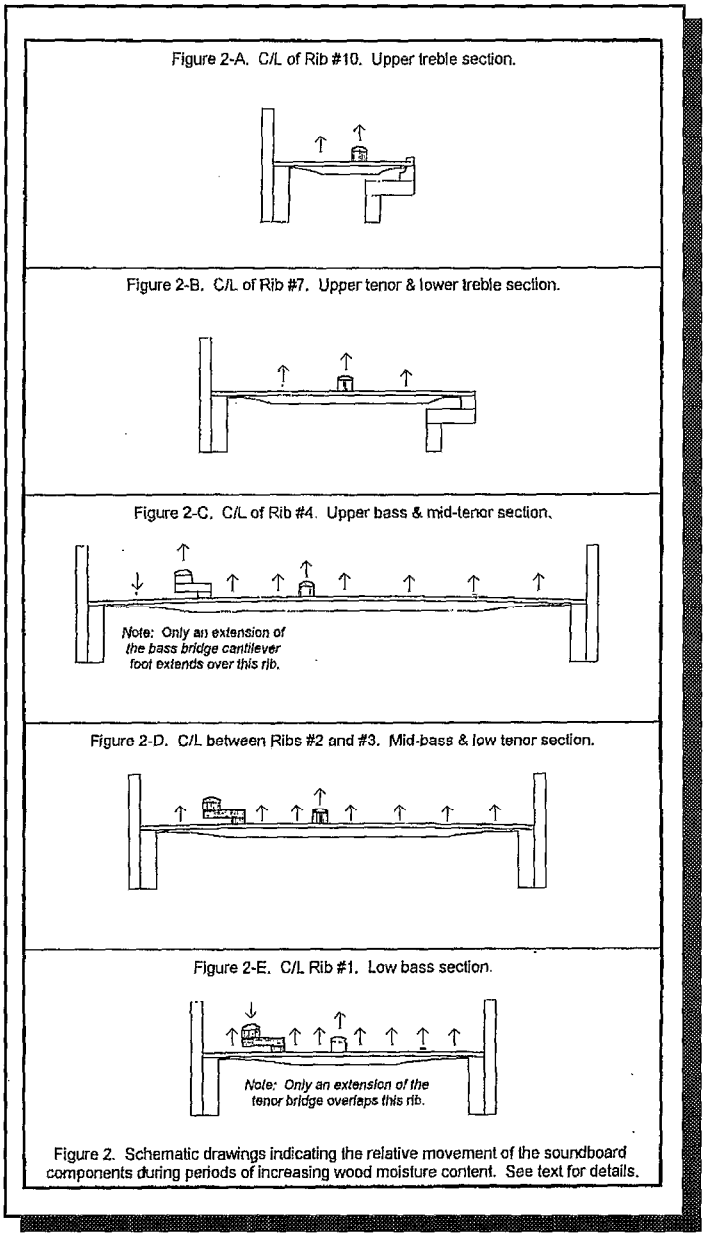

Figure 2. Schematic drawings indicating the relative movement of the soundboard components during periods of increasing wood moisture content. See text for details.

Continued from Previous Page

plane very far, so as the wood fiber in the soundboard panel expands a distinct bulge will develop on each side of the bridge forcing the ribs into a shape somewhat like a very shallow "m." The tension and pitch of the strings in the mid-tenor section will go up, though not by much. It is probable that string tensions and pitch will go up in the upper bass as well even though the back lengths are very short in this piano. The bass string unison tensions[8] are considerably lower than those found in the tenor section. Add to this that the end of the bass bridge is now a terminating beam ending in the middle of the soundboard, a part of the panel that will be wanting to bulge upward a fair amount. Offsetting all of this is the presence of a bass bridge cantilever — cantilevered bridges pose some special problems of their own due to the variety of forces acting on them (*See Figure 3.*) — although at this end of the bridge it is fairly short. Among other things, the increasing upward force of the soundboard will cause the bass bridge assembly to rotate (or "rock") around its mounting point on the soundboard. This will cause the ribs under it to distort forcing a depression behind the bass bridge solepiece (or "foot") and a rise ahead of it. Since the bridge mounting point is fairly close to the tenor bridge, this force will try to raise the ribs under the tenor bridge further.

Figure 2-D — The low tenor and mid-bass sections. The back lengths of the mid-bass strings are fairly short and the downbearing is already very high. The bass bridge mounting point — in spite of the cantilever — is getting fairly close to the rim and the feathering of this rib extends to a point just under the cantilever. The middle section of the bass bridge is tied down very tightly so it won't be able to move upward very much. Because of the cantilever the upward forces generated by the expanding soundboard panel — taking the path of least resistance — will simply rotate the bass bridge assembly around its mounting point. There will be a substantial depression behind the bridge and a noticeable rise in front of it. Tensions and pitch in the mid-bass will probably not go up much, if at all. The tenor bridge will go up somewhat more. The tenor string tensions are dropping, both the speaking lengths and the back lengths are getting longer and this is getting fairly close to the end of the tenor bridge.

Figure 2-E — The low bass and the bottom tenor bridge. This rib is fairly small and the feathering extends well under the cantilever. The bass bridge will not rise much, if at all. Indeed, it will probably go down slightly. This rib goes under an extension of the tenor bridge, but because of its small cross-section it will not offer much resistance to the forces causing it to bulge upward. Here it is the tenor bridge that is a terminating beam and as such it will not offer much resistance to the upward force of the soundboard. The strings in the low tenor section have very low tensions. The speaking lengths are relatively long as are the back lengths. In sum, there is little resistance to the upward force of the soundboard and ribs in this area, so the bridge will probably rise quite a lot as will string tensions and pitch.

This particular piano will probably exhibit pitch changes at the lowest tenor note that are at least similar to those that are described in the original question. Not all pianos will react this way. Each will have its own unique pattern depending on its specific design. On average, though, despite the individual idiosyncrasies found in specific areas of specific instruments, the overall pitch of all pianos will drift sharp during periods of high relative humidity and flat during periods of

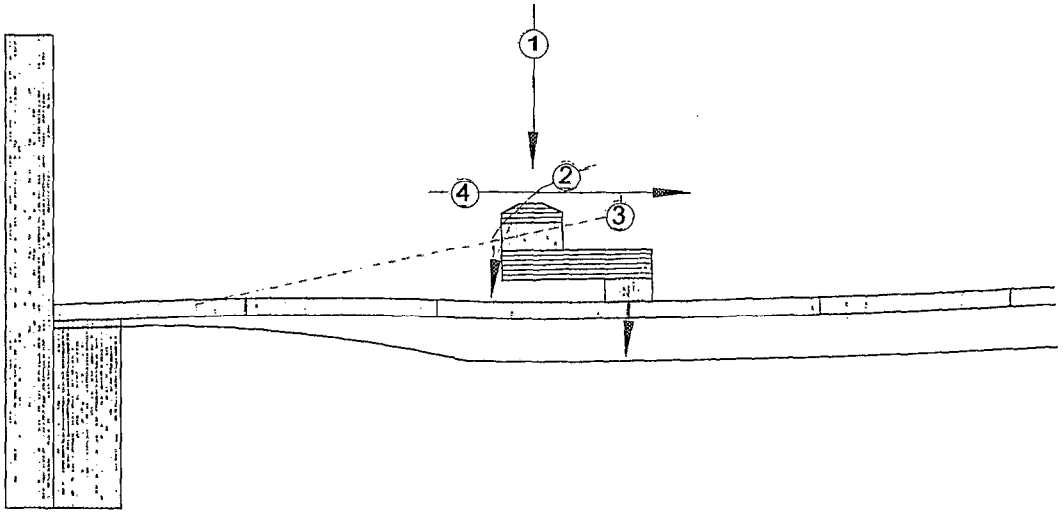

Figure 3.
There are a variety of forces acting on the cantilevered style bass bridge. These forces will attempt to move the bridge in several different directions -- four of which are illustrated above:

1) The downforce from the string's downbearing will act to push the bridge straight down.
2) The bridge assembly will try to rotate about an axis located at or about the center of its shoe. This rotation will be resisted by the ribs underneath the soundboard. Eventually, the ribs will take on a permanent bend or distortions in response to this force.
3) The bridge and soundboard assembly will try to rotate about an axis located at or about the point where the rib meets the inner rim. This rotation will be resisted by the rib assembly and the compression of the wood cells within the soundboard panel.
4) The top of the bridge will be pulled toward the front of the piano in line with the string plane due to the elongation of the strings.

low relative humidity and it is rare to find one that will retain acceptable relative pitch — that is, a piano that will stay in tune with itself — during these changes. So, with a few explanations, expansions and elaborations, Dr. White's rationale basically remains sound.

Notes

1) Fandrich, Delwin D. "Tuning Stability in Pianos," Piano Technicians Journal, *Feb., 1995: pages 16-20. Please refer to this article for a more complete discussion of the forces involved in the changes a piano goes through as the relative humidity around it changes. I'll try not to repeat too much of that information here.*

2) To some degree all soundboards will have some amount of compression crown in some atmospheres no matter how they are designed. Prudent woodworking practice for this type of assembly dictates that the moisture content of the soundboard panel be not more than 6 percent to 7.5 percent no matter how the soundboard is designed or where it is built. It is reasonable to assume that the finished piano will spend at least part of it's life in an atmosphere that will result in a wood moisture content that is higher than this. Once the moisture content of the soundboard panel goes above the level it had when the ribs were glued on, there will be some degree of compression crowning.

3) Spring pressure is not a linear function of it's deflection. The more it is deflected, the greater will be the force required to deflect it further.

4) Hartman, John. "The Effects of Downbearing On the Tone of the Piano — Part 4," Piano Technicians Journal, *Nov., 1995. Actually you should refer to the entire series of four articles which develops the concept of downbearing much more thoroughly than can be done here.*

5) McFerrin, W.V. "The Piano — Its Acoustics," Wakefield, Mass., Wakefield Item Press, 1972. See Chapter 9 — Down Bearing of a String. This chapter contains a good discussion of how to measure and calculate both distance bearing and load bearing.

6) Baron, Patrick. "Calculating Downbearing Force," Piano Technicians Journal, *Nov., 1995: page 37.*

7) Aware of this, several manufacturers have established recommended stringing sequences for their instruments to minimize this effect. When available, these sequences should be followed.

8) The term "unison tension" refers to the sum of the tensions of each of the strings in a particular unison. If each string of a three-string unison in the tenor section has a tension of 160 pounds, the unison tension will be 3 x 160 = 480 pounds.

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Overstrung Bass Rescaling

By Steve Fairchild, RPT
Long Island-Cristofori Chapter

Rescaling the bass section is not easy to say the least. However my search for a good compromise which has taken 20 years of trial and error, resulted in what I call the "Fairchild Super-Scale." Although you can do the calculations by hand, it's best to use a spreadsheet like Super-Calc or Lotus 1,2,3, etc. They're time saving and more accurate.

Bass rescaling starts at Note #1 (A0). To set the tension use my formula:

L^.5*40.

Restated: The square root of the length, times 40, equals the tension in pounds for Note #1. Example: The speaking length of Note #1 on a concert grand is approximately 79.563 inches. Its square root is 8.9162772500635, times 40 (the aproximate Breaking Point Percent) equals 356.65109000254 lbs.

Now that we have the tension we can extract the steel core diameter by using a reverse breaking point percent formula.

(T/40/930)^.6

Restated: Tension divided by a breaking point percent of 40, divided by the constant 930. Take the answer an raised it to the .6 power. The answer is a steel core diameter of .0615205726673961 inches.

Lastly the O.D.(outer diameter) is computed by using a reverse bass wire tension formula:

((T*434)/Hz^2/L^2-.11*d^2)/.89)^.5

Restated: The square root of ((tension times 434, divided by hertz (27.5) squared, divided by length squared, minus .11*steel core diameter squared) divided by .89). O.D. equals .189408466089491 inches (outer diameter).

To find the O.D. sizes of the rest of the single bass strings proceed in this manner. Divide the O.D. of note #1 by the 12th root of 2.2^(1/12) or 1.0594630943593. This gives you O.D. for note #2. Divide O.D. for note #2 by 2^(1/12) and you have O.D. for note #3. Repeat this up to the last single bass wire.

To find the dw (wrap) sizes of the rest of the single bass strings proceed in this manner. Divide the dw (wrap) of note #1 by the 9th root of 2.2^(1/9) or 1.08005973889231. This gives you dw for note #2. Divide dw for note #2 by 2^(1/9) and you have dw for note #3. Repeat this up to the last single bass wire. The formula for dw is:

(D-d)/1.9

Restated: Take the O.D. of note #1 and subtract d (steel core) from it. Then divide the answer by 1.9 this gives you dw (the diameter of the wrap).

To find the d (steel core) sizes for the rest of the single bass stings, take the dw (wrap), times it by 1.9, then subtract it from D. If you've done the math correctly the wire sizes should be the same as listed in the example below.

Note #1 —
D = .189408466089491
d = .0615351942582474
dw = .067301722016444

Note #2 —
D = .178777785746312
d = .060383156980325
dw = .0623129625084142

Note #3 —
D = .1687437599644055
d = .0591251667989865
dw = .05769399662342466

Of course, d needs to be rounded off to available steel wire sizes. Also, D should be rounded off to 3 decimal places for the string maker, who likes to call d "the core" and D "the O.D." This rounding off should be done only when the entire bass calculation is finished.

Example: Note #1 — D = .189 d = .063
Example: Note #2 — D = .179 d = .059
Example: Note #3 — D = .169 d = .059

To make the transition from single to the bichord strings, we obtain the D and d sizes by dividing D of the last single wire by 1.183 and d of the last single wire by 1.07.

Example: Note #8 —Last Single
D = .126414984626733
Divide above / by 1.183
d = .0518310421383548
Divide above / by 1.07

Example: Note #9 — First Bichord
D = .106859665787602
d = .0484402262975278

Once again when you're through calculating all the bass strings these notes will be rounded off to three places for D and three or four places for d depending on which type of steel wire and its decimal measurement.

Example: Note #8 — D = .126 d=.051 (#23 American standard music wire gauge)
Example: Note #9 — D = .107 d=.048 (#21 1/2 American standard music wire gauge)

To find the O.D. sizes of the rest of the Bichord bass strings, proceed in this manner. Divide the O.D. of note #9 by the 18th root of 2.2^(1/18) or 1.03925922603184. This gives you O.D. for note #10. Divide O.D. for note #10 by 2^(1/18) and you have O.D. for note #11 Repeat this up to the last Bichord bass strings.

To find the dw (wrap) sizes of the rest of the Bichord bass strings proceed in this manner. Divide the dw (wrap) of note #9 by the 12th root of 2.2^(1/12) or 1.0594630943593. This gives you dw for note #10. Divide dw for note #10 by 2^(1/12) and you have dw for note #11. Repeat this up to the last Bichord bass wire. The formula for dw is (D-d)/1.9. Restated: Take the O.D. of note #9 and subtract d (steel core) from it. Then divide the answer by 1.9 this gives you dw (the diameter of the wrap).

To find the d (steel core) sizes for the rest of the Bichord bass wires, take the dw (wrap) times it by 1.9 then subtract it from D.

If you've done the math correctly the wire sizes should be the same as listed in the example below.

Note # 9 —
D = .106859665787602
d = .0484402262975278
dw = .0307470734158285

Note #10 —
D = .102822917623372
d = .0476823093274289

Continued on Next Page

Legend:

O.D. or D	=	The large outer diameter of a bass string.
d	=	The steel wire core diameter.
dw	=	The diameter of the copper wrap.
T	=	The tension in pounds.
Hz	=	The hertz or C.P.S.
L	=	The speaking length.
BP	=	The breaking point percent.
/	=	The sign for divide.
*	=	The sign for times.
^	=	The sign for raise to the power.

All decimal measurements are inches.

Overstrung Bass Rescaling

Continued from Previous Page

CHART A

	SUPER-SCALE COMPUTATION O.D	d	dw	ROUND OFF O.D.	d
01:A.0 = SINGLE =	.18940846608949	.0615351942582474	.067301722016444	.189	.063
02:A#0 = SINGLE =	.17877778574631	.060383156980325	.0623129625084142	.179	.059
03:B.0 = SINGLE =	.168743759644055	.0591251667989865	.0576939962342466	.169	.059
04:C.1 = SINGLE =	.159272900153358	.0577798170415918	.0534174121640875	.159	.059
05:C#1 = SINGLE =	.15033359916107	.0563637200358142	.0494578311185557	.150	.055
06:D.1 = SINGLE =	.14189602258112	.0548916877823525	.0457917551572461	.142	.055
07:D#1 = SINGLE =	.133932010786021	.0533768973364647	.0423974281313454	.134	.055
08:E.1 = SINGLE =	.126414984626733	.0518310421383548	.0392547065728306	.126	.051
09:F.1 = Bichord =	.106859665787602	.0484402262975278	.0307470734158285	.107	.048
10:F#1 = Bichord =	.102822917623372	.0476823093274289	.0290213727873385	.103	.048
11:G.1 = Bichord =	.0989386623162117	.0468928585600278	.0273925282927284	.099	.047
12:G#1 = Bichord =	.0952011392710794	.046076442022745	.0258551038149129	.095	.046
13:A.1 = Bichord =	.0916048055061119	.045237265655144	.0244039683426147	.092	.045
14:A#1 = Trichord =	.0881443274320329	.0443791976244596	.0230342788460912	.088	.044
15:B.1 = Trichord =	.0848145729421046	.0435057911255562	.0217414641139728	.085	.044
16:C.2 = Trichord =	.0816106038008902	.0426203057560775	.0205212094972699	.082	.043
17:C#2 = Trichord =	.0785276683205405	.0417257275522386	.0193694425096326	.079	.042
18:D.2 = Trichord =	.0755611943137413	.0408247877657079	.0182823192358071	.076	.041
19:D#2 = Trichord =	.0727067823128722	.0399199804573153	.0172562115029247	.073	.040
20:E.2 = Trichord =	.0699601990453192	.0390135789788746	.016287694771813	.070	.039

CONCERT GRAND COMPARISONS

	BALDWIN SD10 VALUES	O.D.	d	STEINWAY D VALUES	O.D.	d	YAMAHA CFIII VALUES	O.D.	d
01:A.0 =	SINGLE =	.181	.063	SINGLE =	.196	.067	SINGLE =	.178	.059
02:A#0 =	SINGLE =	.174	.063	SINGLE =	.187	.067	SINGLE =	.178	.059
03:B.0 =	SINGLE =	.167	.063	SINGLE =	.176	.063	SINGLE =	.170	.059
04:C.1 =	SINGLE =	.154	.063	SINGLE =	.162	.059	SINGLE =	.162	.055
05:C#1 =	SINGLE =	.147	.055	SINGLE =	.156	.059	SINGLE =	.154	.055
06:D.1 =	SINGLE =	.142	.055	SINGLE =	.146	.055	SINGLE =	.152	.055
07:D#1 =	SINGLE =	.135	.055	SINGLE =	.138	.055	SINGLE =	.140	.051
08:E.1 =	SINGLE =	.129	.055	SINGLE =	.131	.055	SINGLE =	.132	.051
09:F.1 =	Bichord =	.100	.045	Bichord =	.111	.049	Bichord =	.108	.044
10:F#1 =	Bichord =	.103	.047	Bichord =	.107	.049	Bichord =	.103	.044
11:G.1 =	Bichord =	.097	.045	Bichord =	.101	.047	Bichord =	.099	.044
12:G#1 =	Bichord =	.091	.045	Bichord =	.096	.045	Bichord =	.099	.043
13:A.1 =	Bichord =	.084	.045	Bichord =	.093	.043	Bichord =	.094	.042
14:A#1=	Trichord =	.078	.039	Trichord =	.086	.041	Trichord =	.084	.040
15:B.1=	Trichord =	.070	.039	Trichord =	.077	.041	Trichord =	.080	.039
16:C.2=	Trichord =	.068	.039	Trichord =	.073	.038	Trichord =	.076	.038
17:C#2=	Trichord =	.066	.039	Trichord =	.071	.038	Trichord =	.072	.038
18:D.2=	Trichord =	.066	.039	Trichord =	.066	.037	Trichord =	.070	.037
19:D#2=	Trichord =	.063	.039	Trichord =	.064	.037	Trichord =	.070	.036
20:E.2=	Trichord =	.062	.039	Trichord =	.060	.034	Trichord =	.066	.036

dw = .0290213727873385

Note #11 —

D = .0989386623162117

d = .0468928585600278

dw = .0273925282927284

As before, d needs to be rounded off to available steel wire sizes. Once again, D should be rounded off to 3 decimal places for the string maker, who likes to call d "the core" and D "the O.D." This rounding off should be done only when the entire bass calculation is finished.

