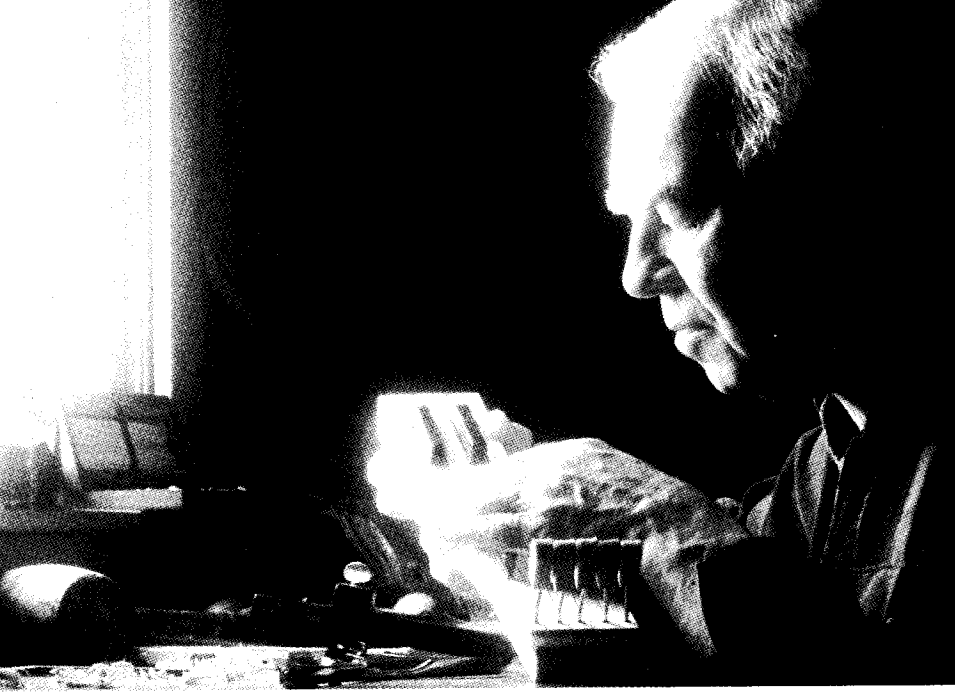
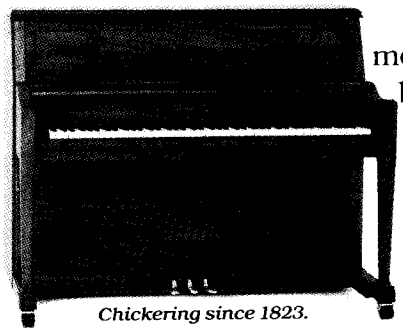
Piano Technicians
Journal
August 1984



Here's why it takes Aeolian over a year to make a piano in East Rochester.

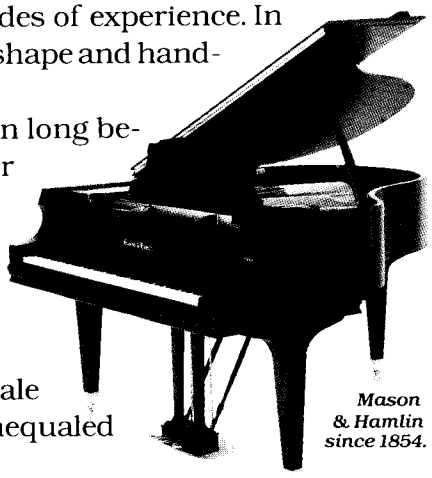
We work slowly and carefully in our East Rochester plant to create Chickering, Knabe and Mason & Hamlin pianos. Each of these great names boasts its own unique character, while sharing a tradition of uncompromising quality.



Chickering since 1823.

The demand for quality pianos is as strong today as ever. We're meeting that demand with instruments made with solid spruce soundboards and lumber core cases. And our pianos are painstakingly assembled by our skilled craftsmen. These masters of piano making have perfected their art through decades of experience. In creating each piano, they individually shape and hand-fit over 7,000 parts.

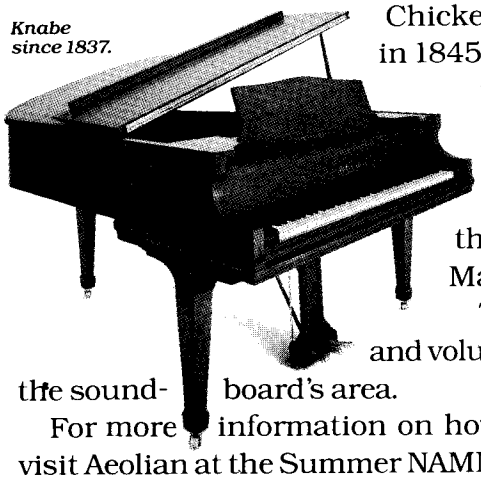
Our demands for perfection begin long before the first step of manufacture. For example, we select only prime, aged spruce for back posts and keybeds. And our pin blocks and bridges are quarter-sawn, hard rock maple. The extra attention to detail results in flawless pianos that are traditionally in demand by discriminating customers.



Mason & Hamlin since 1854.

America's oldest piano, Chickering enjoys a proud heritage. Chickering pioneered the overstrung scale in 1845, and has refined it to a degree unequaled in any other piano today.

Knabe since 1837.



Acclaimed as the premier performance instrument by the most exacting and critical musicians, Mason & Hamlin maintains a lasting tonal quality. A remarkable innovation, called the tension resonator, preserves the crown of the soundboard in Mason & Hamlin pianos for the life of the instrument.

The sound of a Knabe is unmistakable. In our Knabe grand, tone and volume are enhanced by the unique shape of the rim, which increases the soundboard's area.

For more information on how you can get in tune with our quality-built family of pianos, visit Aeolian at the Summer NAMM show, booth 8306 or contact Dave Campbell, Aeolian American Corp., East Rochester, New York.

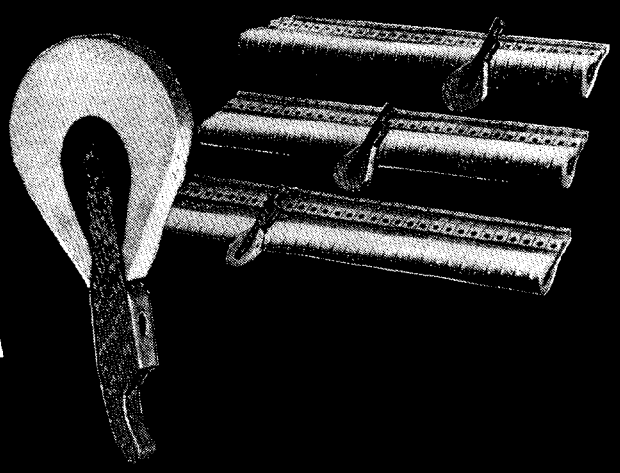
Aeolian

performs for you.

Schaff

NOW HAS AVAILABLE...

IMADEGAWA
HAMMERS FROM JAPAN.



Due to the increase in popularity of Japanese-made hammers the last few years, Schaff has engaged with the Imadegawa Company in Japan to be a nationwide distributor. We will maintain a large stocking inventory which together with our years of replacement hammer expertise, will enable us to provide the finest hammer duplication service in the U.S.A.

Who else can offer...

1. A full range of wood moulding sizes and felt weights to accommodate almost any hammer duplication requirement.
2. Both upright and grand type hammers.
3. Either standard bore stock sets or custom made hammers.
4. A long standing history of providing reliable service and selling quality products.

CHARACTERISTICS OF STANDARD BORE STOCK HAMMERS

UPRIGHT HAMMERS—A set consists of 30 bass and 64 treble hammers. All bass section hammers are drilled at an 18° angle. Tenor section has 14 hammers at 12°, 10 hammers at 7° with the balance of tenor and treble at 0°. A 7/32" diameter drill is used for the bore hole. On a special order basis a type "B" set can be ordered with all tenor and treble hammers bored at 0° angle. On a stock basis upright hammers are available in the following striking distances (as measured at the treble end) of 2⅜", 2 7/16" and 2½". Also 12 Lb., 14 Lb., and 16 Lb. weights of felt available. All hammers are made of birch wood moulding, stapled throughout and have the option of being reinforced and unbored.

GRAND HAMMERS—A set consists of 30 bass and 65 treble hammers. All bass section hammers are drilled at a 9° angle. Tenor section has 8 hammers at 9°, 8 hammers at 6°, 10 hammers at 2° and the balance of tenor and treble at 0°. A .204" diameter drill is used for the bore hole. All hammer tails are shaped and tapered at no additional cost. On a stock basis grand hammers are available in the following striking distances (as measured at the treble end) of 1⅞", 2" and 2⅛". Also 12 Lb., 14 Lb., and 16 Lb. weights of felt available. Hammers come stapled throughout and can be provided unbored. Except for Steinway style, all grand hammers are made of birch wood mouldings and have the option of being reinforced.

STEINWAY STYLE—A set consists of either 20 or 26 bass hammers, reinforced with walnut mouldings and bored to Steinway specifications.

CUSTOM BORE HAMMERS

Both upright and grand hammers are duplicated from customer samples and bored to exact specifications. With our extensive inventory, we should be able to match 90% of the samples received for duplication. The samples we cannot match for Imadegawa hammers can be made from our high quality U.S. made hammers. Try Schaff and avoid unnecessary replacement hammer costs and order processing delays that occur in dealing with smaller suppliers.

WRITE OR CALL US FOR A COMPLETE PRICE LIST ON IMADEGAWA HAMMERS.

THE HOUSE DEDICATED TO SERVICE

Schaff PIANO SUPPLY COMPANY
451 OAKWOOD ROAD, LAKE ZURICH, IL 60047

Prices Subject To Usual Discount
For Same Day Service Try Our 24 Hour Phone
(312) 438-4556

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9140 Ward Parkway
Kansas City, MO 64114

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Letters

(Editor's Note: anyone who doubts that there is drama in a piano technician's life should talk to Lowell Hart. In a recent letter to Executive Director Barbara Parks, Hart, who lives in Alberta, Canada, put forth a vignette that had all the elements of great drama — love, violent death and yes, even a bit of humor.)

One day a few months ago, what was to be a simple tuning and some key-easing turned out to be a clear case for Scotland Yard.

A customer had called, stating that she thought her piano had gotten a bit out (it had been tuned only seven years before). Could I come and tune it and also take care of a few sticky keys?

While removing the fallboard from the piano, I noticed a strange musty odor. Looking for what might be its source, I noticed a small brown object lying behind the hammer shanks. A dead mouse perhaps? Upon closer inspection, my suspicians were confirmed when I spotted four tiny feet and a tail protruding from the action.

To most tuners working in rural areas, extracting an occasional mouse from a piano's interior is just part of the job. But I could see this was not going to be a routine mouse-removal. The mummified remains of this unfortunate rodent were held firmly in place by a hammer rail spring which was wound completely around its neck.

It took some effort to separate the mouse from the spring (Has anyone ever developed a combination spring straightener and mouse remover?). A simple case of suicide, I thought, since the lady of the house owned three cats.

But wait! Lying nearby was another small, brown, still form. Had there been foul play? Murder-suicide? A double suicide? Did the second mouse, on finding its mate dead, die of a broken heart? The mystery may never be solved.

At any rate, the mice were removed, thus freeing the keys, the piano tuned and the customer satisfied. What more could a tuner ask?

Lowell Hart
Calgary Chapter

WANTED
SEE FEBRUARY ISSUE

Beginners to skilled piano technicians who would be interested in obtaining video tapes of instructions on tuning, repairing and rebuilding of pianos.

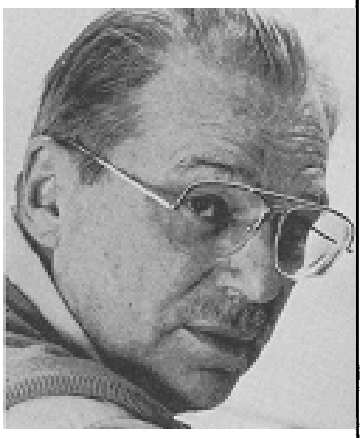
Video tapes will be approximately six hours in length with detailed instructions on how to do it and why. Complete course available ***fall of 1984.***

These video tapes will be great for classroom instruction as well as self-learning, with easy-to-follow instructions. Refinishing, restringing, action regulation, pin blocks, key work, and many more subjects are demonstrated.

Your income will improve after using the techniques described in these video tapes. Sound interesting? ***Try our money-back guaranteed*** demo tape for only $19.95 or buy the full six hour tape for $139.95 and receive credit for the returned demo tape.

Still interested? Drop us a line or call. Contact either Milton De Puy or Geo. Wing at **The Piano Workshop Inc.,** 3166 W. 33rd St., Cleveland, OH 44109 **Phone (216)631-1777 or 631-1991. DO IT NOW!**

The President's Perspective



Charles P. Huether
President

Goals For The Coming Year

I am grateful for the inspiration, dedication and hard work of all those people, sung and unsung, who have preceeded me in the 80 or more years of struggle to achieve an organization of piano technicians and its acceptance and recognition in the industry.

It is my hope that while I am president, this organization will continue on its course of providing education, encouragement and support not only to its members but to all those interested in the piano and its service. We invite and encourage all interested and qualified parties to join with us in our continuing efforts to offer the piano-using public, from artist to hacker, the highest level of honest and competent care and service.

To achieve an ever-growing organization, it is important to nourish the grass roots. It is from these roots that our vitality and our leaders develop. We flourish as long as we have busy, active and dedicated chapters. We flourish as long as these chapters develop interested and dedicated members and leaders.

Our hopes and plans for the year include closer contact with chapters; efforts to find those who need assistance and to provide that assistance; efforts to refine the hopes and aspirations of members, not forgetting members at large; and to chart courses towards these goals. They also include efforts to broaden recognition and acceptance of the Piano Technicians Guild among all levels of piano users.

We have made these goals the priority business of the Board of Directors. We have also given specific instructions to various committees whose functions are chapter-related to generate contacts, information, feedback.

I would like to meet as many of our members as possible, but there are practical considerations to such a project. Within reason, I am willing to travel to all regions to meet, to learn from and to work with membership. Time and resources are limited, but I ask for and would welcome invitations from any regional or state meeting. I will come and work and teach if requested and all I ask is assistance in covering the expenses, plus the right to say "No" without offending anyone should the time be inconvenient for me.

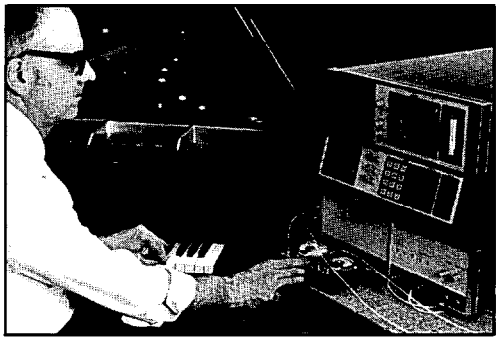
These brief monthly messages have their limitations. Be alert to the other avenues of organizational contact. Make sure that your chapter meets regularly and that you are aware of what is going on. Make sure that your chapter files its regular activity report. Share your successes with others. Ask to share others' successes. Be a working member, contribute. We will all be better for your efforts.

The Baldwin Piano...

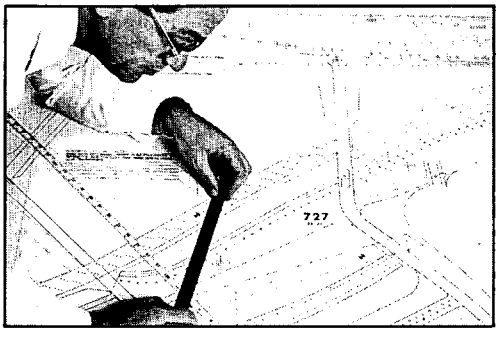
You can see why it sounds better

At Baldwin we believe that perfect piano tone is an ideal shared with all those who design, build, play and service pianos. That's why continuous research in piano tone has always been one of our major commitments. And that's why our piano engineering and research department is one of the largest in the industry. And that's why you'll often find in every Baldwin piano innovations to improve piano tone introduced in our SD-10 concert grand.

