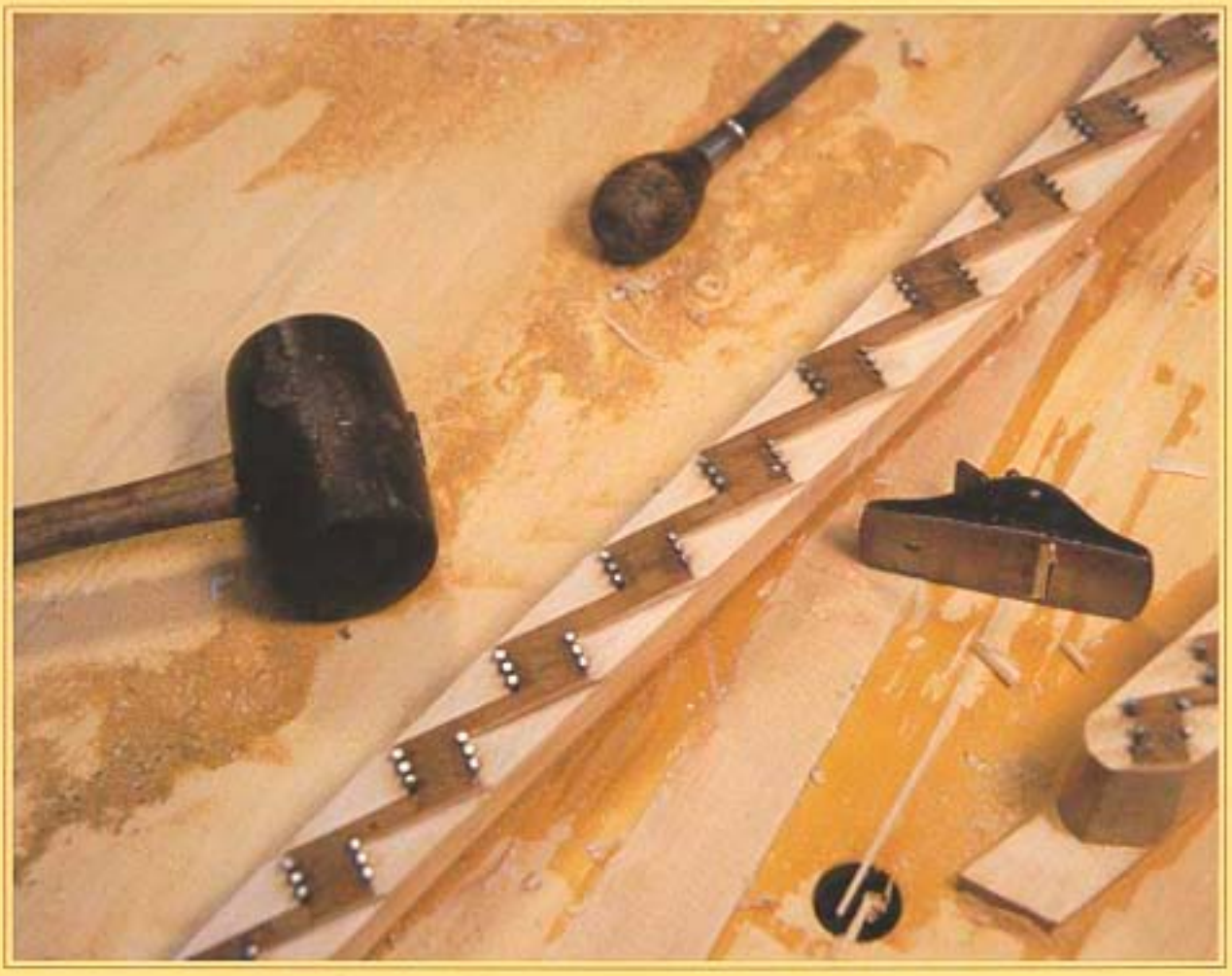
PIANO TECHNICIANS
Journal
JUNE 1990



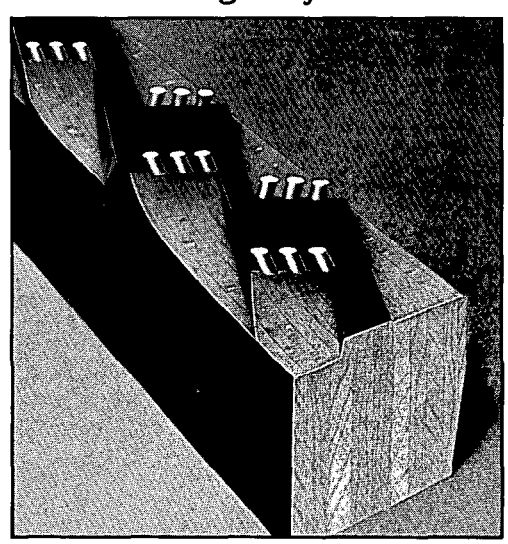
The Baldwin Piano...
You can see why it sounds better

The bridge is a critical component of the tone-producing system. It must precisely terminate the speaking length of the strings, and it must transmit vibration efficiently to the soundboard. In addition, it must be extremely strong to withstand the force of sidebearing and to resist splitting.

Traditionally, bridges have been capped so that they can be notched easily and the height altered for downbearing by planing. Our patented AcuJust™ plate suspension and hitch pin design gives us complete accuracy in setting downbearing, so we no longer need to plane our bridges down after installation. And we now notch all bridges by machine to gain increased precision and consistency.

In addition, our research showed that eliminating the capping, in combination with the above changes, gave us a definite improvement in tone. We gained maximum tone quality, greater efficiency in transmission of vibration, and improved reliability. At the same time we eliminated problems previously associated with capping: (1) occasional loose capping, (2) checking and splitting of the cap, (3) grain direction which was not always parallel to the line of the bridge, and (4) the potential tone barrier of a horizontal glue joint in the bridge.

THE BALDWIN GRAND BRIDGE: Thin vertical laminations are bent for continuity of grain from one end of the bridge to the other without horizontal glue joints. Baldwin researchers have found this design contributes significantly to outstanding tone quality.



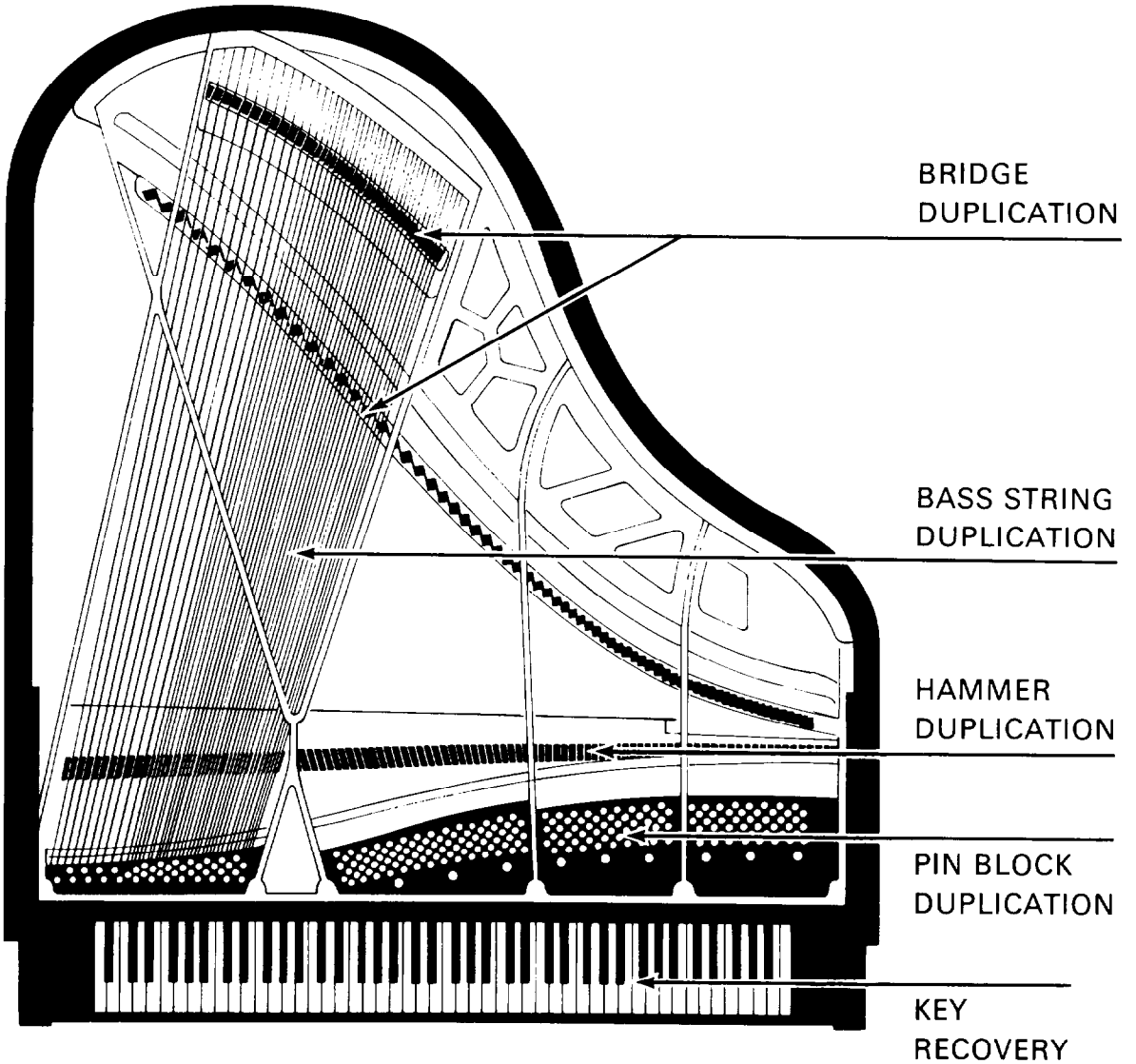
Third in a series of informative ads on piano tone published by Baldwin Piano & Organ Company exclusively for the benefit of piano technicians.

Baldwin® – *Leading the way through research*

For more information contact Kent Webb, Technical Service Manager; for parts contact Linda Gann, Baldwin Piano & Organ Company, Highway 63 South, Trumann, AR 72472 — Phone: (501) 483-6116

TOTAL DUPLICATION BY SCHAFF

The only all-service company remaining in the piano industry today! All duplications controlled by the company that **CARES**! Trust Schaff with all of your replacement needs



OTHER SCHAFF DUPLICATION SERVICES...

1. PIANO AND ORGAN COVERS
2. UNIVERSAL BASS STRINGS
3. SQUARE GRAND HAMMERS
4. BRASS FLANGE RAILS
5. QUALITY QUEEN BENCH COVERS
6. "PERFORMER" BENCH CUSHIONS

THE HOUSE DEDICATED TO SERVICE

Schaff **PIANO SUPPLY COMPANY**

451 OAKWOOD ROAD,
LAKE ZURICH, IL 60047-1516

24 Hour Hot-Line
Reg. (708) 438-4556
T-Free (800) 326-0341
Fax (708) 438-4615

PIANO TECHNICIANS
Journal

JUNE 1990 — VOLUME 33, NUMBER 6 OFFICIAL PUBLICATION OF THE PIANO TECHNICIANS GUILD, INC.

The Piano Technicians Journal (ISSN 0031 9562) is the offical publication of The Piano Technicians Guild, Inc., 4510 Belleview, Suite 100, Kansas City, MO 64111. The *Journal* is published monthly. Second class postage paid at Kansas City, MO., US ISSN 0031 9562 foreign and domestic. POSTMASTER: please send address changes to: *Piano Technicians Journal*, 4510 Belleview, Suite 100, Kansas City, MO 64111.

Annual subscription price: $85 (US) for one year; $155 (US) for two years; $7.50 (US) per single copy. Piano Technicians Guild members receive the *Piano Technicians Journal* for $45 per year as part of their membership dues.

President's Message

Convention Draws Near

Ronald L. Berry, RTT
President

At this time of year we are preparing for our annual convention. This year it is in Dallas, Texas. The convention is the focal point of the year for PTG. The Board and Council meetings are the political and organizational part of the convention. Policies which affect the whole organization are made in these meetings. The social functions give us a chance to renew friendships with other technicians. The exhibit hall gives us a chance to meet manufacturers and suppliers and look at their wares before buying. The Auxiliary program presents things of interest to our spouses and includes business classes since many spouses run the operational side of our businesses. Obviously, the most important part to most technicians is the technical institute. Institute Director Dick Bittinger has put together a huge selection of classes on every subject imaginable. Plan to come take advantage of the best minds in the industry. Why not take advantage of others' experience to help you do jobs more efficiently and to avoid costly mistakes? All of the instructors volunteer their time to make this convention happen and that is why it can be offered at such a reasonable price.

The spring seminars are now finished, and I want to thank those who organized them for providing further opportunities for people to upgrade their skills. At the seminar in Quebec City we were treated to a showing of the new French version of the "Unseen Artist," "L 'Artiste Meconnu." Thanks to the efforts of Roland Bessette and Jean-Marc Beauchamp, this film can now be used to promote PTG in the large French-speaking province of Quebec.

I want to thank all those who took the time to fill out the survey in April. This data will be helpful in making decisions in the future.

As a reminder, be sure to discuss the Bylaws changes in your chapter meeting and inform your delegate of your feelings. See you in Dallas.

Industry News

New President Announced At Yamaha

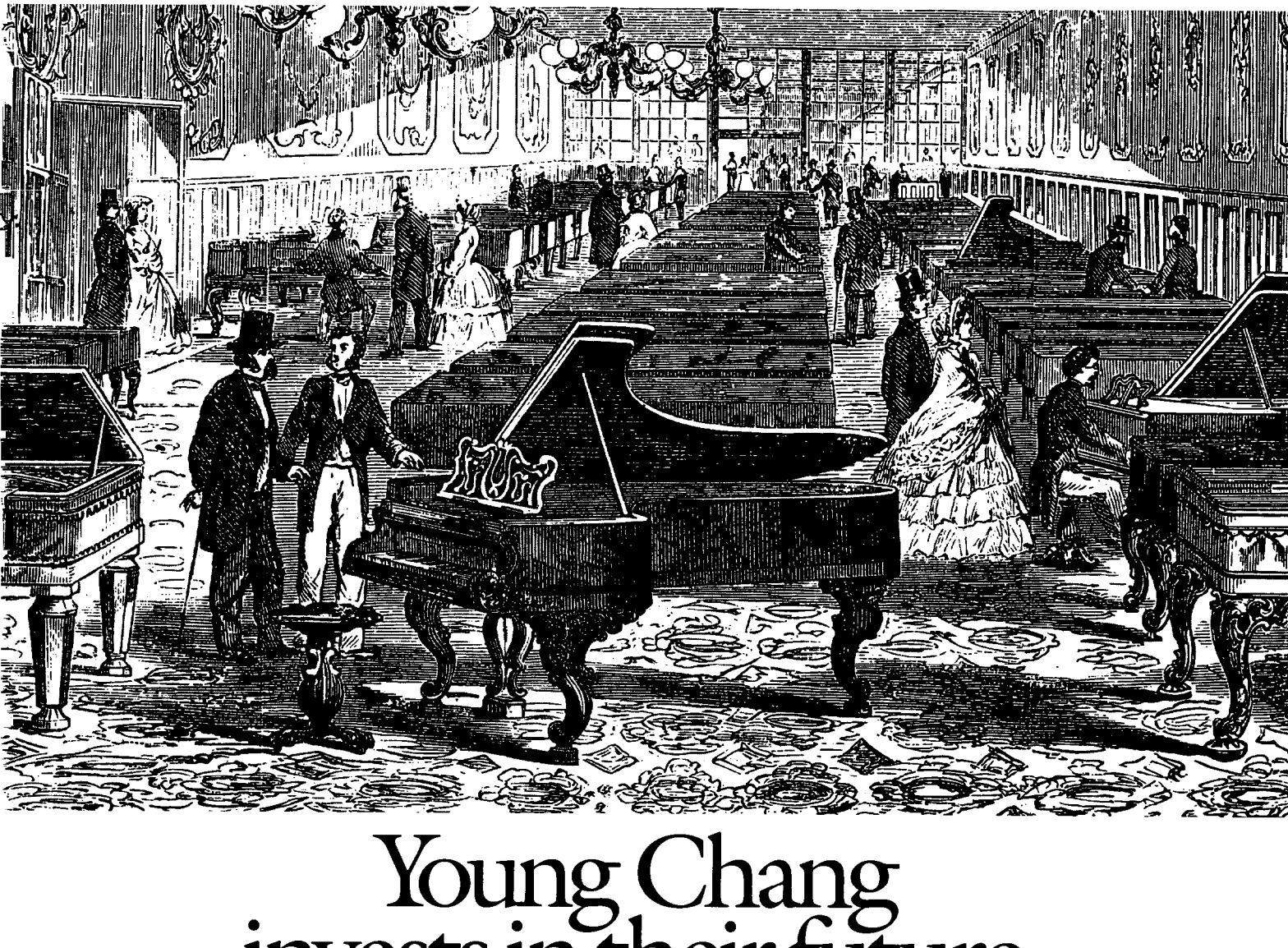
Yamaha Corporation of America announced March 23 that Peter Suzuki, currently company Executive Vice President, has been appointed President succeeding Masahiko Arimoto who is returning to Japan for a new assignment.

Suzuki had been with Yamaha International Corporation, the U.S. company that started in 1960, from 1968 to 1984, before returning to Japan as Chief of Staff, President's Office and later was appointed Executive Vice President of the Yamaha Music Foundation. He is also a Director of Yamaha Corporation (Japan). He returned to the U.S. in mid-September last year.

Suzuki

During his fifteen years in the U.S., Suzuki was Senior Vice President and member of the Board of Directors of Yamaha International Corporation. In addition to general management responsibilities, he was involved in the areas of music education, sporting goods, export, keyboard and administration.

Some manufacturers ask your customers to invest in their past.



Young Chang invests in their future.

Some of the most "prestigious" instruments in the world are also the most expensive. At Young Chang, we don't believe a piano's value is limited to the number on its price tag or its place in history.

History isn't restricted to what has happened on the stages of the most famous concert halls in the world. Because history is being made right now in the homes and studios of the people you see everyday. It's the discovery of the joy of music that inspires us to create instruments of extraordinary beauty and remarkable performance. And it's a deep love and commitment to music that requires us to make carefully crafted instruments available at reasonable cost to anyone who shares this love.

We believe the instrument that's most appreciated is the instrument that's most played. And as one of the most popular imported pianos, the value of Young Chang pianos appreciates like few other instruments.

For technical information, call or write Alan Vincent at Young Chang America, 13336 Alondra Blvd., Cerritos, CA 90701, (213) 926-3200.

YOUNG CHANG

The best the world has to offer.™

From The Home Office

The Pie

Larry Goldsmith
Executive Director

Piano exports are up. Piano imports are down. That's the word from the American Music Conference, which conducts an annual interpretive analysis of U.S. Department of Commerce data.

"Acoustic piano exports were up 34 percent to 8,400 units and down five percent in total value to slightly more than $8 million. Vertical piano exports rose 40 percent in units and dropped eight percent in value, while exported grands were down six percent in units and up 13 percent in total value. Canada imported the largest number of units: 3,427 valued at more than $3.2 million," AMC noted in a recent press release.

Noting the continued weakness of the dollar against foreign currencies, AMC estimated a total increase of eight percent for all exports of musical instruments, parts and accessories in 1989. The total value of these exports is approximately $224.41 million. Meanwhile total imports fell 32 percent, to $632.77 million.

Acoustic pianos represent the second largest import category at $115 million, behind electronic keyboards. Unit shipments dropped 37 percent to 56,400, of which 55 percent were vertical pianos.

So what does it mean? It's not necessarily good news for anyone, even those companies that saw their market share increase in 1989. The problem is that the pie is shrinking. In 1978, total shipments of new pianos in the United States were more than double what they are today, and the downward trend is expected to continue.

How does that affect those of us who work in what might be called the piano aftermarket — tuning, maintenance, repair, rebuilding, etc.? After all, there are still a lot of pianos out there.

For one thing, we're all parts of a whole. Every segment of the piano industry — manufacturers, dealers, teachers, technicians — supports the other segments. Former President Marshall Hawkins was fond of describing the industry as a series of interconnected triangles — a triangle composed of manufacturer, dealer and technician, another composed of dealer, teacher and technician, another composed of the piano owner, teacher and technician, and so on. None of us can survive without the others. Even if we never touch a new piano, we have a stake in seeing a healthy piano industry.

For another thing, declining piano sales means that the public is losing interest in the piano. That's bad news for everyone. Increasingly, piano-industry groups are seeing the need for immediate, cooperative action to support our common bottom-line objective — helping more people to enjoy the benefits of making music, piano music.

A steadily growing body of research indicates that music plays an important role in developing both the mind and the body, and that these benefits are available to people at any age. In fact, music may even be the language of a higher consciousness. By supporting these efforts and serving as the piano's ambassadors to the public, we help ourselves both directly and indirectly.

In Dallas this summer, you'll have an opportunity to learn what the piano industry is doing to help itself and how each of us can make the pie larger. I strongly urge you to attend.

PTG's Texas Roundup

1990 Institute Class Schedule

Dick Bittinger
1990 Institute Director

Here in the following pages is the schedule of classes for the 1990 Annual Institute to be held July 7-11 at the Hyatt Regency Hotel at Reunion in Downtown Dallas. This will be the 33rd PTG Annual Convention and Institute. In last month's *Journal*, you had class descriptions and also most of the instructors' pictures, and now you have the class schedule. All you have to do is take time to plan your week of learning in the many phases of piano technology being offered at the Dallas Institute.

If you haven't sent in your convention registration, please do it soon so we can save a seat for you. You must hurry to save yourself some money, because June 4 is the cutoff date for lower rates on pre-registrations. We will want you to be in on PTG's Texas Roundup and then we can put our brand on you!

The Making Of A Continent

Thom Tomko
Dallas Chapter President

If you like photography and would love the chance to shoot pictures of the wild and exotic animals of the continent of Africa, then don't miss this year's convention in Dallas. For all you animal lovers out there, the Dallas Zoo has opened its new 25-acre exhibit called "The Wilds of Africa." Six very different habitats are recreated to provide a real-life home for more than 90 species of animals, birds and reptiles unhindered by cages and bars. Animals are free to roam in their own wild outdoors.

Dallas is the world's first zoo to focus on all the major habitats of one continent. Safari visitors can experience what Africa is like in the bush, desert, river, forest, woodlands, and mountain environments. Unique landscapes, rock work, water systems, and streams accurately replicate the natural homes of some of the world's most magnificent animals. Creating normal situations for the animals by putting them in a natural environment will hopefully prepare them for the day they can be reintroduced into the wild.