Example: Note # 9 —

D = .107 d = .048 (#21 1/2 American standard music wire gauge)

Example: Note #10 —

D = .103 d = .048 (#21 1/2 American standard music wire gauge)

Example: Note #11 —

D = .099 d = .047 (#20 American standard music wire gauge)

The entire bass wire pattern should look like Chart A after the complete rounding of the diameters has been done. Most concert grands should not be rescaled. This was used as an example of how to apply this all-new technology to other inferior or poorly scaled pianos. Also on Chart A is a comparison of three concert grands, so you could get an idea of how the Fairchild Super-Scale might relate. All diameters were measured by hand for the three pianos, and are not factory specifications. Once again the grand comparisons are for example only. No adjustment has been made for the crossover from bichords to wound trichords. In smaller grands that have wound trichords on the bass bridge I convert them to bichords according to the above calculations.

Two important rules should be observed:

Rule 1: Always check the breaking point percent of the upper Bichords. It must not exceed 60 percent or so. If that happens increase the d (core diameter) but don't change your D unless there are other problems. Use this BP% formula:

T/(930*d^1.667)

Restated: Take the tension and divide it by 930 times the steel core raised to the 1.667 power.

Rule 2: If the lowest bass D (outer diameters) exceed .300 simply take all those that do, and make them the same D as the nearest size to 300 without going over.

Example: Speaking length= 38 inches for note #1:

Note #1 — Super-scale diameter = .331 (Must be changed to .295)

Note #2 — Super-scale diameter = .313 (Must be changed to .295)

Note #3 — Super-scale diameter =. 295 (leave alone)

This scaling technic is only good for the overstrung section. If there is a bass supplement on the tenor bridge, then a different method must be employed. A mathematical bridge is built to tie the first steel wire to the last Bichord in the overstrung section. The prime consideration is that the inharmonicity changes smoothly over these transitional strings. Also other factors such as volume, hammer contact time and BP% need to be evaluated. I generally scale this section after the all steel wire notes have been done. Which is another methodology unto itself.

In closing let me say that the hallmarks of the Super-scale are:

1: The inharmonicity changes smoothly.

2: The BP% for the single strings is generally between 35 and 40 percent, and 40 to 55 precent for the Bichords.

3: The partials are sharp and clear. Which makes the octaves easy to tune all the way down to note #1.

4: Most reports from around the country mention excellent tuning stability.

Romantic Era Piano Tuning —

The Ordinary Temperament Commonly Practiced

By Daniel Ressl

What sounds did the great composers have in mind when they penned their masterpieces for the piano? Owen Jorgensen's 1991 book, *Tuning*, revealed a treasure trove of pertinent information on this topic. First, what is a musical piano tuning?

"The opinion of the best practical authors is, that the difference of character produced by a difference of proportions in various keys, would be of considerable advantage in the general effect of modulation. But, when it is considered that upon an average of all the music ever composed, some particular keys occur at least twice as often as others, there seems to be a very strong additional reason for making the harmony the most perfect in those keys which are the most frequently used; since the aggregate sum of all the imperfections which occur in playing must by this means be diminished in the greatest possible degree, and the diversity of character at the same time preserved. Indeed, in practice, this method, under different modifications, has been almost universal." —*Thomas Young, 1799.* "Thomas Young's statement on key usage still holds true today. The above philosophy of well temperament is very convincing. It is possible that in the future well temperament could again become the common tuning. . ." Jorgensen, *Tuning*, p. 252.

D'Alembert's well temperament, published as the ordinary well temperament commonly practiced in the eighteenth century, continued prominently in print into the nineteenth century. {It's harmonic balance (graduated from the narrowest major third CE to the widest major third C-sharp-E-sharp), corresponds with that of instructions attributed to Handel.} Also, according to Jorgensen's scholarly and penetrating discussion, Ellis's 1885 tuning analysis documented tuners practicing this form of temperament at that time (*Tuning*, pp. 203-213 and 545-558).

The evidence shows that this form of well temperament was actually employed by professional piano tuners, and clearly separates it from tuning schemes which existed on paper only.

C-sharp major is the most brilliant key because the key of C-sharp uses the most sharps. Every tone is sharped in the C-sharp major scale. Bach used the key of C-sharp, not D-flat, and several historical temperaments make C-sharp - E-sharp the largest major third.

Thomas Young published a bearing plan in the B626-B638 octave about 1800. He took the temperament low to more easily judge the slower speeds of the major thirds. In that range, 6:4 fifths are easier to hear than 3:2 fifths. The minor third-major third fifth test checks 6:4 fifths. For example, when B27-030 beats slightly faster than D30-F#34, B27-F34 is a slightly narrow 6:4 fifth. The wide fourth can be checked by the major third-major sixth test. For example, when B27-0#31 beats slightly slower than B27-G#36, D#31-G#36 is a slightly wide fourth. Of course, such tests are for when uncertainty arises. Usually, it is a simple matter to raise the tone through the point of purity, a little too sharp, and settle it back to its correct degree of tempering.

So much for the information gleaned from others. Now I'll add my bit, and I would not be surprised if someone else had already done it, too. After all, I'm seeking the sound Chopin's best tuner produced long ago!

The following method of setting the ordinary well-temperament capitalizes on easy equal-beating procedures, and 6:4 fifths.

Laying The Bearing — B-Flat 26 to B-Flat 38
Tempering 6:4 Fifths

1. C28	To the Tuning Fork
2. F33	C-F Wide One Beat in 3 Seconds (1/3)
3. Bb38	F-Bb Wide 1/3
4. Bb 26	Bb-F Narrow 1/3, Bb-Bb (6:3) Pure
5. Eb31	Eb-31 Bb38 Narrow 1/3
6. G#36	D#31-G#36 Wide 1/3
7. C# 29	C#-G# Narrow 1/3
8. F#34	C#-F# Wide 1/3
9. B27	B-F# Narrow 1/3
10. E32	B-E Wide 1/3; Check C-E Wide about 2 BPS
11. D30	Bb26-D=D-F#, Both Wide about 4 BPS
12. A37	E-A Wide = D-A Narrow, Both about 2 BPS
13. G35	D-G Wide = C-G Narrow, both about 1 BPS

The C-E third can be simply regulated, within the limits of good taste prevalent during the nineteenth century. One beat in three seconds in steps two through ten, as given, produces about 4 BPS width at the middle C-E third; 0.4 BPS in steps two through ten produces about 5 BPS at the middle C-E third; and one beat in two seconds (one-half beat per second) steps two through ten, produces about 7 BPS at the middle C-E third. Of course, these fourths and fifths must be tuned with consistent evenness. Expanding the fourths and narrowing the fifths as described also

Alternative Plan
Laying the Bearings
E32 to F#46 Tempering 3:2 Fifths

1. C40	To the Tuning Fork
2. F33	F-C Narrow 0.5 BPS
3. B-flat38	F-Bb Wide 0.5
4. Eb43	Bb-Eb Wide 0.5
5. G-sharp36	G#-D# Narrow 0.5
6. C#41	G#-C# Wide 0.5
7. F#34	F#-C# Narrow 0.5
8. B39	F#-B Wide 0.5
9. E32	E-B Narow 0.5
10. E44	E-E Pure, C28E-32 = C28 E44, C40-E44 about 7 BPS
11. F45	F-F Pure, Db29-F33 = Db29-F45
12. F#46	F#-F# Pure, D30 F#34= D30-F#46
13. D42	BbD = D-F#, Both Wide about 9 BPS
14. A37	E32-A = A-D, Both Wide about 2 BPS
15. G35	G-C Wide about 1 BPS = G-D Narrow the Same

narrows the widest thirds, for less chord color contrast as C-E widens. The limits of good taste prevalent during the nineteenth century for the middle C-E width ranged from four to seven beats per second, in well-tempered piano tuning, starting from today's standard pitch "C" or thereabouts, examples of tuning varied as different tuners preferred more or less sweetness in the major thirds.

A tuner might prefer more sweetness in the C-E third. Consistently slowing all the fifths and fourths of steps two through nine, as required, produces the desired result. One beat in three seconds would produce 4 BPS width at the middle C-E third. The 10-6 test checks 3:2 fifths.

In 1848, when Chopin's piano had been tuned by the Broadwood factory's equal-temperament zealot Hipkins, Chopin wrote: "Those with whom I was in the closest harmony have died; even Ennike, our best tuner, has drowned himself. So I can never again have a piano tuned just as I want it." (*Chopin*, Zamoyski, 1979, p. 266) All of Chopin's piano compositions beautifully exemplify and exploit well temperament key characters, from the Minute Waltz to the Funeral March. No wonder Chopin lamented the loss of his fine well-tempered piano tuner!

Setting the Temperament from G35 to F#46

1. C40	To Fork
2. F45	C-F 1 BPS Wide
3. Bb38	Bb-F 1/2 BPS Wide
4. Eb43	Bb-Eb 1/2 BPS Wide
5. Ab36	Ab-Eb 1/2 Narrow, Check Ab-C about 10 BPS Wide
6. C#41	G#-C# 1/2 BPS Wide
7. F#46	C#-F# 1 BPS Wide
8. B39	B-F# 1/2 BPS Wide
9. E44	B-E 1 BPS Wide, Check C-E about 7 BPS Wide
10. D42	Bb-D = DF#, Both about 9 BPS Wide
11. A37	A-D Wide = A-E Narrow, about 3 BPS
12. G35	G-C Wide = G-D Narrow, about 1 BPS

Harmonic Balance — Major Third Widths in Cents

One Beat in Three Seconds Steps Two through Ten		One Beat in Two Seconds Steps Two through Ten
5.2	C-E	8.8
7.0	G-B	9.2
10.1	D-F#	10.8
11.1	A-C#	12.6
17.8	E-G#	16.0
18.1	B-D#	16.3
18.2	F#-A#	16.6
18.4	C#-E#	16.8
18.0	Ab-C	16.3
16.0	Eb-G	15.5
12.7	Bb-D	13.6
11.5	F-A	11.6
5.2	C-E	8.8

Beat Rates, Beats Per Second of Major Thirds

One Beat in Three Seconds Steps Two through Ten		One Beat in Two Seconds Steps Two through Ten
4.3	Bb26-D	4.6
6.4	B-D#	5.8
2.0	C28-E	3.3
7.4	C#-E#	6.8
4.3	D-F#	4.6
7.2	Eb-G	7.0
8.5	E-G#	7.6
4.8	F-A	5.8
9.7	F#-A#	8.9
4.0	G-B	5.2
10.8	Ab-C	9.8
8.3	A-C#	8.0
8.6	Bb-D	9.2
12.9	B-D#	11.7
4.0	C40-E44	6.7
14.8	C#-E#	13.6
8.6	D-F#	9.2

Now, for those who always flip to the end first, to judge whether an article merits reading, comes the fascinating conclusion! Even if, one or two hundred years ago, bearings might have been laid from B626 to B638, or from E32 to F#46, today we know that bass breaks are better avoided for the sake of initial tempering accuracy, and octave duplications deleted for efficiency. These fifths are 3:2 fifths.

Check the following, from the slowest to the fastest wide major thirds in the temperament: GB 5 BPS, C-E 7, A-C#8, B6-D9, D-F#9, A6-C 10, B-D#12, C#-E#14.

Here again, the first several fourths and fifths could be taken more slowly for more sweetness in the simpler keys. One beat in three seconds in steps 3,4,5,6 and 8, and two beats in three seconds in steps 2,7, and 9, would produce C-E 4 BPS. 10,11, and 12 remain the same, and the final thirds check would be: G-B 4BPS, C-E 4, BPS, A-C#8 BPS, B6-D 9BPS, D-F#9 BPS, A6-C 11BPS, BD#-13 BPS, C#-E# 15 BPS.

Small pianos with wildly inconsistent inharmonicity benefit from 4:2 octaves down to C#29, and 6:3 octaves below C28, by more nearly approximating the desired major third beat rates just below the temperament, compared to 6:3 octaves immediately below the temperament.

Daniel Ressl is a retired piano tuner/ technician living in British Columbia, Canada.

Behold the Upright

The Hammer Zone

By Don Valley, RPT
Western Carolinas Chapter

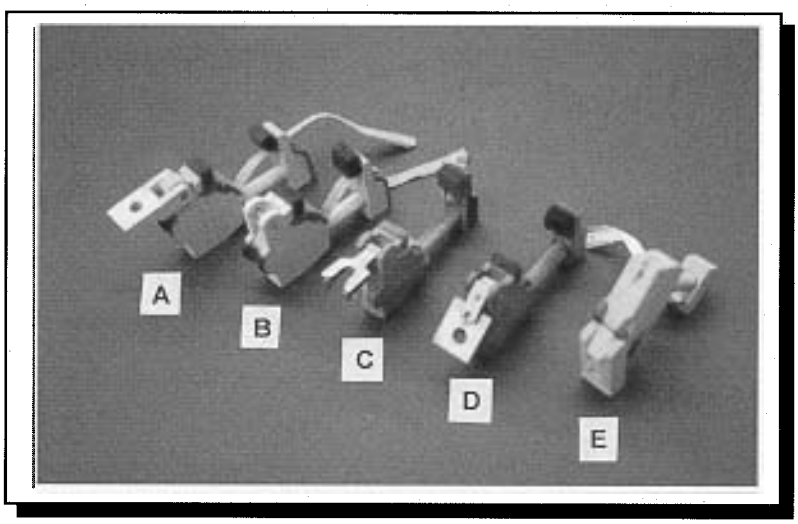


Photo 1

At the top of the action we see the hammer head. This area, including the butt and shank, is the topic for this article. Even though the overall design and function of this part of the action has been basically the same for over a century, manufacturers have significant small design differences in the butt, some of which are still being retained. Those differences found in the existing uprights need to be identified and understood from the outset as you familiarize yourself with this element of the action.

Differences in hammer butt design are noticeable in four areas: 1) the method of attachment to the action rail; 2) the catcher; 3) the spring assist; and 4) the angle of the hole for the shank seating.

1) Most butts are attached to the action rail with the familiar wooden flange. (Photo 1-a) Others are attached similarly with a forked brass "Billings" flange(c) while still another is mounted onto a tongued brass rail(b) mounted on the wooden action rail (d).

2) The catcher has either a hole for the bridle strap to pass through or is plain without the extension for the hole (e). The latter was used most frequently in compressed actions.

3) The full-length spring rail is used on the majority of actions. Others have individual small springs attached to each butt with a cord loop on the flange. Some even have a cord loop attached to each tongue of the brass rail. (Photo 2)

4) Shanks are inserted into the butt at 90 degrees or at a lesser angle. The latter usually is found on smaller actions.

As you inspect the butt to determine the extent of rebuilding necessary, the wooden flange may need to be replaced if the originals are dark-colored and brittle. If the bushing cloth is in good condition, then perhaps only lubrication is necessary. However, check the center pins real thoroughly to determine if replacing these will give the needed consistency of friction. You may find that replacing corroded center pins with new makes the required difference. To check for proper freedom, hold the flange vertically. Raise the hammer shank to horizontal. Let it drop, allowing it to swing. Three or four swings is sufficient. Many more means a center pin that is too loose; less means just the opposite. This can be done even with the Billings type of flange while you hold the flange tightly with pliers, approximating its tightness when it is mounted on the rail. Of course, we must understand in all this that the center pin does not move; the flange bushing cloth rotates on the pin.

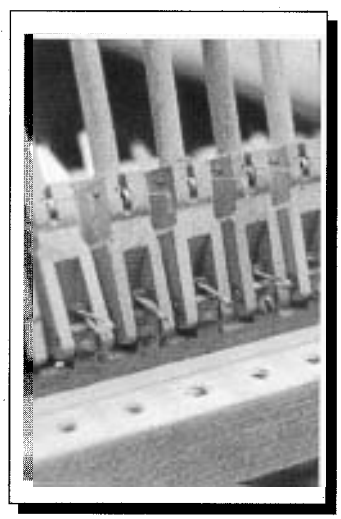


Photo 2

Managing your time for greatest efficiency in rebuilding tasks usually means performing one task at a time on each piece before moving on to another type of task. Now that you have completed the flange and center pin work, evaluate the area where the jack tip pushes the butt. The butt felt usually needs replacement because of compacting. The butt skin is usually heavily worn, especially in the center area of the action. The butt cushion felt sometimes needs replacement. Take a sample of each of these and dupli-

cate each 88 times. Remove all of these worn parts. Start replacement with the butt cushion felt since that is applied right to the wood. (Photo 3) A light glue application — just enough to keep it in place — is proper here. Then apply the

Photo 3

butt skin. Usually the ends of this extend beyond the butt cushion felt. Glue the ends well, keeping pressure and tension until the glue has set. This needs to be quite tight so the jack movement will not wrinkle the leather. Masking tape is excellent in places such as this where clamping is difficult. (Photo 4) By drying overnight it is safe to remove the tape the following day. Next, replace the butt felt; just a spot of glue on the support block is sufficient. Be very careful to keep glue from the jack surface of this felt as well as away from the butt skin in this area. This is a spot where clicks can be a nuisance.

The catcher usually needs new leather applied. Also inside the catcher at the lower edge will frequently be a felt cushion about half the size of a butt felt.