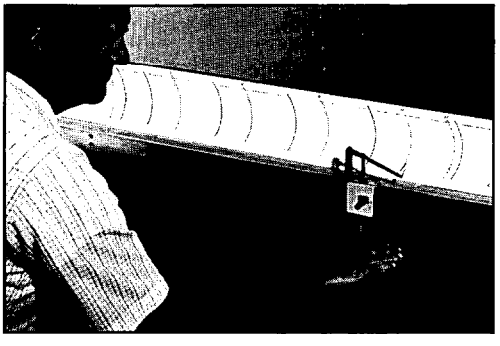
RESEARCH shows us why, as well as how, some things work better because we've taken a pioneering approach to piano improvement. We've substituted scientific testing and analysis for the unquestioning acceptance of traditional solutions. Some of the achievements that have resulted are treble termination bars (U.S. Pat. No. 3,477,331), the Acu-Just™ plate suspension system (U.S. Pat. Nos. 3,437,000 and 3,478,635), and vertically laminated bridges. Our patents are the most significant ones awarded for tonal improvements in grand piano tone in recent years.



ENGINEERING translates research into reality. To support our design innovations, we have produced our own testing and construction equipment and have expanded the use of precision tooling to insure that each Baldwin piano built will exactly match established standards of tone and performance. One example of this is a winding machine (U.S. Pat. No. 4,055,038) developed in connection with the SynchroTone™ Strings (U.S. Pat. No. 3,523,480).



MATERIAL STANDARDS insure continuing quality. For example, stringent standards for weight, dimension, taper, and hardness of hammer felt are established, and each sheet of felt is checked to be sure it meets those standards before it is accepted for production use.



First in a series of informative ads on piano tone published by Baldwin Piano & Organ Company exclusively for the benefit of piano technicians.

Baldwin. - *Leading the way through research*

BALDWIN SPECIAL SERVICE—You may order Baldwin replacement parts at any time our office is closed—nights, weekends, and holidays—by dialing direct (513) 852-7913. Your verbal order will be recorded on our automatic answering service and processed the next working day.

Executive Director's Message

Barbara Parks
Executive Director

Impressions of Indianapolis

The Piano Technicians Guild's 1984 Convention and Institute is now history.

And what a historic event it was, at least from the point of view of those of us who work for the Guild in Kansas City. We'll bring you a full report on the Indianapolis convention in next month's *Journal* and *Update,* but I wanted to take this opportunity to pass along a few quick impressions.

My earlier thoughts about how important and how valuable the convention and institute are were confirmed. Even though I knew the convention schedule and the list of classes to be offered, I was astounded by the amount of activity, the sheer volume of information and the pace at which the convention proceeded. I can't remember one person who came to Indianapolis solely to have a good time. Although everyone seemed to enjoy himself or herself, they were definitely there to learn.

It was inspiring to see several people who made it to Indianapolis even though the trip had obviously put a strain on their budgets. They attended every hour of class, they stayed afterwards to ask questions and they shared their newly-acquired information with others. They made every moment of their investment count.

That, to me, is why organizations like the Guild exist, and why this particular one must continue to exist. There is an obvious need for this information, and only the Guild can fill that need. Looking back on everything that happened during that week, I can't see how anyone who is serious about piano technology could afford to miss it. Even technicians who had been working on pianos for decades sat in classes listening attentively and taking pages of notes. There was something for everyone.

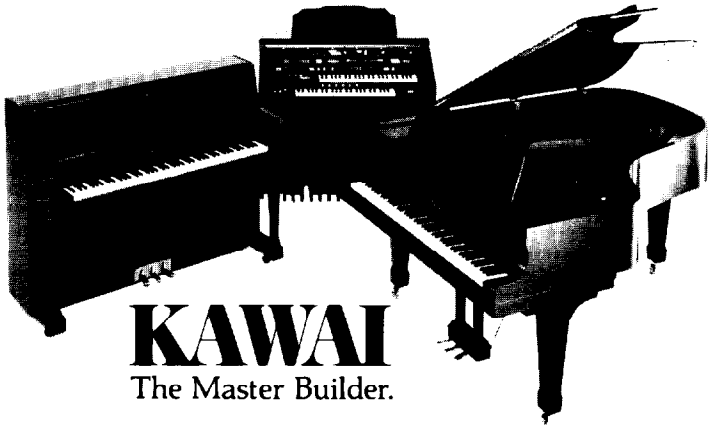
I also was impressed by the dedication of those who participated in the Guild's governing process. There are very few people who can even pretend that sitting through a two-day meeting is fun. But the Council meeting was well-attended, the debate was spirited, and every issue was thoroughly aired. As I had been promised, my first Council meeting was indeed an excellent example of democracy in action. An organization that can call on so many people who give freely of their time and energy cannot help but succeed and grow, so long as they are willing to work together for common goals.

My only regret is that I did not have a chance to meet everyone who was there. I did appreciate all those who introduced themselves and shared their thoughts about the Guild, and I look forward to meeting more of you in the future.

For now, though, there's just one thing I would ask you to do. Find a 1985 calendar, turn to the July page, and write "Kansas City" in big bold letters across the first five days. Those are the dates of our next convention and institute at the Hyatt Regency Kansas City. We're already working on it, and I know Institute Director Ernie Juhn is putting together an innovative and invaluable Institute program.

I'll see you there!

At Kawai, the tuner's hands and ears alone can determine the final "rightness" of a piano in the final tuning process.



KAWAI

The Master Builder.

Pianos Stolen From NAMM Exhibitors; Numbers Listed

Four pianos were stolen from manufacturers as they were tearing down their exhibit booths at the end of the National Association of Music Merchants trade show at McCormick Place in Chicago June 26.

Walter Piano Co., of Elkhart, Ind., lost three instruments, all consoles, and Heintzman Piano Co. lost one, a studio. According to Charles Walter, the pianos disappeared while exhibitors were loading up their booth displays at the end of the show.

The missing Walter pianos and their serial numbers are: an Italian provincial in pecan, number 507694; a Queen Ann in cherry, number 507736; and a Queen Ann in mahogany, number 507656.

The Heintzman piano, an ebony studio, was numbered 271228. Piano technicians who may be called to work on these instruments are asked to notify the authorities.

INDUSTRY NEWS

Kimball Supports Rhythmic Gymnasts

Kimball International Keyboard Division, supplier of more than 100 pianos to the 1984 Summer Olympics, has been named official sponsor of the United States Gymnastics Federation Rhythmic Gymnastics Team.

"The rhythmic gymnasts have not performed the Olympics in almost 30 years, and we're proud to help with the return of this beautiful event. Rhythmic gymnastics is more like dancing than the gymnastics events to which we're accustomed," said James Birk, executive vice president, Kimball International Keyboard Division. Competitors use four hand apparatus, a hoop, ball, clubs and a ribbon, while competing.

The performer works in tandem with the pianist to reach the best possible score. The precise harmony among the rhythmic gymnast, pianist and apparatus is essential. Judges evaluate the gymnast's moves and the combined musical effort to determine the score.

Besides providing pianos for the Olympics, Kimball will provide a Viennese Edition grand piano for all USGF rhythmic gymnastic events in 1984.

Steinway Unfurls Quality Banner

Lloyd W. Meyer, president of Steinway & Sons, received a red, white and blue "Product Quality USA" banner and a "Quality" gold pin June 24 from Richard A. Templeton, publisher and vice president of *Quality*, a business magazine devoted to the issues of quality control and production.

Steinway & Sons was selected for inclusion in the magazine's yearlong "Quality Recognition" award program by the magazine's National Advisory Board. According to Templeton, Steinway met the *Quality* criteria: it is an American company making a high-quality product, with a central business/manufacturing philosophy and a history of unique and creative approaches to maintaining the integrity of its product.

Coming Events

Date	Event	Site	Contact
Sept. 30-Oct. 2	South Florida Regional Convention	Ft. Lauderdale	Mort Zack 3210 Holiday Springs Blvd., Apt. 304 Coral Springs, FL 33065
Oct. 5-7	Ohio State Seminar	Ohio State University	Mark Ritchie 5784 Linworth Rd. Worthington, OH 43085 (614) 436-5907
Oct. 19-21	Texas State Convention	Waco Hilton Waco, Texas	Martin Wisenbaker 808 Cordell, Houston, Texas 77009
Oct. 26-28	Central Illinois Seminar	Ramada Inn Champaign, Ill.	Cindy Genta 907 Anderson Urbana, Ill. 61801 (217) 328-2691
Nov. 1-4	New York State Convention	Ramada Inn Clifton, N.J.	Brad Renstrom 67 N. Greenbush Rd. West Nyack, NY 10994 (914) 358-6995
Nov. 16-18	North Carolina State Convention	Radisson Convention Center, High Point	Anthony Thompson 407 Woodlawn Ave., Greensboro, NC 27401 (919) 274-1922 (919) 274-3407

The International Scene: England

Fred Odenheimer
Chairman, International Relations Committee

Here it is the 11th of May and today our English tour started. Everything is moving so fast, one hardly has time to take a breath and another day is gone. We spent a wonderful day with the Ralph Longs a couple of days ago. Their hospitality does not know any bounds. We enjoyed the old and quaint city of Ware, met the friendly people of Phelps Travel and walked in beautiful sunshine through town and park.

In Switzerland, the weather could not have been any better. To make it short, we had sunshine every day. There still was lots of snow in the mountains, but with spring flowers covering every bare spot in profusion. We saw winter turn into spring and when we left, the forest was a fresh green.

We paid a visit to *Europiano* President Fritz Grossenbacher, who asked us to write a short report about the Piano Technicians Guild Convention for *Europiano* Magazine and also write something about the Pianoforte Tuners' Association Convention in Southport, England, which I promised to do.

We spent a day with the Lothar Thommas in Hochwald near Barel and enjoyed their great hospitality. We could not make connection with br. Lauchli, president of the Swiss Piano Builders Organization, but talked to him over the phone. Those of you who were in Gwatt will remember him and his lovely wife. Since they will be in California in late May and early June, we hope to meet them there.

Back in England: our first day's travel brought us to Naish Felt where we were first treated to a luncheon (which should have been spelled in capital letters, since it really was a dinner.) It was followed by a visit to the factory, which was a really interesting and educational experience. It is always fascinating to see wool turn into such a useful product with so many diverse applications.

THE TECHNICAL FORUM

Upright Action Design, Vertical Rebuilding, Heat Treating The Capo D'Astro Bar, Tech Tips And The Multipurpose Tool Contest

Jack Krefting
Technical Editor

Upright Action Design

Most of our readers, most of the time, look through these pages for practical, usable tips, rather than for theory and math, but now and then we get a request for a discussion on action design. Fortunately, we recently received a highly informative letter on the topic written by someone who is eminently qualified to speak to that area, having spent many years designing piano components for the industry.

Dietrich Dotzek first corresponded with the *Journal* 15 years ago, in a discussion with then-Technical Editor Don Galt about tuning stability. Dotzek lives in Sweden now, although his work as an industry consultant has occasioned periodic residency in other parts of Europe as well as the United States. His technical writing has been published on numerous occasions in *Das Musikinstrument* and *Musik International,* both German trade magazines.

Mr. Dotzek recently redesigned an upright action for Herrburger Brooks, and shares with us some of that action's design features. Our thanks to Kimball International, Inc., of which Herrburger Brooks is a subsidiary, for permission to publish this information. Here is Dotzek's description.

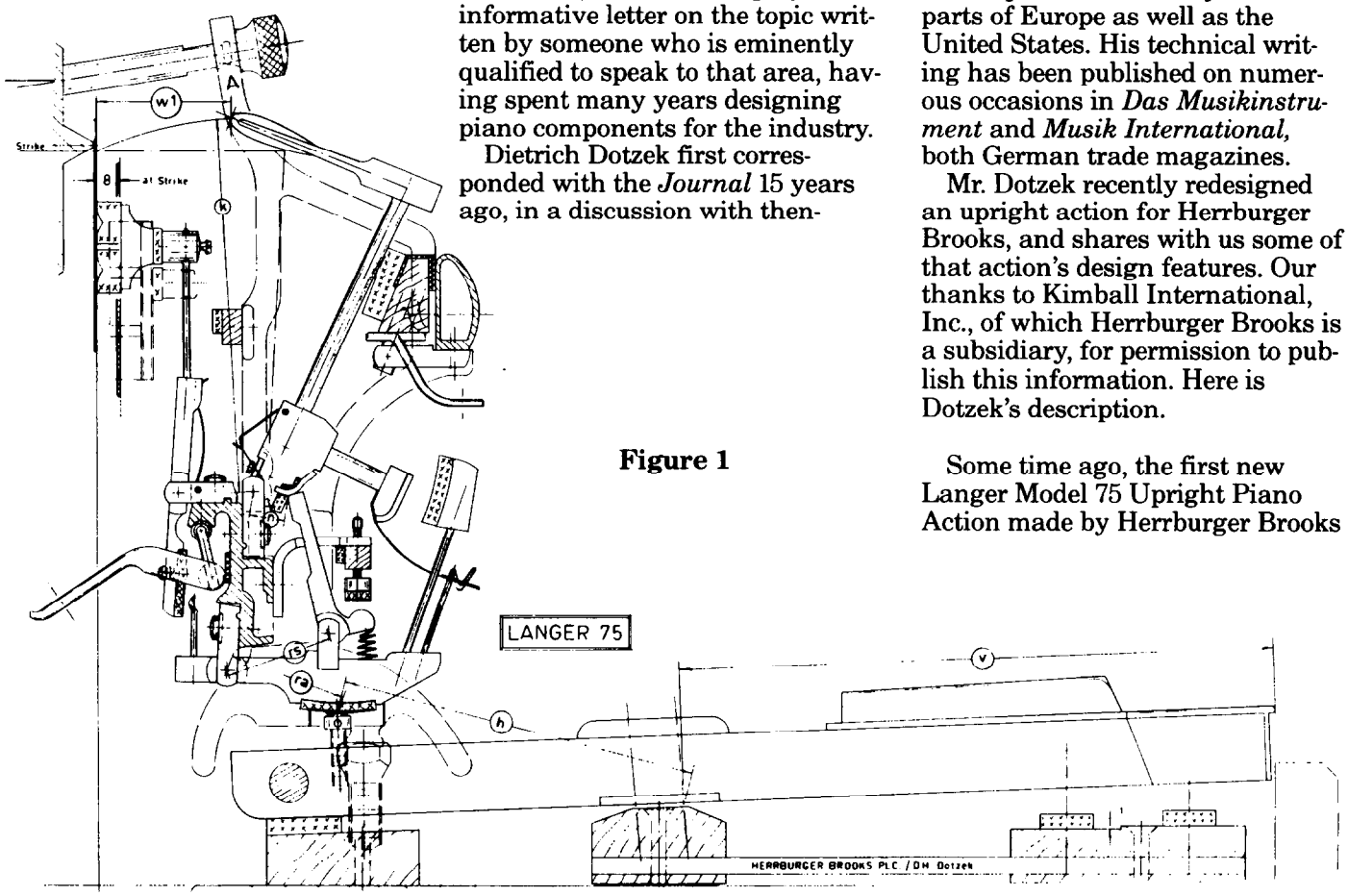


Figure 1

Some time ago, the first new Langer Model 75 Upright Piano Action made by Herrburger Brooks

Plc. was introduced in Europe. The Langer 75 is a redesign by Dietrich H. Dotzek for Herrburger Brooks that has been extremely successful in Europe.

