PIANO TECHNICIANS
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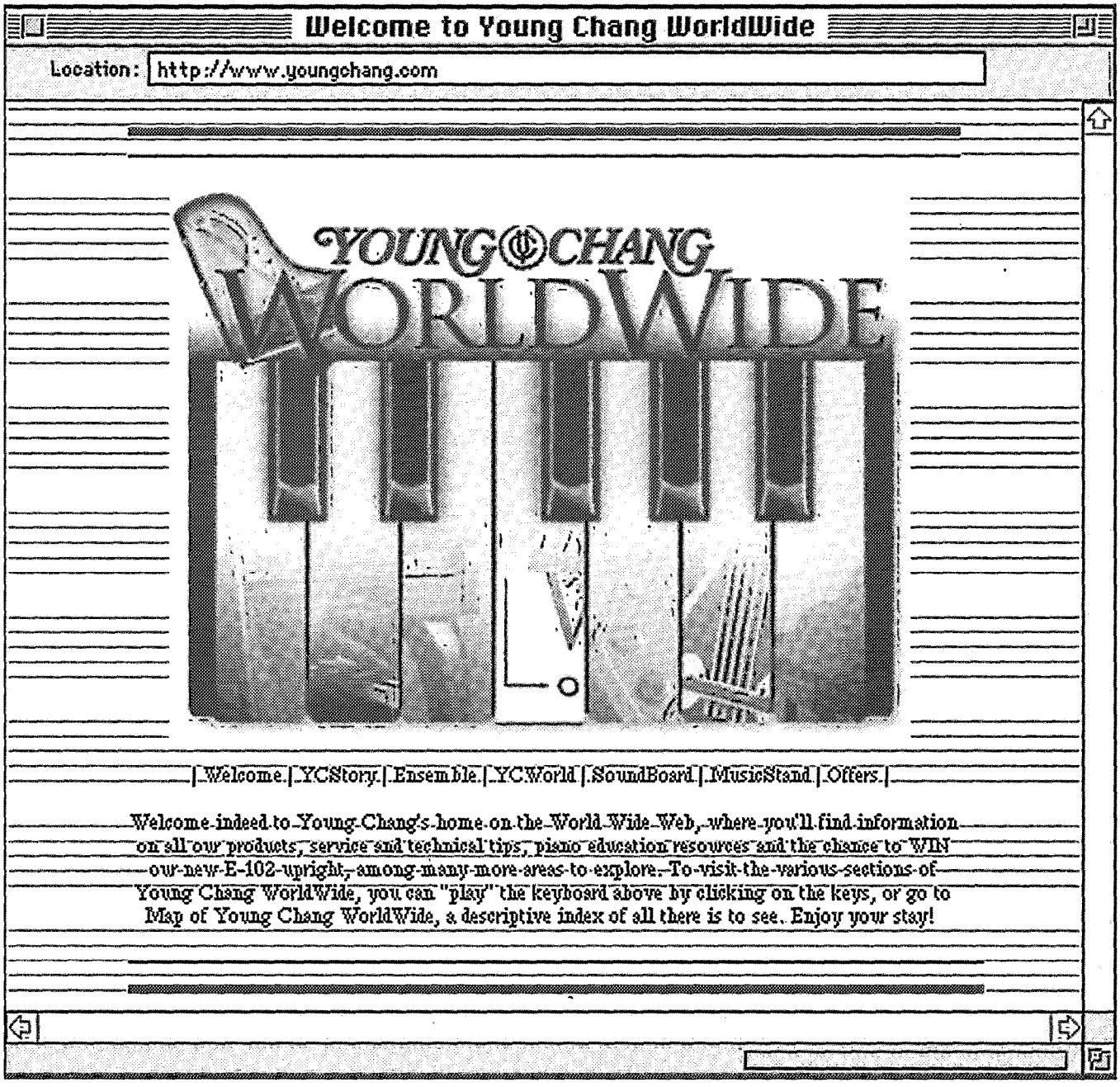

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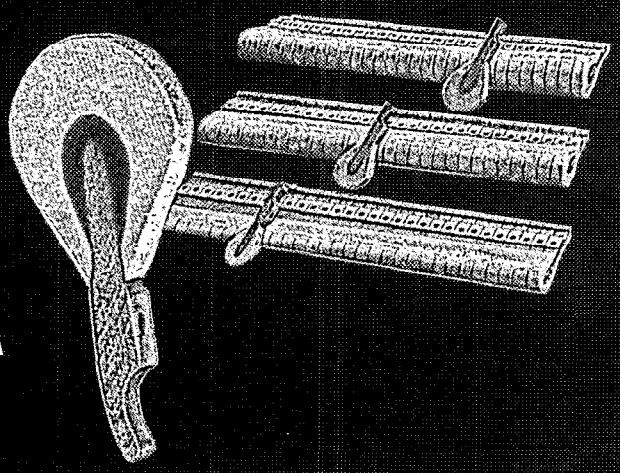

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PIANO TECHNICIANS
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Editorial Perspective

Pianawareness

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

I've been encouraged by some recent appearances of pianos and even piano tuning in TV and radio commercials, books, and other media. Midas (mufflers & brakes) has a couple of commercials running these days which compare servicing your car to the act of tuning a piano. Although the actor who gingerly carries a tuning hammer to the piano with both hands seems never to have seen a tuning hammer or even a piano before, just having a concert grand featured in a TV commercial is a great thing for public awareness of our industry. The radio version may be even better. The narrator asks, "How good would a piano sound if you only tuned the most commonly used notes?" (tuning going on in the background) "Sure, you'd have a few great-sounding notes, but..." (sound of Bach being played on a grossly out-of-tune piano). "To bring a complex system into harmony requires a coordinated effort." The narrator then goes on to explain how this relates to servicing a car.

Noah Adams of National Public Radio recently published a best-selling book entitled "Piano Lessons," which chronicles Adams' experiences resulting from his decision to learn to play the piano. He tells about the process of learning about pianos, buying a piano, having it tuned, trying to learn to play, and so forth. The aim of the book is, again, to relate these processes and experiences to some larger experience—namely life, in this case. But pianists, dealers, teachers, tuners and rebuilders populate the pages of the book, and I deem this a wonderful thing for our industry as a whole. In addition to Adams' book, two major books on the history of the Steinway company were published last year.

Recent movies and television programs too numerous to mention show pianos in homes and concert halls. The message is quiet but persistent: pianos are an element of class, representing the upper edge of our society's sensibilities.

I hope it doesn't seem naive of me to say that there continues to be great interest in the piano. I hope that pianos continue to be seen in all the right places and continue to be a topic of media attention. My hopes were raised recently as I presented a program to a local music teachers' group. My talk, scheduled for an hour, was extended by at least 15 to 20 minutes by the audience, which didn't want to leave until all their questions had been answered. I was happy to oblige them, and when I laid out an assortment of PTG brochures and technical bulletins at the conclusion of the program, and announced that it was "first come, first served," a kind of "feeding frenzy" ensued. I turned to talk with someone privately, and when I turned back around to see how the brochures were doing, all but two were gone!

The conclusion I drew from this experience is that we need to do a better job of providing these materials to the public. The interest is there; we need to meet it halfway. If I were to do this presentation again, I think I'd buy some inexpensive folders and fill each one with a pretty complete assortment of PTG literature. I'd make sure everyone who attended got one. One of my students reported to me that he set up displays of PTG brochures and bulletins (imprinted, of course, with his name and phone number) at different public locations, and has received quite a number of calls as a result. You may say, "I don't need any more business than I already have." The issue, however, is larger than any one technician's business; we exist as part of an industry, and it's important to keep the whole industry as healthy as possible. Let's do our part to help keep the piano —and piano service — in the public eye.

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

PACE
Professionals Advance through Continuing Education
LESSON PLAN

COVER ART

This month's cover illustrates the use of a rotary planer for tapering grand hammers. See Chris Gregg's article beginning on Page 19. Photo by Chris Gregg.

COLUMNS & COMMENTS

DEPARTMENTS

IN ADDITION

PIANO TECHNICIANS **Journal**

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VISION 2001

If we are to succeed in arriving at a destination, it is essential to identify the destination clearly. The challenge facing Council this year is to state the destination for the PTG in the next five years, and begin designing a plan to reach that destination.

PTG President
Leon Speir, RPT

The Vision 2001 book contains an abundance of background information on the PTG for your consideration. In it you will find history lessons as viewed through the eyes of former Presidents. It also contains an introduction to the planning process and what it means to the PTG, and a proposed mission statement.' The section labeled, OUR CUSTOMERS, lists those affected by the decisions and actions of the PTG. Listed too are three ORGANIZATIONAL VALUES STATEMENTS AND AN ENVIRONMENTAL ANALYSIS showing the strengths, weaknesses, opportunities, and threats that the PTG may face in the next five years. Other information includes three SCENARIO studies to help predict future growth and change along with a listing of potential BARRIERS to achieving the long range planning change objectives. All this information lays the foundation for proceeding with the work facing council this year.

Delegates attending the upcoming Council session in Dearborn will be asked to consider the following action on the Vision 2001 recommendations:

- Replace the current Mission Statement with the one recommended in the Vision 2001 book.
- Evaluate the three proposed strategic directions statements:

1. TOWARD PROVIDING MORE MEMBER BENEFITS
2. TOWARD A MORE PROFESSIONAL ORGANIZATION
3. TOWARD A MORE PRODUCTIVE ORGANIZATION

You will find these proposals listed on pages 24 through 29 of the Vision 2001 book. Delegates will decide if these statements represent the strategic direction the PTG must take in the next five years.

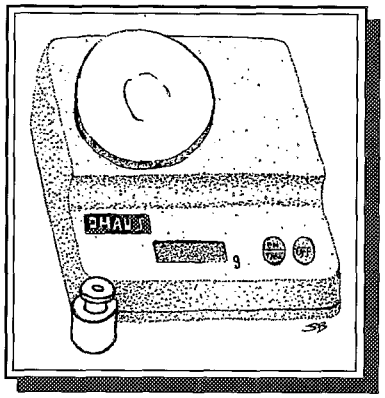
- Evaluate the change objectives and set priorities for each year.

After the change objectives are identified, work will begin to draft specific proposals that are based on these change objectives. Committees, working with the Board and Staff, will draft these proposals for consideration by next year's Council.

This year marks the inauguration of formalized strategic planning by the PTG. If we are to succeed, members and Council delegates must be fully informed of the material contained within the Vision 2001 book. Discuss it with other chapter members so you can send a delegate to Council who is prepared to tackle the task at hand. The groundwork has been laid; now it's your turn.

TT&T Electronic Gram Scale

Here's an electronic gram scale which fits the requirements for the kind of work described in Chris Gregg's and David Stanwood's articles in this issue. The "Ohaus 300-gram Economy Scale" is accurate to .1 of a gram, with a capacity of 300 grams. Power is supplied by an included AC adapter or a regular nine-volt battery.



Ohaus 300-gram Economy Scale.

The scale is order number 116-103, and is available from Rio Grande Albuquerque, a jewelers' supply company. To order, call 1-800-545-6566 (from the USA), or 1-800-253-9738 (from Canada). The price is U.S.$91.25 plus shipping and handling.

— Steve Brady, RPT

TT&T Where's the Click?

On two Young Chang grands, I've had customers complain of a sort of "click" they were hearing in a number of notes. After checking all the usual causes—loose screws, glue joints, etc., I was able to isolate the noise to the keys. I found no "pulley" key problems, the keyframe was fine (screws tight, no debris), and there was no glue wicking to the surface of key bushings. However, as I lifted the keys to check for over-tight balance rail holes, there was a distinct squeak. With a little trial, I found that the "click" was actually an accelerated "squeak" and a drop of McLube later, the problem was gone.

— David Durben, RPT

TT&T Polishing Keypins

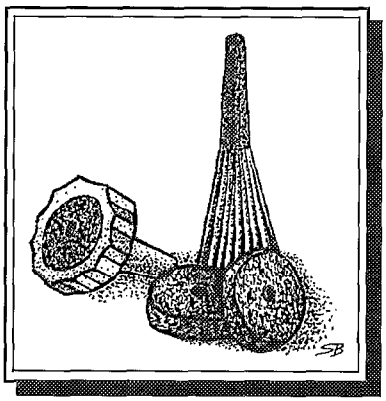
Polishing keypins? Yuk! Most technicians I know would rather be doing something more stimulating, like cleaning out the kitty litter box.

I felt the same way one morning as I was preparing to recondition a grand action in my shop. After I had run out of a long list of procrastination steps (cleaning fingernails, reading old *Journal* issues, calculating how many angels could fit on the head of a pin, etc.) I glanced up on a shelf. Light bulbs exploded in my head. I feverishly went to work (***not*** on the keypins). In a few minutes I had built a Better Mousetrap. Actually, what I had devised was a Better Keypin Cleaner.

A *Better* Keypin Cleaner. Not the best, you understand. The best would be a lobotomized assistant to cheerfully do the job for me. But, alas, that was not on my shelf. What was on my shelf was a package of two extra screw-on tips for my 'Hot Stuff' CA glue bottles. Now if you are like me, you alternately praise and curse the great CA Glue God — praising it for the time it saves in certain situations (like gluing the casters onto a sloping floor with a shifting piano), but cursing it for losing just as much time as you saved by trying to get the glue OUT of the bottle in the first place! Yes, folks, just a little moisture near that little glue spout and you have a clogged spout. Well, my solution has been to unscrew the spout and extract the glue with a throwaway plastic pipette. I use the screw-on tip as an air-tight cap. No more clogging, and the pipette is a very handy applicator. But that's another story.

The point is, I had a package of screw-on tips that I had bought back in my days of cursing at clogged tips. Yankee (Russian Jew) that I was, I could not just throw the tips away. And so they sat on my shelf, for months— along with the Strobotuner, the transistor radio, and a genuine set of 1950s Story & Clark plastic flanges.

My heartbeat reached its aerobic exercise rate as I opened the package. (The array of things that will get a piano technician excited is truly awesome.) I removed the snap-on black cap from one of the tips and sliced half of the tip off—enough so a keypin could slide through the shaft of the tip. At the cap end of the tip—the part that screws on to a glue bottle— I also sliced off enough so that the remaining depth was about the same as a thick cloth front rail punching, which conveniently pops into place (see illustration). Voila!, or Eureka! (or whatever you're supposed to say when you finally understand the words to "Hey Jude"). I snapped the black cap back on, chucked the whole thing in my drill, brushed a little Wenol (Flitz, or any other paste-like metal cleaner should also work fine) onto some keypins, and went to work.


CA glue spout and cap modified for use as keypin cleaner.

Having two tips, I modified the second one too, in the same way. I call it the wash/rinse cycle. I use one to apply the paste and the second, cleaner, one to clean, just snapping them in/out of the black cap which stays chucked in the drill the whole time. Finally I use a one inch wide strip of buckskin, shoeshine style, for polishing. Wash/rinse/dry. Coffee break.

No muss, no fuss. I still had time to read my *Journals.* Still haven't figured out how many angels....

— Danny Dover, RPT

The 2nd GPA
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All Six Prize Winners selected Kawai.

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

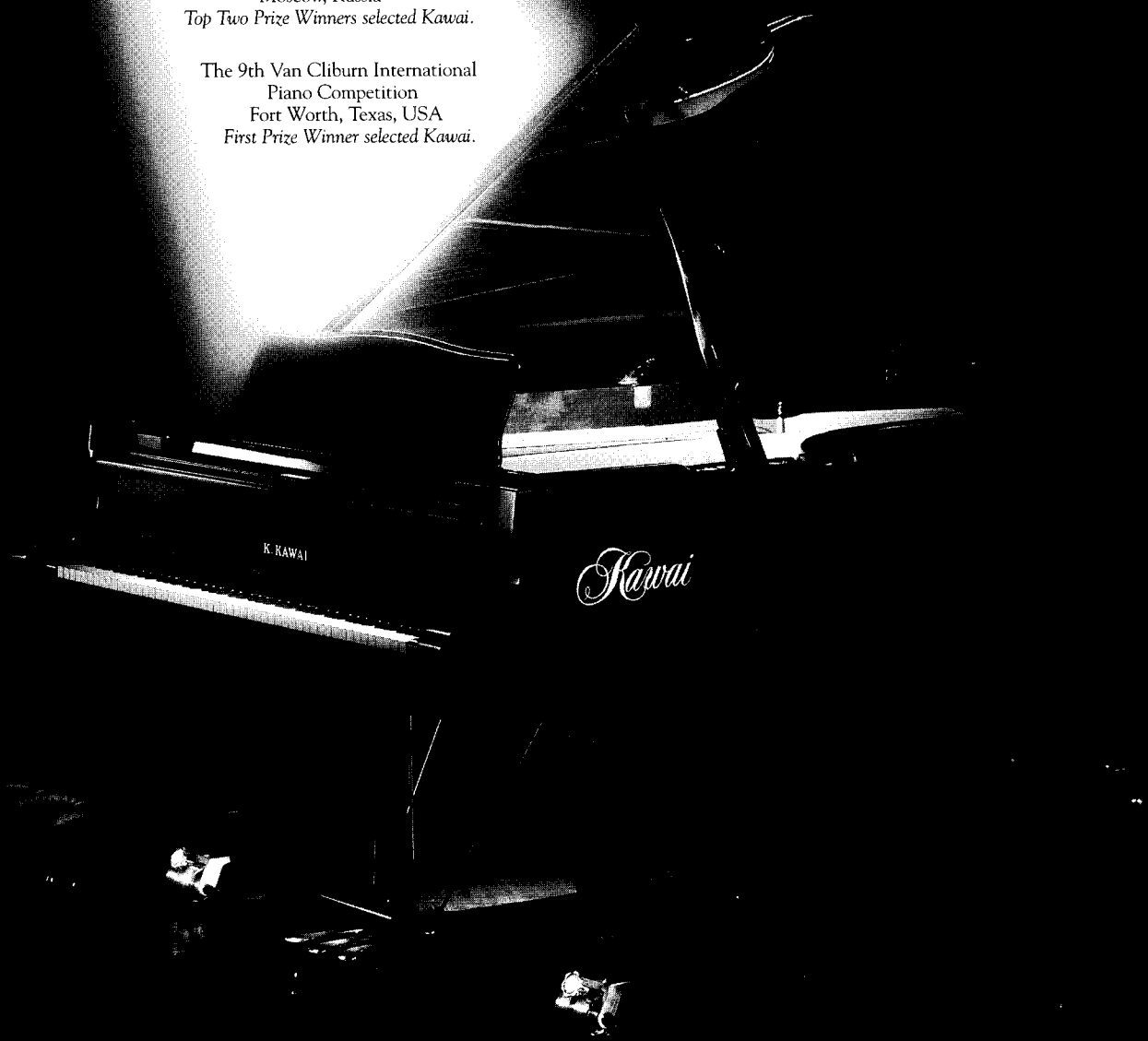
The 45th Ferruccio Busoni
International Piano Competition
Bolzano, Italy
First Prize Winner selected Kawai.

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.

Q — Sharp Work!

All right, all you cybertechs ... after spending the better part of a day refinishing a set of ebony sharps, there has *got* to be a better way. For years I have been sanding the keys to restore the shape of the sharps, removing the old finish in the process. Then I used to use a black NGR stain once the keys had been smoothed out. The problem with the stains that I was using was that they left a purplish hue — much like a magic marker leaves behind — that had to be steel-wooled out. Then I would use a paste wax to seal in the stain. This process works about 60 percent of the time as a permanent refinish. The biggest problem is the stain sometimes comes off the keys onto the naturals (and fingers) after a few months of playing. This process is also extremely labor-intensive. I have recently switched to using spray lacquers for a more even finish, but the result resembles plastic and hides the ebony grain. Also, lacquer has a tendency to fish-eye under some conditions.

What do you folks do to keep your black keys looking sharp?

— Rob Kiddell
C.A.P.T., PTG Associate

A — Horace Greeley, RPT

I'm really old-fashioned, I guess. I do the first part of the process as you suggest, right up to the dye. Then French polish several coats. Yup, it's labor intensive, but pianists love it. (*EDITOR'S NOTE: see Norman Neblett's article in this issue for an elaboration on this method. — SB*)

A — David Sanderson

I would guess that you are spending too much time getting the old finish off and that is eating up your profits (especially if you are sanding it off). Since we redo the sharps for each set that we replace or restore keytops, I made a tray out of wood to receive the upside down sharps. I put a piece of plastic in the tray and then fill the tray carefully with a thin stripper to the right level. Let them stay in that tray for 20 minutes at least, taking care not to let them tip and ruin your bushings. Put the stripper into the tray after the keys are in or else the stripper may rise up too far when you add the keys. That's how we do it. It beats treating the keys individually, that's for sure. We then proceed as you indicated. Don't use sandpaper unless you have to; it opens the grain too much. Stain and polish with a fine steel wool. We haven't clear coated them nor had any of the problems you mentioned with the stain rubbing off on the naturals. French polish sounds like a beautiful option, Horace, I'll have to try it.

A — Bob Hohf, RPT

Here's one way:

1. Sand sharps to 400 grit.
2. If they must be really ***black,*** apply Ebonholzbeize (don't be fooled by its brown color) or violinmakers' neck stain, both available from International Luthiers Supply, Box 15444, Tulsa, Oklahoma. 74112, 918-835-4181. I apply this only if the sharps have the characteristic white streaking of ebony. Fine pianos usually have selected out the streaking. Some color variation and grain figuring is beautiful to some eyes.
3. Apply tung oil (spread on with cloth).
4. Apply more tung oil.
5. Keep applying tung oil until the wood stops absorbing.
6. Wipe off excess.
7. Rub with course cloth daily until the oil is set. This takes several days (or more if the temperature is low).
8. If the oil gets dull in-between rubbing, rub with 4/0 steel wool to low gloss.

Tung oil is *the best* finish for highlighting figured wood. It darkens with age. Damage may be restored by applying more oil. If time is a factor, you might try clear Watco or some other penetrating oil finish (I have not done this.)

A — Randy Potter, RPT

At the end of his description of his sharp refinishing process, Rod Kiddell asked: What do you folks do to keep your black keys looking sharp?

I replace them. A new set of ebony sharps costs between $50 to $65 U.S. It takes a half hour (maybe) to knock off the old ones, 15 to 30 minutes to sand the keysticks smooth and prep the keys (a little longer if you did not put any glue remover on first, and managed to tear wood off the top of some of the keysticks and have to remove it from the old sharp and glue it back onto the keystick first), and an hour or so to glue on the new ones. And much of this (except the sanding) can be done sitting in the living room with your family, if you have a mind to.

