

A nuts and bolts guide to the new Young Chang G-208.

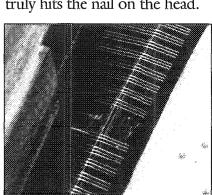
Our engineers are obsessed with the little things because they recognize the importance of attention to detail. But lately, they've become equally obsessed

stability, and offers a longer soundboard lifetime. We're so pleased with this new design, we're now incorporating it into all our grand pianos. then terminated in equal length offering improved sustain, projection and clarity.

Together these innovations create an instrument with a rich,

full sound, greatly improved response and a remarkable evenness of tone throughout the entire range of the keyboard. Our engineers set out to design an

instrument offering outstanding tone and performance for the stage or studio. And we think the Young Chang G-208 truly hits the nail on the head.



Because strings bear against a replaceable brass rod, tuning control is improved.

For technical information on our new G-208 grand piano, write to us at Young Chang America, Inc., 13336 Alondra Blvd, Cerritos, CA 90701. Or call 310/926-3200, ext. 237.

YOUG & CHANG
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fundamental formation of the set out to instrument of standing tone and provided the set of the set out to the

with big things, and the result is 6'10" long. Our new G-208 grand is a departure for us and represents the smallest and largest of our latest innovations.

The G-208 is a 6'10" grand piano of an entirely new scale design. It features our new "Asymmetrically Crowned" soundboard which places the highest part of the crown in each rib directly under the bridge providing maximum support under the downbearing pressure of the strings. This new soundboard design exhibits improved power, projection and tuning

The G-208
features a hard
brass bearing rod
in the Capo DiAstro
bar. Because steel
and brass are a selflubricating combination,

we've discovered a brass rod offers better control of strings during tuning. In addition, the brass rod is easily replaced later in the life of the instrument eliminating the need for reshaping of the capo bar.

We also took a close look at our action and developed an all-new action design which improves response without loss of projection or clarity.

Our new double duplex system terminates the strings at the rear of the bridge and near the tuning pins with duplex bars. Both duplex lengths of the strings for each note are

CASES GENCK

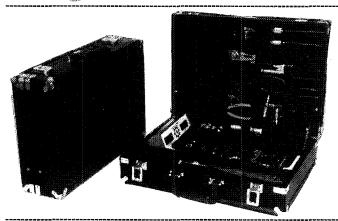
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This snap of member San French of the Sacramento Valley Chapter illustrates one simple premise: never, EVER mess with a man who's chiseling! (Copyright 1993, Frank Pedrick)

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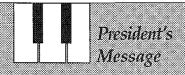
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Resolution On Educational Goals

This July, the PTG Council will consider the following resolution:

Whereas the PTG Bylaws state that the first priority is to provide continuing education in order to promote professional competency, and

Whereas this continuing education then promotes technical competency, benefiting all members as well as consumers of our members' services, and

Whereas PTG remains the primary source of both entry level and continuing piano technology information for its membership, while other industry sources of educational opportunities are being forced to cut budgets and programs,

PTG hereby accepts and endorses the following educational goals and priorities:

- To define and promote minimum standards of professional competency.
- To outline the curriculum of study that leads to achievement of those standards.
- To work with piano technology schools, piano manufacturers, and all subordinate bodies of PTG to efficiently deliver educational programs based on that curriculum.
- To provide technical information and business resources for the members of PTG.

The debate of this resolution will actually be a policy discussion aimed at defining PTG's role in the education of piano technicians. Most members say that the greatest value of membership is the learning and sharing of knowledge; however, PTG has never

identified itself openly as an educational organization. At this Council, we will ask the question: is education really PTG's first priority?

To answer this question to our satisfaction, we must consider our history, our industry, our economy, and our intentions. Here are a few points to ponder as you and your chapter begin to consider this resolution and its meaning:

Most PTG programs are education-oriented: the Journal, our Institute, the RPT examination, our publications and business aids. Seminars, conventions, and chapter meetings exist primarily to provide educational opportunities. Traditionally, some have said that our role is to provide continuing education only, that beginning technicians should find basic education elsewhere. However, the reality is that many members join PTG to learn the trade. This has always been the case, and may be an increasing trend. The number of technicians who have received all of their piano technology training through PTG is rising.

Thus, we have a dilemma. We are not set up to train the next generation of technicians. We have neither the funds nor the resources to be a school. Yet, our members are using us for this purpose, most successfully. The line between continuing and basic education is increasingly blurred.

Meanwhile, how are schools of piano technology faring? The number of schools is shrinking, while declining enrollments put others in jeopardy. Is the cost of a residence school too high compared with the earning potential of a new graduate? Are we seeing a change in how people choose to learn? Correspondence schools have become popular options. Since many people choose piano technology as a second career, they are often unwilling to leave an established

home to pursue an education. Is this trend likely to continue?

How will the decline in new piano sales affect PTG's educational programs? For years we have regarded the piano manufacturers as the "deep pockets" in our industry. Now we see many cutting back on technical staff and funding. Can manufacturers continue subsidizing our Institutes and seminars by providing instructors, pianos and resources at little or no cost? Will we see even more factories closing, if new piano sales continue to decline?

Are traditional learning opportunities disappearing? Once many technicians were trained in the factories, but now many factories have closed. Manufacturers are operating with tight cost controls and tend to employ more hourly workers; training programs to augment these worker's skills are difficult to fund. And formerly, many major cities had large rebuilding shops that employed apprentices. Now many of these shops have downsized or their owners find they are unable to devote time to training due to the pressures of business.

Even in PTG chapters, the number of RPTs able to take on a student seems in decline. Many Associates say that they are unable to find a mentor. And many RPTs

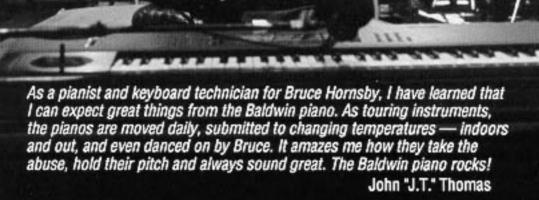
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Bruce Hornsby



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President's Message Continues—...Resolution On Educational Goals

have reported "burnout" from the experience of training potential technicians.

To be frank, it now seems that PTG is the primary educator of piano technicians in North America; this is the task that has come to us. We are living in changing times and must prepare for the twenty-first century by making the best decisions possible. This Council will attempt to analyze current realities and chart our course for the future. Our success will depend upon our ability to accept those realities and our willingness to seize the opportunities that come along with them.

Although we might wish for a different set of realities (booming piano sales, highly trained technicians joining PTG, expanding factory schools), it is important to recognize

that we do have the ability to turn challenges into opportunities. Last year's Council dealt with concern over increasing numbers of Associates by resolving to improve educational opportunities for all members. Now the PACE program and the exam study guides are tools chapters can use to encourage upgrading while updating skills of all members. Watch for further innovations as we study ways to improve/simplify our exam delivery systems.

All our educational programs are under constant review. The *Journal* is our most important member benefit; many of your suggestions will be incorporated into a re-format of this magazine which will debut in May. Further, Institute attendees have asked for more new classes at our annual convention as well as more hands-on

training; again PTG will act...you already have the Kansas City class schedule which implements these member requests.

PTG is entering an exciting era, coming of age to accept the challenges of a changing time. The Board spent long hours in January grappling with these issues, studying the report of the Educational Panel and exploring our role in the industry. By presenting this resolution, the board intends to carry this discussion to the entire membership. In this column next month, we will look at a few strategies for action to come before Council in July. There are exciting possibilities just ahead.

Tune in to a new career opportunity...

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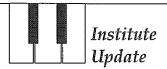
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Something New For Everyone

Steve Brady, RPT . Institute Director

he 1994 PTG Institute in Kansas City this July will feature a number of new ideas

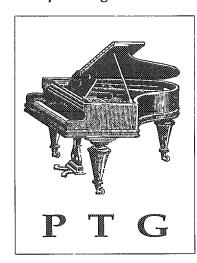
in curriculum and presentation. Some of these, such as the symposium series and the PACE Academy, have been outlined in recent articles. You should be receiving the official convention brochure soon, if you haven't already. In response to members' requests that we make the brochure more accessible and informative, we are including this year a letter-code which indicates the approximate level of the material to be

presented in each class. This way, you will be less likely to attend a class which is either way below or way above your own level. The codes are B=Basic, I=Intermediate, A=Advanced and E=Everyone.

In addition, we are returning to a format which has been used in some previous years, where classes are grouped into general topic areas. Even though some of the classes seem to defy categorization, or perhaps belong in two or more different areas, I feel that this system of listing the classes has definite advantages in ease-of-use over a strictly alphabetical listing.

We are proud to introduce a good number of classes which are brand-new this year, at least in the sense that they are being offered for the first time as full-length classes at the Annual Convention. The classes mentioned in this article are drawn entirely from these *new* classes.

Expanding Horizons



Cultivating Artisans

In-Home Service & Repairs Classes

Chris

Trivelas, co-developer of the Fandrich Vertical Action, presents a new class called Effectiveness-Based Piano Service. Chris will help you tailor your piano service business and technical procedures to your own personality, circumstances, and ambitions.

Scott Jones of Steinway introduces

a class called 88 Ways To Better Steinway Service. This wide-ranging program will give you helpful tips for all aspects of piano service, resulting in better, faster, more stable service.

In what is sure to be a hit class, the legendary Norman Neblett teams up with outstanding technician and writer Nick Gravagne to demonstrate two approaches to Getting The Most Out of a Good Grand. Nick and Norm will each work on a very different kind of grand, and will show you techniques of piano refinement gathered through decades of experience.

Karen Robinson's new class on *Grand Damper Service in the Home*, subtitled *Mastering the Beast*, will provide you with the knowledge you need to approach grand damper problems with confidence.

In a related new class, Mary Smith presents techniques for regulating and troubleshooting Vertical Dampers.

Kawai's **Ray Chandler** offers a new class on string replacement techniques and string behavior: *The Ins and Outs of Piano Wire*.

Finally, **Jim Harvey** weighs in with a new look at methods and tools for in-home service, guaranteed to provide quality repair results in record time.

Tuning Classes

Michael Kimbell, whose articles have graced the pages of recent *Journal* issues, presents *Advanced Tuning: A Wealth of Intervals*, a class designed to help a good tuner become a great tuner.

Former contributing tuning editor **Bill Ballard** will help you get *The Handle on Your Hammer* with his new class on tuning hammer technique.

Christine Lovgren of the North Bennet Street School in Boston will teach a *Master Class in Temperament Tuning*, which includes analyzing the pros and cons of different test intervals and patterns, and actually tuning a temperament as a group.

If you use the Accu-Tuner, **Dean Reyburn** can help you take your productivity and accuracy to the next level in his class, *Accu-Tuner to the Max!*

Piano Design, Construction and Materials Classes

Ken Sloane, head technician at the Oberlin Conservatory will present the results of his years of intensive research in *Analyzing the Checking Area in Grand Pianos*. Ken can show you the whole story of this important area and its impact on a piano's performance.

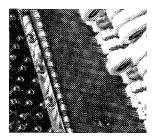
In a class not to be missed, Mason & Hamlin's Paul Monachino will demonstrate the lost art of cutting

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THIND THING

T'S THE FIRST THING THAT GOES INTO A WURLITZER PIANO.

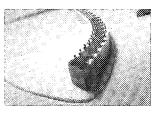
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<u>Institute Update Continues—Something For Everyone</u>

a set of damper wedge felts from a felt sheet, by hand. Paul may be the last person left in North America who has this incredible skill.

David Stanwood will offer a new class on *Hammer Weight and Action Leverage*. Learn how action leverage affects your choice of replacement hammers.

A trained physicist as well as a piano technician, Jim Ellis will teach us what every tuner should know about the physics of tuning and stability. Pins and Strings and Things will include a visual and aural demonstration of what happens to a piano during and after a tuning.

Finally, **Del Fandrich** will answer the questions "What glue should I use?" and "What lube should I use?" in his class on adhesives and lubricants, *Slipping and Sticking Your Way to the Top.*

Rebuilding and Shop Classes

Glen Hart (inventor of that wonderful butterfly spring tool and other great gadgets) will teach *Not Just Another Hammer Boring Class*, showcasing sophisticated methods and equipment for boring and installing grand hammers with factory speed and accuracy.

Acclaimed Kansas City rebuilder Greg Hulme presents his methods for restringing the grand piano, from tear-down to finished product, including pattern-making, rescaling, plate bronzing, agraffe replacement and more.

Bill Smith is the master craftsman who has hand-crafted each Golden Hammer Award presented since the beginning of time. He is a specialist at *Ivory Keyboard Restoration*, and will present in this class his methods for achieving original-quality ivory replacement and repairs.

Historical Interest Classes

New classes on *The Techniques* and Materials of Antique Piano Restoration (Edward Swenson) and Harpsichord Maintenance for the Piano Technician (Mike Reiter).

Remember, these are just some of the new classes awaiting you at the 37th Annual Convention and Technical Institute in Kansas City this July 6-10. Be sure to mark your calendar now for an educational experience you can't afford to miss!

Next month: A look at some of those truly outstanding classes from previous years which we'll be encoring for you in Kansas City.

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t's an interesting phenomenon. The moment one sits down to write about the activities and restaurants in the town where one lives, it's difficult to think of any! Kansas City is full of so many options, it is easy, on a day to day basis, to forget about all that is available in the City of Fountains.

Famous, in particular for steaks, barbecue, jazz and The Country Club Plaza, Kansas City boasts a plethora of entertainment and culinary possibilities. From dining to shopping; museums to amusement parks; performing arts to sports—you should be able to find it all in the metropolitan area known as Kansas City.

No Toto—you're not just in Kansas anymore. When you come to the 37th Annual Convention and Technical Institute in July, you'll be in Kansas City, Missouri. Kansas City is a bi-state metropolitan area which straddles the Missouri-Kansas state line. It includes more than 136 cities and 1.5 million people.

So where do all these people go for good food and fun? Well, from now through June, we'll be exploring a variety of activities and places available in America's Heartland. This month, we'll concentrate on activities in and around Kansas City, which are not within walking distance from convention headquarters, but may be of interest to those who want to include some family time with convention time.

Eating well in KC is not a difficult thing to do. In other words—you name it, we more than likely have it. Of course, good steaks and barbecue helped make this city famous. There are literally hundreds of places to choose from. At the end of this article, we'll try to narrow them down, at least a little. Our vegetarian friends will also be glad to know there are Chinese, Continental, French, Greek, Italian, Japanese, Mediterranean, Mexican and Middle Eastern choices (to name a few), all offering full menus sure to accommodate.

"Forget the food, we want to shop!" you say. Well, not to worry.

Kansas City Will Offer An Excellent "Convention-Time" & "Family-Time"

By Jami Henry
Director of Communications

One of Kansas City's most popular attractions is The Country Club Plaza. Built in 1922, The Plaza is this nation's first shopping center. It encompasses 55 acres and more than 150 of the finest shops including Gucci, Saks Fifth Avenue, Polo, Jack Henry, Williams-Sonoma and much more!

The Plaza was modeled after Seville, Spain and reads more like an outdoor museum than your basic shopping center. Red tiled roofs, ornate ironwork, mosaics, statues and fountains offer a scenic trip you'll remember for years to come. And The Plaza is located just 5 miles south of the downtown area.

On the western edge of Kansas City, Missouri and just north of The Plaza, you'll find the historic district called Westport. PTG Home Office is located in the heart of the Westport area. More than 150 years ago, Westport business began to boom and it became a jumping off point for the Santa Fe, California and Oregon Trails. Civil War buffs are sure to be intrigued by the site where the Battle of Westport was fought that ended the Civil War in the West. Today, Westport is home to a wide variety of unique shops and boutiques and dozens of clubs for those interested in a little night life.

In addition to these shopping alternatives, there are literally hundreds of malls and outlets available throughtout the metro area. Further beyond the mid-town area, families enjoy Kansas City's own amusement and aquatic parks, Worlds of Fun and Oceans of Fun. Worlds of Fun is an internationally themed park which offers over 140 rides, shows and attractions including the nation's largest steel roller coaster. The Midwest's largest water park, Oceans of Fun, plays host to sand and water sports including a million-gallon wave pool, a children's water playground and giant water slide.

If outdoor entertainment is something you enjoy, Swope Park is home to the Kansas City Zoological Gardens. New renovation to the zoo has opened an Australian Walkabout that features free roaming kangaroo and emu, a new Red Panda exhibit and a new indoor restaurant. Scheduled to open this spring is the International Domesticated Animal Exhibit and African Elephant Exhibit.

Feeling lucky? The Woodlands, a 300 acre dual-track racing complex, features greyhound racing year 'round and quarter horse racing August-November.

If history and museums interest you, then pick a topic. Kansas City is sure to have a museum about it. And of course, the nation's 8th largest museum of history and art is located just a few blocks east of The Plaza area. The Nelson-Atkins Museum of Art is home to over 50,000 works of art dating from 3,000 B.C. to the present. With an extensive Asian collection and paintings by masters like Monet, Degas, van Gogh, and Rembrandt; plus the Henry Moore Sculpture Garden featuring 13 of his larger-than-life works, it's a day of adventure all by itself.

Children young and old are sure to enjoy the Toy and Miniature Museum. Located in a 1911 renovated mansion, there are over 500,000 miniatures, antique toys, doll houses and furnishings dating from the mid-1800s to present day. Leave plenty of time for reminiscing with this one!

Other museums include: The Liberty Memorial, a Monument to Peace devoted exclusively to the First World War and America's involvement in the Conflict; American Royal Museum and Visitors Center, an expansion of the American Royal Complex which offers the chance to learn more about the American Royal Livestock, Horse Show and Rodeo and the role of agri-business in our lives; Arabia Steamboat Museum, a new museum featuring over 200 tons of recovered "treasure" from the sunken 1856 steamboat "Arabia"; Thomas Hart Benton Home and Studio, featuring a self-guided tour of the home and studio of this famous Missouri artist; Black Archive of Mid-America, a museum dedicated to one of the nation's largest collections of black art, paintings, sculptures and research of the Kansas City area and famous black leaders; Jesse James Bank Museum and Farm Home, the bank museum is the site of the world's first daylight peacetime bank robbery -executed by the infamous James Gang. The Farm Home near Kearney, MO, includes original furnishing and the gravesite of Jesse James; Kansas City Fire Museum, a turn-of-thecentury fire station which houses the historic and educational memorabilia of vintage pumpers and hook and ladder trucks; Lewis & Clark Point offers a view of the connection of the Kaw and Missouri Rivers and of both Kansas Cities and marks the spot where explorers Lewis and Clark camped in 1806; and the Kansas City Museum, a regional history and science museum which illustrates the story of the Kansas City region and the people who settled here. Of course

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Program: PACE Plus with David Vanderlip, Kathy Smith, Steve Schell, Teri Meredyth Contact: Jim Karukas 544 Terrill Ave. • LA, CA 90042 • 213-255-3578 these are only a few of the possibilities when it comes to museums and history in and around KC.

Theatre goers will be happy to note a variety of Broadway musicals and plays, dinner shows, concerts and classic or contemporary productions can be found throughout the city in a variety of settings. The Folly Theatre is Kansas City's only surviving 19th century playhouse and offers a wide range of programs including dramas, musicals, ballets and classics. Starlight Theatre is Kansas City's summer outdoor amphitheater which opens broadway musicals and popular concerts.

And finally, for the sports enthusiast, the Kansas City Royals Baseball Team will be in town July 4, hosting Toronto, and July 5-7 as they take on Milwaukee. Games are played at the Harry S. Truman Sports Complex in Kauffman Stadium. In addition, the KC Explorers, a World Teamtennis professional league, will host St. Louis on July 6 and San Antonio on July 13 at the new American Royal Arena.

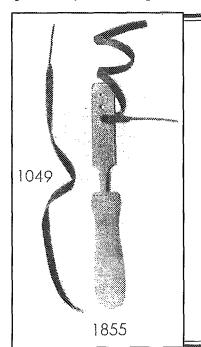
So much to do, so little time. As I sit and ponder it all, now I can think of a whole lot more. But, this will certainly be enough to get you started planning. Oh, I almost forgot. I promised you a list of places to eat.

This month: Larry's Top Ten List.

- 10. Rosedale B-B-Q
 Barbeque ribs, beef, pork, chicken
 and all the "fixin's."
- 9. Grand Street Cafe
 An artful rendition of American
 cuisine.
- 8. Cascone's *Italian Restaurant & Lounge*
- 7. Margaritas
 Authentic Mexican Cuisine
- 6. Hereford House
 A great Kansas City Steak, fixed to your perfection.
- 5. Westport Flea Market
 Antiques and a build your own
 burger bar.
- 4. Metropolis Grill

 Casual atmosphere and imaginative regional American food.
- 3. Jennie's Great Italian food
- 2. Stroud's Fried Chicken "Home Cooked" dinners, served family style.
- 1. Roselle Court at the Nelson Enjoy lunch inside the Nelson-Atkins Museum—culture & cuisine, a great combination

Next month, we'll focus on the legacy of jazz and blues that was born in the 1920s and continues in hundreds of clubs throughout the city, and I'll have suggestions about more places to eat!



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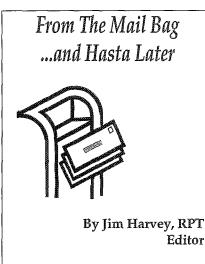
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Technical Forum

nce again, there's a lot of information to assimilate in the magazine

this month. So I'll keep my ramblings to a minimum. First a notice. I was unable to attend the NAMM show this year, and left the assignment in the capable hands of Yat-Lam Hong and Nick Gravagne. Their reports are in the final stages. However, that doesn't help us for this month's publishing deadline. We'll have to hold off until next month's issue.



Digging into the stack of mail, our first letter comes from a person who's name is quite familiar to this column, Chris Day.

Learning to 'PACE' ourselves

Dear Jim, I was reading the technical on vertical shank replacement and it occurred to me that some sort of prologue was missing. The reader might be forgiven for assuming that all broken shanks should be replaced. If one is rebuilding a piano of some merit in the shop, then all broken shanks should be replaced. However, the broken shank repair of choice is a difficult decision which I have never seen discussed in the pages of the Journal.

Many technicians find that there is not the money to be made in deep rebuilding of the majority of uprights out there in consumerland. This means that most times that a broken shank is encountered is in the home. The technician will probably not have specifically allowed time

for the repair and there will be another customer scheduled immediately after this one. The array of tools that is required for hammer shank replacement is more than most technicians carry on daily rounds and the process is not one most suited for

fine carpeted living rooms. The question of repair cosmetics is one that is always high on PTG's mind, however, I question whether, if a customer were presented with two alternatives which would both do the job and would be out of sight in normal use, they would opt for

the better-looking job over the cheaper job. From the pianos that I peer inside, it is clear that the vast majority of broken hammer jobs use shank repair rather than replacement, the exception being where the shank broke cleanly and close to the butt.

There seems to be a need for an article on hammer shank repair discussing what types of repair are available for what types of break, their time to perform and the ramifications of that choice. I would imagine that even an accomplished repairer would take 30 to 45 minutes cover to cover for a shank replacement while repair may take as little as five minutes with immediate ability to continue tuning. I have thought about such an article at some length and there are more things to consider and write about than it, at first, seems.

3

Sorry about jumping into the middle of your letter, Chris. I believe one of us needs some clarification. First, I assume you're writing about

PACE technical article #3: "Vertical Shank Replacement," November '93. If so, perhaps your "prologue" idea is perhaps valid... or not. This article, as are all the PACE series to date, just what they imply: "...to provide stepby-step instruction in essential skills." In no way was this article endorsing the replacement of all vertical shanks in this manner. I suppose one could do it this way en masse, but it would definitely not be the most expedient route; no more than the PACE article on string splicing represented the method for restringing an entire piano. Instead, the series (at least currently), is all about those typical one-shot field repairs that we encounter all too frequently in our daily routines.

Nowhere did the article challenge the use of spliced shanks. Instead, this article specifically addressed an efficient method of dealing with shanks when they have broken at or in the hammer or butt — a repair that many technicians botch big time.

This repair is an exemplary model for technicians with tight schedules. The last time I did this particular procedure, it took about seven minutes to complete — so much for the extra time. If it's cosmetics we're shooting for, borrow a little grunge from adjacent action parts: a little saliva (or the wetting agent mentioned in the article) helps provide the adhesion necessary to transfer said grunge from the old parts to the new one. This is a quick (and quite creative, if I do say so) method of creating that aged, "never been serviced" look!

Now let's pick nits on the assortment of tools required. I'll concede that there were a couple of tools mentioned that were not on the initial picture, specifically a straightedge, a file, and a well-used claw hammer with a hole drilled in the end. The slider-type scale (straightedge) is as necessary as a ballpoint pen. Forget about the file and claw hammer, and what's left is not an inordinate amount of stuff to carry — even as part of one's "basic" service kit. My own

preference is to use the old-fashioned shank extractor—the kind that requires turning, and reserve the plier-type for backup and/or shop use. Incidentally, note that a drill motor is not required: the drill bit pictured is the Mehaffey spur-tip that fits in the combination handle.