Part of the introduction then were articles published in the German trade magazine *Das Musikinstrument,* one written by Dietrich H. Dotzek about the mathematics involved in upright piano actions in general and Langer in particular.

Results Of Testing

a. An absolute minimum of friction between the upper surface of the capstan screw and the lower surface of the wippen cushion.
b. No friction of any significance between the jack tender and the regulating button.
c. Damper lever ratio: 40:19 = 2.1 (from the damper lever center pin to the center line of the damper block, 40 parts; from the damper lever center pin to the point of contact with the spoon, 19 parts.)
d. The attack surface of the hammer butt has a large radius, which means less friction between the top of the jack and the butt leather, and hence a less stiff touch, plus better and quicker return of the jack to its "firing position." Maximum number of blows per second: 11.6; hence, trills can be executed "inside the keys" within reasonable limits. At this number of blows per second, the contact is 0.021 seconds per blow. Eleven and six-tenths blows per second is definitely an above-average repetition rate. Thus, the action has a lighter touch and is a pleasure to play on. The player has full control and a maximum of dynamic range.

Other Points Of Interest

1. Action rail of extruded aluminum.
- No dimensional changes due to variations in relative humidity (Wood is subject to up to four percent shrinkage tangentially, which causes some of the dimensional changes in a piano).
- A stable, well-balanced profile, hence very low tolerances.
- Aluminum wire beads with microscopic grooves for a secure, yet adjustable flange fit.
- Additional thickness to accommodate screws: 4 and 5 mm.

Explanation Of Symbols (See Figure 1)

k — Upper lever arm of the hammer assembly (A straight line drawn from the hammer butt center pin to the hammer head striking point.)
$\mathbf{w}^1$ — Stroke of the upper lever arm **k** of the hammer assembly up to the point of letoff (Or in more customary terminology, hammer blow distance minus letoff.)
n — Lower lever arm of hammer assembly (The straight distance from hammer butt center pin to the point of contact of the top surface of the jack with the hammer butt leather.)
$\mathbf{r}_s$ — Upper lever arm of the wippen (A straight line drawn from the wippen center pin to the jack center pin.)
$\mathbf{r}_a$ —Lower lever arm of the wippen (A straight line drawn from the wippen center pin to the point of contact between the bottom surface of the wippen cushion and the top surface of the capstan screw.)
$\mathbf{S}_n{}^1$ — Stroke of the lower lever arm **n** of the hammer assembly (i.e., of the point of contact of the top surface of the jack with the hammer butt leather) up to the point of letoff.
$\mathbf{S}_s{}^1$ Stroke of the jack center pin up to the point of letoff.
$\mathbf{S}_a{}^1$ — Stroke of the point of contact of the key and wippen profiles up to the point of letoff.
v — Front lever arm of the key (A straight line drawn from the key balance point to the front end of the key.)
h — Back lever arm of the key (A straight line drawn from the balance point of the key to the point of contact between key and wippen profiles.)
$\mathbf{S}^1$ — Key dip of a natural up to the point of letoff.
S — The entire key dip of a natural including the letoff and aftertouch.

Recommended Standard Specifications

k = 126 mm. (4.96″) — resulting in a total hammer shank length up to the center line of the hammer moulding of 115 mm (4.53″)
$\mathbf{w}^1$ **= 43 mm. (1.69″)**
n = 12 mm. (.472″)
$\mathbf{r}_s$ **= 37 mm (1.457″)**
$\mathbf{r}_a$ **= 40 mm (1.575″)**
$\mathbf{S}_n{}^1$ **= 4.1 mm. (.161″)**
$\mathbf{S}_s{}^1$ **= 4.1 mm. (.161″)**
$\mathbf{S}_a{}^1$ **= 4.43 mm (.174″)**
$\mathbf{S}_a$ **= 5.75 mm. (.226″)**
v = 200 mm. (7.874″) = 40 parts
h = 115 mm (4.527″) = 23 parts; hence the key ratio is 40:23, or 1.74″
$\mathbf{S}^1$ **= 7.7 mm. (.303″)**
S = 10 mm. (.394″)

Assuming the correct friction line, i.e., when the action is at half stroke, the key balance point **W**, the point of contact **P** between the capstan screw and wippen cushion profiles and the wippen center pin **H** should all be in a straight line.

The measurements $\mathbf{r}_a$ and **h** are both dependent on this. The ratio of **k** and $\mathbf{r}_a$ is a decisive factor.

$$\mathbf{1.}\ \mathbf{S}_a{}^1 = \mathbf{w}^1 \frac{\mathbf{n}\,\mathbf{r}_a}{\mathbf{k}\,\mathbf{r}_s} = 43\,\frac{12 \cdot 40}{126 \cdot 37} = \mathbf{4.43\ mm}$$

$$\mathbf{2.}\ \mathbf{S}^1 = \frac{\mathbf{v}\,\mathbf{S}_a{}^1}{\mathbf{h}} = \frac{200 \cdot 4.43}{115} = \mathbf{7.7\ mm}$$

(Continued on next page)

Calculations (Continued)

3. $S_s' = S' \frac{h\, r_s}{v\, r_a} = 7.7 \frac{115 \cdot 37}{200 \cdot 40} = 4.1$ mm

4. $S_s' = S_n'$

5. $k : n = w' : S_n'$ $126 : 12 = \underline{10.5} = 43 : 4.1 : \underline{10.5}$

6. $S_a = s \frac{h}{v} = 10 \frac{115}{200} = 5.75$

7. $S = \frac{v\, S_a}{h} = \frac{200 \cdot 5.75}{115} = 10$ mm

Thus we have the correct transmission ratio between the key dip and the hammer blow distance up to the point of letoff:

8. $\frac{w'}{s'} = \frac{h\, r_s\, k}{v\, r_a\, n} = \frac{43}{7.7} = \underline{5.58} = \frac{115 \cdot 37 \cdot 126}{200 \cdot 40 \cdot 12} = \underline{5.58}$

An example of variant specifications:

$k = \underline{135}$ mm ($\underline{5.315}$") — i.e. overall hammer shank length $\underline{115}$ mm ($\underline{4.527}$")

$w' = 43$ mm (1.692")

$n = \underline{11.9}$ mm ($\underline{.468}$")

$r_s = 37$ mm (1.457")

$r_a = \underline{39}$ mm ($\underline{1.535}$")

$S_n' = \underline{3.79}$ mm ($\underline{.149}$")

$S_s' = \underline{3.79}$ mm ($\underline{.149}$")

$S_a' = \underline{4.0}$ mm ($\underline{.157}$")

$S_a = \underline{5.225}$ mm ($\underline{.206}$")

$v = 200$ mm (7.874") = 20 parts

$h = \underline{110}$ mm ($\underline{4.33}$") = $\underline{11}$ parts; hence the key ratio is $\underline{20{:}11}$, or $\underline{1.8}$

$S' = \underline{7.27}$ mm ($\underline{.286}$")

$S = \underline{9.5}$ mm ($\underline{.374}$")

Assuming the correct "friction line."

Calculations:

1. $S_a' = w' \frac{n\, r_a}{k\, r_s} = 43 \frac{11.9 \cdot 39}{135 \cdot 37} = 4.0$ mm

2. $S' = \frac{v\, S_a'}{h} = \frac{200 \cdot 4.0}{110} = 7.27$ mm

3. $S_s' = S' \frac{h\, r_s}{v\, r_a} = 7.27 \frac{110 \cdot 37}{200 \cdot 39} = 3.79$ mm

4. $S_s' = S_n'$

5. $k : n = w' : S_n' = 135 : 11.9 = \underline{11.3} = 43 : 3.79 : \underline{11.3}$

6. $S_a = s \frac{h}{v} = 9.5 \frac{110}{200} = 5.225$

7. $S = \frac{v\, S_a}{h} = \frac{200 \cdot 5.225}{110} = 9.5$ mm

Thus we have the correct transmission ratio between the key dip and the hammer blow distance up to the point of letoff:

8. $\frac{w'}{s'} = \frac{h\, r_s\, k}{v\, r_a\, n} = \frac{43}{7.27} = \underline{5.9} = \frac{110 \cdot 37 \cdot 135}{200 \cdot 39 \cdot 11.9} = \underline{5.9}$

- Additional profile to facilitate the fitting of the damper rod hinges into position (Only one hinge type is necessary).

2. Hammer rest rail also of extruded aluminum.
- Space-saving tubular profile.
- Additional thickness to accommodate screws.
- Silver-white matte finish for an elegant appearance.

3. Fork/stay screw of hardened aluminum, a new idea that allows letoff rail to be adjustable both in and out and *up and down.* This is advantageous when installing the action in the piano.

4. Screws pan head, rolled thread, zinc plated, blue passivated, self-tapping, Pozidriv No. 2 with additional slot.
- Flange screws additionally provided with captive rolled-on washers.
- Damper drum screws machine type screwed into brass bushings.
- Action foot screws: both cup and ball types available. A self-tapping screw was rescrewed 100 times into an existing threaded hole in extruded aluminum. Only five times was it not then guided into the existing thread. Even the six new threads did not strip until 3.5 Nm torque was applied. (According to DIN 267, German Industrial Standards, such a screw should be able to withstand a torque of at least 3.4 Nm without breaking. When more than 2.0 Nm torque is applied, the wooden flange starts to deform.)

5. Action brackets pressure-die-cast aluminum, guaranteeing extremely high accuracy and a precision appearance.
- Available in nine different sizes and fittings.
- All assembly screws can be reached from the front, including those for the damper stop rail. This is advantageous both when installing and later when servicing the action.

6. Wooden action parts are out of Canadian rock maple. Hammer shanks are available in Scandinavian birch or maple. Test results show that maple is superior in bending strength, compressive strength, hardness and radial, tangential, and volumetric dimensional changes when subject to variations in temperature and humidity.

7. A special maintenance-free

Teflon coating is on the following friction surfaces:
- Damper spring against stem
- Jack against butt leather
- jack tender against letoff button

Test results show 16 percent less friction and insensitivity to humidity and other changes.

8. Centerpin bushings are inserted and glued automatically.

Vertical Rebuilding

Continuing with the keyboard, we proceed to one of the most important — though often neglected — items of all, the key bushings. The condition of these small pieces of wool cloth, and their clearance to the keypins, has a more direct effect on the feel of the instrument than any other replacement part, simply because they affect the movement of the parts that are in direct contact with the fingers of the pianist.

Equally important, of course, is the balance rail hole in the bottom of the key; but since that was discussed in an earlier issue, we will assume for now that it is all right — that is, that the key will not move in a fore/aft plane, but yet it will slide down its balance rail pin of its own weight.

No reconditioning job, let alone a rebuild, should be estimated without consideration of the key bushings. If the hammers show considerable wear, it stands to reason that the keys have been played hard and the nap of the cloth is worn down. Certainly if the cloth is worn down to the threads in the center, or if there is any excessive movement of the key, or if any of the front rail keypins have been turned, we must rebush. When estimating, remove the keyslip and look at the front rail cloth punchings to see whether there are telltale bits of red wool on them, almost surely an indication that the pins have been nicked by a spacing tool. If in doubt, replace the keypins as well as the bushings. They are cheap, readily available and easy to install, so if there is any reason at all to do so (worn plating, nicks, etc.) they should be replaced. Before removing them, measure their height so the replacements can be installed the same way as the originals.

Figure 2 shows a bushing wedge in use. It is so called presumably because it must be wedged into position, because it isn't wedge-shaped at all. These are available in wood and in aluminum, both of which work very well provided they are the right size. We do not recommend spring clamps which are also available and marketed for this purpose, because they put an uncontrolled amount of pressure on the bushing cloth, usually way too much. Technicians have told us that they have applied spring clamps to balance rail buttons only to have the buttons split in half from the pressure; even if that doesn't happen, the excess pressure can force the glue to saturate the cloth and make it as hard as a piece of wood. The wedge-shaped slotted jigs made for balance rail bushings are generally way too thick, and work well only if sanded down so they are narrower and without a taper at the bottom.

When bushing the front rail, use a low- to medium-grade hot hide glue and two pieces of bushing cloth of the thin, hard, tightly-woven variety. Traditionally, we have been told to select the "cloth with the white center" because it was the best. It is my understanding that some makers of cloth that may be of lesser quality are also surface-dying the cloth to make it appear like the old standard, so look it over closely. The best criterion of quality is the number of threads per inch, the more the better.

Looking again at *Figure 2*, we see a key button of the preferred type, having a slot in the side for the cloth. The reason this type is better is that no matter how many times the key is removed and replaced, with this type of construction, there is no possibility that the keypin could catch on the lower edge of the bushing and dislodge it. This also allows for a greater gluing surface so less glue can be used in the ver-

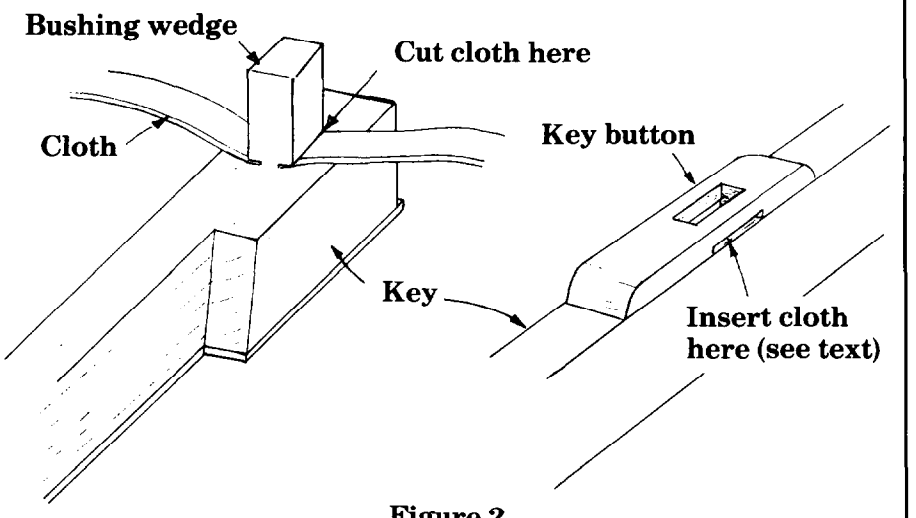


Figure 2

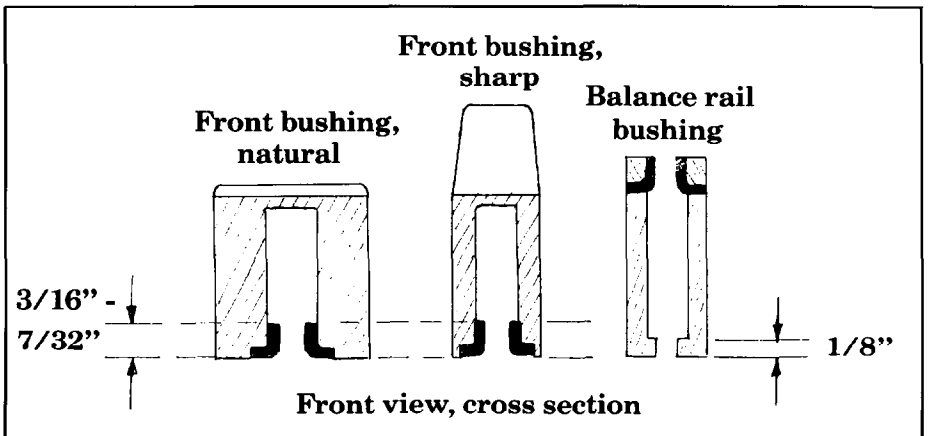


Figure 3

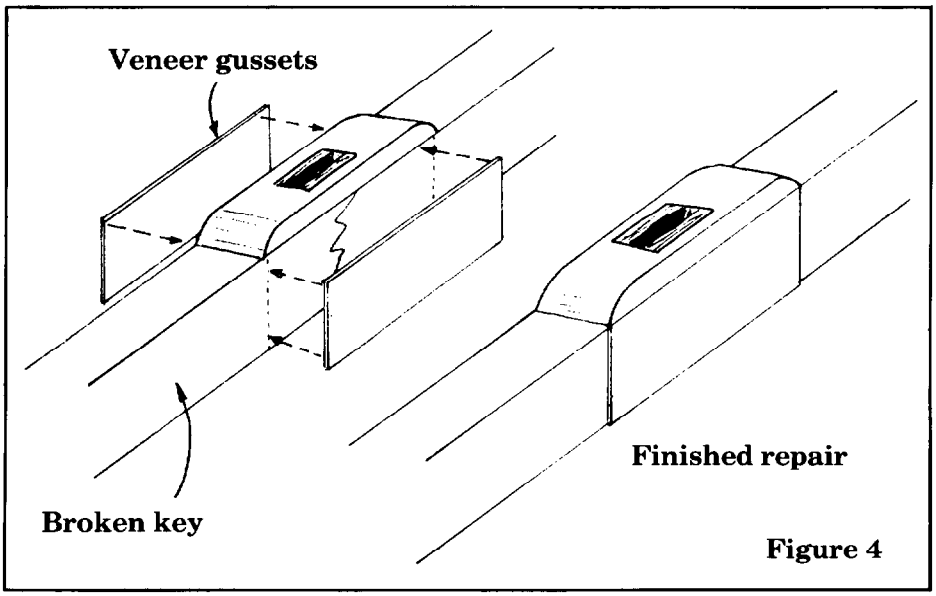


Figure 4

tical portion where the cloth touches the pin.