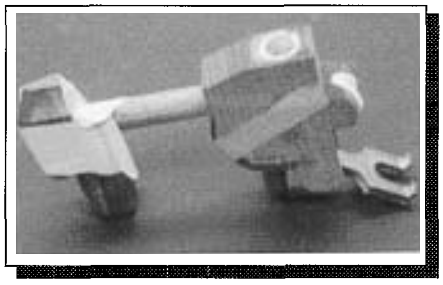


Photo 4

This is here to keep the jack from tapping wood. The catcher can be sanded easily after removing the initial mass of leather. Be certain to remove all glue. As you install the leather pieces, be certain to place the nap of the leather facing downward. Clamping pressure can easily be duplicated, here again, with pieces of masking tape. After this job is complete and all dry, apply the felt cushions to the backs of the catchers. A good material is butt felt cut in half. Once this is dry, you are ready to install the bridle straps. Having kept a sample, cut them to exact length. A simple but effective tool is made in the following way: Use a block taken from waste pin block stock — 4 x 6 to 5 x 8. Drill near one end a small hole to accept a #22 center pin; make it a tight friction fit. Drive the center pin into the hole to be left there. Fit the hole of your bridle strap sample onto the center pin. Mark a line or use tape specifying where you will cut each bridle strap. Stack five or six bridle straps onto the pin. Use a good sharp single-edge razor blade (preferably in a handle) to make your cut. It is quick, safe, easy and accurate. (Photo 5)

Attaching the bridle straps with white glue is simple and durable. No need to use tacks which ultimately serve to split the wood. Upholsterers use white glue to attach various types of fabric to wood and find it very durable. To attach the bridle strap, feed the newly cut end through the

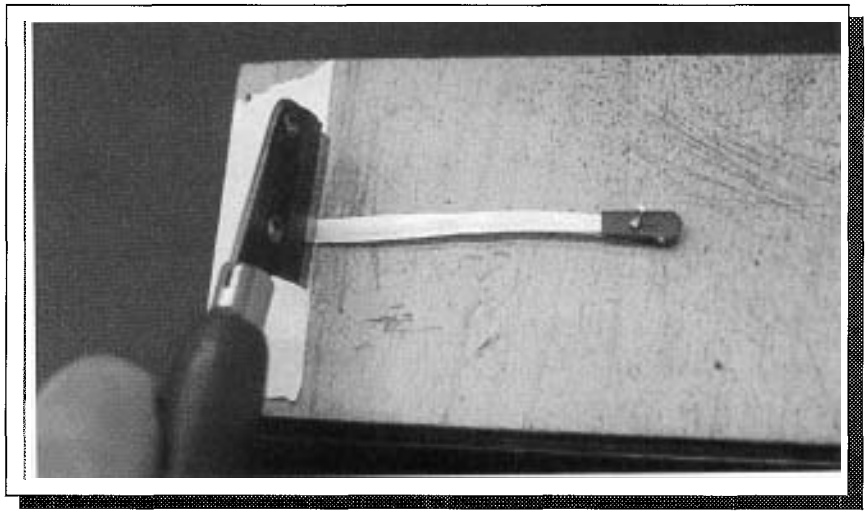


Photo 5

catcher. Place a small drop of white glue on the top end. (Photo 6) Place it where the catcher dowel enters the butt. Let each one rest to dry in such a way that there is no tension on the glue joint. This method has been used for many years without a breakdown. It yields a very neat result without straps wound around catcher sticks or extra ends hanging around in the action. (Photo 7)

Now in dealing with hammer installation, there are two procedures to consider: 1) you retain the existing shanks; 2) you install new shanks. We will proceed first with #1. To get everything in

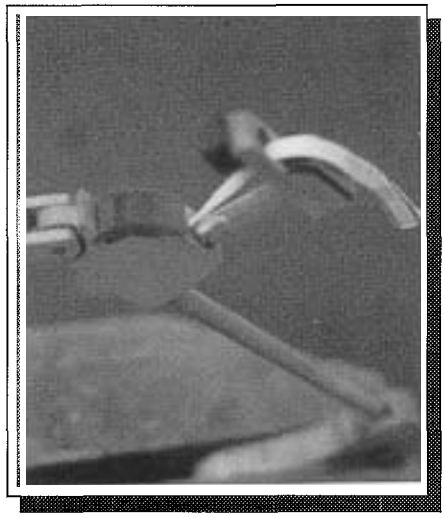


Photo 6

order, you will need to install the hammers back onto the rail. For reasons of alignment, it is best not to have removed any of the old heads yet. In the process of installing these hammers, align them perfectly to the strings — providing, of course, the strings are in their proper location — so you may next remove the old heads and leave the shanks properly spaced for the installation of new heads. Be certain to leave the end hammers heads of each section as your guides for proper installation of the new set.

In most older uprights you will not find the shanks the exact same length;

Continued on Next Page

Behold the Upright

Continued from Previous Page

they have not been inserted into the heads all the way. You will either correct the length of the shanks to be the same or you will adjust the positioning of the hammer heads to give you that nice straight line. Incidentally, as you clean the shank tops from excessive glue and the glue collar, make certain to trim the very ends where a glue buildup is often the culprit keeping you from getting that head seated exactly where you want it.

At this point you must measure the diameter of the shank to determine the size of your boring bit. If you do not bore your own hammers, I encourage you to begin. The next best is to send samples to your hammer supplier and have them custom-bored. The stock hammer set is generic in the area of measurement and angle and, many times, these are incompatible with the upright you are repairing. Other factors supporting the boring of your own hammers include the variances you can make in improving on the angled hammers, original duplication of the rake, as well as sectional variations in striking distance. Just a few notes of caution in the event you are just getting into hammer hanging. The striking distance is from the center of the hammer shank to the nose of the hammer. Do not measure according to the hammers you are replacing, but to the contour of the original hammer. Also, be alert to the fact that reshaping may have removed too much of the felt to be able to judge well. In this event, and commonly, hammer #86 - 88 are good targets because of only 3/32" to 1/8" original felt being over the nose of the molding.

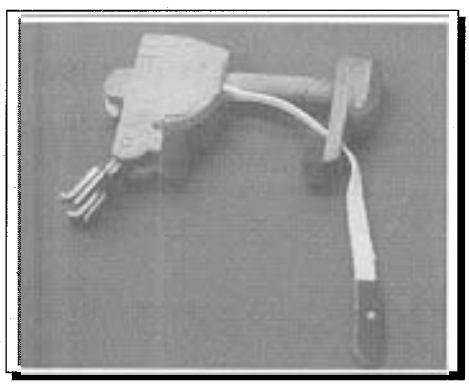


Photo 7

To hang the set of hammers in the piano I use a set of aluminum 1" 90-degree angle stock. (Photo 8) I have a length for each of the three sections, which really in its simplest form is a "shelf" for the hammer shoulders to rest on while drying in place. I place a screw hole in the bass end of each shelf. In the treble end is an elongated screw slot. These are so you can anchor the shelves to the strings very firmly. For the top treble section, cut away some of the extreme right back section so the bridge will not obstruct it. On the backs of the rails have been glued 2 or 3 short sections of magnetic strip for initial holding to the strings. (Photo 9) A narrow bar of aluminum stock about 1/8" thick will need to be made for each of the six screws. It should be about 1" long and no wider than 3/16" because of having to fit between unisons. Into this drill and tap a hole compatible with a small roundhead screw. These will stay on the brackets to turn behind the strings to lock the shelf securely in place. Secure the bass end one first; the treble end of each has the slotted hole for freedom for choice of best unison. This slot needs to be only 1/2" in length. On the top of the shelf surface glue a floor of 60-grit abrasive paper or cloth. This will keep the hammer seated, preventing any drift.

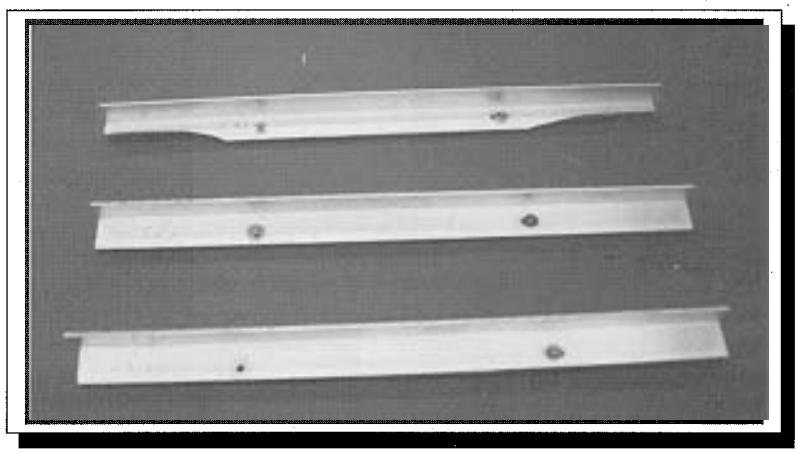


Photo 8

Now, place your new sample guide hammers next to those in the action you have yet to remove. Determine the striking point. Glue each. Let dry for one hour. Remove the old hammers. Set your guide rails in line with the new samples. (Photo 10) The reason for this rather than with the original samples is that the configurations of your new hammers are rarely the same as those you are replacing.

Your hammers can now be hung. Since the shanks have been correctly spaced, you can proceed one-by-one until the job is complete. I like to begin at note 88 since the hammers are not angled. Therefore it is easier to check for that mild bit of play you need for minor adjustments side-to-side, perpendicular location, glue fit, and so on. In any event, make certain the hammer is striking the unison squarely. A dilemma will be present here because you have set your shanks previously with the old hammers to line up with the strings, but the hammers are not spaced equidistantly — the appearance is less than "perfect." Be not dismayed. Look carefully at the location of the unisons. You will often see the unisons not perfectly spaced from one to the other. This has resulted from the

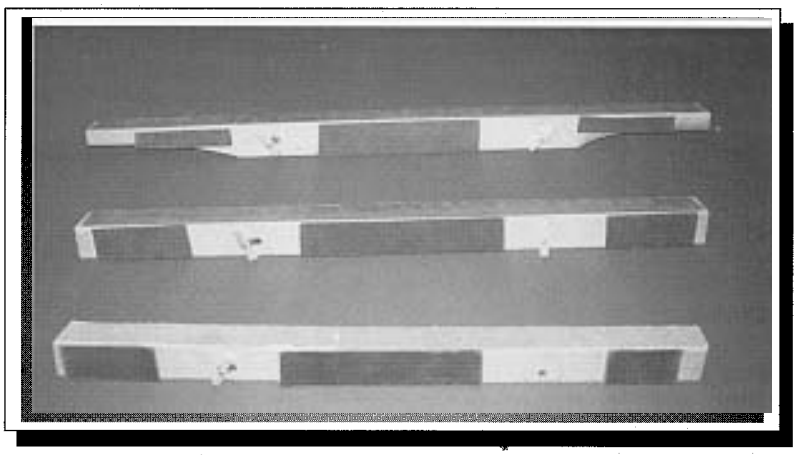


Photo 9

Photo 10

strings, under tension and use over the years, finding their "home" seat. You may find extreme cases in certain unisons where it is advantageous to re-space some unisons slightly. Experiment for the best result.

Troubleshooting Piano Problems

By Ernie Juhn, RPT
Long Island Nassau Chapter

First, it is extremely important to learn how to interpret customers' complaints. We have to be fluent in a strange language. Words like "zings," "pings," "rings" and "sings" do not mean the same to all people. "Flat" notes don't necessarily sound flat and "sticky keys" in reality may not stick at all. "Sharp" pianos may not be sharp and brassy, "woody" or "tinny" pianos may not sound like real wood or real tin. An analytical mind is an absolute must. To succeed in troubleshooting, we need to become expert translators of non-descriptive descriptions. If you like detective stories, troubleshooting should be your favorite piano work.

Troubleshooting covers a lot of territory, from tuning problems to noisy piano benches. In this series I will try to include some of the less common and more unusual problems. In some instances, you may find my procedures somewhat unorthodox, but isn't it the end result that counts?

Troubleshooting Complaints that are Not (Piano Problems)

The Mystery

A fine concert grand on the stage of a concert hall rattled during a concert. It was so loud that everybody heard it and complained about it. The technician worked on the piano next morning. He found nothing. Being a very conscientious individual he also called in a couple of his colleagues — they heard nothing. During the next concert — it did it again. Loud and clear.

Frustrating? You bet. How do we solve it? With logic. First thoughts: what is different during the concert than when the piano is being serviced? There are no people in the hall, the air conditioning may have been on or off, the stage lights may be on or off. So all these variables were tested and explored — no success. Finally, another thought: there were also instruments, music stands and musicians on stage during the performance, none of which were around during service time. Bingo! By trial and error, it was determined that the snare drum rattled. Quite loudly. The percussionist knew about it but did not think that it was important. He also did not know what to do about it. The problem was solved easily by adjusting the tension on the snare drum slightly.

The "Pong"

Not too long ago, I was called by a customer who had an unusual complaint. When I arrived at the house I asked my standard question, "What seems to be the problem? " (I ask this question even if I have been forewarned and am familiar with the complaint). The pianist said, "My piano has a 'pong.' Mind you, it is not a ping but a pong." At first I thought that the young lady was joking, but she was not; she was dead serious. My next step, of course, was to ask for a demonstration, and she did not hesitate for a second. She sat down and played a Chopin nocturne for me — beautifully. I heard nothing unusual. Cautiously I asked her, "Did you hear it?"

"No, it only does it when the lid is open."

"Oh, then let's open it up."

I opened the lid and she played again — something else — very nicely, and I heard the "pong." What is a "pong?" A pong is a noise produced by a minute particle of Styrofoam (the white packing material that often comes in the shape of peanuts) lodged between the fly leaf (front lid) and the lid of the piano. The movement made a rather loud groaning noise that is hard to describe. She described it — it was a "pong."

Getting Behind

The piano was an upright. The complaint was a vibration on certain notes which sounded more like a buzz.

"It is there all the time. It is obvious and never goes away. Somewhere in the middle of the keyboard. That's easy isn't it?"

No, it isn't. It almost sounded like a loose rib or a cracked soundboard. No such thing could be found. When the piano was moved away from the wall to inspect the back, the noise went away. No matter what, it did not come back and yet, when the piano was pushed back against the wall, the vibration came back. Loud, clear, and always. What now? This is when an analytic mind is absolutely necessary. Very gingerly, I moved the piano away from the wall, an inch at a time, and when the vibration became marginal the solution became very clear. It was not the piano — it was the wall! And sure enough, when the piano was just about far enough to push my hand behind the piano and push against the wall with my hand the vibration stopped. To prove the point, I moved the piano away from the wall and when I pounded my fist against the wall the vibration was clearly audible.

It was not a piano problem. It was a "wall problem." There was, however, a small detail yet to be taken care of: the solution. But that is not a piano problem.

Foiled Again!

A rather large hall. The piano: a concert grand. The complaint: a buzz on certain notes. I was called to find the buzz. The "house tuner," as well as a few local technicians just could not find it. First, let me say that indeed I heard the buzz loud and clear — so did everybody else. It was right in the area of the tenor break. Here are some of the things technicians had come up with, so far. When the end of the long bridge was pushed down, it became less audible. It changed dramatically when the top of the piano was raised. Technicians measured bearing and found that there was not too much. They also decided that there was hardly any crown in the board. Nobody could pin it down, and numerous suggestions were made — some quite costly; from "jacking up" the bearing (and/or crown) to re-gluing the bridge. Mind you, all the standard remedies, including tapping bridge pins and so forth, had failed.

At this point, I was pretty sure that a different approach had to be taken. Logic. Pushing down makes it less loud — of course it does — so will playing pianissimo. Conclusion: ignore that symptom. Bearing and crown: since it does it on a couple of notes only, not the next one up and not the next one down, we are barking up the wrong tree there, too. If it were a bearing or crown problem, it would not stop abruptly on either side of the problem; it would "fade out." Therefore, we will have to ignore that possibility, too.

Next, the top up makes it much more audible. Here I started to experiment. I rotated the piano on stage and, wow! The buzz went away when the piano was in one position and came back when it was in another. It almost pointed toward the problem being in a certain direction. Conclusion: The noise may come from the outside and "reflect," so to speak, into the piano, making us believe that it came from inside the instrument. And sure enough, having someone play these notes while I moved around in the hall, I found a piece of insulating foil behind an air conditioning installation. It vibrated sympathetically with certain notes only. It fooled us all! Seems that the rather loud noise was somehow reflected by the piano top in such a way that we heard it coming from inside the piano!

Problems the Pianist Feels

A Different Look at Light and Heavy Touch

We all know that "touch" can mean a lot of things. It can have to do with action regulation, weight and action centers. Touch can change overnight (without the piano actually being touched) because of the "placebo effect," but there is another factor which can be quite dramatic. It has to do with the hammer itself.

Consider bouncing two different balls. A very soft one and another one that is very hard. No question that the harder ball bounces faster, easier and higher than the soft one (well, maybe not a croquet ball...). If we apply the same theory to our piano hammer, we will come to the conclusion that hard and soft hammers behave quite different from each other, too. Obviously, I am speaking of a situation where both hammers are in the same action and regulated equally.

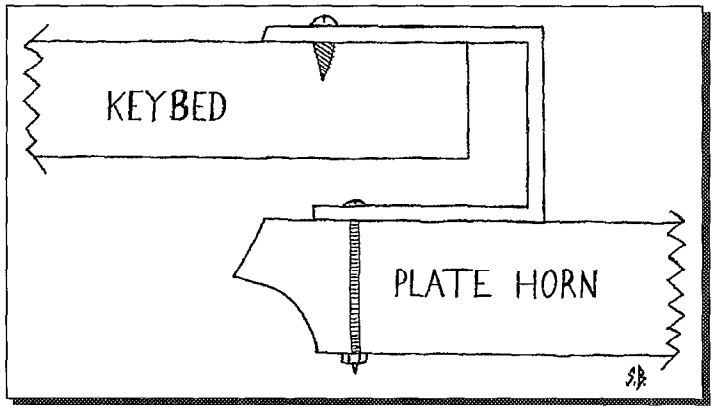
Suppose both of our hammers have been filed nicely and both strike the entire unison squarely, but one of them has been softened more than the other. The key with the softer hammer will seem heavier and the harder hammer will seem lighter. Unfortunately, there are some other "side effects." If we apply this experiment to two larger sections of the piano, we will notice that the portion with the harder hammer will also produce much faster repetition, and the opposite will happen to the softer hammer section.

Having said all that, I would strongly suggest to keep the above in mind when dealing with complaints about "heavy" or "light" touch. In fact, I urge you to explain some of the effects extensive voicing or "tone regulating" can have on touch.

The Case of the Disappearing Silence

The piano is a vertical. The complaint is that some keys often fail to sound. It happens only sometimes. To make matters more complicated, when it happens, it does it for a few months; after that, the problems disappears for a long time. Clues: it happens in the center of the keyboard, and it is taking place in a part of the country which has seasonal changes.