To eliminate the file and hammer for knurling, you have at least two choices with extant tools, although both involve Vise-Grip Jrs. (Model 5-WR). Surely everyone carries two pair of these by now. By adjusting the jaws appropriately, it's possible to use those sharp teeth in the plier to create a synthesized cross-hatch knurl; or, simply apply the inner teeth of the plier to the shank at the point the knurl is to begin and slide (drive is a better word) the plier off the end of the shank, following the direction of grain. We're simply providing a means of preventing hydraulic backup of the glue. Back to Chris...

3/-

On another matter, I noted the article on ninth partial intervals for tuning. I would like to add a caveat concerning the effects of inharmonicity. Real pianos have both steps and irregularities in their inharmonicity in the scaling of their strings. If high partials are used for tuning it should be appreciated that significant errors will occur if the partials are not in the proper place for that string. Take, for example, a string with a calculated inharmonicity of 1.0. A reasonable figure for C5. (The lowest value on an average piano is about 0.1.) Since the sharpness of a partial is a function of the inharmonicity multiplied by the SQUARE of the partial number, the 4th partial will be 4X4X1 or 16 cents sharp. An error of 10% in the actual inharmonicity of this particular string would lead the 4th partial being 4X4X1.1 or 16.6 cents sharp, a change of 0.6 cents—not too bad. Now let us do the same calculation for the 9th partial. The supposed sharpness is 9X9X1 or 81 cents. The actual sharpness is 9X9X1.1 or 89.1 cents sharp. The error is now 8.1 cents. If this is being used to make a tuning judgement on C5, an 8.1 cent error is not acceptable. The user of high

partials should be aware of these serious limitations in using high partials and take them into account when inexplicable peculiarities seem to be devil the tuning.

3

Since you took the conversation away from tools and into "higher" multiplication, all I can say is... okay, caveat accepted. Incidentally, I've received several positive comments, most of them verbal, about Levitan's article. The only documented comment is:

"...By the way, I certainly enjoyed reading Daniel Levitan's "Ninthpartial Intervals" in the December issue. He is such a good writer, let's hear more from him! I found the style clear and unpretentious, and the content, thorough and well-organized. As a result, now I know more than I ever wanted to know about this subject, and am taking longer than ever to get through a tuning..."

Since that letter was not intended for publication, I'll make the quote anonymous, and won't tell you it was from Michael Travis. Back to Chris, who, while continuing to dissect the magazine, finds a moment of humor...

Finally on a more whimsical note, I see that Samick is still hard at work on their piano for lefties. Yes, I mean it, just look at their insert in their advertisement! It has been that way for as long as I can remember and Samick still hasn't fixed it.

Keep up the good work, Chris Day

Oh no, the secret is out! Since I'm left-handed, and tune left-handed, and play the piano mostly in the bass, Klaus Fenner was prototyping that piano for folks like me, and the photo inset was not to have appeared until the instrument was ready! For the correct view of bridge notching ("chiseling", as I like to say), see this

month's cover. On a more realistic level, flipping that picture would cost more than it would ever be worth. This happened once while I worked for Kawai. Normally it was part of my job to look for technical accuracy in corporate documents. Once while I was on a teaching run, full-color, multi-page brochures were printed... thousands of them, with one picture of a backwards grand piano. After I pointed this out on my return... well, I suspect they're still having those brochures for lunch!

Reeboks, anyone?

Dear Mr. Harvey, I am writing to request that the Piano Technicians
Journal include product evaluations and reviews. I applaud the inclusion of much practical and useful information presently featured in the Journal — the PACE lessons being a fine example. But the lack of product reviews (that would assist members in making purchasing decisions), strikes me as a glaring omission.

For example: In the history of piano tuning, electronic tuning is unquestionably a major—if sometimes controversial—development. Just how good can an electronic tuning be? How do the various brands of tuning instruments perform? What are their strengths and weaknesses? I suspect that efforts to answer such questions in the Journal would be of great interest and benefit to many readers.

I suppose there might be concern that unfavorable reviews would offend advertisers. Perhaps... but numerous publications survive in spite of it. Besides, critical reviews are often the impetus for manufacturers to improve products.

I realize the PTG Journal is not Consumer Reports, and I am not suggesting costly and comprehensive "laboratory" testing of hundreds of products each year. But why couldn't the Journal ask qualified individuals or small teams of members to evaluate selected products—tools, accessories, software, repair products, etc. Perhaps this would make a good chapter project. I believe it would provide a genuine service to the membership.

Sincerely, David Bauguess, RPT

Somehow I don't see this happening, David. If it were a new VCR, automobile, or yes, even sneakers - maybe. Then there would be hundreds of products vying for the attention of millions of consumers (i.e. Consumer Reports). But to put the Yamaha PT-x (whatever it is this week) against "Doc" Sanderson's Accu-Tweak x (ditto) in the pages of this magazine... nah. Same goes for the three or four makers of key easing pliers, and so forth. Your point about the chapter discussion is valid. I can't recall one of my chapter meetings wherein the merits of a particular product was not discussed, usually over coffee and doughnuts. As for electronic tuners and/or tunings, they can be quite (make that incredibly) useful, especially when used by someone who knows what tuning is all about in the first place. Without getting into detail on this (several articles at a minimum), suffice to say that electronic tuners have been dumped in the same discussion bucket as hand guns and other forms of ballistics entertainment: the devices are fine; the owner/operators are where we start to experience problems.

What was that again?

Dear Jim, Thanks for the work you do for us all as Editor of the Forum and as Editor. Further to the November article by Jon Joyce on decibel levels, fatigue and the use of cotton as ear protection, a physician once drew my attention to some facts about the ear. I've refreshed my memory with a look at a Review of Medical Physiology.

. The middle ear has the three smallest bones in the body, the hammer (malleus), anvil (incus), and the stirrup (stapes). In response to sound, the ear drum moves, in turn moving the three linked bones. There is a mechanical advantage that amplifies the movement of the last bone in the series, the stapes.

The middle ear also contains the two smallest skeletal muscles in the body. One, the tensor tympani pulls inward on the handle of the hammer (manubrium of

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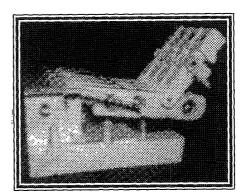
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the malleus), the other (the stapedius) pulls the foot plate of the stapes outward.

Loud sounds initiate a reflex contraction of these muscles generally called the tympanic reflex. These muscles act as a governor to impede the movement of the three bones (ossicles) and ultimately to reduce excessive stimulation of the auditory receptors. There's a hitch to this elegant arrangement in that there is a reaction time in the range of 40-160 milliseconds and does not protect against brief, intense percussive sounds such as gunfire and test blows.

Part of the fatigue associated with tuning is from these muscles becoming fatigued and going into spasm. It's a bit like having been out in the sun all day when there's a lot of glare and you've lost your sunglasses. By the end of the day you are tired. When we're tuning and voicing for six or eight hours or longer, in effect our ears have been squinting and the fatigue can radiate to other muscles in the head, neck, shoulders and so on.

The cotton apparently reduces the volume about 5-7db depending on how it is used. It's like a good pair of sunglasses that allows the appropriate amount of light in. I use it mostly to tune unisons although it can be used throughout [the tuning]. It's worthwhile to buy sterile cotton batting from a pharmacy in order to ensure you're getting real cotton. The packing cotton in pill bottles and some other products may not be cotton and if so, will not work as well.

It might be worthwhile to remember at the end of a long day that these little muscles have been working hard to save your hearing; the fatigue is just the little guys' way of letting you know it's time to take a break.

Jim, is there any chance Bill Spurlock might do a treatment of installing key buttons? I don't remember that having been looked at in the Journal for a long time. Another item might be on mothproofing these days. Are there any new products to discuss and so forth? Has anyone ever done a random check of the various pitch references one finds on electronic metronomes and tuning devices that are often found in homes and institutions? It might be interesting to know if they are fairly accurate or not, as a rule. Even if many people have an AccuTuner

and could do this themselves, it might be worthwhile printing something about this. Once again, thanks...

Regards, Eric Schandall

Thanks for the input from Victoria, B.C. I couldn't help but think of an old gospel song as I read this... something about one bone being connected to another. Seriously, thanks for the "extended" version of the rationale for using cotton ba... ear protection, Eric. In terms of the key buttons, you're right in that this has not been addressed in a long time. I'm sure Bill would be happy to address this, providing the job even remotely involves the use of c-clamps. Actually, Bill would be the ideal candidate for this assignment, with his succinct writing style and photo-documentaries. Mr. Bill, are you watching this channel?

Tuning instruments: the word is set off to point out that there is a difference between "devices" and "instruments." I once had a guitar player for a famous performer challenge the pitch of the piano, which I had "pitched" by cross-checking with both my Accu-Tweaker and tuning fork. Subsequent investigation revealed that his source of authority was a palm-sized box that, if I recall, had the words "Barbie's Pitch Reference" embossed on the plastic cover. As for metronomes, an absolute reference is not as critical in music, or as a vehicle for learning tuning beat rates. You'll see mention of metronomes in Paul Monroe's article this month, along with beat references like 8.4 and 9.2. George Defebaugh was the only human I've ever known that could aurally slice beats and cadences this thinly.

Mothproofing: I need some help on this one, y'all. My most recent understanding was that we don't need to have the concern that we once had in this area. In earlier instruments, (whatever) damage has already been done, notwithstanding any current residents. In more contemporary instruments, I heard mention about the choice of materials (synthetics and

blends), and/or the processing *method* (with certain additives) that makes the insides of a piano fail to be the taste treats they once were for moths. Other than that, parachlorobenzine, by any other name, is likely to find itself on the government's hit list (if not already).

Ahh! TOOLS

Dear Mr. Harvey: Thanks to you and our colleagues, I have reaped the benefits of the many practical and interesting articles from the Journal; now it's time for me to make a contribution.

I hereby submit two items—one of technical and the other of general interest. The first includes my adaptations of a mirror and an automatic center punch to assist me in regulating. The second describes some interesting features on an 1887 upright. Also included is a drawing and photos for you to use as you deem appropriate.

Of technical interest:
So this guy walks into the doctor's office...
Doc: What's your problem?
Guy: A weak back.
Doc: When did it start?
Guy: A week back.

Since I have a weak back, I perform as many upright regulation procedures as possible while comfortably seated. I've found the following adaptation to a simple mirror to be indispensable in enabling me to view the top of the action without standing and stooping.

The mirror pictured was from an automobile sunvisor, but any mirror that measures at least 5" x 6" will work. I created a harness for the back that consists of two pieces of nine inch string and a discarded pen cap. (See drawing-p. 17) I drilled a hole through the cap large enough to allow both pieces of string to slide through freely. The pen cap attaches to any tuning pin by force-fit and the harness allows the mirror to be easily adjusted up or down with one hand. (Photo 1).

With the mirror slipped into place, I have a clear view of the top of the action on which I need to perform letoff

adjustments, hammer checking and damper regulation. (Photos 2 & 3).

I also use the mirror during key leveling. With the bottom edge resting on the keyframe and the back resting on my paunch, I have a nice close view of the key fronts and can scrutinize the heights without squatting down (Photo 4).

Another tool I use for key leveling is an automatic spring-loaded center punch with a 1/2" wooden dowel, 3" long with a 3/16" hole drilled through it (Photo 5). I attach the dowel to the center punch with a clamp and use the complete tool to "tamp" down the punchings to settle them (Photo 6).

> Carman Gentile Redwood Chapter

Carman, as mentioned in my acknowledgement letter to you, I have tried a myriad of reflective devices, including shaving, camping, and even TV repair mirrors, to accomplish what you've done here. In short, I really like this idea for its simplicity and "portable" nature, and have already hurt myself several times for not thinking of it myself! Nice touch with the lab jacket too, for those times when precision surgery is being performed.

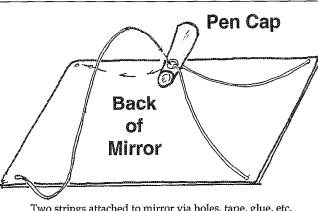
Incidentally, considering the amount of geography required for the existing pictures, I'm going to hold off on the piano flicks for the time being. Don't worry, they won't go into a black hole. And we'll even go along with the jokes, as long as you keep the neat ideas coming!

To wip or not to whip... that is the confusion (Part 1)

Without doubt, the recent discussion on nomenclature created more provocation for reader response than anything else I can recall. I've received mail, phone calls, and were it not for my fax saying "uh-uh" lately, likely I would have received responses through this medium as well. Even as I'm putting the finishing details on this column, there is still mail coming in on the subject. Notwithstanding those responses yet received, let's see what the consensus is to date.

Figure 1 & Photos 1-6 From Carman Gentile.

Detail of adjustable, non-slip harness for regulation mirror



Two strings attached to mirror via holes, tape, glue, etc.

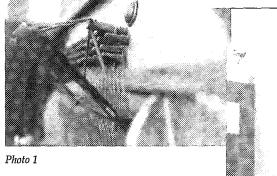




Photo 3

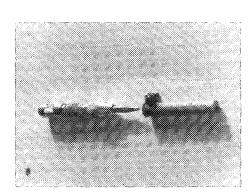


Photo 5



Photo 2



Photo 6

First, a couple of the more interesting telephone fragments:

John Gertz of Rochester MN, called to say that he "noticed" the wippen discussion in the *Journal* (for which I'm glad). He went on to say that while at Western Iowa Tech and poking around in the library, he found that the word was actually a German verb, likely pronounced *vippen* and spelled *wippen*; meaning "to balance, or to see-saw." This information was found in the New Schiffler (something or other) dictionary.

Not to miss out on all the fun, Gary Greene of Steinway called to add to the festivities by quoting something similar from Walter Pfeiffer and some other likely obscure source. He indicated that one of his sources dates back to the early 1900's, and in all definitions, as well as other instances in the book, the word is "whippen." He appended his call by stating that if he has added to the confusion... he's a happy camper!

Now for some of the correspondence:

Dear Jim, I greatly enjoyed your discussion of 'wippen/whippen'. The word comes from German. The Wildhagen-Héraucourt dictionary defines the verb 'wippen' as 'to balance, rock, seesaw, teeter.' You can see why the Germans created from this a noun to refer to a piano part that does in fact rock up and down.

I asked my wife, a professor of linguistics, why the 'h' would have crept in, and she said it was probably introduced by contamination from the English word 'whip,' simply because that is the most similar word we have. She also said for you to feel free to drop the 'h' but not to be surprised if it hangs on in literature like a tick on a hound dog.

It's much easier to answer the question of why we introduced a word from German at all. That happened because nobody could agree on a term. Edward Quincy Norton (1887) simply used the word "lever" for the wippen. Daniel Spillane, in 1912, going for accuracy at the expense of brevity, called it the 'escapement-lever rocker.' Samuel Wolfenden (1916) referred to it as the 'action lever.'

The Germans were similarly uncertain for a long time. Julius Blüthner and H. Gretschel (1909) refer to the Steinway wippen as the 'Winkelhebel', or 'angle lever.' Herbert Juhghanns (1932) refers to the wippen as the 'Hebeglied,' which doesn't translate into any very graceful English phrase but means 'lifting part.' Aren't you glad we didn't borrow that?

To sum up, it appears that, not so long ago, no one had an expression in either English or German for what we now call the w[h]ippen. Personally, I think we should all be glad that we're down to only two choices. Yours,

Paul Barber Pasadena, CA (Pomona Chapter)

(Say "howdy" to my Pasadenian and Pomonian friends, Paul. I miss y'all.)

Whip-it Part 2

Dear Jim: You and Jim Ellis discussed the spelling and meaning of w(h)ippen in the February Journal, but you did not go quite far enough. My 1942 Funk and Wagnalls Dictionary gives the same definition. However, it adds that it is from German 'wippe.'

The Wildhagen-Héraucourt German-English Dictionary (London: George Allen and Unwin, Ltd., 1972) gives as a meaning from the noun 'Wippe': '(1) balance; (2) bascule (of a bridge); (3) balancing (gymnastics); (4) whip.' For the verb 'wippen,' '(1) to balance, rock, seesaw, teeter... (2) to rock... to wag its tail; to flap the wings.' Wahrig's Deutsches Woerterbuch (Mosaik Verlag, 1975) is about the size of a good collegiate dictionary. It gives (my translation) the following meanings for the noun: 'Two-armed lever; board which is held in its middle to a post so that two or four persons may sit on it and swing' (i.e. a seesaw). Its verbal form means "to swing on the seesaw." Both are derived from middle and old high German. The former from 'wipf' meaning quick movement or swinging; the latter from 'wipfen' meaning spring, ultimately from 'wip': swing. Incidentally, the German word for whip, such as you would use on a horse is 'Peitsche.'

To return to English, 'whip' is related to the German 'wippe' in the sense of movement about a balance point. The venerable Oxford English Dictionary gives 'wippe' as an obsolete form of 'whip,' but says nothing about a piano action part. It does, however, have over three pages of entries for whip and whip compounds; despite the lack of standardization in English spelling, practically all examples in middle English and all from perhaps 1500 onward do have an 'h.' In several, the idea of quick movement is important. Among other cognates, it gives the German 'wippe' in the above senses.

What does this mean to us? Although the English words 'whip' and 'wippen' are historically related, as you two Jims stated, apparently wippen is the correct spelling in English. Oliver C. Faust in his Tuner's Pocket Companion does not use the term. Instead he calls the part a 'grand support' in the Swiss grand action, which is similar to the modern grand action, and a 'jack rocker' in an upright. For these reasons, I suspect, but cannot prove, that the German piano makers brought the word along with the instrument to England and America. The essence of the two words is not a device of punishment or torture, but, rather, a thing which moves quickly, usually about a center.

Christopher Banner

Whippit some 'gin

Dear Jim: Thanks for the great words of wisdom each month. I always enjoy reading your work. Just one question: after a long, tiring day of wrestling with a difficult action, am I whipped or wipped? Just one more thought: for those obstinate clients who have their piano tuned once every ten years whether it needs it or not, do you recommend a firm whippen/wippen? Keep up the good work.

Sincerely, **David S. Mayfiel**d

Thanks to all the foreign words and dictionary jargon above, my spelling checker no longer gags: it required Heimlich (a German word of known origin) maneuvers. And although spelling accuracy is usually a point of pride for me, I claim no responsibility for typos in retyping these letters.

Lem'me see if I can summarize or "move quickly about the center" of these offerings:

- Ellis and I obviously really screwed up by using dictionaries that had the word "New" as part of their titles;
- •I don't know any of the authorities being quoted above, so would have to see their RPT cards before accepting their word on piano part nomenclature;
- Obviously confusion abounds, even among similar words and sources or origin, so we need a more contemporary and authorative source of information;
- Faust apparently didn't get out very much. For this he can be forgiven, even though his part nomenclature suffered as a result;
- "Hebeglied" is starting to grow on me;
- •If see-saws were called whippens, they would be brought up on charges of child abuse. Now that I think of it, I still have a scar...

The above findings from various members all came from "legitimate" sources. So let's just add one more *legitimate* source of authority, thereby keeping things official, in perspective, and hopefully eliminating the indecision: The word is "wippen" (Jim Harvey Piano Technicians *Journal*, 1994), and the correct definition is from *Piano Parts and Their Functions*, Piano Technicians Journal [house organ].

Seriously, all of the (then) available sources of information went into the making of our *own* book of nomenclature. And should anyone not like the judgement calls made by the those assembling that information, you can still send (many of them) a nasty-gram indicating your displeasure. These include (but not limited to): Errol (Putt) Crowl, LaRoy Edwards, Don Galt, Lew Herwig, Dean Howell, Newton Hunt, Francis

Mehaffey, Steve Jellen, John Scheer, Carl Warmington, and Roger Weisensteiner.

True(?) Confessions

Dear Jim: I have actually been wondering lately why I still pay dues to PTG. And then along came Ron Nossaman's fantastic Left Fork article 'ADVICE.' I laughed and laughed, then read it to my wife Marguerite, of 47 years, who also laughed. Now comes your 'Something Old, New, Borrowed... Argh!' Jim, you and Ron made it all worthwhile. I'll stick around for another year. Actually, I had already mailed in my 1994 dues, after all, on a national level, lots of good is being done.

You really have a way with words. I wish I were as erudite in my job as editor of our ham radio monthly newsletter. If you ever tire of piano related work, I'm sure you could make a fine career in writing as you handle the language with skill and empathy.

...The whole point of this letter was to thank you for your fine article. I am looking forward to your next one. Your closing paragraph reveals your character, a man of high ethics, deep thinking and caring. Oh, how we need these attributes today.

Peter Wolford, RPT San Francisco Chapter

I have to be wary of compliments. A fellow once called me "incorrigible" and I thanked him! Now that I've looked up "erudite" thanks, Peter. Okay, perhaps I'll stick around for another year too, although there won't be another article for a while. Gee, has it been since November 1991? Time flies when you're having fun... or are not aware that time is passing! I'm sorry to say that circumstances dictate that, effective with this issue, my tenure as editor is at an end. I have truly enjoyed the moment, and have learned a lot about things I knew nothing about before like being an editor, for example. Thanks to the membership for their votes of confidence. And for all of you who have helped me so much, whether with articles, letters (hate or

otherwise), middle-of-the-night phone calls, or sometimes just by exercising patience, you have my sincere gratitude.

Jim Harvey, Editor-What-Was

Note: Jim Harvey has, as he notes in his column, decided to resign from the position of Journal Editor. For two and a half years, Jim has devoted countless hours to the job and the Board and membership thank him sincerely for his efforts. Now he wants to put this time and energy into his own piano service business. Along with piano expertise, Jim brought a lively sense of humor to the job, as well as considerable knowledge of computer technology; and under his tenure, the journal staffing structure was reorganized.

The challenge for the Journal in the future is to build upon his many contributions and those of all Journal contributors. So, in the May issue, PTG will begin advertising for a new Journal Editor; job descriptions will be available to interested applicants. Meanwhile, our Home Office Staff will accept all Journal correspondence and submissions. With the help of the Editor Advisory Committee and our current Contributing Editors and writers, the staff will maintain the high standards of quality we expect in our Journal and even introduce a fresh look to these pages.

Again, our gratitude goes to Jim Harvey as he moves on to other professional endeavors both privately and within PTG. We have enjoyed it, too! —Fern Henry

Please send all Letters to the Editor, articles, technical questions, and other correspondence to:

> Piano Technicians Journal Managing Editor 3930 Washington Kansas City, MO 64111-2963

In Brief

his lesson begins a series on vertical piano regulation. Participants will learn the first steps of the regulation process: tightening screws, aligning the action properly in the piano, travelling and aligning hammers, and spacing hammers to the strings.

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 direct blow vertical pianos in good condition. Used pianos in a dealership or practice room pianos at a college are good candidates, as long as they have only light wear. Grooved hammers will require reshaping first, before hammers can be spaced to the stringsperhaps the same pianos used in Lesson #6 (hammer shaping) could be used here. Alternatively, action

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LESSON PLAN

Technical Lesson #8 Vertical Regulation-Part 1 Alignment

By Bill Spurlock, RPT Sacramento Valley Chapter

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

models can be used, although not all of the steps here will apply. For instance, setting action height for proper strike point on note 88 can only be done on an actual piano.

Additionally, meeting setup should include:

- Extra regulating tools
- Extra heat gun(s) or other suitable heat source for bending hammershanks
 - Travel paper

Estimated lesson time

Depends upon meeting format. If the steps in this lesson are to be done on an entire piano, allow three hours. If these steps are to be practiced on only a few notes of the piano, allow one to two hours, depending upon the number of participants.

Tools & materials participants must bring

For this lesson, participants should obtain the following tools:

- ouniversal tool handle
- flange screw driver blade
- phillips blade screwdriver
- •small flat-blade screwdriver
- •screw starter (see photo 1, from auto parts store)
- heat gun or other means of heating a shank (e.g. "gas match" type butane lighter)
- travel paper gummed brown tape, Avery correction tape, or selfadhesive labels and razor blade
- •small adjustable wrench
 - *small hammer

Assigned prior reading for participants

PTG Technical Exam Source Book (PTG Home Office, 816-753-7747), pages III.1 & III.2.

General instructions

Regulation is the process of adjusting the action parts to give the most power, repetition speed, and evenness of touch and tone from note to note. Before adjustments can be made, parts must be in good working condition (not excessively worn, pinning good, hammers shaped properly). Badly worn parts will never function correctly and cannot be regulated to standard tolerances.

Regulation should follow a logical sequence beginning with tightening all screws, making sure the action is properly seated and aligned in the piano, and aligning action parts. I suggest the following procedures:

Tighten all action screws

Before removing the action from the piano, tighten the screws holding the action brackets to the action rails, if they are accessible from the front. Doing this while the action is still in the piano locks the brackets into proper alignment with the action mounting studs.

Next, remove the action and tighten all wippen flange screws, damper flange screws, and sticker flange screws (if present). Replace the action in the piano and tighten the mounting screws for the regulating (let-off) rail.

Hammer flange screws can be tightened now, or they can be tightened later during hammer-to-string spacing.