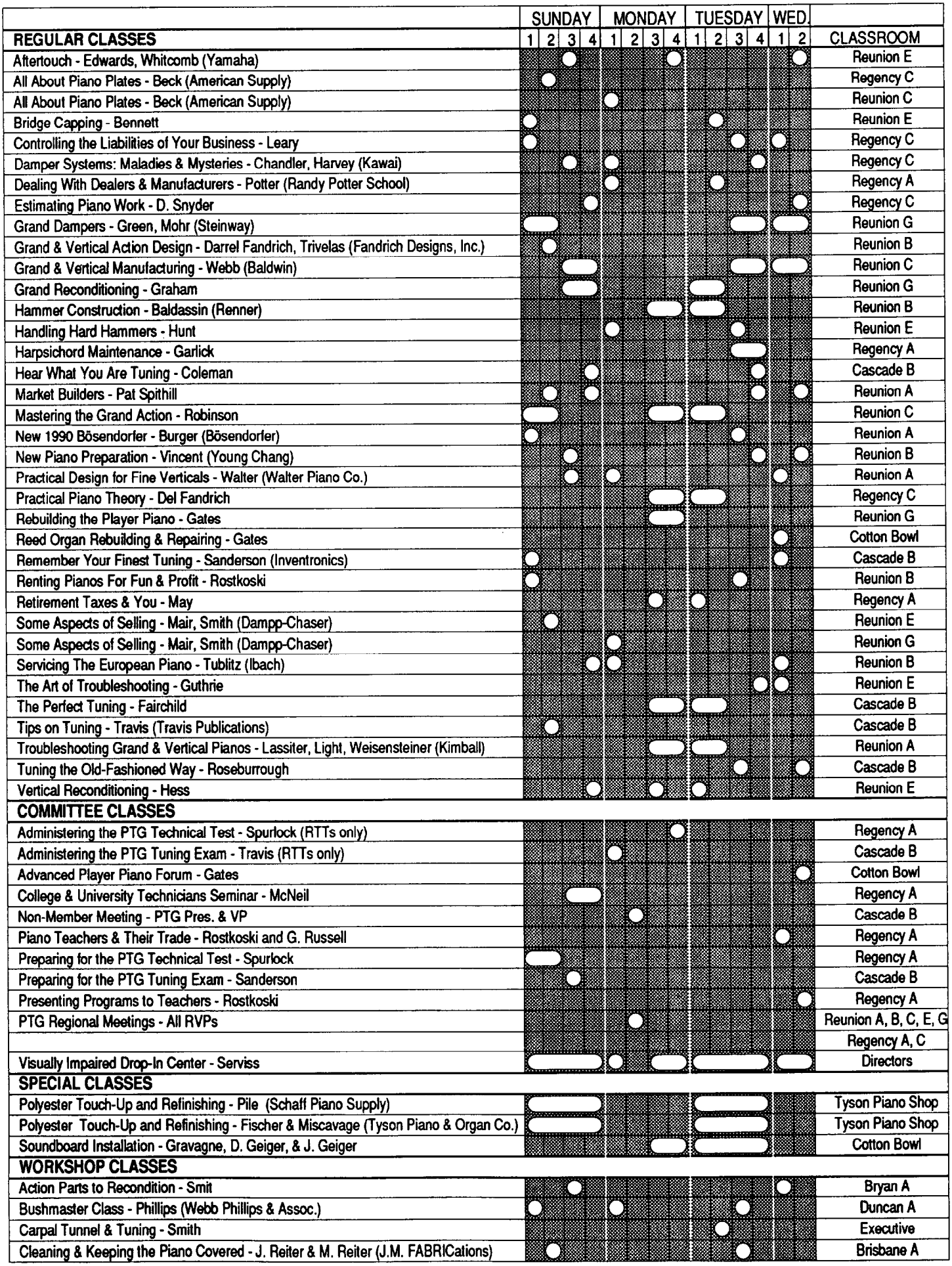
Scene from the Dallas Zoo.

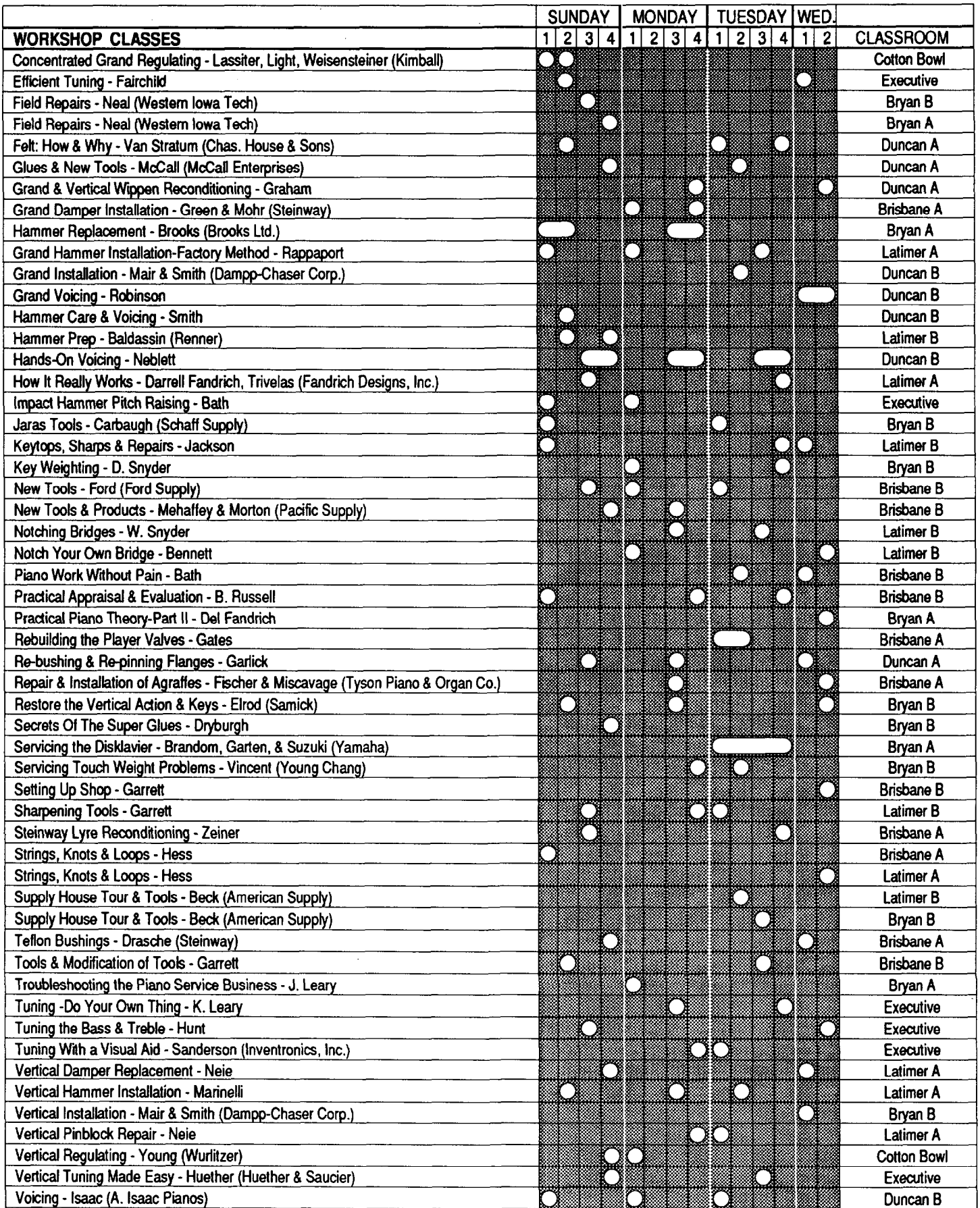
The Dallas Zoo has the first monorail in the country that is capable of climbing and descending to different levels. You can glide quietly on a three-mile per hour, 20-minute tour past the six habitats. In hopes of a new message for the 90s, Dallas Zoo officials hope to illustrate the need to not just conserve the animals, but also their environments.

Ecology deals with the importance of interrelationships between the animals, plants, environment, weather, and geology. All of these things intertwine and show how important and critical each of these components are. To describe animals in the context of their habitat is to truly describe the animal.

The Jack L. Hammond Gorilla Conservation Research Center is a two-acre reserve designed to allow the zoo's low land gorillas a place to roam freely in an environment that replicates as closely as possible their native equitorial forest habitat. The gorilla habitat is quite unusual because it sets up a situation as though the gorillas were in a research area. This allows the visitor to come into their research facility and see it from the perspective of a scientist. The visitor can use the same equipment as research scientists to learn about these wonderful animals.

These animals are important and need our respect. To preserve them we must preserve their habitats where they live. Dallas has taken their first step, and we hope you can find some time to visit our zoo.


SUNDAY
MONDAY
TUESDAY
WED.
1 2 3 4 1 2 3 4 1 2 3 4 1 2
CLASSROOM
REGULAR CLASSES
Aftertouch - Edwards, Whitcomb (Yamaha) Reunion E
All About Piano Plates - Beck (American Supply) Regency C
All About Piano Plates - Beck (American Supply) Reunion C
Bridge Capping - Bennett Reunion E
Controlling the Liabilities of Your Business - Leary Regency C
Damper Systems: Maladies & Mysteries - Chandler, Harvey (Kawai) Regency C
Dealing With Dealers & Manufacturers - Potter (Randy Potter School) Regency A
Estimating Piano Work - D. Snyder Regency C
Grand Dampers - Green, Mohr (Steinway) Reunion G
Grand & Vertical Action Design - Darrel Fandrich, Trivelas (Fandrich Designs, Inc.) Reunion B
Grand & Vertical Manufacturing - Webb (Baldwin) Reunion C
Grand Reconditioning - Graham Reunion G
Hammer Construction - Baldassin (Renner) Reunion B
Handling Hard Hammers - Hunt Reunion E
Harpsichord Maintenance - Garlick Regency A
Hear What You Are Tuning - Coleman Cascade B
Market Builders - Pat Spithill Reunion A
Mastering the Grand Action - Robinson Reunion C
New 1990 Bösendorfer - Burger (Bösendorfer) Reunion A
New Piano Preparation - Vincent (Young Chang) Reunion B
Practical Design for Fine Verticals - Walter (Walter Piano Co.) Reunion A
Practical Piano Theory - Del Fandrich Regency C
Rebuilding the Player Piano - Gates Reunion G
Reed Organ Rebuilding & Repairing - Gates Cotton Bowl
Remember Your Finest Tuning - Sanderson (Inventronics) Cascade B
Renting Pianos For Fun & Profit - Rostkoski Reunion B
Retirement Taxes & You - May Regency A
Some Aspects of Selling - Mair, Smith (Dampp-Chaser) Reunion E
Some Aspects of Selling - Mair, Smith (Dampp-Chaser) Reunion G
Servicing The European Piano - Tublitz (Ibach) Reunion B
The Art of Troubleshooting - Guthrie Reunion E
The Perfect Tuning - Fairchild Cascade B
Tips on Tuning - Travis (Travis Publications) Cascade B
Troubleshooting Grand & Vertical Pianos - Lassiter, Light, Weisensteiner (Kimball) Reunion A
Tuning the Old-Fashioned Way - Roseburrough Cascade B
Vertical Reconditioning - Hess Reunion E
COMMITTEE CLASSES
Administering the PTG Technical Test - Spurlock (RTTs only) Regency A
Administering the PTG Tuning Exam - Travis (RTTs only) Cascade B
Advanced Player Piano Forum - Gates Cotton Bowl
College & University Technicians Seminar - McNeil Regency A
Non-Member Meeting - PTG Pres. & VP Cascade B
Piano Teachers & Their Trade - Rostkoski and G. Russell Regency A
Preparing for the PTG Technical Test - Spurlock Regency A
Preparing for the PTG Tuning Exam - Sanderson Cascade B
Presenting Programs to Teachers - Rostkoski Regency A
PTG Regional Meetings - All RVPs Reunion A, B, C, E, G
Regency A, C
Visually Impaired Drop-In Center - Serviss Directors
SPECIAL CLASSES
Polyester Touch-Up and Refinishing - Pile (Schaff Piano Supply) Tyson Piano Shop
Polyester Touch-Up and Refinishing - Fischer & Miscavage (Tyson Piano & Organ Co.) Tyson Piano Shop
Soundboard Installation - Gravagne, D. Geiger, & J. Geiger Cotton Bowl
WORKSHOP CLASSES
Action Parts to Recondition - Smit Bryan A
Bushmaster Class - Phillips (Webb Phillips & Assoc.) Duncan A
Carpal Tunnel & Tuning - Smith Executive
Cleaning & Keeping the Piano Covered - J. Reiter & M. Reiter (J.M. FABRICations) Brisbane A



	1st period	2nd period	3rd period	4th period
Sunday-Tuesday	8:00-9:30	10:30-12:00	1:30-3:00	4:00-5:30
Wednesday	8:00-9:30	10:00-11:30	○ 1 period class	⬭ 2 or more period class

1990 Convention Schedule

Friday, July 6

8:00 a.m.	Council Delegate Check-in
9:00 a.m.	Council Meeting

Saturday, July 7

10:00 a.m.	Council Meeting
1:00 p.m.	Regional Caucuses
2:00 p.m.	Exhibits open
7:00 p.m.	Convention Opening Assembly

Sunday, July 8

8:00 a.m.	Institute Period 1
9:00 a.m.	Exhibits open
10:30 a.m.	Institute Period 2
1:30 p.m.	Institute Period 3
2:45 p.m.	Exhibits open
4:00 p.m.	Institute Period 4
6:00 p.m.	Dallas Chapter Night — Recital

Monday, July 9

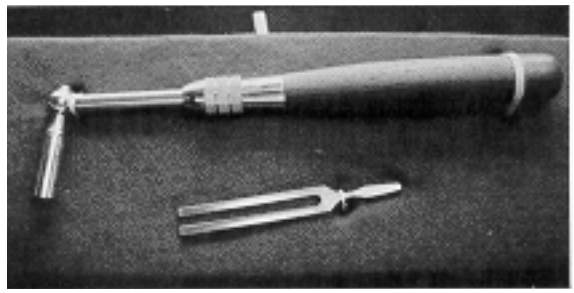
8:00 a.m.	Institute Period 1
9:00 a.m.	Exhibits open
10:30 a.m.	Regional Meetings/ Non-Member Meeting (Exhibits Closed)
12:30 p.m.	Exhibits open
1:30 p.m.	Institute Period 3
4:00 p.m.	Institute Period 4
7:00 p.m.	Convention Awards Banquet

Tuesday, July 10

8:00 a.m.	Institute Period 1
9:00 a.m.	Exhibits open
10:30 a.m.	Institute Period 2
2:45 p.m.	Exhibits open
1:30 p.m.	Institute Period 3
4:00 p.m.	Institute Period 4

Wednesday, July 11

8:00 a.m.	Institute Period 1
10:00 a.m.	Institute Period 2
12:30 p.m.	Convention Closing Luncheon
2:30 p.m.	Manufacturers Symposium



A 24-karat Hale tuning hammer and tuning fork will be the Grand Prize in the Dallas Chapter raffle at the 1990 Convention. Donated by Tuners Supply.

...Let Us Put Our Brand On You

Dallas Chapter Moneymakers

During the 1990 National Convention, the Dallas Chapter will be organizing a few money-making projects with portions of the proceeds going to the National Piano Technicians Foundation of PTG.

A raffle will be held with the grand prize being a donated Hale tuning hammer from Tuners Supply. This hammer will be plated in 24-karat gold, accompanied by a 24-karat gold tuning fork. Both items will be enclosed in an elegant glass and wooden showcase.

Action models from piano manufacturers will be on display in a chapter exhibit to be viewed by all. The models will also be included in the raffle to be held at the end of the convention. One does not need to be present to win, for the models can be shipped to the winners.

As of this printing, the following manufacturers have offered to send action models to the Dallas Chapter. These models will be put on display and then raffled off at the end of the convention. Samick, Kawai, Steinway, Wurlitzer, Yamaha, and Young Chang. We thank these manufacturers and hope to report the support of others in the near future.
Dallas Chapter

The Dallas Chapter will also be selling commemorative 1990 Convention Pins, as in Portland. This new tradition continues, so if you wish to purchase a pin before the convention, or because you cannot attend, contact Thom Tomko (214/780-0143) on how to order your pin.

The members of the Dallas Chapter at their May chapter meeting. First row: Thom Tomko, Immediate Past President and Host Chapter Convention Chairman. Newly elected officers Dan Mullen, Treasurer; Kay Miscavage, Secretary; Will Neiberding, Vice President; Mike Ello, President; and J. Wyatt, Membership Chairman. Second row: Brent Fischer; Darren Speir; Leon Speir; Craig Waldrop; Francis Lawhead; Lloyd Olson. Third row: Joe Tom McDonald; Keith Morgan; Joel Swafford; Walt Connell; David Kroenlin; Gary Bauchman; James Williams; Karl Schilken; Joe Lafuze; John Wood. Standing up behind the group: Ron McCall.

Convention Briefs

Learn what our industry is doing to promote music and pianos during the convention Opening Assembly Saturday evening, July 7:

- Listen to National Association of Music Merchants Executive Director Larry Linkin and Director of Market Development Karl Bruhn describe a program that brings together the entire music industry in support of education. This project involves virtually every organization and every level of the music industry — and your help is needed!
- Learn more about the National Piano Foundation's "Piano Popularization" project, and what is being done nationally, locally and regionally to help people discover and appreciate the piano.

***

Attention families: Enjoy Dallas and meet other PTG spouses and children. Please come to the Auxiliary Room to arrange activities with other PTG families.

Friday, July 6 and Sunday, July 8 (9 a.m., Auxiliary Hospitality Room) — Spouses and children gather for sign-up lists (swimming supervision, group nap time, babysitting, outside activities). If you are interested in group babysitting during the Convention Awards Banquet Monday July 9, the Auxiliary Luncheon Tuesday, July 10, and the Closing Luncheon Wednesday July 11, please contact the Home Office or Eileen Guthrie, 2 Cloninger Lane, Bozeman, MT 59715; (406) 587-4088.

Soundboard Repair And Refinishing: Part V

Susan Graham
Technical Editor

Last month we left the soundboard looking like a miniature steeplechase course. The old finish is still intact; there are untrimmed shims and/or larger new sections glued in place. Necessary bridge repairs have been done and the bridge pins have been solidified with epoxy. In general, the board looks worse than when we started. Now comes the fun part of turning it back into a visually pleasing as well as functional part of the piano.

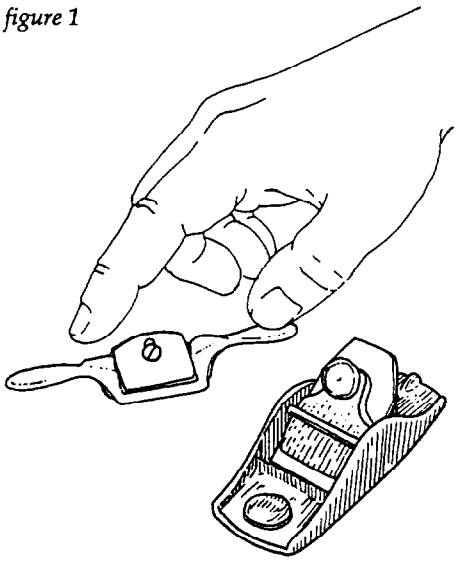
Trimming down shims is a satisfying and fairly simple job. Various tools may be appropriate: chisels, drawshaves, planes and scrapers. Selection is determined by preference, amount of wood removal required, and ease of access to the section of board. A variety of tools breaks the monotony of the job, yielding a better result through minimizing the frustration/boredom level (which, in direct proportion, influences the klutz factor).

I do a lot of shim trimming with a little "finger" plane and a small drawshave (fig. 1). Small tools such as these are available through woodworkers' supply houses: they can also be found in companies specializing in violin and other instrument builders' supplies (this source does tend to be more expensive). Since these tools can be used one-handed, they can be pushed or pulled, which is convenient working around obstacles.

If larger sections of wood are to be removed I like the Stanley G12-60 plane (fig. 2 foreground). This plane has a low blade angle (compare it with the rabbet plane in the background) which makes it less inclined to dig into soft spruce. It is a good "palm" grip size and is heavy enough to do real work but small enough to manage in tight areas.

Other technicians may prefer to work primarily with a chisel: tool selection is very personal. Where access is not a problem, many of us find it is not always the smallest tool which permits the finest work. Just as a chef uses a rather large knife to cut very fine slices, allowing the weight of the tool to do the work, woodworkers often find that a substantial (but sharp) tool is the best for fine cutting.

figure 1



Illustrations by Valerie R. Winemiller

A sharp edge on any tool used to cut down shims or plane a pieced-in board is imperative. Even with the sharpest edge, planing direction is also important, and can be tricky: it is not unheard-of for grain in spruce to curl or change. This may require a switch in direction, or may create areas which must be sanded to level after initial crude wood removal. With luck, you pre-determined the desired planing direction and glued the shims so they could be cut down with a minimum of banging knuckles against bridges, etc.

Since the old finish coat is still on the board, it is sometimes possible to plane right down to the wood so the last plane stroke just removes any glue residue and cuts the shim down to the level of the board. If in doubt, leave the shim a little high — it is easy to overwork the new wood of a shim, since the lighter, unfinished color makes it conspicuous. Final leveling will be achieved as the board is scraped and sanded. The important thing to avoid is gouging or catching and pulling up splinters from below the level of the board.

For an extensive discussion of techniques for renewing termination points at the bridges, you should be following the recent columns from my colleague Nick Gravagne. Nick advocates removing bridge pins if they will come out fairly easily without removing chunks with them. He can then renew the entire notch with a chisel before reinserting the pins.

Clean termination is imperative for clean sound: the string should contact the wood of the bridge top at the same point that it contacts the bridge pin. If anything, it should contact the *pin* slightly ahead of the wood. In order for this to happen, the line of the upper edge

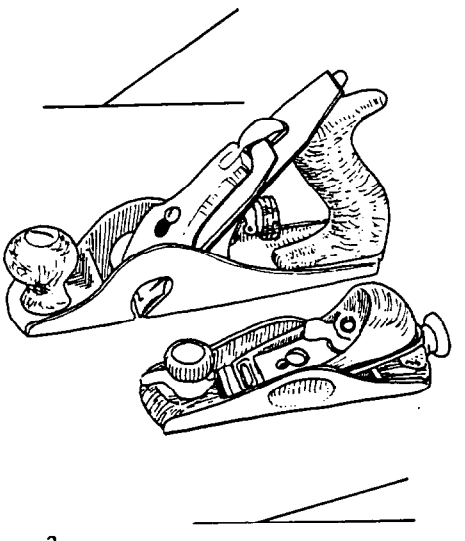


figure 2

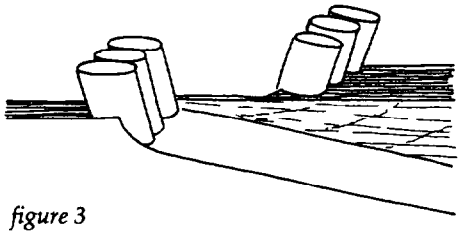


figure 3

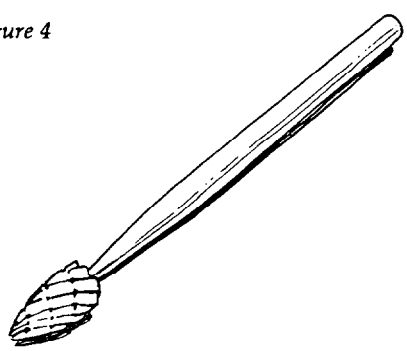
of the notch must bisect the pin (fig. 3). Some very fine piano makers actually notch bridges to the "back" edge of the pin — extending the notch slightly farther into the top of the bridge — to insure that the string does not contact any wood (or accumulated finish or dirt) before it meets the pin. Such contact can create a false termination, "blurring" the metal-to-metal contact of string and pin which is intended to be the solid and definite termination of the speaking length. An unpleasant zing in tone and our old friend the false beat can result.