I have tried several different methods of refinishing the originals over the years. I have used re-staining products sold by piano supply houses, that were not supposed to come off, but did. I have tried liquid indelible shoe stain, lacquer felt pens, spray cans and brush on lacquer and enamel. Since I want to get paid 100 percent of the time, a method that gives

Continued on Page 12

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Continued from Page 10

only a "60 percent success" is not an acceptable option. Having work go bad is not my idea of professional results. The process you describe can take 5-6 hours, at least for me. I can usually tune three pianos for clients in six hours, and I sure can't get that much for refinishing a set of sharps, so I would rather tune the pianos — and get paid — than do those sharps for peanuts.

I often send my keytops out, though. Keytop replacers, such as Walker, will replace the sharps with plastic for $50 to $70, depending on size and certain options. Plus the cost of shipping keys to them. If you pre-pay, Walker will return ship for free. Add the cost of ebony sharps for sharp replacement, and you are looking at about $150. Add something for mark-up, plus the cost of removal and replacement, if it was not already included in the regulation or other repairs you are doing at the time. Then, while someone else is doing the sharps, I am out getting paid for tuning pianos.

A — Paul Stephens, RPT

I like the idea of tray-stripping sharps. Rather than applying any finish I like to polish the ebony on a buffing wheel. Red tripoli and the same wheel I use for brass seems to be a good combination. The sharps are very smooth and feel great. However, this seems to be worth the trouble only if the ebony is very high quality and very black. Otherwise, it makes more sense to replace them.

Postscript

Thanks to everybody for their advice on refinishing sharps...

Horace Greeley, I've got my refinisher teaching me the finer points of French polishing.

Bob Hohf, I'm on the lookout for Ebonholzbeize.

David Sanderson, your tray idea for chemical stripping is intriguing; that's my next wooden jig project.

Randy Potter, thanks for the business notes, I'm definitely not making a cent laborwise—the $90 (Canadian) I charge for sharp refinishing is too cheap.

Thanks again,

— Rob Kiddell

Q — Broken Plastic Action Parts

I had the misfortune today to arrive to tune a Kranich & Bach console, which the owners warned me had "broken keys." Of course, this can mean a lot of things, many of which are quickly remedied.

I was prepared for broken plastic elbows. It was much worse. Broken plastic jacks.

My questions: are any of the standard replacement jacks the right size to replace these? Is it easier (this is, of course, a relative term since there will be no ***easy*** way to do this) to replace them flange and all, or repin all the jacks? Having never done such a horrible job, I have no idea how long it might take so I can't estimate a price for labor ... 3 hours? 3 days?

The ultimate question: is there ***any*** justification for repairing these things? Thanks in advance for your expert opinions.

— Barb Barasa
Sycamore, IL

A — Keith McGavern, RPT

The last time I did this type of work (years ago) there were parts available that were the correct size. Main thing ... replace the plastic, jacks and/or flanges. It really isn't a horrible job, Barb. Consider it an excellent opportunity to learn more about vertical actions and receive remuneration to boot.

I would estimate a full day's involvement minimum. This includes ordering the parts, service call to remove the action, shop time to replace defective parts, service call to reinstall action and regulate. After all is done, you will know whether the time was adequate or not for the next job.

The only justification I would need is if the customer still wants the work done on their piano after they have been advised of the costs of repair versus investing the same money in another instrument.

A — Ray Hopland, RPT

With all the parts that are plastic the butt flanges must be plastic also. I recently did a Story & Clark that had plastic butt flanges, wippen flanges, damper flanges and levers, jacks and backchecks. All the plastic had to be replaced. The jack flanges were not plastic. I ordered all the replacement parts from Schaff. The pinning was not a problem as far as time but bending the dampers to achieve the right angle was another matter. I made a jig to do this but it would be difficult to describe in text form.

By the way, I didn't get rich on this job but it was fun.

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Continued from Page 12

A — Paul Stephens, RPT

Having replaced several sets of plastic action parts, I found that it saved considerable time for me to pull out the new damper wires and reinstall the original damper wires from the plastic damper levers into the new wood damper levers. This seemed to go quickly and only required a little wire bending. Try this on a few next time you have a set to change.

A — Dale Probst, RPT & Elizabeth Ward, RPT

It would help to know how much of the action is plastic. We have run into the following plastic parts: damper flanges/levers, wippen, hammer and jack flanges, jacks, backchecks, and lifter elbows. If the wippen has plastic jacks only, you can order replacement jacks only (APSCO # 244545) or jack and flanges assembled (APSCO#244454). If the jack flange is wooden, we replace the jack. If the flange is plastic, we replace the assembly. Allow six to eight hours to install and regulate depending on your speed. It can be done in home or shop. If the wippen has two or more plastic parts, we replace the wippen. In our area (North Texas, South Oklahoma) the plastic damper parts have held up fairly well until they need regulation, which is fatal. Be aware that in many cases wooden replacement parts are not identical to the plastic and may need modification. Especially if you are replacing flanges/wippens on the Pratt Read actions with metal action rails. In our opinion, this is a repair that can be hard to justify unless the piano is of better quality and condition than most. The compressed action is funky at best. We have done it when the customer makes an informed decision that is based on sentiment, not logic.

Postscript

Thanks to everyone for their help! I will tell the customer that the repair would be to replace all the wippens, and I'll just estimate my time for this.

I assume the regulating that would need to be done would be adjust the capstans and the let-off. If I'm overlooking something obvious, tell me! But thanks again!

— Barb Barasa

A — Steve Brady, RPT

Actually, Barb, you are overlooking a few things. In addition to let-off and capstans, you'll need to do some spoon-bending because the new wippens come with spoons which probably won't be set right for the piano in question. First, though, sort the new wippens according to which way the spoons stick out: that is, to the right, to the left, or straight up, because each type goes in a different section of the piano. When you install the new wippens, you'll probably have to do some spacing (by papering the flanges) to get them in line with the hammer assemblies. Backchecks and bridle wires will need regulation, too. Unless you've done a lot of regulation (especially dampers), I'd plan a couple of days to do this job.

Good luck with it!

Letters

Your editorial in the December *Journal* made reference to a thin volume published by Tuners Supply Co. titled *Repairing and Regulating of Pianos.* It was originally published in Braille, and I believe titled *Grand and Spinet Pianos.* It was written by Edward Menke in about 1954. Later it was printed in bold type by the American Printing House for the Blind. Somehow Tuners Supply picked it up, changed the title, forgot the author and sold it for half price. The content is still accurate in most respects, but not as in-depth as later textbooks.

Speaking of in-depth technical information, the PACE series are really very good. They are a good review series for experienced technicians as well as beginners. At the Piano Hospital Training Center, we take pride in using the latest technical innovations as well as accepted regulation procedures.

— Ken Serviss, RPT

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New Touchweight Metrology

By David C. Stanwood, RPT
Boston Chapter

Introduction

As piano builders and rebuilders, we have inherited a crude and archaic system for measuring the balance of the action mechanism. The weight of the hammer, which sits out on the end of a long lever arm and has such tremendous influence on touch and tone, is measured in weight to the nearest pound of a sheet of felt from which many sets of hammers are made. We assume the proportion of key to hammer movement is roughly 1:5, but have no reasonable means for accurately measuring this ratio or detecting leverage problems. The keys are "balanced" using downweight as a primary indicator but "balance" implies a state of static equilibrium and downweight is taken from the moving key.

We know that when a piano is built, the weight of the action parts sitting on the back of the key exerts an upward force at the front of the key which is too high without the addition of keyleads to the front of the key. What is the effective weight of the action parts? How does their weight translate to an upward force at the front of the key? How much is the downward force at the front of the key? Conventional wisdom simply does not provide answers to these important questions.

A New System Of Weights & Measures

I have found answers to these and many other questions by inventing a new system of weights and measures. Metrology is the science of weights and measures so I call this system "The New Touchweight Metrology." The units of the New Touchweight Metrology define the balance of the upwards and downwards static forces at the front of the key as contributed by the weight and leverage of each action component.

The piano action may seem like a complex mechanism but in fact it acts as a simple lever that propels a hammer into the string. It functions as a catapult, with a short lever arm on one side of a pivot and a long lever on the other. The long lever arm is shortened into what engineers call a "folded beam" by use of the wippen and shank levers.

The New Touchweight Metrology takes the folded beam of the action and "Unfolds" it into a simple balanced lever such as the scale you might find in your doctors office (see Figure 1):

Where:

B = Balance Weight
F = Front Weight
W = Wippen Weight at the Key Ratio radius
S = Strike Weight at the Strike Ratio radius

Figure 2 shows the balance of static forces at the front of the key, where: The downward static force of the Wippen Weight on the back of the key translates through the Key Ratio to the upward force of the Wippen Balance Weight at the front of the key, and: The downward static force of the Strike Weight is multiplied through the combined leverage of the shank, wippen, and key to the upward force of the Strike Balance Weight at the front of the key.

The balance of the upward and downward static forces at the front of the key are expressed as the equation:

BalanceWt + FrontWt = (WippenWt x KeyRatio) + (StrikeWt x StrikeRatio)

Definition & Determination Of The Units

Balance Weight— The amount of weight, placed on the front of the assembled key that equals the upwards static force at the front of the key.

Balance Weight is found by measuring UpWeight and DownWeight

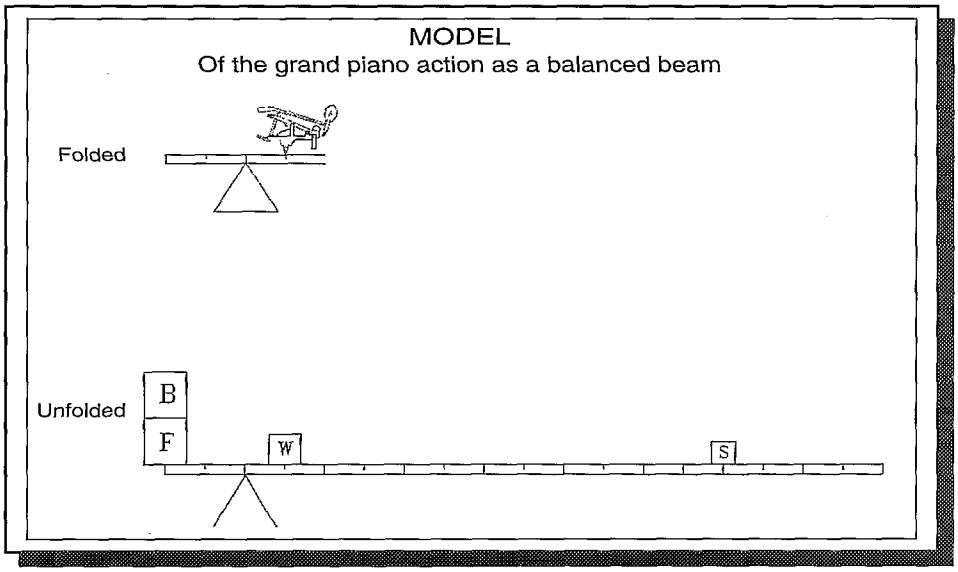

Figure 1

and calculating:

Balance Weight = (DownWeight + UpWeight)/2

When measuring UpWeight and DownWeight the touch weights are placed on the key centered on a point 13 mm in from the front vertical edge of the key.

When the balance weight is placed on the front of the key it is balanced and motionless as if it were a balanced scale. Additional weight must be added to the balance weight to overcome friction and start the key moving down (DownWt) and weight subtracted from the balance weight to start the key moving up (UpWt).[1]

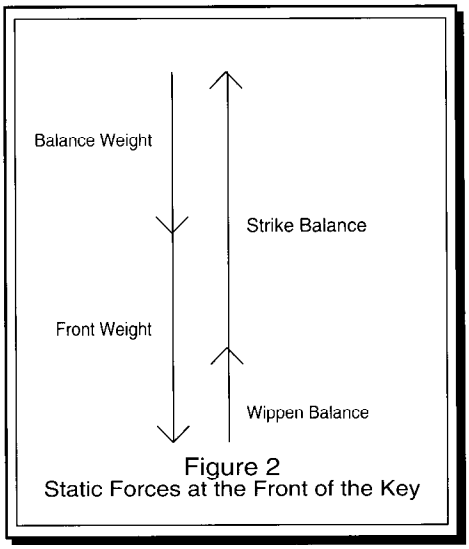

Figure 2
Static Forces at the Front of the Key

Upward and Downward Static Forces at the Front of the Key.

Front Weight — The radius weight of the keystick, pivoted on its balance point, taken at the front of the key. It represents the downward static balancing force at the front of the key.

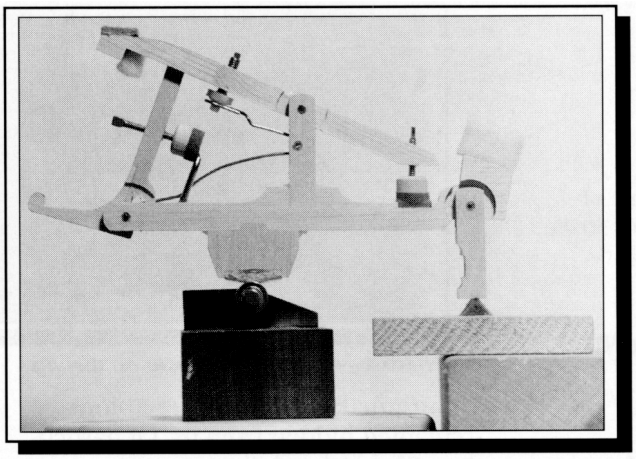
Photo 2 — A wippen on the weighing jig.

Front weight is found by placing the key on a wedge pivot so that the balance hole is centered across the edge of the wedge. The front of the key rests on a roller bearing which is on the pan of a digital scale.[2] The key is oriented in a horizontal attitude similar to that when the key is at rest in the assembled action. The roller bearing rests on a vertical axis through a point on the surface of the key 13mm in from the front vertical edge of the key (see Photo 1).

Wippen Weight — The radius weight of the wippen pivoted on the wippen center, where the capstan contacts the wippen heel.

The wippen heel rests on the roller at the capstan contact point. The wippen flange rests on the felt wedge so that the wippen center is aligned with the vertical axis through the center of the roller. If necessary the flange may be wedged with a sliver of wood to prevent the flange from rotating (see Photo 2).

Strike Weight — The hammer weight plus the radius weight of the hammer shank, pivoted at the hammer flange, taken at Strike Line Radius.

The strike line of the hammer rests on the felt wedge block and the end of the tipped up flange rests on the roller so that the flange center aligns with a vertical axis through the center of the roller. The height of the roller is adjusted so that the shank rests horizontally. Playing cards can be helpful as shims (see Photo 3).

Key Ratio — The ratio of downwards force at the capstan to the corresponding upward force at the front of the key.

The key is set on the jig as for weighing front weight. An amount of weight is placed on the front of the key to make the front weight at least 70 grams. This weight holds down the front of the key. The scale is then tared to zero. (Digital scales have a tare button which makes the scale read zero, regardless of what weight is on the pan.) Two 50-gram weights are placed on either side of the capstan so that there combined center of gravity is at the capstan/heel contact point. The scale will then read how the 100 grams translates to the front of the key.[3] For instance, if the scale reading were -57.0 the key ratio would be 0.57 (see Photo 4).

Wippen Balance Weight — The upward static force at the front of the key from the leveraged weight of the wippen.

Found by calculating:

WipBW = KeyRatio x WipWt

Top Action Balance Weight — The total upward static force at the front of the key resulting from the leveraged weight of the wippen, hammer, and shank.

Found as:

TopBW = BW + FrontWt

Strike Balance Weight — The upward static force at the front of the key from the leveraged weight of the hammer

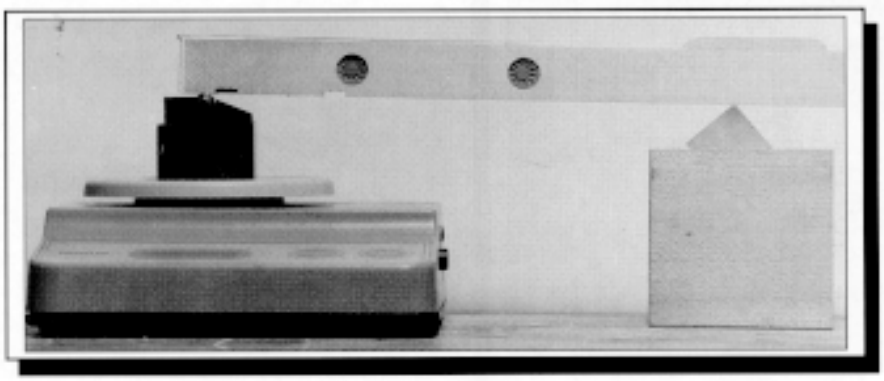
Photo 1 — A keystick on the Front Weight jig.

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New Touchweight Metrology

Continued from Previous Page

and shank.

Found by calculating:

StrikeBW = TopBW- WipBW

Strike Ratio — The amount of weight to balance one gram of strike weight at the front of the key.

Found as:

Strike Ratio = StrikeBW/StrikeWt

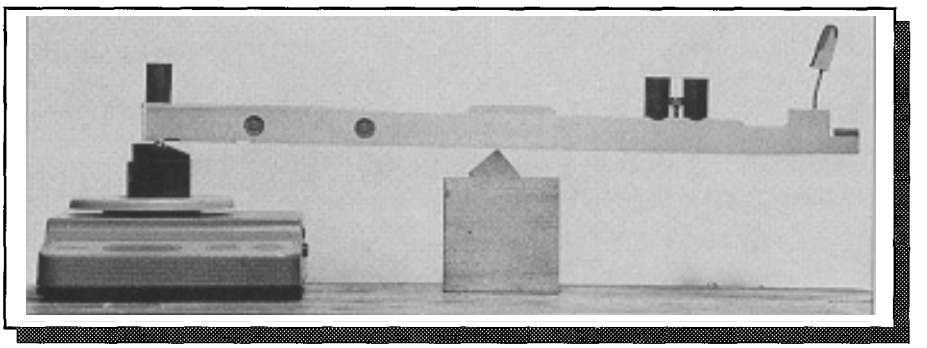
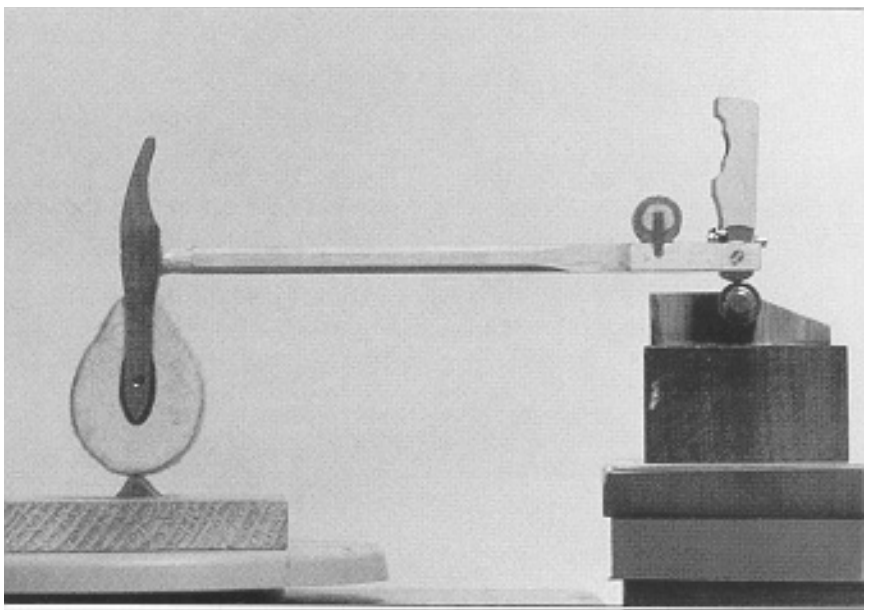


Photo 4 — Taking Key Ratio on the Jig.

Conclusion

The New Touchweight Metrology bridges from the old Metrology of DownWeight and UpWeight through the Balance Weight, thereby maintaining the connection to traditional touchweight parameters. The array of information provided by the New Touchweight Metrology gives a wealth of information that has heretofore remained hidden from us. Of particular utility is the ability to measure hammer weight "on the shank" and the calculation of Strike Ratio. The New Touchweight Metrology provides a useful and relevant framework for a more complete understanding of the balance of piano action mechanisms.

The weights and measures described above only partially describe the units and methods of the New Touchweight Metrology. Other units and methods will be described in future articles. In my next article I will show the results of studies using the New Touchweight Metrology and discuss the correlation between strike ratio and leverage which leads to the ability to rate the "dynamic" feel of piano actions using methodology of the New Touchweight Metrology.



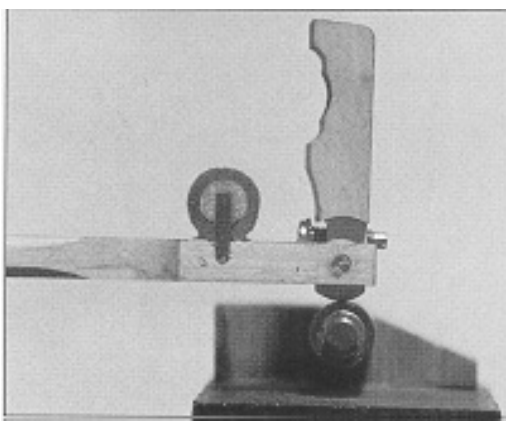


Photo 3, above — Hammer, shank, and flange on the weighing jig. Photo 3a, right — Alignment of the action center to the vertical axis of the roller is critical.

Notes:

1. To the best of my knowledge, the Balance Weight value was first described by Don Galt, RPT, in "Resistance in Piano Action," in the April, 1969 issue of the *Piano Technicians Journal*. He called it Weight Resistance. In the October, 1990 *Journal* is published a method for balancing keys to a specified balance weight, by David C. Stanwood, RPT.

2. For this work, a scale needs to have 150-gram capacity and resolution accuracy of .1 gram. The roller bearing shown is an "idler bearing," which can be purchased from small parts component suppliers. In a pinch, an edge-trimming router bit can be used.

3. In all cases it is only necessary to carry the decimal to the nearest tenth except for the "key ratio," which is carried to the nearest hundredth.