Figure 3 is a front-view cross-section of three keys, showing the relationship between the bushing and the key mortise. There must be enough cloth to do the job of supporting the key against the pin, but any more than that will lead to problems with sticking keys. The reader should be aware that the dimensions called out are not industry standards, merely one opinion (mine) as to how far a key bushing should project.

The repair of broken keys has been covered at great length in these pages over the years, but we will state briefly that the most common cause of key breakage is short grain; that is, the length of the grain is not always parallel to the length of the key, because trees don't always cooperate and grow crooked to accommodate the flare of a key at a particular point. This is something that should be carefully considered by the manufacturer of the keys. Indeed, if the flare isn't too radical, the key maker can select a blank that will roughly correspond with the key flare. The problem is that, since the key mortise must be parallel to the length of the front of the key, any accommodation for flare will necessarily result in short grain at the balance rail. Under heavy use, then, it will break as we see in *Figure 4.*

The usual repair involves gluing the key back together, with some kind of reinforcing gusset on either side. Some use veneer, others prefer a piece of drumhead. Whatever is used must be thin enough to fit between the keys without interference, and yet stiff enough to add strength to the key.

Next month in this space, we will consider the manufacture of a new keyboard.

Heat Treating The Capo d'Astro Bar

Matt Grossman of Memphis has submitted the following information on a topic that should be of interest to every piano technician. Here's Grossman:

Piano: Steinway model D, nine-foot concert grand.

History: built in 1964. Completely rebuilt in 1975 by a recognized master piano rebuilder. Used continually since then in a major university recital hall. Was generally the preferred piano over three other concert grands.

Problem: The treble section had always been weak, but in the past year or so it had become much worse. There was a dramatic drop in tone and carrying power starting with the first note on the capo d'astro (or V-bar) all the way up to note 88.

After trying all the common remedies such as seating the strings, changing the strike point, reshaping hammers, regulating the action and lacquering hammers, there was no significant improvement in the sound of the piano. The instrument had adequate down-bearing.

In the course of tuning the piano for a recital one day, I noticed that one of the strings in the capo d'astro section had developed a buzz at the V-bar. So in order to silence the noise, I took a screwdriver and moved the strings of the unison to and fro, essentially wiping them across the surface of the V-bar (many technicians use this common remedy). This got rid of the unwanted buzzing and, much to my surprise, the note took on a powerful singing quality that it did not have before. I was so impressed that I treated all the other strings in the section the same way. This resulted in a big improvement in the sound of the piano, which was noticed right away by the pianists who regularly used the instrument. But it did not last. After only one concert, the sound in the capo d'astro section began to deteriorate. Several concerts later, the sound of the capo d'astro section was dull and lifeless. Using the string-wiping technique again seemed to restore the tone, but only temporarily.

I noticed that when performing the above procedure the strings seemed to be settling quite deeply into the V-bar after they remained in place for awhile. The movement of the string to and fro across the bar seemed to smooth the surface of the bar temporarily. I attributed the changes I was getting in the sound of the instrument to these observations and assumed that the V-bar was not hard enough, making the string termination point somehow inadequate.

Since I was not familiar with the specifications or procedures for hardening the V-bar (if any) I decided to contact the Steinway factory for more information. The factory referred me to John Bogyos, the piano engineer. Mr. Bogyos was very helpful, saying that the V-bar was treated for hardness during the manufacturing process, but that it was possible over the years for the hardness to deteriorate for one reason or another. I asked what could be done to restore the hardness to the V-bar, but he could not give me a satisfactory answer. However, he did say he thought the hardness could be restored and that I should contact the Engineering Department within the university (where I am employed) for help with the V-bar problem. This proved to be an excellent suggestion, and I was fortunate enough to get ahold of Glenn Davis, professor of engineering technology and quite an accomplished welder.

Davis suggested that a welding

device known as a TIG (tungsten inert gas) welder be used to heat treat the V-bar and thereby harden it. Davis explained that the TIG process would allow him to heat the V-bar very quickly without heating up the rest of the plate or even the capo d'astro bar. The heat, and therefore the molecular change that causes the hardening, would be confined strictly to the V-bar where the strings pass under it. He speculated that the process would harden the V-bar to a depth of about .5 mm. (Any large-scale heating of the plate would cause it to crack once the piano was strung and brought to pitch.)

Being very cautious and not wanting to use the plate of a concert grand Steinway to see if the process would actually work, I decided to use a scrap plate as a test piece. I contacted Richard Elrod, quality control manager for the Aeolian Piano Factory in Memphis, to see if he had a broken plate that could be used for my experiment. Mr. Elrod and Aeolian Corp. were very accommodating and generously provided the needed plate at no charge. The scrap plate was transported to the Engineering Department on campus where Professor Davis proceeded to try out the TIG welding process.

First, the hardness of the V-bar was checked before treatment by cutting into it with a common smooth file. It cut quite easily. Then Davis donned his heavy gloves and welder's helmet, turned on his equipment and began. He made several passes over the V-bar, adjusting the welder after each pass. Finally, he was satisfied with the result and a hardness check was made again using the file. This time the file would not cut. The process seemed to work, so we brought the concert grand plate to the shop and proceeded to treat it, testing it first with the file, which again cut easily.

The Steinway plate was evidently made from a different mix of materials than the scrap plate, because when the heat was applied to the surface of the V-bar it started to bubble and deform. Davis stopped immediately and made some adjustments to the welder in order to minimize the deformation of the V-bar surface. After some discussion, it was determined that the deformities could be taken out afterwards in the finishing process so Davis continued to treat the entire V-bar surface. The V-bar was then smoothed down using a common sharpening stone and emery paper. Again the file was used to test the hardness, and it would not cut. The plate was then put back in the piano and new strings were installed.

There was a wonderful improvement in the sound of the instrument. There was no dropoff in tone or volume across the break from agraffe to V-bar, the sound was much clearer with more carrying power, and the notes in the capo d'astro sections sustained longer. In addition, the tuning stability improved dramatically. Everyone who was familiar with the instrument noticed the difference in sound and were very pleased with it, much to my satisfaction.

The piano is once again the favorite instrument of the university music faculty and has been in constant use for about six months now. The sound has not deteriorated at all but matured and developed into something that seems to please both players and listeners alike.

Tech Tips

Our first tip was selected from the Cleveland Chapter's newsletter, *Butts And Flanges,* edited by Janet Leary. The idea was sent to Janet by Paul Bergan (the Piano Man) of the Houston Chapter. Paul's idea refers to the common difficulty of keeping a vertical damper repair spring lined up straight while tightening the flange screw, which of course tends to twist the spring clockwise. Paul suggests holding the spring with a pair of long tweezers as shown in *Figure 5* with one hand while tightening the spring with the other. The tweezer

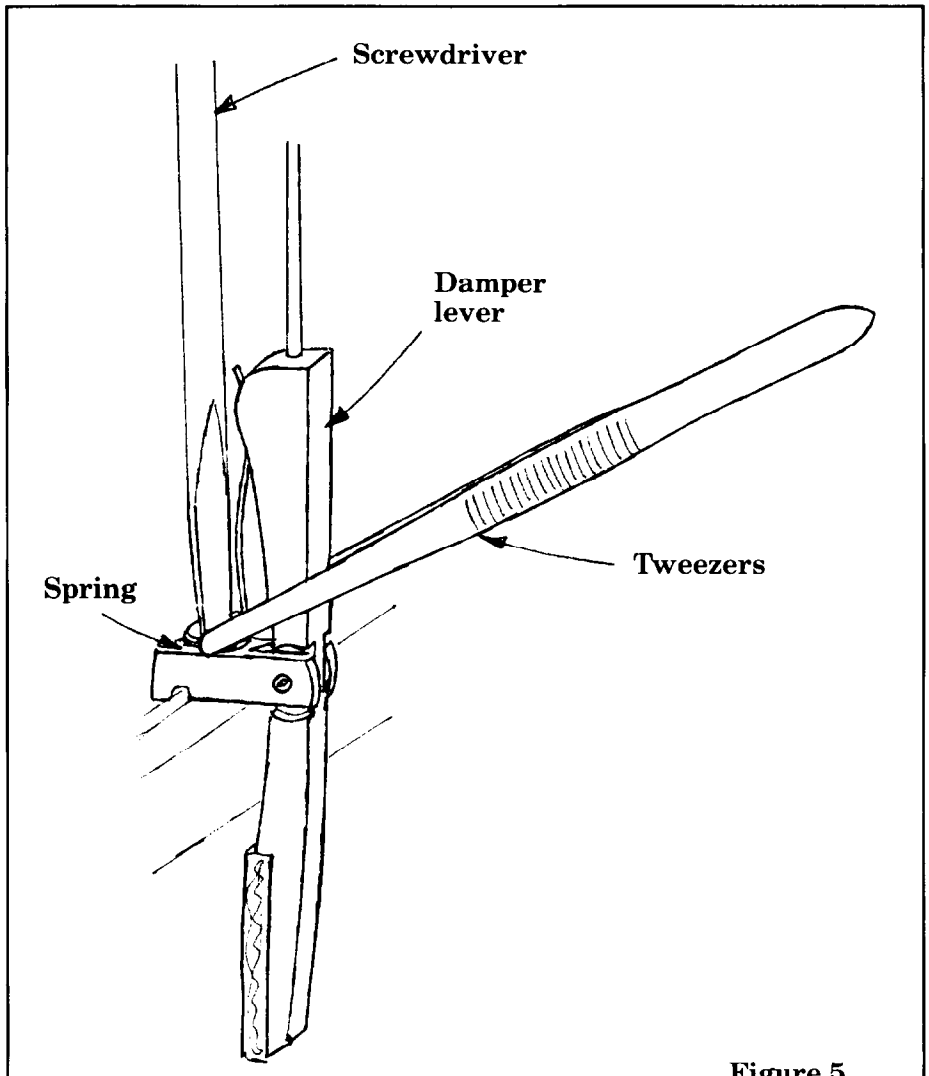


Figure 5

actually touches both sides of the damper lever, which puts the end of the tweezer blade in just the right position to hold the spring coil.

Gary Neie of Pineville, La., sends along the following two ideas:

In replacing strings in the newer verticals with bent-over beckets, I remove the protruding tang with diagonal wire cutters. The diagonal cutters will not fit between tuning pins in the normal cutting method; however, if you turn them over, the cutout portion fits around the tuning pin and the tang breaks off like cutting butter. (ed. note: someone else suggested cutting the tang with a coil-setter slipped over the pin.)

I have several customers who play so heavily that, in addition to breaking strings, they pull the sticker and grommet right through the key fork. When I replace the grommet, I place a flat metal washer on top of the grommet for support and have not had one pulled through with this method.

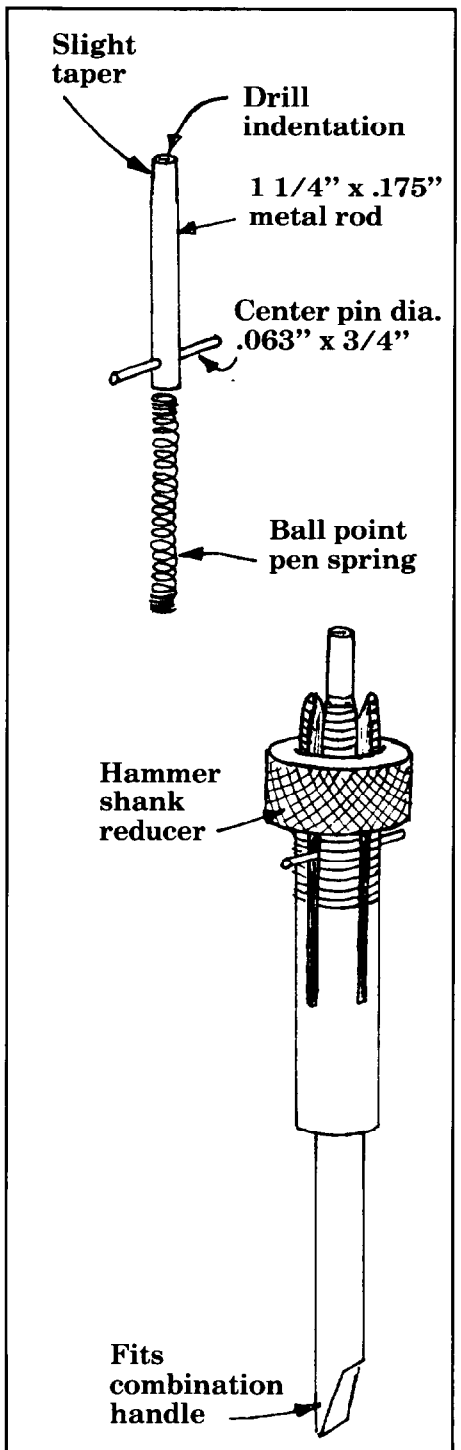


Figure 6

Multipurpose Tool Contest

Daniel M. Sponenburg of Pottsville, Pa., renowned inventor of the blow gauge/pencil combination reviewed recently in these pages, has yet another idea to share. This one is called "Bass String Twister And Shank Reducer To Fit Combination Handle," and here is part of Dan's description.

I made this tool about six or seven years ago. The 1 1/4-inch by 0.175 rod is a nail with the head and point cut off. An indentation is drilled to position the tool and hitchpin. I put a slight taper on the end. The centerpin should slide freely in the shank reducer slots (see *Figure 6*...ed.)

To use, unscrew the adjusting collar, load the spring and the rod into the barrel, and screw on the adjusting collar so the rod slips inside and the collar pushes the string onto the hitchpin. It takes about 15 minutes to make this tool.

Reader Comments

It was interesting to see the picture of the Collard & Collard grand in the May issue of the Journal, interesting because I have one made in the same year, 1827. I also have one of the same make made in 1817. Speaking of unusual pianos, I have one with the bass part of the action (vertical) on an angle as well as the tuning pins. The number one hammer is about halfway between the bottom board and the top of the plate. I also have a vertical piano with a shifting action and key frame so the piano can be played in five different keys.