If you do not remove pins and renew the notching, some other method of cleaning up old finish, dirt, epoxy squeeze-out, etc. from around the base of the pins must be found. The small hook scraper used to scrape the notch will not reach between the pins. For years I used a 1/16" wide slant-end chisel (picked up out of a sale bin at a woodworkers supply store, ground and modified to form a scraper). Picking out varnish from between bridge pins was tedious (I've had more respect for dental technicians ever since) but worth the effort in tonal results and appearance.

As I mentioned previously when singing the praises of a Foredom motor tool in the shop, I now use a small grinding bit in the Foredom to clean up the intersection of bridge, pin and string.

If the pins are dirty or rusty, they can be cleaned up first with a soft wire brush in an electric drill. The brush should be a soft brass "end" type: bristles protrude straight out from a cup-shaped holder. The bristles can be forced down onto the pins while the drill is running. This will clean up the sides of the pins and help to knock dirt free. Then the top of the bridge should be regraphited, I use thinned DAG, letting it dry and then buffing it with a piece of backrail cloth.

figure 4



The grinding burr in the Foredom cleans up around the bridge pins in a fraction of the time it took to do the job with a chisel. As illustrated (fig. 4), the bit comes to a fine point and has a slightly rounded profile. The whole cutting head is about 1/8" long and 1/8" wide at the base. The point will fit between the closest bridge pin spacing: the rounded shape helps prevent gouging out too much of the surrounding notch. If there is a heavy build-up of finish or epoxy around the pins the bit does clog and needs to be cleaned periodically with a wire brush. It may even be necessary to clean around the pins in two passes: one for crude removal of finish and the second to smooth out the wood and pick up any last bits of finish and debris.

I clean up around the pins first, and then scrape the bridge. There is usually some graphite or very dirty varnish which flies free: the old finish still on the notch keeps it clean. If the grinding bit does chatter a little around the pins, using the hook scraper afterwards will smooth down and remove any splinters in the exposed and visible part of the notch.

Scrape the sides of the notch first so that any splinters raised will then be cut off when the top of the notch is scraped. Best results are obtained if each notch can be scraped over its entire width in one stroke (or with several successive strokes covering the entire width each time). Otherwise, there is a tendency to create a ridge or gouge with the corner of the scraper. Throughout scraping, remember that the less damage you create, the faster the job goes in the long run. Those bridges and the soundboard were sanded smooth once in the factory: try to uncover that smooth surface without creating a need for heavy sanding. In the case of the hardwood surface of the bridge, if the scraper is sharp and skillfully used, it may not be necessary to do any sanding at all.

As you proceed down the sides of the bridge, be careful not to let the corner of the scraper drag along the surface of the soundboard. Doing so gouges the board just in front of the bridge. This is virtually impossible to sand out, since it crosses the grain. If the side of the bridge is undercut — many are, especially in the treble — it can be a little tricky to remove finish from the bridge without damaging the board. Angle the scraper, or use a different, smaller tool. I use the side of my shimming knife as a scraper here. The point of the shimming knife is also useful to remove the dark line just at the bridge-soundboard glue joint where the original finish puddled.

After the bridge has been scraped clean, tape off the top and down over the sides to cover the notches. This keeps the surface clean while you work on the board. It also pads the bridge pins so they can't take little bites out of your knuckles and forearms.

Scraping requires common sense. There are times when small flecks of varnish under bridges or at the edge of the case may be better left alone. If removing them requires digging them out of rough spots an unpleasant driftwood appearance may result. If these areas are cleaned and sanded so the surface is abraded — and if the areas are very small — adhesion of the new finish should not be a problem. Sometimes a coarse steel wool can be used in these tricky spots, since steel wool is less inclined to leave cross-grain marks in wood. However, the wool fibers catch in raw spruce and can create other problems.

Above all, when you scrape or sand the soundboard, do not cross *the grain.* We're tempted to kid ourselves that this can be done and sanded out later — but it can't. Cross-grain scraping or sanding leaves scratches that cut across the harder, darker grain lines in the wood. In a soft wood such as spruce these are virtually impossible to remove. If they are minimized with heavy sanding along the grain, the result is unevenness in the surface, problems with finish absorption, etc. It is also time-consuming. Simply make it a rule never to sand across grain, no matter how lightly, how inconspicuous the location, or how much you think you can get away with it.

Use ingenuity instead. A scraper can be used with a push stroke as well as a pull — this may enable you to get at edges. Along the spline (straight side), I remove the quarter-round molding so this edge can be really cleaned up (the molding frequently comes apart as it is

pried loose with a chisel but it is easy to cut another). This edge is scraped with a freshly-sharpened hook scraper, used in short strokes, holding the blade parallel to the case but pulling in a line with the grain of the board. This is also a section where the push stroke with a scraper can be handy. When it needs to be sanded, I wrap sandpaper over a thin cabinet scraper, forming a sharp-edged sanding tool which can be used right up to an edge.

If it comes off relatively easily, I also remove the screws and use a chisel to pop off the molding at the treble corner of the board (just above the top belly bar). This makes it much easier to clean up under the bridge. If that molding won't come off, it may not be possible to completely remove old finish from this corner — leaving it will be less conspicuous than gouging out wood or cross-sanding.

Right about now some of you are probably asking "Why don't you just use a chemical stripper, for crying out loud?" I don't have a real good answer for that. The reasons are based in superstition, tradition, and a lack of precedent. Mainly, I worry about glue joints and the harsh chemical damaging that mysterious resonating quality of spruce. However, I wait and hope for a number of experienced technicians to experiment with stripper on boards and tell me about it ...

What about just sanding? Sanding off old finish without any scraping is time consuming and messy. If a suitably coarse grit is used, it must be done by hand: coarse grit in an orbital or even reciprocating sander is a bad idea on spruce (and only a madman would attempt this job with a belt sander). Grit particles and chunks of finish inevitably get caught under the sander and cut spiral or straight-line gouges into the wood. Mechanical sanders also don't work well around the obstacles of bridges and case, making uniform results difficult to achieve. All in all, traditional dry scraping still seems the safest and fastest way to go.

Spruce cannot be scraped to a finish-ready condition, however. Sometimes hardwood can: skillful scraping can be smooth enough and doesn't leave fine grit or dust in the pores of the wood. Softwood "bubbles" under scraper pressure: it must be sanded smooth.

Sandpaper does two things: it removes material, and it leaves scratches. The trick of good sanding is to accomplish the first and minimize the second. Start with coarse grits, and as material removal becomes satisfactory, switch to finer and finer papers to smooth the surface and remove scratches left by the coarser work. We generally start off with an 80 grit, sanding by hand and following the grain of the board. Use of a felt-backed block is strongly advised. Without a block, sanding pressure is uneven: since your hand is soft (relative to wood, anyway) it tends to yield to harder grain and sink into the soft. A block will span the entire surface and exert even pressure. The felt backing offers a little cushion and minimizes heat build-up and clogging. In areas where a block won't fit, fold several pieces of sandpaper together for stiffness.

Sanding should be uniform: the same number of strokes with a given grit over the entire surface of the piece. The primary function of the 80 grit sanding is to remove final stray areas of finish, but it is necessary to use it over the entire board to maintain even results. Again, watch for grit off the paper and chunks of finish getting trapped under the block and gouging the board: clean up frequently when sanding with coarse paper.

After the 80, we sand again, by hand, with 120. This begins to smooth out the rough work of the 80. Scratches left by 80 are quite visible, and the board has something of a nap at this point. 120 is used to evenly remove (or minimize) those scratches and leave a finer nap. A piece of 120 is also suitable to wrap around a length of 1/2" dowel and use to sand inside the nosebolt holes in the board: this is a not-seen-but-noticeable detail that should be done.

This brings us to the 220 grit stage, and, with a sigh of relief, the orbital sander. Orbital sanders leave tiny swirls: for spruce, they must be fast (at least 12,000 rpm) so they cut, and they must not be used with coarse paper or the swirls will be indelible. Although reciprocating sanders don't swirl, the same cautions should be observed. I like the small Milwaukee sander pictured (fig. 5): it has the required speed and a simple, trouble-free clamping mechanism to hold the paper which doesn't require prying with a screwdriver and which folds up flush with the housing. There is no dust collector. This makes it easier to maneuver around the board — and I deal with the dust later (wear a respirator). It holds quarter-sheets of sandpaper, so I start by cutting (not tearing, which leaves jagged edges) up as many sheets as I can possibly need so I don't have to fool with it once I get going.

You do buy sandpaper by the box, don't you? If not, you're probably paying at least 100 % markup per sheet... find a local supplier or get it from a mail order woodworker supply house. And no, by "sandpaper" I don't really mean sandpaper: I use aluminum oxide in the coarsest grits, garnet in 120-220, and wet-or-dry in the finest. Cheap sandpaper is about as satisfactory as any other cheap tool; buying good stuff by the box accomplishes the same economy. Relatively speaking, sandpaper is cheap and time is expensive. Spruce dust is fine and clogs paper quickly — so change it quickly. You want to be cutting off fibers, not mashing them down.

Keep an eye on the corners of the sander when working around the bridges and avoid marking up the sides with sander chatter. There are, of course, places that can't be reached with a power sander and must be done by hand. In addition, when the board is looking good and clean and uniform following the power sanding, I blow out and vacuum and go back over the whole board quickly by hand with 220. This is to remove any orbital swirls, realigning sanding scratches with the grain. It is also an opportunity to make a last quick check for missed spots.

Following that, clean up dust again and step down to a finer paper yet. Depending on the smoothness of the surface, this may be 320 or you may be able to jump to 400. Some boards smooth out nicely with 220 while others still

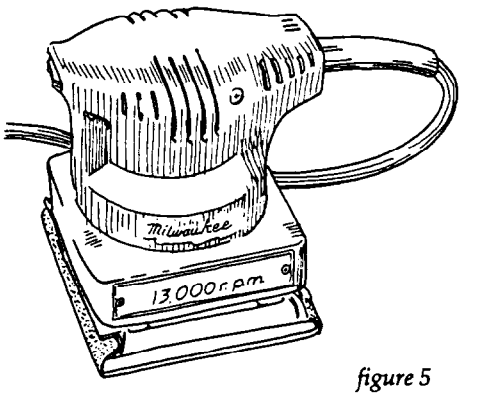


figure 5

need more of the nap removed. Whichever grit you use, remember to sand uniformly: if you find yourself having to sand more heavily in some sections, you've switched to the fine grits too soon and need to go back to a paper which will do more wood removal (but must be used uniformly across the entire board).

Fine sanding should go quickly, since it is now a smoothing process with a minimum of wood removal. After the first fine sanding, I wet the board with warm water and let it dry. This raises some grain — the wood fibers which were bent or compressed rather than removed. When the surface is completely dry, it will be slightly rough again, and can be fine sanded once more — 400 or 600 paper.

One caution about wetting: in my area, there are particles in the tap water which leave small dark spots visible on spruce (modern urban life...). Therefore, I heat up some of my purified drinking water and use that to wet the board.

If all has gone well, after this final sanding you have a board which looks absolutely clean and has a satiny feel to the touch. Untape the bridges and double check the sanding on them — touch them up if necessary but be careful not to drag an edge or corner of the paper along the board as you do so. We're getting close to finish time — but in both senses of the word, so we'll leave things as they are for now.

As promised, the Forum continues with a response from Steinway & Sons to the recent series of articles and comments regarding repetition problems in their pianos. It makes for interesting reading and contains some useful information — my thanks to Bob Dove, acting vice president, technical services, for taking the time to prepare it.

Dear Susan,

At Steinway & Sons, we have been following the series of letters and opinions responding to the "Drum Repetition" article by Ken Sloane which appeared in your October issue. They have all been interesting to read, and I must say, we have been intrigued by the number and variety of approaches suggested by Ken in his original article and by subsequent contributors (both in print and at various technical gatherings.)

We first saw Ken's article following its debut in the Cleveland Chapter's newsletter which Ken kindly supplied us. We invited Ken to our factory to discuss his approach at the time, and although he accepted the invitation, we never got together on a time. Ever since, we have been discussing internally what Steinway & Sons might contribute that would be further enlightening. We distributed copies of the article to our concert technicians and engineers, and asked them how they would approach the problem if it were presented to them. You don't have enough space to print the memo I received following their meeting to compare notes.

As we cogitated, in the true Steinway tradition, each month brought forth an additional point of view in your column. After reading the March issue, I decided it was time to respond. Not with "the answer from the mountain," but simply to make a couple of observations on the process.

Before I make my observations, however, I will add two technical comments on the "Drum Repetition" debate which I think your readers will find interesting. First, if the measurements for string height (of the D at Oberlin) in Ken's article were accurate, and we assume they were, the string height in that piano was higher than usual. Sometimes this is unavoidable as several hand crafting variables come together to affect it, e.g., planing of the keybed, V-bar height, individual soundboard crown, etc. We will in the future be compensating by controlling the height of the action stack relative to the string height (instead of controlling to the keybed). This is a reintroduction of a method previously used. Second, we have been experimenting with different contour shapes on hammer tails and will soon be releasing to production a smoother contour (similar to Ken's drawing) which makes higher checking easier to achieve. We have not found that an increase in the length of the tail is necessary to achieve the desired results. We invite any technician with a specific problem in this area to consult with us, as each piano must be addressed individually.

That is the heart of my first "observation." We have engineering specifications to which our pianos are built, but the instruments are hand-crafted. Each one is a little different from the next. We know a large segment of the technical community would like to have a book of service specifications for Steinway pianos by which to repair and regualte them. We can always supply you with specs; we have a service manual (a new revision is also in the works) containing many of them. But we would caution you that they are only guidelines — a starting point, if you will. For a Steinway & Sons piano to be all it can be, the technician working on it must use his experience and common sense to set it up according to what that particular instrument is capable of, and what the pianist using it wants from it. Developing this skill to perfection is what makes great concert technicians. The ideal blow distance will not be the same on every L. the let-off will not be the same for every situation (depending on frequency of service). The ideal damper timing will not be the same for every artist, even on the same piano.

While it is accepted in the technical community that the ideal tuning will be unique for a given piano, it is less often accepted that other adjustments should also be tailored to the piano being serviced. While a more uniform approach to service may work with other pianos manufactured more uniformly, each Steinway will continue to be different from the next. Since we have no intention of introducing uniformity, we will have to work harder to help the technical community refine the customized approach necessary to service Steinway pianos successfully.

Over the last several years Steinway & Sons has made very substantial investments in the areas of research and development, engineering, quality assurance, and service. As most PTG members are aware, service support has moved from a state of "precious little" ten years ago, to our present level, which I believe is the strongest of any company operating in the United States today. I bring this up simply to illustrate that we are capable, willing and fully prepared to deal with any inquiry regarding the servicing of Steinway & Sons pianos. We strongly urge your membership to call us when questions arise. We will do our best to find the most direct and effective solution to any problem posed.

While I know it is the nature of many technicians to "figure things out for themselves," there are certainly many occasions when hours — even days — of effort could be saved by picking up the phone and calling us (toll free). Any technician can call 1-800-FON-1853 (that's the year we were founded, for easy recall); ask for Mike Mohr, extension 3121. He will see that you get to talk to the right person if he can't answer your question on the spot, or he'll get the answer for you and call you back. For those of you who don't know Mike, a little background follows.

Mike literally grew up on Steinway pianos. His father is "in the business," so to speak and Mike had invaluable early exposure. Ten years ago, Mike himself went to work in the factory and gained practical manufacturing experience, on the bench, in a number of jobs. This experience culminated with three years as a bellyman, one of the most demanding and highly skilled jobs in our plant. Mike's next move was into the R&D department, during which time he also spent considerable time in our Hamburg plant as part of a technical exchange program. In 1986, Mike was promoted to foreman in the action department in the New York factory. Along the way, he had become a skilled piano technician, working on his own, as well as in the factories. Because of his extremely broad background and experience, we invited Mike to join the service department in January of last year where he has been since. As I write this letter, we are in the process of promoting him again. In his new capacity, he will oversee all service administration activities.

Mike is ably supported by Gloria Juhasz (extension 3118) and David Grossi (extension 3119).

Mike and his people are our primary telephone link to the technical community as well as the consuming public. They take hundreds of calls every week, ranging from simple requests for age and history of a particular piano to complicated questions from rebuilders.

Steinway & Sons
Technical Resources:

Retail Service: *Steinway has been supplying the greater New York metropolitan area with retail sales and services since its inception, 137 years ago. At present, we have 21 technicians and polishers servicing Steinway Hall and nearly 7,000 active tuning customers. We work only on Steinway pianos (unless a different brand is present in the same location as a Steinway we service), so we have a tremendous amount of experience with just about any conceivable problem which may be encountered with a Steinway & Sons piano. Scheduling and administrative supervisors are Norma Tamburlini (inside work) and Mike Megaloudis (outside).*

Concert Service: *Steinway & Sons furnishes pianos and service for most performances — of all types — taking place in the New York area. In addition to venue-owned instruments, our Concert and Artist Department provides an inventory of nearly 100 pianos — mostly D's and B's — for this purpose. The Service Department provides the maintenance and concert service for all of these instruments, as well as our selection room (at least five D's and five B's at all times) with a staff of seven concert technicians. In 1989 we provided over 2,000 concert services off our premises. Due to the large number of pianos and services, we have probably encountered just about every problem your readers are likely to come across — in multiple doses — with nearly every artist who plays the piano, living or dead. As a resource, the combined practical experience of this group is invaluable.*

Technical supervision for the two operating groups described above is provided by Franz Mohr, Chief Concert Technician, and by Ron Coners, Manager of Concert Service. Our other Concert Technicians are Ludwig Tomescu, Donald Stromback, Dirk Dickten, Scott Jones, and Karl Roeder.

The two operating groups described above report to Gary Green, our Director of Training and Service Operations. Gary also has an extensive and varied background in piano manufacturing, sales and service. In fact, his experience is so similar to Mike's, we'll just say, ditto for Gary. You can reach Gary at (212) 246-1100, extension 3005, except on Mondays and when he is traveling. On Mondays, call at the toll free number listed above, extension 3123.

Our ***Restoration Center*** *is one of the largest rebuilding shops in the United States, and again, we only work on Steinways — hundreds of them. Run by Bill Youse, Jr. and Terry Walsh, and staffed with a dozen skilled experts in older Steinways, this group is another valuable Steinway resource from which independent technicians can get answers.*

Parts Deparment: *While sales figures are confidential, we can say that our volume is comfortably into seven figures. Managed by Glorie Lefrak, this department supplies parts for both current and older Steinways. If we don't have a part in stock, we'll try to make it for you. We are working assiduously to reduce the amount of time it has been taking us to fill parts orders. Our goals are to provide 48-hour turn-around on small parts orders; one week on standard unfinished case parts; one month on finished case parts. We will try to do better in meeting our projected times on custom case parts (obsolete parts). It will be good news to many technicians that we now have available shanks and flanges to fit Steinway grands manufactured prior to 1984. We will have repetitions (wippens) for these pianos by summer.*

In all, there are approximately 55 people at Steinway in various service capacities. Our experience is your experience when you pick up the phone.

People in our R&D, Engineering and Quality Assurance Departments, as well as on-line factory personnel, are all additional resources the Service Deparment can tap into if we don't have the answers at hand.

In a future letter I will address Steinway & Sons training programs. We are committed to providing quality support to the technical community. Thank you for allowing us to express our view in your column.

Robert F. Dove
(Acting) VP, Technical Services

Also this month we begin a new series on action touch weight and leverage mechanics, written by Alan Vincent, Director of Technical Services for Young Chang America. In addition to being an experienced piano technician, Alan's background includes mechanical and engineering studies: His approach is to tie in the workings of a piano action with that larger world. Although he writes primarily about grand actions, the universality of the principles involved makes the subject pertinent to us all.

Speaking of grand actions, David Stanwood has prepared an extensive piece on his grand action modifications and developments (which are meeting with increasing interest and success).

TUNING UP

The Treble

Rick Baldassin
Tuning Editor

You may recall from last month that our discussion centered around the bass, and that four octave types were presented as being suitable for tuning in that area of the piano. This month, our discussion will center around tuning the treble.

In the treble, there are two suitable octave types. These are the 4:2 octave, and the 2:1 octave. In addition, the 4:1 double octave is very useful. Let us take a moment and review the tests for these single and double octaves.

The 2:1 Octave

Although we commonly think of an "octave" as being the matching of the second partial of the lower note against the first partial or fundamental of the upper note, in piano tuning, this is only true in the top two treble octaves. In the past two months, we have seen that 4:2 and 6:3 matchings are used in the midrange, and that 6:3, and sometimes 8:4, 10:5, and 12:6 matchings are used in the bass. Matching partials two and one in the midrange or bass would cause these octaves to be much too narrow. In the treble, the inharmonicity has increased to the point where 2:1 matching becomes suitable. The aural test for the 2:1 octave are the M10- M17 test (ex. F4-A5, F4-A6) and the P5-P12 test (ex. D5-A5, D5- A6). The M10-M17 test is most commonly used because the beat rates are faster and easier to hear. To tune the 2:1 octave electronically, set the tuner on the upper note of the octave, stop the lights while playing the lower note, then tune the upper note. For the above example, set the tuner on A6, play A5, stop the lights, then tune A6. This electronic procedure is exactly the same as making the intervals of the aural tests equal beating.

The 4:2 Octave

You may recall that the octaves just above the temperament were tuned as 4:2 octaves. To review, the aural test for the 4:2 octave are the M3-M10 test (ex. C4-E4, C4-E5) and the P4-P5 test (ex. E4-A4, A4-E5). Both tests are easy to hear, and are commonly used. To tune the 4:2 octave electronically, set the tuner one octave above the upper note of the octave, stop the lights while playing the lower octave note, then tune the upper octave note. For the above example, set the tuner on E6, play E4, stop the lights, then tune E5. This electronic procedure is exactly the same as making the intervals of the aural tests equal beating.

The 4:1 Double Octave

Tuning the treble is largely a matter of dealing with the relationship of single and double octaves. In the treble, we tune 4:1 double octaves. The aural tests for the 4:1 double octave are the M3-M17 test (ex. F3-A3, F3-A5) and the P4-P12 test (ex. A3-D4, D4-A5). The M3-M17 test is most commonly used because the beat rates are faster and easier to hear. To tune the 4:1 double octave electronically, set the tuner on the upper note of the double octave, stop the lights while playing the lower double octave note, then tune the upper note. For the above example, set the tuner on A5, play A3, stop the lights, the tune A5. This procedure is exactly the same as making the intervals of the aural test equal beating.

The Game Plan

As I mentioned earlier, tuning the treble is a matter of dealing with the relationship of the double and single octaves. Let us take a moment to look at how these intervals relate to each other. To do this, let us look at the relationship of three notes, F3, F4, and F5. If we tune the F3-F4 octave matching 4:2, and tune the F4-F5 octave matching 2:1, then we will have matched the double octave F3-F5 at 4:1 in the process. Sit down at the piano and try it. Aurally, tune F3-F4 such that M3=M10, and tune F4-F5 such that M10=M17. When you play the M3-M17 test, you will find equal beating as well, which means a perfect match at 4:1 (assuming you tuned the previous intervals correctly). Electronically, set the tuner on F5 and tune all three notes to the same setting. When you then test aurally, you will find the M3=M10, M10=M17, and M3=M17. If F5 was the top note of the piano, our lives would be easy, and we could use this system perfectly every time. Unfortunately (for this system), the piano range extends far beyond F5.