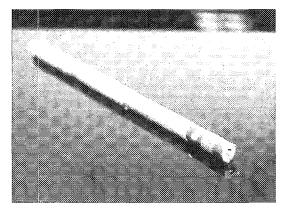
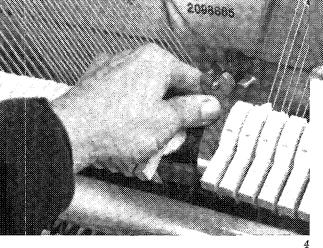
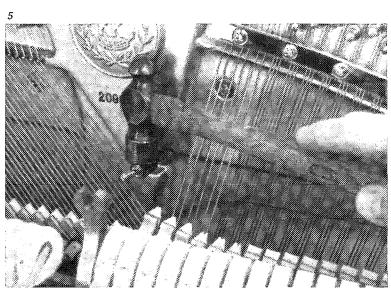


Photo 1: Screw holder/starter from auto parts store, for installing hammer butt screws



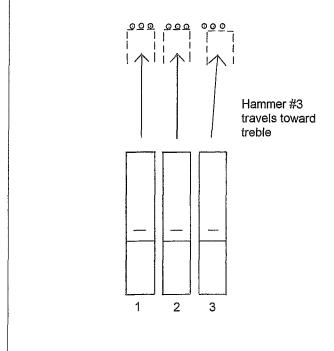
Photos 4 & 5: Once the lower support posts are set, check that the top posts fit snugly into the "U"of the action brackets. This ensures that the action cannot migrate up and down due to lifting force from the pedal rods and keys, and that the action can be removed and replaced without affecting the lost motion adjustments. Lean the action back and tap the top posts down as needed until the brackets are a light press fit under the posts.



LESSON PLAN



check: Hammer #88 should strike its strings about 1/8" below the V-bar. If the strike height appears wrong, or if the note sounds weak, test aurally: Loosen the top action nut, remove the top few keys, and screw the lower action support post down about one turn. Then replace key #88 and pry the action bracket up and down while playing the key. Note the position of strongest tone and adjust the lower support post to hold the action in that position. Finally, feel for play at the lower end of all other action brackets. If any is present, raise their support posts just until the play is gone. This ensures that all action brackets will be evenly supported.



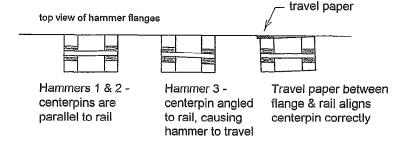
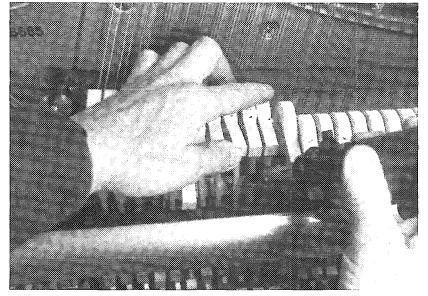


Figure 1



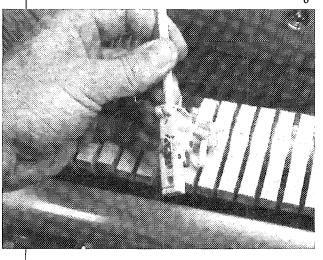
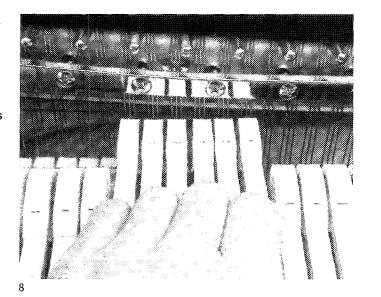


Photo 6 & Figure 1: Correct any traveling hammers by removing the hammer butt and applying self-adhesive paper to the opposite side of the flange to which the hammer travels. Photo 6 shows travel paper applied to the bass side of the flange to correct a hammer that traveled toward the treble. A screw holder as shown in photo 1 is essential for reinstalling the flange screws. Most have a magnet on the opposite end which is handy for fishing out screws dropped into the action.

Note that there are two important reasons that hammers must travel correctly. First, hammers must strike the strings straight on for maximum power and best tone. If the hammer strikes with a sideways direction, some power is lost as the hammer wipes sideways across the strings. Secondly, proper traveling reduces interference with neighboring hammers. When a hammer travels sideways it occupies a wider path as it moves toward the strings, and is more likely to rub an adjacent hammer.

Photo 7: Once the action is fixed in position and traveling is corrected, the hammers can be aligned and spaced to the strings. First check for any hammers that point right or left, rather than straight toward the strings. Correct this alignment by heating the shank while twisting the hammer gently in the opposite direction. Be careful not to burn the shanks, or to over-stress the action centers. Hold the hammer twisted until the shank begins to cool, then recheck alignment.

Photos 8 & 9: Hammers can now be spaced to the strings. Most often, hammers can be spaced adequately by simply loosening the flange screws and tilting or shifting the flanges to one side and re-tightening the screws. Use the screwdriver blade to push against the side of a stuck flange to pop it loose from the rail, then hold the hammer to one side while you tighten the screw. Caution: excessive sideways force on the hammer can damage the pinning, leaving a wobbly hammer.





If a hammer cannot be spaced far enough by simply shifting the flange, warp the hammer shank by heating. Hold the hammer to the side you want it to bend as the shank cools. Hint: Wiping a damp finger along the sides of the warm shank two or three times will "freeze" it in position quickly.

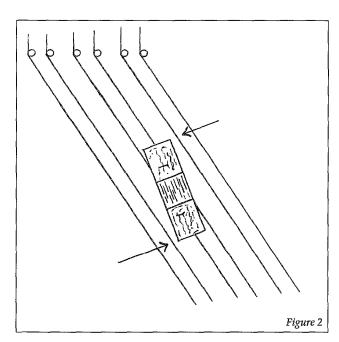




Figure 2: Since bass hammers do not match the angle of their strings, they cross the strings slightly. If each hammer is not centered exactly to its unison, it may contact a neighboring unison string. The easiest way to judge bass hammer alignment is just to look at the gap between the top right corner of each hammer and the next string to the right, and the lower left corner and the next lowest string, and

to equalize the two. This minimizes the chances of a hammer hitting a neighboring string.

Notice the logical sequence of alignment steps: Action supports cannot be adjusted until the correct action height is determined; hammer alignment (rotation) cannot be corrected without first correcting hammer travel, since installing travel paper upsets alignment; and hammers cannot be spaced to the strings until all the above adjustments are made, because those adjustments all affect hammer spacing.

Lesson #9 will continue with further alignment steps.

In Brief

In this lesson, participants will practice tuning and checking 4:2 octaves aurally; these are octaves in which the fourth partial of the lower note is the same pitch as the second partial of the upper note. Following the instructor's demonstration, each participant will tune several midrange octaves, using the M3-M10 test and the P4-P5 test to check the tuning. After each participant has had an opportunity to practice, volunteers will deliberately tune sample octaves in the bass, midrange and treble as pure 4:2 octaves, and the group will decide whether and how they could be improved.

Chapter meeting set-up

These lessons are most conveniently taught to a small group of four or five. Each group should have its own piano and RPT instructor. Each piano should be in a quiet environment for close listening. Avoid using pianos that present serious obstacles to tuning, such as deeply grooved or misaligned hammers, string termination noises, etc.

Tools & materials participants must bring

Tuning hammer and mutes, Coleman Beat Locator.

Home study assignment for participants

Review Owen Jorgensen, Tuning (MSU Press, 1991), sections 229,

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LESSON PLAN

Tuning Lesson #8 Tuning 4:2 Octaves

By Michael Travis, RPT Washington, D.C. Chapter

This monthly lesson plan series is designed to provide supervised practice of tuning skills as a supplement to independent study and practice. Chapters are encouraged to use this material as the basis for special associate meetings, or for their regular meeting program. Each lesson is designed to take about one hour, with about four participants. Participants are assumed to have essential reference materials and tuning tools (see PACE checklist) and access to a well-scaled large upright or grand piano for independent practice.

230 and 231; esp. text on p. 754 and the six 4:2 octave tests on p. 757. Also, see Arthur Reblitz, *Piano Servicing*, *Tuning and Rebuilding* (2nd ed., Vestal Press, 1993), chapter 7; perform tuning exercises #3 and #4, pp. 221-222.

Using your Coleman Beat Locator, find and list the names of the notes corresponding to the coincident partials in the octave A3-A4. Using the aural focusing technique described in tuning lesson #5, guiding your listening by briefly sounding the note corresponding to the pitch of the desired coincident partial while playing the interval, (PTJ 1/94), mute to single strings and tune A3 to A4 first as a beatless 2:1 octave, then 4:2, and then as 6:3. Which type of octave sounds the best to you

overall? Repeat the above for the octave A4-A5, tuning A5. Repeat again for the octave A2-A3, tuning A2 to the previously tuned A3.

Read the information that follows, and practice the 4:2 octave tuning exercise.

As noted previously for 2:1 octaves, tuners seldom deliberately tune pure (or just) 4:2 octaves in everyday work, since there is no need or advantage in so doing. However, consistency in octave tuning is important, and so it is often useful to know one or two tests that let you hear an octave at the 4:2 level in order to judge consistency of parallel octaves by that of parallel pairs of test intervals. The most commonly used 4:2 octave test is the M3-M10 test. The octave is just at the 4:2 level if the M3

up to the lower note beats the same speed as the M10 up to the upper note, all test intervals being wide of pure. The comparison is between a 5:4 M3 and a 5:2 M10.

Another useful 4:2 octave test is the P4-P5 test, wherein the test note is a P4 above the lower note and a P5 below the upper note. If the 4:3 P4 beats the same on the wide side of pure as the 3:2 P5 does on the narrow, you have a just 4:2 octave. An advantage in using the P4-P5 test over the M3-M10 is that you can perform it with one hand, keeping the other on the tuning hammer. A disadvantage is that the beats are much slower, and usually more difficult to compare accurately. Another problem: on many pianos, the faster-beating 6:4 P5 partials, one octave higher than the 3:2 pair, will interfere in this test. Remember to aurally focus on the 3:2 beats, and try to ignore the faster beats at the 6:4 level when listening to the P5.

Exercise: Tune A3-A4 as a pure 4:2 octave

1. Tune the A4 unison until it's clean and solid, and mute A3 and test notes F3 and D4 to single strings. Make sure the M10 F3-A4 is beating on the wide side of pure, about 6-8 bps, by adjusting F3 as needed; and the P5 D4-A4 is beating 1-2 bps on the narrow side of pure, by adjusting D4.

2. Tune A3 to A4 as a simple octave, playing both notes together and aurally focusing on A5 to eliminate the beats at that pitch.

3. Compare the beat rate of the M3, F3-A3, to that of the M10, F3-A4. Also, compare the beat rate of the P4, A3-D4 to that of the P5, D4-A4. If pairs of beat rates are identical with both tests, and remain so after a test blow on A3, proceed to step 6. If not, go to step 4 or 5.

4. If the M3 is beating slower than the M10, and the P4 is faster than the P5, equalize by raising A3 a tiny amount, then go to step 3.

5. If the M3 is beating faster than the M10, and the P4 is slower than the P5, equalize by lowering A3 a tiny amount, then go to step 3.

6. Tune the A3 unison until it's clean and solid. Now try the M3-M10 and the P4-P5 tests once again. If the pairs of beat rates are identical, you are finished. If not, recheck your unisons, and test again. If you still have a problem, start over, or get some help.

General instructions

Begin this session with some discussion of 4:2 octaves, what they are, where they are used and how we test for them. Point out that although today's activity (tuning pure 4:2 octaves) would not often be appropriate in an actual tuning, it's good practice that teaches control, teaches the M3-M10 and P4-P5 tests, and has a result that can be checked for accuracy. If you can tune a pure 4:2 octave accurately, you should have the skill needed to tune it a bit wide or narrow. as the piano requires. Make sure everyone understands both the M3-M10 and the P4-P5 tests; have volunteers use a Coleman Beat Locator to analyze the test intervals.

Each participant should tune three notes in octave three as 4:2 octaves to octave four, and use the M3-M10 and the P4-P5 tests to prove the results. Follow a similar procedure as in the exercise above; the instructor should prompt as needed to keep things moving, though keeping interruptions to a minimum. In each case, participants should first tune the unisons in octave four, and then strip mute octave three and tune the required three octaves, applying the

tests to each one individually and in parallel series. After making adjustments, they can then pull in their unisons in octave three and recheck their work for consistency.

If time permits after everyone has completed this practice exercise, get a volunteer to tune as 4:2 octaves A1-A2, C4-C5, and C6-C7. Using a SAT to set these octaves to just at the 4:2 level is OK for this demonstration, to save time or if appropriate tests are not available or audible (see following paragraphs). The purpose of doing this is to show the sound of pure 4:2 octaves in each area, and to instigate some discussion of how you might improve the tuning (by altering the pure 4:2 octaves) and why.

A *m7-m14* test should be available for the A1-A2 octave. This employs test note B0 (low B), a 7:4 m7 (B0-A1), and a 7:2 m14 (B0-A2), which if they are equal beating at the A3 level, proves a just 4:2 octave. Adjust B0 for a comfortable m7 beat rate with A1, 4-5 bps wide, using a strike tone at

A3 to confirm the correct coincident partial pair. Interference may occur an octave higher at the A4 level, where an equal beating m7-m14 test indicates a just 8:4 octave.

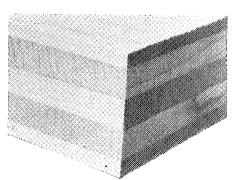
A M3-M10 test may be most useful (or least dysfunctional) for the 4:2 level of the C6-C7 octave, provided you sharpen test note G#5 enough to slow down the beats. However, the coincident partials would be at the C8 level, would likely be extremely short duration, and could easily suffer too much interference from false beats to tell what's going on; but have fun trying! If you cannot set C6-C7 as a 4:2 octave in a provable way, try setting A5-A6.

Note: Do you find these lesson plans valuable? Do you have specific suggestions for changes or clarification? Please direct any comments or suggestions to Journal managing editor, PTG Home Office, 3930 Washington, Kansas City, MO 64111-2963 who will forward them to the author.

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On Hammer Hardening?

Nick Gravagne, RPT Contributing Editor New Mexico Chapter

n recent articles we have talked about relaxing the felt of the too-hard hammer by using techniques involving needles or liquid softeners, or both. It does happen, however, that hammers are too wooly and soft. Such hammers may have been calmly residing for years in a customer's piano, or may have been just installed by the technician. The tone elicits some pleasurable warmth but lacks depth, focus, attack, power, and foundation — it is passive. Where these multifarious deficiencies exist more or less together, no amount of filing, or certainly needling, or applications of heat, will improve the tone. This sort of passivity of tone requires a complete character change - some strengthening of body - and this can only be accomplished with fiber hardeners such as lacquer or dissolved and diluted keytop plastic.

"Lacquering hammers" is, of course, a controversial matter, and understandably so. Some say that a properly made hammer, i.e., pressed fairly rigidly around the wood moulding, will never require hardeners and will easily voice using typical filing and needling techniques. Moreover, they continue, such a hammer is bound to elicit a firm and powerful tone since the inner areas of felt (the core section) is firm yet highly springy and elastic. The muscles of these hammers, in other words, are strong and fit as compared to the out-ofshape and flabby muscles of the toosoft hammer. Flabby hammer muscles —flabby tone.

Now the primary reason that "lacquering" has taken on such a bad reputation has more to do with misdiagnosing tone, misusing the lacquer, and miscommunicating with the customer. Recall that past articles in this series point out that tone begins with the belly of the instrument (soundboard crown and general integrity, downbearing, etc.) and ends with tuning and hammer work. The belly or "box" must be tight and ripe for projection; if not, no amount of hammer work will make it so. It is here where a typical mistake is made.

The customer complains that the piano has no power, no pizazz. especially in the higher octaves. The piano technician, in an effort to "brighten the tone" along with the customer's spirits, hardens the hammers. The tone becomes more percussive and slightly louder, but is still poor. It does not sustain or project, nor can it ever since the problem is (for example) negative bearing brought on by a flat soundboard. Remember, firmly plucking the string at, say, note number 65 should cause a rather sharp and piercing sustain for about ten seconds, the first five of which are most noticeably audible, the remainder subdued but whispering through and hanging on. Short sustains or muffled sustains or both indicate box trouble. And lacquering hammers,

beyond wasting time, only compounds that trouble. Now along comes a very serious-minded tuner in a white wrap-around lab coat. The tonal problem is properly diagnosed, followed by excoriating pronouncements uttered against the moron who "ruined a perfectly good set of hammers" with lacquer. The white-coated and tightly wrapped tuner departs, more convinced than ever that lacquer and hammers should never be mentioned in the same breath.

True, lacquer is misused everyday, but then so are tuning hammer techniques and regulating tools. Lacquer is simply a tool as is a drop screw regulator; improperly used, both cause bad results. Properly used, both improve the performance of a piano.

Soft or VERY soft?

Now, regarding the too-soft hammer, my own experience and that of respected colleagues tells us this: when the hammer is *very* soft, i.e., needles practically penetrate under the weight of your hand, then filing, shaping, and lacquering can bring them up, but only to a point. We have noticed that the tone elicited by hammers so treated can be quite nice under soft, or moderate, or mezzoforte blows, but at forte blows and harder the tone lacks volume and power equal to the blow. In other words, power and projection are

disproportionate to the blow delivered. Pianists hate this; it's like stepping on the gas for more speed — the pedal goes down that last inch, but not only does the Volkswagen *not* speed up, but the acceleration curve falters!

Where the hammer is simply soft, but not very soft, i.e., the needles require some effort to penetrate the hammer, lacquering can benefit the tone at all levels of key blow, including forte. Still, the anti-lacquer activists insist that the properly made and untreated hammer will always outperform the lacquered hammer. Perhaps. Although this may be debatable, one fact remains: short of replacing entire sets of hammers, the too-soft hammers are with us, either existing in the customer's piano, or arriving from the manufacturer for hanging. What can we do?

Personally, I have no problem with using hardeners if I am reasonably sure that a noticeable improvement will be made. Still, my customer is advised that, if hardening proves ineffective (based on expectations), a new set of hammers may be required.

Now this may be tricky if either you or your customer insist on a new set of New York Steinway hammers. Typically, and for quite a while now, these hammers require felt removal (sometimes serious in the upper octaves), shaping, and usually hardening throughout the scale or in selected sections only. On the other hand, once these hammers are giving out a certain tonal quality, the voicing seems to last a good long while compared with the hammer which is more dense and packed to begin with.

The Atlantic Monthly article — It's worth reading!

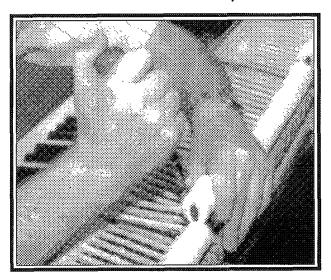
In August of 1982 The Atlantic Monthly ran a very interesting and lively article entitled "The Quality of the Instrument." Beautifully written by Michael Lenehan, the scope of the article is large (could make a small book) covering months of "at the factory" snooping as the author followed the step-by-step construction of a nine foot concert Steinway grand

piano. At completion the instrument was chosen by Franz Mohr to reside in the concert pool "basement" beneath Steinway Hall and to display the prestigious CD (129) tag only stamped on the chosen few. There the instrument sat in the illustrious company of Horowitz's at-the-time favorite CD 75 and Rudolf Serkin's CD 214. Within a short period of time CD 129 was chosen by many top name performers including Richard Goode. Interestingly, in the first days of the piano's

basement life, Lenehan recorded this ... "one of Mohr's assistants went over the piano's action again, and Mohr himself tried to coax a little more volume from the hammers in the bass and mid-treble sections; the latter, he said, had 'no carry'... He filed a few hammers to get down to a harder layer of felt, and added small amounts of juice where the filing did not give him the brilliance he wanted."

But prior to Mohr's selection of the instrument for the concert pool,

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voicer/regulator Raymond Parada, well known and esteemed at Steinway for many, many years, had his first routine crack at the nine footer.

Lenehan asked Parada "if he could tell what sort of piano it would turn out to be... (Parada) said that the hammer felt was a little too soft for his taste, but not so soft that he was ready to relegate the piano to the ranks of the mellow... 'This one, I'm gonna try to bring it up. I like a little volume on the piano, so I like to make it a little harder.'"

So how did Raymond Parada bring it up — make it harder? Before quitting time one day, after the action had been regulated and weighed off, the article reads that Parada "wanted to juice the hammers with his solution of lacquer and lacquer thinner. Later, he would apply the juice deliberately —three drops on this hammer, ten on the next — but for now he soaked the hammers indiscriminately. 'I don't have to think now,' he said. 'I know this felt is pretty far off, pretty soft, so I'm gonna give it as much as it can take.'" The next day Lenehan writes.

"First, with the action in the piano, he (Parada) punched each key with his middle finger and marked with chalk those that sounded strong enough to him — by now, only six or seven of the eighty-eight. These he avoided as he applied the juice. On the treble hammers he squeezed the juice right on top of the thin felt covering, but in the middle and bass sections he juiced only the sides. The felt that actually strikes the string, he explained, should remain soft and

springy; the hardening should take place below the surface. 'When you play soft, you only hear the top of the hammer. If the top is metallic, that's what you hear. When you play hard, you hear the bottom of the hammer. If the bottom is solid, you got a solid tone.'"

The article goes on to explain that over the course of the next couple of days, but after the hammers had been "indiscriminately soaked," the hammers were gradually and selectively juiced to a point of string and brilliant tone, but "without slipping past the point of diminishing tone." When, in Parada's estimation, the hammers couldn't really take much more"... he would try to make the tone more consistent throughout the scale, so that equal pressure on different keys would produce equal volume. He would harden a few hammers only minutely, adding just a few drops of juice, and would soften others, picking their felt with a hand tool that held three sewing needles."

Now let's notice a few things from these passages. First the simplicity of Parada's language, terms, and personal connection with his work. Soft hammers equal soft tone. Hard hammers equal hard tone. On soft blows the top of the hammer most affects the tone; on hard blows the bottom of the hammer is much more brought into play. A solid hammer bottom is responsible for a solid overall tone. Consistency of tone means equal pressure on all notes should cause equal volume on all notes. Hammer tops should be

springy or the tone will be metallic. Let's notice that the operation of juicing began by roughing in with a serious soaking of all hammers. Over the next couple of days the juicing operations became more selective, finally ending when Parada determined that any further brightening of the tone would also thin it out (fundamental subsiding as partials begin to dominate). Because tone work is by nature fussy and painstaking, the voicing operation took many hours to accomplish and included techniques of filing, juicing, and needling. (Parada typically has the piano for three full working days. In this time he fine regulates, travels and aligns parts, weighs off keys, re-regulates, and voices.) Lastly, when Parada first received the instrument, the tone was gutless; it had no real stuff until the hammers were juiced. This same instrument, after further refinements to both tone and touch by not only Parada but others as well, such as Franz Mohr, was chosen by top-flight performers such as Richard Goode.

Conclusion

In the wrong hands, or right hands at the wrong time, both lacquer solutions and bread knives can cause trouble. Most of us recognize the need for lacquering hammers in certain situations; but fear, poor information, or propaganda have caused some of us to either espouse an extremist position, or else retreat into a confused and passive one. I have many friends in both camps, and many more who walk a middle road.

A future article will discuss hardening solutions, proportions and applications along with related voicing work. And sometime this spring we will be installing a set of New York Steinway hammers. The work will be documented and covered beginning with weighing the new hammers compared to the originals, and ending with voicing for power, volume, and musicality.

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Don Mannino, RPT National Service Manager Young Chang Pianos

Aftertouch & Action Travel: The Balance of Letoff, Blow, and Dip

Ninth in a Series of Articles on Grand Action Regulation

Last time we covered the regulation of the wippen, with the jack being regulated to the knuckle and the repetition lever height being set to eliminate lost motion while insuring that the jack can return. This month it is time to get into the "touchy" (sorry about that!) subject of balancing the key dip, the hammer blow, and the aftertouch. This is a long, detailed article, but please bear with me, as this is the true heart of the regulation and it must be communicated as clearly and completely as possible.

here are a number of different definitions of aftertouch. They are all valid in spite of their differences, because there are different reasons for discussing aftertouch, and the definitions match the purpose of the discussion. For instance, to the pianist, aftertouch is that "thunk" that the key makes near the bottom of the key stroke. From a technical point of view this is not a good definition, because there are small constituent sections of this thunk which we need to deal with separately. These include the jack pulling out from under the knuckle (varied by the jack regulation, the condition of the knuckle, and the presence or lack of lubrication), the compression of the repetition spring (varied by the spring tension, the condition of the spring groove, the friction in the repetition lever center, and the drop screw regulation), and the type of front rail punchings (spongy or hard), besides the obvious variable of the actual distance that the key moves during the aftertouch.

The reason I mention the above definition is because we need to be aware that our regulation of the amount of aftertouch in a piano may not relate accurately with the pianist's perception of aftertouch. A piano may have minimal aftertouch by our definition, yet the "thunk" that the pianist feels may be excessive because of the many variables that enter into the pianist's definition.