Tapering Hammers

By Chris Gregg, RPT
Calgary Chapter

Replacing hammers is a fairly routine operation in piano rebuilding work. However, the weight of the new hammers is a crucial issue. If the touchweight with the original hammers is satisfactory and the new hammers are heavier, installing the new ones may create problems. The difference in weight between the old hammer and the new hammer will be multiplied by approximately five to seven grams at the key. So, if a new hammer is, say, two grams heavier than the old one, this can produce as much as fourteen grams in extra touchweight at the key. By far the best way to solve this problem is to correct the weight of the new hammers before they are installed. Reducing the weight of new grand hammers to the same weight as the original hammers will give a much better chance of having an action work properly when the job is finished.

To deal with small weight differences, an accurate scientific scale is necessary. Digital scales are available that will measure down to 0.1 of a gram. These are ideal for this job. The weighing scale that I use is an Acculab V-333 (see Photo 1). It has a load capacity of 300 grams and resolution of 0.1 of a gram. It costs about $150 (U.S.). Most major cities will have a supplier of weighing scales listed in the yellow pages. One word of caution, though. These scales are very sensitive and can be damaged if the weight limit is exceeded. Don't let the kids play with them!

The weight of hammers can be reduced by drilling, tapering, filing, and arcing the tails, removing wood on the underside of the tails (coving), and sometimes by removing the staples. The problem with all these methods except the tapering is that there is a limited amount of material that we can remove from these areas. In tapering the hammers it is possible to accurately remove as much material as necessary to reduce the hammer to the correct weight.

Photo 1 — Acculab V-333 Digital Scale.

Before beginning the process of weight removal, you need to make a chart as a guide to show you the difference in weight between the two sets of hammers. In one column, record the weight of sample replacement hammers. I normally use hammers from the ends of each section. In another column, record the weights of the corresponding old hammers, then deduct the weights of the old hammers from the new hammer weights (assuming the new hammers are heavier) and record the differences. These figures will give you a good idea of how much weight you'll need to remove from the new hammers.

There are usually extra hammers in a new set which can be used for experimenting. You need to find out how much weight is removed when the hammer is bored, coved, filed, and arced. By recording and comparing these weights, you will know if further measures are necessary to get the new hammers down to the right weight.

Figure 1 is a sample spreadsheet showing the weights of the original hammers, and the new hammers at various stages of processing. The weight shown in the last column on the right is the amount that still needs to be removed after boring, coving, filing and arcing. Allowances could be made at this time if the old set is severely worn (and thus underweight) or if the new set is going to be heavily lacquered. Consult with the clients about whether they are happy with the touchweight they had before, or if they would like to have it changed in one direction or the other. Take all this information into account before proceeding with the weight reduction.

Tapering Hammers

Note **Weights in Grams**

	New Hammer Weight	Original Hammer Weight	Difference in Weight	After Hammer Filed	After Hammer Drilled	After Hammer Arced	Amount of tapering Required
Treble							
88	5.9	4.4	1.5	5.8	5.6	5.4	1.0
52	8.4	7.0	1.4	8.2	8.1	7.9	0.9
21	11.0	9.6	1.4	10.8	10.7	10.5	0.9
Bass							
20	11.1	9.2	1.9	11.0	10.9	10.7	1.5
1	12.0	11.3	0.7	11.9	11.7	11.5	0.2

Figure 1, Sample Spreadsheet

To remove the remaining weight (shown in the last column), tapering the hammers is required. By this means it is possible to remove the weight quite comfortably without harming the hammer. The problem has been how to remove material from the sides of the hammer without messing up the surface. Disk-sanding the sides of a hammer works, but the wood dust tends to get trapped in the felt, causing it to look streaky and discolored. Hand-planing is another possible method of removing mass, but it has a tendency to tear into the wood grain.

I now use a rotary or safety planer in the drill press for this purpose (see Photo 2). This is the same tool that is often used for dressing down the tops of keys before recovering. I use the Wagner Safe-T-Planer, model DP10, which costs about $45 (U.S.). I also have one called a "Rotary Planer" made in Taiwan and costing about half as much as the Wagner. It works well and comes with a sharpening stone.

There are a number of advantages to this method. It is very precise. The taper will be consistent on both sides, which is

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Tapering Hammers

Continued from Previous Page

difficult to achieve with the disk sander. It is possible to taper all the way to the crown of the hammer if necessary.

Photo 2 — Rotary Planer in Drill Press Chuck.

A drill press is necessary to use this tool, and the faster the RPM, the better it will cut. 3,000- to 6,000-rpm is recommended. A drill table-raising mechanism is necessary to adjust the depth of cut, and the upper portion of the drill press should be locked in the rest position.

It is necessary to make some type of jig to hold the hammers securely and at the correct angle so they can be run through the planer head. The jig that I use has a tongue-and-groove slide mechanism to move the hammer under the cutter, wooden cams to lock the hammer in place, and a wedge-shaped graduated scale that is used to set the required taper angle (see Photos 3 & 4). The hammer must be held quite solidly, because the machine has a lot of power. Figure 2 shows how the cutter is parallel to the drill table and the hammer is sitting at the required angle for tapering.

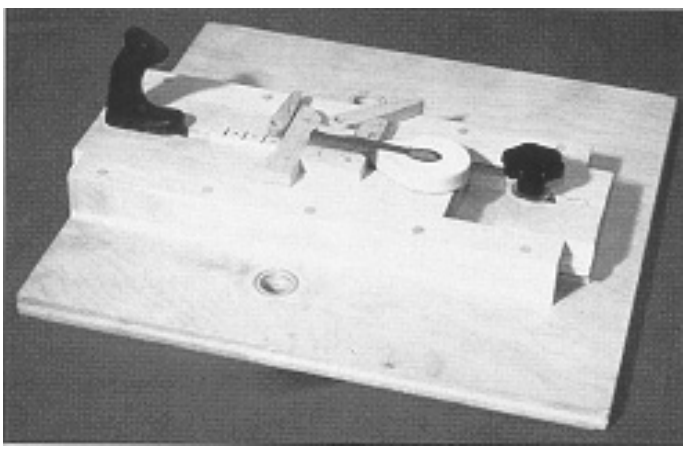

Photo 3 — Hammer-tapering jig

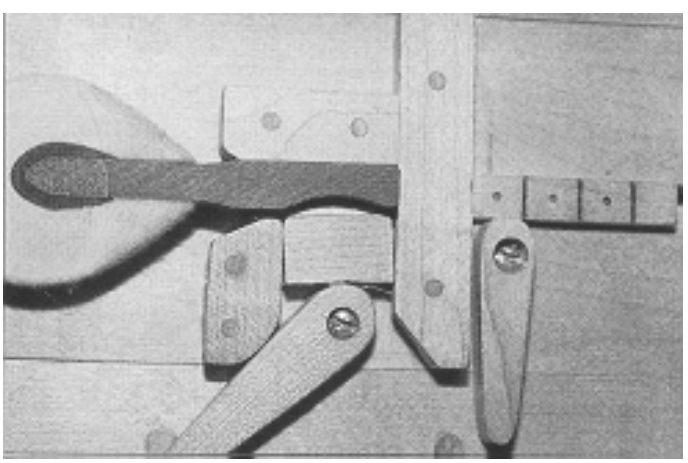

Photo 4 — Detail of hammer-tapering jig, showing locking cams and graduated scale.

Once the equipment is set up, the actual cutting operation does not take long. First, one side of the hammer is cut at the required angle, and then the other side is done using twice the angle of the original cut, e.g., 1.5 degrees for the first side and 3.0 degrees for the second side (see Figure 2). After each pass through the planer, the hammer should be weighed and the difference recorded to make sure the desired weight is being reached. Depending on how much material is taken off the hammer, it may be necessary to make more than one cut. Also, you may need to do a little dressing on the edges of the felt if a deep cut is made. I will do one section at a time. The amount that I take off depends on the figures that my chart gives me.

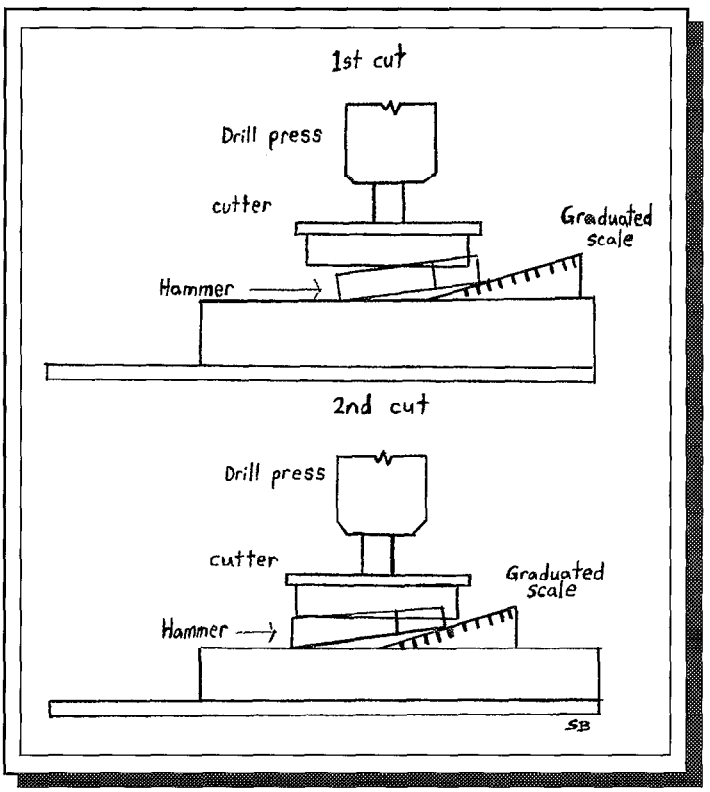

Figure 2 — Hammer-tapering jig in operation, showing different settings of graduated scale wedge on first and second pass. Cutter is parallel to drill press table.

It is possible to taper the hammer all the way from the crown to the tail or even narrow its dimension by taking a slice right off the side. I recommend that an even amount be taken off each side of the hammer to keep it consistent.

A little creativity goes a long way when making the jig. I purposely have not included plan drawings of the one I use, because there are probably many modifications that could be made to it. Once the principle is understood, the jig will follow.

This procedure may seem like a lot of extra work initially but, in the long run, you will often find that very little regulation is required to have the action working well again. The repetition springs should not need major adjustment (unless they did before the job) and the touchweight parameters should be right where you want them. You shouldn't need to add or subtract any keyleads. When it comes to lining up the hammers after traveling, you'll be surprised how much easier it is because of the consistent, even taper. It is a method of customizing the hammers to the piano action, rather than doing the opposite.

The Designer's Notebook

By Delwin D. Fandrich, RPT

The Mechanics & Strength of Wood & Wood Structures

Part 2 — The Strength and Structure of Wood

Del Fandrich

Introduction

Most of us, if we were to give the subject any thought at all, would think of an engineering material as being a "manmade" product. A plastic, for example, or a material that had at least been highly processed and shaped by man such as steel, iron or some metal alloy. Wood, however, is one of the most commonly used engineering materials — certainly the one with the longest history in the engineering affairs of man — and is a natural material that is still used pretty much as it's found in nature. Carefully dried, sorted, selected and cut to be sure, but still it is used basically as it comes from the tree. (OK, I know man is fusing a lot with wood fiber these days. But, for the purposes of this discussion, we'll ignore most MDF, particle board, flake board, etc. products as being unsuitable for the acoustical structure of a piano.)

A lot of mythology and misinformation has been handed down over the years regarding wood; how wood sounds — "tone" wood, etc. — and how it functions in the piano. But, even with all of the mysticism and legend stripped away, we are still left with one of the most fascinating and remarkable engineering materials known even to "modern" man.

There are available today a number of excellent sources for accurate, in-depth information about the composition and structural properties of wood. Two of the best are Understanding Wood *by R. Bruce Hoadley and* The Wood Handbook: Wood as an Engineering Material, Agriculture Handbook No. 72, Rev. 1987, *prepared by the U.S. Department of Agriculture's Forest Products Laboratory.* Understanding Wood, *especially, should be a part of every serious technician's library. It is available from most piano supply companies and any decent bookstore.* The Wood Handbook *is a little harder to find. It is published by the U.S. Government Printing Office — at least it will be until Bill and Newt shut down the whole country permanently! Until then it can be purchased directly from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. The Library of Congress Catalog Number is 85-600532. Since* The Wood Handbook *is in the public domain — your tax dollars hard at work — it is sometimes reprinted by private publishers under a variety of different names designed to confound the innocent and protect the guilty. When last I checked, many of these were still offering the previous edition of the work, Revision 1974.* (The Wood Handbook *was originally published in 1935 as an unnumbered publication. All revisions from 1955 on are called Agriculture Handbook 72, Revision 19??.) The Government Printing Office sells only the current version. Get it from them.*

With this article I'll present the rest of the basic information about the structure of wood that I hope will be helpful in understanding the strengths and weaknesses of wood as it is used in various parts of the piano. While this may all be old news to our more experienced technicians, it may still provide a chance for review. To others it will probably be new. I hope it will prompt further study for at least a few.

Included in a sidebar is a glossary of terms that should be useful in understanding upcoming articles.

The Structure of Wood

The physical structure of wood resembles — and, in engineering terms, acts like — a fiber-reinforced, laminated composite material. Indeed, if it were a man-made material we would call it a fiber-reinforced plastic.

It is the wood cell that makes up the structural element of wood. Wood cells are more or less round and elongated but they vary considerably in shape from short barrel-like cells to long needle-like cells. In softwoods, most of the cells — making up about 90 percent of the tree's volume — are called ***tracheids.***[1] The rest is made up of ray tissue and other miscellaneous cells. Tracheids are fiber-like cells that range in length from about 1 mm in hardwoods to 3 to 8 mm in softwoods. They vary in diameter from about 20 to 60 microns (1 micron = 0.001 mm) depending on the species of tree. The walls of these tracheids are made principally of ***cellulose fiber.*** Cellulose makes up about 50 percent of the wood structure. Cellulose molecules are long-chain, high-molecular-weight linear polymers. In wood cells the number of molecules linked together to form the polymer can be as high as 10,000. These polymers can be as long as 0.01 mm. Cellulose molecules are aligned with the long axis of the cell. It is this longitudinal orientation that accounts for many of the structural properties of wood. It is also these cellulose fibers that are extracted when wood is "pulped" for making paper. With further processing it is also used for making synthetic textiles, films, lacquers and explosives along with a few other man-made products. At one time it was even used for making piano keytops.

The cellulose fiber, along with the tracheids, are bound together with a resin binder called ***lignin.***[2] Lignin is much more difficult to extract in usable form. Much of it is burned to create heat for the pulping process. Some is processed into materials used in oil-drilling. Some is used in rubber compounds and concrete mixes. It is also used to make vanillin — a *very* aromatic process.)

Since the tracheids are aligned with the longitudinal axis of the tree and the cellulose fiber is aligned with the tracheids, wood, especially softwood, is a highly ***anisotropic***[3] material — that is, its physical and strength properties vary considerably in each of its three different dimensions.

Even though wood is technically a ***heterogeneous*** material — its composition varies throughout the material — for engineering purposes clear, straight, evenly-grained wood is generally considered to be homogeneous and is treated as if its composition were uniform

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The Mechanics & Strength of Wood & Wood Structures

Continued from Previous Page

throughout. Except in very small pieces where the variations in hardness, density, etc. between the earlywood and latewood can be a factor, wood acts as though its physical and strength characteristics were consistent all through the material.

The layers of relatively soft ***earlywood*** and the much harder ***latewood*** that we call grain are actually parts of the tree's ***growth rings*** that are arranged concentrically around the central core, or ***pith***, of the tree. Earlywood and latewood are so named because of their periods of growth. Earlywood is formed during the spring and early summer when growing conditions are ideal and growth is rapid. The fast growth during this period forms the usually wider, but much softer portion of the ring. The later, slower growth during the hotter and drier summer and fall forms the thinner and much harder portion of the ring. There is typically a two-to-threefold difference in density between earlywood and latewood in softwoods. The density of earlywood is typically in the neighborhood of 0.25 to 0.35 and in latewood it will be around 0.7 to 0.9.

Much history can be found recorded in the growth rings of trees. Old growth trees are many centuries old when they are harvested and occasionally have fascinating tales to tell. Wide earlywood layers and narrow latewood layers indicate a good long growing season; one with a mild winter, an early spring with plenty of rainfall, etc. A narrow earlywood layer indicates a shorter growing season — perhaps a late spring or a year of drought. Evidence of forest fires is frequently recorded in the growth rings of a tree. In areas where major battles have been fought, spent arrowheads, bullets and shell fragments are frequently found, often to the dismay of the sawyer. Nails, sometimes with barbed wire still attached, can be found where fences once stood. I've heard of one tree branch that contained evidence of a section of imbedded rope thought to have been used as a hangman's rope.

Since each growth ring represents one year of a tree's life, we can determine the age of a tree by counting its growth rings. We can also tell how long it took to grow just that portion of a tree from which a specific board came. In the soundboards we make we use quarter-sawn — or vertical-grain — Sitka spruce and we prefer to have individual boards that are 100 mm wide. We would like to have the growth rings in these boards measure between 1.5 and 2.5 mm in width — let's say they average 2.0 mm. That means it took a minimum of fifty years of ideal growing conditions to add enough girth to the tree to make that ideal board. Add to this the fact that our board must come from the outer portion of the tree — but not the sapwood — and you can see the problem we have in securing a long term supply of musical instrument-grade spruce lumber — whether Sitka spruce or any other kind of spruce — and it's going to get a whole lot worse before it gets any better except that it's not going to get any better! A tree must be well over two centuries old just to begin growing lumber of this quality. The kind of long-range thinking required to plant a tree that cannot be considered for harvest for at least two hundred and fifty years is quite foreign to our "disposable," quarterly P&L statement minds. Why bother? We can plant pulp cottonwoods that are ready for harvest in ten to twelve years, or a Douglas fir that can be cut in twenty to forty years, why bother nurturing an ecosystem that will produce that majestic three to four hundred year old Sitka spruce that you want? Our kids' *grandchildren* won't even be around to see them harvested, will they? As may be ... back to our growth rings.

It is because of the nature of these growth rings that wood needs to be considered in three-dimensional terms. Wood has three different planes or axis. The ***longitudinal axis*** — often referred to as the ***grain direction*** — is the plane that is parallel to the central axis of the trunk of the tree. It is also the plane in which the tracheids run. The ***radial axis*** is the plane normal to the growth rings. This plane is in the transverse direction across the growth rings starting from the center of the tree and going outward toward the bark of the tree. The ***tangential axis*** is the plane transverse along, or tangent to, the growth rings or circumferential to the trunk along the growth rings.

The Strength Of Wood

Strength is a relative term. Strength can be defined as the ability to resist whatever physical forces are imposed on a material. It follows then, that a material can be considered strong — at least strong enough — if it has adequate strength to do the job it needs to do. Unfortunately, we cannot simply look at a table of strength characteristics and decide that since hard maple appears to be the "strongest" wood listed we should use only hard maple to build each and every part of our pianos. Take the soundboard, for example. Although maple is very stiff, and we do want our soundboard to be stiff, there are other characteristics that must also be considered. Selecting any species of wood for any particular application is always a compromise. The final decision is usually made by focusing on the two or three *most significant job* requirements and then selecting the most appropriate species or type of wood for the task. So, while a soundboard made of hard maple may well be stiff enough, what about its other characteristics? Experience with piano soundboards has taught us that they must also be fairly light in weight to function well. Since a maple soundboard would certainly be quite heavy, perhaps we'd better keep looking. In this example, our primary considerations must include both weight and stiffness. More specifically, the wood's stiffness-to-weight ratio. Spruce — especially Sitka spruce — is used for piano soundboards primarily because it has the highest stiffness-to-weight ratio of all readily available woods.

Secondary considerations would include internal friction, appearance (grain density and uniformity), a pleasing color and color consistency, dimensional stability under changing climactic conditions, etc. Keeping in mind that wood is an anisotropic material — remember the growth rings — we also need to consider in which plane we need our "strength" Do we need it to function well under tension or compression? Is the load going to be parallel to the grain or perpendicular to it? What about side loads? What about surface hardness? Will the load be a long-term load or a short-term load? Certainly long-term stability under load would be a consideration in selecting a piece of wood for a back post. Contrast this with the jack which is subjected to a very high compressive load during its normal operation, but that load is only present for a fraction of a

Mechanical Properties of Some Woods Important to Piano Building

Common Species Name	Specific Gravity See Note 2	Modulus of Elasticity See Note 3 (million psi)	Impact Bending Height See Note 4 (inches)	Compression Perpendicular to Grain (psi)	Compression Parallel to Grain (psi)	Shear Parallel to Grain (psi)	Tension Perpendicular to Grain (psi)	Tension Parallel to Grain (psi)
Hard Maple	0.63	1.83	39	1,470	7,830	2,330	---	15,700
Meranti-Lt. Red (Shorea Group)	0.34	1.23	---	---	5,920	970	---	---
Meranti-White (Shorea Group)	0.55	1.49	---	---	6,350	1,540	---	---
Red Oak	0.63	1.82	43	1,010	6,760	1,780	800	---
Yellow Poplar	0.42	1.58	24	500	5,540	1,190	540	15,900
Sugar Pine	0.36	1.19	18	500	4,460	1,130	350	---
(Alaskan) Sitka Spruce	0.35	1.63	25	590	5,480	980	370	---
Englemann Spruce	0.35	1.30	18	410	4,480	1,200	350	12,300
Eastern Red Spruce	0.40	1.61	25	550	5,540	1,290	350	---
Eastern White Spruce	0.36	1.43	20	430	5,180	970	360	8,600

1) Results of tests on small, clear straight-grained specimens @ 12% moisture content.
2) Specific gravity is measured at "oven-dry" conditions.
3) Modulus of elasticity is measured from a simply supported, center-loaded beam with a span/depth ratio of 14/1.
4) The height of drop of a 50-pound hammer causing complete failure

second. Do we expect to bend the wood permanently in making a component as in a grand rim? If so, we'd better select a wood that has good bending characteristics or else we'll have to figure out some way of treating the wood so it won't break while we're bending it. Are there any other characteristics we may need in a grand? Mass and stiffness certainly come to mind.

The table accompanying this article lists some of the more common strength characteristics of a few of the woods typically used in piano building (at least in the U.S.). The glossary presented in a sidebar to this article explains the terms used in this chart along with a few others that are often used to describe the strength and structural performance of wood.