Here is what happens. During the humid season the keybed swells. As we know, such swelling may easily raise the hammer shanks off the hammer rest rail and cause the jack to hang up above its resting place on the butt felt. Consequently it will "cheat" and result in no sound or very weak sound upon striking the key. Now here is an explanation



Bracket fastening top of keyboard to plate horn.

with a possible cure. Almost all vertical pianos have a "horn" coming out of the plate. Generally, a hole is drilled through this horn and the keybed is secured to it with a screw. Obviously, if the bottom is rigidly secured, it will be the top part that will move up and down with climatic changes. A simple metal bracket can be constructed to fasten the key bed at its top (see illustration). This will stabilize the critical area and it will solve the problem. A final thought. It happens in the center of the keyboard because the ends of the keybed are secured to the arms — at the top — and only the center is subjected to this climatic yo-yo.

Vague Problems

Now You Hear It — Now You Don't

Here is my procedure for a very frequent troubleshooting problem. I am speaking of the numerous cases of "now it doesn't do it." My routine is to get as much information

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Do You Hear What I Hear?

By Ed Pettengill, RPT

My graduate studies at the Eastman School of Music included a course entitled "The Psychology of Music" which included an analysis of musical talent, how to test for it and a fairly detailed study of the physical mechanism of hearing. After closing out my classroom music teaching career and beginning full-time work as a piano technician, I found many of the things I learned in that course very beneficial to my new profession. I'd like to share them with you.

Raw musical talent can be separated into three components; pitch, intensity and rhythm. We tuners are concerned mostly with pitch when tuning, a lot with intensity when voicing and some with rhythm when feeling beats while we set the temperament. In this article, I want to draw your attention to the fact that what we hear in a piano may not be what the customer hears and how we feel a piano should sound may not be what our customer wants to hear. We must remember that we are working to satisfy our clients' needs and not our own. What the customer wants is what the customer gets — otherwise they call another tuner and we're out the repeat business we need.

I remember once asking jazz pianist Marian McPartland if she wanted her treble "rare, medium or well done." She replied, "Just nice and bright!" In our language she wanted it stretched a fair amount. On another occasion, very early in my career, I tuned for a concert pianist and decided not to stretch the treble but tune pure octaves all the way to the top. After listening to the first number, I sort of slumped down in my seat and hoped no one knew I was there and had tuned the piano. The artist asked me later what was wrong with the piano, "It sounded fine before but all the life went out of it for the concert." I knew what the problem was but he didn't and I didn't tell him. It's surprising how little some pianists know about the intricacies of stretching and voicing. The early lessons I learned from these and similar experiences were: to be sensitive to the kind of music to be played on a particular piano; and to ask the customers how they want their instruments to sound — especially when dealing with an artist of professional caliber. I always avoid voicing without the customer present.

Here are three short scenarios concerning aging ears. One: My father was a professional violinist for nearly all of his life and had an extremely critical ear. When he was almost eighty, music no longer was pleasant for him. He said: "It doesn't sound right." He was a bit hard of hearing and claimed music now sounded out of tune and distorted. Two: A fine pianist moved into town a few years ago and called me to tune his Baldwin grand. Before I started he said he could not hear the top octave so I didn't have to tune it but would I please try to fix the thumping he heard in the middle register which he claimed no other tuner could hear. I told him I had to tune the entire piano clear to the top because others including myself would know it was out. When it came to the thumping, I could not hear it but he described what sounded like poorly adjusted glides under the balance rail. I adjusted them and ended up with a very happy customer. Three: A sweet but quite elderly lady (suffering some mild dementia) was quite angry with me because I filed the hammers two years previously and now she stated that I cut the hammers and ruined her piano. She had also lost the top of her hearing but wouldn't admit it. Her daughter said it sounded fine, but she didn't dare disagree with her mother for fear of being hit with her cane.

I'm using these little anecdotes to preface my remarks about aging ears. The Baldwin grand owner, a psychiatrist, just happens to have a sweet wife who is an audiologist. She has graciously taken some time to explain the various problems associated with aging ears and other forms of hearing loss which I will relate to you. I'm going to assume most of you have a basic knowledge of our hearing mechanism or have access to an encyclopedia and so I will not include a diagram of the ear in this article.

My father complained about musical sounds being distorted and out of tune. This is caused by a stiffening of the cilia or microscopic hairs within the cochlea that act as auditory nerve receptors. These little hairs vary in length from one end of the tapered cochlea to the other and are said to vibrate in sympathy to the various pitches according to their length. This is how we discern differences in pitch. Those who use hearing aids will also complain of distortion when listening to music. This is caused by what sound people call inter-modulation distortion. In the language of the layman, the electronics of the aid simply cannot handle the complex sound waves of music — especially the intricate harmonic structure of the piano tone. My psychiatrist friend hears music much better without his hearing aids. Another cause of hearing loss is exposure to sustained loud noise or music. Many "rock" musicians are discovering this too late to avoid permanent damage to their hearing.

Hearing loss can occur in virtually any area of the auditory spectrum — from the lowest to the highest. Loss of the high range starts from birth through old age by the gradual stiffening of the smaller cilia, obviously at different rates in each individual. The three little bones of the middle ear and the tiny muscles that

The Tuner's Life

control them act as an automatic volume control to protect the inner ear from damage by loud sounds. Aging and infection can hinder the function of this mechanism. Hearing loss can result from auditory nerve damage due to diseases like strep infections, forms of meningitis, and the use of certain antibiotics — especially streptomycin. Heredity sometimes plays a role in hearing loss. In all of these problems, the loss can be in any area — large or small — of the sound spectrum.

During the course of my studying the "Psychology of Music," I had to assist my professor in his duties administering the "Seashore" tests of raw musical talent to entering students. I remember my taking the pitch section and trying to match the "wow" of the old 78 records with the pitch differences recorded. It was not an easy task! All personal memories aside, I was astounded at the various levels of pitch and rhythm sensitivities and their relationship to the area of the students' performance. String players had the best pitch scores followed by the winds and keyboard players. Brass players were averaged in pitch and percussionists were strongest in rhythm—which would be expected. Singers had the worst overall scores—especially in rhythm. A fine bassist in vocal class could not match pitches or sing in tune at all. I should add here that musical talent was shown, according to Dr. Seashore, to have no relationship to general intelligence. Why all this? Raw musical talent varies greatly. I'm sure we've all encountered the adult piano student who can barely pound out "Red Sails in the Sunset," but knows precisely what unison is slightly out and wants us to come over immediately and fix it. Conversely I had a teacher friend who could play up a storm on the piano but was totally tone deaf. She had a brilliant mind and had learned to play mechanically but she had no idea what it sounded like. According to Dr. Seashore's statistics only about one or two percent of people are totally tone deaf. The rest lie somewhere in between to one degree or another.

Several years ago I was called to tune an old Sohmer upright previously owned by a fine violin teacher. I had heard that it was a pretty good piano and had recommended this family purchase it. When I arrived I found the piano in miserable shape! The grandmother was there, spoke broken English, was in a ratty old bathrobe and missing a few teeth. The piano was to be used by her beginner grandson so I did a quick pitch raise, a semi-fine tuning and some basic repairs — it was late and I was in a hurry. After I finished, this "old lady" sat down and rattled off a superb Brahms "Intermezzo." I was late getting home that evening.

As we daily practice our unique craft, we should always bear in mind that our purpose is to meet the musical needs and tastes of our customers —even though at times what we do may go against what we think should happen. We must always do our best and treat each unusual situation that arises with understanding, compassion and diplomacy.

Troubleshooting Piano Problems

Continued from Page 35

about the complaint as possible. When was the last time you noticed it? Who was playing? Was the piano open or closed? Was there music on the music desk? And so forth and so on. It is most important to explain to the customer that all these questions are really in the interest of finding the problem. Even an apology for asking all these annoying questions may be in order.

My next step is to try recreating the condition. There is another very important question that should be asked. Mind you that people often exaggerate like: "the piano is so bad that it cannot be played" or, "my mother, who is hard of hearing, hears it when she is in the kitchen." A good approach might be to ask — being very serious — is this noise so pronounced that everyone who hears the piano shouts: "My God, what is *that*?" or is it something that one has to listen for in order to notice it? Responses to this question can be very revealing!

"Since the Piano Was Tuned"

And then there are the problems that only happen since the piano was tuned. Here's a case in point.

"The 'other' tuner tuned it very well, and I was very happy with his job; however, after he left I noticed that the action did not respond as well as before."

Now, here is a real detective story. Let's analyze.

Obviously, tuning did not do a thing to the regulation of the piano. Let us assume that indeed the customer is not imagining things. I suggest that there are only two possibilities. Either the tuner decided to make changes on his/her own, or was asked to make the changes but the customer considers these changes to be part of tuning. My first step would be to very diplomatically try to explore what the customer liked about the tuning after the "previous" tuner finished his/her work. There is a pretty good chance that our customer is going to provide some kind of a clue. For instance, "he made it so nice and mellow" or, "I asked him to tone it down and he did a very good job," or "I asked him to tune it more mellow and he sure did." We could even be very lucky and hear something like, "the piano was so terribly brilliant that it hurt my ears before he tuned it. When he got through with the tuning it was like a different piano."

That was easy. Now comes the difficult part. How do we deal with such a situation? Suppose that the customer does indeed provide this valuable information. At this point it really makes no difference whether or not the change was done upon the customer's request. But it is important that the tuner who performed this work did not explain what the result was going to be. It is now up to us to explain the situation and, if necessary, remedy it.

This kind of situation can arise for various reasons. The aforementioned example is only one of many. For instance, corrections in dip, repetition springs, and backchecks can dramatically influence the touch. Let it be said clearly that even though all these adjustments were made because there was a legitimate need for them, we still have to deal with the complaint. Now is the time to use diplomacy, experience and, above all, ingenuity to explain to the customer what happened. It has to be done with finesse and tact, bearing in mind that we are dealing with laymen, often temperamental musicians and always non-technicians. If you solve this kind of problem, you can call yourself a master.

PACE
Professionals Advance through Continuing Education
LESSON PLAN

Technical Lesson #29

Grand Regulation - Part 10: Adjusting Hammer Blow Distance & Sharp Key Dip

By Bill Spurlock, RPT
Sacramento Valley Chapter

This monthly lesson plan is designed to provide step-by-step instruction in essential skills. Chapters are encouraged to use this material as the basis for special Associate meetings, or for their regular meeting program, preferably in a hands-on format. This method allows the written information to be transformed into an actual skill for each member participating.

In Brief

Grand regulation must be done in stages of increasing refinement. Since many adjustments affect others, all must be close before decisions on final adjustments are made. Previous lessons have covered preliminary adjustments up to the point where parts are aligned, keys are leveled, and white key dip, wippen adjustments, let-off and drop are adjusted to an initial setting. Since some of these adjustments affect aftertouch, now is a good time to confirm that the key dip and hammer blow dimensions chosen in Lesson 25 will indeed result in correct aftertouch. This is also a convenient time to adjust sharp key dip, since the criteria for sharp dip will be to create the same aftertouch in the sharps and naturals.

Getting Started

In order to pursue any serious study of piano technology, one must obtain basic resources. Catalogs from several piano supply houses, both large and small, are essential. Besides offering the necessary supplies, their pictures and item descriptions are valuable sources of information. Piano manufacturers' service manuals are also essential sources of valuable information. Most are available at no cost. Most important to participating in this Lesson Plan series are the PTG Exam Source Books, both the tuning and technical versions. Articles in these books will serve as reference material for the lessons.

Hands-on Session Setup

To teach this lesson in a hands-on format, you will need one or more grand pianos in good condition. New pianos in a dealership are probably best, since most regulation adjustments will be close but will typically have some room for improvement in hammer line and aftertouch. Action models are not suitable for this lesson.

Estimated Lesson Time

Approximately 11/2 hours. Participants should each take a turn at setting capstans and sharp key dip on an octave or so.

Tools & Materials Participants Must Bring

For this lesson, participants should obtain the following tools:

- capstan adjusting tool
- hammer blow distance gauge (a 6" steel rule can be used, but a set of homemade gauges in various sizes as shown in photo 1 is more convenient)
- assortment of paper front rail punchings
- selection of general regulating tools.

Assigned Prior Reading for Participants

Review Lesson #25

General Instructions

As discussed in Lesson #25, aftertouch is affected by the key dip, hammer blow distance, key height, repetition lever height, let-off, and drop adjustments. And although all these adjustments affect aftertouch in an action, only key dip and hammer blow distance are used specifically to adjust the amount of aftertouch. These other adjustments have their own criteria — proper action function, maximum power, and reliable repetition, among others.

In Lesson #25, sample notes were regulated to determine hammer blow and key dip adjustments that would give proper aftertouch for a given action. Once the other adjustments mentioned above have been done on an entire action, an "aftertouch check" should be done to ensure that the dip and blow dimensions chosen using sample notes will indeed result in correct aftertouch. At this time, slight changes may be made to refine the amount of aftertouch before proceeding. If sample notes were evaluated carefully when dip and blow dimensions were initially chosen, you will usually fine-tune only the blow distance at this point.

So far in this sequence, key dip has been adjusted only for the natural keys. The criteria usually used for setting sharp key dip is to adjust sharp dip until aftertouch of the sharps is equal to that of the naturals. Once hammer blow distance has been adjusted to its final setting for all notes, sharp key dip can be adjusted by carefully "feeling" the aftertouch in each key as you move chromatically up the keyboard.

Exercises

Because most regulation adjustments affect others, all adjustments must be considered before changing just one. However, given a new or slightly used instrument in good playing condition, most settings can be adjusted for uniformity without upsetting their relationship to

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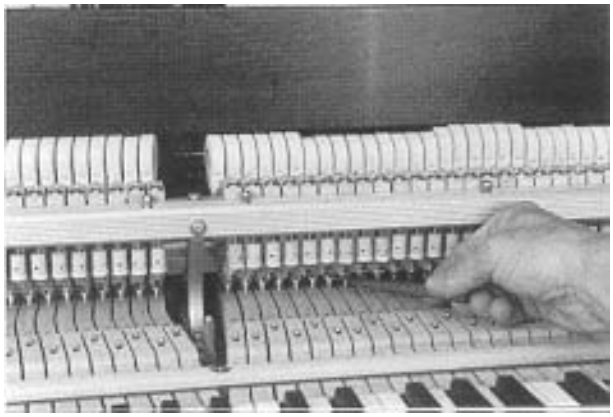


Photo 1, left — Setting hammer blow distance on sample hammers. Photo 2, above — Setting hammer height to match samples, using the stretcher as a visual guide.

Setting Hammer Blow Distance

Hammer blow distance is most easily adjusted by setting a few sample hammers to the correct height, then setting the others to match. Since the string-to-keybed distance often varies across the scale, samples should be set at the ends of each section; an additional sample in the center of each section may be useful as well.

Assuming white key dip and other adjustments are correct, adjust blow distance on a couple of sample hammers until proper aftertouch is achieved. Decrease blow distance to increase aftertouch, and vice versa. Briefly, aftertouch criteria would be:

- When the key is depressed very slowly, the hammer should rise after drop, but not beyond the let-off point.
- If the jack jams into its stop felt in the repetition lever when the key is fully depressed, aftertouch is excessive.
- Other criteria were fully explained in Lesson #25. However, ultimately the regulator must make a judgement as to the correct feel of the "bump" at the end of the keystroke as the jack escapes and the key travels a small amount further. Minimal aftertouch can cause a mushy, tight feeling at the completion of the key stroke, and the jack might not fully escape on a very soft blow. Excessive aftertouch causes a harsh bump at the end of the stroke. It can also slow repetition, because the farther the jack rotates away from the knuckle, the more key release is required to allow the jack to return for a repeat blow.

Photo 3 — Adjusting sharp key dip by comparing aftertouch of sharp and natural keys.

Adjusting Sharp Key Dip.

Feel the aftertouch on each key in succession as follows: Depress each key very slowly until resistance at the start of escapement is felt, then push firmly through that point. Note carefully the "feel" of aftertouch of the sharps compared to the naturals. Does the sharp key move a longer distance and stop abruptly (more aftertouch), or does it just barely move past escapement into a mushy zone (less aftertouch)? Hint: using two fingers as shown in photo 3 gives a clearer sensation of aftertouch. Add or remove paper front rail punchings as needed until the sharps feel the same as the naturals.

PACE Lesson #29

Continued from Previous Page

others. This approach will be used in this lesson, where a new grand piano or two might be available for practice.

After deciding upon a blow distance measurement, adjust two or more sample hammers for each section. Photo 1 shows a typical home made gauge consisting of brass pieces soldered to a grand damper wire. Even simpler is to just bend the wire into a rectangular shape at one end; make several with different measurements. Many other designs are possible, but any type of gauge will be more convenient to use than a steel rule. ***Hint:*** it is best to hold the gauge over an adjacent hammer, rather than the one you are adjusting. That way, the hammer being adjusted is free to move up or down, and you can also tap the key to observe the natural rest position of the hammer.

Once samples are set, you can adjust the remaining hammers to match. With the action in place, and by raising or lowering your head, you can often use the soundboard-to-belly glue joint as a reference line. Another method is shown in photo 2: slide the action out until the hammers just clear the stretcher, and sight against the lower edge of the stretcher as a guide. Of course, if string height varies in different sections, your hammer height will vary as well, so your hammer line will not follow the level line of the stretcher. Additional samples are helpful here.

Remember the Interdependence of Regulation Adjustments

- A slight refinement of hammer blow distance changes the angle of the hammershank. This in turn slightly changes jack-to-knuckle alignment.
- Refining jack-to-knuckle alignment then changes the simultaneous contact of the let-off button and the drop screw, which you may restore by slightly changing your initial setting of drop.
- Changing drop may change the feeling of aftertouch, causing you to again make a minor refinement of hammer blow distance, and so on.

Thus most adjustments are interdependent, so a fine regulation requires repeated steps of increasing refinement. Therefore effective regulating work requires you to have a thorough understanding of how each adjustment contributes to the whole. Only then can you make the necessary judgements as to when each adjustment is "close enough" for a particular circumstance. The following are some considerations we typically face:

- Wear changes the shapes and sizes of parts, limiting the performance improvement available from regulation alone.
- Action design and parts quality obviously affect the performance potential of an action. Erratic pinning, rough leathers, and erratic dimensions all limit what can be achieved through regulation.
- The customer's needs and desires must be a high priority when regulating.

Thus, regulation of an inexpensive new piano on the showroom floor (one that is intended to meet a low price point), may consist mostly of eliminating rubbing parts and other malfunctions. Regulating a moderately worn grand for a client on a budget may consist of some refurbishing followed by going over most regulation steps once only. Regulating a quality grand in good condition for a demanding musician may involve going through most regulation steps two or three times. In any situation, the knowledgeable regulator will be able to prioritize the steps in order to achieve a good regulation most efficiently.

Piano Rental Program for Technicians

By Dick Carbo
Seattle Chapter

Why

Renting out pianos is a great way to develop a supplemental source of income in addition to your tuning and repairing business. An income that requires a minimal amount of risk to you in that it is applied with your life's work. You have control. It enables you to have security in your life financially. You don't have to continually look for more and more tuning clients.

Benefits

It supplies a segment of the public with a low cost way to give their children piano lessons and fun throughout their lives. It also can be carried into your retirement years as a nice addition to your income stream.

It is a great way to build your net worth. The only limits to your success is in your mind.

It is a great way to ease the pain during slow times in the service business.

How To Start

Begin small by buying one or two pianos you can rehab easily.