A more technical definition of aftertouch is needed. For our purposes, let's use the following: "the motion of the action parts, especially the key and wippen, after the hammer has stopped moving towards the strings." In other words, everything that happens after the hammer is no longer being pushed up by the jack can be called aftertouch. This is a definable, measurable quantity of motion, and we can use this definition to help us achieve our fine regulation of the action.

There are many different opinions about which regulation specifications should be adhered to absolutely in piano regulating. Many people believe that the key dip should be absolute from one piano to the next, others believe that the overall key dip is not absolute, but that the aftertouch should be the same in all pianos, and still others prefer to vary all specifications in the interest of maximum power and hammer travel. Of these, the argument for consistent key dip seems to have the most merit, but I feel it is better to adhere to a limited acceptable range of key dip specifications, rather than holding to one absolute figure.

In regulating pianos, we must always try to regulate each piano for the best performance. Unfortunately actions do not always perform best when regulated exactly to the manufacturer's specifications. Even among different pianos of the same make and model, it is sometimes possible to make improvements in performance by slight (and I emphasize slight!) adjustments away from the specifications. Perhaps this is a dangerous subject for the PTG to put in print, because used unwisely this idea (and this method of regulating) might lead someone to use it as justification for their poor work. That is certainly not the purpose here! Used with discretion and care, however, this way of approaching grand action regulating can lead to the difference from "My piano plays much better than before" to "My piano plays better than I ever thought it could!"

Since I am propounding that we must find the optimum specifications for each action, let us look at the relationships between the key dip, hammer blow, letoff, and aftertouch. A better understanding of the relationships between these dimensions will help us to understand better the hows

and whys of this "custom" approach to regulating.

Let me continue by giving some more definitions. Key dip is simply the travel of the key, from rest to full depression. Anyone who has regulated many actions knows the problem with measuring this: the key dip changes slightly depending on how hard the key is depressed. This is one source of differing opinions about key dip-some measure the key dip with minimal pressure, and others use a medium blow, and others use a calibrated weight. All of these methods result in different key dip measurements in different pianos, because of the different compression of the front rail punchings and even different touch weights.

Aftertouch, once again, is the motion of the action after the hammer has stopped moving toward the string. Please note that the jack is still slightly in contact with the knuckle after the hammer stops moving up—you

cannot start the aftertouch definition with the "release of the hammer" because this changes according to how the note is played.

Letoff is easier to define and measure. It is the measurement of how close the hammer comes to the string when the note is played very slowly. Most manufacturers recommend a tapered letoff specification, closer in the treble and farther in the bass. One problem this presents to us when regulating is that we must decide where we should taper the regulation. Since the letoff is slightly lower in the bass, should the hammers be slightly lower at rest also? Or should the hammers be regulated equally from the rebound felts, with a little less key dip in the bass? Or perhaps we should keep all of these the same, and allow the aftertouch to be greater in the bass? More on this later.

Instead of hammer blow I like to use the term "hammer travel." Hammer blow usually refers to the measurement from the hammer rest position to the string. Hammer travel, however, is the motion of the hammer from the rest point to letoff. The hammer travel is adjustable at either extreme, with the capstans adjusting the lower limit of travel, and the letoff buttons adjusting the upper limit.

Hammer drop is a misnomer, and this causes a lot of mis-regulation of actions. We should not actually regulate a "drop" distance, because this is too imprecise and dependant on too many other factors. When a drop specification is given, it normally refers to the hammer's distance below letoff when the key is fully depressed. This depends on proper key regulation (and aftertouch) as well as how hard the key is depressed. This can be resolved by a different method of regulating the drop, by using the timing of the contact of the repetition lever with the drop screw. The "drop" specification can then be used later to confirm proper regulation of the aftertouch.

We have all heard of the "5 to 1" ratio of hammer motion to key motion. The key dip (the "1" in the ratio) relates directly to the motion of



the hammer (the "5"), or hammer travel. I prefer to think of this as a balance of the different regulation specifications. This relationship is intimate. If the hammer blow is too great, then the key dip may feel too shallow, and there will be too little aftertouch. If the hammer blow is too shallow, then the key dip may be perceived as too great, and certainly those pianists who are aware of aftertouch will notice that there is too much. If there is a good reason for putting extra hammer blow into an action, then this must be balanced by either minimizing the aftertouch, which is risky, or increasing the key dip. If a particular pianist prefers a very shallow key dip, then both the aftertouch and hammer blow will probably have to be compromised slightly to accommodate the artist's unusual needs.

This balance can be thrown off by improperly regulated repetition levers. If the levers have been set too high there will be a slight amount of lost motion in the action, and the aftertouch will be too small. This is why I placed such emphasis on regulating the repetition levers by feeling the jacks rub against the knuckles in the last article—if there is any lost motion at all, the relationship between the hammer travel and the key travel will be thrown off.

Keep in mind that there are benefits of adjusting the hammer travel up or down. A greater hammer travel will sometimes help the pianist to get more power out of the piano. A shorter hammer travel can give added control to the pianist. Some pianos, because of the way the upper action was fit to the keyboard and the strings; benefit from having a little more key dip to allow for a sufficient hammer blow, while in others it is better to keep the key dip at the recommended specification and adjust the blow distance. There is no one answer, so we must work to find the best solution when we are regulating.

This is not as hard as it may seem. The best way to approach regulation is to start with a known set of specifications, test them on a

sample note, then experiment if you are not satisfied with the results. If you regulate the blow distance to 45mm, the key dip to 10mm, and the aftertouch is minimal, you must try a few minor adjustments to bring about an adequate aftertouch. Let's take a look now at a practical sequence for doing this.

Step 9: Set Sample notes for proper letoff in the piano.

With the action in the piano, regulate sample notes in each section for correct letoff. I like a tapered letoff, and as close to the strings as is reasonable for each piano's circumstances. In a concert situation where you will be seeing the piano regularly, a very close letoff of 1mm in the treble and 2.5mm in the bass is ideal. In the normal home piano it is better to leave a little extra margin for wear, so 1.5 or even 2mm in the treble may be called for, with 3mm in the bass. Keep in mind that a close letoff will translate into better control, so keep it as close as is reasonable.

It is usually best to set the first and last notes of each section, with one extra note in the middle of the longer sections, like the tenor section of most scales. We will also need one sample note near the center of the scale to use as a test note, so I usually set middle C as my center of the tenor section note. Be very careful on these letoff samples —since you are only having to bend over the piano and look carefully at a few notes, take the time to be sure they are right on the money.

Step 10: Establish regulating specifications.

Pull the action out onto the workbench (or a table, or the protected top of the piano), and adjust a letoff rack so that the sample hammers of the center section of the scale just touch the letoff rack at letoff. It is best to have a very slight amount of contact, as this eliminates guesswork—you can easily see the hammer as it

touches the rail and blocks out any light from behind. If the sample hammer at the center is different from the ends, and you are sure you were accurate when you set them in the piano, then adjust the letoff rack correctly for one end sample and the center note. Thus you will break the long section of the piano into two sections for regulating purposes.

Now get out your regulating ruler with an adjustable reference slider, and set the rule to the manufacturer's hammer blow specification minus the manufacturer's letoff specification. This is important—this becomes the hammer travel specification (which you may change slightly later), and it should not include the extra distance from letoff to the string. The letoff distance in the piano will taper slightly from bass to treble, but the hammer travel should not. For example, if the manufacturer's specification for hammer blow is 47mm and the letoff for the center of the piano is 2mm, set the ruler to 45mm and use that as the hammer travel specification. Holding the ruler up to the letoff rack, adjust the capstan on your sample note so that the hammer travel matches the ruler.

Now adjust the drop screw on this note. To regulate the drop, do not watch the hammer. Start with the drop screw lower than it should be, and play the note slowly while watching the jack and feeling for contact of the repetition lever with the drop screw. Press down until you feel the repetition lever contacting the drop screw. Carefully depress the key further until you can see and feel the jack tender contact the letoff button. Now turn the drop screw up a little and test again, continuing until you can feel and see that the drop screw and letoff buttons are being contacted together.

It is possible to continue raising the screw a little while the contact of the parts still feels acceptable. If you continue to turn the screw up farther still you will be able to feel the jack contact the letoff button before the repetition lever is stopped by the drop screw. I have found that it is best, and most reliable, to set the drop

screw on the lower end of this range, so that is why it is important to start with the drop screw too low, then stop turning it up when the two points of contact just come together.

Once the sample note is regulated on the bench, put the action into the piano and regulate the key dip with punchings until it is to the manufacturer's specification. Play the note with a medium blow. While you hold it down, reach in with your other hand and pull down slightly on the jack tender to test for clearance between the jack and the stop felt in the repetition lever window. There should be something like 1mm at the top of the jack, so the tender should be able to move a little without feeling like you are just compressing the stop felt.

We have a built in method of determining the correct aftertouch in an action. The jack is the indicator, and the position of the jack when the key is at full travel is the test. There must be enough aftertouch to insure that the jack gets fully out from under the knuckle, and there must not be so much aftertouch that the jack is driven into the stop felt of the repetition lever. This is where different actions can show their diversity, depending on how the action went into the case (slight under or over centering), how the stack was fit to the keyframe (giving a slightly different capstan position and therefore key stick ratio), and how the spread was set. If the jack is equidistant from the knuckle and the stop felt (a little less than 1mm from each is possible in most actions), the aftertouch on that action should be ideal for the best performance. The actual amount of the gaps in front of and behind the top of the jack may vary from almost nothing to over 1mm, but regulating the action so that the jack is centered between the knuckle and the jack stop felt when the key is fully depressed will almost always give good performance.

Back in the piano now, if the jack can be moved a little while the key is depressed then measure your key dip again for reference and pull the action out. Check your sample

note again on the workbench for correct key dip. At this point you might want to play around with the keyframe on the workbench a little to get the correct key dip on the workbench, but it is usually possible to just play the note fully as you did when the action was in the piano, feel the jack motion, and compare how much it will move compared with when it was in the piano. Now lift up a neighboring hammer, play the sample key, and look at the jack position in relation to our two reference points (the knuckle and the stop felt). Keeping in mind any change caused by the action being out of the piano, evaluate your aftertouch. Going in and out of the piano a few times may be necessary to be sure you are feeling the proper clearance of the jack from the stop felt.

If the aftertouch is not great enough, you have the option of either decreasing the hammer travel or increasing the key dip, or perhaps a combination of the two. Conversely, if the jack is jamming into the stop felt, then you can either increase the hammer travel or decrease the key dip.

Your regulating experience and the type of use the piano is subjected to are the best guides as to which of these options you choose. It is common for concert instruments to have a little more hammer travel and slightly more key dip, to give the maximum amount of power to the pianist. It is also acceptable for the aftertouch to be minimized in concert instruments with the hope of increasing repetition, as the piano is being monitored closely enough to insure that the jacks will always clear the knuckles.

In home pianos where control and ease of playing are more important it would be more appropriate to insure reliability with sufficient aftertouch, while decreasing the hammer travel in order to maintain a more "correct" key dip.

After you are satisfied that the hammer travel, key dip, and aftertouch are right on the sample note, place the action in the piano and

put any new front rail paper punchings under the felt punchings. Now make an aftertouch gauge out of paper and cardboard punchings.

Remember the definition of aftertouch: motion of the action after the hammer has stopped moving toward the string. Place some more punchings under the key until the key comes into contact with the punchings and stops (with very light pressureno compression of the front rail cloth) when the hammer is precisely at the highest point of travel. To test this, slowly depress the key while watching the front punchings and feeling for firm contact with the punchings. When the key stops, look at the hammer and press down on the key a little harder to compress the punchings. The hammer should now drop down a little. If compression of the punchings allows the hammer to rise a little more before dropping, remove some punchings. If the hammer drops before the key is stopped by the punchings, then add some punchings. This is where the condition of the knuckle becomes critical; flattened knuckles will make this almost impossible, while nice round ones will make it simple.

After you have the punchings in place as described, these punchings are exactly the thickness of the aftertouch in this piano. Take these extra punchings off the key pin, glue them together, and write the piano's name and serial number on the resulting aftertouch gauge.

Now you are ready to put the action back on your work surface and regulate the upper action one section at a time.

Step 11: Regulate the letoff

Set the letoff rack carefully in the first section so that the hammers just touch the rack at letoff. Now simply adjust all the letoff buttons in the section for proper letoff on the rack. Move on to the next two steps before resetting the letoff rack for another section.

Step 12: Regulate the capstans

With the letoff rack still in position, use the ruler, set to the specification for hammer travel (decided earlier) to regulate the capstans of the end notes of the section. After the end hammers are set, place a straightedge on top of the hammer flanges and, sighting across the straightedge at the hammer tops, set the capstans for a straight hammer line. If one end of the section is higher than the other, place a rubber tuning wedge under the straightedge to raise one end to match. You can then sight over the straightedge so that it is even with both sample hammers, then regulate the section to the straightedge.

This is a good point to check the consistency of the repetition lever height adjustment. If there are any that are slightly too high, you will find that the hammers on those notes will not come to rest reliably. If bouncing the key causes the hammer to stop at a different height each time, carefully push down on the jack tender and try to feel the jack rubbing on the knuckle skin. If you can't feel it, quickly reach over and adjust the repetition lever screw slightly to lower the lever. It is also sometimes possible to lightly bounce the key and feel for the slight slapping of the jack top on the knuckle caused by the lost motion when the repetition lever is too high. Like good tuning, good regulation comes from lots of cross checks, and this is an important one for refining the regulation and insuring evenness.

Step 13: Regulate the drop

Make sure that the drop screws are all a little low, and begin turning them up and feeling for the contact of the repetition lever and the jack tender on their regulating screws, as described above. Don't worry about the hammer position with the key fully depressed at this point, because the key dip hasn't been set yet. It isn't really even good to watch the ham-

mers, as they will probably all move too far up from excess key dip.

After these three steps are completed in one section, reset the letoff rack for the next section and continue regulating. After these steps are finished in the entire action place the action back into the piano and gather your supplies and tools to the piano for regulating the key dip.

Step 14: Regulate the key dip

Sitting on a low seat or on the floor with your eyes as close as possible to the level of the keys, place your aftertouch gauge on the first key pin. Slowly depress the key until it touches the gauge and watch the progress of the hammer. This regulation is easiest if the key dip is too great to start with, so if the action is a little shallow to start, just go through and remove punchings throughout the scale to make this job go easier. It is

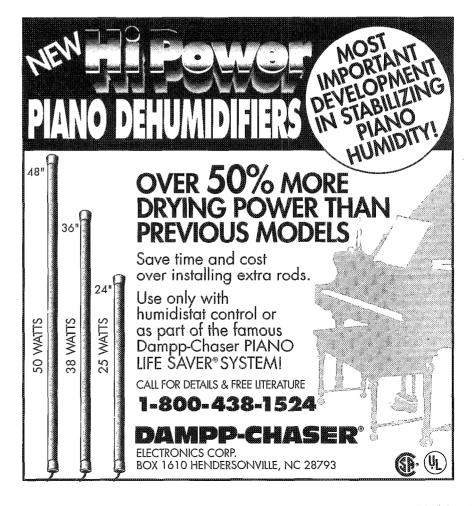
also helpful to raise the dampers off the keys, if only to help you feel the key meet the punchings.

The aftertouch gauge is the reference point now, so any punchings you add at this point will be put under the felt punching before you go on to the next key. As described earlier, check for correct aftertouch on the key and add punchings until the hammer is at its highest point when the key reaches the bottom while the aftertouch gauge is in place.

You should make use of cross checks as you work up through the scale. Depress groups of keys together to give a quick check for proper regulation. If you find one key that is going down more or less than the others, you have found a problem with one of the other steps in the regulation:

a.The repetition lever height may be off, causing a little lost motion.

b.The key may not be squared and leveled correctly.



c.The letoff may be wrong.

Once again, making use of the built-in checks in this process will not only make the regulation turn out better, it will make you a better regulator by training you in the art of paying attention to details.

One of the real beauties of using the procedure to set key dip is that the sharps are automatically set to match the travel of the naturals, even if the keyboard was not made well. The travel within the action stack should be absolutely even, and the key dip is set to match on both the sharps and naturals.

After the key dip is set, move the action back to the workbench and recheck the drop screws by lightly depressing groups of keys and looking at the hammer positions when the keys are all the way down. If you use the letoff rail (set to the letoff position) for this you can now check that the hammers end up slightly lower than the letoff position. Mainly, though, you should be checking for evenness. If a hammer is a little higher or lower than the rest, then either the drop screw is not set correctly or the jack is not set under the knuckle correctly on that note. Re-regulate the jack under the knuckle, lower the drop screw and regulate it back up by touch, then confirm the setting by testing it against the neighboring notes again.

As usual, this has taken much more space in words than it takes in time to accomplish. Although this way of carrying out the regulation may seem overly cumbersome in writing, it works amazingly well in practice and the setting of the key dip goes very quickly after you have the feel of the process in the first few notes.

Next time we will look into backcheck regulation and repetition spring settings. In addition to setting the backchecks for checking height, we also will look at the problems encountered with an incorrect backcheck angle, and how to establish the correct angle for the backchecks to meet the hammer tails.

Regulation Checklist (for this installment):

Regulation Step

- 9. Regulate repetition lever height
- 10. Establish regulating specifications
- 11. Regulate letoff
- 12. Regulate capstans
- 13. Regulate drop
- 14. Regulate key dip

Related Items

Check/service wippen, jack, and repetition lever centers. Make an aftertouch gauge

Recheck the repetition lever height

Recheck drop and jack to knuckle regulation

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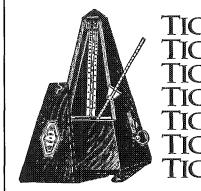
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TICK TOCK.



Chains of Intervals

Michael A. Kimbell, RPT Contributing Editor San Francisco Chapter

Last month we explored the interaction of intervals within the following groups:

> P5 + P4 = P8 M3 + m6 = P8 m3 + M6 = P8 M3 + m3 = P5 M3 + P4 = M6

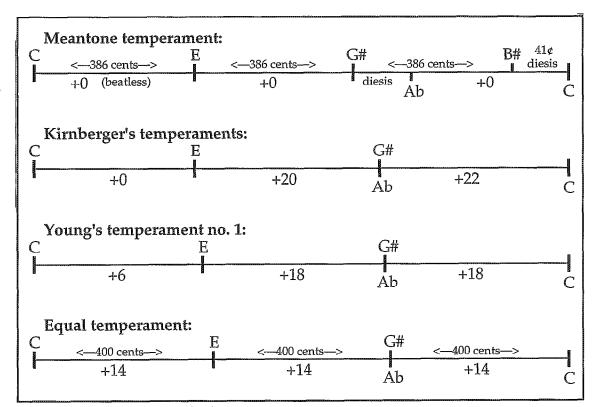
For each group, we started with beatless intervals and then explored various degrees and combinations of tempering. The real fun begins when we expand the groups into the chains or series of contiguous intervals which underlie a lot of classical and contemporary music. In equal temperament several chains of like intervals appear to have equivalents: 3 major thirds = 1 octave4 minor thirds = 1 octave 4 fifths = 2 octaves + M33 fifths = 1 octave + M612 fifths = 7 octaves12 fourths = 5 octaves

he equal sign, however, is deceptive. In contrast to the groups discussed last month, it is impossible to make all of the intervals in these chains beatless without creating very badly out-oftune octaves. The necessity for tempering at least some of the intervals, as opposed to its mere possibility, thus becomes evident. In our discussions of intervallic chains we shall refer to several different systems of tempering the intervals, including meantone and well temperaments as well as the more familiar equal temperament. Even if we rarely have an opportunity to tune non-equal temperaments, knowing how they work can give us a clearer picture of equal temperament and how its elements interact, thus helping us to de-bug and refine our normal tunings.

Any analysis of intervallic relationships is greatly simplified if we remember the classification of intervals according to inversion within the octave:

P5/P4 M3/m6 m3/M6 In other words, fourths and fifths are interchangable except for the direction of tempering: if the fifth C-G is narrowed by 4 cents, then the corresponding fourth G-C is widened by the same 4 cents. Likewise minor thirds and major sixths are interchangable: if the minor third D-F is narrowed by 16 cents, then the corresponding major sixth F-D is widened by 16 cents. A chain of major sixths will interact with octaves in the same way as a chain of minor thirds, and so on.

The tuning of the major third probably affects the character or color of a piece of music more than the tuning of any other interval (other than the unison). Let us therefore begin with the chain of major thirds illustated in Example 1. In the familiar world of equal temperament, three equally-sized major thirds, each 400 cents in width, stack neatly to form a perfect octave 1200 cents in width (ignoring inharmonicity), as shown at the bottom of the example. A beatless major third, however, is only about 386 cents in width, as discussed in my article on beatless intervals in the



Example 1 - Chain of major thirds against an octave

December 1993 Journal. (If we take the beatless major third as the zero point, the equallytempered major third can be represented by +14 cents, or 14 cents wider than beatless.) If we stack three beatless major thirds, as shown at the top of Example 1, we fall almost 42 cents short of reaching the full octave. This discrepancy of 42 cents between three beatless major thirds and one beatless octave is

called the diesis. (In

lower	Mear	ntone	Aron-N	eidhardt	Young no. 1		Eq	Equal	
note	P5	M.3	P5	M3	P5	М3	P5	M3	
С	-5.5	0	-5.5	0	-4	+6	-2	+14	
G	-5.5	0	-5.5	+3.5	-4	+8	-2	+14	
D	-5.5	0	-5.5	+9	-4	+10	-2	+14	
A	-5.5	0	-5.5	+14.5	-4	+14	-2	+14	
Е	-5.5	0	-2	+20	-2	+18	-2	+14	
В	-5.5	+41	0	+22	-2	+20	-2	+14	
F#	-5.5	+41	0	+22	0	+22	-2	+14	
C#	-5.5	+41	0	+22	0	+20	-2	+14	
Ab	+35.5	+41	0	+22	0	+18	-2	+14	
Eb	-5.5	0	0	+16.5	0	+14	-2	+14	
Bb	-5.5	0	0	+11	-2	+10	-2	+14	
F	-5.5	0	0	+5.5	-2	+8	-2	+14	

Example 2 - Fifths and major thirds in several temperaments

the interest of simplified arithmetic we are cheating here, since the theoretical width of the diesis is actually closer to 41 cents; perhaps we can invoke inharmonicity as a lame excuse! For clarity, the tempering of intervals is exaggerated in the examples.)

When we are attempting to tune a keyboard instrument, we obviously have a choice to make which has far-reaching consequences for the style of keyboard music to be played: either we can call a spade a spade and admit that B# is not the same note as C, that G# is not the same note as Ab, and that the highly dissonant diminished fourth G#-C is totally different in character from the calm and consonant major third Ab-C; or else we cheat by tempering (expanding) at least two if not all three of the major thirds so that G# and Ab become "enharmonic" equivalents of each other. The first choice leads us to either just intonation (everything beatless) or meantone temperament (beatless thirds and tempered fifths); the second choice leads us to either well temperaments (most thirds tempered) or equal temperament (all thirds tempered). In the cases of just intonation and meantone temperament, we are faced with the additional choice of physically splitting the G# key (fore and aft) and adding an extra

set of strings so that we can play both the true G# and the true Ab, or of eliminating the possibility of playing Ab entirely. In both well temperaments and equal temperament, G# and Ab are both always available without extra keys on the keyboard, allowing a much greater range of harmonies as well as musical "puns," such as the equivalency of the augmented sixth to the minor seventh, which Schubert and other classical composers are fond of using in order to change suddenly to distant harmonies and back again.

In equal temperament and in well temperaments, the 42 cents of the diesis is distributed among two or three major thirds. Instead of two beatless major thirds plus one "wolf third" G#-C which is 42 cents wider than beatless (as in meantone temperament), we can have three major thirds each 14 cents wider than beatless (14 + 14 + 14 = 42, as in equal temperament), or some unequal distribution of the 42 cents such as 0 + 20 + 22 (as in Kirnberger's temperaments or Jorgensen's "Aron-Neidhardt" temperament) or 6 + 18 + 18 (as in Thomas Young's temperament number 1), as shown in Example 1.

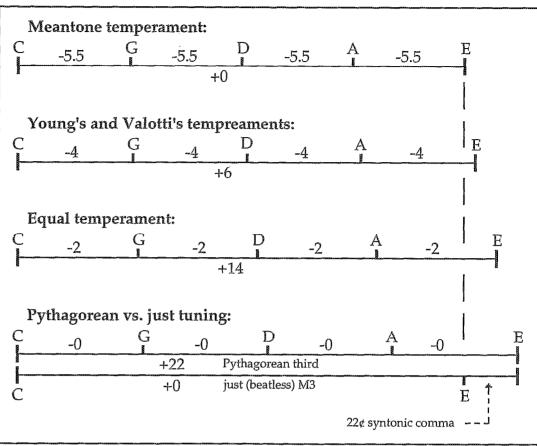
In equal temperament and in each of the well temperaments there

are twelve different major thirds, as we have seen in my previous articles. Since a chain contains three major thirds before repeating itself in the next octave, there are four different chains of major thirds on the keyboard: C-E-G#/Ab-C, C#/Db-F-A-C#, D-F#-A#/Bb-D, and D#/Eb-G-B-D#. All twelve thirds are thus accounted for. A single well temperament includes many different sizes of major thirds and distributes the diesis in several different ways, as you can see from the variety of values given for the major third in Example 2. The essential pattern for major thirds in well temperaments can be seen from the chart: the "white note" major thirds F-A, C-E and G-B (with low values) are close to beatless and are thus calm and resonant in character; as one moves down the chart, the values increase at first, indicating an increase of brilliance in the major thirds as one plays more sharps in the music; then the values decrease again as the number of flats in the music decreases back to the starting point of C. (As we proceed with chains of other intervals, I shall explain how easy it is to arrive at the actual values, which can be used as a sort of gauge for tempering or coloring intervals in non-equal temperaments by comparison with their "normal" values in equal temperament.) The variety of intervallic colors in well temperaments, due mainly to the variety of major thirds, contrasts with the homogeneity of colors in equal temperament.