Wood in Tension

The strength characteristics of wood vary dramatically with grain direction. For example, wood is very strong in tension in the longitudinal direction — with the grain. Its tensile strength drops off very rapidly when the load is not closely aligned with the grain direction, however, and it is very weak when the load is applied perpendicular to — or across — the grain. The parallel-to-grain tensile strength of dry Sitka spruce is about 9700 pounds per square inch; the perpendicular-to-grain tensile strength of the same wood is only 370 psi.[4] Other softwoods exhibit similar variations in tensile strength compared to grain direction. The difference between parallel-to-grain and perpendicular-to-grain tensile strength is even more dramatic with some hardwoods. Hard maple has a tensile strength parallel to grain of approximately 15,500 psi. while perpendicular-to-grain it is only around 700 psi.

One other problem of wood under tension is that, unlike materials such as steel and some plastics, it tends to act as a brittle material as it reaches its breaking point. That is, it fails catastrophically when a load exceeds the member's maximum load capacity. Remember, this includes the convex part of a beam where the wood will be under tension when it is bending under a load. This type of sudden failure is not quite as much of a problem with wood under compression.

Wood in Compression

While wood is not particularly weak under compression — at least when the compressive load is applied parallel-to-grain — it is not noted for its great strength either. Sitka spruce has a compression strength of about 5,600 psi parallel-to-grain. As with its tensile strength, the compression perpendicular-to-grain strength (at its *proportional limit*) is fairly low — only about 580 psi.[5]

Under compression perpendicular to grain, it is the earlywood layer that fails first. The soft earlywood cells will only tolerate about 1.0 percent compression before they reach the point of permanent deformation. It matters not what causes this compression. It can be an applied load or the result of internal compression in a board which has had its movement restricted.

Generally, wood's parallel-to-grain compressive strength rating is not the limiting factor in structural wood members. A wood column will usually buckle long before an applied load reaches the compression limit of the wood. To prevent buckling, a wood structural member is usually oversized considerably which raises the compressive load rating beyond any possibility of danger. Just one 75 mm by 75 mm maple piano leg could conceivably support something over 70,000 pounds. At least for a while. And until someone bumped into it.

Wood in Shear

Wood is also not particularly strong in shear along the grain direction — with cells and fibers trying to slide past one another. In fact, wood's weakness in resisting shear stresses also limits its usefulness as a structural member in tension. Unless the fasteners transferring the load to the wood member are carefully and cleverly designed, longitudinal shear fail-

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The Mechanics & Strength of Wood & Wood Structures

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ure around the fasteners can cause catastrophic failure long before the tensile load capacity of the member is even approached.

In most of the load-bearing components of the piano, this is not a problem. However, shear failure is not uncommon in piano soundboards that are compression crowned. If the grain angle of the soundboard panel is not exactly vertical, as the internal compression of the panel increases during periods of high humidity the wood can ***shear fracture*** along the grain line — it will be the earlywood that will fail — with the wood on one side of the fracture being pushed up and the other side being pushed down.

Summary

This is certainly not everything that can be said about the strength of wood. Hopefully, it's a good start. And, no, I've not said much about the effect of moisture on wood and wood structures. I'll deal with that whole subject in one of my upcoming articles on soundboards. Until then, look over the glossary of terms to get some idea of how the strength of wood is measured and rated.

Also included somewhere is a short piece on the speed of sound through wood and one on the internal friction of wood. Although neither of these subjects has a lot to do with the actual strength of wood, they may be of interest to the student of piano design.

And, finally, consider where the piano industry will be when we finally do run out of "old growth" spruce trees. I'm not sure I can make a good soundboard out of MDF. I'm not sure I want to try.

Notes:

1) The structure of hardwood is considerably more complex than that of softwood. Since it is the structural properties of spruce that technicians are usually interested in, I'll mostly be discussing coniferous woods — softwoods — in this article. For a much more thorough discussion of the structure of both hard and soft woods see the book "Understanding Wood and The Wood Handbook."

2) Lignin, which makes up about 25 to 30 percent of wood's composition, is considerably more complex in nature. Its chemical nature is still not fully understood, in part because the process of separating it from the rest of the wood material changes it from its original form.

3) Engineering materials classified in one of the following three ways:
Isotropic: A material having equal properties in all planes or dimensions. Most non-reinforced plastics, metals, etc. are isotropic materials.
Anisotropic: A material having varying properties in different dimensions. Wood and most man-made fiber-reinforced plastics are anisotropic materials.
Orthotropic: A material having unique & independent mechanical and physical properties and characteristics along each mutually perpendicular axis.

4) The poor resistance to tension across the grain explains why soundboards exhibit such a predisposition to develop cracks. It also explains why it is so important to design soundboards in such a way that they do not appreciably change their acoustical qualities if and when they do crack.

5) The low resistance of Sitka spruce — any spruce, actually, other varieties are even lower — to fiber, or cell, crushing under perpendicular-to-grain compressive loads is an excellent reason for abandoning the practice of compression crowning soundboards. More on this in a later article.

The Strength and Structure of Wood — A Glossary of Terms

The following is a glossary of terms that are often used in discussions about the strength and use of materials of all kinds, including wood, in mechanical systems. Some of these terms have already been used in these articles and others will be in the near future as we look at action performance, soundboards and other topics concerning the piano and its acoustics.

In some cases I've given examples illustrating why these properties are important along with the definition, or explanation, of the term.

Brittleness: The property of breaking without perceptible warning or visible deformation. Glass is a good example of a brittle material, as is cast iron — at least the grade of cast iron used in piano plates. Wood, even though in bending and in compression it acts more like a resilient material, in tension it acts like a brittle material.

Compressibility: The amount a material compresses — in wood, without cell or fiber damage — under a specific load. The compressibility of wood varies inversely with its density — the harder the wood the less it will compress under a given load — and directly with its moisture content — the higher the moisture content of a piece of wood, the more it will compress without causing cell or fiber damage. Soft earlywood compresses more readily and is damaged by compression more easily than the harder latewood.

Compression Failure: The permanent deformation of wood fibers resulting from excessive compression either along the grain or across the grain. Wood can tolerate approximately 1.0 percent compression without suffering cell or fiber failure. (1.0 percent compression is 1.0 mm per 100 mm, or approximately 1/8" per foot.) Beyond 1.0% compression, fiber failure occurs as the wood cells crush. Compression failure can result either from excessive end or edge loading or from excessive bending, in which case the concave side of the bend would suffer from compression failure. In finished lumber compression failure appears as fine "wrinkles" across the face of the piece. In a soundboard compression failure appears as "compression ridges" along the grain of the board, often immediately adjacent to or near a glue joint. Wood can suffer from compression damage without giving the appearance of having catastrophically failed.

Compression Recovery: The amount in percentage of return to the original dimension in a given time. In most materials — including wood — compression recovery is somewhat less following a prolonged load than it is following a brief load. See also *Creep*.

Compression Strength: The measure of a material's ability to resist deformation under a compressive load. In wood, this varies with the direction of applied

load. Wood has much greater compression strength parallel to grain than it has perpendicular to grain.

Compression Set: When a load is applied to a piece of wood, its shape or size changes. If the load is not so great as to cause compression failure the part will return to its original size and shape when it is removed. If the load is too great — such that the wood fiber is stressed beyond its *Fiber Stress Proportional Limit (FSPL)*— the part will undergo some permanent change in size and shape. The unit amount in percentage of compressibility that a material fails to return to its original shape when an applied load is removed is compression set. Earlywood fiber in vertical-grain soundboard panels can easily be stressed beyond its FSPL as it swells in response to increasing moisture content. This is often a major factor in soundboard panel structural failure and the *potential* subsequent acoustical deterioration.

Creep: The permanent deformation of a material resulting from a load applied over a long period of time. If the load is high enough, and applied long enough, it is possible for a structural member to fail — creep-rupture — even though the member is capable of sustaining the load for a shorter period of time. Measurements of wood strength are based on a *time under load (TUL)*— the amount of time a load is applied to the member — of five to ten minutes. For a *TUL* of 1.0 second, strength characteristics can be over-rated to 125 percent of the listed specification. For a *TUL* of 10 years, they should be de-rated to 60 percent of their listed specification. Evidence of "buckling" can sometimes be found in upright pianos using "three/quarter" plates with backposts that have been too highly stressed. This is creep-rupture and it usually occurs in the backposts along the lower edge of the pinblock. There is no practical cure. Creep is also responsible for the deep string grooves that develop over time along the tops of bridges. See also *Stress Relaxation.*

Creep Rate: The rate (in inches/inch/unit of time) at which strain, or deformation, occurs in a material under stress or load.

Creep Recovery: A measure, in percentage, of the decrease in strain, or deformation, when a load is removed. See *Fiber Stress Proportional Limit* and *Compression Set.*

Elasticity: The ability of a material to return to its original shape and dimension after removing the force or load that produced the change in shape and dimension. A material is highly elastic if it easily deforms and quickly recovers. We expect good elasticity in several parts of the piano action. The key and hammershank are excellent examples. They both bend a great deal when the action is played hard yet we expect them to return to their original shape quickly and undamaged to be ready for the next blow. See also *Modulus of Elasticity.*

Elastic Limit: The greatest unit stress a material can withstand without permanent deformation.

Fiber Stress Proportional Limit — FSPL: Up to a certain point the ratio of load to deflection in a wood beam will be constant. Beyond that point, deflection increases rapidly as the beam suffers various types of failure until ultimately the beam breaks — that is, the amount of deflection is no longer proportional to increases in load. The point at which the load to deflection ratio is no longer constant is the ***FSPL.*** As long as this limit is not exceeded the fiber and cell structure in the wood will return to its original shape after a load is removed. Beyond this point fiber damage, cell shape change and wood deformation will be permanent. See also *Compression Set, Compression Failure* and *Creep.*

Hardness: The property of a material that enables it to resist indentation. In wood it is usually defined by the load required to embed a 0.444" ball to 1/2 its diameter in a direction perpendicular to grain. The hardness of wood is important in a number of areas of the piano structure — the caps of bridges and various action components to name just a few.

Hooke's Law: The law that states that for elastic materials, strain is proportional to stress within the elastic range is named after Robert Hooke who discovered the behavior in 1678. See *Fiber Stress Proportional Limit.*

Impact Strength or Impact Bending: The measure of force (in inch-pounds, foot-pounds or Joules) required to break a material when applied as a sudden blow. The Wood Handbook measures impact bending as the height (in inches) from which a 50-pound hammer must be dropped to cause catastrophic failure in a wood sample. Sudden blows on wood members are common on several different parts of the action assembly.

Modulus of Elasticity: The ratio of unit stress to unit strain within the elastic limits of a material, that is without causing damage or fracture. This modulus (or *measure*) is an indication of how stiff a material is. The type of wood used for hammershanks must be chosen in large part based on its stiffness — weight is not a particular consideration. The type of wood chosen for soundboards must be stiff as well, but it must also be a very lightweight wood.

Modulus of Resilience or Resilience: The property whereby a strained body gives up its stored energy on the removal of a deforming force. Resilience is the energy of elasticity — the energy stored in a material under strain within its elastic limit that will cause it to resume its original shape when the stress is removed. The capacity of a unit volume to store energy up to the elastic limit.

Modulus of Rigidity or Rigidity: When an elastic material is subjected to a shearing stress, a displacement takes place; the ratio of the shearing stress to the displacement per unit length is the modulus of rigidity. It is a measure of both stiffness and deflection. A material with high rigidity has high stiffness and low deflection under load. See also *Stiffness.*

Modulus of Rupture in Bending or Rupture: Maximum bending stress or the load capacity of a wood beam. The amount of stress in bending being sustained by a member at failure.

Shear: A condition of stress or strain where parallel planes slide relative to one another.

Shear Strength: Measured parallel to, and perpendicular to grain. Perpendicular to grain, wood has very high shear strength. Parallel to grain, wood has very low shear strength. Soundboards, in particular, can be subject to shear failure if careful attention is not paid to grain angle, lumber processing and moisture control in the finished panel.

Stiffness: The property which is measured by the rate at which stress in a material increases with strain. A stiff material will bend very little under a given load, but will have high internal stress, a flexible material will bend more and will have less internal stress.

Strain: The distortion set up in a material by the action of an external force. Unit deformation, or deformation per unit of length — **Strain = deformation / length** Bending Strain — deformation under load or load deflection. For a simply-supported, center-loaded beam, deformation under load (or deflection) can be calculated using standard flexure formula with reasonable accuracy.

Stress: Internal forces set up in a material by the action of an external force. Force per unit area, or the amount

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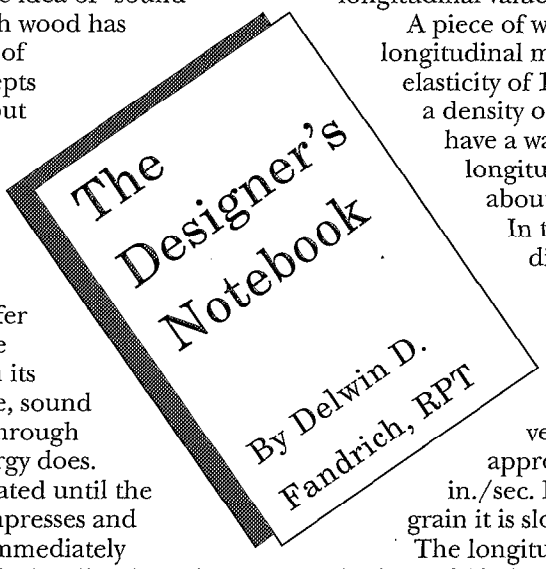
The Strength and Structure of Wood

The Speed of Sound Through Wood

I am often asked about the speed of sound — wave velocity is actually the better term — through wood, usually through the various types of spruce and maple. I generally don't try to give a specific answer for a number of reasons. First, the idea of "sound" traveling through wood has led to a number of erroneous concepts and theories about how pianos produce sound, many of which are still prevalent within the industry. I'd prefer not to encourage those notions. In its most literal sense, sound does not travel through wood. Wave energy does. Sound is not created until the soundboard compresses and rarefies the air immediately adjacent to it. It is the vibration of air molecules that our ears detect as sound.



Second, it's not an important factor in the performance of the wood in a piano soundboard — or in any other part of the piano, for that matter — in and of itself. It is important only because it is related to the elasticity (*springiness*) and the mass (*inertia*) of a material or a structure by the following formula:

Wave velocity = (springiness / inertia) ^ 0.5

These are the same two properties that control the wave impedance of a structure. The stiffness and mass of a soundboard system are certainly important, as are the wave velocity and wave impedance *of the system,* but the wave velocity along each piece of wood is not.

Finally, the wave velocity through wood is a highly variable property.

- It varies **directly** with the square root of the density of the material.
- It varies **inversely** with wood temperature and with moisture content — both temperature and the moisture content of the wood affect the modulus of elasticity, hence they affect wave velocity — and with frequency and the amplitude of vibration.
- It also varies **with** grain direction, or angle. Transverse (radial) modulus of elasticity can be 1/20th of the longitudinal value, hence, the wave velocity across grain is 1/3 rd to 1/5 th the longitudinal value.

A piece of wood with a longitudinal modulus of elasticity of 1,800,000 psi and a density of 30 lb./ft^3 would have a wave velocity in the longitudinal direction of about 150,000 in./sec. In the transverse direction, its modulus of elasticity would be about 100,000 psi and the wave velocity will be approximately 35,000 in./sec. Perpendicular-to-grain it is slower still.

The longitudinal modulus of elasticity of Alaskan and Canadian Sitka spruce with a moisture content of 6 percent is approximately 1,960,000 psi., and with a moisture content of 12 percent it is approximately 1,630,000 psi. Wave velocity will vary considerably through this range.

Wave velocity may vary even within different pieces of wood cut from the same tree depending on the density and the modulus of elasticity of each specific piece of wood. The density and the modulus of elasticity of different pieces of wood cut from the same tree may vary quite a lot depending mostly on the variations of grain density found throughout the tree.

Wave velocity through wood is independent of species. If two pieces of wood from two different trees happened to have the same modulus of elasticity and density the wave velocity in each would be the same. The longitudinal modulus of elasticity of yellow poplar is approximately 1,580,000 psi. and the density is 0.42. Wave velocity through this wood will be similar — at least parallel-to-grain — to that of eastern spruce. This does not mean that a soundboard made of yellow poplar will give the same acoustical performance as one made of eastern spruce. There are many, many other factors involved. (It should be pointed out that many laminated soundboards have been — are being — made using poplar core stock with spruce veneer faces. When properly engineered this need not necessarily be a bad thing. Alas, as it's usually done today, it usually is.)

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The Strength and Structure of Wood — A Glossary of Terms

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of force acting on a unit area —

Stress = load / area

usually expressed in pounds/inch^2.

Stress Relaxation: The reduction in stress in a material that is held at a constant deformation over time. Wood members in pianos — especially elements such as soundboard panels and ribs — are forced into a deformed position for long periods of time. This is their normal state. During this time the stress built into them during manufacturing is gradually relaxing. Even if the piano is never played, tuned or even touched, soundboard crown and string loading is gradually disappearing. See *Creep.*

Tensile Strength: The strength of a structural member under tension. Wood is strongest in tension parallel to the grain and weakest in tension perpendicular to grain. It is usually measured both parallel to, and perpendicular to grain.

Toughness: A quality of wood which permits the material to absorb a relatively large amount of energy, to withstand repeated shocks, and to undergo considerable deformation before breaking. The relative degree of resistance to impact without fracture. The property which enables a material to absorb energy while being stressed above its elastic limit without fracture. The wood chosen for hammershanks must be "tough" since the hammershank — in the normal operation of the piano — is expected to absorb a great many quickly repeating shock loads, any one of which, if allowed to remain for some longer period of time, would be sufficient to bring about the catastrophic failure of the part.

The Strength and Structure of Wood — Internal Friction

As wood is strained (bent), some mechanical energy is dissipated as heat due to internal friction. Internal friction in wood is a complex function of temperature and moisture content. In general, there is some level of moisture content at which internal friction is minimum. On either side of this minimum, internal friction increases as moisture content decreases to oven dry and increases as the moisture content increases to the fiber saturation point.

The moisture content at which the minimum internal friction occurs varies with temperature. At -20 C (about -4 F) this point is when the moisture content of the wood is about 14 percent; at 23 C (about 73 F) this point is about 6 percent moisture content; at 70 C (about 158 F) it is about 4 percent moisture content; and at 90 C (about 194 F) it is not well defined but is close to 0 percent moisture content.

Similarly, there are temperatures at which internal friction is minimum. The temperatures related to minimum internal friction vary with moisture content. The temperatures of minimum internal friction are higher as the moisture content is decreased. Above 0 C, and above 10 percent moisture content, internal friction increases strongly as temperature increases and as moisture content increases. For very dry wood, internal friction decrease as temperature increases.

The value of internal friction, expressed logarithmically, ranges from about 0.1 for hot, moist wood to less than 0.02 for hot, dry wood. Cool wood, regardless of moisture content, will have some intermediate value. Parallel-to-grain internal friction (under normal conditions) is approximately 10 times that of structural steel.

Chasing The Wolf

Thoughts Towards a New Perspective on Octave Stretching

By Jim Coleman Sr., RPT
Phoeniz, AZ Chapter

In the development of various historical tunings, we are aware of the many attempts to refine tuning to the point where there would be maximum harmony available. The theory of Pythagoras was that one could tune half way around the "circle of 5ths" in the direction of the sharp keys and then tune half way around the circle in the flats direction. This always left a huge "wolf-tone" 4th or 5th. This sounded terrible. Many "meantone" tunings were developed to distribute this wolf among some of the less important intervals or usually intervals which were more distant from the key of C or of A Minor. Sometimes more attention was given to the pure major thirds than to pure 4ths or 5ths. As long as one did not modulate to more distant keys, the tonality was relatively pure.

Later attempts to smooth things out are seen in the many "well temperaments." Some of these systems involved maintaining proportional relationships in order to provide a small measure of evenness. Often in the process, systems were developed in which one could play in all of the major and minor keys if he/she didn't land on one of the less important tones too heavily or too long. Some of these systems closely approached equal temperament. At any rate, the main objective was to chase the wolf tones away in a more and more refined way.

With the arrival of the complete acceptance of equal temperament, we have seen the capitulation of the forces pursuing pure harmony. Our modern ears are so conditioned to hearing equal temperament that we have remained relatively unconscious of the wolf tones in our octave tuning. Often one still hears technicians say "I just tune my octaves pure." This is regrettable, for it has been adequately shown that there are no such things as pure octaves in modern pianos. With the need for more power in pianos, thicker strings have been utilized. With thicker strings comes greater stiffness. With greater stiffness comes higher inharmonicity.

With the advent of sophisticated electronic tuning devices, we can measure the amount of inharmonicity of any note on the piano. The interesting thing that is discovered is that each note on a piano, in general, has inharmonicity which increases on an exponential scale as you check readings going up the partial series. For example; if C3 were tuned to zero cents deviation at the first partial (or fundamental), the second partial might be 1.6 cents sharp to the theoretical frequency while the 4th partial might be 4.1 cents sharp and the 8th partial might be 9.7 and the 16th as much as 33.7 cents sharp. In Figure 1 you can see how two notes of an octave are mismatched in regard to their coincident partials.

For octaves in the middle of the piano it has been generally accepted practice to balance the octave matching between the 4-2 type (4th partial of the lower note and 2nd partial of the upper note) and the 6-3 type (the 6th partial of the lower note and the 3rd partial of the upper note).

In the upper bass section, there is some consensus among knowledgeable peers to use 6-3 type octave matching in the upper bass and graduating to 8-4 octave matching in the lower bass, especially on larger pianos such as 6'-grands and above. There are definite exceptions to this rule in some small pianos where 4-2 type matching is needed in the upper bass. Another exception is found in pianos that have single wound bass strings where the copper end is overwrapped on one end. This added weight at one end does strange things to the partial structure, even causing negative inharmonicity at the 2nd or 3rd partials. On some pianos like this it is literally impossible to make an acceptable compromise in the octave tuning.

In treble octave tuning, the compromises are a little different. 4-2 type octave matching becomes too wide by the time you progress as high as F5 or G5. It is easier to hear and to test notes in this range as 4-1 type double octaves, usually with a slight stretch (3rd-17th aural test, i.e., like D3-F#3 compared to D3-F#5). The Sanderson Stretch tunings followed this theme.

The area where there is less consensus is in the 6th and 7th octaves. For some time there was more emphasis on keeping simple 2-1 type octaves as the accepted standard. The theory was that the undamped tones one octave lower would add reinforcement to the upper note of an octave. There is a sense in which this is true. However, the undamped octave-fifth below also adds reinforcement, and the double octave below also adds reinforcement to the top register. The double octave-fifth also adds reinforcement, so where do we stop in this analogy? Perhaps balance is the word needed here.