Let us now look at the relationship of F4, F5, and F6. From the previous example, we have already tuned F4-F5 as a 2:1 octave, such that the M10=M17. If we now aurally tune F5-F6 as a 2:1 octave, such that the M10=M17, we will find the double octave from F4-F6 is flat, and the M3>M17. Electronically, set the tuner on F6, stop the lights while playing F5, then tune F6. To test the double octave, with the tuner still set on F6, play F4 and stop the lights. Now play F6. You will find the display is rotating counterclockwise, indicating the double octave F4-F6 is narrow, or F6 is flat. If we were to carry the experiment up another octave (F5, F6, F7), we would find the double octave even flatter. But that is a subject for next month.

No combination of pure 4:2 and 2:1 octaves will be satisfactory over the entire scope of the treble. If the tests cannot be used in equal beating fashion (producing pure 4:2 and/or 2:1 octaves), can the tests be used in unequal beating fashion? To tune the treble satisfactorily, they must be.

We know from our discussion of the midrange, that the midrange octaves were tuned as wide 4:2 octaves, such that the M3<M10. If, for example, F3-F4 were tuned this way, and F4-F5 were tuned as a 2:1 octave, the resulting double octave 4:1 would be wide. We know from our previous example that a 2:1 octave from F4- F5 causes the problem of a narrow double octave from F4-F6, so we know that the octave F4-F5 must be tuned wide of 2:1, such that the M10<M17. But how wide of 2:1?

My experience has shown that if the F4-F5 octave is tuned wide of 2:1 by the amount that it takes to make it a 4:2, the F4- F5 octave will sound OK, and we will have adequate stretch to maintain the double octaves. It is easier to tune F4-F5 as a wide 2:1 octave aurally, because the M3-M10 4:2 test is beating very fast. These beat rates become too fast to be useful somewhere between A4 and C5. Knowing how much faster to make the M17 than the M10 allows us to work with useful beat rates, and still achieve the desired 4:2 matching. Tuning this way means that the double octave from F3-F5 is quite stretched, and that the M3<M17. Test to make sure the double octave actually sounds OK.

With a 2:1+ octave (stretched to the point of being 4:2) between F4-F5, we can now tune a 2:1 octave between F5-F6, and have a pure double octave between F4-F6. To preserve the double octave from F5-F7 (which we will discuss further next month), however, we must look ahead, and again expand F5-F6 beyond the point of matching 2:1, such that the M10<M17 once again. How much expanded should this octave be? As much as absolutely possible. Sometimes, the scale permits stretching to the point of actually being 4:2. Quite often, however, the scale does not permit this, and we have to settle to have the octave expanded beyond 2:1 as much as our ears will tolerate. Sometimes, it is in the best overall interest of the tuning to accept even more than our ears will tolerate.

To recap, F3-F4 is tuned 4:2+, F4-F5 is tuned 2:1+ (4:2), and F5-F6 is tuned 2:1+ (as much as possible). This means that the double octaves between F3-F5 will be 4:1+, and between F4-F6 will also be 4:1+. The F5-F6 octave will be wide enough that the double octave between F5-F7 (which we will discuss further next month) should hopefully be at least 4:1, and not flat of this.

Here is a chart which summarizes the tests for the octave types:

4:2+	M3<M10, P4>P5
4:2	M3=M10, P4=P5
4:2-	M3>M10, P4<P5
2:1+	M10<M17, P5>P12
2:1	M10=M17, P5=P12
4:1+	M3<M17, P4>P12
4:1	M3=M17, P4=P12
4:1-	M3>M17, P4<P12

Other tests

To insure that we have chosen the proper amounts of stretch, and to mask any scale problems which may exist, we must consult tests other than octave tests if we want a really fine tuning. Because the electronic procedures give exactly the same results as the aural tests, it is necessary to use these same tests to insure our work is done properly when tuning with an electronic aid.

The most common tests compare the parallel fast beating intervals, such as M3rds, M6ths, M10ths, and M17ths. When the thirds and sixths become too fast to hear well, drop back to the 10ths until they become too fast, then drop back again to the 17ths. With any luck, you will be able to hear the 17ths to the top of the keyboard, but certainly you will be able to hear them in the treble section which extends from C5-B6. Tuning as I have outlined above, maintaining the double octaves, will insure that the progression of M17ths will continue. Single octave tuning will allow the beat rates of the 17ths to level out, and even reverse.

Another test is to compare several notes with a common test note. This procedure was outlined in the review of Dr. Sanderson's class, published in the September 1987 *Journal*, p. 29. This procedure tests the relationship of the M3 (5:4), M6 (5:3), M10 (5:2), and M17 (5:1). For example, test the relationships of notes F4, A#4, F5, and F6. The test note in each case would be C#4. First play C#4-F4 (M3), then C#4-A#4 (M6), then C#4-F5 (M10), and finally C#4-F6 (M17). The progression should be as follows:
M3<M10<M6<M17

You should note that as long as the fifths are contracted, the M10 should beat slower than the M6. Playing these intervals in succession in this manner will show whether a good balance of single and double octave tuning has been executed.

Another practice is to listen to the fourth and fifth below the note being tuned. The fifth should not beat faster than the fourth. For example, if we were tuning C4-C5, test by playing F4-C5 (fifth), and G4-C5 (fourth). This test is helpful because the fourth and fifth each want note C5 to move in the opposite direction to make the interval sound smoother.

Conclusion

Tuning the treble is a game which involves compromise between what may sound best as a single octave, and what is in the best overall interest in terms of double octaves. The octave and double octave tuning tests and electronic procedures will help to determine and execute a suitable compromise. Finally, the parallel intervals will help to tie it all together, and actually mask any scale problems which may exist.

Several articles have appeared on the subject of treble tuning over the past couple of years. A listing of several of these appears at the end of this month's article by Michael Travis. I recommend you read his article carefully, along with another article, "Treble Octave Stretching" by Richard West. Finally, supplement your reading with the articles which Michael has listed. Further information on the subject can be obtained by attending the institute classes to be offered in Dallas this July.

Until next month, please send your questions and comments to:

Rick Baldassin
Tuning Editor
2684 W. 220 North
Provo, UT 84601

At Large

Piano Action Touchweight And Lever Mechanics

Alan Vincent, RTT
Young Chang America
Los Angeles Chapter

This series of articles will consider the factors which contribute to the touchweight of a piano action and how touchweight problems can be diagnosed and corrected. Most of the information will be based on the grand action although vertical actions will also be considered.

The "touch" of a piano is a subjective item. What one pianist likes, another might condemn. At times the condemnations may be due to a wide range of factors which are separate from the piano (which will not be discussed here) and not within the immediate control of the service technician. However, the "touch" of an instrument should fall within certain measurable parameters and the technician should be able to correct any legitimate touchweight problem by applying the fundamentals, theories and procedures which will be presented in this series of articles. Touchweight problems are a very common aspect of piano technology; there are many piano actions in the field whose performance can be significantly improved if these problems are properly addressed. No amount or refinement of regulation will cure poor performance in an action with excess weights in the keys or one with a compressed action spread.

A further intent of these articles is to dispel common myths regarding this aspect of piano technology and replace those myths with concrete information. This is intended to address some of the "tricks of the trade" which are based on empirical information but poorly grounded in technical theory and likely to produce inconsistent and detrimental results.

As piano technicians, it is our desire to produce good tone and performance in the instruments we service. We can think of tone as being created by the belly assembly (the rim, bridge, soundboard and rib design), the string scaling and the action. The action of a grand piano would include the keys, top action and hammers. When a piano is serviced in the field, a far greater improvement in the tone can be achieved through changes in the action as opposed to changing the belly or *scale* design. Design changes may yield improvements but these rarely could be effected on the spot whereas there is always something that could be done to improve the action and hammer condition. A thorough knowledge of the grand action is essential for concert work, rebuilding and many piano service situations.

Touchweight Defined

The term touchweight can be divided into two separate measurements; "downweight" and "upweight." Downweight is the amount of weight necessary to depress a key of the piano from the "at rest" position to the point of let-off. All touchweight measurements are taken without the weight of the dampers (or spring tension, in the case of a vertical). When servicing a grand action, touchweight measurements can be taken with the action on the workbench or on the keybed with the sustain pedal depressed. A vertical action must be serviced while in the piano and touchweight measurements are made with the sustain pedal depressed.

The upweight is the amount of weight which the key will lift from the point of let-off back to the resting position. The difference between the downweight and upweight and the range in which the two figures lie can be very helpful in diagnosing the condition of the action and the cause of a touchweight problem.

The touchweight measurements (downweight and upweight) are specified to and from the point of let-off because of the increased frictional resistance encountered when the jack tender contacts the let-off button. At this point the jack begins to arc out from under the knuckle causing considerable frictional resistance between the top of the jack and the knuckle. Frictional increases also occur at the beginning of let-off from the contact between the drop screw and the repetition lever, the contact of the repetition spring in the groove in the bottom of the repetition lever and in the repetition lever center.

The movement of all piano action parts is a travel arc (a segment of a circle) which means all touchweight measurements are actually torque measurements and could be specified in gram/centimeters. Torque is the amount of force needed to rotate a circular member about its axis. One gram/centimeter would be equal to one gram of force from a point one centimeter away from the axis of the rotating member. In the case of a piano action part, the axis of rotation is the center pin, the distance from this axis to the place where force is applied (for instance, wippen center to capstan contact) influences the torque. Brass weights which are calibrated in grams are the most common tool used for measuring touchweight, since distance from the axis affects the reading, the weights should always be placed at the front of the key and in a consistent location from key to key. The weight should take the hammer to the point of let-off in a smooth, definite motion. It may be necessary to tap lightly on the bench or

action rail in order to start the movement of the key and hammer.

The touchweight of any piano action is determined by the following three factors: weight, friction, leverage.

Any touchweight problem can be traced to one (or more) of these factors. Further explanation of each of the three is found below:

Weight—This is the weight of any and all of the action parts, hammers and keys and also includes the use of lead weights to add to or counter balance the weight of the action parts bearing on the capstan screw. The touchweight of an action can be significantly altered by changing the weight of the action parts, especially the hammer.

Friction — Friction is defined as the resistance to movement between two bodies when those bodies are in contact with each other. The three factors which determine the amount of friction present in a mechanical system are:

1. Surface condition — Wood on wood or metal on metal in an oil bath would be examples of two different surface conditions. The friction present would be much less in the lubricated metal to metal contact.

2. Surface area — The larger the area of the contacting surfaces, the more friction will be present.

3. Pressure between the contacting bodies — if the pressure forcing the contacting bodies together increases, then the friction present will also increase.

Friction is a very important concern with regard to piano actions but is often overlooked when diagnosing touchweight problems.

Leverage — Leverage is defined as the location of weights or forces acting upon a lever relative to the lever pivot points.

Changes in leverage can also increase or decrease measurable weight and result in frictional changes. Leverage factors within the piano action (specifically the grand action) are very important in determining proper function. Fortunately, the leverage principles involved are quite basic and, once understood, will afford the technician a greater facility in restoring or increasing the performance level of any action, regardless of manufacture.

Examples of leverage changes would be: increasing or decreasing the distance of the centerline of the hammer molding from the shank flange center; movement of the capstan location; any change in the action spread.

It is important to emphasize that the three factors (weight, friction and leverage) are interdependent. Since only one measuring criterion is used, that being the downweight and upweight readings as measured at the playing end of the key, it is up to the service technician to determine the actual cause of a touchweight problem and to make the correct adjustment. Any change in one of the three factors will result in a change in the touchweight measured at the playing end of the key. In the case of an increase in hammer weight, this could be construed as an increase in weight, an increase in friction (the heavier hammer pushes the knuckle down much harder on the jack, etc.) or, to a lesser degree, a decrease in leverage: all of these are actually correct. An understanding of the true cause of a touchweight problem is important so that the technician can expedite the most effective repair.

In future articles, we will look further at each of the factors contributing to the action touchweight and the effect of each on the others.

Vertical Piano Damper Replacement; Part I

Bill Spurlock
Sacramento Valley Chapter

Most articles and classes on the subject of dampers begin with a statement like, "Most technicians find damper work to be a pain in the neck, but here are some methods that might make it easier for you." I cannot improve upon that introduction, except to add the following: Damper work *is* difficult (especially in verticals) because access and visibility are limited, and the work is done, since "adequate damping" is very subjective and not possible to measure. Because of these difficulties we may tend to avoid dampers and never develop the skills to make the work routine, thus ensuring that the job will always remain a "pain in the neck."

Such neglect of our skills is unfortunate because, with a systematic and practiced approach, good damper work is not only possible and pleasant, but also offers an opportunity to improve a piano's performance by upgrading its damper design. In this article I will discuss the preliminary steps to a damper replacement job: evaluating existing damper problems, possible redesigning of damper styles to improve over the originals, removing existing damper felt and choosing and preparing new damper felt. Next month I will conclude with damper installation and adjustment.

Diagnosing Existing Damper Problems

Poor damping results in excessive after-ring after a key or keys are released. This symptom can be caused by one or more bad dampers in the piano which can allow after-ring when those notes are played. These strings will also ring sympathetically when other notes in the piano are played. This bad damping can be caused by any of the following problems:

- damaged or maladjusted damper felt not seating on the strings
- wrong type of damper configuration for a given string (e.g. flat damper felt for heavy wound strings)
- weak or broken damper springs not holding the dampers tight against the strings
- improper pedal, spoon or damper lever wire adjustments which hold the dampers slightly off the strings
- dampers located at the wrong point along the string's length so they fail to silence certain partials, even though they may be in good condition and adjustment

Given this number of possible problems, it is important to approach an after-ring problem with a logical sequence of tests. Only in this way can you get an overall picture of the damper system and separate trapwork problems, individual problem dampers, and design deficiencies inherent in a given piano. I suggest the following sequence of tests to diagnose poor damping:

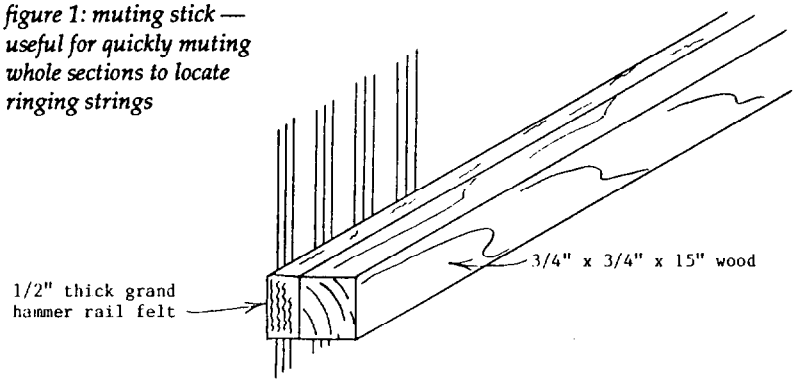
1. **Check for broken damper springs.** Step on the pedal two or three times and watch to see that all dampers lift and return to the strings. If one or more do not return, they may have broken springs, causing poor or no damping on those notes and allowing them to ring whenever any key on the piano is played.

2. **Make sure that the trapwork, damper lift rod, or spoons are not holding the dampers slightly off the strings.** After checking that the pedal return spring is working well, feel for lost motion in the pedal lift dowel; back off the pedal adjustment nut if you are in doubt. Next, push a few strings toward the plate to make sure that the dampers follow the strings for at least 1/16". If they do not, reach around the side of the action and press down on the end of the pedal lift rod and repeat the test. If the dampers *now* follow the strings, the trapwork is somehow failing to return fully or the lift rod is sluggish and not falling back away from the damper levers. If the lift rod has plenty of lost motion but there is still no follow, the spoons are holding the damper levers up. This can be confirmed by pushing down slightly on the wippen to force the spoon back toward the action rail; if that damper now follows, its spoon *or* its damper lever wire are out of adjustment. (See Vertical Regulation Part II, December 1989 *Journal*; dampers must be adjusted for even lift with the pedal *before* spoons are adjusted.) Of course, lack of damper follow caused by the trapwork or lift rod will affect all dampers, whereas lack of follow caused by spoons may only affect individual dampers. If a single damper is found which does not follow even with the lift rod and spoon checks, it may be hanging up on a neighboring damper head.

You have now ruled out mechanical interference preventing the dampers from resting snugly against the strings.

3. **Locate the string or strings that are ringing.** To do this, play a staccato chord to excite the ringing, and alternately mute out different sections of the pianos to locate the source of the problem. Although you can use your fingers or forearm to press against the strings, I like to use a felt covered wooden stick as shown in figure 1, made from any straight piece of scrap wood approximately 3/4" square and about 15" long, with 1/2" thick grand hammer rail felt glued to one surface. This avoids contaminating the strings with finger oils (or contaminating your fingers with string dirt!) and allows test muting of entire sections quickly. By alternately playing your chord and pressing this long mute against different sections of strings you can quickly find out which section contains the ringing strings. With

figure 1: muting stick — useful for quickly muting whole sections to locate ringing strings



a six-inch length of mute stick (or your hand) you can zero in on smaller areas and find out whether there is just a single damper, a group of dampers, or a whole section at fault.

4. Determine the cause of the ringing. Having located the offending dampers, you must determine whether poor damper alignment or seating is at fault, or whether the dampers are just the wrong length and in the wrong position to work well. Use your muting stick to press all damper heads in the offending section slightly harder against the strings immediately after playing the staccato chord. If the ringing is vastly reduced, either damper alignment is slightly off, the damper felt is worn or damaged, or the damper springs are weak. (By adding extra force to the springs you are forcing the felt into better contact with the strings, overcoming alignment or spring problems.)

Very poor alignment will be obvious as the felt may not be contacting all strings of the unison. Slight alignment problems may not be so obvious. Plucking individual unison strings or lightly muting the individual strings with one finger will tell whether all unison strings are being evenly damped. If you find that only one string of a unison rings on and the other two do not, the damper is misaligned and not contacting all three strings evenly. Inspecting the grooves on the surface of flat dampers will show whether they are sitting flat on the strings. For wedge and single bass dampers, watch closely as they lift on and off the strings; they should not deflect to one side as they come to rest.

To test the springs, pull damper heads back one at a time with the finger. If the springs feel very weak, strengthening them may correct the ringing; you can experiment on individual dampers to find out. A common mistake here is to strengthen springs in an attempt to overcome poor alignment or bad felt. This is really treating the symptom rather than the cause, and will only work if so much extra spring tension is added that the touch becomes unbearably heavy.

If pushing against the dampers *does not* greatly reduce the ringing, the problem has to be in the damper length and location on the strings. Such poorly designed dampers will typically dampen the fundamental tone reasonably well, but will leave one or two partials ringing. Once again, the sure-fire test of improper damper placement is to apply additional pressure to the dampers and listen to the after-ring. While extra pressure will usually hasten the decay of the fundamental, it will have little or no affect on certain higher partials. Likewise replacing these dampers with new felt of the same length will have no affect if the problem is damper position on the strings.

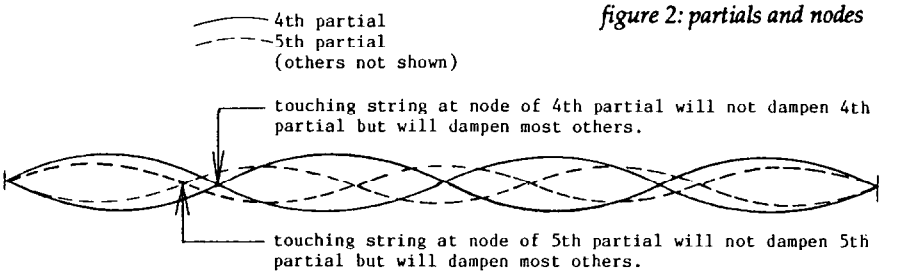
To understand how certain partials can continue to ring even though there is a damper pressing against the string, look at figure 2, which shows the wave patterns of two partials of a vibrating string. Notice that the string divides itself into segments (two segments for the second partial, three segments for the third, etc.) and that there are points called nodes between the segments. These nodes are like pivot points for a given partial wave pattern; contacting the strings right at these nodes has no dampening effect on their particular partial, but will dampen other partials. To demonstrate this effect on a piano, play and sustain a bass note. Then touch the string lightly with your finger tip near the hammer strike point. Continue playing the note and touching the string about 1/8" lower each time. You will hear the fundamental tone stop as soon as your finger touches the string, but a partial (or combination of partials) will continue to ring. The pitch of the partials will change with each new finger position. When you happen to touch exactly on a node you will hear an especially clear and loud partial which continues to ring just as loud no matter how hard you press. Thus if the damper touches the string at the wrong spot, no amount of spring pressure or alternate felt types will completely stop a ringing partial.

Choosing New Damper Types For Improved Damping

The tests above should tell you whether damper problems exist, and whether they result from the original dampers being in poor condition or from poor original design. If the problem is simply due to felt in poor condition, replacements of the same design as original should work fine. In the case of poor design the next step is to determine what style of damper you can use that will improve upon the originals.

Older uprights commonly have a lot of after-ring in the bass that can be reduced with a change of damper scaling. To experiment with different bass damper designs, you must first silence all strings in the piano except for a single bass bichord. One of the lowest bichord notes will usually be the hardest to dampen, so this makes a good note to experiment on. Use your felt covered muting sticks (held against the strings by a couple of hammers wedged off the hammer rail) to mute out the tenor and treble. Insert temperament strips between each bass string (except the test strings) both above and below the keybed. Now the entire piano should be

figure 2: partials and nodes



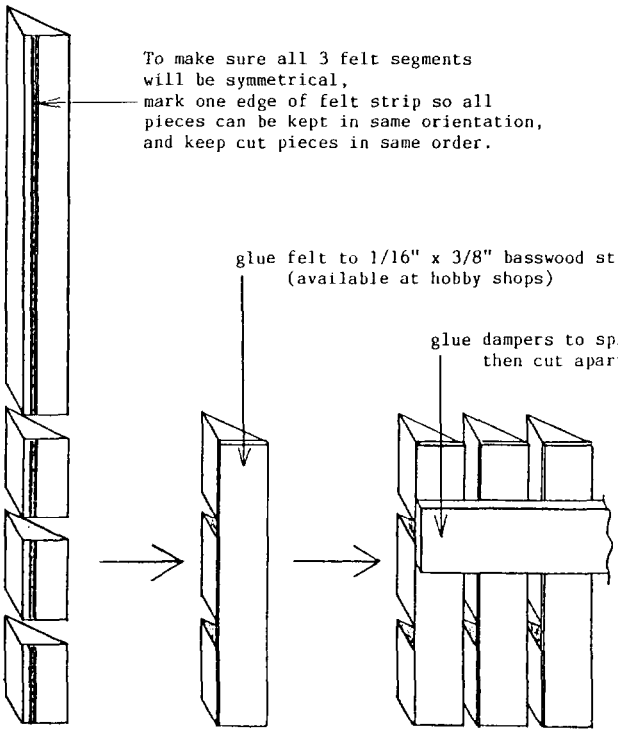


figure 3: making your own long bass dampers

well muted, making it easy to hear the difference in damping ability among different damper styles.