Next in importance after the major thirds in determining the color of the music are the perfect fourths and fifths. (This heirarchy of intervallic colors is reflected in many of the best schemes for setting up a temperament, which rely chiefly on relationships between major thirds and perfect fourths and fifths, with minor thirds or major sixths employed for cross-checking.) The interaction of long chains of fourths and fifths with octaves, while of prime theoretical interest to us tuners, has only an indirect effect upon the music; much more important musically is the interaction of shorter chains of fourths and fifths with major thirds. illustrated in Example 3. Whether we stack four perfect fifths to form a compound major third, or substitute downward fourths for some of the upward fifths to arrive at a major third within the same octave, is of no importance — the theoretical and

If we employ the beatless fourths and fifths of medieval or "Pythagorean" tuning, as at the bottom of Example 3, the result of a chain of four perfect fifths (or two fifths up and two fourths down) is the Pythagorean major third which is almost 22 cents wider than beatless. This discrepancy of 22 cents between four beatless fifths and one beatless major third is called the syntonic comma. It is useful to compare this figure of 22 cents with the 14 cents (wider than beatless) of major thirds in equal temperament. Since 22 is about 60% larger than 14, a Pythagorean third will beat about 60% faster than its equally-tempered counterpart. For

practical ramifications are the same.

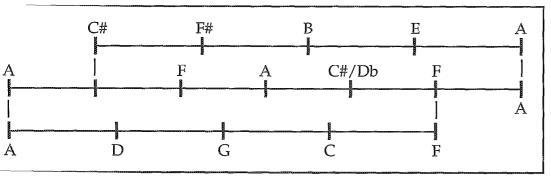


Example 3 - Chain of fifths against a major third

instance, the major third F3-A3 would beat 11 times per second instead of 7 if beatless fourths and fifths were used in the tuning. Small wonder that medieval theorists regarded the major third as a dissonant interval! Nevertheless, Pythagorean thirds occur in many eighteenth- and early nineteenth-century well temperaments generally on major thirds such as Db-F or F#-A#, never on major thirds such as F-A, G-B or C-E. The presence of many sharps or flats in the music thus adds expressivity, piquancy or brilliance to many of the major thirds if the "black notes" are tuned with beatless or nearly-beatless fourths and fifths.

If we wish to have major thirds which are not as wide and not as rapidly-beating as Pythagorean thirds, we then have to narrow one or more of the four perfect fifths in the chain which embraces the major third.

If we want an entirely beatless major third, as in meantone temperament, then the entire syntonic comma of 22 cents needs to be distributed among the fifths, since a single fifth narrowed by 22 cents would be a hopelesslydissonant "wolf." If the fifths (or fourths and fifths) share the load equally, then each fifth is narrowed (or fourth is widened) by about five and a half cents, as shown at the top of Example 3. (This eventually leads to the appearance of other wolves, as we shall see shortly.) If, however, the fifths are each narrowed by only four cents (as in Young's and Valotti's well temperaments), the resulting major third will be 6 cents wider than beatless: 22 - 4 - 4 - 4 - 4 = 6. Going further, if the fifths are each narrowed by only two cents (as in equal temperament), the major third will be 14 cents wider than beatless: 22 - 2 - 2 - 2 -2 = 14. Likewise, if two fifths are



Example 4 - Contiguous fourths and major thirds in equal temperament

beatless and two are narrowed by 2 cents, then the major third will be 18 cents wider than beatless: 22 - 2 - 2 - 0 - 0 = 18. From this we can see that in the actual setting up of an equal temperament, an error of only one cent in each of the fifths (or fourths) of the chain can cause a four-cent error in the resulting major third

We can now see how the widths of all the major thirds in Example 2 have been calculated. Take the major third D-F# in the Aron-Neidhardt temperament: the chain of fifths is tempered as given by the boldfaced numbers in the table, starting at D and reading downward:

D-A -5.5 A-E -5.5 E-B -2 B-F# 0

To calculate the major third D-F#, start at +22 (the value if all the fifths were beatless) and then take into account the actual narrowing (or widening) of the fifths: in this case 22 - 5.5 - 5.5 - 2 -0 = 9, the value given for the major third whose lower note is D in the Aron-Neidhardt temperament. As you can see from the Meantone part of the table, one monstrously wide inside-out "wolf" fifth results in four monstrously wide major thirds: 22 - 5.5 - 5.5 -5.5 + 35.5 = 41, the price paid for eight beatless major thirds. (Properly speaking of course, the pack of wolves in meantone temperament consists of one diminished

sixth and four diminished

fourths!)

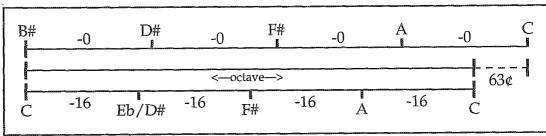
For tuners of equal temperament (which is most of us), one of the chief considerations in setting the temperament is to tune a chain of four fifths (or two fifths in one direction and two fourths in the opposite direction), not only arriving at the correct size of major third but obtaining equally-tempered fifths and fourths in the chain. After all, two beatless fifths plus two fourths which beat twice as fast as they should (that is, tempered by 4 cents instead of 2) would still add up to a major third correctly widened by 14 cents. It so happens that a chain of contiguous major thirds over two octaves (an excellent foundation for an equal temperament) embraces two chains of contiguous fourths, as illustrated in Example 4. By having the beat rates in all three chains progress in the usual manner, with 5:4 beat ratios between contiguous thirds and faintly increasing beat speeds in the fourths as one moves upward, one can set most of the notes of the temperament very

accurately.

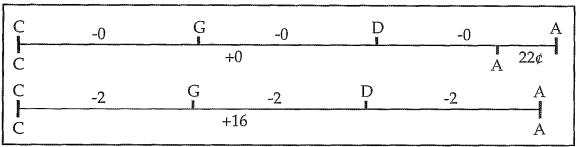
Let us now consider briefly the interactions of chains of *minor* thirds with the octave, and of chains of fifths with the minor third. A chain or stack of four beatless minor thirds exceeds an octave by about 63 cents, as shown in Example 5. In equal temperament the 63-cent discrepancy is distributed equally among the four minor thirds: each minor third is therefore narrowed by about 16 cents. Of greater

practical importance to the tuner is the interaction of the chain of three perfect fifths with the major sixth (the inversion of the minor third), shown in Example 6. Here the chain of fifths exceeds the beatless major sixth by 22 cents, the same syntonic comma we encountered earlier in Example 3. If each of the fifths is narrowed by 2 cents, as in equal temperament, then the width (in cents beyond beatless) of the major sixth is adjusted accordingly: 22 - 2 - 2 - 2 = 16, which agrees with the value of +16 in Example 5. In the actual setting up of the temperament, an error of one cent in each of the fifths (or fourths) of the chain can thus cause a three-cent error in the resulting major sixth or minor third.

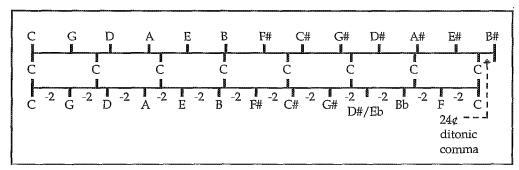
At this point we are ready to explore the discrepancy between a chain of 12 beatless fifths and a chain of 7 octaves, illustrated in Example 7. If we substitute downward fourths for some of the upward fifths, as in the well-known "fourths and fifths" temperament scheme, or even if we



Example 5 - Chain of minor thirds against an octave



Example 6 - Beatless and equal-tempered fifths and major sixths



Example 7 - Beatless and equal-tempered fifths against octaves

consider a chain of 12 beatless fourths against a chain of 5 octaves, the results are always the same: the discrepancy is almost 24 cents, the *Pythagorean* or ditonic comma. If eleven steps in the "fourths and fifths" temperament are tuned beatless, the final step (assuming a beatless octave) is either a fifth which is 24 cents narrower than beatless or a fourth which is 24 cents wider than beatless. The wolf strikes again! Standard equal temperament distributes the 24 cents equally among the 12 fifths, so that each fifth is narrowed by 2 cents (or one-twelfth of the ditonic comma). Well temperaments distribute the 24 cents unequally: in the simplest scheme (Valotti's temperament or Young's number 2) six of the fifths are narrowed by 4 cents while the other six are tuned beatless. Young's number 1 represents a more elaborate scheme: four are narrowed by 4 cents, four by 2 cents, and four are beatless, but the total narrowing of fifths still adds up to 24 cents. In its all-out push for beatless major thirds, meantone temperament narrows eleven fifths by

about five and a half cents, resulting in the giant inside-out wolf fifth mentioned earlier.

So far in this article I have ignored the issue of inharmonicity and tempered octaves. In this regard, an alternative distribution of the ditonic comma, Lucas Mason's "new tuning" of stretched octaves and beatless fifths, is worth mentioning because it brings inharmonicity into focus. Instead of narrowing the fifths in order to accommodate the octaves, Mr. Mason stretches the octaves more than the usual amount in order to accommodate beatless fifths across the entire keyboard. Whether the increased consonance of the fifths makes up for the loss of consonant octaves is a point of debate; in any case we should recognize that the more commonly accepted piano tunings of today actually represent a compromise between pure fifths and pure octaves. In other words, in our common, "stretched" equal temperament every interval is tempered, including the octave; no interval is strictly beatless.

At no point in our exploration of intervallic combinations and temperaments are any value judgements implied.

"Beatless" does not necessarily mean "better," nor does "non-equal" necessarily mean "inferior." Any tuning system represents a compromise between the conflicting tendencies of chains of various intervals. Equal temperament is a compromise which favors the relative purity of fourths and fifths; meantone and well temperaments represent alternative compromises in favor of purer (and/ or more expressive) thirds and sixths. For any gain in favor of the purity of one interval there are always corresponding "losses" for other intervals which may nevertheless heighten the brilliance or darkness of the music, since how much an interval is tempered determines to a large extent its color and musical character. It is our job as tuners to find a compromise which offers the best balance of resonance and musical expressiveness for a particular instrument, player, and range of musical styles.

Next month we shall reexamine and extend the discussion of these interacting chains of intervals from the birds-eye view of the circle of fifths.



Feature

[Ed. note: Part 1 of this article was published in the March, 1994 Journal.]

Sandblast now?

ne idea that seems to be a double-edged sword is abrasive blasting the keys to clean them. Actually, we should be calling it "glass beading" the keys as to use sand or some of the other abrasive mediums under pressure would wear down all the sharp edges, pit the keys everywhere we don't want them pitted — you get the idea. Glass bead blasting is much safer to both keytop and technician. It does a mild abrasive scrubbing of the surface without eating the daylights out of the wood. It will produce a "peened" look to the material without actually damaging it.

I have no iron-clad rules as to when to blast the keys. Old tops on or old tops off each offers advantages you can consider. Try both and find the method that suits you best.

Use a gang clamp or clamps to keep the keys in orderly control. They are simple to make and use and keep you from constantly playing 52 pickup! Bill Spurlock has a honey.

Take care to cover the capstans. On grand keys also cover the backchecks (I leave the wires to be blasted) and the damper lifter felt. They should not be abraded by the glass beads. I use a little cover made of duct tape run across the length of the keyboard. After glassbeading the keys I zip off the cover and while I have the keys before me I clean the capstans with a good quality brass polish. Step back and admire the cleaned keys with shiny capstans just crying for those new keytops!

The Keys To \$uccess

Part 2 of 2

Bob Bartnik Richmond Chapter

The biggest problem is that the blasting cabinet takes up a lot of space, requires several pieces of equipment, and when you get done with it you have to have some place to store the contraption until needed again! The result is cosmetic for the most part, and I offer it as an additional charge for the higher priced jobs and "specialty" repairs like smoke-damaged pianos or those really nasty pianos even I can't stand to touch. Presently, I have access to a friend's cabinet and while the price is right (free), the trouble with hauling everything over to his house, setting up, doing the work, clean up, going home and unloading... I am slowly but surely fabricating a modified version of the blast cabinet offered in the Journal by Jim Harvey. Thanks for the idea, Jim!

Preparation: trimming top surface prior to recovering

To me, preparation of the keyblank is crucial. I want to remove just enough wood so that I duplicate the height of the original key. This means less work leveling the keys once back in the piano. Also, I've seen "recovering jobs" where they popped off the old tops and glued new molded keytops some three times thicker directly onto the unprocessed

and prepared surface. Just guess what effect that can have on your fallboard and other case parts!

I'm fortunate in that I have a set of Oslund key machines (check the cover of the November 1991 issue of the Journal for a picture). These machines are legendary and make shaving the key surfaces a matter of a few simple adjustments. For those who don't have such a setup take heart. Check the Journal classified section for availability. If still unable to get involved to this degree, but you want to do quality work, again take heart. Bill Spurlock has published several helpful jigs and fixtures to make this job a reality. Check the back issues of the Journal for these and other related articles.

You can rig up a sanding platform to your drill press quill or purchase (less than fifty bucks) the Wagner Safe-T-Planer attachment for your drill press or radial arm saw that will allow precise trimming. A homemade jig or the ready to use Peterson router guide turns a router or planer into a specialty tool just for key work.

I use the Wagner Safe-T-Planer in conjunction with a four-inch drill press vise. This handy little vise cost me about \$10.00 (Harbor Freight Tools, 800-423-2567), and worth every penny. I have modified the original metal jaws of the vise. I fabricated a set of "L" shaped jaw replacements from some wood scraps. This allows the key to rest with its top above the vise, but sit firmly and squarely in the jaws. The wooden sides of the jaws also serve to protect the keys from teeth marks. The secret to this design is that the lip the key is to rest on (the bottom of the "L"), must be narrower than the width of the average key and allow the key to sit high enough to clear the top of the vise. This allows plenty of room to trim wood from the keytops.

After making and testing the new jaw pieces, you can either drill and mount them into the original screw holes or, if this is to be a permanent adaption, superglue the wood onto the original jaws. Sometimes you can make a temporary adaption of the

vise for key work by using a hot melt glue gun and securing a plain wooden block into the base of the vise next to the fixed jaw. This works like the "L" lip if it is kept narrower than the key width. When you are done you can pry the hot-melt glue off and use the vise for other things. Be careful to align the block so you get a square and flat work surface.

I have my vise mounted on a hardwood board. This board rests against a rail. The rail is nothing more than a straight piece of 1x2 hardwood clamped to the table. The drill press vise mount is lubricated with paraffin wax and glides against the edge of the rail. The Safe-T-Planer is set to the appropriate depth and trims the wood from the keytop. You control the length of the cut, so pay attention!

The vise works just as well if you are trimming the keys with a sanding disk or sanding drum setup. I keep some "blanks" around to practice controlling my cutting/sanding depths. The bottom (seating) lip of the vise to the underside of the trimmer/sanding disk/sanding drum is your measurement equivalent to the original thickness, less the thickness of the new keytop. Hence the importance of precise measurements!

The vise is an important part of the key recovering process and should be treated with respect. Pay attention to details and the modified vise will work like a champ!

Notching

After trimming the key to accept the new keytop material, dry fit a keycover and note if the end of the keytop fits flush with the new trimmed area. Sometimes the shaved surface doesn't go far enough to the rear and the new keycover doesn't fit flush. If this happens take a sharp chisel, cut back the notch and elongate the area.

Nothing is more frustrating as gluing on a set of keytops and finding they are flayed up at the rear of the key because the trimming didn't go back far enough. A few minutes with the chisel will prevent this embarrass-

ment. Here a sharp chisel is of paramount importance. A dull chisel will cause the wood to compress and shred instead of cutting cleanly and smoothly. The first cut should be a short stop cut in the key going as deep as the shaved area. The second takes the excess remnant wood back from the shaved edge to the stop cut. I turn the chisel bevel side down and use a smooth right/left cutting/shaving motion to cleanly smooth and flatten the area.

Again, this step may not be necessary but isn't it easy to check before committing yourself too deeply?

Surface repairs

Make any necessary repairs to the gluing surface with a good wood epoxy or putty, wood insert, whatever is needed to get a smooth, even work area. It may be necessary to run the repaired key through the trimming operation again to restore any variations created. The more even, level surface you have the less chance the keytop will pop off. I like using the two-part Minwax® brand High Performance Wood Filler. It mixes like an epoxy and dries in fifteen minutes, then can be shaped, carved and/or sanded. Nice, quick and effective, and found at most hardware stores. That's the name of the game.

Installation: jigs and fixtures

Again we can pick and choose from a variety of professional and homemade jigs and fixtures designed for keytop installation. My jig has been evolving for some twenty-five years. The original was no more complicated than a bent nail in a board. The bent nail provided the proper amount of "Lip" overhang while the board held the glued-up keytops in position the receive the key. Today I have "refined" the jig to be virtually indestructible. It is welded steel! It replaced one made of scrap wood, glue and a piece of old key stock that I used to attain my overhang. Why did I make it of steel? Why not? Actually, it was to prevent distortion and loss of accuracy by the reaction of the contact cements to the scraps of wood and plastic it came in contact with. Sound impressive? Anyway, it made sense at the time!

All this jig is designed to do is to allow you to adhere and align the new keytop material to the old key and do so in as efficient a way as possible. As functional as this latest jig is, I did not discard the wooden jig it "replaced." Some spinet keys with extended keybuttons on the underside of the key prevent the use of the longer jig. Maybe only one set in a hundred is like this, but when you need the right tool to do the job... nuff said!

Adhesives

Depending on the type of keytop material you are using, you have a variety of adhesive alternatives. Perhaps the oldest method used in recovering keys is to use a solvent that physically bonds the two surfaces by melting the underside of the plastic keytop to the wood grain of the key blank. While most any volatile solvent would work, my solvent of choice is acetone. It is readily available and has a moderately fast flash-off ("drying" or evaporation time).

Modern contact cements have replaced most other adhesive methods and with good reason. They are readily available, reasonably priced, strong bonding and dependable. Available in both flammable and nonflammable mixtures, both deserve your respect: read all warnings and use properly! Respect and protect your body parts.

I use a plumber's acid brush (available in sizes from 1/8" to 1/4") to lay a thin coat on both the wood surface and the underside of the keytop. The best thing about them is that they are good, cheap, and disposable — and there's no cleanup!

I don't know if this is really true or not but I feel I get the best results from the older "flammable" type of contact cement. Maybe I'm just more used to it and recognize the vapor smell and make some kind of mental association, but it seems to work better for me. Who knows. The writing on the wall is that flammable versions are going the way of the dinosaurs so give the latex, nonflammable types a try. I am slowly (and begrudgingly) making the move myself as my favorite version disappears.

Remember: contact cement is designed to give a permanent and strong instant bond to two surfaces. Use gentle pressure to align the keytop before applying more pressure to permanently seat the keytop. It's usually a one-shot deal so use caution! Keep a rag handy for hands and read up on cleanup procedures and materials and first aid measures.

Keytops

I have my personal preferences for key material. Depending on the type of key recovering I'm doing, I may cut some 1" x 6" ivorine blanks from bulk sheets. I purchase mine from Schaff Piano Supply Company, one of the few remaining supply houses that still stocks pyralin material. It is this material that works so well with solvents to bond it to the key wood. The Oslund machines were made for these keytops and really provide a more personal "hands-on" job. Here your personal skill and artistry with a hand file really shines!

Molded keytops have all but made this material obsolete for the average technician and that is a real shame. It still has its uses. I do an average couple sets of "Waterfall" keytops each year and I haven't seen any of the molded keytop manufacturers beating a path to be first to make them. Should we throw these pianos in the dump because we can't recover the keys? I think not.

Molded keytops are the new generation of materials for the technician. We've come a long way since they were first introduced and each catalog update from suppliers seems to introduce a new and improved version. Vagias Ventures makes an astonishingly wide variety of different keytop finishes, colors and materials. I keep the most popular selections in stock and they provide excellent service for ordering keytop sets.

I order my plain white keytops, with and without fronts, from the supply houses and find them, at first glance, pretty much alike and of similar good quality. However, "plain" keytops have improved and it is possible to order both generic sizes and seemingly more "model-specific" molded keytops. Basically, this refers to both width and length of keys. Get samples from different makers and use them to compare with your job on hand. For specialty jobs like clavichords, harpsichords and whatever, I play it by ear and usually end up milling my own stock from the local hardwood supplier. Most of these jobs are covered with thin wooden strips like pearwood, cherry, etc. and the occasional mother-of-pearl inlaid sharp keeps the mind churning round and round! I love a challenge!

Find what you like and are comfortable with but don't forget that to stop is to stagnate. Don't be afraid to check out options and new materials. That's what makes it fun!

Trimming: accuracy = quality work

Prior to the final filing of the keytops the obvious excess material along the sides and in the notches must be removed. This can be accomplished in a variety of ways depending on your pocketbook, ingenuity, and skill.

For those who have the bucks and can find them there are the Oslund machines, the Solenberger machines, and Bill Spurlock's router jig system to name a few. Your router can be adapted to trim keytops with a ballbearing type flush cut laminating bit. Even something as simple as a plain vanilla 10" Bastard Mill File can do the job.

Sometimes the best tool for the job is that simple file. Take a look at your tool and observe one side coarse, one side fine; one edge toothed, the other blank. Practice filing in a downward stroke against the keytop toward the bottom of the key. Try not to file up against the underside of the keytop as you might inadvertently pull the freshly glued keytop loose. Even though the glue has set the prescribed amount of time it is still "fresh" and the bond can be broken. As you get more comfortable with the process you may find a circular stroking motion with the power on the downstroke more comfortable.

Clean notches and smooth, crisp edges are achieved by using both sides of the file: rough for rapid removal of excess plastic; fine to remove filing grooves and leave a smooth edge. You will improve with practice but the best advise I can give is don't be in a hurry. Give yourself time to do the job right and the job will be done right!

Finish filing: the importance of proper and clean tools

As you file the keytops remember to periodically vacuum or brush up the shavings as they are both flammable and can scratch your finish surface. Don't try to do it all at once.

You are cutting a relatively soft material, not hardened steel! Check your files for buildup and clean them as needed. Don't think you are "wasting" time—a clogged file cuts unevenly and you run the risk of friction burning or skittering along the edge causing damage. One thing I have learned is I hate to have to replace *one* keytop I screwed up because it means breaking a whole new set of molded keytops! [Mistakes = Waste!]

The finish filing should be a flowing motion as you caress the keytops to gently soften the edges. The better the filing, the less buffing you need do for a good, clean looking job. By the same token, take time to get the

notches clean and sharp, the edges flush, and buffing is like icing on the cake!

Buffing

All buffing wheels are not created equal, nor do the materials they service respond the same. The material the wheel is made of, how it is sewn, and the recommended speed are all important to getting the right results. Check the motor used to drive the wheel: size of shaft, r.p.m., horsepower. Don't forget the little details!

I mark each wheel according to the type of material it buffs: *ivory* only and *ivorine* (plastics) only.

So, too, should you use polishing compounds recommended for the appropriate surfaces. [RPM = HOT = MELTDOWN!]

A beautiful recovering job can be ruined by buffing with too much pressure, which generates too much heat, which melts the new keytops, which causes technicians to cuss... Use a slow to moderate speed with a soft cotton wheel and light, gentle pressure to get good results.

The purpose of buffing is to remove minor imperfections in the finished keytop. Prior to buffing I will examine the keys for glue runs and smears or file marks. I try to remove these blemishes with a Scotchbrite® pad, OOOO steel wool and/or a razor blade prior to buffing. A few passes with the fine side of the file should remove edge marks not previously corrected. Only then should you lightly buff the keytops with the appropriate compounds. Check with your suppliers for recommended buffing compounds. Periodically clean your buffing wheels of hardened compound buildup with a buffing wheel rake. To neglect this is to invite undue friction and the inevitable keytop meltdown.

Sometimes a satin finish is desired. A light, quick hand buffing with a Scotchbrite pad or OOOO steel wool should sufficiently knock the sheen off the keys.

While you are buffing, don't forget to buff the fronts! Nothing looks

worse than a beautiful set of new keytops with cruddy looking fronts. It may be worth your time to go at these with OOOO steel wool or a Scotchbrite pad before buffing to get any really nasty stuff off it.