Let's digress for just a moment to add one more item to the mix. In many classes at Seminars and Institutes, a demonstration has been made between the melodic sense of hearing and the harmonic sense of hearing. The demo usually went something like this:

The note C3 was played and everyone was encouraged to listen carefully and remember that sound. Then C7 would be played and tuned until there was a 70 percent to 80 percent agreement that the pitch was correct. Then with the use of an electronic measuring device, the note would be found to be 25 to 50 cents sharp. Now this is much sharper than anyone known to the writer would even dare to tune. It is even much higher than the 16th partial of C3 would require on many pianos. This demonstration shows that the subjective judgments made using the melodic (one note followed by another) sense of hearing requires sharper tuning than does the harmonic sense (one or more notes played together).

Now, there is no way that the melodic sense of hearing is going to be completely satisfied in piano octave tuning in the treble. However, demonstrations made recently show that much greater sharpening of the treble can be tolerated harmonically than was previously thought possible. With the advent of the new FAC stretch tuning on the Accu-tuner, technicians are becoming accustomed to hearing pure 4-1 type double octaves to the top end of the piano. At a recent convention, a concert was heard where the top C8 was tuned over 50 cents sharp, with proper gradations below supporting it. It sounded great. This writer has suspected that in growing older perhaps his hearing may be the problem, so younger ears have been employed in some of the tests, yielding the same conclusion that sharper tuning does sound better.

Can it be, that in listening to all of the partials available, we tend to chase the "wolf tones" of the octave relationships by giving more consideration to higher partials then we have heretofore considered? It is my opinion that this is the case. This is one of the reasons I have given encouragement to Virgil Smith in his presentation of "Tuning by Listening to the Whole Tone," after all, isn't that the way everyone listens to music?

Figure 1
Single Octave Partial Matching

Below illustrates matching the 1st partial of upper note with 2nd of lower note of octave. Notice the mismatch of 4-2, 6-3, 8-4, 10-5 and 16-8.

```
      1     2   3  4  5 6  8
      |     |   |  |  | |  |
|     |  |  |  | |  |    |  |  |  |
1     2  3  4  5 6     8  10 12 16
```

Below illustrates matching the 2nd partial of upper note with 4th of lower note of octave. Notice stretch of 2-1 relationship, but the others are less than before.

```
      1     2   3  4  5 6  8
      |     |   |  |  | |  |
|     |  |  |  | |  |    |  |  |  |
1     2  3  4  5 6     8  10 12 16
```

Below illustrates matching the 3rd partial of upper note with the 6th of lower note of octave. Notice greater mismatch of 2-1 and 4-2, but the others are now better matched.

```
      1     2   3  4  5 6  8
      |     |   |  |  | |  |
|     |  |  |  | |  |    |  |  |  |
1     2  3  4  5 6     8  10 12 16
```

Below illustrates matching the 4th partial of upper note with 8th of lower note of octave. Notice greater mismatch of 2-1, 4-2, and 6-3, but better match of 10-5, 12-6 and 16-8.

```
      1     2   3  4  5 6  8
      |     |   |  |  | |  |
|     |  |  |  | |  |    |  |  |  |
1     2  3  4  5 6     8  10 12 16
```

Below illustrates matching the 5th partial of upper note with 10th of lower note of octave. Notice greater mismatch of lower order partials, but better match of higher order partials. This type of tuning works only on Concert Grands in the bottom octave.

```
      1     2   3  4  5 6  8
      |     |   |  |  | |  |
|     |  |  |  | |  |    |  |  |  |
1     2  3  4  5 6     8  10 12 16
```

For better understanding of aural tests of this, buy and read Rick Baldassin's book "ON PITCH." Order from Home Office. On page 48 he shows where each of these is traditionally used.

In the high treble, it is suggested that you try more stretching, using 4-1 double octave matching plus a little bit, but please be consistent in balancing 3-1 and 6-1 relationships (octave-fifths and double octave-fifths).

```
        1     2
        |     |
|  |  |  |  |  |
1  2  3  4  5  6
```

There are places in the treble where pure 3-1 tuning will produce good 4-1 double octaves and they are easy to hear.

```
              1
              |
|  |  |  |  |  |
1  2  3  4  5  6
```

Pure 6-1 tuning such as this will always be much too sharp. A sharp 3-1 and a flat 6-1 gives good control for wide 4-1 double octaves, and less narrow 8-1 triple octaves.

We have all become accustomed to listening to M3rds beating at anywhere from 5 BPS to 20 BPS in effort to chase the "Wolf Tones" and to have equal temperament. Is it any worse to have upper single octaves beating 5 to 10 BPS, if in the process the double octaves sound better, the octave fifths sound better, the double octave fifths sound better, and the triple octaves sound better, in fact, the whole piano sounds better? Also in the process of tuning like this, there is a closer approach to what the ear wants to hear melodically.

If this idea seems to have any merit, perhaps some younger, sharper minds can do some studies in this area and quantify what the ideal stretch of octaves should be, on certain pianos at least. Write your editor if this rings a bell with you. Are there any modern day "Wolf Chasers" out there?

Refinishing Sharps

By Norman H. Neblett, RPT
Los Angeles Chapter

Older keyboards of quality pianos have often had their original ivory keytops replaced by plastic coverings. To refurbish sharps, the common practice is to clean and spray them with black lacquer or replace with plastic. No plastic sharp will come close to duplicating the feel of good ebony. Plastic sharps are often a different shape or width and have sharper edges than the original and may not space properly with the white keys. Painted sharps become slick from perspiration, wear through, and eventually start to chip and negate the qualities and feel characteristics of ebony.

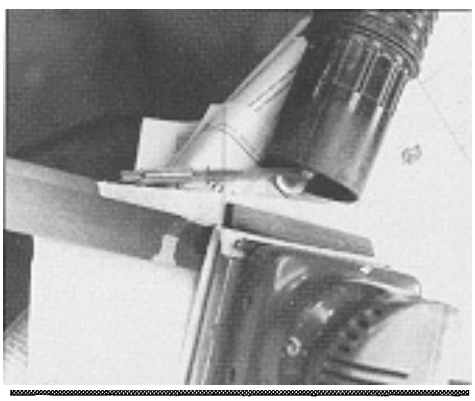

Figure 1

The solution is to create a black, durable, hand-rubbed anti-slip surface that shows the wood grain. This is accomplished by using a black dye, french polish, and 4/0 steel wool. The procedure is as follows: Dampen a coarse cloth with a solution of one part household ammonia and one part water and clean off the grime from each black key and its raised sharp. Using an electric sander and 100-grit, open-coat paper, sand each side of the key removing the finish from the sharp (See Figure 1). Before returning the black keys to the action frame, press a sheet of newspaper the size of the action frame over all key pins down to the punchings. Place 1/2" to 5/8" x 4'6" square stick between the horizontal rows of front keypins and replace the keys (See Figure 2). This simple jig acts as a squaring device for sanding the sharp tops (See Figure 3). After removing the finish on top, carefully address the sharp front and the edge chamfer. If the sharps are worn, sand more to restore proper shape and edges. Blow clean or vacuum.

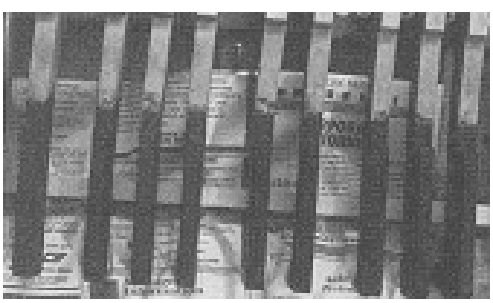

Figure 2

How to finish: Using a dauber, apply the leather dye to the top, side, and front of the sharps lifting the key as necessary (See Figure 4). Prepare a pad, and apply four or more coats of french polish in the same manner. Then lift each key up and apply one dye coat and french polish to the black key sides. If you wish a cut-off line on the key, use masking tape before finishing. Finally, rub sharps in grain direction with 4/0 steel wool (See Figure 5). The whole job takes around four hours, is very durable, and can easily be touched up if wear occurs. *Enjoy!*

Figure 3

Figure 4

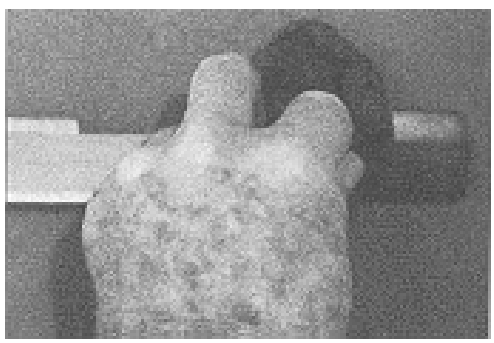

Figure 5

Tool & Supply List

1. Chemical gloves
2. Dust Mask
3. Squaring stick
4. Newspaper
5. Angeles Jet Black leather dye, solvent base, or equivalent
6. French polish*
7. Rags — ammonia & water
8. 4/0 steel wool
9. Vacuum or air
10. Palm sander
11. 100-grit, open-coat silicon sandpaper

*EDITOR'S NOTE: Such as APSCO #511734 "Star Lac French Finish."

Behold The Upright

The Crack in the Back

By Don Valley, RPT, MM
Western Carolinas Chapter

At the outset of this series, we began working our way from the bottom of the piano to the top. Now we are at the very top of the upright where the top edge of the pinblock is exposed along with its back structure and the support beams. If you are rebuilding this piano and this area is covered, you must remove the covering in order to assess the condition of this part of the piano structure.

Frequently, the downward pull of the string tension causes this structure to separate with the plate pulling forward and the block coming with it, leaving a gaping crack along the length of the top. Because this is a common situation, the repair will be the subject of this article. Since this is one repair I have performed many times on location, I will present this as an in-home repair.

First Things First

For the most part, this condition is discovered on your first encounter with this piano and, most likely, with this client. A somewhat unnerving development. Yet, this is where the real professional succeeds in getting the client to recognize knowledge, expertise, integrity, and honesty. Any time one goes to just "tune" or "service" a piano and ends up finding a condition requiring several times the expected expenditure, some tact and proper demeanor are fundamental, to say the least!

Rather than opening your mouth and gasping aloud, just quietly proceed in preparing yourself. Do not involve the client until you have gone through the following procedure. It will guide you in determining the bottom line — your price to complete the repair and make the client happy.

1) You came to tune; it has turned into a service call. Unless this is a frequent repair for you, you are not prepared to do it on the spot.

2) You must return two more times; once to make the repair and, after the glue dries, again to remove clamps and do whatever stretching and tuning is required to stabilize the piano at A=440.

3) You must take a trip to the hardware store and purchase bolts.

4) You must purchase (if you do not have them), proper clamps.

5) The repair itself will take at least one of your appointment times.

6) Figure time required to gather your materials, load, transport, unload, set-up, reload.

As you can see, this is a time-intensive process. Your first time will be the most difficult to judge. I base most of these repairs on a factor of five tuning-service appointments. I quote this on a per-job (flat-rate) basis, not on a time basis. You are not selling your time; you are selling your expertise. Do not discuss *time* with your client, even though that is what you are considering for yourself in order to be certain you are well-covered so you come out on the plus side rather than the minus. This is why I have included the format for thinking it through.

Now that you have thought it through and have written it down for yourself, call in your client and discuss it. Explain it in terms the uninitiated can understand. Talk about the procedures you will have to perform. Speak of the necessity to do much more than the standard tuning to perform the repair. Mention the number of times you will need to come back. Explain the alternative. Then, having given a thorough explanation, present the bottom line — the cost. You will probably hear, "Oh, I thought it would be a lot more than that; just go ahead. I want it to be right."

With the job in hand, and prior to your leaving, take care of a few details. Measure the thickness of the back of the piano, including the plate. Write this measurement down for yourself. Remember what Abraham Lincoln said: "The stubbiest of pencils is better than the sharpest of brains." Determine the number of bolts you will need. (At least five, maybe six) Set up your return appointments. I suggest two consecutive days when it will be all right for the piano to be left dismantled and in a clamped state, out away from the wall, and not pretty.

Tools & Materials

- Five or six 5/16" bolts and nuts; 10 - 12 washers. Length at least 1/2" longer than thickness of piano back
- Long drill bit, 5/16" (Can be regular or spade bit)
- Hammer
- Five Heavy-duty bar or I-beam clamps
- Clamp blocks
- Hacksaw
- One Spade Bit - 1"
- Plate (tuning pin) bushings
- Socket wrenches
- Crescent wrench
- Glue (I prefer Titebond®)
- Knife (Long flexible blade for spreading glue)
- Plastic sheet, newspaper, or cloth for

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Behold The Upright

Continued from Previous Page

floor protection
- Vacuum cleaner
- File
- Portable air compressor or blower
- Permanent felt marking pen

Procedure

Remove the lid, hinges, etc., from the piano. Remove the front board and any other furniture pieces that would obstruct your work. Pull the piano away from wall, three feet or so. Cover the action with paper or cloth. Protect the floor in like manner. Clamp along the top of the piano, using a wood block at each clamp location to protect the plate. Clamping now is to maintain position while you remove the top line of plate screws and do your drilling. Remove the top four or five plate screws.

Drilling

One by one, drill a 5/16" hole from front to back using existing screw holes as locations. Do not try to drill the entire hole in one pass. Back out the drill every inch or so to discharge the chips and reduce heat buildup. If you do not, you can ruin your bit on the first hole. The bit will get very hot because of the friction of such a long hole. For long-term bit protection, keep a can of ice water and two to three ice cubes right at your drilling location. Cool your bit with a two- to three-second dip each time you withdraw it for cleaning.

Once each hole is drilled through, change to the 1" spade bit. At the back of the piano, insert a plate bushing into the hole. This is to help the spade bit stay on center while you drill to a depth of 3/8". This is for sinking the washer and nut so it does not protrude beyond the piano back and damage a wall.

Inserting the Bolts

Back at the front, take one bolt with washer. Force it through the hole you just drilled. A hammer may be needed here. Place washer and the nut on the bolt and tighten to position. Do not over-tighten because the clamps will do this work at the proper time. Perform this procedure for each hole drilled.

Some judgment calls are often needed at this point in the job. Occasionally, you may need to file a washer edge so as to fit a certain spot. You may also choose to use the thick beveled-edge washers already on many large older uprights. Sometimes, especially on smaller pianos, it is impossible to get a bolt in an existing screw position. It is all right to drill the plate at another location. The plate drills easily, much like a dense hardwood. It is always best to position any hole through one of the vertical beams. The choice of using a standard long drill bit or a long spade bit will be determined by whether or not the existing holes in the plate are at least the size of your bit. If not, expanding those holes is simple with a standard bit, but havoc is created with a spade bit. Otherwise, the drilling may be quicker with a spade bit. With your new bolts in place and tightened, one of the two needs for your portable air compressor presents itself — that is, to force any dislodged chips out of the crack you intend to close.

Gluing

In joining wood surfaces with glue, it is imperative to get glue spread generously over the surface. A second imperative is to squeeze as much glue out of the joint as possible so that you do not have a thick layer of glue between the pieces being joined. Such a result cannot hold under pressure. The idea is to join the two surfaces and allow the properties of the glue to act on the pressured wood fibers of each surface. If there is a thick layer of glue between the surfaces, the wood is kept from responding to its adjoining member. The less glue, the better, so long as it is evenly spread.

In this gluing operation, be generous in order to be certain the glue covers well. Use a long flexible blade (knife, soundboard steel, etc.) to work it down all the way. Allow it to drip through. Then use the compressed air to more evenly force and spread it where it would not run. Start your clamping at one end and proceed to the opposite. Turn each clamp 1/2 turn. Repeat this procedure until the crack is closed. This keeps even pressure on the plate. If the crack does not want to close all the way, reduce the tension on the strings. One-half turn on each pin is all right. Do this quickly so the glue will still activate. Then proceed to finish the clamping process.

Trimming Bolts & Finishing

Tighten the nuts on the new bolts. Obviously the ends extend beyond the back of the piano. You may choose to take care of this in one of two ways.

Method #1. This is my preferred way. With your hacksaw, mark the spot on each bolt where you want the end finished off. Remove the bolt and put the nut back on. Do the same for each bolt, numbering them with your magic marker so you will replace them in the same holes. Take them with you back to your shop where you can cut and file them smooth and clean. Be sure to back off the nut after it is cut in order to restore the threads. When you return the following day, reinsert the bolts and tighten them hard prior to removing the clamps.

Method #2. Tighten the bolts to where you want them to stay. With the hacksaw, proceed to cut the waste end off flush with the piano back. If a clamp is in the way, remove it momentarily until you have finished that bolt and then reapply the clamp. The disadvantage of this procedure is a marred piano back and a rough bolt job. However, the job produces the same results.

Upon your return, replace the bolts and remove the clamps. Set the piano in place. Complete your stretching and tuning. Reassemble the piano and collect your fee from another happy client.

I have performed many of these back operations and have never had a failure. What causes such a separation in the first place? There are several possibilities: failure of hide glue when the piano has had extensive exposure to a humid environment; perhaps it has been stored in an outside building without temperature or humidity control; failure to properly season the woods used and to lower the moisture content down to at least six percent. If the wood isn't dried to that point, glue cannot do the job intended for it. The latter situation is often the case in the newer economy model pianos.

Considering the alternative to this repair — another piano — your price to do this repair (with the guaranteed result) is a bargain.

PACE
Professionals Advance through Continuing Education

LESSON PLAN

Technicial Lesson #33

Grand Regulation — Part 14 Adjusting Grand Dampers for Even Lift from the Key & Pedal

By Bill Spurlock, RPT
Sacramento Valley Chapter

This montly 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

This lesson will describe procedures for checking damper lift by the key and pedal, and illustrate use of a special jig for setting damper underlevers at the correct and even height. A companion article following gives instructions for making your own damper lever setting jig.

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 economy grade pianos in a dealership are probably best, since most damper adjustments will be close but will often exhibit minor problems and uneven adjustment. Since this lesson focuses on evenness of adjustment among all dampers, action models are not suitable to use.

Estimated Lesson Time

Approximately one-and-a-half hours.

Tools & Materials Participants Must Bring

For this lesson, participants should obtain the following tools:

- duck-bill pliers
- small flat-blade screwdriver
- damper lift gauge, as shown in photo 1 (can be made of thin wood or from a bent wire)
- selection of general regulating tools

Assigned Prior Reading for Participants

PTG Technical Exam Source Book, pg. VIII.1 - V.III.15

General Instructions

As described in Lesson #32, the damper underlevers must sit at the correct height and be in an even line at rest. This requirement is essential for correct and even damper lift by the keys, for even lift by the pedal, for proper sostenuto operation, and for proper damper stop rail function. Evaluating the damper regulation begins with checking the timing of damper lift by the keys.

Damper lift by the keys: The dampers should begin to lift when the hammers have travelled one half the distance to the strings, or slightly less. This "timing" of damper lift is determined by how high the damper levers sit above the key end felts at rest. If the damper levers sit too low, the key contacts them sooner, before momentum is built up, and the action feels heavier. If they sit too high, the action feels lighter, but also the total amount of damper lift is less. In this case the wedge or trichord dampers may not fully clear their strings.

Actually, damper timing is most important during key *release,* rather than key depression, because it affects the player's control of tone. A late-lifting (early seating) damper may mute the string unintentionally as the key is just slightly released. On the other hand, an early lifting (late seating) damper may sustain a note longer than intended if the pianist does not fully release the key. So it is the timing of damper *seating* that we are really regulating when we adjust the timing of damper lift. Thus damper timing must be even from key to key to allow the pianist to control the tone.

To check damper timing, place a gauge of one-half hammer blow distance against the underside of a unison and play the key. See Photo 1. Watch for the damper to wink as the hammer bumps the gauge.

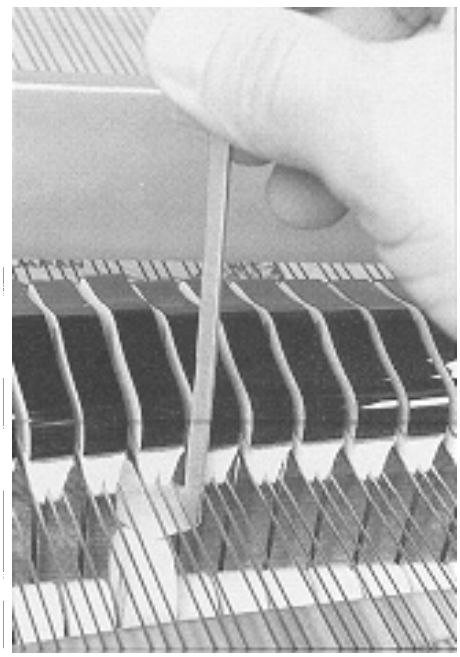

Photo 1 — Testing timing of damper lift by the key, using a gauge of approximately one-half hammer blow distance.

When installing dampers from scratch, sample underlevers are set to a trial height (approximately 1/8" above the key end felts. The action is slid in, and the damper timing is checked on these samples. The samples are adjusted

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as necessary until correct, then all other damper levers are set to match using a jig such as shown in Photo 2.

When refining the regulation of a set of dampers that are already installed, first check the timing of several dampers using a gauge as in Photo 1. This will confirm that the average damper lever height is correct. Next, proceed as described below to refine the straight line of damper levers. Once that is done, individual key end felts can be shimmed or ironed to achieve very even timing of damper lift by the keys—this procedure is not covered in this article.

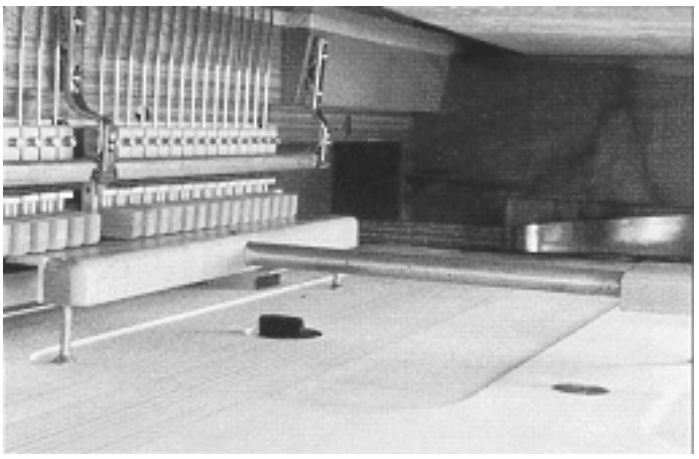


Photo 2 — Using a damper lever setting jig to check and fine-adjust damper lever height.