We started with uprights in 1970. You must put them in playing condition, up to pitch and regulated, and easy to play, etc. Case cosmetics are not so important. Run a little ad in your paper. For example: "Rent a nice piano for your beginner. Only $26 a month. No time limit. Call me at 555-1234 for details."

Our formula for determining the monthly rental fee is as follows: Say you have invested $450 in your piano. Divide it by 20 which equals $22.50 a month. This pencils out. Any investment you make which returns 5 percent a month is golden. You recapture your investment in 20 months.

Treat these pianos as capital equipment in that they are not for sale. They can become depreciable items and can be written off in seven years, much as your business vehicles, tools, etc. You give your rental clients free service as long as they rent the piano. Including tuning, repair, etc. This can then be written off as a business expense.

Remember, these pianos become hard working members of your family and are not to be sold! If you sell them you defeat your objectives.

A good friend of mine, the late George Morgan, had a large fleet of rental pianos he had gathered over the years, around 300. It put his income at a very comfortable level. We now are mostly retired and our fleet numbers around 100 pianos.

Try to keep the monthly fees under $30. Stress in your ads that this is the best way to start a beginner with very little up front cash necessary.

Delivery and Pickup

I recommend a utility trailer with a canopy to start with. A pickup truck is not advisable. The trailer bed is only about 18 inches off the ground for ease of loading and unloading. Help is another matter. We have used high school or college boys who work for us part time. We pay better than average wages. Remember, if you pay peanuts you usually get monkeys.

We charge for delivery and pickup. Our fees depend on distance and difficulty.

Screening Clients

Get a credit application from your clients-to-be. Check references! Use a value judgment in selecting clients. We have been renting pianos since 1970. Some have generated from $7,000 to $10,000 gross over time. A few of our clients have rented our pianos for up to 12 or 14 years each. We have a clause in our rental contract stating that the rent may be raised due to inflationary pressures, with 30 days written notice.

Win-Win-Win!

This has become great fun and it's a win-win-win occupation. Parents get a decent piano to start their beginner for very little money. The student gets a well-tuned and regulated piano to start on. The teacher is assured that her beginner has a better chance of remaining interested in playing. And lastly, you get an outstanding return on your investment. You will no doubt get a few "good guy" letters to put in your scrapbook. We have!

We also keep a few pianos to rent out for special occasions such as weddings, anniversaries, parties, etc. We charge a minimum fee of $148 for a weekend usage. These are usually out a couple of weekends a month the year around. They mostly are studio models such as Baldwin Hamiltons, Everetts and Yamahas.

We have never borrowed money to acquire pianos. We started with an old Haines upright in 1970. We got it for $75 and rented it out for $10 a month. We still have it in our fleet and it is now bringing $29 a month.

We also have a heavy old Chickering upright bought shortly after in 1971. Our investment including repairs was $275. The first client was a college professor who kept it for eight years. We then brought it in and hung a set of hammers on it! Then we leased it to the Fleet Reserve Club at a nearby navy base. They had it for six years. Since then it has had several clients and is going out again as this is written. It's a little beat-up looking, but it plays great. Money to date is $11,000. Not bad for a return on the original $275.

TECHNO*stuff*

Richard Anderson, RPT • Chicago Chapter

Mid-Life Crisis Pianos

One of the things that we will have to deal more with in the coming years is servicing the unique needs of pianos made from about 1950 to 1980. I call these mid-life crisis pianos. Both because they are of an age where the parts that normally wear out on pianos are just about worn out, and because they were made during the time when most manufacturers were undergoing their mid-life crisis. Many of these pianos have also been neglected because they were sold as needing less service, or were of a nature that caused technicians to be less inclined to service them.

Prior to World War II, quality materials and craftsmen were plentiful, piano design had fully evolved, and manufacturers all tried to make the best product possible, whether pianos or toasters. After World War II, the supply of quality materials was decreasing, a new generation of labor was replacing artisans, and manufacturers were making cheap dinette sets, cheap toasters, and cheap pianos. The consumer deserves much of the blame for this for demanding and purchasing these goods. Remember one of the symptoms of Consumer Reports Syndrome; the inability to recognize that one gets what one pays for.

Fortunately, by about 1980, consumers finally got disgusted with pianos that were self destructing in their living rooms and began buying pianos that were reasonably well made. Most of the piano makers that went out of business in the 1970s and early 80s were at the low end, and the folks that are left are making good pianos. Of course, everything goes in cycles, and now that we have our domestic piano manufacturing house in order we have to watch out for the Asian pianos.

Design, materials and workmanship are the three major factors that determine the quality of a piano. There were significant changes to all three during the piano manufacturing mid-life crisis.

Design — Almost all changes in piano design made in the last 60 years have been made to make the piano easier and less costly to produce. No matter what fancy name the marketing department comes up with for these changes, the bottom line is less time and less money going into the piano. Some changes in design also had to be made to compensate for the quality or type of materials available and the people handling those materials. Unfortunately, many of these changes that made the factory's job easier has made our job harder.

Materials — Material purchasing has to be one of the most frustrating parts of making a piano. Whether you're buying lumber, plates or actions, finding a stable source of appropriate quality materials is surely a challenge. The manufacturer's challenge of dealing with low grade material is compounded for us over time and exposure to climate changes much broader than the factory environment.

On the bright side, most of the genuine improvements in pianos in recent years have been in materials. Pinblocks are a prime example. During the 1950s and 60s most manufacturers were still using a block made of relatively few and relatively thick quartersawed maple plies. With high quality wood, good design, and proper seasoning and installation this made a fine block. Many pianos made in the 1940s and even earlier with this block are still tunable. As the supply of high grade maple decreased, and manufacturers became less careful with handling and installation, this style of block simply didn't hold up. Many of these pianos became untuneable after relatively few years. The new style of multilaminate high density blocks used by almost all manufacturers today has proven to be a good replacement for the old style blocks remaining tunable longer and making better use of remaining resources.

Workmanship — Piecework. Organized labor. Enough Said.

Grand Illusions ...
The Page for Serious Cases

Mr. Piano Guy

Dear Mr. Piano Guy:
What's your opinion of the Hyundai pianos?

— Ernie July
Big Deal, NY

Dear Ernie,

You must have bowling ball wax in your cranial cavity to think Mr. Piano Guy is going to fall for this practical joke. A Korean car company that makes pianos? Does it get 35 measures to the gallon? Next you'll try to pull my leg about a Japanese piano company that makes motorcycles or something equally ludicrous. Mr. Piano Guy wishes you would take your bean-dip sense of humor and go assault Dear Abby. She needs a good tweak.

Dear Mr. Piano Guy:
What, exactly, is this "mezzo-thermoneal stabilizer" thing I see touted on labels in some pianos, and what exactly does it do?

— Susan Gram-Wates
Shake, Rattle and Roll, CA

Dear Susan,

What you are referring to is a process that is used to prematurely age the wood of a piano so that when it is purchased, it sounds like a vintage 40- or 50-year-old piano instead of a new one fresh out of the box. What is not widely known, however, is that the labels you speak of were misprinted, and those pianos are actually treated in a mezzo-*thermonuclear* stabilizer, which means that every time you open up and tune one of these babies, you are exposed to about 5 million rads of low-level radiation. Just thought you'd like to know that.

Mr. Piano Guy

Mr. Piano Guy is a syndicated column published by Mr. Piano Guy Academy of Piano and Toaster Oven Technology, which is solely responsible for its contents, unless you're contemplating a libel suit, in which case you should leave us alone and go after the publisher of this magazine.

Attention! Hot New Opportunity!

Mr. Piano Guy is now offering franchises for those interested in getting into the lucrative piano refinishing business. Earl Scheib ("Any piano—$99.95") Piano Painting dealerships are now available in all 50 states, Canada and Peru. This is a can't miss deal. The Earl Scheib technology offers a guaranteed $99.95 piano finish (includes undercoating) that resists damage from sun, liquids and road salt. And listen to this: you are no longer confined to corny, old-fashioned finishes like oak, walnut and ebony. Your customers will really go for having their pianos done in Candy Apple Red, Neon Orange, and Electric Blue. If you want to know more about this fantastic opportunity, write us here at Mr. Piano Guy Academy of Piano Technology and Vaseline Enhancement Research, Petrolube, PA.

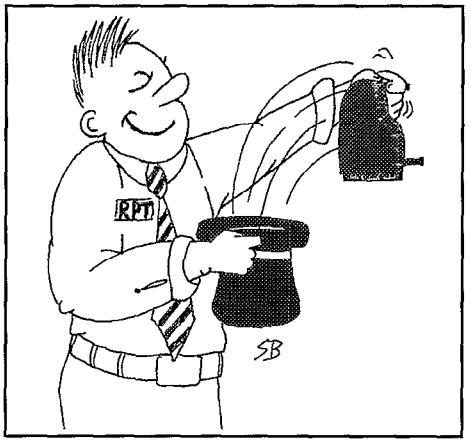
On The Soapbox

It pains Mr. Piano Guy to have to do it, but occasionally he feels compelled by duty to speak out on issues that go to the heart of our social fabric. This time it pertains to TV's portrayal of the role of the piano in the American family value system. The Guy is sick and tired of television shows in which portrayal of a family without a piano is not only acceptable, but even desirable. Everyone knows that traditional family values call for at least one parent and a piano in each healthy home. Yet, time after time in TV sitcoms, we see homes with two parents, a couple of kids, and no piano. TV just doesn't get it! It is obvious to any student of sociology that those folks in Los Angeles would not have felt the need to riot and loot if each of them had had a piano in the home when growing up.

It is time for the entertainment industry to take a stand for traditional values and begin regularly depicting happy home situations. Let them show life the way it should be. When every family has a piano in the living room (assuming they have a living room), then all folk, rich or poor, can be a part of the American Dream.

(The preceding statement is a personal opinion by Mr. Piano Guy, and in no way was influenced by the possibility that he may utilize his millions of dollars earned in the piano tuning business to enter this year's presidential race as an independent candidate.)

[Mr. Piano Guy may be contacted through his Seattle affiliate, Randy Rush, RPT.]



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

See Faces Not Just Tuning Pins

By James Schmitt, RPT
Trades Relations Committee Chairman

I can still remember the day — it was one of those cool, drippy, gray days in late February that we often find here in the Pacific Northwest. I was on my way to service a piano that had, by all accounts, not seen any kind of attention for a long time, or so I was led to believe from my phone conversation with the owner. The home on the outside was nice, as was the lady of the house who answered the door. We walked through a clean living room and there it was, an old upright piano that was in worse condition then I had been led to believe. The bottom board was cracked so badly that a book had been placed under the pedal portion to allow the dampers to lift when the damper pedal was depressed. There were 10 broken hammers and most of the bridal straps were broken as well, and leave it to say, the instrument was regulationally dysfunctional. My first impulse was to close the thing up and find a way to walk out the door with my reputation intact. However, I swallowed hard and finished my evaluation, finding the rest of the piano tolerable. I found the lady of the house and informed her of my findings and then started to listen. She told me that a friend had given the piano to the family, being that her husband's business was on the slow side, and hoped it would be of some use. I informed her that the instrument was not very good and would leave a lot to be desired if played by anyone wanting a serious piano, but she assured me that all she wanted was the piano to play the best it could for a money figure she presented. I was still skeptical, but then I saw her — a quiet eight- or nine-year-old girl sitting on the far side of the room listening, and that is when I realized the importance of that moment. If I didn't find a way to make that piano work, then there was going to be one more child in our society who was not going to have a chance to play the piano.

I pulled the action from the instrument and returned to my shop. I replaced the missing hammers and bridal straps, did some repinning and hammer surfacing, blew the dirt out with some compressed air and returned a few days later to repair the bottom board, replace two broken strings, remove the dirt and tune to A-440. The whole time I was in that home, there was this quiet young girl sitting in the corner watching. When I finished and left, the piano was at A-440, all the notes worked and the action was removable. The door closed behind me for the last time, and for me to return without knocking would constitute breaking and entering. I walked past the front of the house and could see through the window to where the girl was playing the piano. I have returned to service that piano and found that it is meeting the needs of the family for the moment, but the thing that makes the situation tolerable is the fact that we all understand the piano is not very good and will need to be replaced with a better instrument in the future.

This story is important to me because it is a landmark in my change in attitude in the way I think of pianos and the way I think of piano owners. I am becoming more motivated to study piano design, service and function, not because I am fascinated by it all but because the needs of the artists who use the pianos I service. They demand that I be the wisest, most competent technician I can be. The end result is that I may be just as interested in studying the piano as you, but for a more relational reason. The problem is that some technicians are not good communicators, they were drawn to this business because it seemed that they didn't have to work with people to service pianos, and our industry has suffered as a result. We now know how to service the needs of pianos better then we ever did in the past, and we have tools that do a better job then tools of the past. However, I think one of the main reasons that our industry is in decline is because we are not serving people. We are not seeing the owners of our pianos as individuals who need our help so they can make music, but as the individuals that facilitate our craft in piano service as an end in itself.

My reason for taking your time with this line of thought is to give you some ideas for improving your people skills. If you are a good communicator, these will make you better. If communication is a problem area for you, these will help you start the process of being a better communicator. We have all heard that practice makes perfect, well it can if it is perfect practice, otherwise practice simply makes permanent. If I open my mouth and put my foot in it, guess what I am practicing? That's right, and if I want to change that, then I will need to practice something different. I recommend finding a partner and working through some scenarios that will likely come your way and having a ready made line so that you will have practiced something different, other then opening your mouth and putting your foot in it.

I also think that knowing what you are willing to work on or not work on is helpful before you are faced with that decision, and then be ready to give a meaningful response if you are not willing to work on a piano. For me, the piano needs to be tunable to A-440 and have a complete compliment of keys that all work. The action needs to work somewhat consistently under a reasonably functional regulation. Since I am at the moment talking about a piano that is at the low end of my service willingness, I make sure I have done everything I can do to educate the artist-owner on the

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In Today's Economy — Where are You Now?

By Don Valley, RPT
Economic Affairs Committee Chairman

Focus — Goal — Purpose — Direction — Change. When one looks back over the panorama of business and industry, the shocking realizations of existence and annihilation have to be related to the title given to this writing. Perhaps the hardest, and yet most important one, to envelop is "Change." Change breeds change.

A glance at very obvious direction changes of some major corporations we all do business with from time to time should set an example of the necessity for every independent piano person to adapt some attitudes for ongoing success. Sears — once Sears & Roebuck — primarily once a catalog mail order house, had the mammoth catalog delivered to each home. Had the company not ventured out into the localized city-store concept in addition to the mail order service, it would perhaps be extinct today. Yet outside influences and advancements such as transportation and industry growth provides mobility for the Sears customer to not have to shop by mail, but could take the Model T Ford and visit the local store. S.S. Kresge and W.T. Grant were in a similar situation, both similar "5 and 10 cent stores" of the downtown variety. In the battle for life in the field of competition, the Kresge company, under professional management, hired outside expertise for advice on direction. From the downtown store sprang the K-Mart, the giant store of several blocks under one roof known as Super K. W.T. Grant grew from within and was not willing to venture into change, and is now non-existent.

In another scenario I have observed for several years, two national chains got back on track and are alive and well today. In these, it took willingness on the part of the company owners to sell to a much larger corporation. The product was something the public wanted. The products were unique, they were keepers. I am referring to Taco Bell® and KFC®. Kentucky Fried Chicken® was trying, in my best understanding, to hold on to the endearment of this success story begun in Corbin, Kentucky, as a special recipe that would last in the world of "southern fried chicken." Basically they had a chicken and biscuits menu! But the competition had come. KFC® offered other varieties of fried chicken, such as crispy, and added menu items. KFC® held on, closed restaurants and still had original recipe, but the chicken pieces were very small. Then I think of many years ago when the typical Taco Bell® was a little stucco place by the side of the street but growing in numbers, yet they were simple with a very basic menu concept — no positioning in the marketing scheme — just doing business on the basis that the taco was cheaper than a cheeseburger. Then, no growth.

A few years ago something

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See Faces Not Just Tuning Pins

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piano's condition. That way, if another technician looks at the piano and bad mouths it, the owner will say, "So, big deal, I already knew that so stop bad mouthing my piano."

We can all tell war stories of ways we have successfully dealt with situations we have faced at one time or another. Because there are no perfect pianos or perfect piano technicians, we are always needing to make judgment calls on the pianos we face. What may be the best piano for one person may be the worst piano for another. With all the variables, it is imperative that teachers, dealers, and yes, technicians, work together to match the piano with the artist. For that reason, if for no other, I think we could all benefit from a good dose of "Stop, look, and listen." The more I can get another person talking, the less I need to talk and the more I can learn about the piano and what the artist-owner wants from it. There is that aspect of specialized knowledge in which I, as a technician, may need to depend on the teacher for an understanding of the artist's instrument needs. Or I may need to interact with a dealer about the pricing of a given piano and the artist's expressed ability to pay for the instrument. The point here is that I am not going to learn in these relationships if I don't listen.

One of the things about the National Piano Foundation's SPELLS program is that it expressly gets our industry talking to itself. In our area of the country, people look to teachers for assistance in finding pianos, and in one of our SPELLS committee meetings I learned that teachers are not all that confident being in that position and feel that greater dialogue would help them get the right people talking so that the right piano ends up in the right hands. We, of course, know of the tension that exists between dealers and technicians; with dealers claiming that they were already to sell a piano when some tuner came along and ruined the whole deal, and technicians claiming that more times than not they will show up just in time to keep a person from spending good money on a bad piano. Some of that kind of tension is natural and keeps us all accountable and honest. I think everyone would be well served to enter into an on-going dialogue outside these urgent moments so that we better handle difficult situations when they arise. The testimonial of many in the country is that SPELLS is a good facilitator of industry communication — that being the key in all of this. We can communicate better and smarter together than if we keep to ourselves, attentive to the business of working with and talking to, not at, each other.

In Today's Economy — Where are You Now?

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happened. KFC® and Taco Bell® began to spring up with a brand new face lift. New buildings began to be built as well as unique adaptations of other closed food establishments. They have been placed in key traffic areas directly against their competition. They have marketed the uniqueness of their products. They have expanded their product lines to surprisingly unbelievable proportions. Taco Bell®, especially, features new items — almost seemingly weekly.

What made the difference? A large corporation saw potential and purchased these companies. The fact is not that we cannot exist and be successful if we are small. The fact is that under the proper guidance, our goals and purposes can be refocused into the proper direction if our attitude is open to the truth.

Bringing it closer to all of us — take a look at the Piano Technicians Guild. Back in 1957 two diverging groups of people had the wisdom to merge and create the organization we are all a part of. For many years we existed with our headquarters in Seattle and did all right with that arrangement until our growth demanded knowledge and expertise in management where our in-house people were not fully qualified. Our purpose was the same — to serve our own constituency. Our goals were expanding and our focus was broadening. We needed direction in making a change. Our assets were not sufficient to deal realistically with our goals and responsibilities. So, the acquisition of a management firm and the shift of our home office to Kansas City resulted in our organization being under guided direction. During the few years of this arrangement, PTG was securely positioned in areas of management and funding, with a good healthy asset which allowed a succeeding move — to hire our own CEO, remove the management firm, and proceed independently, and soon purchase our own building to serve as our home.