Ivory repair and replacement

Ivory can be cleaned! I use my random orbit sander and start with eighty grit non-loading paper for preliminary cleaning. I'll follow up with one-fifty paper on the random orbit sander before going to hand sanding 220/320/400/600 wet-or-dry grits to remove minute sanding marks. I know this sounds like a lot of physical effort, but really, most of the work was done by the sander. The hand sanding is done wet and a few swipes per grit is all it takes. Remember ivory has a grain to it. Go with the grain as often as possible and finish up sanding with the grain. A razor blade or hand scraper can be used to attack those really nasty marks. Once sanded and/or scraped, the ivories are waxed.

Ivory can be buffed with an ivory polish or a good quality paste wax or it can be lightly oiled with a good quality oil. It will soak into the open pores and seal them producing a shiny polished finish upon buffing.

Being organic, ivory can be bleached out and/or set in sunlight to lighten — if you have the time or want to risk the ivory separating from the key. Be careful what you put on ivory to clean it. Some perfectly ordinary and harmless cleaning compounds, when combined, react on ivory by turning it a bilious shade of orange! I was going to tell you what they were but I changed my mind — don't be tempted! Use plain ol' mild soap and water on a slightly dampened rag to clean the keytop, followed up by a dry towel. Don't let too much water get on the wood as it will loosen the ivory, warp it (organic will curl) and damage the wood.

Plastic is not organic but petroleum-based. It works best with other types of buffing compounds. Going at plastic with sandpaper may produce negative results you can't correct without replacing the keytops. Be warned and be careful.

New Ivory (i.e., If I were a rich man)

When do you replace real "old" ivory with "new" plastic? This is one of those questions with which every technician must come to grips. Ivory, real ivory, is a thing of the past. I try to salvage good, reusable ivory when I recover keys. As a result I have boxes of mismatched ivory pieces, heads and tails alike of various lengths, widths, thicknesses, grain patterns, color variations...

In the olden days ivory blanks were affixed to the key by a glue impregnated wafer. The wafer was soaked in water and sandwiched between wood and ivory. Brass cauls and clamps were affixed and a heat source was applied to the brass. The heat caused the water to boil off and activate the glue. The heat was removed, the cauls cooled and the key and ivory were trimmed.

These days I use contact cement or the superglue types depending on what kind of mood I'm in! The superglues are the most convenient and quickest. Contact cement is often closer at hand in the shop.

Economics rears its ugly head when it comes to deciding when to replace all the ivories with a new set of plastic keytops. While most will agree a beautiful full set of real ivories are a joy to behold and a sheer pleasure to play, Mr. and Mrs. Joe Average Customer:

- a) doesn't know the difference, nor really care
 - b) is more interested in the visual
- c) chokes at the cost of repairing real ivory versus new plastic
 - d) all of the above

As in all things there are exceptions, but in reality this covers most customers we'll run into. Those few exceptions deserve our attention and special recognition for going the extra little bit. I see too few of them.

If you don't have a plethora of concert artists pining for real ivory but do have a serious inquiry, contact your suppliers and manufacturers for availability and cost of real ivory. Brace your customers as to both the high cost and the time it takes to do the work. A more available resource of organic keytops are those done by my friend Don Bunch down in Washington, N.C. He has come up with a way of covering keys in bone with a look and feel as close as I care to get, at less than half the cost of ivory. Give him a call for details.

Tip: Don't limit yourself to just yourself! Use fellow technicians, manufacturers, suppliers and any and all sources you can find. There is nothing to stop you from being both a contractor and a subcontractor, just as there is no reason why you shouldn't use subcontractors if they can provide that extra needed service.

Can ivory be repaired? Had you asked that question a few years ago I'd have said either "No" or "Why bother?" It was certainly easier to just cut them off and glue on a new set of plastics. As ivory becomes more "precious" to me I have taken more care to look into repairs.

Warped and/or twisted ivories can be soaked in hot water until clean and supple. Pressed between two sheets of plate glass and the odd brick placed on top for added weight, the ivories are left to air dry, once again flat and true.

Thanks to women's fake fingernails I have been fixing chipped ivories. I mix some of the polyester nail product and apply it to the chip after bolstering the area with a masking tape dam to give it a molded shape. Once cured I use an emery board to shape it down to proper aspect. A little matching paint mixed into the epoxy will near-match the ivory. A little touchup paint to blend in the edges and you're done.

Be something special

While it may just be a touch of vanity, have something you do go above and beyond to call of duty. Take the time to clean the capstan screws, or clean and lubricate the balance and front rail pins. Whether or not you mention this to the customer is your business, but it is a point of pride to me to "go the extra mile." The best thing about this is it makes my work go easier so I, too, benefit for so little effort.

Tip: Don't think that the job is over when the keys are recovered. There is more to recovering keys than just gluing new keytops on. A key job also includes:

- 1. Transportation to and from the job;
- 2. Disassembly of case parts to remove keys;
- 3. Assembly of case parts after installa tion;
- 4. Leveling keys and correcting dip;
- 5. Key squaring and spacing;
- 6. Easing and other adjustments if rebushed;
- 7. Minor action regulation and adjust ments

In other words, don't sell yourself short. Verbum sapienti sat est—a word to the wise is sufficient!

Additional information

Recent articles available for your scrutiny give alternate methods and/or jigs and fixtures you may find of interest. The list found at the conclusion of this article is by no means comprehensive, and the author encourages you to do some research yourself. After all, do I have to do everything for you... mumble, mumble... mumble.

Finally

I'm fond of saying nothing is carved in stone. By this I mean there is no "right" way to do this job as long as the finished results are up to standards. My way of doing something is just that—my way! Find whatever method and tool assortment works best for you. I merely offer possible avenues to investigate.

You may or may not have access to Oslund machines or the mechanical skills to create the jigs and guides Bill Spurlock and others use. Not to despair! I know of technicians who recover keys with nothing more than disc sanders and a couple of files and they do beautiful and high quality work! Get yourself a set of old clunker keys and practice -- if you don't have an affinity for this work, don't sweat the small stuff! Check around for those of us who do key recovering as a regular service and get them to show you or answer questions. Docendo discitur (one learns by teaching). We often find we get more out of helping you than you do! It teaches us to verbalize what we do almost by reflex!

Begin a dialogue or relationship with one of the many fine key recovering businesses found advertised in the *Journal*. See what services they offer and poof—you can offer the same! It is just that simple — well, almost.

Remember that this is another way to expand your business, either directly, by offering the service and doing the work yourself, or by acting as a middleman and subcontracting the work out to — I don't know; say... me!

Bonus points

Translate the following Latin phrase and receive adulation:
Quomodo nunc, spadix bos. Reversed translation: woh won, nworb woc.

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Key Surfacing/Trimming Machines

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Solenberger Piano Service

Ed Solenberger 1551 Lynn Ct. Santa Rosa, CA 95405 707-542-1756

Spurlock Specialty Tools

Bill Spurlock 3574 Cantelow Rd. Vacaville, CA 95688 707-452-8564

Peterson Router Guide

Don C. Peterson Piano Service 11530 N. 6000 W. Highland, UT 84003 801-756-9786

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American Piano Supply Company

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Ford Piano Supply Company

4898 Broadway New York, NY 10034 212-569-9200

Pacific Piano Supply Company

P.O.Box 9412 N. Hollywood, CA 91609 213-877-0674

Wagner Safe-T-Planer

Pianotek Piano Supply Company 214 Allen Ferndale, MI 48220 800-347-3854

Journal articles worth looking up:

December 1987, pgs 17-20 "The Technical Forum," Susan Graham, RPT "A New Beginning; Make This Tool: The Key Clamp"

July 1989, pgs 10-12 "The Technical Forum," Susan Graham, RPT "Key Leading"

May 1990, pgs 26-29
"Practically Speaking," Bill Spurlock,
RPT
"Key Balance Hole Repair"

January 1991, pgs 22-25
"Practically Speaking," Bill Spurlock,
RPT
"Grand Action Touchweight, Part II"

March 1991, pgs 21-25 May 1991, pgs 34-37 June 1991, pgs 29-32 "Practically Speaking," Bill Spurlock, RPT "Key Recovering"

November 1991, pgs 20-23 "Practically Speaking," Bill Spurlock, RPT "Using The Table-Mounted Router, Part

January 1992, pgs 18 - 20, 27
"Practically Speaking," Bill Spurlock,
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"Cleaning Piano Actions & Parts With A
Glass Bead Blaster"

February 1992, pgs 16-21 "Practically Speaking," Bill Spurlock, RPT

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May 1993, pgs 16-17 "Technical Forum," Ed Solenberger, RPT

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Richard Anderson, RPT Feature Writer Chicago Chapter

: One of my customers is a conservative church that has a 30-year old studio piano. The piano has been played and tuned regularly without problems. The church recently began renting the use of its facilities and piano to a musical group that performs rather emotionally and the piano is starting to break strings. Is the hard playing by this new group responsible for the string breakage?

: Hard playing with flat hammers will break strings of any age prematurely. The same change in the vibration of the strings that make playing with flat hammers sound bad causes the wire to fatigue sooner.

Imagine that the round strike surface on the hammer induces a round wave form in the vibrating string. When this round wave runs into the capo bar and reverses direction the angle of deflection of the string from rest is small. A flat hammer with a somewhat square strike surface will induce a square wave that produces a harsher, less musical sound and causes a larger angle of deflection when the wave hits the capo bar. This larger angle of deflection is what causes the wire to fatigue.

The wire can withstand only a certain amount of oscillation at the capo bar that is the product of the number of deflections multiplied by the angle of deflection. When the limit is exceeded, the wire breaks. Even new wire will break after only three deflections of 90 degrees, but wire that's played lightly with well-maintained hammers will last until other factors necessitate its replacement.

In this case, the piano had been played lightly for thirty years, but the hammers had not been filed. So even though the conservative folk were playing lightly, they were depleting the oscillation bank with their flat hammers. When the emotional folks began playing hard they broke the bank almost immediately because they increased both the angle and number of deflections with their heavy playing.

What to do about your customer that's ready to snap?

- •Replace or splice broken wire. Further playing on the remaining one or two strings of a unison will overload those strings and cause them to break even sooner.
- Reshape hammers. The damage has been done already, but this will help forestall the inevitable.
- •Deregulate the action. After reshaping the hammers, the letoff will most likely be farther than "normal." Leave it there. The greater letoff will put less energy into the string and deplete the oscillation bank more slowly.
 - Tell the customer:
- 1. The strings will continue to break. The steps above will only buy them some time. The damage has been done starting several years ago when they neglected to have the hammers serviced (or somebody forgot to tell them to have it done).
- 2. The piano will have to be restrung soon. Individual replacement or splicing will add up to more than the cost of restringing in short order.

This is a good example of how regular service (in this case hammer shaping) will prolong the life of certain parts (the hammers) as well as the rest of the instrument (the strings). It makes a good illustration to use to explain the benefit of what we do to the customer. This is also a good introduction to:

Richard's Rule of Thumb #1:

No individual's or manufacturer's piano is immune from the laws of physics.

In other words, stuff breaks! We don't need to apologize or feel responsible for it (unless, of course, we broke it). We're all too often too sympathetic with customers and unwilling to say, "These parts need replacement." Compassion for the customer is helpful, and empathy for the customer is essential, but we can't take responsibility for the piano's age or quality, or its condition prior to our tenure.



The Temperment

Paul Monroe, RPT Orange County Chapter

The purpose of this series of articles is to reach out to the inexperienced tuner and help create a good foundation on which to build a profession.

he "TEMPERAMENT": to me, one of the most difficult subjects to explain in words so as to provide a clear and easy understanding to the beginning tuner. So a word to the beginners: read as many books as you can on this subject, put into practice what you read and then go back and read it again.

The more you know about this subject, the easier it is to understand what you are doing and why you are doing it.

The following three rules may help you. Rule #1—Know what you are doing. Rule #2—Know why you are doing it. Rule #3—If you don't know the answers to #1 and #2, ask questions. With this in mind, let us start with piano wire and the temperament.

As the hammer strikes a string, the string divides into different frequencies called partials. The first one is called the fundamental, the next one the 2nd partial, etc., etc. To help you hear my point, slowly press and hold down note C1 so as to pull the damper away from the string. In a staccato fashion strike C2, G2, C3, E3, A#3, C4.

This little experiment is meant to convince you that a string does divide, sub-divide and generate frequencies other than the fundamental. Try the same procedure with other notes, making sure you keep the sequence of the octaves, fifths and thirds the same. Refer to Dr. William Braid White's book "Piano Tuning and Allied Arts," page 42 for a technical explanation.

Having very briefly introduced partials as a way to have a better under-

standing of the temperament, (see Fig. 1 - p. 48) for the complete temperament with cross checks and tests to check your accuracy. These cross checks and tests are but a few of the many that can be used. As you progress and mature as a tuner, you will find more on your own.

Before starting to tune and memorize your temperament you must know the following:

Expanded	Contracted	
Intervals	Intervals	
Major third (M3rd)	minor third (m3rd)	
Major sixth (M6th)	minor sixth (m6th)	
Fourth (4th)	Fifth (5th)	

Start tuning the temperament with interval F3-A3 with a beat rate of approximately 7bps (beats per second). What causes you to hear 7bps? If you know, read quickly. If you don't know, read carefully.

The following assumes the piano is at standard pitch. The frequency of the fifth partial of F3 is 873.07038. The frequency of the fourth partial of A3 is 880.00000. The differential is 6.992962. Therefore the differential in the frequencies of these "coincidental partials" creates the beat rate you hear. To the craftsman these are known as the 5/4 coincidental partials and they exist in all Major 3rd intervals. An amazing coincidence; the frequency ratio of A3 to F3 is also 5:4. Read White's book for a detailed explanation.

Your question at this point should be, "How do I know what 7bps

sounds like?" The following explanation is not original. I was introduced to this method at a state PTG convention by Jim Coleman, Sr.

Place your metronome on 103.9. As you hear each click of the metronome, count 4. Click, 2, 3, 4; click, 2, 3, 4; click, 2, 3, 4 etc., etc. What you are counting is a beat rate of 7bps. Listen, count, practice and practice until you have that beat rate programmed into your subconscious.

The metronome setting for the next interval, F3-D4 is 119.8. Again as you hear each click count click, 2, 3, 4, etc.

The next interval is A#3-D4 and the metronome setting for this interval is 138.7 Count again click, 2, 3, 4, etc., etc.

When you have these beat rates programmed into your subconscious, you are well on your way to setting a temperament aurally. If you are using the Accu-tuner, use this aural method as a method to check your accuracy.

To help you hear the beat rate of F3-A3 more clearly and without the influence of other unwanted characteristics, hold down F3 and A3 releasing the dampers from the strings and in staccato fashion strike A5. Listen. The beat rate you hear is the true differential between the 5/4 coincidental partial rate and the beat rate you hear when you play the interval. If this does happen I choose to stick with the true beat rate I generated by sympathetic resonance. A word of caution when you strike A5—if you have the piano muted and the dampers are not on the strings, push the hammer of A5 against the string to dampen

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The Tuner Continues—The Temperament

the tone. This will allow the partials to ring out loud and clear. To help you hear the beat rate of F3-D4 more clearly, strike A5. For the interval A#3-D4, strike D6.

This may be the appropriate time to let you in on an astounding fact. The "proper" beat rate varies from one piano to the next, due to variables built in to the piano. So therefore, to say that all F3-A3 intervals on all pianos should

be 7bps is in error. The beat rate of 7bps is the starting point. In your tuning maturity you will be able to set the ideal temperament for the piano you happen to be tuning.

We will continue our discussion of the temperament in the next article. Remember rule three: if you don't know the answers to rules #1 and #2—ask questions.

Figure 1

The Defebaugh F3-F4 Temperament				
TUNE	ТО	BPS	TESTS	
F3	A3	7		
D4	F3	8	A-D4th should be slow	
			roll up to 1bps.	
A#3	D4	9.2	F-A# 4th to have slow	
C.11.4		0 T	roll.	
C#4	A3	8.7	Should be about .5bps	
G#3	C#4	.9	slower than A#-D M3rd. F-G# m3rd should be	
Gmo	Cit	•9	slightly faster than A#-D	
			M3rd. (9.31bps to 9:2bps)	
C4	G#3	8.2	Should be slightly faster	
			than D-F M6th and	
			slightly slower than A-C#	
			M3rd.	
F#3	A#3	7.3	Slightly faster than F-A	
D#4	T40	0.4	M3rd.	
D#4	F#3	8.4	Slightly faster than F-D	
			M6th and slightly faster than G#-C M3rd and	
			slower than A-C# M3rd.	
В3	D#4	9.8	Slightly faster than A#-D	
			M3rd.	
G3	В3	7.7	G-C 4th should have a	
			noticeable roll. G-D 5th	
			should be less than the	
			4th. Beat rate to be in be-	
E4	G3	9	tween its neighbors.	
17.4	GO	フ	C-E M3rd to have a beat rate.5bps faster than B-D#	
			M3rd. Beat rate to be faster	
			than A-C# M3rd but	
			slower than A#-D M3rd.	
F4	F3	0+	G#-F M6th to be slightly	
			faster than G-EM6th C#-F	
			M3rd faster than C-E	
			M3rd.F-G# m3rd a little	
			faster than G#-F M6th.	



Close Encounters Of The Word Kind

Ron Nossaman, RPT Feature Writer

id you ever notice how hard it sometimes is to make a graceful transition from tuning mode to conversational mode and retain your grasp on whatever reality you call your own? You get so wrapped up in some peripheral daydream to escape the tedium of tuning that you find that you neglected to leave a trail of bread crumbs to find your way back to lucidity to answer the question you realize with some panic that your customer has just asked. It goes like this...

Customer: "...rug..... smokes a little don't panic, OK?"

You: "Izzi wubbet?"
Customer: "I said, will you be all right in here?"

You: "Wak id abblum inna bucket."

By now she is having second thoughts about having even let you in the door, much less giving you access to her treasured musical picture shelf. Meanwhile, with a superhuman effort, you finally regain partial control of the power of speech and spend the next minute or so trying to re-establish the illusion of being harmless and, at least, semi-professional. Don't even dream of trying for normal at this point, you are currently in "disaster recovery" mode and there's no extra horsepower for unnecessary frills.

You think, "Maybe I can fake it. Maybe she didn't hear what I didn't come even close to saying just now, or maybe she did and thinks I'm on drugs, or off planet, or maybe she, too, says or does something stupid often

enough to have pity and let me off the hook."

I must be getting better at looking harmless and/or pitiful because people will generally leave a conversational hole for me to duck through until I can backtrack a little and join the discussion in progress as I lock in on the subject. It's a little like where the other folks at the banquet table pretend not to notice when you go to wash the lasagna off your lap, and when you return with the huge resulting wet spot. I often wonder if it's a mercy move, or it's just so far south of their own center of consciousness that they are momentarily too disoriented to do you any damage. More likely, they're afraid to continue in this vein with the possibility of witnessing their tuner pass through a half dozen psychotic episodes and a fetish or two and turn into a turnip before their very eyes. They've all seen those trashy early 1960s science-fiction flicks where the alien, when accidentally exposed, spontaneously renders down to a mixture of black cherry Jell-O and cinder blocks. Probably, by the time they realize that it's just inane babbling and not alien morphing, I've recovered enough to divert their attention with some more organized (if equally disturbing) conversation. I sometimes wonder what would happen if I were tuning for a clinical psychologist when this happens. Who knows, maybe Thorazine's not so bad.

None of this really means anything other than the fact that there is an internal "Tuning World" that I go into that has a surprising depth and breadth. I really do get "lost in my

work" occasionally. Interestingly enough, to me anyway, this never happens with either very good, or very poor pianos. I only get lost in the middle of the road tunings. No, twit, not literally on the white line, just those easy, monotonous, colorless tunings that I can get through on auto pilot. It's like when you used to have a real job that you drove to every day. Weren't there days when you found yourself in the parking lot at work with no definite memories of the drive? Surely you didn't think you were the only one driving around town on pure autonomic function, without the burden of consciousness? You weren't! If you had been awake you might have noticed me going the other direction in a similar condition. I have known people who had no idea where they'd been for the last fifteen years. In fact, I took a Philosophy class from one of them in college. That should explain a few things to some of

When I count to ten, you will awaken refreshed. You will have no memory of this session except for a lingering conviction that it is a very good thing to donate large sums of cash to a worthy cause. A mailing address comes to mind...

Conversation I wish I'd overheard: Traveler: "Pardon me, sir, I seem to be lost. I was on Bliss Street before I crossed the river, but now I find myself on Ignorance Avenue. What happened?"

Local: "Man, on this side of the river, Ignorance is Bliss."

Like the waiter said, "That's not mold sir, that's garnish."

Thorazine: Chlorpromazine - Reduces anxiety, agitation. Discuss this with your physician. If you have any cash left after the prescription is filled, a mailing address comes to mind...

I'm OK, You're OK

It has come to my attention that there could be the barest possibility that my sometimes somewhat cynical outlook, and/or my nefarious habit of indicating the presumed gender(s) of the characters, or verifiable brand names of pianos in my presented vignettes, has the potential of offending some portion of my readership. Being an individual of extreme sensitivity to the feelings of others, and wishing (above all else) to "please all of the people, eventually," I humbly submit this sincere act of contrition.

One very fine undetermined morning (there are specific days of the week that some persons find distasteful or distressing.) to which was attached no religious, ethnic, or sociological significance, my personal timekeeping device of unspecified national origin and product name affiliation gently awakened me, at whatever time of day the reader may find most acceptably gratuitous, in the

gentlest manner conceivable. I sprang from my non-brand-specific bed, with its "Do not remove this tag under penalty of law" tag prominently displayed (I conform to my utmost ability, laying no claims to any superior talents, to the expectations of my society and community), and skipped cheerfully into the kitchen to brew a delicious cup of my choice of morning beverage on a politically and ecologically proper appliance, being very careful (as is my custom) to practice energy and resource conservation in the process. "Golly," I thought to myself, "It sure is swell to be a piano tuner. I must try not to appear too boastful about it, though, lest some unspecific individual or faction less fortunate than myself suffer an unnecessarily traumatic blow to their self esteem." Secure in my knowledge that I was in a proper frame of mind to positively represent the entire world-wide music industry (specifically unnamed), I returned to the bedroom to dress.

Having chosen and donned clothing in moderate earth tones and made of ecologically benign materials, carefully chosen to convey a soothing, trustworthy, and non threatening aspect, I prepared for another exciting day of enhancing the aural potential of a comfortably moderate number of very fine pianos. I endeavor to schedule (at the customers' convenience) no more instruments than to which I can safely and dependably render the best

possible service of which I am capable, thereby augmenting and enhancing the very lives of the proud owners or custodians of these instruments.

Since singling out any specific instance or situational anecdote relating to any experiences I might have in the course of a day of professional service could conceivably have a potentially distressing effect on any number of religious, gender related, socio-economic, or morphologically related groups or individuals, it would be prudent to just say that I made as many individual entities as happy as I was able on that day and I feel really good about it. I'm truly proud to be allowed to be a part of such a noble calling. My endeavors could make it possible that a whole world of culture and beauty will open up for some individual who has yet to experience the joys of music. It is to my eternal joy that I can contribute some small effort to that end.

I'm pleased that I am allowed to share with you some of my joy and satisfaction in accomplishing my daily tasks, and I sincerely hope that my choice of descriptive words or phrases, vocabulary, length of sentences, number of commas, haircut, or inadvertent specificity hasn't offended any of you (regardless of any extenuating circumstance, attitude, or condition you may embrace).

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[Ed. note: Part 1 of this article was published in the March, 1994 Journal.]

The Triangle of Service

So how do we do all of this? To do it well, we have to understand the triangle of service. But before we can understand the triangle of services, we first must understand exactly what service is. And to understand what service is, we have to understand a very important concept: the moment of truth.

The authors of the book Service America say: "When the moments of truth go un-managed, the quality of service regresses to mediocrity." A moment of truth is the instant a customer thinks of your product or service. Every time a customer thinks of the piano, or your name, it is the instant the customer calls you to set up an appointment, or plays the piano after you have tuned it. It is every moment that he thinks about a piano, not just his, but every piano that he sees or hears. It is a chain of experiences that form his opinion of you.

Therefore, it is entirely possible that a customer could experience up to 10,000 "moments of truth" between tunings. If the customer has a good impression of you, because you did a great job tuning or repairing the piano, these moments will be positive ones. But if you did a bad job, or said something offensive, those moments will be negative. And those negative thoughts will continue to build into a rage, and there goes your reputation.

Donald Porter, director of customer services of British Airways points out: "If you are a service person, and you get it wrong, ... you are very likely erasing from the customer's mind all the memories of the good treatment he or she may have had of you. But if you get it right, you have a chance to undo all the

SERVICE MANAGEMENT

Willem Blees, RPT St. Louis Chapter Part 2 of 2

"In order for your company to serve its customers, you need a strategy that will serve to differentiate your company from your competitors in the mind and the experience of your customers. The service strategy must mean something concrete and valuable to the customer, something he or she is willing to pay for."

wrongs that may have happened before the customer got to you. You really are the moment of truth.