Play the unmuted note to get a good idea of the original damper's sound. You will usually hear a combination of the fifth and sixth partials ringing on in the bass. This is because these partials are fairly strong in this section of the piano, and because the bass dampers usually sit near the fifth and sixth nodes. Why not use some impressive formulas to compute the ideal damper length and location? There probably are certain standards used by manufacturers to design damper scales; however, I have compared damper-to-nodes locations on a variety of pianos and found quite a bit of variation among different pianos, all of which have good damping. Chances are the manufacturers' designs were refined through trial and error anyway, so I feel that experimentation is the most direct route to success.

Actually, I have found that major improvement in bass damping can always be had by following the maxim "bigger is better." While this sounds like a very unscientific approach, I have found over and over again that the old uprights with the tiny one-inch long dampers have the worst after-ring, that those with the 13/8" dampers are slightly better but still mediocre, and those with the 13/4" dampers are better yet, but not great. It is also evident that the newer, quality studio uprights with 2 1/4" to 2 1/2" long bass dampers have very good bass damping. These longer dampers can be purchased from piano manufacturers who use them, or made up from scratch. I always make my own as described in figure 3.

After listening to the original damper, replace it with a longer one and listen again. (Remove the original from the wood block, then apply a spot of yellow glue to the new one and fit its wedges into the strings above the block. Pull the block away from the strings, slide the damper down the strings to the correct height, and release the block. This ensures correct alignment to the strings.) I have permanent samples made up in two-inch, 2 1/4" and 2 1/2" lengths that I use for these experiments, but I have always found that the 2 1/4" damper with three 5/8" long sections of felt seems to be the point of diminishing return. The only further improvement some pianos respond to is an angled top edge to the damper that allows it to be mounted higher and still clear the hammers. Of course there is a limit to the length of damper that will physically work on an action; since the damper levers pivot and lift the dampers off in an arc, too long a lower end will not lift enough to clear the strings.

On many pianos the worst damping is in the low tenor, especially on the first couple of tenor notes whose dampers must be very short in order to clear the top-most bass string. As in the bass, mute out all other strings of the piano to experiment on a problem note. Frequently the problem is not so much the short length of the damper as it is the use of flat felt. If pushing harder on the low tenor dampers gives adequate damping, then switching to trichord felt will probably work fine. However if a ringing partial persists even with extra pressure, damper placement is the problem and we have to either lengthen the damper or add an over-damper. If hammers are to be replaced on the action you have the opportunity to curve the hammer line upwards on the last four or five hammers to allow longer dampers to be installed. Alternatively an over-damper can be installed as shown in figure 4 (these are usually only necessary on the first one or two tenor notes).

Once you are two or three notes above the bass break, there will be room to lengthen the tenor dampers if necessary. Trichord felt will usually do the trick, but once again the pressure test will confirm whether fit or placement is at fault. The higher in the scale you go, the easier the strings are to damp and the less critical the placement becomes.

When testing dampers it is important to realize there is no such thing as instantaneous damping. Indeed, if dampers did stop the sound instantly the music would sound very choppy and dry. What we are really after is a fairly even decay rate from note to note, and a minimum of annoying partials ringing on after the rest of the sound has stopped.

Finally, it is important to only

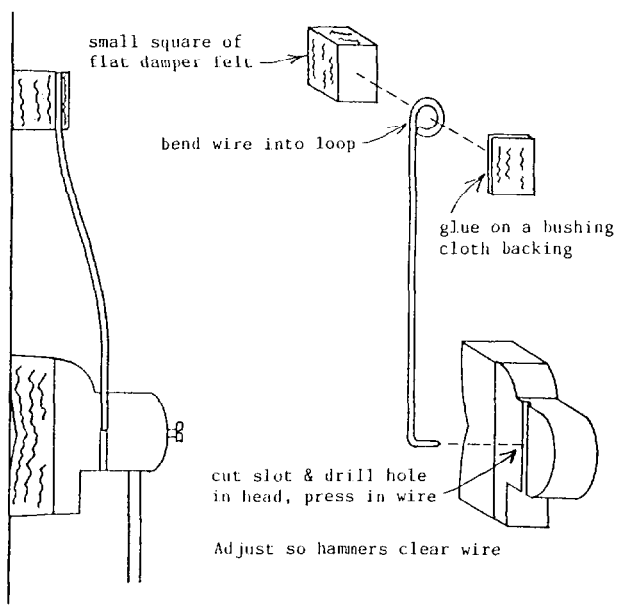


figure 4: adding an over-damper

use the best quality damper felt. Since dampers have to be very accurately adjusted to work properly, uneven or poorly cut felt will sabotage the job no matter how well the rest of the work is done.

Removing The Old Damper Felt

When you have decided upon the best length and type of damper felts to use, you next need to decide whether to retain the wooden damper heads. If they are in good condition you might decide to reuse them, replacing only the felt. If the two pieces of the wood blocks (in tenor & treble sections) seem to have weak glue joints, you may decide to separate the heads at these joints and replace with felt already mounted to wood blocks. If you prefer to start with all new wood blocks and set screws, you can remove and discard all old wood blocks, felt and all. These can then be replaced with the modern dowel-type blocks which then glue into a hole in the new damper heads (see figure 5). The advantage of these is that only one side-to-side wire bend is necessary to center the head over the unison; the felt is then aligned parallel to the unison at the time the dowel is glued into the head.

To remove only the old felt, the simplest method is to mount the action in a cradle and rotate it horizontally, dampers side facing the workbench. Tear off the front sections of the bass dampers, leaving only the small mounting felts; but leave the flat dampers intact. Fill a tin can with wallpaper remover/water solution and bring it up under groups of damper felts, allowing them to soak up all the solution they can hold. Do not submerge any part of the wood blocks unless you are going to be separating them at their glue joint. Leave the felt to soak in the horizontal position for about two hours, or until the dampers pull away easily leaving no felt behind. (Excessive soaking risks penetration of the front wood block and weakening of the wood-to-wood glue joint). As soon as you have removed the old felt, stand the action back up and lightly scrape any glue residue from the wood blocks.

At this time the damper lever pinning should be checked and the lever felt replaced if worn. The springs should be replaced if they show any signs of corrosion or past breakage (see "Springs In Vertical Actions" July 1989 *Journal*, p. 18). In addition, the damper lift rod and spoons should be polished as necessary, and the lift rod hanger bushings replaced/lubricated (see "Working With Wool Cloth Bushings," June 1989 *Journal*).

Next month I'll conclude with a unique method of pre-adjusting the damper heads *before* felt installation. ≣

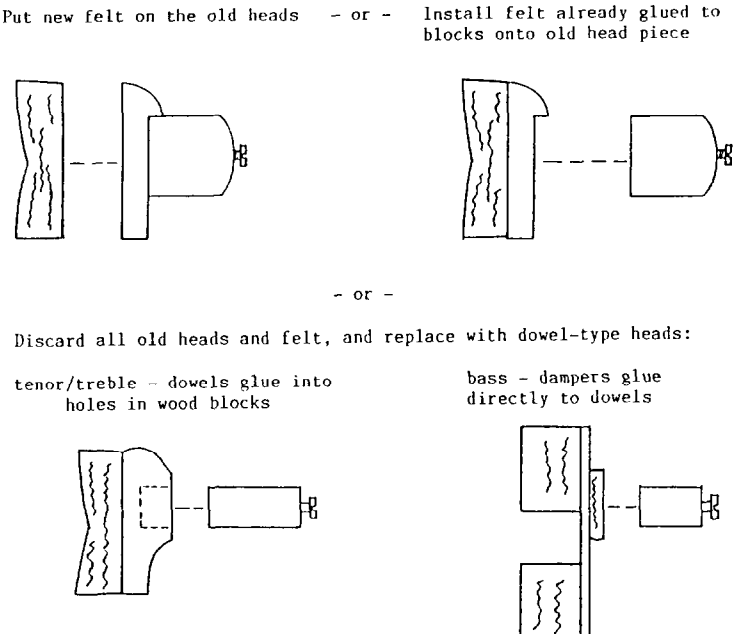


figure 5: damper replacement options

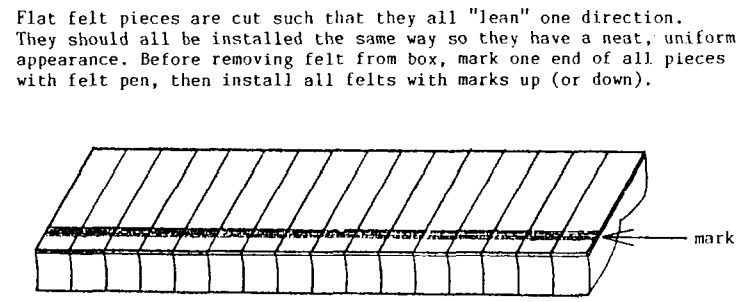


figure 6: preparing flat felt

GOOD VIBRATIONS

More On Bridge Re-working; And Introduction To Recapping

Nick Gravagne
New Mexico Chapter

We left off last time having discussed some of the more common reasons for reconditioning a bridge, and the techniques required to accomplish the job. Two less common reasons for re-working the original bridge discussed in this article have to do with bearing considerations.

Let's assume that before and after teardown, a piano bridge shows evidence of either having rolled forward a bit — yes, it is possible for a bridge to roll and it is certain, at least, that the forces tending to cause such movement are always present — or perhaps the bridge was not planed quite right at the factory leaving the rear of the bridge a little too high. In addition, the soundboard has good crown and shows little, if any sign of distortion. So if the bridge, apart from that it is too high at the rear notches, appears to be otherwise in fine condition, and if adequate net downbearing exists, it seems worth a try to pull the front and rear pins in the offending area and plane the bridge top such that the negative front bearing disappears, or becomes slightly positive. The job will have to be finished by re-graphiting, re-notching, and repinning. In addition, a slight adjustment of the plate may be required. Although the above condition is not common it does occur. Usually a bridge with a high rear edge is accompanied by a distorted soundboard.

But, assuming that net downbearing exists, and that other conditions are in good order, how serious does the negative front bearing have to be before such an approach is considered? First of all it depends on where in the scale the negative condition exists. A *slightly* negative condition — that is a feeler gauge of .001" to .002" or so can be placed between the string and the front bridge surface — although not ideal, is not a problem in the lower to mid scale, or in the bass. In fact, a small negative amount as this may not really be a problem in the higher scale as well considering that the "lean" of the pins and positive net downbearing are maintaining a close contact of string to bridge: but it is a bit risky, especially if the pin lean is 16 degrees or less, or if the measurements and checks were made on a soundboard that was not dried out (the shop RH, for example, was 65%).

Incidentally, before going on let me clarify a misconception I have been encountering regarding front and rear bearing. It has been understood by some that a zero front or rear bearing indicates that there is zero pressure on the bridge top (and on the soundboard). Not so. As long as there is a positive downward deflection on one or the other side of the bridge top there must exist, generally speaking, net downbearing as pressure. Let's say, for instance, that a one-half degree of downbearing angle can be measured in the short rear string length of a strung piano, and that positive rear bearing can be measured, but zero front bearing is evident; that is, the speaking string length continues as a straight line over the bridge and then deflects downward by one-half degree. This does not mean that pressure exists only at the "point" of the rear notch and nowhere else. Equal pressure exists, for practical purposes, across the bridge top as well. This is so because downbearing angles in pianos are relatively shallow. Where they are steep, say on the order of 25 degrees, there would be great pressure on the rear notch point, and the direction of this force would be forward and downward at about 80 degrees of vertical. The bridge would roll forward and zero bearing initially found at the front notch would go negative. So, under the conditions outlined in the typical piano, zero bearing at the front notch actually indicates the *lowest limit of positive bearing.*

At any rate, should a decision be made to pull bridge pins and plane or sand down the rear edge of the bridge, some method is necessary of knowing how much wood to remove once the plate is out of the way. First, pull front and rear pins at selected places along the bridge. Next, a carpet thread can be stretched from agraffe or capo to cross the bridge top at these places and small kerfs cut into the rear edge of the bridge. Make the cuts with a small hobby saw between two pin holes. These kerfs would obviously be most evident at the rear of the bridge top, gradually disappearing as they approached the front notch; that is, the kerfs would be angled cuts which are deeper at the rear by something like 1/32" (depending on how bad the negative front bearing was). Once the plate is out of the way the remainder of the pins can be pulled and the rear edge of the bridge planed or sanded to the bottom of the saw kerfs. Unless you are very skilled with small hand planes, consider using a sanding block, or electric palm sander, or even a disk sander chucked in a drill. Once the bridge has been "leveled" it needs to be re-graphited, and re-notched, etc. per previous articles.

Another reason for planing a good bridge to a lower setting exists when a new soundboard has been installed and the combination of new crown and original bridge height yields too much downbearing. This would not have been a surprise since the experienced bellyman can predict certain outcomes based on measurements taken at teardown. One such scenerio which is again, uncommon, exists when good (if not complete

found on a flat or even *sunken* soundboard. Since the board is going to be replaced it is obvious that the positive bearing readings initially measured on the old soundboard are going to increase to too much bearing if the original bridge height is retained. If the bridge is exceptionally tight and true, the bridge pins can be pulled and the bridge reset to a lower level per the techniques discussed above and in past articles. Of course, the entire bridge top needs reduction, not just the rear edge. In brief, the process involves installing the un-pinned original bridge to the new soundboard after which the soundboard is installed in the case. The plate is dropped in and bearing is set by way of carpet threads, bridge kerfing and planing down. Finally the bridge is re-notched, repinned, etc.

A variation on the above process (indeed, it can be considered with a new, oversized bridge cap) is to temporarily install the new board with screws along the stretch of soundboard edge located under the plate and along the belly rail, and clamps/blocks along the long side. This way the assembly can be removed after the bridge has been kerfed and the bridge can be worked on with much more ease and freedom of accessability.

But no matter how it is done, an obvious concern pops up here: since front bridge pins lean to the left, it is clear that reducing the bridge top will cause the pin holes to "travel" to the right. Side bearing will be reduced, and string location at the damper and hammer will have shifted to the right as well. Moreover, pins in the high treble which not only lean left but angle into the center of the bridge as well, will end up with new hole locations which are not only to the right of where they were, but to the rear a bit. The question is, by how much? If we assume a pin lean of 30 degrees (about the most I've ever seen, and does exist on some fine pianos) and a bridge top reduction of a full 1/16", the pin holes will shift to the right by .036" and a string 12" long will relocate to the right .015" at the damper and .008" at the hammer. Now if the pin lean is more like 20 degrees (more typical), the holes move .023" while the 12" string shifts .011" at the damper and .005" at the hammer. In fact, the only real consideration at the hammer and damper is in the higher one-fourth of the scale. The longer strings are virtually unaffected by the shifting holes and strings to the right. In all cases, additions to string lengths are negligible.

Now, is this a quality job? Again, it depends on the piano and a slew of other circumstances. It must be taken into account that in our examples above, much work has gone into improving the technical and aesthetic condition of the piano. As to planing down an existing bridge cap, I can say that such an approach is generally reserved for decent, but not the best, pianos, and that the bridge should be unusually sound. I have lowered and re-notched existing bridges and most people would be hard-pressed to tell them apart from new caps; indeed, they have been mistaken for such. But again, these are judgement calls, and it is still true that every rebuild is more or less unique and should be taken and assessed one at a time.

Bridge Recapping: Introduction

Recapping bridges is an essential part of quality piano rebuilding. Repair and reconditioning methods such as epoxy fill, renotching, repinning, and fervent prayer for a miracle can only go so far, after which the only right thing to do is to remove the old bridge top and put a new one on. But it is a big job demanding much of the rebuilder in terms of know-how and skill, and unlike action regulating, you just can't go back and make a wrong adjustment right by simply turning a screw. Demanding, too, is the tool requirement, both hand and power; tools without which there is no hope of doing the work. Still, done properly, the positive results as to tone, tunability, appearance and increased value of the instrument are quite gratifying.

In broad outline the process of bridge recapping follows these lines:

1. Diagnostic. Assessing the need for a new cap. What went wrong with the original bridge and can an improvement be made with the new cap?
2. Measurements and locations. The bridge stands at a certain height and the bridge pins and notches are located relative to a fore-and-aft as well as side-to-side position in the case of the piano. Patterns, or templates, or "rubbings" will be necessary.
3. Bridge top removal (not all bridges were capped, some being solid hardwood). Once the pattern of bridge pin and unison spacing has been made, along with some way of relocating the new cap back in the right place, the top of the bridge (usually about 1/4" to 1/2" down) of wood needs to be removed leaving a flat and true surface for gluing on the new cap.
4. A new hardwood cap needs to be cut to slightly oversize in contour, and cut to depth according to how much is required to make the new cap as tall as the original, or taller if the plan was to increase downbearing as well.
5. Filling the bridge pin holes in the body of the bridge with hardwood "shoepegs" (from supply houses), gluing the new cap to the body, and trimming cap flush to bridge body.
6. Graphiting and burnishing top.
7. Locating bridge pin holes with pattern, punching and drilling same.
8. Carving the notches, shellacing and varnishing the notches.
9. Pinning and filing pin tops.

Considering this list, it is easy to see why so many rebuilds are left wanting as to the bridge work.

The next series of articles, which will more or less follow the above outline, will deal with this aspect of rebuilding. This series will not cover complete, new Baldwin-style vertical laminate bridge making. It is also assumed that the bridge, or part of it, will be recapped on the original soundboard.

Diagnostics

Piano bridges and caps crack, we all know that. Even those bridges which were perfectly made from high quality woods will, given enough time, crack, either seriously or not so seriously. The reasons are only useful to us in that we could learn from them how to circumvent, if possible, future failure in our new bridges.

First, let's talk about materials. If solid hardwood such as maple is being used, the wood should be quarter sawn and having annual ring tightness of, say, approximately 10 to 12 grains per inch. This at least represents something of an ideal, and besides, a tighter grain isn't necessary, nor is it generally available. Most commercially obtainable hardwood is not quarter sawn, so you will have to order materials from specialty suppliers (a partial listing will be published in a future article).

Other woods are often employed in bridge work. Beech, for example, which has the same specific gravity as sugar maple but rates lower in all the strength categories, is, and has been for many European makers, the bridge capping material of choice. Then there is the question of horizontally laminated bridge material, be it maple or beech. Over the years some rebuilders have insisted that the many glue joints existing in such bridges are injurious to quality tone. It may be that tone does suffer here, but perhaps more due to the discontinuity of grain direction, and the great stiffness of these built-up bridges. Still, as bridge *caps*, as opposed to entire bridge units, there is something to be said for them. You will notice that some (if not all) Bosendorfer grands contain horizontally laminated bridge caps in the two tightest treble sections. That this type cap is more resistant to splitting than quarter sawn material of any species is a certainty. However, when using this type cap it is best to run the top layer's grain lengthwise to the bridge body.

Beyond using the right material, and taking care to drill for new bridge pins in wood which is neither too dry nor too wet (an EMC of about 7.5 to 10%, which relates to ambient materials storage conditions of about 70° F, and RH of 40 to 55%), it is the quality of the wood and the orientation of the long grain (in the solid cap) relative to the bridge body which is the really important consideration.

As to grain orientation of the bridge cap-to-body, there are two things to remember: 1. Considering that a bridge is not straight in its length, but curves and bends here and there, it is necessary to strike a compromise as to cap placement. Many of the finest pianos look to obtain as much long grain in the cap as is practicable. Since the bridge curves, the cap will have to change directions more or less in line with the sweep of the bridge, and this being so, there must be two or three cap pieces to cover a typical long bridge. We have all seen caps which, rather than running lengthwise of the bridge body, ran almost front-to-back. This short-grain condition in the cap is quite perfectly arranged for future splitting. Many old Knabe bridges were made this way in the upper two treble sections, and I have yet to see one that didn't need recapping. Straight bass bridges are a special case; when laying out the cap be sure to offset the long grain a bit so the pins do not line up in the same grain line; 2. carving notches across the long grain is unavoidable in the two highest treble sections since the piano strings are more perpendicular to the cap grain than parallel to it. It is more difficult to carve wood across the grain than along the grain. Although there is nothing that can be done about this, it is helpful to at least orient the "rise and fall" of the grain relative to the surface so as to allow clean carving at the front notches at the slight expense of having to "finesse" the notches at the rear which will have a tendency to "tear out."

Other diagnostic considerations include surveying the bridge pin spacing and offset stagger for conditions of weakness or undue stress. If the original spacing of a three-string unison was unnecessarily crowded, move the position of the outside pins away from the center pin. If the offset of front pins to back pins is unnecessarily wide, that is if the front and back pins are not centered in an imaginary line crossing the bridge top — which would be found if a thread were pulled from the agraffe hole to the appropriate side of the correct hitch pin — then the front and back pins should be brought closer to that center line in order to lessen the twisting stress. Most of the time, however, at least on the better pianos, the foregoing is not a problem.

We'll pick up here next time with measurements and locations. ≡

EXAMINATIONS

Learning To Pass The PTG Tuning Exam; Part VII: Treble

Michael Travis, RTT
Washington, D.C., Chapter

It is my understanding of all frequencies we can hear, those of the mid-treble, octaves four through six, are those most of us hear the best. It is perhaps not too surprising that the treble section on the exam, octaves five and six, seems to cause less of a problem for examinees than temperament, midrange, bass and high treble.

The "trouble with trebles," if it exists, seems to be more pronounced in octave seven, for a number of possible reasons. We'll talk about tuning the top more in the next article, since it is a section of the piano, and a separate section of the exam, with unique difficulties.

Tuning the treble should be simpler than tuning the bass not only because most of us can hear better in this range, but also because there are available fewer checks, and hence fewer choices of how to tune. M3s, P4s and P5s become relatively useless fairly quickly as we go up from C5, and we are left with mostly octave, P12, double octave, M10 and M17 tests. Fewer choices should and most often do mean faster decisions. I know a number of fine tuners who can tune the treble fairly accurately and quite efficiently using only single octaves and M17s, though most will recheck their results with other intervals. I used to kid around when describing how to tune this area, claiming all you need to do is tune single octaves from the top side (wide of pure) and "let the force be with you." Of course, I now realize there are a number of ways to tune the treble, and a number of tuners out of touch with the "force" who may appreciate a little more detailed information.

Treble Exam Specs

The treble in the exam is the fifth scored category, coming after pitch, temperament, midrange and bass, and spans the 24 notes from C5 to B6. The scoring tolerance in octave five is two cents deviation (after pitch correction) from the master tuning per point, and in octave six is three cents per point. This compares with the tighter tolerance of one cent per point through the midrange octaves three and four, and the more liberal six cents per point in octave seven. Broader tolerances in the treble do not mean this area is much easier for you to pass than the midrange, my comments above notwithstanding. Though you can get away with larger mistakes here than you can in the midrange, you may tend to make more of them, so the difficulty pretty much balances out.

As with all other sections, you still have to score 80% to pass this section. As with the bass, the conversion from penalty points to percent score is straightforward: score = 100 minus number of points. And my general advice is also the same: budget adequate time to do your best work, tune all the notes at least once, hone your tuning on the second pass, and recheck as time permits.