Sid Stone, RTT
San Francisco Chapter

We also have a letter from Ben Carlton, RTT, of the Puget Sound Chapter, who expresses appreciation to all the writers who have helped to make the *Journal* what it is today, with the suggestion that technicians who have been helped by a particular article might want to consider thanking that particular writer with a letter or a postcard. Ben goes on to say:

While I am atop this soap box, I have another observation which I believe merits expanded editorial comment. It is my personal opinion that a stack of back-issue Journals, assisted by its wonderfully-written index, is second only to "hands-on-personal-instruction by a knowledgeable teacher." The combination of that excellent index, plus those past Journals, is a light-year ahead of the $500-plus correspondence courses which are advertised in national magazines on "how easy it is to learn piano tuning." Write for their literature if you would like a 20-cent chuckle.

Once again we want to encourage all of our readers to consider writing an article, a series of articles or at least a comment, question or technical tip for publication. If you want to write a series, please send me the first article together with a rough outline for the rest of the series, and we will see what can be arranged.

Sometimes a series planned well ahead of time doesn't get off the ground for one reason or another and we have to find a replacement to keep enough technical material in the magazine. One such series, planned to encompass the day-to-day routine and experience of the university technician, was to have been written by Martha Lagoy and entitled "Committed To The Insititution," certainly an intriguing thought. Alas, however, Martha became uncommitted to that particular institution, leaving us with a one-article series which, on the face of it, would seem as useless as a jigsaw puzzle with most of the pieces missing. This article, however, is certainly an exception, having enough strong points to stand on its own. We present it in this issue, with our thanks to its multi-talented author.

Please send all technical material for publication directly to me at this address:

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The Quick And Easy (Maybe Even Painless) Practice Room Tuning

Martha Lagoy, RTT
Cincinnati Chapter

Before attempting to tune any piano, the technician should determine that the instrument is indeed tunable, i.e., that the tuning pins are tight, that there is no excessive rust around tuning pins, hitchpins or bridgepins, that there are no broken action parts, etc. For the purposes of this article, it will be assumed that the instrument in question is in reasonably good condition but sorely in need of a judiciously applied tuning hammer.

Practice room tunings must be accomplished quickly and efficiently, and they involve a certain amount of compromise for the sake of speed. As with any venture of this nature, there is no such thing as a free lunch, and sacrifices must be made somewhere along the line. In other words, in order to decrease the amount of time ordinarily necessary to complete a tuning, the technician must develop a method of "priority bargaining" which applies to practice room pianos. As a consequence of devoting the greatest amount of energy toward accomplishing a fast tuning, the tuner *must* decrease the emphasis which he or she might usually place on those aspects of the tuning located further down the priority list. Here is a list of tuning priorities this technician uses with favorable results.

1. Time

The most important aspect of the practice room tuning is the duration. If the technician hopes to keep all of the instruments relatively close to being in tune, he or she must be able to complete acceptable tunings within a reasonable amount of time. Practically speaking, the *most* time that should be spent on a practice room piano is one hour. Despite the formidable and decidedly admirable achievements of Steve Fairchild, not everyone can be a speed tuner. However, it is entirely possible to do a downright respectable tuning in 30 minutes or less, and that should be the ultimate goal of the institutional technician.

> "Practice room tunings must be accomplished quickly and efficiently, and they involve a certain amount of compromise for the sake of speed."

2. Stability

Once the technician becomes accustomed to the idea of accomplishing tunings quickly, the next objective should be solid, stable tunings. It is pointless to produce tunings at the speed of sound if they fall out at the speed of light. Good hammer technique, by which tuning pins are turned instead of bent, and substantial test blows, which eliminate twist in the pins and which equalize tension along the entire string length, are absolutely essential for a stable tuning.

3. Pitch

In any institutional setting, the technician must bear in mind that fixed-pitch instruments will proba-

bly be used with the pianos at some point, and so it is crucial that the pianos be maintained at standard pitch. Raising or lowering pitch drastically is not an easy task, especially in the practice room, but every effort should be made to accommodate those poor clarinet and trumpet players who cannot afford to strain their lips in an attempt to match a piano that is wildly sharp or flat. (A description of a pitch-raising pattern which is very useful for achieving a stable tuning will be discussed in another article in this series.)

4. Unisons

To uneducated ears — and for all practical purposes one may consider any non-tuner to possess uneducated ears — the most easily detectable characteristic of an out-of-tune piano is noisy unisons. Therefore, it behooves the technician to strive for the tightest possible unisons within the given time limitations.

5. Octaves

After unisons, sloppy octaves attract critical attention from pianists who encounter them. Aim for quiet octaves with a comfortable amount of stretch in the proper direction. (Methods for stretching octaves will be outlined below.)

6. Temperament

Paradoxically, that aspect of tuning which bewilders so many technicians at first is the least critical factor in the practice room tuning. It is a simple matter to produce a tuning which, to the aforementioned uneducated ears, sounds perfectly fine, even though the temperament is somewhat less than ideal. No more than five minutes should be spent on laying the bearings. Allowing any extra time could justifiably be termed "agonizing."

With the list of priorities firmly established, it is now possible to examine the actual tuning pattern which can successfully be utilized for the practice room piano.

First, strip mute the entire piano. On grands, this is an easy and straightforward procedure; on verticals, in the high treble, caution must be exercised in the insertion of the muting strip. In order to mute those unisons at the upper end of the dampers, a screwdriver blade or a bar ruler may be used to hold the dampers back, one by one, while the muting strip is pushed down between each damper and the strings. (It should be mentioned here that when muting off any piano, the technician should depress the sustaining pedal so that the dampers are lifted and no damper felt is pinched during the insertion of the felt strip.) The bass section may effectively be muted by placing a muting strip or rubber mutes so that the left-hand string and the right-hand string (respectively) of two adjacent bichord unisons will be muted, leaving one string of each note free to sound.

"For the possessors of "midget digits," for instance, treble octaves should be checked with fourths and fifths, and bass octaves should be checked with fifths and the minor third-major sixth. These particular acoustical checks ...have the built-in advantage of guaranteeing an acceptable amount of stretch in the proper direction."

With the piano now muted so that only one string of each unison can be heard, the pitch should be set according to the tuning fork (A-440 or C523.3) and the temperament tuned. From this point, octaves should be tuned all the way up the instrument. Then, while the ear is still accustomed to the high frequencies of the extreme treble, the technician should tune unisons from note 88 down to the top note of the temperament. On grands, simply pull the muting strip out one string at a time. On verticals, a Papp's mute (a nylon tweezer-like contraption) is a practical and convenient aid to unison tuning in the high treble. It can be inserted on an angle between hammer shanks to mute off the right-hand and left-hand strings of two adjacent trichord unisons while the left-hand and right-hand strings (respectively) of those unisons are tuned, and then relocated to the next two unisons while the right-hand and left-hand strings of the two original unisons are pulled in.

After all treble unisons are tuned, proceed to the bass and tune octaves all the way down to note 1. Then, beginning at the lowest note of the temperament, tune bass unisons down. With the temperament unisons still muted off, check the tuning thus far using some basic tests: octaves and double octaves, four-octave chromatic scales, arpeggiated major triads, or whatever checks will suffice to ensure that the instrument will serve the purposes of those dedicated music students. (A breezy rule of thumb might be, if nothing howls, the tuning is all right.) Finally, tune the temperament unisons and quickly recheck the piano.

The main inducement for using the tuning pattern described above is that it is a time-saver. While tuning in the high treble, for instance, it is generally faster to remain up in the high frequencies to tune unisons for two reasons: first, the ear is already used to extreme pitches, and second, the ear is not yet tired from tuning the rest of the instrument. Another time-saving rule to which the technician should adhere is to use *only* those accoustical checks which can be accomplished with one hand. For the possessors of "midget digits," for instance, treble octaves should be checked with fourths and fifths, and bass octaves should be checked with fifths and the minor third-major sixth. These particular acoustical checks, in addition to reducing the amount of time spent testing (since the tuner does not have to remove one hand from the tuning hammer in order to try the accuracy of every octave), have the built-in advantage of guaranteeing an acceptable amount of stretch in the proper direction.

As the tuner should recall, the very term "temperament" refers to the fact that acoustical compromise is necessary in achieving the 12 evenly-spaced semitones which form the foundation of any piano tuning. Fifths are tempered to be slightly smaller than perfect (i.e., the upper note and lower note of any given fifth will not be in an exact 3/2 ratio, but in an "almost-

3"/2 ratio). Likewise, fourths are tempered, but in the opposite way (the upper note and lower note of a tempered fourth will not form an exact 4/3 ratio, but rather a 4/"almost-3" ratio). Tuners can rely on the contracted fifth and the expanded fourth in octave tuning in this manner: first, tune a treble octave (for example, C6 from C5) until it is acceptably quiet, and then play C6 with its lower fifth, F5. (Remember, since octaves are being tuned upward, it is assumed that F5 is tuned correctly.) If that fifth produces a noticeable beat, the C6, although it appears to be solidly tuned to C5, may be a tad "too perfect," forming an overly contracted fifth with F5. By raising the C6 until it forms a quiet fifth with F5, the tuner is stretching the octave in the proper direction; that is, sharp in the treble. However, if the C6-C5 octave now beats, the stretch is excessive and C6 should be flattened a bit. Ideally, treble octaves should be just sharp enough to form quiet fifths below but not so sharp that the octaves themselves or their expanded fourths below are noisy. Similarly, bass octaves are stretched by using the same ideas in reverse. The minor third-major sixth test also is an effective means of tuning bass octaves, especially for those notes composed of copper-wound strings. According to this test, the lower note of the octave (the note being tuned) and the note a minor third above (for instance G2 and B♭2), when played simultaneously, should have the same beat rate speed as the upper note of the octave and the note a minor sixth below (conveniently, G3 and B♭2). The octave G3-G2 will now be stretched slightly, or more specifically, the G2 will be slightly flat from a perfect 2/1 octave with G3.

A helpful hint recently pointed out by Bill Brandom of Everett is that the technician should visually inspect the arrangement of tuning pins, particularly on verticals, to see if any strings rest against neighboring tuning pins. If so, those strings coming off the neighboring tuning pins in question should be tuned *first* and then the strings which rest against those tuning pins should be tuned. Generally, there will be a pattern to such an occurrence, especially in the tenor section of verticals, such as a string coming off the topmost tuning pins of a unison (i.e., the left-hand string) may brush against the bottom tuning pin (for the right-hand string) of the note immediately below.

It stands to reason that if the left-hand string of the upper unison is tuned before the right-hand string of the lower unison, the movement of the lower right-hand tuning pin will disturb that left-hand string which is resting against it, thereby knocking out the tuning of that upper unison.

Although it may seem frustrating to force oneself to move quickly through tunings without being able to fuss and nitpick, there are some benefits to mastering the "quick and easy" tuning, especially if done in abundance. First of all, the technician will be able to accomplish a great many tunings in a limited amount of time, and second, lo and behold! one's speed, accuracy, and stability will improve as a natural by-product.

As a final gentle reminder, the institutional technician should remember that when treating the practice room piano, he or she is not tuning for Vladimir Horowitz at Carnegie Hall, but merely for Susie Lipschitz down the hall.

18th-Century Harpsichord Music And Tuning In Italy And England

Jack Greenfield
Chicago Chapter

Vocal And String Music Dominate Italy

The most important branch of music in 18th-century Italy was opera and cultivation of the voice. Italian opera was popular not only with all classes across the entire peninsula, but it also attracted large audiences in other countries. Italian singers and musicians were employed in Italian operatic productions presented throughout Europe.

During the first half of the 18th century, violin music also flourished in orchestral and chamber music performance. Around 1730, Italian composers began to write orchestral compositions for separate concerts in the plan of the opera overture, the *sinfonia*. These usually had three movements, an Allegro, a short Andante and a fast, rhythmic finale. Classical chamber music and sonatas were written in the same pattern.

Tartini's Writings On Temperament And Acoustics

One of the most prominent Italian violinists and composers of his era was Giuseppe Tartini (1692-1770), of special interest because of his writings on temperament and his acoustical discoveries. Tartini, the son of a wealthy nobleman, was a colorful, highly energetic character. He studied violin as a child and while growing up alternately studied for the Church, for the law and for the army. Meanwhile, besides becoming a skillful violinist, he became a champion fencer. He secretly married at the age of 21, and then, because of the disapproval when discovered by an angry cardinal, he hid in a monastery for several years. Here he studied composition and acoustics and invented a new violin bow. During his studies, he discovered the phenomenon of "resultant" or "difference" tones, the production of a third tone whose frequency is the difference of the two generating tones, especially noticeable with high-pitched violin tones. In later years, he taught his students to use this effect for accurate tuning.

"Tartini, the son of a wealthy nobleman, was a colorful, highly energetic character. He studied violin as a child and while growing up alternately studied for the Church, for the law and for the Army."

After leaving the monastery in 1715, he finally settled down to a career as a violinist. From 1720 to 1765, he held the position of leading violinist at St. Anthony's Basilica in Padua. In addition, he had time to teach, compose, study acoustics and theory and take short leaves for engagements in other cities. His fame as a violinist and teacher of violinists was so great that he became known as "Master of Nations."

The last five years of his life he spent in teaching and writing. He wrote books on acoustics in 1754 and 1767 and composed several hundred musical works including solo sonatas, chamber music and concertos.

Valotti's Temperament And Writings On Theory

Tartini was closely associated with Francesco Antonio Vallotti (1707-1783), who had entered the service of the Church in 1716 and served as organist beginning in 1723 before appointment as *maestro* at St. Anthony's in 1730. In this post, which he held for about 50 years, he directed a choir of 16 singers and an orchestra of 16 strings and several wind instruments under the leadership of Tartini when he was there. Vallotti was highly regarded as a composer of church music, but his books on theory drew little attention.

Tartini's book *Tratto de Musica,* published in Padua in 1754, discussed his discovery of difference tones in 1714 and praised a temperament that Vallotti used in organ tuning. Vallotti's temperament was a simple system in which six fifths were tuned pure, and the remaining fifths were reduced 1/6 ditonic comma, about four cents less than pure. Temperaments similar to Vallotti's appeared elsewhere in Europe later.

18th-Century Italian Harpsichords

As the harpsichord dwindled in importance in Italy during the 18th century, composition of harpsichord music declined, dropping to insignificance by the end of the century. Harpsichord building continued until the final decades. Many older Italian instruments with obsolete enharmonic keyboards were rebuilt with the extra keys used to fill out short bass octaves and extend the treble. New instruments were generally built in the simple traditional Italian style with two sets of strings and a single manual. Instruments used in the home to accompany singers or by composers in their work were octave spinets, small single manual instruments with a single set of strings pitched an octave higher. The invention of the piano by Bartolomeo Cristofori at the start of the century made little impact in Italy.

Harpsichords Flourish In England

The status of the harpsichord was vastly different in England where the construction of the instrument reached its climax before it was driven into oblivion by the piano. The final stage of harpsichord building in England began with Herman Tabel, who had trained in Antwerp, possibly with the last Couchet, before establishing a shop in London around 1700. Little more about Tabel is known, other than that he trained Berkat Shudi (1702-1773) who came from Switzerland, and Jakob Kirckman, who came from Germany. Shudi left Tabel to open his own shop in 1728. Kirckman married Tabel's widow and took over his business.

By mid-century, both firms had risen to leadership in the building of keyboard stringed instruments

"Although manufactured with mass-production methods, Shudi and Kirckman instruments contained well-made actions and produced magnificent tone with reedy trebles and sonorous basses."

in England. Their harpsichords acquired international prestige and were imported by wealthy buyers even in countries such as Germany and France where excellent instruments were produced.