When you make a mistake, there has to be a point of facing up to that mistake. Most people will forgive your screw-ups, even to a preposterous degree, if you will acknowledge the customer's personal needs, and make an effort to set things right. That is what makes the concept of managing the moments of truth the very essence of service management.

Every time you work on a customer's piano, the customer is assessing the quality of the service, even if it is unconsciously. But as we are working, and especially after we have left and he or she is playing the piano, the customer is thinking about whether or not to partake of your services again. There is a "moment of truth" each and every time the customer plays the piano, and every time he or she walks past it. The customer is grading us on our performance. If nothing goes wrong, then all is well, and we can expect to return in the future. But if something goes wrong, then we have to "recover" from the mis-

When dealing with you in solving a problem, there are four things that the customer will focus on:

First, there is care and concern. This is obvious. Did you show some consideration for the customer, and did you take the care in solving the problem? Then there is spontaneity. Were you able to solve the problem right away, without having to call a lot of people, or make excuses why the problem could not be solved? The third area is problem solving. Again, this is very obvious. You either took care of the problem or not.

And last there is *recovery*. This is the most crucial aspect of solving a problem. This comes after the mistake has been rectified. It involves talking with the customer to offer assurances that you want to continue to service the piano, and that you are indeed sorry a problem existed. You can go to extra steps by contacting the customer later to make sure everything is all right. By making the extra effort to call, you are assuring the customer that you are concerned about the piano. This will help greatly in the recovery of any doubts that may have existed about you. What this does is help the customer form a very positive opinion of you. It is the positive opinions that will help shape thoughts of you during the time the customer does not see you, but while those moments of truths are occurring. It is the something extra that will keep that customer as your customer.

In the service business, it takes more than just being an average piano tuner — it takes something special to keep customers. When British Airways did a survey of how customers felt about their service, 20% said they thought BA to be superior to other airlines, 15% thought BA to be inferior, and the rest saw no difference. At first they were pleased with the report, but then someone mentioned that 65% of the customers who responded to their survey didn't see any difference between their company and the others. They had to do something special to make those customers always want to fly with British Airways.

In our business, if a majority of your customers do not hear the difference between your tuning and that of one of your competitors, then you are taking a chance that those customers will leave you. So to keep those customers, you have to do something a little better than your competition. You have to "stand out." To be an effective piano tuner you must offer something special, especially in an industry where most customers don't really know the differences in the quality of service offered them. In most instances, in piano tuning, "average" really equates to "mediocre, at least in the mind of the customer. If you want to stand out, you have to be better than just mediocre.

A customer expects you to tune a piano, and expects it to be done right. How you achieve that result really makes no difference to the customer. The customer does not care if you use a machine, or do it left-handed. That is not important, and don't expect *that* to be the thing that causes you to be invited back. But because customers' expectations are progressive, (they expect at least the level of service they have become used to), you must exceed that expectation.

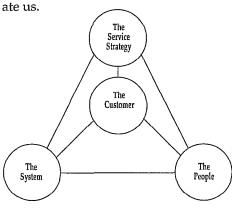
Although service is obviously different than a physical product, you should look at service as a product. A service product is any incident of doing something for others for a fee. Service can be distinguished from a commodity by one or more (and usually several) of the following characteristics:

- 1. A service is produced at the instant of delivery; it can't be created in advance or held in readiness.
- 2. A service cannot be centrally produced, inspected, stockpiled, orware-housed. It is usually delivered wherever the customer is, by people who are beyond immediate influence of manage ment.
- 3. The "product" cannot be demonstrated, nor can a sample be sent for customer approval in advance of the service; the provider can show various examples, but the customer's own hair cut, for example, does not yet exist and cannot be shown.
- 4. The person receiving the service has nothing tangible; the value of the service depends on his or her personal experience.
- 5. The experience cannot be sold or passed on to a third party.
- 6. If improperly performed, a service cannot be "recalled". If it cannot be repeated, then reparations or apologies are the only means of recourse for customer satisfaction.
- 7. Quality assurance must happen before production, rather than after production, as would be the case in a manufacturing situation.
- 8. Delivery of the service usually requires human interaction to some degree; buyer and seller come into contact in some relatively personal way to create the service.
- 9. The receiver's expectations of the service are integral to his or her satisfaction

with the outcome. Quality of service is largely a subjective matter.

10. The more people the customer must encounter during the delivery of the service, the less likely it is that he or she will be satisfied with the service.

These characteristics paint a picture of a very special kind of transaction between buyer and seller: the transaction we call service. The more we understand this transaction, the more our customers will understand us, and appreci-



To help you visualize the process of service, think of dealing with your customer in terms of a cycle of service. The cycle begins at the very first point of contact: the advertisement in the paper; the referral from one of your other customers; the Yellow Pages. It ends, temporarily, when the service call is completed, and begins again when the customer is ready to have you back.

Within that cycle of service are thousands of moments of truth, and one of those moments is called the *critical moment*. What you need to discover is when the most critical moment is. Because it is at this moment that the customer will decide whether or not you can come back. Each customer is different, just as each piano is different. The secret lies in being aware enough with each customer, to recognize the most critical moment of truth, and make it the best one.

This brings us, at last, to the *Service Triangle*, as drawn above. This triangle represents the three elements of service: strategy, people, and system, and how these three revolve around the customer.

This triangle represents a process, rather than a structure, because it forces us to include the customer in our conception of the business. If you look at this diagram, you will notice that the lines do not just go into the middle towards the customer. There are also lines that go between the outside circles of the triangle. This is to help us understand that the service of customers is not done by the three different elements of service, but that each are responsible, and related to each other.

The first element of the triangle are the people. You should think of yourself as a company, made up of several different people. After all, you are a tuner, technician, accountant, receptionist, secretary, floor sweeper, etc. It is obvious that your company exists to serve the customer. But what is equally important is that you should think of your company as existing to serve the needs of the people who are serving the customer. In other words, your business is there to help you serve your customers

Large companies have many employees who all support each other. The company supports the employees, and gives them training, benefits, and help in any way it deems necessary. By the same token, your company (of one) needs to support all the "people" in its organization. That means if the bookkeeper needs help with the books, the company will provide the funds to hire the help, or provide the training to do it yourself. If the technician needs a tool to do the job right, the company will buy that tool. If the secretary needs a vacation, the company provides it. If the tuner needs additional training, the company sends the tuner to a seminar or convention.

From a customer's point of view, they want a piano tuned. What the customer does not want to hear, when calling to set up an appointment, are the problems the people in your company are having. The customer does not want to know that the "employees" are having fights among themselves, or with their spouse. So, in order for you to serve your customer best, make sure that the people in your company are ready to serve the customers.

In order for your company to serve its customers, you need a strategy that will serve to differentiate your company from your competitors in the mind and the experience of your customers. The service strategy must mean something concrete and valuable to the customer, something he or she is willing to pay for. What is a service strategy? A service strategy is a distinctive formula for delivering service; such a strategy is keyed to a well-chosen benefit premise that is valuable to the customer — and that establishes an effective competitive position. One of the most important things a company can do is determine exactly what business it is in.

If your company does rebuilding or refinishing, or sells and offers rentals, be sure to let the public know this. If all you want to do is tune, with some minor repairs, then that needs to be told. In other words, the strategy is to let customers know what you are willing and capable of doing.

The system is that which delivers the service to the customer. The system is the hardware that is used to tune the piano, the car that takes you to the customer, and the computer or bookkeeping system that keeps track of the cash flow. When the customer's interest is treated as an afterthought in the quality of the service delivery system, the situation is programmed for mediocrity and dissatisfaction.

All of your tools, supplies, merchandise, etc. have to be in excellent working condition. They have to be clean, and kept in organized containers. Included in the system is the quality of the person delivering the service, the condition of his or her clothes, and the attitude the person has about his or her work. No matter how well you do your job, or how much money you spend on advertising, if you don't look and act the part, it will all be for naught.

How To Teach An Elephant to Dance

To recap what we have talked about so far: we live in a service oriented economy, and an increasingly service-conscious society. We have concluded that high quality service is a powerful

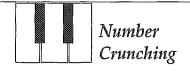
competitive weapon that is regarded as an essential part of business strategy. And the concept of managing the moments of truth is a primary driving force behind a successful operation.

The process of rethinking your attitudes about service management is akin to teaching an elephant to dance. It seems impossible, but until you try, and work at it, it will not happen. In order for it to become part of your daily life, you must first realize that it is possible to happen, and then you must be motivated to make it happen.

To create a new service orientation usually involves five stages:

- 1. Evaluate the present level of service. Find out what customers think about your service and how they want your company to improve its service.
- 2. Clarify the service strategy. If you can't or don't want to handle this yourself, this is the time to get help. Ask a professional to set down some strategies that have worked for other companies similar to yours.
- 3. Educate yourself and others in your company. Read articles on how to tune better or how to regulate, and besides this article, read other books on service.
- 4. Implement the new tactics. Once you have learned how to do it, put the plan into action. As with any new idea, it might take time to do it right. Make changes when necessary to make the system work right.
- 5. Reinforce the new orientation and make it permanent. Don't give up on the plans. Make service management a way of life.

Information for this article came for the most part from Service America - Doing Business In The New Economy by Karl Albrecht and Ron Zemke. A Warner Books publication.



Greek Number and Music Theory

Michael J. Wathen, RPT Cincinnati Chapter

Sometimes we are able to appreciate the fine workings of things around us only by understanding their historical development. The history of music as it relates to tuning and number theory is no exception. Imagine that we find ourselves in an environment similar to that of the early Greeks, without all the preconceived ideas of frequency and pitch that we are familiar with; then ask, "Can we associate numbers with pitches?" If so, what are the laws that govern their use? In what follows, I will attempt to reconstruct what I believe to be the most likely avenue of discovery taken by these early Greeks toward the understanding of the connection between ratios and intervals, and show how the laws for their use might have been derived. The following is, for the most part, speculative, but represents current academic trends in thinking along these lines. Those who care to pursue my account of these ideas will find a bibliography of references at the end of the article.

The historical record that would outline the development of the beginnings of number and music theory is discouragingly minimal, consisting of a handful of papyrus fragments that refer to the discoveries

long after the fact. Our greatest hero, Pythagoras, holds the honor of having no work in existence that is attributable to his hand. Yet, he retains his immortal reputation. He is often credited with the discovery of the theorem named after him: if the sides of a right angled triangle have lengths a, b, and c, with c the hypotenuse, then $a^2 + b^2 = c^2$. However, there are clay tablets in existence from the Babylonian era that make evident the knowledge of these relationships as stated in the theorem some 1500 years earlier.

It is clear that there arose in about 500 B.C. a group loyal to the precepts of a society calling themselves the Pythagoreans. Pythagoras was given an identity by his devotees that was a nebulous mixture of deity, political figure, and scientist. There were dietary constraints and secret oaths that were based on the properties of certain numbers. But the real crux of their movement was the belief that there was a connection between numbers and the natural order of the cosmos. Numbers could even be said to be the actual elements that gave things their essence and definition and that the path of purification of one's

soul lay in performing certain rituals that would allow one to understand the significance of numbers: "Harmony of the Spheres."

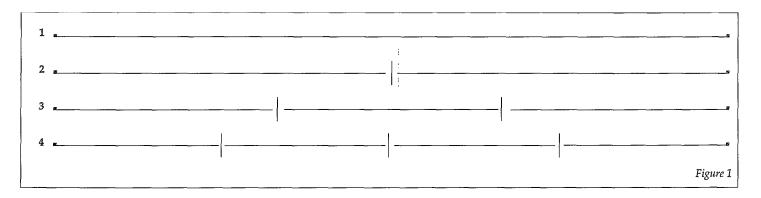
If we view the world with the eyes of an early Greek, we will have to build our constructs around historical plausibility. All our definitions then must be able to stand on the barest minimum of notions. For example, the concept of frequency is a relatively modern one that depends on several other ideas for its definition. Frequency has no meaning unless the second, as a unit of time, is defined, and the second cannot be defined without an accurate measuring device. So frequency would be the sort of thing that would be excluded from our discussion.

The following is a list of some relevant developments in mathematics together with the approximate dates for their introduction:

Development Date

Decimal system 1600 A.D.





Hindu-Arabic number system with accompanying place holder notation, and long division algorithm 825 A.D.

Euclid's Theory of Proportions; Elements, books V and VII 350 B.C.

If we wish to see through the eyes of a Pythagorean, then caution is in order. He certainly never had in mind what we think of when we hear the word ratio: a/b. For this reason I will employ the notation a:b (read: a is to b) in order to avoid assuming all the incumbent rules that modern notation implies. For example: a/b implies division of a by b and decimal expression, but for a Greek neither option was available. The previous table is a good indication of what was not evident to the Greek mind.

For the early Greeks, their idea of ratio was one of a length measuring another length exactly; or stated differently, if the two lengths were with common measure, then they were considered a commensurable relationship. If it could be shown that the two lengths had no common measure, then this relationship would be called incommensurable. When we say measure here, we are not talking of numbers, but of a specific length. If A measures B then we have in mind a straight length A, which, if placed on B end to end a certain number of times, we would find that one of those ends would coincide exactly with the beginning B and one end of A would also coincide exactly with the end of B.

We have all probably seen at one time or another a picture of an

ancient Greek hovering over an instrument called a monochord and using its movable bridge to deduce the proportional relationship between pitch and string length. These illustrations seem to imply the manner in which the Greeks made their discoveries, first constructing their monochord and then using this instrument to prove that their hypothesis were correct. Feeling a little uneasiness with this rendering of events, I decided to consult with one of our faculty members, Don Parker. Parker teaches math history here at the University of Cincinnati. He has devoted much of his time to researching the history of mathematical thought and technique. He was a guest lecturer last year at one of our chapter meetings, speaking on the Greeks and their music. I asked him about his views regarding the use of the monochord. He told me that he just could not accept this popular rendition of past events. Constructing a monochord to make new and unforeseen discoveries? That would be like inventing an automobile solely for the purpose of studying how a speedometer might work. Yes, they certainly used a monochord, but the most likely scenario was that their first discoveries centered on the fact that if one places a finger lightly upon a string touching the node that divides the string into two equal segments, then the resulting pitch would be an octave higher than the open string. By moving a finger around on the surface of the string in a like manner, one can locate the subsequent divisions of length, each producing a distinct pitch. The pitches derived in this manner were different from randomly

chosen pitches, and seemed to show a definite relationship between length and pitch.

Having examined some of the finer distinctions of chronological development, we may proceed with our hypothetical synthesis of Greek music and number theory. We construct a monochord and we will also need a rule to divide the string.

Examine figure 1 above. The number to the left of the segment indicates a number of equal divisions contained within the string. If each of the numbered lengths above represents a new subdivision of the string into smaller and equal segments, then experimentation will show that each successive division will produce a pitch that is in some sense higher than the previous. For example, one of the segments of string number three will produce a pitch that is higher than the one of string number two; it has a ratio of 3:2, and sounds like something that practicing musicians of the time would have called a fifth (the fifth note of an eight note scale). Notice that two of the segments of number four exactly measure one of the segments of string number two. Then 4 is related to 2 the same way that 2 is related to 1.

Suppose we take the pitch produced by one of the segments of string number two, and we take the pitch of one segment of string number three. The interval between the pitches will be heard to be a fifth. We move up a fourth from the higher pitch by taking one of the pitches from string number four. But this pitch is an octave above our original pitch. For the Greeks it was probably this inherent physical property of the

string itself, namely the fifth plus a fourth produced an octave, that gave them the key to the laws of ratios.

With these ideas in mind we can now accept that it is at least reasonable to talk about the relation-

ships that string lengths have to pitch by representing the pitch produced with their relative magnitudes. If, for example, three units B measure exactly two of A then we attach the ratio 3:2 to the pair of pitches that comprise the interval.

What is important here is that we disregard our understanding of what the word *plus* means in this particular context. After all, the Greeks were probably not handicapped with a knowledge of arithmetic operations

H PLUS FOURTH IS OCTAVE

With some examining, our sense of logic should tell us that our combine operation above is just simple multiplication together with some algebraic laws of cancellation. It was probably in a manner similar to

this that the Greeks uncovered the hidden connection between number and music. They felt this must be the key to all creation. It was revealed in the length of a string! They pushed their number theory, even to the point of making it the focal point of a quasi-religious sect. Previously, cultures and civilizations had been forced to reconcile explanations of

natural phenomena by evolving elaborate myths and legends. Now, they could explain the natural order by association with numbers. They felt sure that their discoveries explained how all the planets revolved around the earth, in fact, how everything worked (Harmony of the Spheres).

ese ratios be that would have led them to write what our imaginary Greek wrote on elaborate mythinking.

How, then, will these ratios be compounded? The current thinking, with which I concur, is that music theory provided the basis for understanding how intervals are compounded with their ratios. It seems quite natural to think in terms of addition and subtraction when compounding intervals. We know that a fourth plus a fifth is an octave and that a fourth subtracted from a fifth leaves a whole tone. So how do we find similar results when the ratios of the intervals are compounded? If we add the ratio of a fifth with the ratio of a fourth we need to end up with the ratio of an octave.

Since we have cautioned ourselves sufficiently about the Greek meaning for ratio, we will now, for the sake of notational ease and conjecture, assume the modern notation. Is the modern conception of ratio consistent with the Greek definition? Is adding and subtracting intervals the same as adding and subtracting their respective ratios?

that would have led them to write what our imaginary Greek wrote on his blackboard. So let's change our vocabulary just a little. We will now say that a fifth compounded with a fourth gives an octave, and we will denote this new operation by a plus sign inside of a circle. We will list all the relationships we had determined earlier and a few more that can be likewise extracted from the diagram.

$$\frac{4}{2}=\frac{2}{1}.$$

$$\frac{2}{1} \oplus \frac{3}{2} \oplus \frac{4}{3} = \frac{4}{1}.$$

$$\frac{3}{2} \oplus \frac{4}{3} = \frac{2}{1}.$$

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Heath, T.L., *The Thirteen Books of Euclid's Elements*, Cambridge: Cambridge University Press, 1926, repr. New York: Dover 1956. Books I and II contain propositions that can construct division of the rule. Books V and VII contain propositions dealing with proportions and ratio theory.

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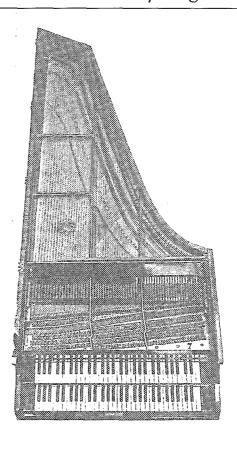
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Indianapolis Chapter One Day Seminar Indianapolis, IN Contact: Bob Bussell 317-782-4320

April 15-17

Central West Regional Seminar
Boulder-Denver Chapters—Boulder
Contact: Richard Capp
3350 Loyola Ct.
Boulder, CO 80303

April 16

East Tennessee One Day Seminar Knoxville Contact: Dennis Mayhew 7700 Old Clinton Pike Powell, TN 37849 615-938-5440

April 23-24

Florida State Seminar St. Petersburg Contact: John Ragusa 7318 Ponderosa Drive, Tampa, FL 33637 813-988-0396

April 24

LA Chapter PACE Plus
La Canada Presbyterian Church
Contact: Adam Fiore
414 Second Street, #122,
Hermosa Beach, CA 90254

April 28-May 1

New England/Eastern Canada Seminar Contact: Chris Robinson 190 Long Hill Road, S. Windsor, CT 06074

May 11-14

Pianoforte Tuners Association Convention
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Contact: Ralph Long
8 Baldock Street
Ware, Herts SG12 9DZ
Ware (0920) 469485

May 13-14, 1994

Springtime In The Rockies
Provo Park Hotel—Provo, Utah
Contact: Vincent Mrykalo
694 N. 100 E., Provo, Utah 84606
801-375-2987

May 14

New Mexico One Day Seminar Albuquerque, NM Contact: Fred Sturm 315 Nara Visa NW, Albuquerque, NM 87107

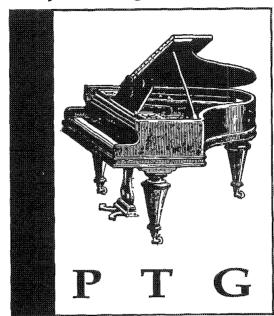
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		April	1	2
	6	7	8	Calgary 1-Day Indianapolis 1-Day
	13	14	CW Regional Seminar	East Tennessee 1-Day
-	20	21	22	Florida State Seminar
	27	New Engla	nd/Eastern Canad	a Seminar
	4	5	6	7
	11	12	Springtime in the Rockies	New Mexico 1-Day
	18	19	20	21
	25	26	27	28
	1	2	3	4
	8	9	10	11
	15	16	17	18
	22	23	24	25
	29	30		

Expanding Horizons



Cultivating Artisans
July 6-10, 1994

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AUXILIARY

EXCHANGE

Dedicated To Piano Technicians Guild Auxiliary News and Interests

Expanding Horizons, Cultivating Artisans is our theme for the 1994 PTG Convention in Kansas City, MO, home of the Piano Technicians Guild Headquarters. I truly hope that all of you are planning on being there. We have many new and exciting events to thrill, entertain, and delight you, least of which would be to renew old friendships and catch up on happenings of the past year. You should all have received your January 1994 PTGA Newsletter by now and read the minutes of the last Council Meeting. If you have items that should be placed before the Board and Council, please send them to me no later than May first. (The editor is always ready to receive articles for the newsletter so please forward them to her and also a word of thanks is always welcome too.)

I thought I would whet your appetite a little so you would make those plans to attend convention in KC. First of all, I will be changing the arrangement of the auxiliary program around quite a bit. We open on July 7 with a welcome and then a get acquainted coffee and rolls time. The members at large meeting for about fifteen minutes or so and then I will call the first Council Meeting to order (Council Meeting I) We have the great good fortune of installing a new chapter at this time. We will place ideas and recommendations to the Council for discussion but nothing will be voted on at this time. We then proceed to the Opening Auxiliary Welcome Luncheon after which our two very superb scholarship winners will perform for us. That day we have dinner on our own and the Baldwin Reception that evening.

On Friday, July 8, is our KC tour with many exciting places to see and, of course, the much talked of luncheon with play afterwards. I have also asked our tour manager if he would take us to see and hear the largest pipe organ in the U.S. I'm even working on Ray Chandler to play it for us. When we return from the tour, we will have an exercise class at the pool. Again dinner is on our own that night.

On Saturday morning we will have our education classes with a break for coffee at 10 a.m. and another class until noon. Lunch that day will be on your own. Return at 1:30 p.m. for Council Meeting II where we will vote on all items before the Board. This way you can meet and talk with your delegates during the tour or in the hall and tell them how you feel about an issue and how you want your delegate to vote. After voting we will have the Installation of Officers for the new year.

The Post Council meeting will take place at around 3:30 to 5:30 at which time all others could get another look at the Exhibit Hall which by the way will allow children this year if accompanied by a parent or guardian. The PTG Golden Hammer Banquet is Saturday night at 7 p.m.

On Sunday morning, an early chapel service will be followed by our choice of PTG classes which we can select from the roster of classes for that day. The last two items your Board has fought very hard to receive: children in the exhibit hall and spouses taking PTG classes. We hope that you appreciate and take advantage of these new additions.

These plans could be subject to change; however, I have worked very hard to arrange meals so that we didn't have two on one day. Many of you agreed with me last year that we were eating two meals on Saturday in the hotel and couldn't get out to sample the city restaurant fare and Kansas City has some wonderful steak houses.

I will go into detail next month about our education classes on Saturday, when I have more contracts firmed up.

However, I would advise you to make your reservations early this year as prices will be considerably higher for late registration. Each of you must make your own hotel reservations. A block of rooms has been set aside for the convention; however after June 6, or when those rooms are reserved, there will be no way to stay in the convention hotel. Early reservation plans can help you avoid such inconvenience. The number for the Hyatt is 816-421-1234.

I sincerely hope that this answers some of the questions that have been coming across my desk. I'll see you in Kansas City.

I leave you with the words of Samuel Johnson, "It is better to live rich than to die rich." So, spend it in Kansas City in July!

ONE IF BY LAND, TWO IF BY SEA—Immortalized in poetry and folk history, the midnight ride of Paul Revere will be remembered forever. His ride took place on April 18, 1775.

Phyllis Krahmer Tremper PTGA President

Spring Fever Hits The A-440 Farm

From The Auxiliary Editor

The headline says it all! Our first spring at our new farm has us pruning and plowing and planning like mad. Can the planting be far behind? As our children get older and develop more and more interests of their own it makes the planning aspect more complicated. We have sports camps, piano lessons, horse shows, and extended visits from friends to factor in to our schedules and that's just looking at the kids' activities. By the time we factor in Mike's and my commitments there's not a day on this summer's calendar that doesn't have some sort of mark on it.

This scheduling jungle is not news to a million other families. A visit to the office supply store shows that scheduling gadgets such as personal pocket planners and computerized calendars are "hot items." The leisure industries are growing but the challenge to find leisure time is also growing.