First Pass Treble

You may wish to make a quick pass up through B7 in the high treble prior to rechecking your work. If so, then one good approach would be to tune simple octaves almost as if you were performing a pitch adjustment. As we discussed with reference to the first pass in the bass, go for moderate accuracy and high speed to re-tune the detuning. It's also OK to plod along and tune with high accuracy as you go, as long as you know you can finish all the notes. I'll say it again: there's a rather severe penalty which can really kill your score in areas with notes you don't get to. My advice remains to hurry through all the notes in octaves 5-7 on the first pass, then go back and recheck.

In octave five you can tune primarily for clean-sounding octaves, checking only the P5 and P4 down from the note being tuned on the first pass. The octave and P5 should both sound clean, and a little better than the P4. If the P5 sounds worse than the octave, then come up a little more, and if the P4 sounds too wild, come back down a bit. With a keen ear and some tolerance for dissonant sounds, you can also use the "Harvey chord" described previously: simultaneously play the note being tuned, the P4, the P5 and the octave below, and go for the smoothest sound.

In octaves six and seven, the P5/P4 tests are not going to give you much useful information, so just stick with the single octaves, tuning just slightly on the wide side of pure. With experience, you may be able to tune surprisingly well this way.

Goals For Treble Tuning

The type of treble tuning that master tuning committees who prepare the exam pianos are supposed to do can perhaps best be described as conservative. Specifically, single octaves are a little wide of pure throughout the treble, and should maintain clarity all the way to the top. Double octaves start out no more than one bps wide in octave five and become more pure to slightly contracted in octaves six and seven. P12s are clean-sounding throughout octave five and part of octave six, and pick up speed toward the top, though beating slower than P19s in octave seven. P5s and P4s are also fairly clean-sounding throughout the range, but this is mainly due to the fact that their coincident partials get weaker and inaudible as you go up, which limits their diagnostic usefulness. Parallel M17s accelerate fairly evenly in octaves five and six, though nearer the top their rate of acceleration slows, and may actually stop or begin to reverse in octave seven. (See

ref., Baldassin, May 1988 *Journal* p.24).

This is a fair description of how the committee will master tune the treble of the piano you take your exam on. It's up to you to learn by study and practice to perform this type of tuning under exam conditions, even if it deviates in some respects from the type of tuning you normally do for your customers. We want to be fair and let you know what we are doing, and then be persnickety customers in the exam room in asking you to try to duplicate this type of tuning. I hope what follows will help.

Instrument Tuning The Treble

This is easy. Tuning electronically, use the 2:1 octave plus a cent rule. Set the instrument to read the fundamental of the note being tuned, play the octave below and measure; add one cent to this value by turning the dial or tapping the button and tune the note as a 2:1 octave, one cent wide. If you've tuned a good midrange, this simple procedure tuning octaves five through seven should be sufficient to pass the exam in both the treble and high treble.

Alternately, I have found that a pure 3:1 P12 tuning over octave five and most of octave six gives about the right amount of stretch to the 2:1 single octaves in this range, though occasionally you may have to narrow that a bit to limit the width of the 4:1 double octaves. To do a 3:1 tuning, set the instrument to read the fundamental of the note being tuned, play the P12 below and measure, then tune the note to this setting. To combine the 2:1 octave plus one cent tuning with the 3:1 P12 tuning, you can use the following rule of thumb: tune as pure a 3:1 P12 as possible up to but not above a 2:1 plus 1.5 cent single octave. For the exam, do not exceed one cent wide single octaves in octave seven.

Nitpicking The Treble

Assuming you've been through octaves five and six once, you may be ready now to debug your first pass. In octave five, play parallel P5s, octaves, P12s and double octaves over the range, listening intently for the odd beating interval. If (or when) you find one, test with parallel M10s or M17s if you have any doubt as to which way to move. For example, if the M10 or M17 is beating too fast compared with the parallel intervals of like kind just above and below, your note is probably too sharp. Finally, run a series of parallel M17s over the range, listening for beat rates out of sequence. If the parallel M17 test seems to conflict with the consonant interval checks, run a few checks (e.g., contiguous intervals) on its lower member, which may have drifted since you tuned it last.

In octave six, you can "walk the line" between the double octaves and P12s which usually have to be compromised in that area by playing them in pairs, listening for approximately equal beat rates. For example, from F6, listen to the double octave F4-F6 and then the P12, A#4-F6. If the double octave sounds worse, nudge F6 down. If the P12 sounds worse, raise F6 a tad. Then make sure the single octave still sounds clean. After checking octave six this way, run your parallel M17s and listen for irregularities as before.

Treble Octave Diagnostics

While checking your treble tuning, you should be aware of the changes happening over this range in the character of the octaves, and the implications for interpreting octave tests of the M3-M10-M17 family. These tests are among those examiners use extensively to aurally verify penalty points throughout the treble, so you should also be familiar with them to better defend your tuning.

These include the M3-M10 test for the single octave at the 4:2 coincident partial level (example 1 below), the M3-M17 test for the double octave at the 4:1 level (example 2), and the M10-M17 test of the single octave at the 2:1 level (example 3). In each case, equal-beating test intervals indicate that coincident partials are matched at the given level. All test intervals beat on the wide side of pure.

Example 1: Test C4-C5 by playing the M3, G#3-C4 and the M10, G#3-C5. In this range, the M10 should be beating about the same or a little slower than the M3, indicating a nearly pure to slightly contracted 4:2 single octave.

Example 2: Test C4-C6 by playing the M3, G#3-C4 and the M17, G#3-C6. In this range, the M17 should be beating slightly faster to about the same as the M3, indicating a slightly wide to nearly pure 4:1 double octave.

Example 3: Test C5-C6 by playing the M10, G#3-C5 and the M17, G#3-C6. In this range, the M17 should be beating slightly faster to about the same as the M10, indicating a slightly wide to nearly pure 2:1 single octave.

In the midrange going up from the temperament, single octaves may be slightly wide to nearly pure at the 4:2 level (third-10th test), but from about the upper third of octave four you need to begin making the transition from 4:2 octaves to 2:1 octaves (10th-17th test) to preserve octave clarity (though you may never actually get to a pure 2:1 octave except perhaps in the high treble). If you're still tuning pure 4:2 octaves at E5 or F5, you're probably going to be running too sharp and getting some increasingly objectionable single octave beats due to the louder 2:1 partials.

As mentioned above for electronic tuners, a pure 3:1 P12 is very useful here and will usually make a good transition; pure P12s may be tuned (tuning the upper member of the interval) through octave five to about the middle of octave six, using the sixth-17th test, but recheck octaves and double octaves to be sure. Example: Test the P12 F4-C6 by playing the M6 G#3-F4 vs. the M17 G#3-C6, and tune C6 to get equal sixth-17th beat rates for a pure 3:1 P12. A faster M6 means a contracted P12, and a slower M6 means it's expanded at the 3:1 level. Pure P12s should not be used all the way to the top since that will force your octave seven notes too sharp for the exam.

Another way to make the octave transition is to use the M3-M17 test for the 4:1 double octave, starting in octave five with the M17 up to one bps faster than the M3, and tapering down to beat about the same speed around the middle of octave six. Because you're supposed to tune octave seven as clean single octaves for the exam, there will be a point of crossover in the upper area of octave six or the lower area of octave seven where the 4:1 double octave test will start to show this interval to be a tad narrow, and it may get increasingly narrow the higher you go. This is OK for the exam, as long as your single (2:1) octaves are not also narrow as would be indicated by a slower M17 on the M10-M17 test.

From about the middle of octave six to the top, you can let the M10-M17 test for 2:1 single octaves take over, which should show the M17 beating about the same or a bit faster but not slower than the M10. This indicates single octaves that should be clean-sounding as required for the exam in octave seven, but that are not flat. We will talk more about octave seven next time.

This Is Not A Test

I've seen some tuners in the exam room try to use an interval to test with which is an octave plus a P4 wide, (P11) and so feel compelled to mention that this is not a useful treble test interval in my opinion, though it is certainly interesting from a musical standpoint. P4s have their lowest pair of coincident partials at the 4:3 level, and P11s have their lowest pair at the 8:3 level. The problem is, the 8:3 partials in the treble P11s do not seem to be loud enough for purposes of parallel beat rate comparisons; as you go up to and beyond the P11 C5-F6, they move well out of "scanner range" beyond the keyboard. I seriously doubt you'd want to match them electronically if you could, since this would make your treble tuning run quite sharp. This interval is a waste of time from a treble tuning standpoint, though it may be used to some advantage in the bass in the P11-P4 test for an 8:4 octave (October 1983 *Journal*, p 19). Test parallel P11s? Beam me up, Scotty!

In Conclusion

Treble tuning in octaves five and six for the PTG Tuning Exam may be efficiently accomplished in two passes, one a fast, moderately accurate tuning employing mainly single octaves to correct the detuning and get to all the notes (including octave seven) at least once, and another involving closer interval checking. Through experience and practice, you will learn what intervals work best for you; I recommend an emphasis on clean-sounding consonant intervals, octaves, double octaves and P12s, while making fine adjustments to obtain smoothly changing M10 and M17 beat rates.

Next month: high treble

Journal References:

Baldassin, Rick. "On Pitch" series, #6 (February 1984 *Journal*, pp 29-31) and #9 (December 1984 *Journal*, pp 27-30) deals with types of octaves and double octaves, and how to set them aurally and electronically.

Baldassin, Rick. April 1988 *Journal*, pp 20-22. "Picasso Tuners," discussion of treble octave tuning.

Baldassin, Rick. May 1988 *Journal*, pp 22-25. "Interval Widths" continues above discussion of treble octave tuning compromises, charts included show trends in single, double and triple octaves and M17s with these and hybrid types of octave tuning.

Baldassin, Rick, and Peter Briant. August 1989 *Journal*, pp 22-27. "Aural Fine Tuning for Electronic Tuners," review and discussion of an Al Sanderson class, with charts showing changes in M3, P4, P5 and different types of single octaves tuning with correct vs. incorrect stretch numbers — aural-only tuners should read this.

Coleman, Jim. August 1988 *Journal*, p 33. "Passing the Tuning Test," has a useful discussion of octave tuning.

At Large

Treble Octave Stretching

Richard West, RTT
Nebraska Chapter

My purpose for writing this article was twofold: 1. To get a handle on what I actually try to do when I tune, and 2. To try to understand Rick Baldassin's articles. In the process, I waded through more than 20 past articles on tuning, with all the charts, graphs, and cents, and came up with what is my reading of what Rick has been preaching over the past few years.

Proposition I: Equal temperament is not directly applicable to piano tuning.

Equal temperament is a mathematical ruler based upon breaking up the octave into 12 equal parts (the 12th root of two). If a piano were actually tuned according to a strict equal temperament, the result would be miserable. The reason is the "I" word — inharmonicity. That is, because of the stiffness of the piano wire and the resultant inharmonicity, all the upper partials of every string are higher than in a theoretical, perfectly flexible wire. The frequencies of the partials of a vibrating piano string are not simple multiples of the fundamental (2f, 3f, 4f, etc.), but involve a complicated formula which takes into account the partial number, the fundamental frequency, and the inharmonicity of the string. Equal temperament assumes partials are simple multiples of the fundamental, does not factor in the effect of inharmonicity, and is therefore not directly applicable to pianos. The result is that the only note on a piano that is exactly the same as in equal temperament is the A-440. All other notes deviate from equal temperament because of the inharmonicity inherent in piano scaling. To further complicate matters, since the string scales differ from one piano to the next, the inharmonicity also varies accordingly. Every tuning, therefore, is a custom tuning, and the success or failure of that tuning depends on how we deal with inharmonicity.

Proposition II: Although there is no standard piano tuning good for all pianos, there is a general definition that can be applied to all pianos.

What we all strive for in a well-tuned piano is that the parallel intervals (thirds, sixths, 10ths, 17ths) should progress evenly. For example, neighboring thirds should not differ greatly in beat speed from one another. In addition, a well-tuned piano should have smooth fifths, and the double octaves should sound good. This general definition may seem inadequate to those who want a specific definition of piano temperament, but to try to specify how narrow a fifth is, or how wide a fourth is, or how many beats per second the F-A temperament third is for all pianos, flies in the face of reality. Inharmonicity makes interval width different — not only between particular brands and models of pianos with different string scales, but even within each particular piano. The F-A temperament third beats between six to eight beats per second; the F-A third three octaves above is nearly pure. Why? Inharmonicity.

Proposition III: Defining a stretched octave, comes down to specifying what set of coincident partials is being used to check the octave.

A strict definition would be: "Any octave that does not match the mathematical 2:1 ratio of equal temperament is stretched." That is, if the A above A-440 does not have a frequency of 880 Hz, then the octave must be stretched. Therefore, strictly speaking, all pianos have stretched octaves because inharmonicity pushes the upper partials higher than the theoretical, mathematically perfect string.

Another definition might be that any octave which is not "pure" is stretched. The key word here is "pure." If one tunes a "pure" 2:1 octave so the second partial of the low note is beatless with the first partial or fundamental of the top note, other coincident partials at higher frequency levels will still be beating. The 4:2 octave (fourth partial: second partial), the 6:3 octave (sixth partial: third partial), and the 8:4 octave (eighth partial: fourth partial) will all be beating at different speeds. The conclusion is there is no such thing as a truly "pure" octave. Only one set of coincident partials can be pure; the rest will be beating. This means we have a choice of which set of coincident partials will be pure. The higher the point of coincidence, the wider the octave. A 4:2 octave is slightly wider than a 2:1 octave (for the same two notes); a 6:3 octave is wider than a 4:2 octave (for the same two notes), etc. Why? Inharmonicity. We also have the choice to leave none of the coincident partials pure.

Proposition IV: There are ways of knowing precisely what kind of octave is being tuned.

Octave tuning begins with playing the octave and tuning it "clean," that is, listening to the beats between the loudest set of coincident partials and eliminating that beat. Sometimes the loudest pair is at the 2:1 level, but not always. There is no way of knowing without further tests.

2:1 Octave Tests

If the following intervals beat at the same speed, the 2:1 octave is pure.

M(ajor)10-M17. Example: F2-A3 (10th) = F2-A4 (17th).

P(erfect)5-P12. Example: A#2-F3 (fifth) = A#2-F4 (12th).

4:2 Octave Tests

If the following intervals beat at the same speed, the 4:2 octave is pure.

M3-M10. Example: F3-A3 (third) = F3-A4 (10th).

P4-P5. Example: F3-A#3 (fourth) = A#3-F4 (fifth).

6:3 Octave Test

If the following intervals beat at the same speed, the 6:3 octave is pure. This test is better for the bass and tenor areas, and is not as effective in the treble because the beat speeds are too fast.

m(inor)3-M6. Example: F3-G#3 (m3rd) = G#3-F4 (sixth).

4:1 Double Octave Test

If the following intervals beat at the same speed, the double octave is pure. This test is very helpful in the treble.

M3-M17. Example: F3-A3 (third) = F3-A5 (17th).

The Options

Given this arsenal of tests, the question still remains — what works best? Ultimately, this is a personal decision, but let's look at some of the options.

1. All octaves pure 2:1. This option is "clean" sounding, but the upper treble will sound flat, and the 17ths will actually start slowing down in the last two octaves.

2. All octaves pure 4:2. This helps the upper treble, but may cause the 2:1 octaves to beat too much and be too noticeable.

3. A combination. In the February 1984 *Journal*, Rick Baldassin describes a system which tunes 4:2 octaves in the first octave above the temperament (i.e. use the M3-M10 test), and 2:1 octaves in the octave above that (i.e. use the M10-M17 test), which results in a pure 4:1 double octave. This is the system I have used, but did not realize it until I saw it outlined by Rick.

4. The Sanderson model. This is an electronic tuning which adds one cent to all the 2:1 octaves.

5. Octaves that are 4:2+. This starts getting into what has been called "Picasso Tuning." The wider the 4:2 octave is expanded, the more likely the 2:1 octave is going to be beating fast enough to be disturbing.

I like option three the best. It allows me to expand the treble octaves slightly, but keeps a clean double octave. When I reach the last two octaves, I can keep the 17ths smooth, and they won't slow down like they would with pure 2:1 octaves. If I keep the 17ths beating at between 12 and 15 BPS, the 2:1 octaves will be slightly expanded, and the 4:1 double octaves will be OK. ≡

Sound Background

Expansion Of Musical Acoustics In The 18th Century

Jack Greenfield, RTT
Chicago Chapter

Leaders In 18th Century Acoustics

The progress of acoustics science during the eighteenth century resulted to a great extent from work done by Daniel Bernoulli (1700-1782) and Leonhard Euler (1707-1783). These men were good friends, had similar education and followed almost parallel paths in their careers. They had slightly different outlooks, however; Bernoulli was primarily a physicist with an interest in mathematics while Euler was primarily a mathematician with an interest in physics. Although the scope of their work included a wide range of other major subjects in physics and mathematics, they dominated the study of acoustics from the late 1720s to the early 1780s. Most of their important work in musical acoustics falls into the following classifications: 1. Vibrations of musical strings; 2. Lateral vibrations of bars, rods and chimes; 3. Longitudinal vibrations of air in organ pipes and wind instruments.

Euler also wrote on resonance, consonance, tuning and temperament, and on a system of harmony based on his acoustical theories.

Biographical Backgrounds

Daniel Bernoulli was a member of a family of eminent mathematicians. Of Dutch origin, the Bernoullis had settled in Basel, Switzerland just before the start of the 18th century. His father Johann, and his uncle Jakob who was older, had become famous in the scholastic world as professors of mathematics. While two brothers, two nephews, and a cousin of Daniel Bernoulli also became mathematicians, he preferred physics. He also studied medicine and a variety of other subjects. He received a Ph.D. from the University of Basel in 1721. Four years after leaving the University, Bernoulli began his professional career at the academy in St. Petersburg, Russia. He returned to Basel in 1733 where he lectured and taught at the University until he retired in 1776.

Leonhard Euler was born in Basel. His father, although a clergyman, had studied some mathematics with Jakob Bernoulli. Later, the younger Euler attended classes in mathematics given by Johann Bernoulli where he met Daniel Bernoulli as a fellow student. Besides mathematics, Euler's education included physics, astronomy, medicine and theology. Euler completed his education several years after Daniel Bernoulli. Through the influence of Daniel Bernoulli, Euler also obtained an appointment to teach in St. Petersburg and he began there in 1727. Although Bernoulli was displeased with the rough unsettled living conditions in the Russian capitol and left after a few years, Euler was content to stay longer. Euler left St. Petersburg in 1741 to teach at the Berlin Academy but he returned to St. Petersburg in 1766 where he remained for the rest of his life.

Bernoulli and Euler began to collaborate early in their careers. After Bernoulli left St. Petersburg in 1733, they corresponded with each other frequently, communicating details of their work. They maintained an unusual relationship, part collaboration and part friendly rivalry. While they agreed in some conclusions, in others they held different views.

Perhaps more than any contemporary scientist, Bernoulli made frequent use of experiments in his research to check theoretical assumptions and calculations. Although he wrote a large number of papers, some were written decades after his work on the project discussed had been finished. Euler was more of a theorizer than an experimenter. He wrote even more than Bernoulli, (he was one of the most prolific writers in the history of mathematics). His total work exceeds 800 writings, ranging from large textbooks to small pamphlets. Euler wrote on mathematics, physics, engineering, music, philosophy and religion. He wrote on every level from advanced technical works to elementary texts for teaching.

Vibrating String Theory Advances

In their research on vibrating strings, Bernoulli and Euler sought to develop dynamical and mathematical explanations of the division into harmonic segments theorized by Saveur but not accounted for in Taylor's formula. Previously, Johann Bernoulli had begun such an investigation. In 1727 he had proposed an equation based on the motion of a hypothetical cord holding spherical weights at the center of each vibrating section. Daniel Bernoulli followed this idea except for a change he found better suited to the experiments he carried out. He used pendulums made up of lengths of rope holding various numbers of weights. These swung in complex oscillations he considered analogous to the complex segmented vibrations of musical strings. From his observations he developed formulas relating amplitude, frequency and modes of vibration. Bernoulli's first papers on vibrating strings were presented in the early 1730s. He continued and published other papers on the subject for over 30 years more.

Bernoulli's research led him to the following discoveries and the observations he was the first to state:

1. The complex vibrations of any sounding body can be considered a composite of simple modes of vibration correspond-

ing to pure tones emitted simultaneously.
2. The vibrations of pure tones can be expressed mathematically by simple sinusoidal formulas that take the form of sine curves in graphical representation.
3. The mixtures of amplitudes of the various modes which determine the quality or timbre of a tone depend upon the way the sound is initiated. This is illustrated by the difference in the tone of a harpsichord when the strings are plucked at different positions.
4. The displacement of any point on a string at any instant is the algebraic sum of the displacements corresponding to the simple modes.

Bernoulli's writings indicate complete understanding of the dynamics that make it possible for a string to vibrate simultaneously in a multitude of approximately harmonic segments. His mathematical proof, however, was considered inadequate by his contemporaries. Euler and others disagreed with his mathematical concept that implied expression of the string oscillations as a formula for an infinite series of sine curves. Instead, they proposed alternate theories and formulas derived through methods of the calculus. The controversy on this subject which began around the middle of the 18th century was not resolved until the next century when Bernoulli's views were substantiated.

Musical Properties Of Bars And Rods Studied

Daniel Bernoulli and Euler share credit for being the first investigators who undertook the scientific study of the acoustical and musical properties of rods, bars and chimes. Their first reports on these studies were published in the early 1730s. At that time, small tuned percussion instruments, similar to the glockenspiel with metal bars grouped in two rows to correspond to piano keyboard disposition, were used for practice by carilloneurs in Europe.

In their research on bars as in other investigation, Bernoulli carried on the experimental work. He studied the effect of stiffness on vibration patterns by observing the oscillations of heavy cords. Reasoning from these observations and applying principles implied by Hooke's law of elasticity (*Journal*, January 1990, p. 30), Bernoulli and Euler developed theory and formulas for the musical vibrations of bars, rods, and chimes. From Hooke's law they assumed the energy for the vibrations was derived from the reactions of the inherent internal restoring force within the elastic bodies that were struck. In contrast, strings vibrate under tension applied externally.

The validity of their theory and formulas was checked by Bernoulli's experiments which compared theoretical node positions and mode ratios with the actual results observed in tests with chimes. He could determine the actual location of the nodes by supporting the chimes on his fingertips and finding the points of support at which the pure tone of a particular corresponding mode was most intense. To check calculated mode ratios, he obtained the frequencies for the pure modes by matching the tones of the chimes to tones from his harpsichord.

These studies culminated in two papers by Euler in 1772 and 1774. Using a partial differential equation he had formulated, he calculated frequencies and nodal positions for the lateral vibrations of a straight elastic bar corresponding to various methods of support: with either or both ends clamped, simply supported or free to vibrate. These figures, giving values for frequency ratios not in a harmonic series, contradicted the popular 18th century belief that the overtones of all other natural bodies as well as of musical strings were harmonic. The Bernoulli-Euler theory of bar vibrations, with refinements and confirmation by later investigators, is now widely accepted in acoustics science.

Vibrations Of Bars In Musical Instruments

The tone quality of bars used for musical purposes is derived primarily from the transverse modes of vibration, that is, bending back and forth in directions perpendicular to the length. The frequency of the fundamental pitch depends upon length, thickness, density and the elasticity of the material. The pattern of upper modes of vibration depends upon the method of support and the degree of freedom for the ends to vibrate.