Refining damper lever height: Once you have determined that the basic damper lever height is correct to give acceptable timing of lift by the keys, you can refine that height for evenness. This job may be done to correct for settling (compression of the damper felts), or to refine the regulation of a newly installed set of dampers. Damper levers can be checked with a hand held straightedge, or more conveniently using a jig as shown in Photo 2 and described in the accompanying article. Here I will describe use of the jig.

Adjust the damper lever setting jig to match the average lever height. Slide the jig under the levers, watching for any that are lower than the jig (any that wink when the jig is slid under), and for any that rest higher than the jig. Loosen the set screws on these, make sure their dampers rest snugly on the strings, and retighten. Note: when a set screw is initially tightened, the damper wire will often rotate in the top flange, misaligning the damper head to the strings. To correct, grab the wire just above the top flange with duckbill pliers and twist. Test monochord, bichord and trichord dampers by lifting their individual levers with a finger, watching for any twist as they lift off the strings. Adjust to eliminate any twist.

Some damper levers have spoons that contact the key end felts, allowing individual adjustment. In this case, the levers must still be adjusted to an even height using the damper setting gauge under the *wood* of the levers as above. Then the setting gauge is readjusted to the average height of the spoons, and individual spoons are bent to match the gauge.

Refining lift by the pedal: Once the damper levers are set to an even height, individual adjustments can be made to achieve a perfectly even damper lift by the pedal. Some damper levers are equipped with capstans for individual adjustment as shown in Photo 3. While barely "winking" the pedal, adjust until all dampers lift as one. For levers without capstans the felt of the lift tray can be shimmed or ironed to refine the lift. This felt is usually only glued along its rear edge, allowing paper shims to be inserted under it to speed up late-lifting dampers. Early lifting dampers can be slowed down by ironing the felt with a hot knife directly under the individual levers.

Remember that such adjustments are only done to correct for wear of the lift tray felt, not to compensate for an uneven line of damper levers.

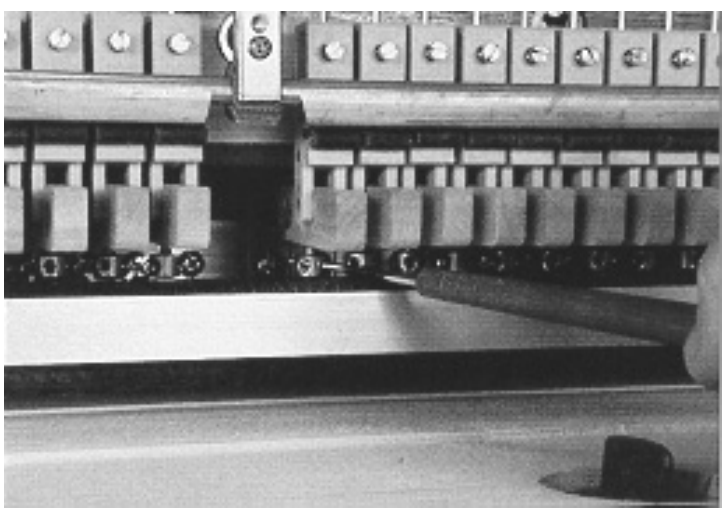


Photo 3 — Refining damper lift by the pedal on a system having individual capstans.

Exercises

Participants should evaluate the damper regulation of a piano by first checking for a straight line of damper levers at rest. Each should take a turn at resetting the height of one damper lever that needs improvement. The lever should be even with its neighbors and the damper should be properly aligned to the strings when done.

Next, each participant should check the timing of damper lift by the keys using a gauge as shown in photo 1. Exact timing is not as important as evenness. If timing is found to vary on some keys, the participants should diagnose the reason, i.e. uneven damper lever height, worn or damaged key end felt, or erratic hammer height.

Finally, each participant should check for even lift by the pedal, and again diagnose any unevenness.

Build Your Own
Grand Damper Lever Setting Jig

By Bill Spurlock, RPT

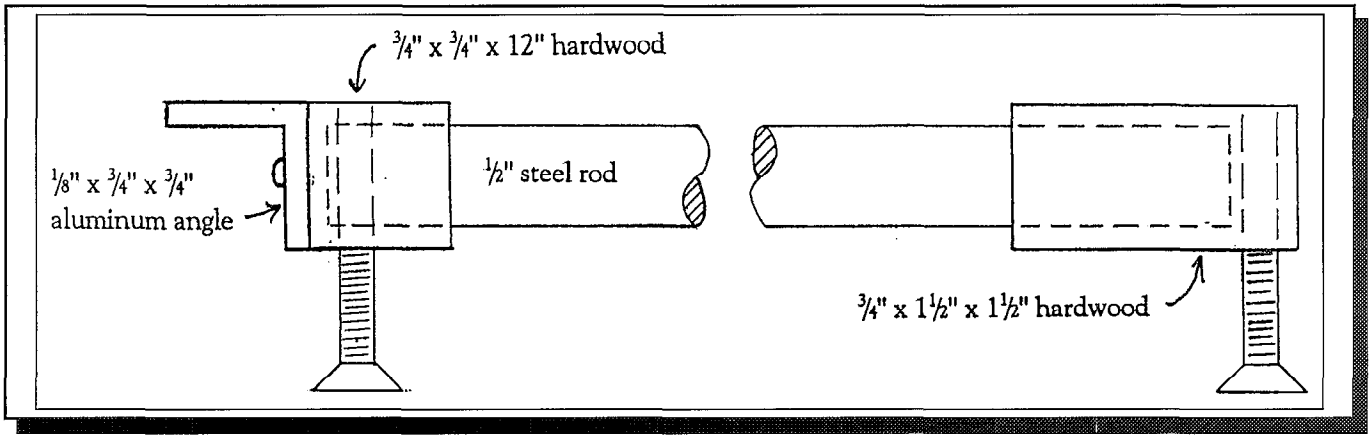
This jig supports grand damper levers at an even height when reinstalling dampers. It is also ideal for checking and fine adjusting the height of dampers already installed. Only by having all levers in a straight, level line is it possible to properly regulate the damper upstop rail and sostenuto. Correct jig height is measured directly from the action: With the action and jig on a flat surface, the screw feet are adjusted so the *underside* of the aluminum angle matches the height of the key end felts. The damper levers will then be automatically installed to rest 1/8" above the ends of the keys, due to the 1/8" thick aluminum. Dampers will then lift when the hammers are approximately one-half way to the strings. For complete instructions on use, see the accompanying PACE Lesson #33.

Tools & materials

- hardwood, $^3/_4$" x $^3/_4$" x 12", and $^3/_4$" x $1^1/_2$" x $1^1/_2$"
- $^1/_8$" x $^3/_4$" x $^3/_4$" x 12" aluminum angle metal
- $^1/_2$" x 10" steel rod
- (3) 10 x 24 x $1^1/_2$" flat-head machine screws
- 10 x 24 tap
- (4) #4 x $^1/_2$" pan-head screws
- #24 drill & $^1/_2$" Forstner bit
- drill press, table saw, hack saw
- CA glue

Instructions

- Cut wood pieces, aluminum angle, and steel rod to length.
- Drill the $^1/_2$" holes in both blocks using the Forstner bit.
- Drill & tap for the #10 x 24 screw feet
- Clamp the aluminum angle to the long wood block, and drill four small holes for the pan-head screws. Screw together.
- Apply medium viscosity CA glue to the $^1/_2$" holes and assemble the steel rod.



RPTs & Marketing

By Bob Russell, RPT
Chairman, Marketing Committee

*"You have to **BE***
*before you can **DO,***
*and **DO***
*before you can **HAVE.**"*

Be ...

Let me start out by saying that becoming and BEing a Registered Piano Technician has been a key ingredient in my development as a professional piano technician. BEing a Registered Piano Technician adds a significant dimension to our lives and business: CONFIDENCE! *Confidence* in ourselves, *confidence* in our technical skills, and the increased *confidence* our customers have in us. When our customers are buying our services they are usually buying *us.* When we add the dimension of *confidence* that BEing an RPT provides us, we give ourselves a distinct advantage over our competition. As greater numbers of *confident* RPTs promote themselves using our PTG Marketing Products, this advantage will grow dramatically. A Registered Piano Technician armed with *integrity,* a strong *belief* in his or her own services, and the *desire* to get those services into the hands of as many people as possible is a *powerful* force with which to deal!

Do ...

From our PTG Business Resource Manual, here are eight simple steps you can DO to promote your RPT status and business.

- ***Use the RPT Bookmark.*** Serving as both a thank you card and advertisement for RPT, the bookmark is an effortless way to let your client know you are a member of PTG and you've achieved RPT classification by passing a series of exams. Leave a bookmark on each piano you tune, or use it to mark the client's place before closing and removing music books from their piano. Your signature adds a personal touch, and the "thank you" message conveys your appreciation for their business. Most importantly, the large "RPT" graphic and brief description instantly convey the importance of RPT. Leave them on 15 pianos a week, and you'll be telling 750 people a year what RPT means.
- ***Mention RPT in your telephone answering machine message.*** This tip comes from Elmo Lundy, RPT of Murphreesboro, Tenn. It's simple, it's obvious, and we should all be doing it. Your message might go something like, "Thank you for calling Bob's Piano Service, the business of Bob Jones, Registered Piano Technician. Please leave your message . . ." With virtually no effort on your part, callers will learn there's a classification called Registered Piano Technician. Your regular clients will be reminded of this when they call and hear your message. Price shoppers who continue dialing around after hearing your message may ask the next technician they reach if she/he is an RPT.
- ***Mention Registered Piano Technician during phone inquires.*** Simply say during the call that you are a Registered Piano Technician. This short mention of your credentials tells the caller — without having to say it — that not all technicians are RPTs. This works! Clients who call around tend to ask other technicians if they are "registered." You also should mention RPT when referring a client to another RPT technician: "Jane Doe is a Registered Piano Technician and I can recommend her work."
- ***Use the RPT name and logo consistently on your business card, invoices, stationery and postcards.*** Now that we have a single name for tested members, a recognizable and effective logo, and a variety of business aids to promote them, public recognition is much easier to achieve. Consistent and frequent use of the RPT logo on your personal business materials is reinforced by official PTG business aids and media exposure. The cut-and-paste logo clip art in the PTG Graphics Standards Manual makes it easy to add the logo to your business cards, letterhead, etc. Remember that consistency and repetition are the keys to recognition.
- ***Use the RPT Dealer Service Tag when doing in-store service.*** This attractive product is the brainchild of RPT and South Central RVP Jack Wyatt, a form member of the PTG Trade Relations Committee. Designed to hang conspicuously on pianos serviced on the showroom floor, the tag combines a short service record, space for the technician's signature and the message, "The company whose pianos bear this folder has made a commitment to quality by employing a Registered Piano Technician (RPT) member of the Piano Technicians Guild to prepare and service this instrument. Registered Piano Technicians have demonstrated competence by passing a series of three rigorous examinations on the maintenance, repair and tuning of pianos." The handsome gold paper and prominent RPT logo exude quality. Customers browsing through the showroom see our logo and learn that there is a standard for piano technicians. Quality is projected upon the dealer as well, who then becomes more aware of PTG's commitment to service.
- ***Place countertop displays of PTG brochures in piano stores and teacher studios.*** Piano owners and shoppers are full of questions. How often should my piano be tuned? How do I take care of the finish? Where do I find a good piano tuner? Our brochures provide clear, easy-to-read answers to such questions, display our logo and explain that RPT members have passed a series of exams. Displaying these brochures in countertop holders in stores and studios is an efficient way to reach the piano-owning public. They give sales staffs and teachers an easy way to answer questions, educate the

public about proper piano care and promote our business (via your attached business label).

- ***Contribute to your local music teachers' association.*** By joining a local teachers' group, you show your support of the music community and learn teachers' needs and concerns. After getting to know them, offer to write a column for their newsletter or present a talk at one of their meetings. Just about any organization that has meetings and a newsletter needs regular contributions — if they are of good quality. Articles should be well written, succinct and should address teachers' needs. Avoid being self serving, but always include the initials RPT after your name. Teachers understand the value of professional organizations, so your affiliation with PTG will lend credibility to your words.
- ***Provide extraordinary service.*** This may seem obvious, but the most important marketing strategy you can use is to consistently provide excellent service to clients. Doing so ensures a good reputation and endless word of mouth referrals. If your RPT credential is prominently featured in your business, then your good reputation will promote both PTG and RPT.

Have ...

The benefits of BEing an RPT are truly immeasurable. By using your RPT status as the cornerstone of your marketing strategy and by utilizing our PTG Marketing Products you'll enjoy the *trust, confidence* and *respect* of your clientele. The customer will enjoy having you in their home and will enjoy the fact that they've hired a professional to service their piano. Many of our customers lack the ability to fully appreciate the high quality service that we provide. All customers, however, have the ability to recognize professionalism. BEing an RPT and presenting this information in a language the customer can understand (PTG Marketing Products) will increase their awareness and appreciation of your technical expertise. The customer will be more interested and excited in proper piano care which makes it easier for us to sell our services at a price that supports our standard of living.

By gaining the *interest, trust, confidence* and *respect* of your customers by BEing a Registered Piano Technician, the customer will enjoy their piano more, the student will enjoy playing on a properly serviced piano, and the quality and quantity of your business (income) will grow dramatically.

BEing a Registered Piano Technician is *incredibly, inspirationally, intellectually, interdependently* . . . wonderful!

R.P.T.

Registered Piano Technician

Piano Technicians Guild members can earn this designation by passing a series of examinations on the tuning, repair, and maintenance of fine pianos. This is the only industry-wide standard available, and demonstrates a commitment to quality by the technician displaying the RPT logo below.

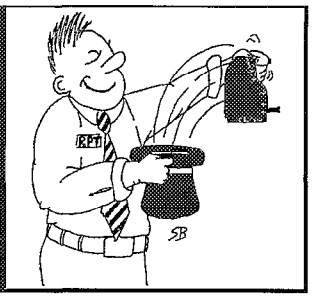
PIANO TECHNICIANS GUILD
Registered Piano Technician

Bob Russell, RPT

Here is one example of how you can promote your RPT status.

Grand Illusions ...

The Page for Serious Cases



Dear Mr. Piano Guy:

I am the Technical Institute Director for a large and prestigious non-profit piano technician's organization. One of the things that makes this job so cool is that I get to run around during convention time with a walkie-talkie on my belt and bark instructions into the hand-held microphone. It's about as macho as being a police officer, only I don't get shot at. Anyway, all of the news reports lately about illnesses related to devices which emit electromagnetic fields have me worried. Can you allay my fears?

—Bob Jumpsuit, Marshmallow Zone, Ohio.

Dear Bob: You are correct to be concerned about this. Recent studies have linked belt-mounted walkie-talkies to cancer of the love handles. I would suggest switching to cellular phones for your communication needs. They are thought by some to cause brain cancer, but no one ever said you had to have a brain to be a piano tuner.

Mr. Piano Guy is a syndicated monthly column published by the Mr. Piano Guy Academy of Piano and Corn Dog Technology. The Academy is a division of MPG Enterprises, this month featuring the new "Ambi-Cauls," the key bushing cauls that can be used by both right and left-handed technicians. Remember "Ambi-Cauls," the tool that goes both ways.

A New Business Aid

Mr. Piano Guy Enterprises is pleased to announce the publication of a book for you piano tuners that has the potential to change your life. Have you ever envied the way some musicians, music critics and concert tuners can talk about pianos and music in a way that makes it sound like they know something you don't? Do you feel like the 97-pound weakling getting sand kicked in his face as you hear a rival tuner describe a piano in terms that makes it sound like God's own personal instrument, when the only words that sprang to your feeble mind were, "Hey, that thing sounds pretty darn good!"

Well, now you can learn how to talk like the "pros." With Mr. Piano Guy's Guide To Pompous Over-Description," you can impress your customers, intimidate our fellow tuners and fool dealers into thinking you know all there is to know about piano tone and musical expression.

You needn't be limited any longer to basic vocabulary like "mellow" and "bright." With Mr. Piano Guy's new approach, you'll soon have words like "luminescent," "subtle" and "majestic" rolling off your tongue. "Mr. Piano Guy's Guide To Pompous Over-Description" comes in an easy-to-learn 10 step format, and is published in a handy pocket size that you can keep with you for quick reference.

Your phone will be ringing off the hook when word gets around that you have a cosmic understanding of piano tone, so order your copy today!

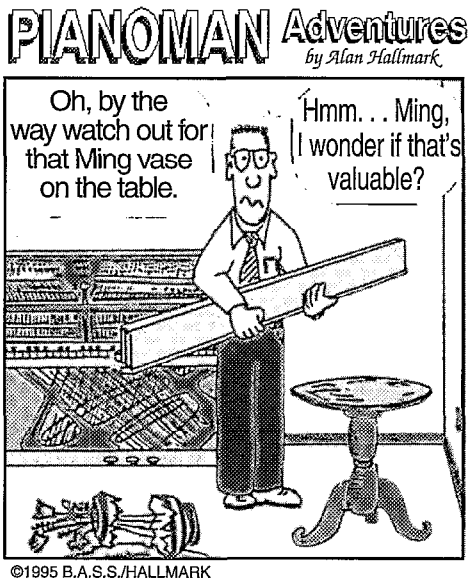
Dear Mr. Piano Guy:

I have noticed an increase in husband-and-wife piano tuner teams lately, and it's really beginning to bug me. Would you care to comment on this disturbing trend?

—Pat Smute, Yellow Snow, Alaska

Dear Pat: You are correct in your perception of an increasing number of these maritally linked pin jockeys. As the little woman has shown a decreasing inclination to stay at home over the past few decades, many of these ladies entering the work force have chosen to horn in on their husbands' tuning businesses. You really shouldn't let it bother you, however. That's just our society.

What is quite distressing is the increase in the number of tuners entering into therapy because their (non-tuning) spouses don't appreciate or understand what they do. Who among us hasn't launched into an interesting discourse at the dinner table on the differences between hornbeam and maple in hammer moldings, or the optimum amount of aftertouch in a grand action, only to be met with blank uncomprehending stares. Many of us get no sympathy at the end of the day complaining about having to tune four new Baldwins with a broken arm. Is there anything more deflating than snuggling up in bed with one's spouse, murmuring sweet nothings like "Let me check your blow distance, baby," only to be icily rejected?

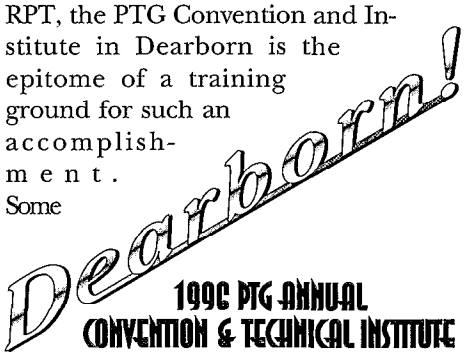


PTG Review
Dedicated To PTG News • Interests & Organizational Activities
PIANO TECHNICIANS GUILD

Associations Preparing for Exam Have Much to Gain at Dearborn

Successful technicians set goals and focus on becoming as highly skilled as possible, but until these goals and intelligent thoughts are placed into action there is no real accomplishment. The accomplishment takes place when opportunities, such as the classes and tutoring sessions at the PTG Convention, are seized.

For those considering becoming an RPT, the PTG Convention and Institute in Dearborn is the epitome of a training ground for such an accomplishment. Some of the Institute classes are geared for beginners and entry level technicians, which in itself is a great educational experience. There are other areas that are more specifically geared toward exam preparation, however. Whether it's the written, technical, or tuning exam, there are prep classes for each.



If it's tutoring you need to set you on the right track, clarify a problem area, or just receive an evaluation of your skill level, there are experienced CTE's ready to help you refine your tunings to the highest level. The tutor's supportive approach to help and assist make it a comfortable atmosphere, conducive to learning. Whether it's beat rate, octaves, temperament, unisons and stability or learning to use your electronic tuning device, there is a spot for you.

We are faced with decisions each and every day, and deciding whether or not to attend a PTG Convention is one. I can say from personal experience the benefits of attending far out weigh the costs. The PTG Convention and Institute is a good value considering the quality and quantity of educational opportunities. There is a proverb that says, "What you get is what you set." Take advantage, set your goals, and set your sights on Dearborn.

— Paul Olsen, RPT
Institute Director

Detroit-Windsor — A Tale of Two Cities

The Detroit-Windsor Chapter PTG has a unique title because the two-city name includes two countries. Several members in the D-W Chapter are Canadians, making ours a truly international Chapter. The Ambassador Bridge connects our two cities as well as the Detroit-Windsor Tunnel.

Located in the Sun Parlor of Ontario, Windsor has a population of 193,400, and is often called the Southern Gateway to Canada. It is the chief port of entry into Canada from the United States. Windsor lies on the southeast bank of the Detroit River, directly opposite Detroit, Mich.

Windsor is one of Canada's most important industrial cities, with an output exceeding that of some provinces. Windsor is sometimes called the "City that put Canada on Wheels" because its chief products, like those of Detroit, are automobiles and automobile parts. Other products include pharmaceuticals, chemicals, salt, and distillery and brewery goods. Despite its industrial image, Windsor is also part of a rural region known for orchards and farmlands, which are nurtured by the mildest climate in Ontario. Windsor is also a major transportation center.

One symbol of its peaceful ties to the United States is the Peace Fountain. Located in the Detroit River, this floating fountain is one of the largest in North America, and presents a variety of water displays, illuminated in changing colors at night.

A major shopping center is Devonshire Mall, which includes the Art Gallery of Windsor. The downtown area has many interesting shops, and restaurants featuring various cuisines.

In Jackson Park, the Queen Elizabeth II Garden is a sunken area planted mostly in roses. Included is a Lancaster bomber, a memorial to those in the Royal Canadian Air Force killed in WW II. More than 400 custom-made lights decorate the fountain and grounds. Several memorials and monuments are in the park, including ones to Copernicus, the father of modern astronomy, and to the poet Robert Burns.

Two gambling casinos are a recent addition to Windsor; one is on board a ship in the Detroit River.

You do not need a passport to enter Canada, but you may need a birth certificate and photo ID to return to the US. Radar detectors are illegal in Ontario. A US dollar is worth $1.40 Canadian. There is a Gift and Services Tax (GST) of 7 percent.

Windsor is about 10 miles from the Hyatt-Regency Hotel in Dearborn. It will take about 20 minutes to reach the Ambassador Bridge, which can be seen from the revolving lounge at the top of the hotel. Another few minutes along Riverside Drive will take you to downtown Windsor. Allow some time to clear customs both going and returning.