Design Of English Harpsichords

Shudi and Kirckman harpsichords were similar in design: one or two manuals — most with five-octave compass but a few larger, two eight-foot stops with optional four-foot lute, harp and other special-effect stops. The special effects were produced by such methods as changing the plucking point, contacting the strings with leather or felt pads mounted on a rail and auxiliary devices such as the Venetian swell — a system of baffles opening and closing like Venetian blinds to shut off the sound. These measures to provide variety in tone color and dynamics were adopted to meet the competition from the piano, which became a serious threat after the middle of the century. Although manufactured with mass-production methods, Shudi and Kirckman instruments contained well-made actions and produced magnificent tone with reedy trebles and sonorous basses.

"...Harpsichord production continued to climb until the 1780s, when Shudi reached a peak annual output of 25 harpsichords and Kirckman about twice as many."

In spite of the rapid popularity of the inexpensive square pianos introduced in England in the 1760s and better grands in the 1770s, harpsichord production continued to climb until the 1780s when Shudi reached a peak annual output of 25 harpsichords and Kirckman about twice as many. In the last decade of the century, harpsichord production plunged abruptly, coming to an end with both firms switching to the manufacture of pianos only.

Keyboard Composition in Great Britain

Although interest in the instrument was high in Great Britain, there were no first-rank British-born composers of harpsichord music during the 18th century. The most prominent harpsichordists were the Germans, George Frederic Handel (1685-1759) and Johann Christian Bach (1735-1782), Johann Sebastian's youngest son. Handel was born in Halle, Germany, and showed exceptional talent for music at an early age. He acquired great skill as a keyboard instrument player and became a master of all forms of composition. He began his career in Germany and spent several years in Italy, where he was acclaimed a genius, before settling in England in 1712. He spent the rest of his life there as a leading composer, director and keyboard instrument performer. His great work was in opera and oratorio, but his keyboard compositions do not rank with those of his contemporaries, Johann Sebastian Bach and Scarlatti. Handel's harpsichord works consist of three collections of suites and miscellaneous pieces and a group of six fugues.

Johann Christian Bach, the most successful of Bach's sons, arrived in London in 1762, three years after the death of Handel. Johann Christian's training had included studies with his father and older brother, Carl Phillip Emmanuel, and several years with teachers in Italy. He began his career in several different positions in Northern Italy before coming to London in 1762. In England, he enjoyed success as a director and composer of opera, orchestral and chamber music, as well as keyboard music. He was the first musician to give a solo concert (1768) on the piano in England, and his continuing activity as a pianist was an influential factor in promot-

ing the acceptance of the instrument. He wrote about 70 sonatas for keyboard, about two-thirds accompanied by other instruments.

Rome-born Muzio Clementi (1752-1832), who became one of England's most prominent keyboard performers after the death of Johann Christian Bach, gave concerts on the harpsichord early in his career. His first sonatas were designated for either harpsichord or pianoforte. His later compositions made full use of the characteristics of the piano as distinguished from those of the harpsichord.

Thomas Young's Temperament And Acoustical Studies

One of the more important documents on temperaments known in Great Britain appeared at the end of the 18th century in a paper on acoustical research by an English scientist, Thomas Young (1773-1829). The work was included in the *Transactions Of The Royal Society Of London* in 1800. Young, after completing medical studies and receiving a degree in 1796, had become interested in the formation of the human voice. This led him into investigation of vibrating strings, musical pipes, beats and wave motion.

In his paper he discussed musical temperaments. His first was a complicated arrangement with 1/12 syntonic comma and 3/16 syntonic comma tempered and six pure fifths. Young also demonstrated that if a string is struck or plucked at a node, the harmonic vibrations or partials corresponding to that node will be absent.

Young pursued his medical practice intermittently. He had inherited wealth and received a substantial income from his writings. He could therefore spend his time on scientific research, which he preferred. He became one of the most eminent physicists of his time. His primary interest was optics, but he made other important contributions to acoustical science as well. He was first to present the idea, confirmed by later research, that the elongation of a wire or rod varies with the tension in a fixed ratio. This ratio is now known as the *modulus of elasticity* or *Young's modulus*. Young's modulus is used in calculations for inharmonicity.

Young designed the first device capable of recording sound waves. This apparatus had the sound source in contact with a recording stylus which made a helical trace on a rotating cylinder.

Recent History Of The Vallotti-Young Temperament

Barbour included Young's irregular 1/6-comma temperament in his 1950 *Tuning and Temperament* but made no mention of Vallotti's work. Vallotti's earlier presentation of the same temperament became better known after republication of his 1754 book in 1966 in the original Italian and in a German translation. Since then, the irregular 1/6-comma temperament has reappeared in several books, manuals, and magazine articles on historic tuning for harpsichord or piano and in articles or letters in the *Piano Technicians Journal* by Fairchild (October 1982, page 20), Tittle (February 1983, page 10) and Jorgensen (February 1983, page 16), who provides a detailed history. This temperament, as shown by Barbour or transposed, is considered one of the better well temperaments practical for performance.

Intonation And Tuning Of The 1/6-Comma Irregular Temperament

In the transposed version of the temperament, which favors the key of C shown in the table, the six fifths composed of pairs of diatonic notes are tempered 1/6 comma, about four cents, and the remaining fifths, containing one or more sharps or flats, are pure. The divisions between pure and untempered fifths are at F and B. Musical character or effect is to a large extent influenced by the size of the major thirds. In the key of C, the most prominent major thirds FA, CE and GB are slowest beating or "mellow," only six cents wider than pure. At the other extreme in the key of $F^{\#}$, $BD^{\#}$, $F^{\#}A^{\#}$ and $C^{\#}E^{\#}$ are the fastest beating or "brightest," 22 cents wider than pure. In between are major thirds in graduated sizes and tone shading with $E^{\flat}G$ and $AC^{\#}$ the same as in equal temperament.

In Young's original pattern, intended for aural tuning using a C tuning fork to set initial pitch, the divisions between pure and tem-

pered fifths are at C and $F^{\#}/G^{\flat}$. Beginning from C, the notes F, $B^{\flat}$, $E^{\flat}$,$A^{\flat}$, $D^{\flat}$, $G^{\flat}/F^{\#}$ are tuned in a pure series. In the other direction from C, the notes G, D, A, E, B, $F^{\#}/G^{\flat}$ are tempered 1/6 comma or about four cents narrow. Starting with C_4G_3 at 1.8 b.p.s. and G_3D_4 at 1.3 b.p.s., beat rates are about twice as fast as in equal temperament but change at the same rate ascending or descending. The contiguous equally widened (10 cents) major thirds F_3A_3 and $A_3C^{\#}_4$ beat in about a 4:5 ratio, theoretical figures are 4.9 b.p.s. and 6.2 b.p.s. By setting A_3 after tuning all of the pure fifths, it serves as a guide for tempering the remaining fifths. The corresponding equally widened contiguous major thirds in the transposed temperament shown in the table are $B^{\flat}D$ and $DF^{\#}$. The articles mentioned and Jorgensen's *Tuning the Historic Temperaments* give full instructions for each version of the temperament.

1/6-COMMA IRREGULAR TEMPERAMENT

Transposed Vallotti-Young Temperament

Tempering of Intervals (¢ from Just)
Intonation (¢ from C)

Interval Tonic	$E^{\flat}$	$B^{\flat}$	F	C	G	D	A	E	B	$F^{\#}/G^{\flat}$	$C^{\#}/D^{\flat}$	$G^{\#}/A^{\flat}$
Fifth	0	0	−4	−4	−4	−4	−4	−4	0	0	0	0
Major Third	+14	+10	+6	+6	+6	+10	+14	+18	+22	+22	+22	+18
Intonation	298	1000	502	0	698	196	894	392	1090	592	94	796

THE
ECLECTIC'S
NOTEBOOK

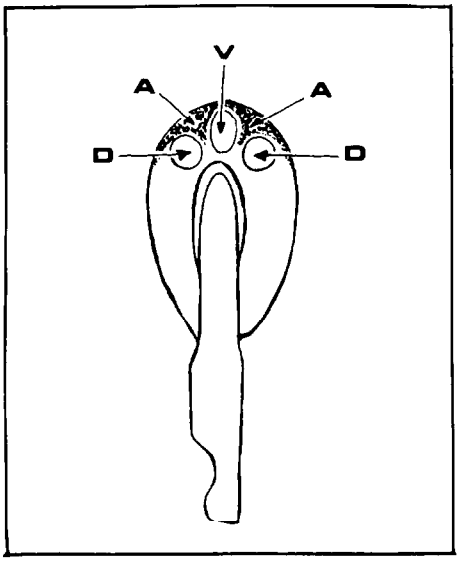
Bringing Up A Piano

Christopher S. Robinson, RTT
Connecticut Chapter

By my count, these articles have now been persisting for an entire year, and soon it will be time to move on to other vistas. Voicing is not a subject which lends itself to written dissertation. Visual columns that you have been reading really have more to say about how to *think* regarding the problems of voicing than teaching the mechanics of actually performing the work, although there is no question about the attempt of this writer to include a significant amount of concrete, tangible material.

Please proceed with caution. These processes need to be learned through application of time and manual effort. Written instructions alone cannot suffice.

How do we "bring up a piano;" that is, make it either louder or more percussive once we have exhausted the alternatives previously discussed? The first thing which must be done is expressed in our opening question: that is, are we talking about only volume, only attack or possibly both?



To increase attack, which is to say the percussiveness or initiation of the sound, softness in hammer areas A (article 11) must be reduced. There are three methods of achieving this end. First, and most well-known, is to carefully file the outer layers of felt off the hammers, revealing higher-tension inner layers underneath. The operation requires skill and care and should be finished with a grit concentration of no less than 180 pieces per square inch (some fine technicians insist on 280 grit). The second approach is to use a heated brass iron to steam and shrink the felt around its core, thereby creating more surface tension and harder outer layers. The third approach is to use an acetone-based mixture to congeal and harden the outside

"This method requires the introduction of the lacquer product through the outer layers of the hammer in area(s) A of the shoulder. Although volume increases can be obtained in this manner, the percussiveness of attack usually also increases, sometimes to a disturbing degree."

layers of felt without significantly affecting the core of the hammer. All of these methods will perceptibly alter the nature of the attack figure in the modern piano, along with possibly increasing the volume, depending on how extensively each technique was exercised.

Aside from the use of the long single needle, as we have already read, there are really only two methods for increasing volume, one of them yielding the advantage of not disturbing the balance of the other components of the subject piano tone, and the other being used at the expense of decay length.

I'm not sure exactly where this technique originated, but I learned of it through that fine technician and mentor to so many of us, Cliff Geers. Like many operational methods, this one must be mastered, not just understood. A small amount of nitrocellulose lacquer, in the reduction of about eight parts thinner to one part product, may be introduced into area V of the hammer through the side using an eye-dropper or other appropriate device. It is very important that the solution not be allowed to bleed up into the striking point of the hammer. The beauty of this method is that it will actually yield an undeniable increase in net volume without disturbing the nature of the attack or of the decay.

There also is another very well-known method of increasing volume using lacquer. The problem with this older method is that it does disturb the attack and decay characteristics of the subject piano tone. This method requires the introduction of the lacquer product through the outer layers of the hammer in area(s) A of the shoulder. Although volume increases can be obtained in this manner, the percussiveness of attack usually also increases, sometimes to a disturbing degree. Most often, however, there is a significant *decrease* in the length of decay when the lacquer product is applied into the shoulders. The note is louder, but the volume is paid for with the ability of the sound to sustain.

Let me ask two questions: one, is it worth it? And two, referring to what we have discussed in past articles at such great length, do you understand why inserting a hardening agent into the hammers' shoulders should reduce decay length?

Please do not misunderstand. This writer uses chemicals to achieve the effects which are required. The problem is that chemicals reduce the options of the tone regulator since they alter the organic nature of the essential felt hammer. When all the "homework" is done; that is, all the shaping, forming, lightening, deep needling and finish-filling, and the tone is still not at an acceptable level of output, you can bet your socks that I will not turn up my nose at the use of chemicals. *But not until all that basic homework has been finished!* Once these agents are introduced into the hammer, the flexibility of choice for the tone regulator and piano performer is forever restricted.

There *is* an easy way to become a skilled tone regulator. What must be done is that on each and every routine tuning the technician does, he or she must pick out exactly one note that sounds especially different from the rest of the notes in the piano. Then the note must be analyzed as to exactly what it is that makes it sound different.

Last of all, the proper approach should be employed to correct the offending sound and bring it into accord with its neighbor. One note at a time, it is possible to bring one's skills up to the point that 88 of them at a sitting can be contemplated.

While we have not discussed such things as harmonics, which assuredly are a very large part of *how* an instrument sounds, perhaps we have discovered that it is the analysis of the problem that gives us the answers we need to succeed at our job. If the note is weak in its sixth partial, the remedy will be either to restore the harmonic to the offending sound, or to remove the sixth partial from the neighboring notes. My own reluctance to deal with the question of tone regulation from the overtone approach arises from my complete inability to analyze what, specifically, must be done to a piano hammer to control the characteristics of any given harmonic.

Next month we will examine some unusual tuning hammer techniques which confront ordinary tuning dilemmae.

Whipping Wippens Into Shape

Priscilla And Joel Rappaport
Austin, Texas, Chapter

Sometimes, during an action restoration, the original set of wippens can be used. When deciding whether to use the old wippens or install a new set, consider the following factors:

1. Is the wood too brittle? Does the wood hold the adjustment screws (for the jack and repetition lever) tightly, or will they turn loosely in old wood? If flange repinning is needed, perhaps the wood is not sound enough to hold your new, larger-sized center pins.

2. If many of the other action parts are to be replaced, do the old wippens present a clean, neat appearance to match the new parts? Are the old wippens nicely machined? Are they too dirty to clean up? Have they been smeared with graphite grease? Have chemical applications rendered the wood unsound, unsightly and impossible to work with?

3. Have moths gotten into the small pieces of felt throughout the wippens? Are many of the repetition springs brittle and broken? These can be very time-consuming to replace.

4. In what shape are the major felt and buckskin pieces? Through the years, the drop screw can dig a substantial hole in the felt or buckskin at the end of the repetition lever. The capstan does the same at the saddle felt, resulting in friction that will not be noticed.

Luckily, fixing up the items mentioned in paragraph four above is all that is needed many times to restore a set of wippens to practically like-new condition. Procedures for doing this are what we will discuss this month.

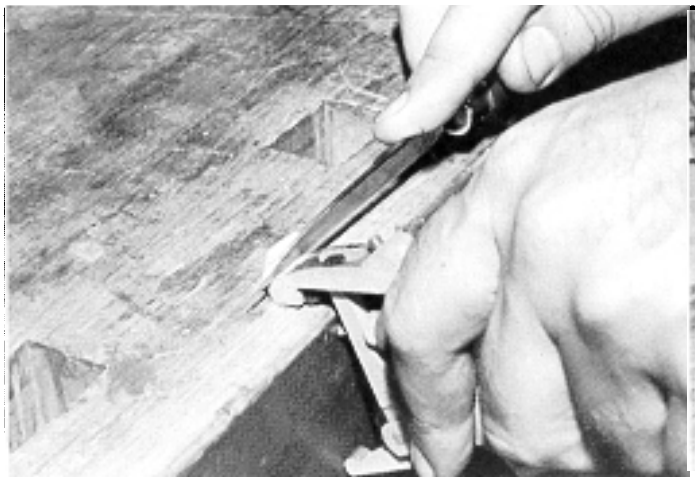
Our discussion will involve the two areas where larger pieces of felt are on the wippen: the drop screw area on the end of the repetition lever and the saddle area where the capstan contact is made. Some technicians use wallpaper remover to remove the old cloth, although we have never had very good luck with this method; it always seems to take many applications of solution and turns out for us to be slower than simply cutting away the felt. In addition, often (although not in this case) there is another small piece of felt underneath the saddle felt. There is nothing wrong with retaining this original piece if it is in good shape. Wallpaper remover would also separate this piece when you might want to leave it.