So far, so good, in relationship to the home base. But how has this affected the service to our membership? Have we been able to achieve our goals? Have we been able to move ahead, redefine our focus? Have we been on target with our purpose? Have we been willing to make changes in our directions in order to get on and stay on the cutting edge? I believe we have.

As we take a look back over our shoulder, some scenes behind us may help us to see the position PTG has today. What has been our image and how have we been perceived? Have we not, for a long time, basically been self-centered and exclusive? As we see our present focus, would not the film, "The Unseen Artist," fit more appropriately into our present marketing scheme? Was it a "shot in the dark" (no pun intended), are you using it? The brochures we had for many years were useful, excellent, and each standing in its own right, but our literature was not unified, projecting a focus on our image and purposes. Was not our direction wavering according to the trendy thoughts of council from year to year? Where was the stability in our direction? It was us! A successful highway had been taken in regards to our management, but the total concept had not yet come into play. Many times business is its own worst enemy because it wants to never let go of what has been good, but wants to advance not taking on anything new.

The visible fact is that PTG has taken many single-handed shots over the years to, step-by-step, make progress toward a unified goal. Then, seeing the need to grasp the concept of "professionalism," some major leaps have been determined and afforded by acquiring "out of family" professionals. The marketing firm has given guidance in direction and focus. The PACE program has filled a void. The committee on education has researched this area of need as to its direction, its purpose, and its focus. With all these interest areas being given keen oversight under the umbrella of our organization, a unifying of our positioning now will set us distinctly within the larger picture of professionals on the cutting edge with forward motion to succeed. Strategic planning becomes a necessity in any business or organization, large or small. Without plans for progress, a business will fail — a matter of fact from the beginning of time. If we never stop to assess our position, we will fall into the trap of status quo satisfaction at the expense of achieving our goals. Perhaps we will have listened to ourselves one time too many!

Let's make this personal and practical for your own business. Are you small, but want to look or be big? Are you big, but want to appear small and personal? In your business are you at that place where you realize your need to ***do something*** — move forward, expand, or stay small and specialize? Are you at the point of redefining your goals? Ask yourself the following questions and then answer them:

- What is my goal in my business?
- Where is my focus? (Does it line up with my goal?)
- What is my purpose? (Does it control my focus?)
- What is my direction? (Does it achieve my purpose?)
- Do I need to change my direction to accomplish my goal?

In a time of a rapidly changing economy, it makes no difference whether the organization is large in its scope or a sole proprietorship; the willingness to make changes with the trends of the market will keep that business moving forward and on the cutting edge. You have already aligned yourself with your professional organization. This is indicative of your desire to maintain that professional image — be up front where it counts. Are you ready to ask yourself that final question? Is it time I confronted myself with the challenge — the challenge to relate my business to the strategies of today's advancing economical market and begin to step in pace with it?

Building Your Humidity Control Business with PTG Marketing Tools

By Bob Russell, RPT
Marketing Committee Chairman

One aspect of my piano service business that I have expanded the last couple of years is Humidity Control (HC). I enjoy installing the HC systems and I particularly enjoy tuning stable pianos. The profits are nice, too! In the past, I found it difficult to sell many HC systems. I didn't have the necessary tools to successfully develop my HC business. The good news is that PTG has marketing tools available that will make it easy to develop your HC business. In this article, I'll demonstrate step by step how to use our tools to educate your customers about the "benefits" of humidity control.

Tools Required

Service Records

This marketing tool is valuable for promoting HC. This folded card stays with the customer to serve as their record of your service. Every time you service the piano, you fill in the chart with the humidity and temperature readings. After every tuning, you show the customer their updated service records. The customer then has a much easier time understanding the need for HC when we present statistical information demonstrating humidity fluctuations in the piano.

Humidity Control Technical Bulletin

This marketing tool will fully educate your customers about the causes and effects of excessive humidity fluctuations. Every one of your customers should receive an HC tech bulletin, not just to help you sell HC systems, but to make sure your customer is fully informed about humidity changes in their piano. I find it essential to retaining long-term clients that they understand this information. If you don't take time to educate your customers and a tuning stability problem arises, chances are they will assume the fault is yours and will contact another technician. Another reason to use our tech bulletins is because customers tend to understand and trust what they read more than what they hear. But you still need to talk with your customers. These tech bulletins will compliment and legitimize your verbal statements. Also, many times only one of two decision makers are there when we're presenting our information. The tech bulletin enables the customer to provide "correct" information to their better half when he or she arrives home.

Digital Hygrometer

This tool is valuable for providing humidity and temperature information that we use to diagnose the piano's environment. I recommend the Airguide Digital Hygrometer, available from most suppliers. This instrument is small and fits nicely in my tool case. The digital number display looks more sophisticated and accurate than the dial-type hygrometer. Many homes are now equipped with air-conditioning and humidifiers on the furnace. Customers have a perception that these systems will keep their home completely humidity stable. While these systems do help, most of the time, they fall short of the mark. As HC experts we need scientific evidence to change their inaccurate perceptions. Verbal communication alone will not change their perceptions. By measuring the humidity and temperature of our customers home every time we service their piano, we can determine if there are excessive humidity fluctuations. If a problem exists, we then offer a solution to their problem by installing an HC system.

Selling Humidity Control Systems

The most important aspect of selling HC Systems is understanding what you are selling. Customers do not purchase products or services. They buy the "benefits" of the products or services. I do not sell HC systems, I sell the benefits of HC systems. We have to recognize that what excites us as technicians and what excites the customer are two different things. We enjoy the engineering of the system (how it works). The customer will be more interested in keeping the tuning stable, which increases their enjoyment of their piano. I spend 80 percent of my time talking about the benefits of HC and 20 percent on the technical aspects of the HC system. The "benefits" of HC systems that I use the most in selling are tuning stability, reduction of cracking soundboards and bridges and increased longevity of their instrument.

In the customer's home, one of my first priorities after the initial inspection of the piano is to give them a HC Tech Bulletin. While I am tuning, the customer can relax and read the information at their own pace. After tuning, I can then talk about HC and answer any questions they may have. I show them the readings from the hygrometer and also show the customer their updated Service Record. When we collect and record humidity and temperature information and present accurate and easy-to-read technical information about HC to the customer, they will be impressed with our professionalism and our HC expertise. The customer will then have a much easier time understanding and "trusting" our solution to their humidity problems.

If the customer doesn't purchase a HC system on the first visit, don't be discouraged. It usually takes more than one service visit before they buy. The beauty of our business is that we see the customers every six months to a year. After each service call, we simply show them their updated Service Record with the humidity and temperature readings. After a couple of visits, they can see the fluctuations taking place in their piano. Persistence is the key to selling HC systems. Notre Dame research reveals that 46 percent of the sales people ask for the sale once, then quit, 24 percent ask twice, 14 percent ask the third time, and 12 percent quit after four attempts. The same research shows that 60 percent of all sales are made after the 5th attempt. This means four percent are making 60 percent of the sales. By simply showing your customers their Service Record and talking about the scientific readings taken every time you tune, you, too, can become one of the four percent making 60 percent of all sales. Don't be afraid to ask for the sale. Installing an HC system is one of the most beneficial things you can do for their piano, and will help the instrument live a long and healthy life.

Can you see how, with a few PTG marketing tools, you can increase your HC business, increase your profits, and increase your job satisfaction?

Are you interested in increasing profits and job satisfaction?

When is the best time for you to begin increasing your HC business and profits?

Pick up the phone today and order your PTG marketing tools and get started.

Survey Says ... Part II

In October 1995, PTG surveyed a quarter of its members to find out more about them — who they were, how they did business and what they thought about a variety of PTG-related issues. Information about how the survey was conducted, along with basic demographic information, was included in the January issue of the Journal. Here's more about the rest of the survey.

Questions 8-15: What We Do

Questions 8 through 15 explored respondents' business activities. Except for questioning whether respondents were self-employed, we did not explore their business structure. Had we asked whether they employed other technicians or had some sort of cooperative work situation, we might have received somewhat different answers, especially to question 13, which asked about the number of instruments serviced or sold.

Responses to the part-time/full-time questions were particularly interesting. In question 8, less than half (46 percent) said they worked 40 hours a week or more, and only some 60 percent worked in piano technology 30 hours a week or more. Of those who did, almost three-quarters (72 percent) were RPTs. Of those who worked 40 hours a week or more, 84 percent were self-employed full-time. Of those who worked 40 hours a week or more, most (78 percent) were between 36 and 55 years of age. Four percent were 66 or older.

Most spent that time in customers' homes. An overwhelming majority (69 percent) selected that option, with "in your own shop" as the second option (11 percent). Seventy-four percent of the RPTs and 63 percent of the Associates who responded to the survey worked primarily in customers' homes. Interestingly, of the 53 members who said they worked primarily in their own shops, 22 were RPTs and 30 were Associates. We might strongly suspect, then, that there are a significant number of Associate rebuilders or "Allied Tradesmen." Indeed, five Associate members who responded to the survey said they were self-employed and had rebuilt more than 10 pianos in the past year. Numbers of pianos rebuilt ranged from 14 to 30.

Of the 308 who claimed to be self-employed full-time, 74 percent were RPTs. However, Associates made up almost half (49 percent) of the "self-employed part-time" respondents, indicating that they were in transition between other careers and piano technology, or at least that it was an attractive source of supplemental income. Those who were not self-employed — approximately six percent of respondents — were divided almost equally between RPTs and Associates.

Question 11 asked if the self-employed members did a "significant amount of contract work for school districts, churches, symphonies, or similar entities." Less than half (37.5 percent) said they did. Three-quarters of those who said they did were RPTs. Eighty-two percent of those who said they did were self-employed full-time.

Question 12, which asked if demand for their services was greater or less than in the previous year, was a superficial look at a complex question. However, more than a third (37 percent) said business was up, and 44 percent said it was about the same.

Almost 82 percent responded to Question 13 about tuning pianos. The average was 424, and the median was 400. Of the 184 who said they had rebuilt at least one piano in the last 12 months, the average was over six, while the median was three. Of the 139 who said they had sold a piano in the last year, the average was over 15, and the median was three. In an effort to explore the role piano technicians play in the private exchange of used instruments, we also asked the number of piano sales members had brokered or arranged the sale of in the past year. Over a fourth (27 percent) responded to this question. The average was almost four, and the median was two.

For members who are employed full- or part-time, sales may well play a role. One hundred nine members (22 percent of survey respondents) responded to question 14, with "a retailer of new or used pianos" being the favored response (40 percent). Educational institutions were second choice (27 percent) and "a non-music-related company" was third (21 percent). As might be expected, a significant percentage of those who worked for retailers were associates (41 percent), and a large percentage of those who worked for educational institutions were RPTs (72 percent). Almost all of those who worked for non-music companies were Associates (87 percent) who were self-employed part-time (74 percent).

Arriving at income figures is difficult because of the nature of technicians' businesses. As in the 1993 survey, we asked for gross receipts from piano work during the previous year. The most popular responses were "under $10,000" (23 percent), and "$30,000-$50,000" (25 percent). Almost 60 percent of those who grossed less than $10,000 in 1994 were Associates who were self-employed part-time. A higher percentage of those in the higher categories were RPTs (approximately 84 percent in both the $30,000-$50,000 and $50,000-$100,000 categories. In the highest income category, those who grossed over $100,000, six of the 25 respondents were Associates.

Twelve, or almost half, of those in the highest income category lived in the Northeast Region, as did almost a fourth of those in the lowest income category. A somewhat higher percentage than expected of those in the $10,000-$20,000 and $20,000-$30,000 groups live in the Western Region.

Question 16-18: High-Tech Technicians

Three questions concerned the degree with which PTG members have embraced modern business technologies. Because many of those technologies have fueled the growth of home-based and sole-proprietor businesses, it could be expected that usage would be high. Indeed, that is the case. A third (32 percent) used a cellular phone. Twelve percent used a pager. Slightly more than 20 percent owned, leased or used a fax machine regularly. And sixty percent used computers. This is up slightly from the 1993 survey in which 56 percent of members said they owned, used or had access to a personal

computer.

Of the computer users, 60 percent had a modem and almost 40 percent had a computer that included a CD-ROM drive. Thirty-seven percent had a laser printer, and 61 percent had a dot-matrix printer.

As might be expected word-processing was the primary use for these computers (91 percent). In order of frequency, other selections were customer record maintenance (69 percent), financial record-keeping (67 percent), electronic mail (32 percent) desktop publishing (32 percent), scheduling (30 percent), "other" (24 percent), mathematical computations (23 percent), and research (17 percent).

Questions 19-34: All About Education

This group of questions explored members' feelings toward and participation in PTG's educational offerings. The *Journal* received an overwhelming vote of confidence as more than 70 percent said their reaction to it was "very favorable." An additional 20 percent said their reactions were "somewhat favorable." In the convention area, almost a quarter (23 percent) have never attended an annual convention, 16 percent have attended one, 28 percent have attended two to four, and the highest percentage, 32 percent, have attended five or more. As might be expected, a higher percentage of Associates have not attended a convention, while those who have attended five or more conventions are mostly made up of RPTs. Almost 15 percent of those who have attended five or more conventions are Associates, but remember that many of those employed by exhibiting companies are Associate members.

In deciding whether to attend the convention, respondents found the most important considerations to be, in order of importance, location (61 percent), cost of travel and lodging (52 percent), work schedule (33 percent), classes and instructors (31 percent), registration fee (10 percent) and "other" (9 percent). Almost 47 percent did not attend a regional or state conference in the past year, but 19 percent attended more than one.

Questions 23-34 were an attempt to explore attitudes toward PTG's educational focus. We asked, "In considering PTG's educational offerings, including the Journal, books and Institute classes, which topics would you like to see discussed more, less, or about the same?" Following were a list of a dozen topics.

In almost every case, "about the same" was the most popular choice. Those in which relatively high numbers selected the "more" option were: "In-home repairs" (47 percent), "Action rebuilding" (37 percent), "Business management" (36 percent), "Soundboards and bridge work" (35 percent), "Pinblocks and restringing" (34 percent), and "Computer use" (33 percent). Those in which higher numbers selected the "less" option were: "Electronic aid tuning" (26 percent) and "Tuning theory" (30 percent).

Questions 35-43: Attitudes And Opinions

How does the "average member" feel about any given issue? In PTG, that's a difficult question to answer, because our decision-making process filters and distills individual members' opinions through chapters, Council and Board. The strength with which opinions are held is also hard to measure. In many, if not most, organizations, a high percentage of members are apathetic, or at least are willing to follow the course set out by more active members. Response to this survey, however, suggests that PTG members are more active and involved than in other organizations.

An overwhelming percentage (78 percent) strongly or somewhat agreed that PTG should focus on improving its technical education offerings and developing new ones. Almost as many (77 percent) respondents strongly or somewhat agreed that PTG should work harder to improve its relationships with teachers, retailers and others in the industry. Almost 70 percent strongly or somewhat agreed that PTG's activities should focus on promoting RPTs and its programming should be aimed primarily at developing advanced technical skills. Sixty-three percent strongly or somewhat agreed that PTG should focus on helping its members run their businesses more profitably.

Over half (55 percent) strongly or somewhat agreed that "unethical business practices are a serious problem and PTG should increase its efforts to police the industry..." Twenty-three percent were neutral.

When questioned as to PTG's political structure, only 20 percent strongly agreed that it was fair, representative and efficient. Although only 10 percent somewhat or strongly disagreed with that statement, 37 percent were neutral. Thirty percent somewhat agreed with the statement.

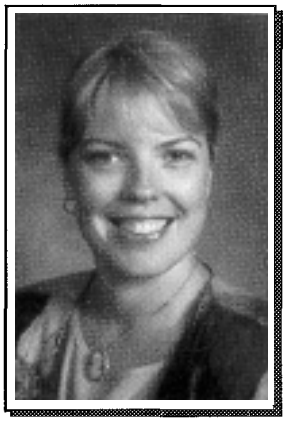
When asked if they agreed that PTG should have three membership categories — RPTs, untested members who tune, and non-tuning members — 21 percent were neutral and three percent did not respond. Over a fourth (26 percent) strongly agreed, and 23 percent somewhat agreed. However, 12 percent somewhat disagreed and 16 percent strongly disagreed.

Perhaps surprisingly, over a quarter (26 percent) of the Associates who responded to the survey strongly agreed. Similar percentages of Associates selected "somewhat agree" (27 percent) and neutral (28 percent). Only 19 percent of Associates somewhat or strongly disagreed with the statement. RPTs, on the other hand, were less united in their opinions. Of the 318 RPTs who responded, 26 percent strongly agreed, 22 percent somewhat agreed, 18 percent were neutral, 14 percent somewhat disagreed, and 18 percent strongly disagreed.

Because of a proofreading error, Question 43 offered two responses with the letter "d": increasing membership and improving business ethics. Although the error is regrettable and certainly takes away from the accuracy of the survey, the combined responses total approximately 8.5 percent; therefore, neither of the two options could be viewed as representing one of the most popular choices.

The most popular choices were "improving educational offerings," with 35 percent, followed by "promoting RPTs" with 19 percent. "Improving industry relationships" ranked third, with 12 percent. Over half (52 percent) of Associates ranked "improving educational offerings" first. RPTs were almost equally divided (26 percent) between "improving educational offerings" and "promoting RPTs." For RPTs, "improving industry relationships" ranked third (13 percent).

Kunsky a Groundbreaker



CE RVP Laura

When Central East RVP Laura Kunsky began tuning pianos she stood out in a crowd.

"Most people usually said they had never met a piano tuner before, or that they'd never met a female tuner before," she said, recalling her early days. "I stood out in a crowd."

She had to stand out. "I needed a career fast," Laura said. "I was expecting my third baby, and I was going through a divorce."

After living most of her life in the Libertyville area of Chicago, Kunsky and her then-husband and two sons moved to Kentucky, but she and her sons moved back to the Chicago area a year later without her husband.

A friend had seen an article in a Chicago newspaper describing a piano tuning class given by Fred Tremper.

"I audited a class by Fred Tremper and I liked it," she said.

From April through September of 1985 Laura attended the four-hour a day, six-day a week class, finishing just in time. Her son, Tim, was born in October.

Piano tuning was an ideal choice for a single mother, giving her the flexibility to care for her children and make a living.

"It was perfect," she said. The career choice also gave her a chance to get back to the piano. "I like this, that's what keeps me tuning."

Since 1986, shortly after completing her tuning class, Laura has been tuning as a member of PTG.

In July in Albuquerque she was elected to the RVP's post in the Central East Region. Her reasons for running for the post were simple.

"The organization has served me well," she said, "and I wanted to give something back."

Laura said, "I wanted to get more people involved in my area, and I think I can represent them well."

Her goals for the region include getting more Associates to upgrade to RPT and getting more testing areas established in the region.

While her new position with PTG is keeping her busy, so is her tuning business, A Joyful Sound.