— Richard Bittner, RPT
Host Chapter Chairman

Leadership in his Nature

The year was 1946, gas was 19 cents a gallon, Harry Truman was President, piano tuning was $6.00 and Jack Wyatt began a career tuning pianos. He is now in his 50th year as a piano technician. There were four brothers in his family who were piano technicians, he said that it just seemed the thing to do.

While attending a Texas State Association Seminar, he took the podium and challenged the gathered technicians to take control over their own destinies. He basically told them to charge what they were worth and demand the respect that was due a true profession.

Jack R. Wyatt, RPT
South Central RVP

Following this experience at the TSA Seminar, Jack swore to his wife and family that he was not going to get involved in this organization as he did the others he served in. That stance drew gibes from his wife and his family members who knew him better than that. His wife of 46 years, Mary, drew the line after following Jack to countless conventions and meetings in various civic organizations, such as the Lions Club, Elks Lodge and the Veterans of Foreign Wars. She told Jack she would not be going with him in this one. So, happily married, Mary stays at home in Garland while Jack travels on PTG business.

Not long after the TSA Convention, then PTG President Nolan Zeringue asked him to serve as the Economic Affairs Committee Chairman, and naturally, he accepted. Then President Fern Henry appointed Jack as the Chairman of the Trade Relations Committee and President Leon Speir reappointed him to the post. During this time he also served TSA, as Vice President for two years, as Seminar Chairman one year, and then as President for two years. In addition to this he served as Vice-President of the Dallas Chapter for one year and as President for two years. He was elected as Regional Vice President in 1995. Jack has also taught classes at various state and annual conventions. In his spare time he plays golf and plays with his grandchildren.

As he travels and works for PTG, Jack continues to challenge technicians. "We must get a firm grip on reality," he said. "We must demand respect as a professional and be fairly compensated for it. We are the lowest paid profession there is for the amount of time it takes to become a good technician. If we do not do this for ourselves, no one is going to do it for us." Piano work is a mostly solitary profession, and in the past, cooperation between piano technicians was almost nonexistent, he said. Now, thanks to the Guild, this has changed in most parts of the country.

Following his nature, Jack is forthright about the future of PTG. "PTG is going to get stronger and stronger as younger people join. Some older people have a resistance to an organization like this, with the educational offerings we have," he said, "As we retire, the younger people will look to the organization for their education, and will support it."

Instead of waiting 10 or 15 years to become a good technician, technicians now want to become RPTs in five years, he said, but most don't want or expect a free ride on PTG. As an example, Jack cited the Associate Seminar he sponsored. Associates paid for their own accommodations, meals and transportation, and fees for the seminar cover the costs of the instructors, and the seminar sold out quickly.

And while some notable manufacturers have either quit producing pianos or been forced to scale back production, pianos are still being manufactured today, and there is a market for high quality instruments.

"The baby boomers are reaching their top earning potential," Jack said. "They have nice homes, and they want to put a nice piano in it. They can now afford a piano, and now they want the nice grand."

"I believe the future of PTG is very bright, very positive," Jack said. "A rebuilding boom is here, and I believe it will only grow in the future. Being an RPT member of the Guild is the only recognizable worldwide standard to be judged by."

RPT Exam Repair Jigs Now Available

By Paul McMillen, RPT, and Mike Carraher, NE Chief Technical Examiner South Central Penn. Chapter

To make the RPT Exams consistent, thorough, and fair, the ETSC has been very careful to outline specific requirements for exam equipment . To further this goal, ETSC has recently been working with Renner and Young Chang to create new high-quality exam action models designed specifically for the regulation sections of the RPT Technical Exam.

Unfortunately, standardized equipment has never been available for the exam's repair section. The Technical Exam Manual offers design guidelines but has left actual construction to individual examiners.

The South Central Pennsylvania chapter is proud to have two experienced CTEs, Mike Carraher and Keith Bowman, who have developed a complete set of RPT exam repair jigs. Their test equipment is finished with obvious care and pride with an emphasis on simulating real-life conditions. Our chapter believes the testing process would benefit if jigs like these were used by other exam committees. It would facilitate more high-quality testing at the local level and thereby create more attractive opportunities for Associates to challenge the RPT exams.

These jigs can also be extremely useful for training, practice, technical sessions, and PACE lessons.

That's why the South Central Pennsylvania chapter has decided to make available high-quality standardized RPT Exam repair jigs to all examiners, exam

Continued on Next Page

RPT Exam Repair Jigs Now Available

Continued from Previous Page

committees, chapters, and individual members.

Here's what we're offering:

Stringing Jig

The stringing jig simulates a small section of a grand piano. It has two plain-wire 3-string unisons strung with .031" music wire. There is an empty pin for a height reference guide. It uses two three-hole agraffes and has a simulated bridge and plate.

Key Bushing Jig

The key bushing jig has seven keys (from either a grand or upright) on a section of their original keyframe glued to a strong plywood base. The guide pins are standard .147".

Hammer Shank Replacement And Reshaping Jig

The hammer shank replacement and reshaping jig is a section of an actual vertical action with ten angled hammers and ten straight hammers. Ten additional hammers are also included.

Twelve Grand Hammers, Shanks, and Flanges

For the exam's grand flange rebushing section, a set of twelve grand hammers, shanks, and flanges comes with the bushings already removed. The bird's eyes will accept a #21 or smaller center pin.

Pending approval by the ETSC and the PTG Board of Directors, this equipment will be on display at the PTG Annual Convention at the Convention Test Center office, Hyatt Regency room 311. Orders will be taken for future delivery.

The cost is $90 for the stringing jig, $60 for the hammer jig, and $30 for the key rebushing jig. The set of twelve grand shanks, hammers, and flanges is $5 if ordered separately or free with a complete set of jigs.

For further information contact Mike Carraher, RPT at (717) 367-8256 or write him at 1502 Mill Rd., Elizabethtown, PA 17022.

Time is Running Out — Passport To Excellence

If you have completed the requirements of 130 hours and want to get your certificate, send your papers to the PTG Home Office right now so we can have your certificate in final form by July 17.

— Don Valley, RPT
Coordinator

EXAMS

The Examinations and Test Standards Committee is pleased to announce the RPT exams will be offered during the 1996 Dearborn Convention. All three exams will be offered — written, technical, and tuning. The Convention Test Center will be on the 3rd floor of the hotel. Applications will be accepted on a first-come, first-served basis until the deadline of June 21, 1996.

If you think you're ready to challenge the RPT exams, ask a local RPT to read a Pre-Screening Manual (available free from the Home Office) and help you to assess your exam readiness. If in your judgement you feel ready for the exams, fill out the application and send it to Mitch Kiel as soon as possible. Available slots are filled in the order applications are received.

A very popular option introduced last year — observing master tuning sessions — is once again being offered. Look for the check box on the Application. Because availability of exam slots at Dearborn's Convention Test Center is limited, ETS encourages you to take your RPT exams locally whenever possible.

If you are an Associate member who needs to take the PTG tuning or technical exams to become a Registered Piano Technician, an excellent opportunity will be available during the Convention and Technical Institute in Dearborn.

The PTG Examinations and Test Standards Committee will conduct tuning and technical exams July 18-21. Before taking the exams you must have passed the PTG written exam. A reclassification form, verifying that the written exam has been passed, must be brought to the examiner at the time of the test. Written test scores are not required.

Only a limited number of exam slots are available, so be sure to apply early by completing the form below and sending it to: Mitch Kiel, 11326 Patsy Drive, SE, Olympia, WA 98501

A $60 fee payable to Piano Technicians Guild is required from applicants for RPT status. There is no fee required for tuning exams for RPTs who are attempting to achieve CTE status, and are enclosing a CTE Consent-to-Serve form.

Deadline for applications and fee refunds is: June 21, 1996.

Application for Convention Tuning & Tech Exam

Name _____

Member # _____ Phone _____

Address _____

City/State/Zip _____

Application For:

☐ **Written Exam Only** — No Fee
If you check here, you may not apply for other exams at this time.

☐ **Complete Tuning Exam—$60** — $ _____

☐ **Complete Technical Exam—$60** — $ _____

☐ **Partial Exam(s)**
Available only if repeating a section for the first time within one year of previous attempt:

☐ **Part 2 Tuning Exam—$30** — $ _____

☐ **Number of Technical Exam Sections—$20 each** — $ _____

Total Fee Enclosed — $ _____
No fee required for tuning exam for RPTs enclosing a Consent-To-Serve Form

_____ **I have passed the Written Exam taken 7/90 or later**
Required for Tuning and Technical Exams

_____ **I will bring Reclassification Form**
Required for Tuning and Technical Exams

Signature _____ *Date* _____

Yes, I would like to observe a Master Tuning on Tuesday, July 16 ☐ (please check)

1996 Technical Institute Class Schedule

	1st Period	2nd Period	3rd Period	4th Period
Thurs.-Sat.	8:00-9:30	10:30-12:00	1:30-3:00	4:00-5:30
Sunday	8:00-9:30	10:30-12:00		

○ 1 class period
⬭ 2 or more class periods

Regional and Committee Meetings will be held during 1st period and first break, Friday

	THURS-18				FRI-19				SAT-20				SUN-21		ROOM
BUSINESS CLASSES	1	2	3	4	1	2	3	4	1	2	3	4	1	2	
50 Ways to Make More Money Now! - *Bruce Genck*						⬭			⬭						Chicago
Business Cents and Nonsense - *Randy Potter*								⬭					⬭		Rolls
Business-Expansion & Diversification - *W. Phillips & R. Brown*	⬭										⬭				Rolls
The Cost of Being in Business - *Vivian Brooks*			⬭						⬭						Rolls
Piano Technician Software Review - *Ron Berry*						⬭							⬭		Stanley
They Plan Vacations Don't They? - *Jim Bryant*		⬭							⬭						Stearns
The Ultimate in Time Management: Ford Time Management											⬭				Stanley Steamer
HEALTH CLASSES															
Avoiding Aches and Pains - *John Foy*	⬭								⬭						Royce
The Ear, Hearing Loss and Related Auditory Disorders													⬭	⬭	Steamer
Dr. Michael LaRouere and Paulette Daniels															
Safety & Shop Organization - *Shawn Hoar*						⬭								⬭	Royce
IN-HOME SERVICE & REPAIRS CLASSES															
Dealing with Friction - *Richard Bittner*		⬭					⬭								Rolls
The Full-Service Approach to Piano Maintenance - *Steve Brady*	⬭												⬭		San Francisco
Hospitals for Hopeless Pianos - *Gary Neie*			⬭								⬭				Washington
The Noise Clinic - *Ernie Juhn*				⬭								⬭			Atlanta
Practical Piano Prep - *Nick Gravagne, Richard Davenport*	⬭												⬭		Atlanta
Regulating the Fandrich Action - *Darrell Fandrich*						⬭								⬭	Dallas
Repairing Chipped Ivories - *Steve Brady*				⬭								⬭			Rolls
Selling, Installation & Expectations of Humidity Control - *Bob Mair*	⬭										⬭				Indianapolis
Seven Keys to New Piano Prep - *Philip Glenn*		⬭				⬭									Indianapolis
Short-Cuts to Efficient Piano Service - *Ben McKlveen*		⬭							⬭						Cord
Springs in the Upright Action - *Donald Valley*			⬭										⬭		Royce
Steinway Grand Dampers - *Scott Jones*			⬭				⬭								Atlanta
Vertical Regulation and Troubleshooting - *Dean Garten*									⬭				⬭		Washington
Wood Finish Repairs As an Added Value - *Keith Libby*				⬭					⬭						Los Angeles
PIANO DESIGN, CONSTRUCTION & MATERIALS CLASSES															
Analyzing the Backcheck Area of the Grand Piano - *Ken Sloane*						⬭			⬭						Knight
Changing the Way Pianos Feel - *David Stanwood*				⬭											Houston
Custom Keyboard Replacement for Piano Rebuilds - *Bob Marinelli*			⬭						⬭						Indianpolis
Grand Piano Plate and Action Relationships - *Alan Vincent*	⬭										⬭				Los Angeles
Piano Making-Yesterday and Today at Bluthner's - *Ingbert Bluthner*								⬭			⬭				Royce
The State of the Piano Industry - *Kent Webb*														⬭	New Orleans
Statistical Techniques in Manufacturing - *Gary Conte*						⬭			⬭						Atlanta
Strings — From Pin to Pin - *Del Fandrich*			⬭								⬭				Chicago
Touchweight Analysis with the New Touchweight Metrology -							⬭								New Orleans
David Stanwood															
The New Touchweight Metrology - *David Stanwood*													⬭		Chicago
REBUILDING & SHOP CLASSES															
Bridging the Gap - *Walter Connell*						⬭								⬭	Washington
The Complete Sharpening Shop - *Keith Bowman*	⬭						⬭								Washington
Fundamentals of Key Rebushing - *Mark Bisso*	⬭											⬭			Stearns
Grand Action Restoration - *Willis & David Snyder*	⬭										⬭				Houston
The Harmonious Beautiful - Restoring the Piano Cabinet -							⬭						⬭		Los Angeles
Sylwester and Julia Czajkowski															
Lyres: Keep it Quiet - *Ken Hannah*			⬭										⬭		New Orleans
New Parts on Old Frames - *Rick Baldassin*		⬭										⬭			Royce
Piano Shop Trade Secrets and Other Helpful Hints - *J. Hartman*								⬭						⬭	Stanley
Shop Tested Grand Hammer Replacement - *John Hartman*						⬭			⬭						Houston

														ROOM
TUNING CLASSES	1	2	3	4	1	2	3	4	1	2	3	4	1	2	
Aural Tuning Techniques - *Virgil Smith*							●								Royale
Basics in Tuning - *Jim Coleman, Sr.*			●						●						Franklin
Basics in Tuning with the Sanderson Accu-Tuner - *Al Sanderson*				●			●								Royce
The Digital-Aural Tuner - *Dean Reyburn*						●					●				Royale
Inharmonicity-Theory and Practice - *Dan Levitan*								●						●	Franklin
Let the Piano Tell You! - *Jack Stebbins*	●					●									Cord
Pitch Raise: Minimum Time, Maximum Results - *Harold Buyce*							●						●		Franklin
Testing, Testing (and more) Testing - *Michael Travis*		●						●							Royale
Troubleshooting the Temperament - *Jim Geiger*	●											●			Franklin
Understanding the Use of Partials in Tuning - *Fred Tremper*				●							●				Franklin
VOICING & CONCERT PREPARATION CLASSES															
Advanced Voicing: Language & Technique - *David Barr*			⬭								⬭				Pierce Arrow
Aftertouch: The Secret of Ultimate Piano Performance- *La Roy Edwards and Kirk Ise*	⬭						⬭								Chicago
Concert Prep/Maximizing the Performance Grand - *Kent Webb*						●			●						New Orleans
From Rocks to Cream Puffs - *Don Mannino*							⬭						⬭		Pierce Arrow
Kawai Concert Grand Service - *Ray Chandler*		●				●									Pierce Arrow
HISTORICAL & SPECIAL INTEREST CLASSES															
Historical Temperaments - *Owen Jorgensen*								●				●			Cord
Player Piano Workshop - *Mark Haas*											⬭				Haas Shop
MIDI & DIGITAL TECHNOLOGY CLASSES															
PianoDisc — Servicing the System - *Don Dusenbury*	⬭														Knight
Servicing the Disklavier and Silent Piano - *Bill Brandom*			⬭										⬭		Royale
SYMPOSIA															
Communication for the 21st Century											●				Marquis Ballroom
Faces of Success						●									Marquis Ballroom
VISUALLY IMPAIRED CLASSES															
Business Techniques - *Wim Blees*	●														Dallas
The Finer Points of Regulation - *LaRoy Edwards*				●											Dallas
Understanding the Use of Partials in Tuning - *Fred Tremper*		●													Dallas
Using the PTG Business Resource Manual - *Wim Blees*			●												Dallas
COLLEGE & UNIVERSITY TECHNICIAN'S FORUM															
Mini-Forums - *Dennis Johnson*							●								Indianapolis
From Hammer to String - *Stephen Birkett*								●							Indianapolis
EXAM CLASSES															
Written															
Preparing for the PTG Written Exam - *Randy Potter*			⬭												Cord
The RPT Written Exam - *Mike Carraher*							●								Stearns
Technical															
Preparing for the Technical Exam - *Mike Carraher*											●		●		Cord
Technical Examiner Training - *Curtis Spiel, Mitch Kiel*														●	Cord
Tuning															
Preparing for the PTG Tuning Exam - *Mike Carraher*	●								●						Royale
Tuner Examiner Training - *Teri Meredyth, Mitch Kiel*							●								Cord
REBUILDING SEMINAR															
Bridge Construction & Duplication - *James Reeder*									●						San Francisco
The Business of Rebuilding - *Ed Dryburgh*				●											San Francisco
Efficient Destringing and Restringing - *Ken Hannah*								●							San Francisco
Grand Pinblock Replacement - *Andre Bolduc*						●									San Francisco
Jigs-Fixtures-Tooling - *Shawn Hoar*											●				San Francisco
Soundboard Construction and Replacement - *Nick Gravagne*							●								San Francisco
Soundboard Repairs: Teardown to Reassembly - *David Vanderlip*			●												San Francisco
Woodworking for the Rebuilder - *Andre Bolduc*												●			San Francisco

PLEASE NOTE: The schedule of classes is subject to change prior to the 1996 Convention & Technical Institute in Dearborn, Mich. Please refer to the Program Guide which will be distributed at the Convention.

	1	2	3	4	1	2	3	4	1	2	3	4	1	2	ROOM
APPLIED SKILLS: HANDS-ON WORK STATIONS															Houston
($20 per session)															
HANDS-ON - REGULATION ($35 per session)															
Grand Regulation - *Kathy Smith and David Vanderlip*															Phoenix
Vertical Regulation - *Brett Dearing and Bill Spurlock*															Phoenix
TUTORING CLASSES ($20 per session)															
Beat Rate Tutoring															*Room*
Comprehensive Tuning for Advanced Students															*Assignments*
Electronic Tuning Tutoring															*Will*
Octaves Tutoring															*Be*
Temperament Tutoring - Basic															*Given*
Temperament Tutoring - Intermediate															*After*
Temperament Tutoring - Advanced															*Registering*
Unisons & Stability Tutoring															
	SATURDAY *Classes will be 40 minutes each during 2nd Period* 10:30-11:10 / 11:20-Noon														
MINI-TECHNICAL CLASSES															
Business															
A Course of Action - *John Ragusa*															Stearns
Economic Freedom: Fact or Fiction? - *Beverly Kim*															Stearns
Where are We Going? - *Lloyd Meyer*															Atlanta
What's Wrong with This Picture? - *Kathleen Gilkey*															Los Angeles
In-Home															
Add a Little Splice to Your Life - *Jeanni Grassi*															Royce
Damper Rails - Dale Probst															New Orleans
Fitting the Pedal to the Pianist's Foot and Style - *Joyce Meekins*															Chicago
Forty Practical Tips for In-Home Servicing - *David Patterson*															Knight
Grand Keybed and Keyframe Treatment - *Paul Bruno*															Houston
Home Spiff the Vertical - Kerry Symes															Indianapolis
The In and Out of Player Actions - *Herbert Lindahl*															Bugatti-Royale
What's the Point of the Hammer? - *Bruce Christensen*															Indianapolis
Rebuilding/Shop															
Brass Rails and Brass Agraffe Annealing - *William Balamut*															Washington
Fast and Efficient Keyframe Prepping - Peg Browne															Washington
Production Pinning and Bushing for the Shop - *David Brown*															Rolls
Something Got Lost in the Translation - *Margie Williams*															New Orleans
Speed - *Kim Fippin*															Knight
Tail Length: How Important is It? - *Peter Collora*															Pierce Arrow
Two Easy to Make Jigs for Precise Hammer Hanging - *Tom Servinsky*															Bugatti-Royale
Tuning and Voicing															
Pitch Raise Method Using A Sanderson Accu-Tuner - *D Knudtson*															Cord
Hammer Shape and Tone - *Doug Wood*															Atlanta
Grand Regulating and Voicing Highlights - *Eric Schandall*															Houston
Piano Tuning 101.5 Basics and Beyond - *Sid Stone*															Franklin
SAT as Aural Teacher - *Mitch Kiel*															Cord
Tuning Stability - *Richard Ruggero*															Franklin
Miscellaneous															
Audio-Visual Techniques for Piano Technicians - *Bob Anderson & Alan Eder*															Chicago
De-Mystifying Perfect Pitch - *Isaac Sadigursky*															Los Angeles
The Glues We Use - *Bill McKaig*															Rolls
Piano Prep School or Crate Expectations - *Allan Gilreath*															Pierce Arrow
Video Action Analysis - *Rick Florence*															Royce
EXHIBITOR SHOWCASES															
Brooks, Ltd.															New York
Webb Phillips & Associates															New York
PianoDisc															New York
Pianotek															New York
Steinway & Sons															New York

Passages

A Life in Tune

John W. Travis

John W. Travis

July 21, 1914
April 2, 1996

John Travis, 81, died peacefully on Tuesday, April 2, 1996 at the Shady Grove Adventist Hospital in Rockville, Md. He had suffered complications after surgery to treat an aneurysm in his brain, and had been in the hospital since March 1.

Originally from the small town of Blackford, Ky., he was one of eight children whose father was a band and choral director, and from whom he received most of his early training. He began tuning pianos at age 14, so upon retirement in 1992 he was proud to say he'd had 64 years experience! His early musical activities included high school band, orchestra and chorus, and writing musical compositions for each.

He was an outstanding and very active student, receiving academic honors in both high school and college. He graduated with a B. Mus. Ed. degree from what was then Murray State Teachers College in 1938, and was one of ten outstanding seniors listed in *Who's Who in American Colleges* that year. He had put himself through school tuning pianos, and the same year he graduated he also joined the National Association of Piano Tuners, at age 24.

In the spring of 1942 he enlisted in the U.S. Navy. He was accepted as instructor, head tuner and instrument repairman for the Navy School of Music, which first brought him to the Washington, D.C., area that year. He had "sea duty" whenever called to tune the piano on the Presidential yacht. He was married in July, 1943 to Genevieve Roemer, of Bowling Green, Ky. During the war he began writing what would eventually become "Let's Tune Up" (first edition, 1968), a highly regarded and uniquely comprehensive primer in piano technology, originally conceived as a handbook for Navy band technicians. After his honorable discharge from the Navy in 1946, he soon became a concert tuner for the Campbell Music Co., then the local area Steinway representative, and as such tuned for most of the famous pianists of the day, including Arthur Rubenstein and Vladimir Horowitz.