"Our discussion will involve the two areas where larger pieces of felt are on the wippen: the drop screw area on the end of the repetition lever and the saddle area where the capstan contact is made."

There is a variety of felt available from your favorite supply house. We like to have several types on hand in sheet form in order to match closely the original thickness. This is important in order to keep the regulation somewhere around the manufacturer's intention.

A sharp knife also is necessary for this work, as you will see. Razor blades are somewhat awkward to use in some of the cutting-apart operations. The glue we use is hot hide glue. It sets up quickly and we spend a minimum of time gluing the new felt to the wippens.

The following pictures cover the procedures for replacing the major felt pieces in the wippen.



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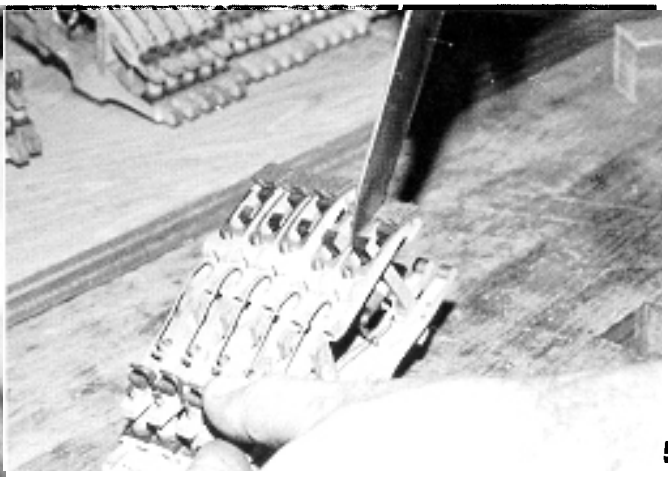

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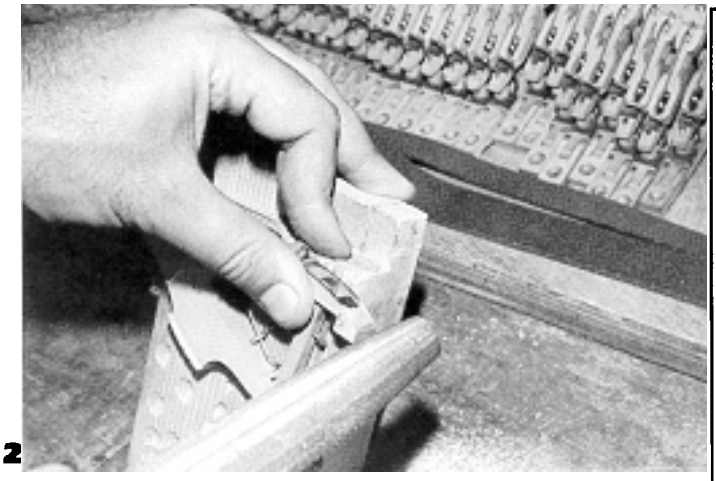

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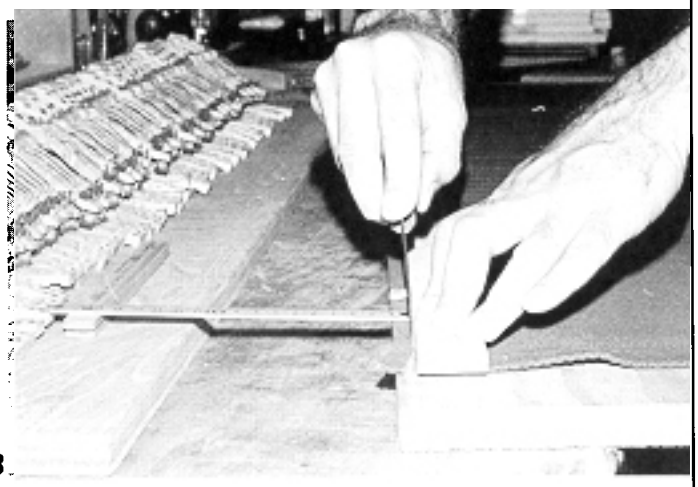

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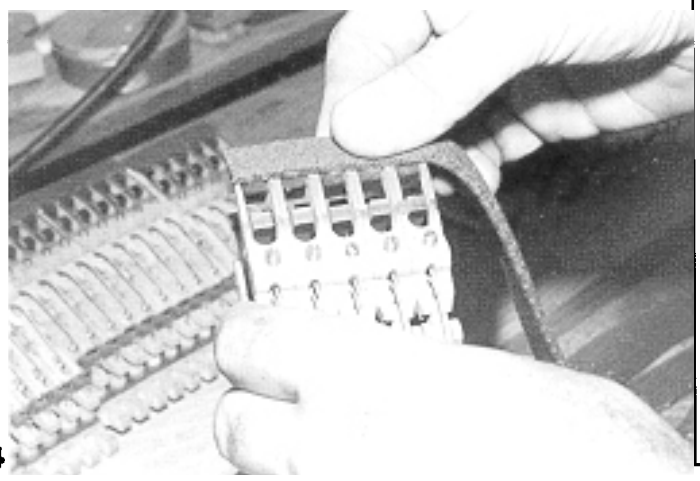

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1. *Cut away the felt at the end of the repetition lever.*

2. *Use some sort of support and clean that area with a file. Be careful with the file so that the surface remains flat across and does not fall off at the sides due to rocking the file as you work.*

3. *Using an original piece of felt (seen here behind the measuring stick) as an example, cut strips of felt in the appropriate width. The color of the felt really does not matter just as long as it is the same on all the wippens.*

4. *Take a handful of wippens and glue the new felt onto the clean surface. Cut the strip cleanly at the end of the last wippen of this group.*

5. *When several groups have been refelted, go back to the first groups on which the glue has dried. A sharp knife will easily slice apart the wippens in no time at all.*

6. *At the saddle, it is very important to get replacement felt that matches the thickness of the original. Again, color does not matter.*

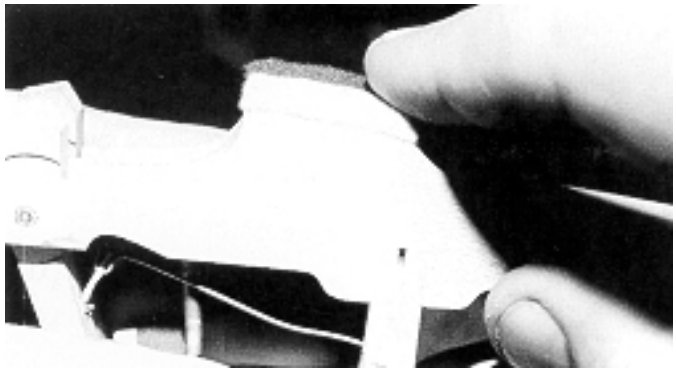
7. *Cut away the old felt. Here, you have to be careful of a small cushioning piece of felt that may be under the saddle felt.*

8. *At the saddle, you will notice that the felt is glued only at the ends. There is no glue under the spot where the capstan contacts the wippen, unless it is covered by the previously mentioned cushion felt. Clean the old glue off after noting how wide the glue will be spread at the ends.*

9. *This is how clean the wood should be. Old felt and glue left here may prevent a good glue joint between new felt and wood.*

10. *Glue the new felt onto the wippens, grabbing several at a time. When you are going to repin the wippens anyway, it is most helpful to have removed the flanges beforehand. In this way, the wippens fit closely together and the felt can be cleanly cut.*

11. *With one smooth motion, the wippens are cut apart. If more than one slice is needed, it means your knife is not sharp enough and may result in ragged edges.*



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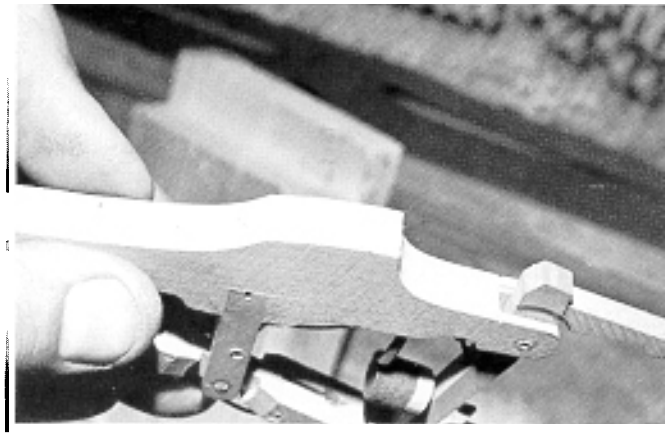

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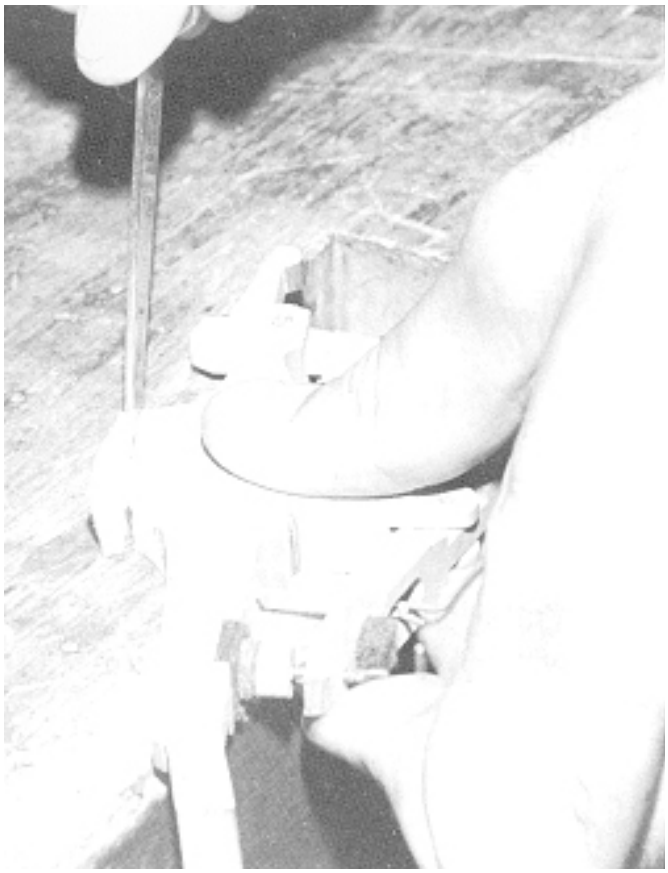

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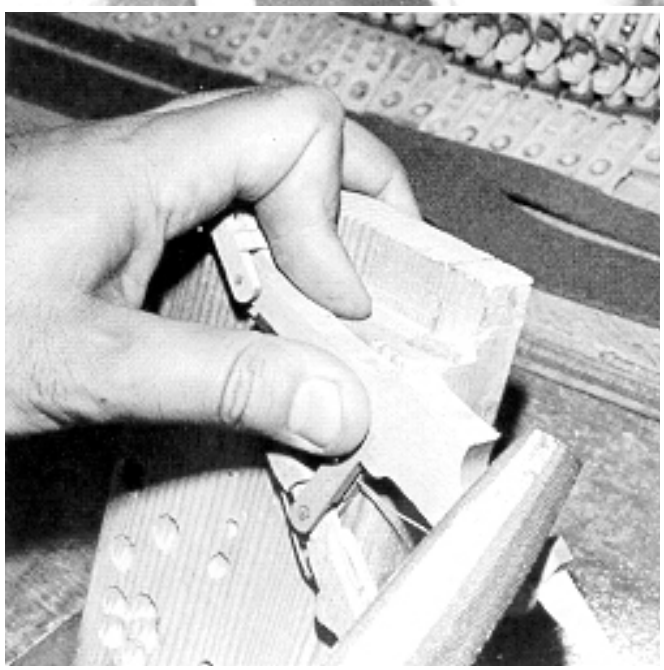

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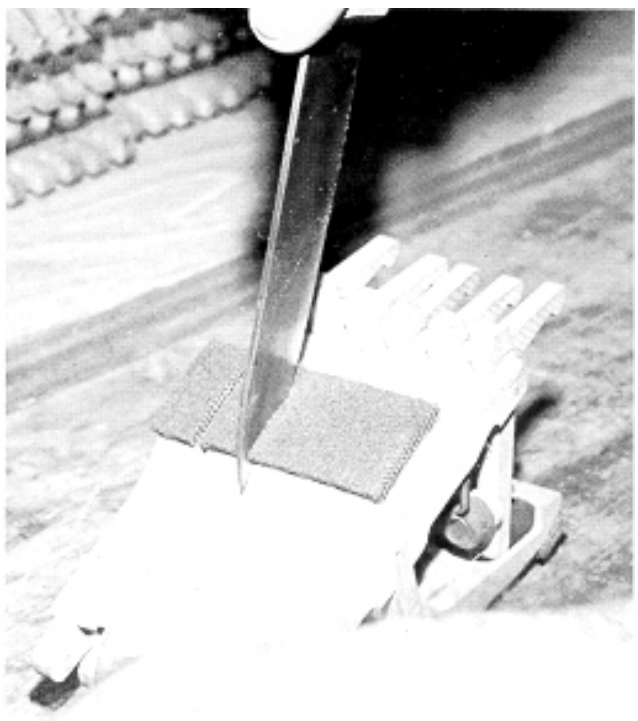

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Hammers And Music

Ari Isaac
Toronto Chapter

Last month I suggested that in order to understand and to produce musical piano tone, it is essential that we apply to it the standards by which art, particularly 19th-century art, is judged. This month we'll begin examining these standards in some detail as well as their relationship to piano tone and to piano hammers.

The first standard by which a work of art is judged is its integrity. According to the dictionary, integrity means wholeness, soundness, honesty. When applied to art, integrity is that quality by which it is easily recognizeable as genuine — genuine in style and genuine in content. A great artist — Mozart, Picasso or Rubinstein — has something to convey which finds an immediate and a ready echo in the viewer's or in the listener's heart and mind.

How does all this relate to the piano? In order to possess musical integrity, the primary, most powerful constituent of the piano tone must be its fundamental. It is by its fundamental that piano tone is known to both composer and tuner. Partials have their place and we shall analyze them in a later segment, but it is the fundamental which gives body to the tone. The fundamental is the most difficult tonal constituent for a piano hammer to produce, hence the extreme brightness or dullness of the majority of hammers made today. A piano whose tone is not dominated by fundamental lacks musical honesty and no music played on such an instrument can hope to possess integrity regardless of the artist's efforts.

There are two more facets to the musical integrity of the piano: the piano's entire history can be seen as an attempt to increase the number and intensity of sound waves emanating from the soundboard while decreasing hammer impact noise. It follows that a very slow decay rate and the preservation or the constancy of the tonal spectrum throughout the life of the note are as essential to the integrity of a musical piano tone as the dominating fundamental. These are complex qualities. We can never hope to attain them by using a hammer built to one specification; hard, medium hard, or soft. If we add to the above requirements the volume range we expect the hammer to produce with relative ease, we have reached a rare degree of complexity. To speak of hardness or softness in hammers is to miss the point entirely. A cannon ball is hard, a ball of cotton batting is soft. Mix the two in any proportion you like, cut them into the shape of a piano hammer and you'll get no tone at all.

A hammer works by having an inner core of highly compressed felt surrounded by outer felt tension. The equilibrium between the inner core and the outer layers of felt under tension determines the mix of fundamental and partials. In other words, the hammer has a compression spring built into it. Hardness and stiffness or hardeners and stiffeners are the enemies of musical tone. What is needed is tension over compression, producing firmness and rebound. Next month we'll take a look at the second standard — profundity.