She said business has been increasing about 20 to 25 percent a year. "It's a good area (Round Lake Beach, 50 miles north of Chicago) for piano tuner/technicians," she said. "Even during the recession our businesses continued to grow."

She attributed that growth to the development of housing and business. "It has been phenomenal," Laura said. "All of the farm land is turning into housing developments. Within five miles there are a dozen new developments."

Laura and her family are adding to that growth. In August 1995 they broke ground on their new home in Barrington, northwest of Chicago.

The Kunskys are building a replica of the lighthouse in Manistee, Mich., where they were married four years ago, along the Fox River.

While it is not a typical conical-style lighthouse one imagines, the two-story house with a light tower similar to a church bell tower was enough to cause concern among the city fathers of Barrington.

"We had some zoning hurdles to overcome," Laura said. "But there was a precedent." A man had previously built a castle in the upscale and conservative community, paving the way for the Kunsky's lighthouse.

Laura and Joe, and their sons, Christopher, 15, Robert, 13, and Timothy, 10, plan on moving into their new home this month.

Ford's Fairlane Center Teaches Class for Convention

This year's PTG Convention & Institute will be held in Dearborn, Mich., and it is our good fortune to be in such a wonderful area, not only for the recreational attractions and the beauty but for the cultural and historical atmosphere as well. The auto industry is a major part of this history of extraordinary technological advancements and what greater resource could we tap than the auto makers?

The auto industry has been on the cutting edge of technology for nearly a century now, and it was no surprise to find out that employee education was a prime concern. Ford not only promotes education, but has developed a complete training center with trained instructors who offer more than 200 classes from business to technical support services. *Business Week* magazine described them as "A recognized U.S. leader in worker training."

The auto industry not only deals with transportation but with people, communication, computers, plastics, business, safety — you name it. The question is, do they have programs that would be of interest and benefit to piano technicians? It turns out they have several.

Through reading the available options and consulting with PTG members and a Ford program director it was decided that a business class on time management might be most fitting for our situation. This is not just any old time management class, but a three-hour, in-depth class teaching not only how to control your time on the job, but to control and manage hours, days, weeks, months, and years to become more productive and to assist in reaching your goals. Each participant will receive a Ford Time Planner with Franklin Quest inserts to help communicate, organize, prioritize, manage time and daily activities and reduce stress.

While tuning a piano the other day I noticed the customer had a planner which looked similar to what Ford uses. I asked her about it and she told me it was a Franklin Planner she received through a similar class which was held by 3M. She said, "Of all the classes I have taken, this one class changed my life more than any other. I am now more productive and less stressed than I have ever been." She said she convinced her reluctant husband to use the system and now he claims he will never go back to his old method.

Time is our most valuable asset and what we do with it determines our productivity and rate of success. Three hours spent in this class will be well worth it and will start you on your way to achieving your goals. The information and tools obtained will save you countless hours, beginning immediately, and continuing as you apply them to your own needs.

The Ford Fairlane Center charges $140 for this class, but is willing to provide the same opportunity to PTG at a considerable discount, yet to be determined. Keep an eye out for advanced registration. This class will be offered only once and judging from the early response it will fill up fast. Take advantage, particularly if you feel a need to become more organized. This class will pay for itself many times over.

— Paul Olsen, RPT
Institute Director

1996 Annual Institutute and Convention

It's that time of year again to start planning for our Annual Convention. Mark your calendars for July 16th and 17th for the PTG Convention and the 18th through 21st for the Institute.

In 1996 the Convention and Institute will be held in Michigan at the Dearborn Hyatt Regency Hotel. The hotel is located 15 minutes from the Detroit Metro Airport, 15 minutes from Detroit and 15 minutes from Windsor, Canada. The hotel is in the middle of Fairlane, which is owned by the Ford Motor Company. The Ford Motor International Headquarters is across the freeway from the Hyatt.

All classes and exhibits will be contained in the hotel. There are 700 sleeping rooms reserved for our needs, and ample free parking in front. There are also four restaurants and two lounges for your dining pleasure. For your recreation there is an indoor pool with sauna and jacuzzi.

Across the street from the Hyatt is the Fairlane Mall, with many shops and fast food restaurants. There are a number of restaurants within walking distance of the hotel.

Nearby attractions in Dearborn are Greenfield Village and the Henry Ford Museum. At Greenfield Village you will see a village of older homes and businesses as they were around the 1900s. Featured at the Village is the birth place of Henry Ford, as well as Thomas Edison's laboratory from Menlo Park. The Village is a must see for people of all ages. At the Henry Ford Museum you will see the older vintage cars like the Model T and that Edsel your dad use to own, as well as cars from other manufacturers.

The 1996 Annual Institute and Convention will not only be a learning experience for the Piano Technician, but also one for the whole family.

See you in Dearborn in July!

— By Richard Bittner, RPT
Host Chapter President

Mini-Classes at Dearborn — An Unbeatable Taste Treat

Do you like two-for-the-price-of-one, and half-price sales? If your idea of a bargain is to get double your money's worth, then the mini-classes at Dearborn are going to suit you just fine.

There's a new flavor for mini-classes this year: *one entire class period will be devoted to just mini's*, rather than running them concurrently with full-length classes. This means you won't be torn between seeing a mini you're interested in but having to leave early or come late to another class.

Another new feature is *extra length*: each mini will be *40 minutes*, rather than 30 minutes as in the past. In 40 minutes, the instructors can give you not just the sizzle but some actual steak (or the salad bar for the vegetarians).

Now that your mouth's watering, you might ask, "What's on the menu?" We've got a lineup of instructors and topics who will make the buffet spread at the Hyatt look skimpy by comparison. You can try some innovative topics you might not want for a whole meal. And there are taste treats for all, whether a raw technician or a well-seasoned one.

There are popular instructors you'll recognize from previous years, and lots of new talent on the lineup as well. Here's just a sampling: **Isaac Sadigursky** will de-mystify perfect pitch, **Steve Schell** will tackle acoustics, and **Lloyd Meyer** will cover the globe with information about international piano markets.

For an up-close look at pedals (from a shoe's eye view), **Joyce Meekins** will show a video of pedals in action, and **Mitch Kiel** will describe wedded bliss for aural and visual tuning. **Doug Wood** will tell you how to make shapely hammers, **Tom Servinsky** will be busy hanging them, and **Peter Collora's** hammer tails will be just the right length.

Margie Williams will make that bench regulation actually work when the action's back in the piano, and **Allan Gilreath** will wear his two hats — technician and piano dealer — and give us the scoop on dealer prep work. **Jeannie Grassi** vows to make string splicing a snap, **Dale Probst** derails the mysteries of damper rails, and **Bill McKaig** sticks it all together with adhesives.

Finally, lest we forget we have our businesses to run, **Kathy Gilkey** takes a lighter look at customer relations, **John Ragusa** has our clients begging us for more, and **Beverly Kim** tells us when we've finally made enough money to retire.

You get the picture — and I've only mentioned a few of the 30 selections you'll be able to choose from in Dearborn. It's true you'll only be able to choose two of the fabulous array of mini-classes, but only getting a lobster and linguine, or chocolate and champagne — now that doesn't sound half bad, does it?

— Evelyn Smith, RPT
Assistant Institute Director

Increasing Chapter Attendance

By Eric D. Olson, RPT

If attendance at your chapter meetings has been declining, try importing some talent. The Shenandoah Chapter in Winchester, Va., had our best attendance in more than a year when David Hughes, RPT, traveled from Baltimore, Md., to give his technical presentation on "Soundboard Manufacture and Installation."

Going to special technical events at neighboring chapters is a great time for seeking out such talent, and so it was that I approached David some months earlier, and he graciously agreed to visit our chapter. Assisted by his wife, Judy, who works with him in his shop, he gave a presentation in three parts.

First was the discussion of the three main ways of building soundboards: flat ribs on flat boards, then crowned by taking on moisture; flat ribs forced down on a board on a concave press; curved ribs on a board on a concave press.

After explaining their reasons for using the latter method, the second part followed, a slide presentation on the process of removing the old board and installing the new. To conclude, they showed us many of the jigs we'd seen used in the slides, and actually demonstrated gluing a rib on a soundboard scrap with fixtures they had brought.

All in attendance agreed it was one of the best technical presentations ever for our chapter, with the fringe benefit of seeing some faces we'd been missing.

Passages

George Lenoir, RPT
September 3, 1909
December 10, 1995

I am sad to let you know that George Lenoir, age 86, an RPT (retired) from Magnolia, Mississippi, died on December 10, 1995. He died suddenly, probably from a heart attack. Please allow me to pass along a few words about him.

I grew up in Magnolia and have known George since I was a child. I remember when his brother, Leslie Lenoir, tuned everyone's piano for hundreds of miles around. When Leslie died in the 50's, he left his tools to George who some time later left the printing press at the local newspaper and began his training. He went to all the PTG Conventions and trained at Hall's Piano in New Orleans and, therefore, was a member of the New Orleans Chapter. George kept my pianos tuned for years in Magnolia when I was raising my children and teaching piano lessons. We became close friends. I very often gave him a "hard time" because my Wurlitzer spinet didn't sound like I thought it should. The treble end kept going out of tune and George, in his patience, would drop by every few weeks just to brush up my piano at no charge. I knew nothing about pianos at the time except how to play one. However, he kept telling me that I needed to learn how to tune. I wasn't sure if he thought I had a good ear or if he was tired of fooling with me and my piano.

After a while he helped me find an older grand which he completely reworked for me. He was always helpful, informative, kind, and a gentleman; a credit to his profession. In 1977, I moved to the Jackson, Mississippi, area and after a few years my husband and I suffered some financial setbacks due to his loss of a job. About that same time George landed in a hospital here in the city. I went to visit him and he encouraged me at that time to go to New Orleans that summer to the PTG Convention. I did go to New Orleans for two days to see what it was all about. I sat with him in a few classes and I was hooked. I was like a duck that had just found water. From that point, through his instruction and helpfulness, I began the slow process of becoming a piano tuner. From the very beginning he talked of PTG, encouraging me to become involved. Because of his influence, I am now a Registered Piano Technician and my husband is an associate. We are so thankful for the inspiration given by him.

—Jeneane Mixon, RPT

In Memory . . .

Charles Nelson
Pamlico, NC Chapter

N. D'Ambra
Southwest Florida Chapter

Ben Bailey, RPT
Pomona Valley , CA Chapter

Michael Bany, RPT
Cincinnati, OH Chapter

Michael Bany, RPT
January 29, 1954
December 28, 1995

Michael Bany, RPT, an accomplished musician and member of the PTG for nearly 10 years, died Friday, Dec. 29, 1995 in Cincinnati, Ohio.

He reclassified and became an RPT in 1986, and had always been a member of the Cincinnati Chapter.

A bass player with a number of local and regional bands, he was an accomplished and respected member of the city's musical community for the better part of 30 years.

The Cincinnati Enquirer described Michael as a "mainstay" of the music scene — a bassist who played with a number of bands in and around the city, including The Goshorn Brothers, The Bluebirds, The Remains, Cincinatti Shakers, Wheels, Craig Fuller Band, Samson, Bany Brothers and Thunder Mug.

In addition to playing the bass, he wrote lyrics for a number of songs performed by the bands he played with.

Michael, a native Cincinnatian, broke out on the city's music scene when he was just 11 years old, playing in a band that included his brothers, Mark and Dave.

A Mass of Christian Burial was held Wednesday, Jan. 3, 1996.

He is survived by three brothers, John, Dave and Mark; a sister, Mary Murray; two nephews, Tommy and Marlin; nine nieces, Lisa, Brittany, Hope, Nicole, Brandi, Claudia, Rebecca, Martha and Julie; and a special friend, Betsy Herkel.

(Information for Michael's obituary was taken from The Cincinnati Enquirer and PTG records. A complete article could not be included in the February Journal *because of publishing deadlines. A complete article by members of Michael's chapter will be published in the March* Journal.*)*

New Members In December

REGION 1

021 BOSTON, MA

RUTH G. RICHARDS
P. O. BOX 90
WEST TISBURY, MA 02575

064 CONNECTICUT

PATRICIA M. HOPKINS
335 WINCHESTER ROAD
WINSTED, CT 06098

BRENDA L. VECCHITTO
188 LIBERTY STREET
MIDDLETOWN, CT 06457

078 NEW JERSEY

MARY A. BROWN
78 BOWLINE STREET
BARNEGAT, NJ 08005

REGION 2

296 WESTERN CAROLINAS, NC

KEVIN V. HARWOOD
120 RED OAK LANE
ALEXANDRIA, NC 28701

301 ATLANTA, GA

FRED K. BROWN III
220 W. BENSON STREET
DECATUR, GA 30030

322 NORTHEAST FLORIDA

ELIZABETH J. BISHOP
952 PARKRIDGE CIRCLE, E.
JACKSONVILLE, FL 32211

381 MEMPHIS, TN

DAVID L. CALL
P. O. BOX 33
717 MAPLE HILL DRIVE
MUNFORD, TN 38058

REGION 3

761 FORT WORTH, TX

RICHARD W. TILTON
828 BRIDLE AVENUE
FORT WORTH, TX 76108

REGION 4

496 NORTHERN MICHIGAN

SANDRA HOLDER
7093 14 MILE ROAD
EVART, MI 49631

REGION 5

581 MINN-KOTA, ND

JEFFREY N. KLASSEN
#19 SUNFLOWER CRESENT
ALTONA, MB R0G 0B0 CANADA

631 ST. LOUIS, MO

DANIEL E. BROWN
2972 WHEATFIELD FARMS DRIVE
O'FALLON, MO 63366

CLAUDIA J. BURTON
1240 FOREST TRAIL COURT
FENTON, MO 63026

REGION 6

931 SANTA BARBARA, CA

JAMES D. LEONARD
337 LEDO PLACE
ARROYO GRANDE, CA 93420

REGION 7

972 PORTLAND, OR

JOHN T. WEHLITZ
27960 SW FARMINGTON ROAD
HILLSBORO, OR 97123

Associates Pass The Test

REGION 4

612 Quad Cities, IL

Anthony L. Polites
245 Lawnridge Drive
Creve Coeur, IL 61610

REGION 7

001 Calgary, AB

Albert V. Picknell
P. O. Box 5300
Lacombe, AB T4L 1W9
CANADA

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.

February 16-18, 1996

CALIFORNIA STATE SEMINAR
Hyatt Regency Monterey,Monterey, CA — Contact: Richard Des Wilson
125 Northridge Drive, Scotts Valley, CA95066
408-438-7708

March 16, 1996

BLUEGRASS SEMINAR
Transylvania University, Lexington, KY — Contact: Ben Griffith
101 Crestwood, Frankfort, KY 40601
502-875-2297

March 21-24, 1996

PA STATE CONVENTION
Sheraton of Bucks, Langhorne, PA — Contact: Webb Phillips
Box 543, Hatboro, PA 19040
215-674-2555

March 29-31, 1996

PACIFIC NORTHWEST CONFERENCE
Seaside Convention Center, Seaside, OR — Contact: Randy Potter
61592 Orion Drive, Bend, OR 97702
541-382-5411

April 12-14, 1996

FLORIDA STATE SEMINAR
Holiday Inn Crown Plaza, Tampa, FL — Contact: Robert Carr
320 West Rich Avenue, Deland, FL 32720
904-736-0551 - E-mail: rvcarr@aol.com

April 26-28, 1996

CENTRAL WEST REGIONAL SEMINAR
University of Nebraska, Lincoln, NE — Contact: Richard West
5 Westbrook Music Bldg., University of Nebraska, Lincoln, NE 68588-0100
402-472-2568

April 27, 1996

HOSPITAL FOR HOPELESS PIANOS
Sherman Clay, LA, Los Angeles, CA — Contact: Jon Longworth
6926 Bellingham Avenue, N. Hollywood, CA 91605
818-982-2431

May 3-5, 1996

NEW ENGLAND/EASTERN CANADA REGION
Westin Hotel, Waltham, MA — Contact: Anthony Malionek
23 Winthrop Ave, Beverly, MA 01915
508-922-0711

July 17-21, 1996

PTG CONVENTION & TECHNICAL INSTITUTE
Hyatt Regency Dearborn, Dearborn, MI
Contact: PTG Home Office
3930 Washington, Kansas City, MO 64111
816-753-7747

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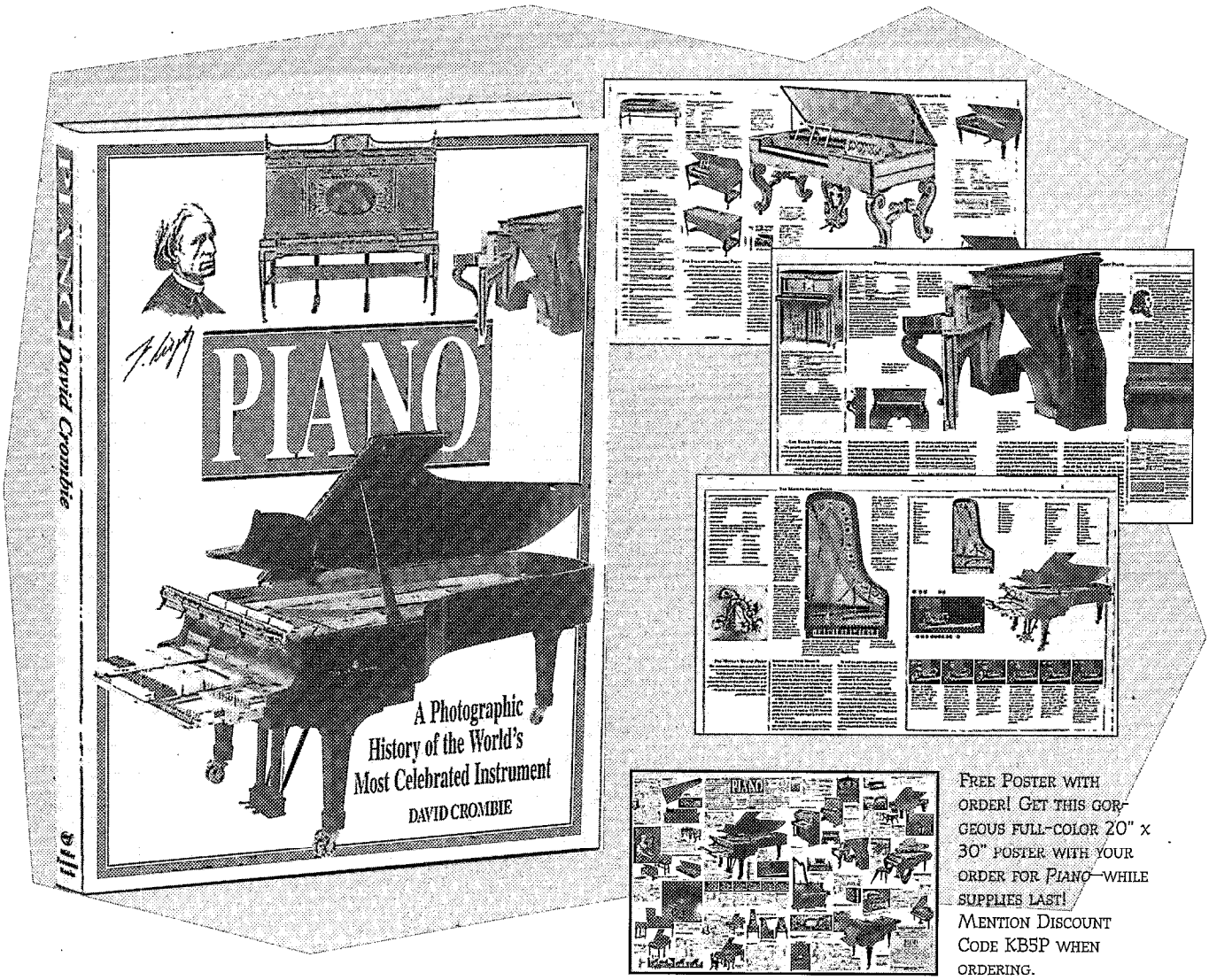

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AUXILIARY EXCHANGE

Dedicated To Auxiliary News and Interests

At Home and On the Road

On New Year's day it was 80 degrees here in Los Angeles. How many of you watched the Rose Parade and/ or the Rose Bowl game? If you did then you know what I mean. It was a lovely day. It still is. Every day is just another day in Paradise if you don't mind the traffic and gun shot noise. No really, Los Angeles has some very nice places and advantages.