In percussion musical instruments such as the xylophone and the glockenspiel, the bars are supported at the intermediate positions which are the nodes or nodal lines of the fundamental mode of lateral vibration. During vibration, the middle section of the bar rises and falls between the nodal lines while the ends move down and up in opposite directions. Theoretically, the nodes or nodal lines of the first mode of lateral vibrations are at 0.224L from the ends of a uniform bar of length L. The bar does not vibrate in harmonic segments but gives inharmonic overtones with frequencies that form a series in the ratios approximately 1.00: 2.76: 5.40: 8.90. In actual musical instruments the frequency ratios may differ because of the drilling for the mounting holes, grinding away the underside of the middle for tuning and other changes in shape. The relative strength of the partial tones depends upon the distance from the corresponding nodes the bar is struck. The fundamental is most intense when the bar is struck in the middle. Higher modes may respond to other striking points.

Tuning Fork Modes Of Vibration

The two bars that are joined together in a tuning fork have only one of their ends free and they vibrate in a different pattern. The theoretical frequency ratios of the modes of vibration of bars with only one free end form the series — 1.00: 6.77: 17.55. Due to differences in design details however, the upper modes may vibrate in other ratios. The upper modes produce the initial high pitched "clang" tone that rapidly fades away, leaving the fundamental.

Historically, analysis of tuning fork tone was made by means of waveform or time-displacement curves drawn by vibrating forks with an attached stylus which traced a wavy line across a moving smoked glass plate or a strip of paper on a rotating cylinder. The oscilloscope is an extremely accurate modern tool for drawing audible waveforms. The variations of sound pressure which can be picked up by a microphone are displayed as a thin wavy line left across the phosphorescent screen of the oscilloscope. Benade shows typical examples obtained from tuning fork tones. In one, a 10 millisecond segment of the pure tone of the fundamental produced a repeating pattern of uniform smooth sinusoidal waves giving a value of 439.6 oscilla-

tions/minute. In another example, the "clang" tone showed a superimposed secondary pattern of waves giving a value of about 2660 oscillations/minute, about six times the fundamental frequency.

Aural Harmonics

Although the secondary upper modes of tuning fork vibrations dissipate rapidly leaving only the single fundamental frequency of the fundamental, under some conditions the continuing sound may be perceived as a complex tone with harmonic partials. In particular, this occurs in piano tuning when the tone of the fork is amplified by placement of its stem on the soundboard and the fork tone beats against a closely adjacent partial generated by one of the strings: A. J. Ellis reported his discovery of this phenomenon in 1885. The presence of harmonic partials in tuning fork tone has had little scientific investigation since then however. Some references point out that pure tones such as the tuning fork fundamental cause "aural harmonics" generated in the ear itself. Another possible cause is vibration of the stem or other natural vibration that is unnoticed unless amplified by the soundboard.

Vibrations Of Air In Musical Instruments

The pioneering work of Bernoulli and Euler was a strong influence in the rise of scientific interest in the vibrations of air columns in musical instruments after the middle of the 18th century. Bernoulli developed a theory for longitudinal vibrations and a formula for calculating the frequencies of overtones in uniform pipes and conical horns. His observations led to the conclusions that overtones in a closed uniform pipe followed a progression of the odd-numbered harmonics. They also showed why the tones of the lower modes of vibration in horns are too dissonant for use in music although the upper modes vibrate in ratios close to the monochord ratios. Euler also wrote on the vibrations of air in organ pipes and horns. The laws of the propagation of cylindrical and spherical waves that he determined have been applied to the design of twentieth century loudspeakers. ≣

Selected References

A.H. Benade. "Fundamentals of Musical Acoustics" Oxford University Press (1976).

C.B. Boyer. "A History of Mathematics" Princeton University Press (1985 paperback printing). Contains biographical information on Bernoulli and Euler.

"The New Grove Dictionary of Music and Musicians" (1980)."Bernoulli, Daniel," "Euler, Leonhard," "Physics of Music."

D.H. Hall. "Musical Acoustics." Wadsworth Publishing Company (1980).

Herman Helmholtz. "On the Sensations of Tone" Dover (1954 re-publication of 1885 English edition). "Tuning Forks" by translator Alexander J. Ellis.

J.W.S. Rayleigh. "The Theory of Sound" Dover (1945 reprint of 1894 edition). Contains Bernoulli and Euler formulas — quite technical; "Historical Introduction" by Lindsey — less technical.

"The Dictionary of Scientific Biography" Charles Scribners Sons (1970). "Bernoulli, Daniel."

A. Wood. "The Physics of Music" Chapman & Hall, Ltd. (1975 edition of 1944 publication).

Note: Following are corrections of errors in previous articles:

November 1989, pgs. 29-30: change exponents and formulas shown from 1/2 to 1/2.

March, 1990, pg. 37, column one, lines 21 and 22: change original wording to "outer and inner diameters D and d can now be expressed as:" With apologies, J.G.

PTG's Texas Roundup

Let Us Put Our PTG's Texas Roundup Brand On You!

Hyatt Regency Dallas at Reunion — July 7-11, 1990

In the shadow of Reunion Tower, SCRVP Danny Boone prepares to wield the PTG branding iron.

Don't miss Dallas:

- *More than 90 Institute Classes taught by leading independent and company-sponsored instructors. Many classes are small hands-on workshops.*
- *Optional special classes: "Soundboard Replacement" and "Polyester Touch-up And Refinishing."*
- *Exhibits by our manufacturer and supplier friends.*
- *Spouse program, including optional tour of Dallas and Dallas Repertory Theater presentation.*
- *Hyatt Regency Dallas Convention room rate: $66 single/$76 double.*
- *Plan now to attend — save $20 by registering before June 4! Visa and MasterCard accepted.*

Convention Registration Form

Name: _____ Telephone: _____

Nickname for badge (if different from above): _____

Home address: _____

City: _____ State/Province: _____ Zip: _____

Country: _____ Are you visually impaired? ☐ Yes ☐ No

Guild member? ☐ Yes ☐ No If yes, what chapter? _____

Region: _____ Chapter #: _____

Spouse name (if registering): _____

Spouse nickname: _____

Is he or she a member of the PTG Auxiliary? ☐ Yes ☐ No

Quantity		*Before June 4*	*After June 4*	*Total*
_____	Guild member:*	$ 110	$130	$_____
_____	Non-member:	150	170	_____
_____	Auxiliary member:*	45	55	_____
_____	Non-Auxiliary spouse:	55	65	_____
_____	Banquet ticket:	28	28	_____
_____	Closing luncheon:	20	20	_____
	Special Classes			
_____	Soundboard Replacement	40	40	_____
_____	Polyester Touch-up			_____
	And Refinishing	40	40	
_____	Auxiliary Tour of Dallas	30	30	_____
Total enclosed				$_____

Please charge to my credit card: ☐ Visa ☐ MasterCard

Card Number: _____ Expiration Date: _____

**Note: All membership dues and fees must be paid in full before the convention begins*

Send To:
Piano Technicians Guild, Inc.,
4510 Belleview, Suite 100,
Kansas City, MO 64111

Office Use Only: ID: _____ Seq: _____
Date: _____ Check: _____ Badge: _____

APRIL 1990 MEMBERSHIP

New Members

REGION 1

CHAPTER 021 — BOSTON, MA

DIEDRE S. CONWAY
84 PEMBROKE STREET
BOSTON, MA 02118

NATAN PAVLOVSKY
9 HEFFERNEN STREET, APT. A
ALLSON, MA 02134

CHAPTER 054 — VERMONT

DANIEL DOVER
116 FLORAL STREET, #1
NEWTON, MA 02161

CHAPTER 061 — OTTAWA, ON

DICK PAPALIA
1412 BANK STREET
OTTAWA, ON K1H 7Y9

CHAPTER 131 — SYRACUSE, NY

JOHN A. MCDONALD
63 ROCK ISLAND STREET
GOUVERNEUR, NY 13642

CHAPTER 151 — PITTSBURGH, PA

RICHARD E. ANKNEY
930 SEWICKLEY ROAD
BEAVER FALLS, PA 15010

REGION 2

CHAPTER 278 — PAMLICO, NC

CHARLES B. NELSON
102 HODGES STREET
P.O. BOX 385
MOREHEAD CITY, NC 28557

ALTON G. TRITT
1409 HURLEY STREET
ROANOKE RAPIDS, NC 27870

CHAPTER 327 — CENTRAL FLORIDA

THEODORE J. SIMMONS
590 OAK PARK CIRCLE
MERRITT ISLAND, FL 32953

CHAPTER 335 — SARASOTA-FT. MEYERS, FL

LUDWIG H. MORHARD
5920 24TH AVENUE S.W.
NAPLES, FL 33999

CHAPTER 381 — MEMPHIS, TN

EDDIE L. WILLIAMS
2507 MARY JANE DRIVE
JONESBORO, AR 72401

REGION 3

CHAPTER 701 — NEW ORLEANS, LA

ALLEN P. MOCKLIN
4645 MEADOWDALE ST.
METAIRIE, LA 70006

HERB J. TASSIN
104 ROSE MANOR CT.
BELLE CHASSE, LA 70037

CHAPTER 727 — NORTHWEST ARKANSAS

STONEY W. COPELIN
1811 EL CONTENTO CR.
BENTONVILLE, AR 72712

CHAPTER 752 — DALLAS, TX

KARL W. SCHILKEN
807 N. ANGLIN
CLEBURNE, TX 76031

CHAPTER 787 — AUSTIN, TX

DAVID A. BREAUX
4003 JAFFNA COVE
AUSTIN, TX 78749

CHAPTER 791 — NORTHWEST TEXAS

ELSON E. CLARK
P.O. BOX 19202
AMARILLO, TX 79114

REGION 4

CHAPTER 452 — CINCINNATI, OH

ERIC WOLFLEY
2206 OHIO AVENUE
CINCINNATI, OH 45219

CHAPTER 454 — DAYTON, OH

KENNETH E. DAVIS
2522 HILLSIDE AVENUE
SPRINGFIELD, OH 45503

CHAPTER 493 — WESTERN MICHIGAN

LYN G. NELSON
8280 HANNA LAKE RD.
CELEDONIA, MI 49316

CHAPTER 601 — CHICAGO, IL

JEFFREY R. GROSSER
992 CHIPPEWA DRIVE
ELGIN, IL 60120

STEVEN J. HARRIS
256 S. HARRISON AVE.
KANKAKEE, IL 60901

REGION 5

CHAPTER 553 — TWIN CITIES, MN

F. STEVE MALLOY
838 WASHINGTON ST.
ANOKA, MN 55303

CHAPTER 585 — NORTH DAKOTA

CHRISTOPHER ROOKE
BOX 601
WILTON, ND 58579

REGION 6

CHAPTER 851 — PHOENIX, AZ

BARRY HEINTZELMAN
5704 W. THOMAS ROAD, #108
PHOENIX, AZ 85031

DAVID J. ROSS
31 E. GENEVA DRIVE
TEMPE, AZ 85282

CHAPTER 901 — LOS ANGELES, CA

ANNA C. BARNETT
2104 VIA RIVERA
PALOS VERDES EST, CA 90274

CHAPTER 905 — SOUTH BAY, CA

MARY J. TOGIOLA
1451 N. AVALON BLVD., #7
WILMINGTON, CA 90744

CHAPTER 917 — POMONA VALLEY, CA

RUDOLF A. PYKA
1804 VALLE VISTA DR.
REDLANDS, CA 92373

CHAPTER 926 — ORANGE COUNTY, CA

SETH M. ANDERSON
P.O. BOX 3279
FULLERTON, CA 92634

CHAPTER 945 — GOLDEN GATE, CA

MARK K. TOUTJIAN
670 GREGORY LANE, STE. A-120
PLEASANT HILL, CA 94523

CHAPTER 953 — MODESTO, CA

JOHN E. KING
3720 FELKIRK WAY
MODESTO, CA 95356

REGION 7

CHAPTER 972 — PORTLAND, OR

JEFFREY R. MOORE
2081 N.W. EVERETT, #112
PORTLAND, OR 97209

Reclassifications

REGION 1

CHAPTER 118 — L.I.-CRISTOFORI, NY

STEPHEN C. FAIRCHILD, JR.
428 GRANADA PKWY.
LINDENHURST, NY 11757

CHAPTER 165 — ERIE, PA

LOREN R. DI GIORGI
411 E. ELIZABETH ST.
NEW CASTLE, PA 16105

REGION 4

CHAPTER 441 — CLEVELAND, OH

LYNN H. GILMORE
5125 BEACHVIEW CIRCLE N.W.
CANTON, OH 44708

CHAPTER 600 — WAUKEGAN, IL

RICHARD T. SCHWINN
111 HAPP ROAD
NORTHFIELD, IL 60093

REGION 7

CHAPTER 841 — SALT LAKE CITY, UT

EILEEN L. KEEN
365 E. COATSVILLE AVE.
SALT LAKE CITY, UT 84115

Coming Events

July 7-11, 1990	**33rd Annual PTG Convention & Techncial Institute** Hyatt Regency Dallas At Reunion Contact: Piano Technicians Guild, Inc.; 4510 Belleview, Suite 100; Kansas City, MO 64111 (816) 753-7747
Sept. 15, 1990	**Rhode Island One Day Seminar** Narragansett Christian Brothers Center Contact: Kirk Russell; 37 Liberty Street; Wakefield, RI 02879 (401) 783-1966
Sept. 28-30, 1990	**Florida State Seminar** Hilton Hotel, Pensacola, FL Contact: Danny Lyons; 1224 E. Cervantes Street; Pensacola, FL 32501 (904) 438-8969
Oct. 5-7, 1990	**Ohio State Conference** Days Hotel, North Randall (Cleveland, OH) Contact: Bob Russell, 1414 Lander Road, Mayfield Heights, OH 44124 (216) 449-5212
Oct. 18-21, 1990	**New York State Conference** Holiday Inn, Binghamton, NY Contact: Donald R. McKechnie; 1660 Slaterville Road; Ithaca, NY 14850 (607) 277-7112
Oct. 19-21, 1990	**Wisconsin Days** Yahara Center, Madison, WI Contact: Norman Sheppard; 5715 Cedar Place, Madison, WI 53705 (608) 233-3844

Auxiliary Exchange

President's Message

In just a few short weeks our PTG Annual Convention will take place in the second largest city in Texas. Dallas, which was named after George Mifflin Dallas, Vice President of the United States during James Polk's administration, was a modest town of under 10,000 in 1841. It sprang up around John Neely Bryan's log cabin on the banks of the Trinity River. His cabin served as Dallas' first Post Office and Courthouse. Now located at the corner of Market and Elm Streets, it is one of several historic areas maintained in the city; and certain to be seen on our Monday tour of Dallas and environs.

Brochures promoting events in Texas often suggest that parents take their youngsters to Six Flags Over Texas. In case anyone asks what about these six flags, here's a capsule history background. Over 400 years ago, European monarchies sent their adventurers to the New World in quest of a Northwest passasge to India. Spanish explorers ventured all over the west and southwest. From California to Mexico, and other areas known as "New Spain," they colonized and established settlements. Names such as de Pineda, Coronado, Guadalajara and Lopez claimed lands for Spain. French missionaries and LaSalle explored and laid claim to lands bordering the Mississippi, for the monarchy of France. Texas' first flag was that of Spain; her second belonged to France as part of the Louisiana Purchase when President Thomas Jefferson proclaimed that Louisiana extended all the way to the Rio Grande. When Mexico won its independence from Spain in 1821, Texas became a state in the new federal republic, and the flag of Mexico was flown. From 1836-45, Texas became an independent nation — the Texas Republic — flying its ensign of the Lone Star State. The desire to annex to the United States culminated in annexation on February 16, 1845. Its fourth flag was lowered and the "Stars and Stripes" was raised.

With the onset of the Civil War the people of Texas by popular vote ratified an ordinance of secession. It was then that Texas flew its fifth flag of the Confederacy. Five years after the end of the Civil War on March 30, 1870, Texas was readmitted to the Union. Once again Texas raised the flag of the "Stars and Stripes."

With the foregoing mini-history we may look upon Dallas in true wonderment. From a semi-rural town it grew like a cloud burst. Oil gushed in Texas in the 1930s and oil wealth in Dallas created a booming economy supplemted by electronics, furniture and clothing manufacture, and insurance companies. Do come and enjoy this metropolis as well as the program and classes available to us at this 1990 event.

Agnes Huether

Here And There

Some of our Auxiliary members had expressed the hope that on their visit to the international convention in Dallas, they might have the opportunity to view Southfork Ranch, home of J.R. Ewing, the fictional oil tycoon portrayed by Larry Hagman in the TV production, Dallas. Well, sad to report the ranch's real owner has had financial difficulties and the property is posted for foreclosure. According to the *Bergan County Record* (New Jersey), J.R. Ewing would never have let it happen. He would have persuaded a real-life Dallas lending firm not to foreclose on his ancestral home. But back in the real world this apparently could not be done. The 41-acre ranch is slated for sale at auction in the near future. We explored the possibility of a visit to the ranch. Upon learning that no animals are stabled there in the summer, and there are no shade trees or areas to enjoy in the Texas heat, we chose not to include a trip to Southfork in our itinerary.

Among nine women who were named outstanding mothers of 1990 by the National Mother's Day Committee is *Annette Strauss*, the Mayor of Dallas.

Agnes Huether, Editor

Birthday Greetings

May		June			
1	Kathleen Olson	2	Joan Pulsifer	1	Jewell Sprinkle
3	Dorothy Trader	3	Ruth Levitch	4	Mila Cox
5	Sandra Shaffer	5	Dorothy Neie	4	United States of America
7	Dorothy Brown	8	Ruth Kochenower	6	Dorothea Odenheimer
10	Maryann Ryder	10	Antionette Tassoni	8	Brenda Hallmark
11	Arlene Paetow	13	Susan Birch	9	Margaret Green
12	Mary Thomason	22	Ingrid Gotrich	14	Lois Meissner
13	Joan Morris	23	Belle Schorr	14	Jennifer Reiter
18	Celia Bittinger	23	Pauline Miller	16	Jean Sanders
19	Theresa McCleskey	26	Deborah Farmer	19	Jean Carraher
21	Jeanna Wilson	29	Frances Goodwin	22	Dorothy Wilkerson
23	Helene Kingsbury	30	Sarah Lampiasi	24	Ruby Savereide
25	Walter Trohan	July		28	Margaret Moonan
29	Mary Tisdale	1	Patricia Harris	29	Sharon Corrigan
				29	Nita Kadwell

But My Wife Works

I have just returned from a PTG seminar. While there I overheard once again the line which has prompted me to write this article. A technician in discussion with a member of the Auxiliary replied, "But, my wife works full-time..."

Without listening further I knew this statement was supposed to explain why his wife doesn't participate in the Auxiliary. I felt this technician and his wife needed the Auxiliary more than they realized.

I feel I am a funny mix myself when it comes to the Auxiliary. When I joined the Auxiliary in the 1970s, I felt I was joining a group of older women who represented an old-fashioned concept in women's groups. The feminist in me scoffed at some of the cutesy things I saw. I felt I suffered through some silliness and lack of purpose to be with people who were friendly to me and gave me something to do while my husband attended these conventions that meant so much to him.

When I was president of the Auxiliary in the 80s, I tried to blend the old-fashioned social traditions of the PTGA with programs which would reach out to younger members and spouses. I felt

that somehow if we offered business classes for spouses we would find a sense of purpose and be better accepted by skeptical spouses and technicians.

Now in the 90s I identify with the older ones because I feel like I have been around forever. But I also have links to the younger ones because my husband, Ron, and I also have two young sons who accompany us to seminars. I work in the family piano business, but I also have my own career as a French teacher. I feel we need to keep pursuing a sense of purpose in the Auxiliary, but I feel one of the most significant purposes we have is to offer a way for people to get to know each other and feel comfortable talking with each other.

Many of us who donate our time to PTG or PTGA do it because of the ties we have with these two organizations. We feel these organizations are more like extended family than impersonal business contacts. Over the years we have become friends with other members. We have shared some of our happiest times together as tourists in different cities and even in different countries. We have shared some of our personal sadnesses and disappointments as we sat in hotels away from home with time to listen and time to talk.

Some technicians reject this family image. They feel it is more desirable to be "professional" and to compare piano technicians to doctors and lawyers. I have never felt that being "professional" precludes one from building friendships or bringing one's family to a seminar or supporting the Auxiliary. I certainly do not feel it diminishes the importance of my own career for me to pay $10 annual dues to the PTGA so I can share my husband's enthusiasm for his profession. If there were some way my husband could join a formal group of spouses of people in my career, he would join without hesitation. We respect each other, and we share an appreciation for things that are important to each other.

We should all support the PTGA and be pleased it exists. Instead of it being a throwback to prior generations it may be a harbinger of what other organizations will be doing. Young professionals in the 90s are fast realizing it is extremely difficult to mesh husband's career, wife's career and children's needs. An organization like the PTGA can be viewed as a facilitator for family understanding.

In contrast to the technician who said, "But my wife works full-time..." there was at the same seminar a man, a professional in his own right and a member of the Auxiliary, who came with his wife and son to share the weekend. Dad and son spent time exploring the lobby, seeing friends and enjoying each others' company while Mom went to technical classes. At night they went out with friends. A real PTG-PTGA family.

If you have just begun to realize how membership in the Auxiliary for your spouse can promote family understanding and communication as well as friendships with other families, then you are probably ready to have your spouse enroll as a member. Send a check (payable to PTGA) for $10 to membership chairman Arlene Paetow; Rt. 1, Box 473; High Falls, NY 12440.

Julie Berry

1990 Convention Schedule For PTG Auxiliary

Saturday — July 7th

9:00am Executive Board meeting

9:00am Auxiliary Hospitality Room opens. The Dallas PTGA members will answer queries about the city.

Sunday — July 8th

9:00am Auxiliary Opening Assembly-Hospitality Room "A Welcome To Dallas" — Sue Speir, Dallas PTGA. A brief history of Dallas by Rose-Mary Rumbley from Festivities, Inc.

9:45am Get Acquainted Coffee and Danish

10:15am Member-At-Large Meeting

10:30am Council Meeting

1:30pm Program On The Harp — Barbara Boone, Waco, TX, PTGA

3:30pm Auxiliary Tea... Scholarship winners Eric Thompson of San Antonio, and James Lutz of Houston will play their winning performances. Barbara Boone will play selections on the harp .

Monday — July 9th

9:30am Assemble in lobby

10:00am Depart for Optional Tour of Dallas including Thanksgiving Square, Kennedy Memorial, Reunion Arena, Old City Park, Dallas Market Center Area, The Morton Meyerson Symphony Hall (designed by I.M. Pei) and more. After the tour we stop at Northport Mall to shop, browse or lunch... before leaving via bus for the Dallas Repertory Theatre. Following the program, English Tea will be served with petite sandwiches and pastries.

4:00pm Return to the Hyatt Regency

6:30pm PTG Banquet and Steinway Reception afterward

Tuesday — July 10th

9:00am "A Technician's Wife Looks at the Piano Industry and It's Future" Eleanor Ford, New York City PTGA

12:30pm Installation Luncheon — Randy Potter will provide music for our dining and listening pleasure. The new officers to the Board will be installed following the luncheon by Jeanine Geiger, Houston, TX, PTGA.