We have two reports in this month's articles on the scheduling to be expected at this summer's Kansas City convention by Phyllis Tremper and Agnes Huether. Any attempt to extol the virtues of Kansas City on my part would be redundant since they have done such a good job of outlining the city and the activities for you. Please try and schedule a trip to Kansas City into your "Leisure Time" schedule with a cross-reference to the "Business Skills and Enrichment" section of your calendar!

Kansas City Convention Marks Celebration of PTG Ancestry

In a Christmas note our president, Phyllis Tremper reminded me that I had promised to do an article for the April issue. Happy Easter to all of us April 3rd.

Each spring articles abound in the PTG Journal urging piano technicians to attend the annual summer convention. Their writers tick off all that is to be gained in the new classes to be held, with more instructors, more manufacturers' and suppliers' exhibits and much, much more! Opportunities for enhancing and honing the skills of the seasoned technician are outlined and detailed. "You can't afford to miss" this or that feature of the convention city. Why all the hype? Is this heavy promotion necessary? Does the same promotional thrust guarantee better attendance say at the American Medical Association, the American Psychiatric Association and the American Bar Association or just the Sports World Show and the Auto show?

Our auxiliary regularly endeavors to promote increased membership with articles on "Why have an Auxiliary?" or readers are reminded that fine friendships are made and enjoyed with attendance at conventions. In addition, certain classes are being opened to Auxiliary members and we have the special socials and tours to view the unique features of the convention city. Well, let me tell you that it will not be at all difficult to thoroughly enjoy the many features of the beautiful Kansas City Hyatt Hotel, The Truman Home, Museum and Library in Independence, Missouri and the elegant Crown Center Shopping Center.

In addition, this year we will celebrate the 90th birthday of our ancestral beginnings! Back in 1904, William Braid White founded the Helmholtz Society of America out of which grew the National Association of Piano Tuners, who merging with the American Society of Piano Technicians in 1957, became the Piano Technicians Guild, Inc.

Your technician, dear reader, will tell you all you want to know about Herman Ludwig von Helmholtz who was born in Potsdam, Germany in 1821 and died in 1894. What Mozart did for music as a composer of operas, oratorios, church music and masses, von Helmholtz did for piano technology. Helmholtz laid the ground work for future physicists, mathematicians and piano technicians concerned with such matters as the explanation of the perception of the quality of tone, propagation of sound, composition of vibrations, the influence of partials and other such esoteric findings. Herman Helmholtz was a professor of physiology, Konigsberg, later at Bonn as well as professor of anatomy at Heidleberg, he investigated among other matters, the labyrinth of the ear and the function of the cochlea bone and its membranous canal. We must surmise that the Society of Piano Technicians under the leadership of William Braid White chose to rename their organization The Helmholtz Society, just ten years after the death of this renaissance man.

Our historical beginnings will be well documented and displayed. In all probability arrangements will be made for transportation to 3930 Washington for a docent-led tour of the Museum at the Home Office, where a specially developed exhibit is being prepared by the members of the PTG Foundation Board. This is another reason to attend the convention this summer. The exhibit will be a REAL FIRST!

Agnes R. Huether

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PTG Marketing Tools Review

How Should I Take Care Of My Piano?

Written with the average piano owner in mind, this brochure covers such topics as problems and tuning needs. Basic rules of piano care are spelled out, along with advice to seek professional piano care from an RPT member of the Guild. This is an excellent brochure for individual clients and for bulk displays in piano stores and music studios.

How Often Should My Piano Be Serviced?

This brochure begins with a brief description of factors affecting maintenance frequency (climate swings, placement in the home, quality of manufacture), then presents quotes from ten piano manufacturers outlining their specific service recommendations. This is an essential tool when answering the perennial question, "How often should my piano be tuned?" The manufacturer quotes lend credibility to your advice.

The Special Care and Maintenance of the Teaching Piano

Proper maintenance is especially important to piano teachers who must provide their students with a responsive action and a musical tone to correct pitch. This brochure describes tuning needs, regulation and voicing as well as their relation to the student's ability to perform. An excellent business builder with teachers, it includes such topics as "What should my regular maintenance program consist of?", "How should I go about selecting a piano?" and "How do I find a qualified person to service my teaching piano?"

All brochures are \$150/500, \$35/100, \$20/50

Bulletin #1: Pitch Raising

This bulletin emphasizes the importance of keeping a piano tuned to A-440 for best sound and proper ear training. It explains how climate and neglect affect pitch and why the technician must perform a pitch raise before doing a fine tuning.

Bulletin #2: Regulation

Topics covered are "What is regulation and how does it affect my piano's performance?", "How often is regulation needed?", "What are the signs that my piano needs regulation?" and the difference between regulation and tuning and information on reconditioning and rebuilding. Space is included for your comments. This bulletin features a detailed diagram of a grand and vertical action.

Bulletin #3: Climate Control

Topics include, "How does humidity level affect my piano's tuning?" "What is relative humidity?" "What can be done to minimize humidity problems?" and "How will humidity control benefit my piano?" A chart is provided for recording relative humidity levels and pitch data. Together with an accurate hygrometer, this bulletin helps you in diagnosing climate-caused stability problems and recommending solutions. Clients receive educational material on the effects of climate as well as documentation of their specific problem.

Bulletin #4: Voicing

This edition describes voicing, explains the difference between tuning and voicing, what is good tone, how the technician voices a piano and also explains to the customer indications that their piano may need voicing.

Bulletin #5: Finish Care

This bulletin discusses common-sense finish care tips, as well as information on various types of products and piano finishes. It also includes a section on cleaning keys.

Bulletin #6: Rebuilding and Reconditioning

Bulletin #6 defines the terms rebuilding and reconditioning and how the two terms differ. It also explains "What happens to a piano as it ages?" "When does a piano need reconditioning or rebuilding?" "What work is included in rebuilding or reconditioning?" and goes on to confirm how to decide if major repairs are appropriate.

All technical bulletins are \$90/500, \$20/100, \$12/50

Place your order by phone by calling 816-753-7747 or use the convenient order form on the next page to place your order by fax: 816-531-0070 or by mail: 3930 Washington, Kansas City, MO 64111-2963. Visa and Mastercard accepted.

Marketing Brochures & Technical Bulletins available to RPTs and Associates

The six-page, stapled brochures are 2-color, printed on glossy-coated paper, and measure 9" x 3 3/4".

Formats are consistent among all brochures. The three brochures intended for customers feature a description of PTG and RPTs on the final inside page.

The technical bulletins are written for the customer who is considering a particular maintenance option. They provide detailed information on specific topics in a question-and-answer format. The attractive, single-page documents are printed on heavy ivory card stock in 2 colors, punched for a three ring binder, 8 1/2 x 11.

These brochures and technical bulletins educate the public about a wide range of piano services and the benefits of proper maintenance. They promote PTG as a source of qualified technicians, and their professional appearance projects quality onto your business. All products provide a space for your business stamp or label.

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Once you have completed this form, fax it to 816-531-0070, 24-hours-a-day—7-days-a-week
If faxing is not convenient for you, simply complete the form and mail it to:
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3930 Washington

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Piano Discussions

News From The World Of PianoDisc

Continue your PianoDisc education

As we mentioned last month, some of you PianoDisc technicians have been clamoring for a follow-up seminar to sharpen up those PianoDisc skills you learned at the Installation Training seminar. Accordingly, PianoDisc will begin offering a series of Continuing Education seminars for certified PianoDisc technicians. Take a look at the information box below for dates and details.

The Continuing Education seminars are

PianoDisc Installation Training 1994

- April 13-16
- May 11-14
- June 8-11
- August 10-13
- September 21-24
- October 12-15 November 9-12
- December 7-10

Continuing Education Series 1994

- May 9-10
- August 8-9
- June 6-7
- October 10-11

Tuition for the Installation and the 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 Continuina Education seminar, call PlanoDisc at (916) 567-9999 during regular office hours.

Our Address

PlanoDisc 4111 North Freeway Blvd. Sacramento, CA 95834

Telephone Numbers

Phone: (916) 567-9999 Fax: (916) 567-1941

Tech Support: (619) 258-1460 (510) 427-0411

Our telephone lines are open daily (except weekends and holidays) from 8 AM-12 Noon and 1-5 PM Pacific Time

two days long, each beginning on a Monday. All classes are conducted by PianoDisc's senior installation and tech support staff.

In the Continuing Education seminar you'll learn more about the operation and make-up of the PianoDisc system. You'll also learn how to repair or replace components and install updated hardware and chips (as opposed to sending the parts back to PianoDisc for replacement). And you could be called upon to do difficult service calls on us. All in all, it's well worth the trip!

In order to attend the Continuing Education seminar you need to be a PianoDisc certified technician in good standing. If you aren't a PianoDisc certified technician you'll need to attend the four day Installation Training seminar first. If you're unsure of your eligibility, contact our Tech Support staff and they will assist you. But make your plans soon—we're sure these new seminars will fill up fast!

Save some אָאָנּיִּ

A hot travel tip for you techs that are booking airline reservations to attend a PianoDisc seminar: try to include a Saturday overnight stay in your itinerary. The difference that this can make in your airfare could be as much as a 60-70% reduction in cost! For example, in a recent call to United Airlines we found that a round trip from Chicago to Sacramento booked one month in advance would cost \$1300, but that a Saturday night stay would decrease the fare to as little as \$398!!

So, if you're planning to attend the PianoDisc Installation Training course, try to stay an extra day or two and leave on the following Sunday or Monday. If you're thinking about the Continuing Education seminar, vou're in luck - the airlines reserve their rock bottom fares for folks who fly on Saturday, Tuesday and Wednesday. So, just plan to fly in on the Saturday prior to your class, enjoy Sunday in beautiful Sacramento, and fly out the following Wednesday. You'll get a great class, and save a bundle to boot!

Tech Spotlight...

This month our spotlight sweeps north towards the Big Apple, where Paul Koegler of H&K Automated Music in Bayshore (just outside of New York City) has been busily installing PianoDisc systems for, among others, Steinway Hall in New York and the Frank & Camille's chain of piano retail stores.

Now Paul, like so many other PianoDisc techs, was very busy for the three weeks or so preceding the Christmas holiday. This should come as no surprise to most of you PianoDisc techs, since you were probably pretty busy too. But we doubt that anyone was as busy as poor Paul. You see, during the seventeen days between December 6 and 23, Paul, with the help of one full time and one part time assistant, installed 26 PianoDisc systems. That's right—26! 25 grands and one upright, every make from Young Chang and Yamaha to Baldwin and (of course) Steinway. "We did lots of Steinways," reflects Paul.

But that's not all he did. Paul also managed to get in two tunings a day, rebuild a pinblock on a Knabe AND do a full rebuild on an old Walters upright player—all before Christmas. "At one point we had 13 installations in progress at the same time, along with the rebuilds," recounts Paul. "Looking back on it now, I can't believe that we got through it." Neither can we, Paul.

How were the hours? "Insane," says Paul, "Absolutely insane. I basically worked from 5:30 in the morning to between midnight and 1:00 in the morning every single day during that time. My wife can verify that—she almost never saw me that whole time!" Paul said that the folks that assisted him didn't fare much better, either.

Now we at PianoDisc commend Paul on his time management skills and his spectacular accomplishment, but like the warning that they give on those live stunt shows on TV says, don't try this yourself. Paul had lots of help, and lots of experience, and in spite of that "I'll never do it again," he vows. Never? Umm-hmm. Just wait 'till next December...

Tech Gazette

Yamaha Service

April, 1994

George Gershwin Plays Disklavier™

An unprecedented recording of piano roll performances by legendary American composer George Gershwin was featured among new PianoSoft selections introduced at the 1994 Winter NAMM Show.

The new Gershwin disk, "Gershwin Plays Gershwin", features such classics as "Rhapsody in Blue" as well as selections that have never been published before. It resulted from the Gershwin Piano Roll Recording Project, spearheaded by Gershwin scholar, Artis Wodehouse. Using original piano rolls created by Gershwin from 1916 through 1926, the project produced the first compact-disc recording of Gershwin performing his own work.

According to Wodehouse, the project would not have been possible without the Disklavier piano's ability to interface with both modern computers and player piano technologies of the past. Computer programs were specifically designed to capture not only the note field on the original Gershwin rolls, but also the dynamics, articulations, and

pedaling encoded on the originals. This information was then transferred to 3.5" floppy disks playable on the Disklavier piano, which were used to play the Gershwin performances during the final recording sessions. The compact disc is being released on the Elektra/Nonesuch label.

Using the floppy disks created for the project, Yamaha then produced the new Gershwin addition to the PianoSoft library. "Gershwin Plays Gershwin" is a truly historic recording that will allow Disklavier piano owners to listen as Gershwin himself demonstrates why he is a giant of American music.

The Gershwin disk exemplifies the Yamaha commitment to providing PianoSoft recordings that are truly one-of-a-kind, and the result from recording projects that stretch the creative potential of the Disklavier piano to new heights.

Newport Music Festival available on disks for Disklavier™

In early 1994, Yamaha will release new PianoSoft selections resulting from another innovative recording project. In 1992 and 1993, Disklavier pianos recorded the live, onstage performances of world class artists appearing at Rhode Island's renowned Newport Music Festival, one of the most prestigious festivals in the United States.

The new releases will include two PianoSoft disks from the 1992 Festival (in addition to three titles already released from that year) and three from 1993, the Festival's Silver Anniversary. The recordings feature such artists as Boris Beresovsky, Phillip Bush, Nelson Padgett, Eduardus Halim, Thomas Hrynkiw, Pietro De Maria, and Ann Marie McDermott.

Disklavier Piano owners will now be able to hear the historical Newport Music Festival performances on the Disklavier piano, right in their living room. These unique Disklavier piano recordings, in addition to more than 230 other PianoSoft disks, now available in almost every musical style, demonstrate the Yamaha commitment to provide disks to meet a spectrum of individual tastes.

Next Month: Major Changes at Yamaha...

PARTS & SERVICE: (800)854-1569

YAMAHA

FAX: (714) 527-5782

There's A Sherlock Among Us!

The Search For The Golden Hammers Continues

By Colette Collier, RPT

Move over, Sherlock Holmes! For the past six months a new "super sleuth" has been hard at work. Wendell Eaton, RPT, has been following up every clue in an attempt to locate the entire set of 25 PTG Golden Hammer Awards. The PTG Foundation will have an exhibit at the Home Office during the 1994 PTG Convention, and a cornerstone of the display will be the collection of Golden Hammer Awards. All of the people who have been contacted have been most gracious about either bringing them, or promising to send them in time to show. Two of the Golden Hammers—Allan Pollard (1973) and Jim Burton (1978) have been donated to the PTG Foundation as part of the permanent collection.

The first Golden Hammer was presented in 1969 to Aubrey Willis. It was made by John Ford, who remembers it well. He started by making a box out of pinblock material. He sent the tuning hammer head, tip, and hammer nut head out for gold plating and lacquering. Then he had to work further on the hammer handle so that it would all fit together. John also made the next two awards, given to Len West (1970) and John (Larry) Scheer (1971). Both of those awards have been impossible to locate as of this writing. Len West worked for many years for Aeolian in Rochester, NY. He died suddenly on June 7, 1969 and was

awarded the Golden Hammer posthumously in 1970. Len's widow, Mildred, and daughter Carrie Lynne moved to Milwaukee, WI, shortly after that. Larry Scheer won the next Golden Hammer Award in 1971. Larry lived in the Philadelphia area, had no children, and repeated efforts to locate heirs have proven futile.

The next one was the easiest for Wendell to locate: he was awarded the Golden Hammer in 1972. This is the first made by Bill Smith, who has continued to this day to craft these incredible momentos. The 1973 Golden Hammer went to Allan Pollard. As previously mentioned, the Pollard family has been most generous in donating that award to the PTGF collection so that it can be preserved for others to see and appreciate.

The next three have eluded Wendell's best efforts: Les Hoskins (1974), John Kohl (1975), and George Lockhart (1976). The search for Les Hoskins' Golden Hammer seems to have reached a dead end in California. Wendell praised Norman Miller as a great help, "...he really researched a lot for me, he just went out of his way" to help. From Norman's reports, we have learned that his daughter and son-in-law have both died, and no one can remember his granddaughter's name. So this trail also seems to have gone cold. The search for heirs of John Kohl is

Continued Page U2

Education Panel & Executive Board Working For You

Michael Drost, RPT Educational Panel Chair

At Mid-Year meeting the Board devoted five hours to the Education Panel's lengthy report of nearly 100 pages.

During the review, the Board attempted to prioritize recommendations in terms of financial capability and immediate and near-future enactment. Several of these items are presently being prepared for Council considerations this July in Kansas City.

To comment on all items positively received by the Board is not possible in the space of this writing. A more complete overview of all items contained in the Panel's report will appear in the forthcoming Council Agenda Book. However, acquainting you with two of these concepts will provide some idea of how the Panel and Board are working toward improving PTG through increased productivity and efficiency.

Streamlining the Examination Process

At the outset it is important to understand this is not an attempt to change the exams. Our exams are very good, as they accomplish the goal for which they

Continued Page U3

Golden Hammer Search—Continued from U1

continuing in Ohio. Helping in the unraveling of clues is Ben Mcklveen, who has visited the court house in Xenia, OH, to get names and addresses from the public record. The most surprising to Wendell of those still missing is George Lockhart (1976). "I don't know why we can't find George Lockhart's" said Wendell. "He was right in Detroit."

So far, Wendell has logged well over 100 hours of investigative time. He has talked with friends, relatives and heirs of deceased Golden Hammer winners. He has enjoyed the challenge; that is easy to see when he starts describing his modus operandi. He began by contacting chapter presidents in the areas where the deceased members lived. After exhausting those leads, he tried to remember people who might have been close enough to the families to have names, addresses and

telephone numbers of the heirs. "I finally traced down Don Galt's. So many of these guys have passed away, and all of a sudden you remember someone..." Wendell remembered a friend of Don's, called him, and that person remembered a son still living in the area. Shortly afterward, Wendell received a call from the son, who agreed to ship the hammer for the display.

Allan Pollard's award proved to be another special challenge. Luckily, the Houston Chapter has stayed in contact with Allan's son, George Pollard. Otherwise, it would have been much more difficult. "Do you have any idea how many Pollards are in Houston?" said Wendell. No doubt he would have called them all.

More recent award winners have become much easier to locate and all have been willing to allow their treasured awards to be displayed in July 1994. To date, Wendell has arranged for 20 Golden Hammers, but he is not ready to give up yet.

The Golden Hammer Awards themselves are a unique part of the history of PTG. Of the approximately 1000 charter members of the Piano Technicians Guild, only 112 remain on the membership rolls. The PTG Foundation is working to compile some of the history of PTG and piano technology in general, before it is lost to us forever.

If you have any information that might help Wendell locate the remaining Golden Hammers, please contact him immediately at 8615 Mayfair Place, Silver Spring, MD 20910—or telephone him at 301-588-6333.



From the New Hampshire Chapter...On January 21, 1994, the New Hampshire Chapter began a chapter project for Associates. The Mission: to completely restore a nice 1909 Sterling full sized upright. The program is under the direction of RPT member and program director, Dick Kimball, who is being assisted by RPT member Gene Row. Pictured here, (I to r) Kimball, Row and associates Janet Barry and Sharon Moore. Other participants present but not pictured include Jim Herrick, Bill Bolton and Doug Kirkwood, RPT.

New Hampshire Chapter Says...
"You'll Be Hearing From Us!"

Educational Panel—Continues From U1

were intended. Again, "We are not going out to buy a new wagon; rather, we wish to pump up the tires on the one we have."

It is the consensus of Panel and Board that the process of giving the exams can and should be improved. Hindsight reveals the logistics of administering the exams is not the most efficient.

The current level of efficiency may account for (at least in part) the low (50%) pass rate on the first attempt by the candidates.

The task of streamlining the exam process will be approached from a variety of angles.

A. Work has begun to produce a "Written Exam Study Guide." This study guide will comprise a group of selected readings that will more than encompass all requirements of the written exam. At the same time it will provide a broad general background in piano technology to all its readers.

B. A "Pre-Exam Screening Manual" will be written and produced to be used by all chapters. It is the strong conviction of the Panel and Board that chapters can do much to prepare the candidate for the exams. "Dryrunning" technical skills in a general way will indicate to the candidate her/his readiness for the exams.

C. Some rearrangement of the order of items within the exams is being studied. There are certain areas where rearrangement of the order in which the material appears may enhance the overall logical flow of the exam.

D. A more comprehensive CTE training program is being given serious consideration. More thorough, in-depth training will equip those giving the exams with a greater awareness of how human factors and efficient use of time affect the results. A keen consideration of "quality" time and psychology are paramount when

attempting to assess the competence of a candidate in this type of "Art-Science."

Raising the candidates's level of readiness and correcting the flaws in the administering of the exams should do much to streamline the process. In addition, it should well improve the emotional well-being of the candidate during the exam process.

Assisting In Your Education Journey

There is a basic principle with us today which was stated by the scholars of the first century. "Nemo dat Quid non habet"— "One cannot give what one does not have." PTG strives to provide a substantial amount of educational assistance. However, it does not intend to offer a total education program primarily because it is not capable of doing so.

To be successful as a tuner-technician will require a person to be well grounded in at least three areas:

1. Technical Skills classes over the years have been the mainstay of PTG educational offerings. We have been conditioned to expect these skills to be of basic, intermediate or advanced levels. All skills are basic. There are just a greater number which become more highly developed, precise and detailed with each task, which may range from simple to a very complex job.

It is the recommendation of the Panel and the desire of the Board to further expand our educational offerings in the technical skills area by providing a greater number and variety of class opportunities throughout all PTG sponsored events.

Continued Page U4

IN BRIEF PTC

Brochures Mailed!

The 1994 Convention and Technical Institute Brochures are out! If you have not received yours, please look for a copy which will be included in the May edition of the *Journal*. Early registration deadline is June 6. It is vital to register for convention classes, accommodations and activities early. Your brochure will give specific instructions about how to register for convention, PACE Academy classes and hotel accommodations. Don't put this off. Make a commitment to your professional future today!

Application Forms For Foundation Scholarship Due To PTG Home Office By May 1

The Piano Technicians Guild Foundation will again offer to help a track Associate member attend PTG's annual convention and take either the tuning or technical examination.

One \$200 scholarship, which covers the \$140 member convention registration fee and a \$60 examination fee, will be awarded to an Associate member who has completed the PTG written examination, is active in his or her chapter, and plans to take one of the remaining examinations at the convention.

Application forms can be obtained from chapter officers. The forms must be signed by the chapter president and received in the PTG Home Office by May 1, 1994. The results of the selection committee will be announced June 1.

2. Management Skills have been of lesser priority in PTG class offerings until more recent years. Traditionally, we tend to think of business management as the activities of keeping books, banking and filing income and sales tax forms.

Management really involves a great deal more. It should include management of overhead, inventory, shop space, job time, repair & tuning schedules, travel, repair & maintenance of equipment, insurances, vacation time, retirement, continuing education, etc.

Often overlooked is the aspect of SELF-management. Becoming and remaining in a continuous state of being organized is essential. Developing and staying on a schedule is mandatory.

The successful selfemployed tuner-technician will be the first to tell you there is no such

MEMBERSHIP PTC STATUS

Northeast Region Northeast RPTs	851 516
Southeast Region Southeast RPTs	640 376
South Central Region South Central RPTs	323 197
Central East Region Central East RPTs	
Central West Region Central West RPTs	396 246
Western Region Western RPTs	
Pacific NW Region Pacific NW RPTs	405 242
Total Membership Total RPTs	

thing as a 40-hour week. Selfemployed persons must realize that a 60 plus-hour week is common, especially when in the stages of getting started in business or when developing new business ventures.

It is intended, as the immediate future unfolds, that there will be a noticeable increase in very specific goal-oriented management classes included in PTG's class offerings.

3. People Skills are among the most important skills needed by anyone who desires to live, work and play successfully in present-day society. All too often tuner-technicians are not equipped to deal convincingly with private customers, public institutions, piano dealers and piano manufacturers. Unfortunately, the majority of these same people are unaware of this shortcoming in their total professional activity.

Consider the following items which are involved when dealing with people:

- Voice control
- Eye contact
- Choice of verbal & body language
- Speaking to, rather than above or beneath the customer

- Conversational honesty, sincerity and enthusiasm
- Displaying respect and interest for customer concerns
- Responding to customer questions
- Determining and meeting the needs of the customer
- Providing the correct amount of technical information
 - Negotiating techniques
- Avoiding intimidation, arrogance, high-pressure tactics and egotistical tendencies
 - Telephone technique
- Manner of dress and grooming
 - Appropriate deportment

These are but a few of the myriad of things involved when we speak of people skills. As PTG develops thoughts and ideas into "hard copy" in the form of a "core" curriculum for its members, several new courses in people skills will be part of the total offerings.

As the panel deliberated through possible causes for failure and success of members, we quickly arrived at the obvious conclusion that skills in all three interdependent areas are necessary in our profession.

Is Your Chapter On The Move?

Let us hear from you. Chapter projects, activities and programs are of interest to the entire PTG membership.

Organizational news, articles about chapter projects, programs and seminars should be sent to:

PTG Journal
Attention: Managing Editor
3930 Washington
Kansas City, MO 64111-2963