Early in the 1950s, he became an independent technician, and began building a large and happy clientele, and helped to raise a family of four children. During this time he began writing the text and collecting some of the stringing scales for his book "A Guide To Restringing" (first edition, 1961). Professionally, he had long been active in the National Association of Piano Tuners (NAPT), and was President (1955-57) at a time when NAPT was moving to merge with the American Society of Piano Technicians (ASPT) to form the present-day Piano Technicians Guild, Inc. (PTG). He became one of the first Co-Presidents of PTG, along with Errol Crowl, at the new organization's first convention in Washington, D.C., in 1958. He helped institute continuing education classes at PTG conventions, and was one of the first convention instructors in modern tuning methods.

During the 1960s he published first editions of both his books, but began to experience eye troubles late in the decade which would plague his later years. In the 1980s, he taught an introductory course in piano technology at Montgomery College in Rockville, Md., while tuning and servicing pianos there. For his exceptional contributions to his profession as an inspiring leader, author and educator, he was given PTG's two highest honors, induction into the PTG Hall of Fame (1976) and the Golden Hammer Award (1993).

Throughout his professional career he maintained a keen interest in music, especially in choral performance and composition. He was one of the charter members of the Choral Arts Society of Washington, choir member of the Calvary Baptist Church of Washington, choir director of the Anacostia Methodist Church, Petworth Baptist Church, and Metropolitan Baptist Church of Washington as well as the First Baptist Church of Hyattsville, Md., and choir member of the Takoma Park Presbyterian Church and the Wallace Memorial Presbyterian Church in Hyattsville. In addition, he wrote and arranged a number of works for church choir. It broke his heart when his failing vision eventually did not allow him to continue with either music or piano work at all, but he had, by the time of his passing, overcome the last of several bouts of depression and had made many new friends and a new life for himself. In his last years, all he had was the love of friends and family and an abiding faith in God, and that was enough to sustain his spirit.

Survivors include his wife of 52 years, Genevieve; four children, John, Jr., Genevieve Wheeler, Michael and Jeffrey Travis; three grandchildren, Kathleen DeCampos, Debora Fitzgerald, and Troy Travis; a great-granddaughter, Cortney DeCampos; a brother, Cecil, and sister, Lyda White.

On behalf of the family, I would like to express our gratitude for the many cards, calls and flowers received. Expres-

Continued on Next Page

Passages

Utah Valley Chapter Charter Member Passes On

M. Jack Reeves
April 3, 1996
Sept. 23 1938

M. Jack Reeves, 57, of Orem, Utah died suddenly on Wednesday, April 3, 1996 of a heart attack while at work at Brigham Young University, where he had been employed for nearly 18 years. He was born Sept. 23, 1938 in Ogden, Utah, and was reared in Long Beach, Calif., where his parents moved the family when he was five years old. Jack served a two-year mission for his church in Guatemala and later graduated from BYU. He married Irene Excell on Aug. 28, 1964 in the LDS Idaho Falls Temple. He leaves his wife and eleven children ages 7 to 30 with many wonderful memories.

Jack was actively engaged in the Boy Scout movement and other youth programs all of his adult life and blessed the lives of many people with his selfless and bounteous service. A fine musician, Jack played guitar and sang in various dance bands for more than 40 years.

He joined the Piano Technicians Guild as a charter member of Utah Valley Chapter when that chapter was organized in 1968. He was a CTE almost from the inception of the new PTG testing program and served faithfully and selflessly in this important work as well. Jack started and supervised the piano tech discussions that are available on the Internet from BYU. He was always more than willing to share with anyone his knowledge of and love for the piano. He will be fondly remembered and greatly missed by all of us.

— Merrill W. Cox,
Utah Valley Chapter

Former Band Director and Technician will be Missed

Jack D. Perkins
March 9, 1996
Sept. 8, 1933

Jack D. Perkins, 62, died Saturday, March 9, 1996 at his residence in Marion, S.C.

Born Sept. 8, 1933, in Gilliam, W. Va., he was a son of the late Abe Franklin and Inez Brown Perkins and the husband of Dr. Carol Perkins. He had been the high school band director in Peterstown, W. Va., Independence, Va., and at Marion High School. He was a member in good standing of the Piano Technicians Guild, and a Charter Member of the Palmetto Chapter. Jack was a member of the First United Methodist Church, where he had formerly been the choir director.

Survivors include daughters Jennifer Daniels of Marion, Jaqueline Perkins of Parma, Italy and Susan Hernandez of Greensboro, N.C.; brothers Floyd Perkins of Galion, Ohio and William Perkins of Vancouver, Wash.; and two grandchildren, Ashley and Chelsea Daniels, both of Marion.

Carol, Susan, and Jaqueline all took part in the music at Jack's funeral. I'll never know how they managed it during such a time of sorrow, but it was music from heaven, fit for a king.

Jack was a delight to have as a fellow PTG member. His sense of humor kept us smiling; and his inquisitiveness kept us all in the mood to learn. He will be missed by all who knew him. Now we bid farewell to a friend, Jack Perkins, gone from this life at age 62.

Cincinnati Donation Honors Bany

There are many of us still with tears, still with anger at the murder of Michael Bany. He was a good friend, a fine musician, and a dedicated RPT. Therefore, the Cincinnati Chapter wishes to channel some of that grief and hurt into something positive in Michael's memory. So, in addition to contributing to the Bany Memorial Scholarship fund, we have donated $500 for the PTG Foundation.

— David L. Jackson, RPT
Cincinnati Chapter

Continued from Previous Page

John W. Travis

sions of sympathy may also be made in the form of a contribution in John's name to the Piano Technicians Guild Foundation, 3930 Washington, Kansas City, MO 64111-2963, or to the Wallace Memorial Deacon's Fund, Wallace Memorial Presbyterian Church, 7201 Sixteenth Place, Hyattsville, MD 20783. In addition, if you have any anecdotes or remembrances of John you'd like to share, you may forward them to the family c/o the PTG Home Office. Perhaps if there is interest, these could be collected and published at some future date.

From the outpouring of support and sympathy, it is a consolation to know that my father's uniquely positive, overflowing enthusiasm for people, music and pianos will be long and fondly remembered by those whose lives he touched.

— Michael Travis, RPT

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1819 RAMBLING RIDGE LANE #201
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REGION 7

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2468 AUANIPERO WAY
MEDFORD, OR 97504

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.

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

October 3-6, 1996
NYSCON
Rochester South Holidome, Rochester, NY
Contact: Robert Edwardsen
716-586-1360
Rochester, NY

October 25-27, 1996
NORTH CAROLINA REGIONAL CONFERENCE
Sheraton Airport Hotel, Charlotte, NC
Conference Director:
James Baker, RPT (704)366-8466
Registration Contact:
Lewis Spivey,RPT (919)937-4777
15 Rachel Drive,
Nashville, NC 27856

October 31 - November 3, 1996
TEXAS STATE ASSOCIATION CONVENTION
Inn on Lake Travis, Austin, TX
Contact: Mike Pope
512-869-4707

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AUXILIARY EXCHANGE

Dedicated To Auxiliary News and Interests

Conventions an Investment

This will be a very fast message this time. You see, I'm going about 600 mph right now, and I'm about 35,000 feet high. Claudia and I are in a Boeing 767, one hour away from landing. We were on the east coast attending the national convention for my profession. I am a professional land surveyor, licensed in the State of California. This year our convention was held in Baltimore.

Land surveyors have a number of organizations throughout the nation. This convention was the big one. It was three organizations in cooperation. The exhibits were incredible. I've never seen so many exhibitors for our profession at one time before. It was the NAMM show of the land surveying Profession. Computers, global positioning systems (GPS), geographic information systems (GIS) as well as laser levels and automatic measuring devices we call "Total Stations" with data collectors that download directly to our office computers.

Many government agencies both attend and exhibit at this convention, too, like, Federal Emergency Management Agency (FEMA), United States Geodetic Survey (USGS), Air Force, and Corps of Engineers to name a few. You see, land surveyors are an integral part of each of those agencies. Land surveyors make the measurements and the maps for many government agencies, using GPS as well as Total Stations and aerial photogrammetry.

L. Paul Cook
PTGA President

If you would like to see what my company does, please visit our web site on the Internet. You can find it at http://www.dolphin.net/cwcook/

Now, it's almost time to start packing for our convention, the PTG Convention. I hope you have your reservations by now, including your room. Conventions bring many friends back together again, from all parts of the world. Conventions help us through learning important things we can take back to our business, which will help us succeed. Conventions really don't cost money, they help us make more throughout the year. Think of going to the convention as an investment in your future.

We have worked hard to put together some very beneficial classes for you this year. Yes, the auxiliary members can and should learn at these conventions, too. The land surveyors welcome the spouses to all classes, lectures and exhibits for the very same reasons. This is true at all the professional organizations I am a member of, which is more than six at the present time. My company does much more than land surveying. We do civil engineering, land planning, computer graphics and animation. Then we provide expert witness work for many court cases.

Continuing education is paramount to any profession. We're coming in for a landing, so I'm signing off for now. I encourage you to attend and you should encourage others to attend this and other conventions throughout the year. Who knows. You might even have fun at it, too, I know I will.

See you next month!

Michigan has some of the largest trucks I've ever seen. Their 18-wheelers have 42 wheels.

June is for Brides

June is busting out all over! Or, at least, that is what the song says. I suppose by now brides all over the country are walking down the aisle and planning their new lives with their one and only. Or, at least, for a few years, or so the statistics say. What is it about June that makes it good for a wedding? Well, first of all, the weather is good for the backyard wedding. After all, father has been pruning and trimming all spring and he wants everyone to see his handiwork, right?

The weather is also great for all the traveling wedding guests and relatives have to do to arrive on time. It beats the canceled and late departed planes of the winter months.

Of course it helps with the flower bill, too. Just think of all those flowers that are in bloom in June that you don't have to buy from the florist. Oh, that helps the pocket book, doesn't it?

One does not have to heat the church in June. Believe me, the good Lord does all that for us. At least he did for my June wedding. My father nearly fainted walking me down the aisle in the 96 degree heat. And I am talking about back in the days before air-conditioning. Most of this group can remember back that far but for you young ones out there, it was miserable, no doubt about it. The hair-do done the day before was all out and we had to make do with hair tied back and in a bun. Mercy!

Today, however, the church is air-conditioned and you can get dressed in the little rooms that all of the churches provide for those things now so you don't have to dress at home, ride in a small car with dress all over the place and mostly caught in the door, and then walk up the steps of the church and trip on the steps in your new shoes.

Oh, hum! Now if I had to do it all over again, which God forbid, I hope I never have to, I would do what my younger son just did. I went up to Chicago to work in his office and manage things while they took a much needed vacation. They were working all hours of the day and night and all be it, they are young, a body can take so much, right? Well, they went to Myrtle Beach, now is that in North or South Carolina? Well, anyway, it rained all weekend as it does on any well-planned vacation, so they went to this little chapel on the boardwalk and — you guessed it. They got married!

The couple who runs the wedding chapel provided everything. And I do mean *everything.* The man reads the ceremony and the woman plays the tape recorder and takes the pictures. The dress is borrowed, the flowers are all fake, although you would never know it from the pictures; the rings are dime-store variety because they did not have time to buy them there, and the cake is a beautiful cardboard variety.

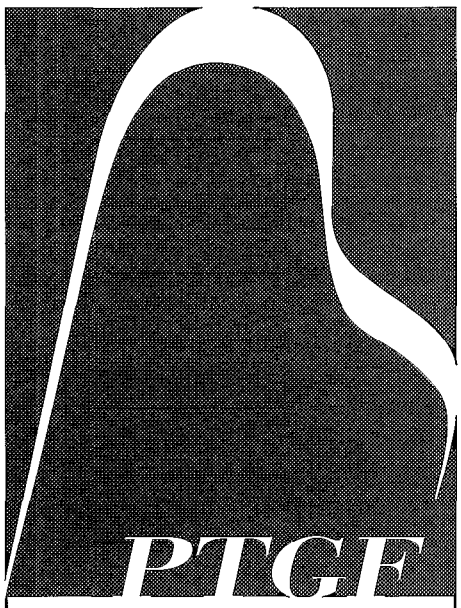
When I picked them up at the airport the next week, we drove home, talked about what went on in the office while they were gone and an hour later, they said, "We got married last weekend!" You could have knocked me over with a feather. They had to show me the pictures and the video before it sank in. Their only regrets were that mom and dad were not there.

Now look at the practical side of the picture. They both had apartments so surely didn't need any more toasters or placemats (which I received five sets and haven't used any of them) and mainly, look at the money they saved. Now they can buy that new washer and dryer which I couldn't afford because my dress and shoes and everything else cost too much. She doesn't have to write those dreaded "thank you" notes to people she doesn't even know, like Aunt Lizzie from Baltimore! And best of all, the bills won't be coming in every month for a year just to pay for the wedding. Way to go. And they are just as happy as those couples who spend thousands of dollars for their wedding, maybe even more so!

As they said to me many times over, "Mom, this is the nineties!" I guess I just have to get with the program. Have a very happy June, wedding or no.

— Phyllis K. Tremper,
Immediate Past President
Auxiliary

Agnes Huether recently donated $15 to the PTG Auxilliary Scholarship Fund in memory of Ginny Russell.



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The work of collecting, organizing and preserving our past must be an ongoing part of our present. Your donation of money or historical materials will allow us to continue this important work. You may also designate the PTG Foundation as the beneficiary of your PTG death benefit. Contact the Home Office for details.

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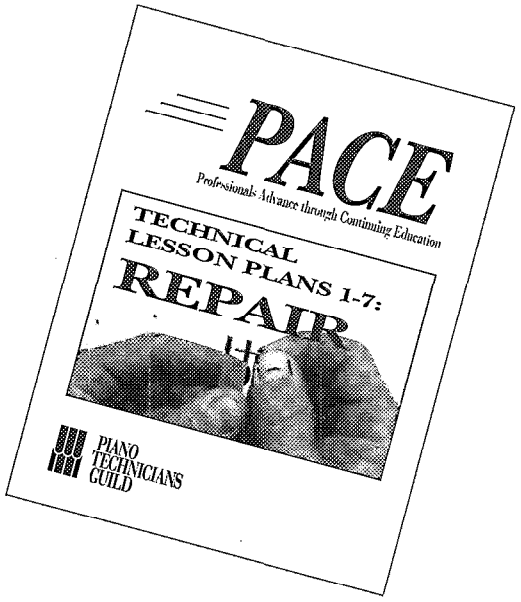

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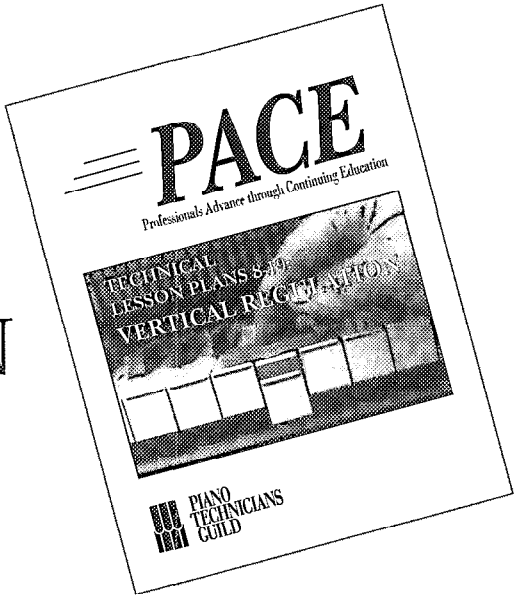

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PianoDiscussions™

June 1996

News From The World of PianoDisc

Looking for info? Try us on the Net

Music Systems Research, maker of some of Americas most technologically advanced musical products, has just opened a site on the world's most technologically advanced communication network. Internet users can surf on over to **www.pianodisc.com** for all of the latest information from MSR.

"Our link with everybody in cyberspace is a great way to introduce new products, show product spec sheets, report on what's happening with the Artist Series and showcase our incredible music library. News will be reported almost as fast as we make it," reports MSR President/Marketing Gary Burgett.

"Using the Internet gives us a unique way to reach potential customers and dealers. It opens so many new doors," continued Burgett. "We realize just how powerful the Internet has become, and believe the exposure it gives us is invaluable."

"Customer E-mail inquiries will be handled by the MSR sales support staff with referrals to our dealers, when applicable," continued Executive Vice President Tom Lagomarsino. "Future plans for the site call for a tech support page and several other exciting features."

TRAINING SCHEDULE

• June 17-22 • August 19-24
September 23-28

CONTINUING EDUCATION

• June 24-26 • August 26-28
September 30-October 2

MSR/PianoDisc
4111 North Freeway Blvd.
Sacramento, CA 95834
Phone: (916) 567-9999 • Fax: (916) 567-1941
Tech Support: (619) 258-1460 or (916) 567-9999

Tuition for the installation and Continuing Education seminars is **free**, but a $50.00 refundable deposit is required for confirmation. The PianoDisc Continuing Education Series seminars are restricted to PianoDisc certified technicians in good standing. For more information about attending a PianoDisc Installation Training seminar or a Continuing Education seminar, call PianoDisc during our office hours.

MSR buys Mason & Hamlin

Landmark purchase gives MSR/PianoDisc owners M&H, Knabe, Sohmer, Steck and Falcone lines

Music Systems Research/PianoDisc owners Gary and Kirk Burgett have recently acquired the Mason & Hamlin Piano Company. Purchase of the firm's assets was approved by the Bankruptcy Court of Worcester, Massachusetts, ending months of planning and negotiations by MSR and over two years of legal battles between the previous owners and creditors. The Burgetts were backed in their bid for control by the creditors' committee. An important factor in influencing the decision was the track record the Burgetts have established since starting production of PianoDisc in 1989. Since its introduction to the marketplace, sales for the firm have increased an astounding 500 percent. MSR is now ranked as one of the world's top music companies by *Music Trades* magazine.

Gary Burgett in Mason & Hamlin's factory showroom, Haverhill, Mass.

Among Mason & Hamlin's assets are the Knabe, Sohmer, George Steck and Falcone piano lines which are not currently in production. Initial operating plans for the firm call for manufacture of Mason & Hamlin pianos in the Haverhill, Massachusetts plant. In addition, plans are being discussed for the other lines, as well as pianos to be used in support of the PianoDisc player product.

"With the recent exit of Kimball from the piano business, there is an opportunity to fill several gaps in the marketplace," remarked Gary Burgett.

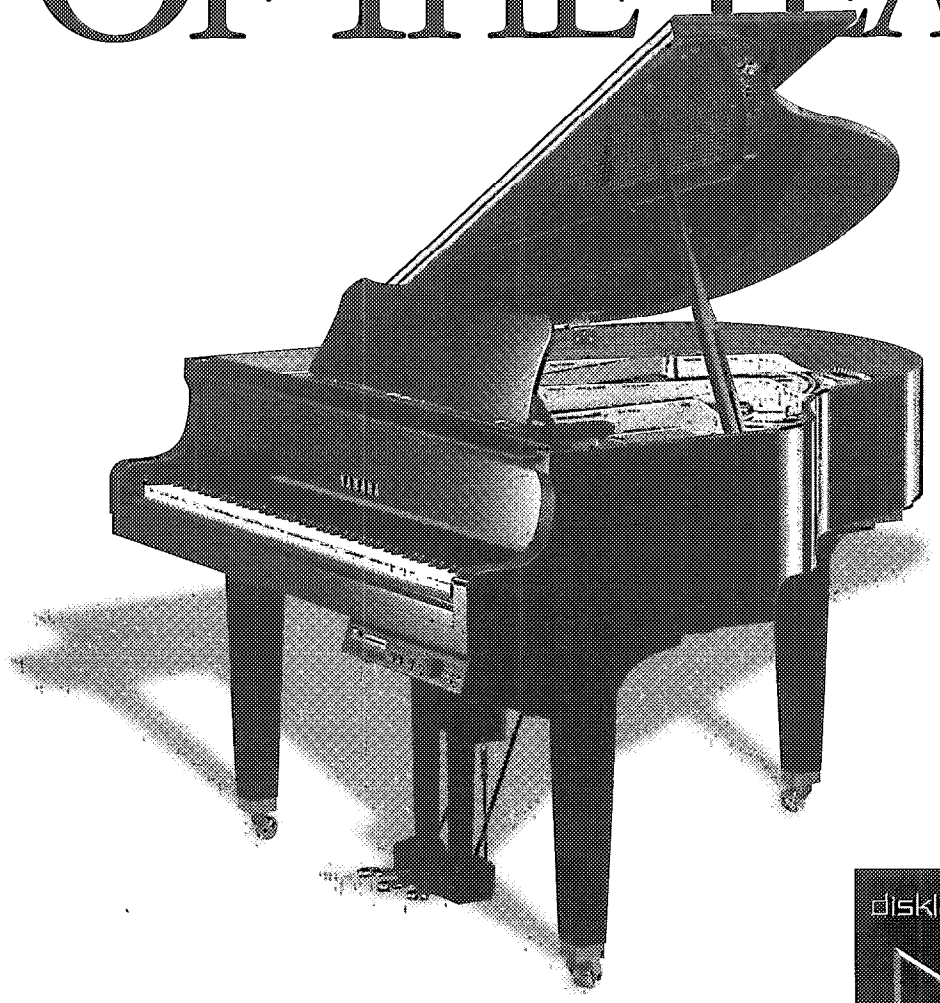
Enthusiasm at MSR for the new acquisition is best summed up by Kirk Burgett: "We are thrilled to be involved in bringing Mason & Hamlin back to its position of prestige in the piano industry. Carrying on the traditions of the great piano artisans is exciting. Owning Mason & Hamlin fulfills a lifelong dream for both Gary and me."

QuietTime, PianoDisc classes available at PTG '96 National Convention in July

Mark your calendar and make your reservations soon for the Piano Technicians Guild's '96 National Convention in Dearborn, Michigan. The dates are July 17-21, the place is the Hyatt Regency Dearborn. PTG officials expect the convention to be one of the biggest and best ever.

We at Music Systems Research are doing what we can to insure that attendees can make the most of their time in Dearborn. We'll be offering classes that can result in increased income for the participants: two three-hour QuietTime installation/service seminars; and two three-hour PianoDisc classes on troubleshooting the system. MSR sponsored classes have always been popular with PTG conventioneers, and since space is limited, make your reservations early. For the PTG sponsored PianoDisc classes, follow your convention material instructions. For the QuiteTime seminars, call us at (916) 567-9999.

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.