We live in an area called Topanga. It is between Malibu and the San Fernando Valley, up in the hills. We have lots of wild life up here, like owls, coyotes, mountain lions, raccoons, opossums, squirrels, and lots of birds. It is very quiet, too. There are no stop signals or even stop signs on our main road for about 11 miles, between Mulholland Highway and Pacific Coast Highway. It's a two-lane country road. We are very fortunate to live here. It's not what you may think L.A. to be like at all. I moved here about 19 years ago and have no plans to move until I retire. Then I may move closer to the beach, perhaps in Santa Barbara. But then that's some time off for me.

As you may remember from last month's article, I just turned 50, on January 10th. Also, my company just entered its 85th year, so we had a very nice sit down dinner party for about 100 people to celebrate both milestones. I enjoyed that a lot. The next day we flew to Eureka, Calif., about 600 miles north of L.A. to have another dinner party with our daughter, her two boys, Cody and Christopher, Claudia's brother, Mark, and his family, at the Eureka Inn after we spent two nights in the Ginger Bread Mansion. The Ginger Bread Mansion is a beautiful Victorian Bed and Breakfast Inn located in Ferndale, just outside of Eureka. We have stayed there before and just love it.

L. Paul Cook
PTGA President

Speaking of Bed and Breakfast Mansions, when you go to the Convention this July in Dearborn Michigan you just may want to go a little early or stay a little longer so you can stay in another wonderful Bed and Breakfast Mansion there. I highly recommend the Stonehenge Inn Bed and Breakfast in Bay City. Bay City is only a few hours drive north of Dearborn. Ruth Koerber is the owner and Inn keeper. You can make reservations in the seven bedroom mansion by calling her at (517) 894-4342. Tell her I sent you for special treatment. This home was built in 1889 for a lumber baron. It is a textbook example of English Tudor architecture. Breakfast is especially good there, too. Rates were between $75 and $85 plus 6 percent tax when we were there last September. Bay City also has one of the largest and best antique stores I've ever been to. Check it out. You'll be glad you did.

Our winter PTGA telephone meeting has been postponed until March, so I have nothing to report to you on that subject. However, if you want us to discuss anything, then please drop me a note or give me a call.

The California PTG Convention in Monterey will be starting very soon. We will be flying up to Monterey on Thursday, the 15th of February. Join us if you can. We will have fun! I'll tell you all about it next month. So until then, stay tuned.

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PIANOS FOR SALE — Spinets, consoles, studios, grands. One or a carload. Excellent brand names. As is or rebuilt. Lowest possible prices. Owen Piano Wholesalers; 2152 W. Washington Boulevard, Los Angeles, CA 90018. Telephones 213-732-0103, 818-883-9643.

PIANO SCALING SOFTWARE for DOS. Plot inharmonicity, Tension, Break %, and more. Automatic Bass Rescaling, String Winding Sheets, Detailed Manual, and much more. Decimal & Metric. $80.00. Tremaine Parsons, Box 241, Georgetown, CA 95634, 916-333-9299

PTOOLS - COMPUTER TOOLBOX FOR TECHNICIANS. WIN & DOS Client Management, Mailmerge, Correspondence, Import/Export, Labels, Envelopes, Autodial and more. Measurement Conversions. Trade Specifications, Zipcode, Supplies, and Resource Databases. Conversions, Specifications, Calculations, Repair Formulas, and more. User: $30.00. Update Status: + $50.00. Tremaine Parsons, RPT; 916-333-9299.

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

SOUNDBOARD PRESS - Designed and built by Chris Robinson and his welder, Ned Lisella. Only two in existence, all custom clamps and bolts included. No reasonable offer refused. Call Brad at: 914-358-6995.

RELIABLE ACCU-TUNER NOTESWITCH! One year guarantee! Includes coiled cable, thumb switch and attaching hardware. Fits all tuning hammers. $49.00 includes s/h. Dean Reyburn, RPT, Reyburn Piano Service; 2695 Indian Lakes Road, Cedar Springs, MI 49319, 616-696-0500

*Bluthner 6'4" 1910 Ebony, ornate plate w/clouds and angels $12,995; 1917 Steinway A, 6'1" Mahogany, $12,000; *Steinway 7' B, 1896, Ebony gloss, $19,500; *Steinway 5'10" 0, Dark Mahogany, $13,500; *Steinway 5'10" 0, 1920, Light Mahogany, $16,000; *Steinway D, 9',1899, Ebony, $28,900; *Mason & Hamlin 5'8" A, 1916, Brown Mahogany w/Piano Disc, $16,000; *Baldwin 7', Ebony gloss w/ Pianocorder, $15,000; *Baldwin 6'3" L, Ebony gloss, $14,995; *Mason & Hamlin 5'8" 1926 "A" Brown Mahogany, $4,500; *Fisher Bby Grand, 5'4" 1915 Circasian Walnut, $4,895; *Baldwin 6'3" L Model, 1982, Walnut, $8.500. Call SCHROEDER'S PIANOS for a complete list of used pianos, 800-923-2311.

NEW FROM SPURLOCK SPECIALTY TOOLS—Soundboard shims to match my custom carbide bit and soundboard routing system. 39" and 78" lengths and three widths. Quality quarter-sawn Canadian white spruce made by Andre Bolduc. Spurlock Specialty Tools, 3574 Cantelow Rd., Vacaville, CA 95688, 707-452-8564.

VICTOR BUYS & SELLS FINE GRAND PIANOS. LARGEST selection in USA, Over 400. Need Tuner Technician, $600 weekly. VICTOR PIANOS, 300 NW 54 St, Miami, FLA 33127, 305-751-7502.

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

REPAIR CHIPPED IVORY IN 20 MINUTES. "AcryliKey" ivory restoration system produces a strong, color-matched, nearly invisible repair. Kit contains material enough for 50+ repairs plus pigments, mixing utensils, sanding pads, and complete instructions. $39.95 ppd. Richard Wagner, RPT; 7709 S.W. Pfaffle, #40; Tigard, OR 97223; 503-624-7360.

25 YEARS OF PTG JOURNALS — 1971 to 1996, $200, Carl Warmington, 142 Pineneedle Dr., Bradenton, FL 34210, Telephone (914) 758-6835.

HELP WANTED

PIANO TUNER needed for Piano Service Company. Duties will include residential and concert tuning; and contributions in the remanufacturing division of the business. Mail or fax resume to Craftsman Piano Service, 15810 N. Cave Creek Rd., Phoenix, AZ 85032. Fax: 602-482-8478.

WANTED: Steinway Dealer in Portland, Oregon needs technician to tune and maintain Concert & Artist promotional fleet of 20 instruments. Ideal opportunity to relocate and build a great business. Fax resume to: (503) 775-9828, or send to: Moe's Pianos, 4500 SE Woodstock Blvd., Portland, OR 97206, Attn; Tiffany Eubanks.

WANTED—Piano tuner/technician, dealer friendly, with some cabinet refinishing and light piano moving experience helpful. Growing piano dealer in the great N.W. looking to employ well rounded piano person. If you are tired of the big city, relocate to a maturate sized city with plenty of work. Ask for Tracy Harmon at (503) 585-5397.

GENEVA INTERNATIONAL CORPORATON, the exclusive U.S. distributor of Petrof Pianos, is wishing to hire a full time Piano Technician for shop work in the Chicago area. Prefer RPT with rebuilding experience. Polyester finish experience would be a plus. Contact Alan Vincent at 1-800-533-2388 for more information.

SERVICES

STRAIGHT SIDES, SQUARE FRONTS and crisp notches are the benchmarks of our quality key recovering. Tops with fronts $115 plus return shipping and insurance. Call or write for free list of our key and action restoration services. Yvonne Ashmore, RPT and Associates, 12700 La Barr Meadows Road, Grass Valley, CA 95949, 916-273-8800

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

ADD ADDITIONAL $'s to your income. Rebuild player pianos for your clients. Send us the player parts. You restore the piano and we will return the mechanism in restored condition. We guarantee our work. For more details, call or write: Jim Brady, 2725 East 56th Street, Indianapolis, IN 46220, 317-259-4307

FOR THE HIGHEST QUALITY GRAND PIANO REFINISHING call 'ADEPT of Ft. Myers, FL. Bill Collins proprietor, 32 years in the craft. Licensed for 11 years at this same location. Specializing in exquisite, high quality and high gloss, lacquer finishes. Color and natural finish matching, case restoration, and invisible repairs. PH. 813-275-7170.

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

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

I WILL RESCALE your next restringing project. Lower inharmonicity, increase power, make voicing easier. $40. For measurement requirements call Paul McMillin, RPT. (800) 820-9014.

FABRICATION OF DISCONTINUED OR HARD-TO-FIND WOODEN PARTS (action or case). NO MINIMUM QUANTITIES. Call Paul Revenko-Jones 312-666-7440 or Brian Newell 312-226-2540.

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

52 PIANO KEYS RECOVERED— .075 tops with fronts (molded plastic) - $95.00; .050 pyralin - $100.00; .060 pyralin - $105.00. Gloss sharps (3 1/2") - $50.00. Keys rebushed: premium cloth - $75.00; leather - $95.00. Other services available. Call or write for price list. FREE return freight on prepaid orders of $50.00. Walker Piano Service, 554 State Route 1907, Fulton, KY 42041, 1-800-745-6819.

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.

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

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

TRAINING

WELL-TEMPERED TUTOR. Learn to tune by ear with your Macintosh computer. Use pre-programmed temperaments or create your own. If you have trouble hearing beats, this program can isolate the beats for you. Score yourself with the PTG exam. Twenty-one historical temperaments also available. Demo disk available. Mark Anderson, RPT: 510-524-0390 (California). Great teaching tool!

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

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

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

WANTED

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

WANTED: TINY PIANOS such as the Wurlitzer Student Butterfly or other small types. Call collect: Doug Taylor,

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PianoDiscussions™

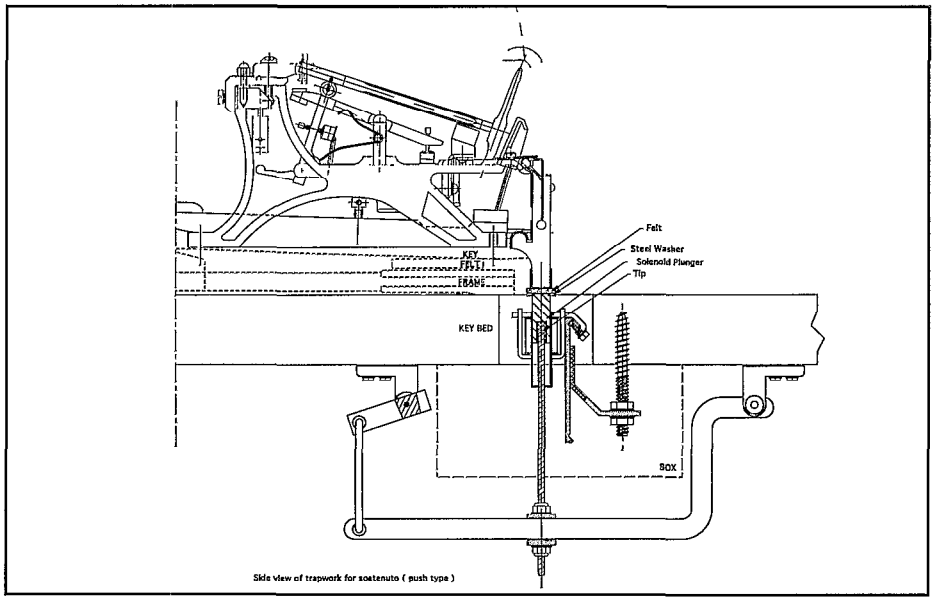
February 1996

News From The World of PianoDisc

For Certified Techs Only

Time saving Steinway sostenuto diagram big help to PianoDisc trained technicians

The following diagram to the Steinway sostenuto system should save the PianoDisc technician a great deal of time — an important and valuable commodity these days. The diagram and accompanying instructions were prepared by our technical advisor Mark Burgett:



Side view of trapwork for sostenuto (push type)

1. While aligning the solenoids on the Bass Solenoid rail, leave enough room on the rail at the break (between bass and middle rail) to place another top solenoid. This solenoid will provide the guide for the sostenuto monkey.
2. After aligning the solenoids on the bass rail, attach guide solenoid to the rail in the space provided. Cut the black wire off as it will not be used.
3. Remove the stem from a solenoid plunger and drill a 1/4" hole 1/2" deep into the existing plunger stem hole.
4. Place a solenoid rubber tip on the threaded stock and push into a 1/4" plunger hole.
5. Place threaded plunger assembly into the guide solenoid (see illustration).
6. The threaded stock will connect to the sostenuto lever to complete the connection.

PianoDisc
4111 North Freeway Blvd.
Sacramento, CA 95834
Phone: (916) 567-9999 • Fax: (916) 567-1941
Tech Support: (619) 258-1460
(916) 567-9999
Our telephone lines are open daily (except weekends and holidays) from 8 AM-5 PM Pacific Time.

INSTALLATION TRAINING SCHEDULE
January 22-27
February/March 26-2
March 25-30
CONTINUING EDUCATION
April 1-3 • April/May 29-1
Call (916) 567-9999 for details

Ruth Laredo joins PD Artist Series

In the realm of classical music, no star shines any brighter than the wonderful Ruth Laredo. In mid-September, this noted Steinway Artist added PianoDisc Artist to her list of credentials by making her debut disk. As expected, she performed with the flawless technique and astounding lyricism for which she is famous.

In addition to five preludes by Rachmaninoff (the composer with whom she is most closely identified) Ms. Laredo performed *Songs of Spain* by Albeniz, *El Amor Brujo Suite* by DeFalla, and the *Prelude and Fugue in G Minor* by Bach. It is a program certain to thrill PianoDisc audiences with both power and beauty. Ms. Laredo's disc is scheduled for a Spring '96 release.

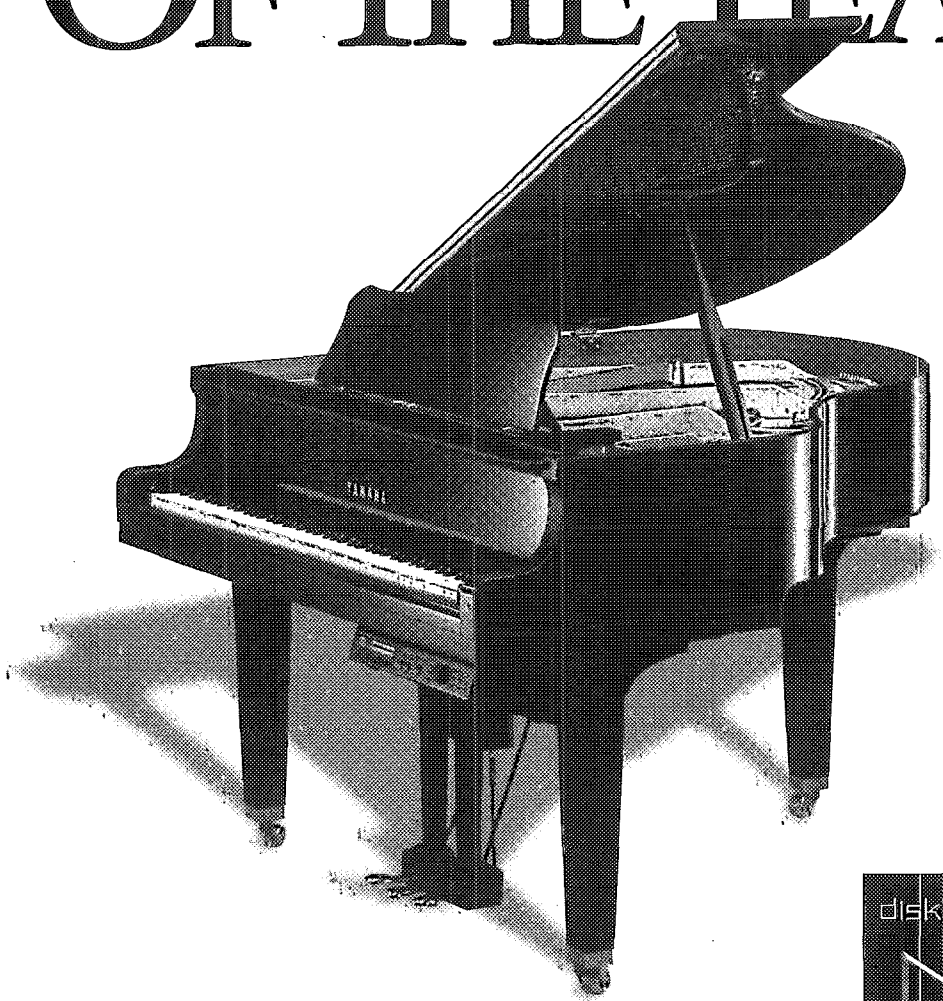
Special class offered at Calif Convention

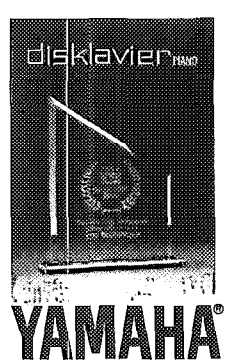
PTG members and non-members who will attend the 1996 California PTG Convention are invited to attend a special class on troubleshooting the PianoDisc system at the Convention headquarters, the Monterey Hyatt Regency, on February 16, 1996.

There is no fee for the class. Non-members who take the class, stay for the convention and then apply for PTG membership will have their $90 convention registration rebated by the California PTG.

Contact Don Dusenbury at (916) 567-9999 for details and to make reservations.

1994 KEYBOARD PRODUCT OF THE YEAR





Dealers have chosen the Yamaha Disklavier Piano as "Keyboard Product of the Year." It just goes to show that great craftsmanship, great technology, great dealers and great salespeople can make things happen.