It's The Little Things That Count!

Gerald F. Foye
San Diego Chapter

My Sight-O-Tuner fell out of the case and bounded down a flight of stairs, coming to rest in a fish pond in the entryway. I suspected it needed recalibration after that.

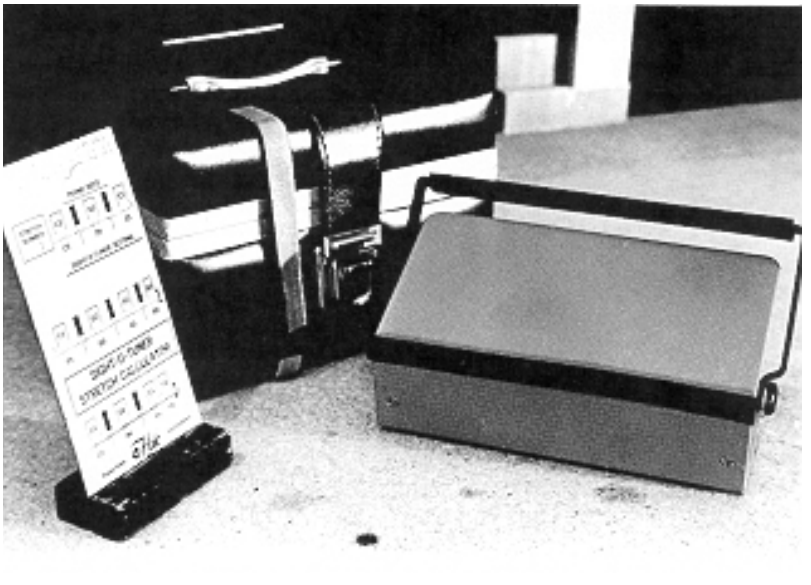
As if that wasn't enough, after tuning an upright console, I noted blue streaks along the lily-white wall above the piano where I had been working. On top of that, the Sight-O-Tuner Stretch Calculator kept falling off the piano.

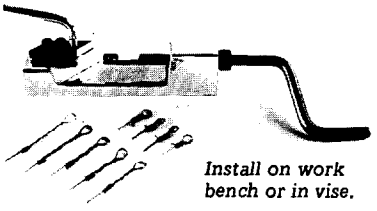
As shown in the photo, all of these little quirks were taken care of. The case no longer comes open since a couple of strips of velcro glued to the case with contact cement prevent accidental opening.

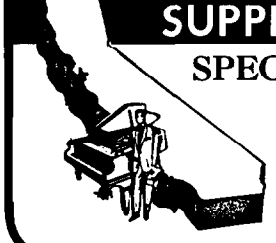
A strip of felt, also glued with contact cement across the rear edge of the strobe, eliminated the blue streaks left by sliding the S.O.T. along the top of the piano while, at the same time, up against the wall of the room.

And, lastly, the falling chart is no longer a problem due to that little block of wood with a saw cut running through it.

Hooray! For a change, we have some modifications we can perform ourselves and, best of all, they don't cost much!







Each One Reach One

Membership Is Everybody's Business

M.B. Hawkins
Vice President

For the past couple of years, the theme "Membership Is Everybody's Business" and the later variation on that theme, "Each One Reach One," have been particularly significant because indeed, membership is *everybody's business.*

For the next few minutes, let's focus on those 150-odd members who, between June of '83 and the end of May '84, did sponsor at least one new member. Please take a moment and look back in the July issue on page 29. These folks took the challenge of "Each One Reach One" to heart and did just that. A big round of applause is due each of you; you deserve it, and we thank you.

To help these new members develop into strong, quality piano persons is an additional challenge. I invite all who know these new people to join in and accept this challenge. That is the Piano Technicians Guild way. To help those not as experienced as we may be to gain additional know-how is a tremendously rewarding feeling. It really cannot be put into words, but the inner satisfaction is just great. We must never forget—had it not been for someone helping us, where would we be today?

So, I ask you to willingly accept the challenge and lend that helping hand. You may discover, as most do, that the teacher often learns more than the student.

New Members

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Anderson, Marshall C.
80 Chandler St.
Boston, MA 02116

Peckham, Russell H.
621 Massachusetts Ave., Apt. 3
Boston, MA 02118

Rosenberg, Barry L.
41 Boylston
Jamaica Plain, MA 02130

Roy, Thomas E.
8 Dongay Road
Smithfield, RI 02917

Slucker, Kevin D.
115 Browne St., Apt. 3
Boston, MA 02146

Williams, Jonathan P.
117 Causeway,
Boston, MA 02114

Cleveland Chapter
Lassiter, Warren D.
Apt. 6, Box 252
Berlin, OH 44610

Columbus Chapter
West, Sandy J.
1902 N. Hulmac
Columbus, OH 43229

Daytona Beach Chapter
Soehlman, Stanley C.
296 Eddie Ave.
Holly Hill, FL 32017

Montreal Chapter
Daoust, Marc-Andre
5435 Milan
Brossard, Que., Can. J4Z 2A7

Dumas, Martin M.D.
601 Des Bouleaux
St. Louis Pintendre, Que., Can G0R 2K0

Losier, Gilles J.
3582 Ste. Famille
Montreal, Que., Can. H2X 2L1

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1851 Carino la Canacla
Santa Fe, NM 87501

Secord, David K.
Box 1123
Santa Fe, NM 87501

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3951 Briarwood Dr., S.E.
Port Orchard, WA 98366

South Dakota Chapter
Rogers, Scott J.
3231 So. Lake
Sioux Falls, SD 57105

Toronto Chapter
Walmsley, James O.
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Beaverton, Ont., Can. L0K 1A0

Allied Tradesman

Baltimore Chapter
St. Charles, Debra L.
15685 Old Frederick Rd.
Woodbine, MD 21797

Apprentice

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110 Brainerd St.
Allston, MA 02134

Otten, Richard W.
3 Lampson St., Apt. 1
East Boston, MA 02128

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329 Reamer Place
Oberlin, OH 44074

Slater, Kenneth C.
2447 Lee Rd.
Cleveland, OH 44118

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Corsicana, TX 75110

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312 Cherry Blossom
Gretna, LA 70053

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Herndon, VA 22071

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Mountain City, TN 37683

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Bourbon, MO 65441

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Berkely, CA 94704

Rhyne, Richard L.
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Oakland, CA 94610

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Affiliate

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No. 37, Jalak Tua
Eng Ann Estate
Klang, Selangar, Malaysia

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Vincent, Alan K.

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Gustafson, H. Leonard Jr.

Northeast Florida Chapter
Humbert, Vernon J.
Lykins, Donald L.

Puget Sound Chapter
Massey, Neil F.

Vancouver, B.C. Chapter
Lavoie, Suzanne

Associate

Central Iowa Chapter
Buss, Wilbur O.

Member Recruitment Points
June 1, 1984 — July 1, 1984

	Pts.	Mbrs.		Pts.	Mbrs.
Bessette, Roland	5	1	Lillico, John E.	2	2
Betts, David C.	4	1	Lovgren, Christine	25	6
Blees, Willem	4	1	Matley, Wayne O	6	2
Bryant, Ken L.	5	1	Metz, J.A.	4	1
Callahan, James J.	4	1	Pagano, Joseph L.	4	1
Doss, Harry W.	4	1	Palm, Stanley S.	1	1
Geiger, James B.	1	1	Pearson, Walter T.	5	1
Godfriaux, Stan R.	1	1	Pierce, James C.	4	1
Graham, Susan E.	4	1	Schoppert, Robert L.	5	1
Grossman, Matt	1	1	Sierota, Walt	1	1
Harmon, Clayton C.	1	1	Sloan, Kenneth A.	4	1
Hitt, Henry L. Jr.	4	1	West, Richard E.	1	1
Jackson, Stephen S.	1	1	Wisenbaker, Martin G.	1	1
Jorgenson, Les O.	1	1	Yonley, Fred T. Jr.	4	1
Leary, Kevin M.	5	1			

The Auxiliary Exchange

What A Time It Was!

Our July 1984 Piano Technicians Guild Convention is over! What a great one it was! It was a delight to meet so many of you for the first time. I know you had a good time and I know you enjoyed the Auxiliary program.

Next month we will bring you a full report on the convention. We do that to bring back memories for you who were there and, for those who could not attend, we want to share some of the inspiration. We know that everyone cannot be at every convention, every seminar, every year. In fact, there were some familiar faces missing this year. Therefore, it is our joy to bring you a complete report of everything that happened. Well, maybe not everything, but as much as we can.

We want to encourage you to start saving now for our convention next year in Kansas City, Mo. Dick and I were there for the mid-winter board meeting and it is a wonderful city for a convention. The hotel is very new and beautiful. The rooms were lovely. We will have a super program ready for you. And by the way, there is a beautiful outdoors swimming pool at the hotel. We have already started planning for next year. We hope you will do the same.

The convention next year will be an international one. We will have technicians and spouses with us from various countries. There will be more information on these details in the coming months.

The convention is always a real "lift" to both Dick and me. We look forward to it with great anticipation. Every day of the convention is an exciting one. We'll be looking for you — July of 1985!

Belva Flegle, President
PTG Auxiliary

New Editor For Auxiliary Exchange

As your Auxiliary president, it is my privilege to fill in as "editor" for this month. Beginning next month, Ginger (Mrs. James) Bryant of the Sacramento, Calif., Chapter will be our new editor. Ginger needs your help! The Auxiliary Board needs your help! What would you like to see in the Auxiliary section of the *Journal*? This month we are going to include a "special feature" article on "Getting In Tune With Yourself On Color." Let us know if you like it. Would you like more things like this? Do you have an area of talent that would be of interest to our readers? Please write to me or to Ginger, and let us know your thoughts.

We are anxious to make this a page you will want to find and read as soon as the *Journal* comes to your home. We would like to include your name, your chapter and articles from you! We will try to bring you exciting and interesting reading, just for spouses. It could be so interesting that even some of our technicians might enjoy it. We have some exciting topics coming up, so we hope you will let us know your thoughts on our varied format.

A Fascinating Aspect Of Technicians And Spouses

One of the most fascinating aspects of us as individuals is that we are just that — individuals. Each of us is made with our own special "built in" gifts, talents, personalities and even habits! Can you think of anything more boring than everyone being just alike?

We all continually glean from others and work to improve ourselves, but when it comes right down to it, we each have our individual way of handling our business, taking care of our records, keeping our homes and sharing our lives. Some of us are very people-oriented and love being where people are. Dick and I certainly fit in that category. It has been our "bringing up." Some people would much rather be alone. Some love to travel — others can't stand to travel, but would much rather be at home. Everyone I have met from New Orleans loves crawfish! I tried my best to eat those little things — Ginger Bryant even tried to teach me how to get the "good eating" out of them. But somehow, I just can't handle those little red fish!

Whatever or whoever we are — whatever we enjoy doing or not doing — whatever we like or don't like to eat, we still can be beautiful and happy people. That need not change our individuality. I'm sure glad for that! So we work hard to make the most of the way we are. As I feel good about myself, my life

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will radiate to others. There are enough "negatives" around today. However, *it can be and is a willful choice* to be a happy, radiant, fun person. There is no substitute for sharing love, goodness, joy and kindness in our social lives or in our business — and it's fun to do it. The rewards are great! It takes work. Living and working with people takes work and practice. Haven't you noticed that the things you really work hard for are the things you enjoy most? Of course! let's put on a "drive" to be the happiest people in the Guild, in our places of business or in our social lives. *You will love the rewards!*

Get In Tune With Yourself Through Color

Most of a piano technician's professional time is spent reconciling pitch in order to bring a piano into harmony with itself. When this is accomplished, the overall effect is aurally satisfying. The hearer is pleased, and the technician is pleased, knowing that the piano is the best it can be. Similarly, a person can be brought into his or her own optimum visual harmony through the proper use of *color.*

Every piano dictates its own tuning. As a qualified technician reconciles a piano to its needs, a trained color analyst helps you find the colors which will put you visually in tune with yourself. Color analysis is the service which is revolutionizing the way people shop and dress today. It is not a mysterious process, but a logical, common-sense approach to dressing that allows color to work for you. Everyone's personal coloration places them in one of four categories: winter, summer, spring or autumn. These terms do not refer to times of the year, but rather to four distinct ranges of colors. A color consultation shows which of these ranges is best for you. Wearing the right colors can have a dramatic, positive effect on your appearance and who doesn't want to look his or her best?

Learning your "season" and how to use your most flattering range of colors can put you on the track to building the fully-coordinated wardrobe you've always wanted. Consider that color is the only no-cost item on a piece of apparel. The average person has between $2,000 and $5,000 hanging in his or her closet. You deserve to have every penny of that investment working for you.

Everyone has an individual set of personal color characteristics. Of these, the undertone color of the skin is the most important. You will be most flattered when you wear colors that repeat the undertone and intensity factors of your skin. Lines, shadows and facial flaws will be minimized. Your skin tone will look smooth with a lively, healthy glow. Your eyes will appear brighter and your hair will look shinier. Your jawline will be more distinct, making you look thinner and younger. When you are wearing your best colors you will be noticed... and to your best advantage. *You* become the focal point, not your clothes. You present an overall, harmonious picture.

Think for a moment: have you ever known a salesman with a "lucky suit?" In all probability, the fabric was in a color complementary to his personal coloring, making him appear more confident, authoritative, and even taller. Consequently, he makes more sales! Even though he may not realize how color has aided him, he correctly makes the connection to that one special suit.

What happens when you wear colors that do not repeat your color palette? It will be just the opposite. Your skin may look sickly, with a sallow cast. You may appear blotchy, tired and older. Your face may take on a harsh, hard look and your jawline can become indistinct, creating the illusion of weakness and added pounds. Who needs it? Have you ever experienced a day when you felt fine, just fine, but everyone asked you if you were sick or tired? The culprit probably was color! Worse than this, wearing a wrong color can cause your face to fade into the background and you can be overlooked — a needless handicap.

All of us have seen people who were perfectly color coordinated. Without even being aware of the reason, we admire their look and are comfortable with their appearance. The opposite is also true, as we can be uncomfortable with a person dressed in their incorrect colors. Their wardrobe color clashes with their skin, eye and hair color. This dissonance affects our reaction to them in a very negative way. Studies have shown that a person's first impression is formed within the first four minutes of meeting you. This subconscious impression is seldom altered, even if found to be in error. The greatest part of that first impression is based on your appearance, making color an important factor in the success of your business, professional and social contacts.

Your color consultation will individualize and personalize your look, leading you to your own statement of style. You may wonder if you can read a book or article and figure out your "season" and understand your best range of colors. At best, you have a 50 percent chance of choosing your season correctly. Understanding your colors is another story. Paying the fee of a certified color analyst is a one-time cost as your season will never change. Suntans, burns, even gray hair make no difference. Your skin undertone color remains forever the same. The same colors always will look best on you.

Color consultation takes from one and a half to two hours. As you watch in a mirror, you will see how different colors affect your appearance, guided by your analyst's trained eye. You will learn how to build a wardrobe around your best colors and how to properly use the packet of fabric swatches you will be given. Women will learn their best cosmetic colors and techniques. You will learn to select cometics, clothing, hair color accessories and jewelry that repeat and reflect your natural coloring, bringing a total harmony to your appearance. You will find that, rather than being limited, you may wear nearly every color of the rainbow (in your shades and intensitites, of course!). You also will learn what colors to avoid, and after a transitional period of one to two years, even your knockabout clothes will be in your most flattering colors!

Within each of us lies the secret of a better appearance. Brighten your image by making a color consultation your next wardrobe investment. Realize how attractive you can be when you get in tune with yourself through color!

Helena L. Thomas
Certified Color Analyst
With Je'riel, Inc.

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