4:00pm Post Council Board Meeting

Wednesday — July 11th

8:00am "Piano Teachers and Their Trade" — Ginny Russell, Mayfield Heights, OH, PTGA. This class is for music teachers who are piano technicians as well as Auxiliary spouses in attendance at the convention. David Rostkoski, Chairman of the Teacher Relations Committee, has extended his invitation to the Auxiliary. Class will be held in Regency Room A.

12:30pm Closing Luncheon

PTG Auxiliary Executive Board

President/Exchange Editor
Agnes Huether (Charles)
34 Jacklin Court
Clifton, NJ 07012
(201) 473-1341

Vice President
Arlene Paetow (William)
Rt. 1, Box 473
High Falls, NY 12440
(914) 687-0364

Recording Secretary
Judy White (Charles)
Rt. 1, Box 134
Alma Center, WI 54611
(715) 964-8566

Corresponding Secretary
Marge Moonan (William)
811 Amherst Drive
Rome, NY 13440
(315) 337-4193

Treasurer
Barbara Fandrich (Delwin)
10131 S.E. Talbert
Clackamas, OR 97015
(503) 653-7576

Immediate Past President
Ginger Bryant (James)
1012 Dunbarton Circle
Sacramento, CA 95825
(916) 929-5706

Classified Advertising

Classified advertising rates are 35 cents per word with a $7.50 minimum. Full payment must accompany each insertion request. Closing date for ads is six weeks prior to the month of publication.

Ads appearing in this publication are not necessarily an endorsement of the services or products listed.

Send check or money order (U.S. funds, please) made payable to Piano Technicians Journal, *4510 Belleview, Suite 100, Kansas City, MO 64111.*

For Sale

"PIANO REBUILDER'S HANDBOOK OF TREBLE STRING TENSIONS" The ideal way to easily analyze the scale when restringing. Available hardbound from your supply house. $35.00.

PRE-HUNG HAMMERS: We are now equipped to pre-hang Nu-Tone, Imadegawa or Isaac grand hammers to your samples (for almost any grand piano) on new shanks and flanges for an $80.00 pre-hanging fee. An example of the total price for a Steinway M, using Nu-Tone mahogany molding hammers, Tokiwa shanks and flanges, pre-hung with hot animal hide glue, would be $442.00 complete. Highest quality workmanship, fast turn-around time, ready to screw on. Expect minimum travel and burn-in. **Write or call Wally Brooks; Brooks, Ltd.; 376 Shore Road; Old Lyme, CT 06371 (203) 434-0287**

NEW PIANOS Consoles $1095 — Studios $1295. High polish, walnut, ebony, mahogany. 12-year warranty — F.O.B. Los Angeles. Increase your income — Exciting profits. **Wilton Sykes; 129 E. Hartford; Phoenix, AZ 85022; (602) 942-5800 — FAX (602) 942-9721**

PIANO KEYS RECOVERED — 52 whites with .075 tops with fronts — $65.00. 36 sharps $35.00. Your choice of pre-paid or on open account. Average three working days turn-around time. Money-back guarantee. Sent UPS or parcel post. We return UPS. **Kreger Piano Service; Rt. 1, Box 693-T; Ottertail, MN 56571. (218) 367-2169**

PIANO BENCHES Ebony, walnut, mahogany — polish. Padded, full-size, music compartment. Six minimum, $55 each, F.O.B. Los Angeles. Check in advance to **Wilton Sykes; 129 E. Hartford; Phoenix, AZ 85022. (602) 942-5800 — FAX (602) 942-9721**

SIGHT-O-TUNER SERVICE: Repairs, calibration & modifications. Fast, reliable service. **Richard J. Weinberger; 18818 Grandview Drive; Sun City West; AZ 85375. (602) 584-4116**

FOR SALE: A luxurious Louis XVI Steinway in mint original condition 21k; the ultimate piano — a Mason Hamlin 7' grand refinished and rebuilt, brown mahogany 22k. **Call Steve. Hewitt Pianos; 13119 Downey Avenue; Paramount, CA 90723. (213) 923-2311.**

FLORIDA BUSINESS— mid-state. Contact Jeanne LeFeber; 2315 Broadway; Lakeland, FL 33801 (813) 665-3104 p.m. and Sundays

PIANO SERVICE BUSINESS FOR SALE. New Brunswick, Canada. Excellent income. Solid institutional base, strong repeat clientele with 70% grand piano emphasis. Full details available in brochure. **P.O. Box 40, Elgin, NB, Canada. E0A 1P0. (506) 756-8201**

FOR SALE: Chicago area tuning and rebuilding business. Established over 20 years. Now relocating. High income. All customers on data base. Service a large number of pianos in a small radius. High frequency accounts. **Call (708) 383-0195** for price.

STEINWAY GRAND LOCK ESCUTCHEONS. New duplicates of original part. Available in raw brass for polishing or custom plating @ $10 each, or preplated in polished nickel slightly higher. VISA/MC **Richard Anderson, RTT (708) 464-4500.**

FOR SALE: San Francisco School of Piano Tuning; 657 Mission Street; Suite #507; San Francisco, CA 94105 (415) 543-9833

SUPERIOR QUALITY FULL-COLOR PRINTED ADVERTISING PRODUCTS AT VERY ECONOMICAL PRICES. Business cards, postcards, rolladexers, calendars, flyers. Call or send good quality print or slide with rough layout and copy for quick quote. **KOSTELECKY PHOTOGRAPHICS; 923 Pike; St. Charles, MO 63301 (314) 946-2483 FAX (314) 925-1612.**

CUSTOM PIANO COVERS MADE TO YOUR SPECIFICATIONS. Perfect for any storage or moving situation. All work guaranteed. Also available, many gift items. Send for brochure and samples. **JM FABRICations; 902 185th Street Court; East Spanaway, WA 98387. (206) 847-6009**

"COMPONENT DOWNBEARING GAUGES (bubble type) give readings in degrees (string angle) and thousandths of an inch (dimension). Available at supply houses. **Box 3247; Ashland, OR 97520."**

88 PIANO KEYS REBUSHED fronts and centers with extra quality felt, $45.00. Return freight paid with prepaid orders. **Tommy L. Wilson; 1418 Ewell Avenue; Dyersburg, TN 38024. (901) 285-4046**

PIANO HAMMERS AND ACTION PARTS for the rebuilder. Highest quality, Nu-Tone (Knight), A. Issac, Imadegawa, and Tokiwa. Large inventory, quality boring and shipping. Fast service. Honest, knowledgeable technical support. Try the new Nu-Tone hammers on mahogany moldings, Excellent! Prehanging on new shanks available. **Wally Brooks; Brooks, Ltd.; 376 Shore Road; Old Lyme, CT 06371 (203) 434-0287**

HANDCRAFTED SOUNDBOARDS by NICK GRAVAGNE. Ready-to-install crowned boards or semi-complete. Your choice. Ordering and installation instructions $15.00. **20 Pine Ridge; Sandia Park, NM 87047. (505) 281-1504.**

LEARN PIANO TUNING — Small classes; personal attention; Cal State & Vets approved; NOT a mail-order course. Call or write for free brochure. **S.F. School of Piano Tuning; 657 Mission Street; Suite 507; San Francisco, CA 94105. (415) 543-9833** "Our 9th Year."

RESTORATION OF CARVED WORK, turnings, inlays, and marquetry, including repair of existing work and reproduction of missing pieces. **Edwin Teale; 19125 S.W. Kinnaman Road; Aloha, OR 97007. (503)642-4287**

WHY SETTLE FOR LESS THAN THE BEST? We have the finest tools: SOLID BRASS ACCUCAULS, BUSHMASTER, KEY BUSHING IRON; we have the fastest, most accurate, and easiest to learn method: THE ACCUBUSH SYSTEM; and now we have the best deal for ordering. Call toll free: 1-800-388-BUSH(2874). Join the experts who agree: THE ACCUBUSH SYSTEM is the BEST system for rebushing keys! (Many have already changed over; if you haven't you are losing time and money). MASTERCARD & VISA accepted. **KEY BUSHING SUPPLY; 84A Main Street; Kingston, NH 03848. For information only, call (603)642-3633.**

BUMPER STICKER. "Piano Tuners Still Make House Calls." Two-color with graphics. Send $5.00 to **B.S.E.; P.O. Box 93297; Rochester, NY 14692.** NY residents add sales tax. MC/VISA orders, **1-800-327-2700, ext. 230D**

AUBREY WILLIS SCHOOL — Our home study course in piano tuning, repair and regulating has been used by hundreds to learn the basics. Accredited member National Home Study Council. No cost information. **Aubrey Willis School; 1212 West Camelback Road; Phoenix, AZ 85013.**

THE GUIDE $10. The Piano Technicians Guide. A job-time study and work guide. Revised and printed to fit a pocket. **Newton J. Hunt, Piano Tuner-Technician; 74 Tunison Road; New Brunswick, NJ 08901. (201) 932-6686**

"LET'S TUNE UP" $20.00 per copy. Last few hardbacks will soon be gone. No immediate plans for another printing. Paperbacks still available at $17.50. Make checks payable to **John W. Travis; 8012 Carroll Avenue; Takoma Park, MD 20912.**

ACCU-TUNER TOOL CASES. "Newly Redesigned." 4 sizes ($120, $150, $180, $200). For Accu-Tuner and Tools. **Bob Conrad, (800) 776-4342.**

NOW HIGH DENSITY POLYETHYLENE key bushing cauls for two-caul method featured in August '88 *Journal*. Precision machined, tough, & glue proof, in quantities of 45, 90, or 180, 25¢ ea. Available for key pin sizes .087", .125", .131", .133", .137", .146", & .163". Also key clamps, felt knives, gram weight sets & soundboard cleaners. For brochure, call or write **Bill Spurlock; 3574 Cantelow Road; Vacaville, CA 95688. (707) 448-4792**

PREFER TO REBUSH both sides of mortise at once? Now manufacturing conventional double-shouldered bushing cauls of high density polyethylene, 25¢ each. **Bill Spurlock.**

SANDERSON ACCU-TUNERS from Authorized Distributor. The most accurate and advanced tuning aid available. Tuning lever note switch for Accu-Tuner $25. Consignment sale of used Accu-Tuners and Sight-O-Tuners or new Accu-Tuner customers. Call for details. **Rick Baldassin; 2684 W. 220 North; Provo, UT 84601. (801) 374-2887**

52 PIANO KEYS RECOVERED — .50-$50.00; .060-$60.00; .075 with fronts—$75.00. New sharps—$32.00; sharps refinished—$17.50. Keys rebushed, felt—$60.00. Return freight paid with prepaid order. **Charles Wilson; 1841 Kit Carson; Dyersburg,TN, 38024. (901) 285-2516**

SO YOU WANT TO BE A CONCERT TECHNICIAN, by Norman Neblett. This informative lecture, professionally recorded and edited in May 1988, is now available on cassette. $10 postpaid. **Rick Baldassin, 2684 W. 220 North; Provo, UT 84601.**

FOR SALE: Full line of technician tools and supplies. Serious inquiries only. Best offer. For inventory write: **Combo Piano Company; 3024 Mountain Heights Road; Front Royal, VA 22630.**

FOR SALE — "A Guide To Restringing" Paperbacks $16.50 plus $1.50 for postage and handling. Hardbacks $21.50 plus $2.00 for postage and handling. Order today. Sorry, no COD's. Make check or money order payable to: **JOHN TRAVIS; 8012 Carroll Avenue; Takoma Park, MD 20912.**

THE RANDY POTTER SCHOOL OF PIANO TECHNOLOGY — Home Study programs for beginning students, associate members studying to upgrade to Registered Tuner-Technician, and RTT's wanting to continue their education. Tuning, repairing, regulating, voicing, apprentice training, business practices. Top instructors and materials. Call or write for information: **RANDY POTTER; RTT; 61592 ORION DRIVE; BEND, OR 97702. (503) 382-5411** See our ad on page 3.

HARPSICHORD AND FORTE-PIANO PARTS and kits, original factory materials from the finest early keyboard suppliers in the world. Also troubleshooting and assistance to fellow RTT's on harpsichord problems. Authorized Zuckermann Agent. Lowest Factory-Direct Prices — buy from the source. Catalogs, price lists free. **Yves A. Feder, RTT; Harpsichord Workshops; 2 North Chestnut Hill; Killingworth, CT 06417. (203) 663-1811**

STATE OF THE ART KEY COVERING — 52 piano keys recovered .075 with fronts — $85.00. Premium Work — includes tops and fronts resurfaced, clean and renew wood and back check coverings, polish capstans. New sharps, $45.00. Return freight paid with prepaid order. Fast service. *"Try us, you'll like us."* **Mr. C. Brunkow; 4991 104th Way North; St. Petersburg, FL 33708 (813) 397-1699.**

FOR SALE: Profitable piano tuning and repair business in Toledo, Ohio. Am relocating with new career. **Contact Gene Wood (419) 385-0131.**

NILES BRYANT SCHOOL — Since 1898 Piano tuning, regulating and repairing learned easily at home through time tested method proven over 90 years of continuous service. ELECTRONIC ORGAN SERVICING also covered. World's only home study course covers all makes and models and contains over 100 pages of schematics. **Write or call: NILES BRYANT SCHOOL; Dept. G; P.O. Box 19700; Sacramento, CA 95819. (916) 454-4748 (24 hrs.)**

DON'T LEAVE HOME without your bottle of Pearson's Super Glue ($3.25) or your tungsten carbide sanding file ($7.00). Rapidly becoming an essential part of every technician's bag-of-tricks (Postage extra). **Steve Pearson Piano Service; 831 Bennett Avenue; Long Beach, CA 90804. (213) 433-7873**

NEW SOUNDBOARDS MADE FOR YOU. Ship old board. New board comes to you ready for installation. Send for instruction on: **Victor Video Tapes; $94.75. Victor A. Benvenuto; 6825 Germantown Avenue; Philadelphia, PA 19119. (215) 438-7038**

VICTOR A. BENVENUTO VIDEO TAPES, PIANO TUNING AURAL/ ELECTRONIC — $175. The most accurate approach to fine tuning. KEY MAKING, $124.75. GRAND REBUILDING (2 tapes), $225.75. Preparation, pinblock replacement, damper installation, restringing. GRAND REGULATING, $175.75. SOUNDBOARD REPLACEMENT, $94.75. Ship old board — new board comes to you ready for installation. Please specify VHS or Beta. All prices include shipping. **THE PIANO SHOPPE; INC.; 6825 GERMANTOWN AVENUE; PHILADELPHIA, PA 19119. (215) 438-7038**

PLATING-PIANO HARDWARE. Stripping, buffing, and NICKEL plating, with hinges up to 60" lengths $125-$225/ set, depending on quantity of parts included. Enclose packing list indicating number of screws with description and quantity of items. REFERENCES AVAILABLE. COD delivery in 2-3 weeks. A.R.O.M. throughout the U.S.A.! We will serve you with quality & reliability. **CRAFTECH ELECTROPLATING; #46R Endicott Street; Norwood, MA 02062. (617) 769-0071 days, (617) 469-9143 evenings.**

FOR SALE: Tuning business on the beautiful island of Guam. Economy is booming, great opportunity for piano-music store, as there aren't any on the island. Included in business: customer list, piano moving trailer with dolly, and 1986 Nissan Stanza van wagon. $10,000. Business available September 1991. **Sharon Wenzel; 388 Ypao Road; Tamuning, Guam 96911. Or please contact at PTG Convention in Dallas.**

BUCKSKIN for recovering grand knuckles and backchecks, upright butts and catchers. The "original equipment" supplying the industry for 140 years. **Richard E. Meyer & Sons, Inc.; 11 Factory Street, P.O. Box 307; Montgomery, NY 12549 (914) 457-3834**

NEW PRODUCT TO BE INTRODUCED AT DALLAS CONVENTION:

PROTEK Center Pin Cleaner Lubricant is new technology for the piano industry. PROTEK formulation is excellent for removing verdigris from old Steinway actions, and provides lasting protection against future build-up. It does not dry out, only the solvents dry, leaving the active ingredient Flouropolymers, a dry lubricant. PROTEK can be used for all general lubricating and on new parts as well. It has many advantages over older lubricants such as silicone. Unlike silicone PROTEK does not travel or creep with gravity. PROTEK has very high adhesive properties. PROTEK will not harm wood, plastic, metal, felt or the piano finish. PROTEK is non carcinogenic and the solvents are environmentally safe.

PROTEK Center Pin Cleaner Lubricant sells for $5.95 for a 4oz bottle and is available through **Ford Piano Supply**, or write to **PROTEK; P.O. Box 99: Port Jefferson, New York 11776.**

Look for our display at the Annual PTG Convention in Dallas, Texas.

Wanted

WANTED: STEINWAY AND MASON HAMLIN GRANDS. All sizes and cabinet styles. **Ask for Karen Bean at (415) 676-3355. Piano Finders; P.O. Box 23814; Pleasant Hill, CA 94523.**

WANTED: Journal back issues and index. **Paul Klaus; Rt. 8, Box 177; Edwardsville, IL 62025**

WANT TO BUY: One set of wall-type tubular **chimes** with keyboard. New or used. For church sanctuary. Send information to Harry Berg; 2612 Gill; Bakersfield, CA 93306

WANTED: Complete Ampico A action with push up fingers for 5'8" Knabe circa 1919. Need drawer, stack, expression pneumatic and pump. Will consider buying junk piano with complete action also. **The Piano Works; John A. Bailey; Pemberville, OH (419) 287-4848**

WANTED: Still looking for Steinway player grand in fancy case (prefer unrestored). Will also consider Mason & Hamlin, Knabe or Chickering. Reward for successful leads. **Kavouras; 2740 Lighthouse Court; Lynwood, IL 60411. (312) 474-8787**

"ATTENTION — GOVERNMENT SEIZED VEHICLES from $100. Fords, Mercedes, Corvettes, Chevys. Surplus Buyers Guide. **1-602-838-8885 Ext. A15669."**

WANTED: Original style legs and trapwork for Steinway B, 1900. John Glover; Rt. 2, Box 394; Suttons Bay, MI 49682 (616) 271-6974.

TECHNICIAN REQUESTING WORK IN THE U.S. OR CANADA. Experience includes: 2 years — action assembly; 10 years tuning (aural) and repair. **Contact: Nicolas Briza; 118 Bolosan; 2400 Dagupan City, PHILIPPINES.**

WANTED: ASSISTANT PIANO TUNER-TECHNICIAN. New England Conservatory of Music; 290 Huntington Avenue: Boston, MA 02115. Starting date July 1, or as soon as possible. Hours must be flexible. Salary negotiable depending on experience and qualifications. Must be able to tune four pianos a day. Tuning must be stable. Must be qualified to do small repairs on grands and verticals. For an interview: write to **Frank Hanson at the above address or call (617) 262-1120, ext. 235, mornings only.**

WANT TO BUY. Steinway duo-art player grand. Will pay finders fee. Especially want carved (fancy) case. Call Collect, **Jim Brady; (317) 259-4307; 2725 E. 56th Street; Indianapolis, IN 46220.**

INSTRUCTOR WANTED; RTT needed to teach piano repair. Saturday only — flexible — good pay. **S.F School of Piano Tuning — 657 Mission Street; Suite #507; San Francisco, CA 94105 — Tele: (415) 543-9833.**

WANTED!! DEAD OR ALIVE: "Steinway Uprights." Call collect, **Ben Knauer (818) 343-7744.**

"ATTENTION: EASY WORK! EXCELLENT PAY! Assemble products at home. **Details. (1) 602-838-8885 Ext. W-15669,** 6am -11pm, 7 days."

UP TO $1000.00 FINDER'S FEE will be paid for successful purchase of a Mason and Hamlin Ex-Player. I have mechanism to install. **Please call collect (317) 259-4307 or evenings (317) 849-1469. Jim Brady; 4609 Cranbrook Drive; Indianapolis, IN 46250.**

INDEX OF DISPLAY ADVERTISING

Parts as Synonymous with Quality as the Lyon & Healy Name.

What we put into our pianos determines what you can get out of it. That's why the skilled craftsmen who build our Lyon & Healy pianos only use the finest parts in the world.

Parts like Delignit pinblocks, West German cut-thread tuning pins, Roslau strings, Langer actions and Imadegawa hammers. Superior parts equaling superior pianos. And that means fewer troubles for you.

Lyon & Healy has been a leading force in the music industry for over 125 years. See and hear why at the Lyon & Healy Booth (#2829) at the Piano Technician's Guild Convention in July.

Lyon & Healy Pianos
"A STEP ABOVE"

Lyon & Healy

Murray Foreman Joseph Trappa Walter E White Ralph Stilwell Michael Tocquigny Ken Taylor Ginger Dakin Philip E Craig Frank Hambright Ernest C Caviani DeVon Anderson J Sam Corbett Joe Brittin Neil Kusherman Barbara Bennett Charles K Ball Karen Robinson Richard Anderson Skip Becker John Callahan Robert L Murphy Brian S DeTar Roy Hebert Jr Jim Faris Mark Mandell Lewis M Tartar Mark Bunker Chuck Cohen Loren Buntemeyer David S Cesca Elizabeth A Baker Albert H Sutton Richard D Chambers William T Barrett Peter Bondy David P Anderson Steve M Billington Kathleen M Epperson Jack D Boyd David C Betts Charles Pope George Mehaffey D Elwyn Lamb Jim Harvey James Houston Ed Whitting Jr Stephen Lowrance Mark E Adams Dennis Benson James J Callahan Randy E Cox Charles A Garrison Paul Thomas Barber Stephen R Bovie Martha Riley David Eriksen Vann Grimley A Y Hibbard Andrew Gonzales Scott Brotzmann Kenneth Kadwell Susan Edwards Stephanie Cadra-Hawks Peter C Briant Don Cherni Bill Barnett Charles F Beach Byron Nicholson Robert V Liston Newton Hunt George R Morgan Edward Whitting Sr Dennis Gabriel Merrill Cox Michael Jalving Pamela Borum John D Grutzmacher Bob Dillinger David P Carlson Karen Hudson-Brown Laurie J Blakeley Allan Cate Dennis W Nicholson Jerry Berens Scott Colwes John Baird Robert Anderson David H Thomason Raye McCall Marvin A Nigh Christopher L Dincher Michael D Cantrell Jeff C Turner Patrick L Stone Mark Harryman Scott M Freebairn William E Dege Beverly Joe Meade Jack Louis Jr Don R Shoffner Larence Goetsch Russ Petree H Louis Fornoff Brian Derek Elvin Dunlap Richard L Johnson Mike Bingham Craig Fehrenbacher Horace Greeley Anthony J Pascone Jr Evans Brittin Edward F Guerra Michael R Eggehorn James K Grunke Jr Byung Sam Choi Jim Christopher Morgan Rhys McKay Harry Henderson Thomas Reese George P Langford Charles N Morgan Hugh W Smith Carl Warmington Steve Hornbeck Jim Callahan Sr Christie Cornetta Gary L Bruce Don C Tew John J Eisenhart Russell A Forks Ruth Brown Elizabeth Chafey Pamella Consoli Keith A Frazier Leon Graviet Charles Lincoln III Tom Sheldon Carl Mehaffey Mark Anderson Steve Partridge Larry E Graddy Terry Zimmerman Yoshi Nishimura Carl Fischer Amos Hedrick Denzil R Holman Todd Wray Lorelle Nelson Fred Bruhn Robert Conrad Art Walter Richard D Perry James Thompson Art Seger John Myers Nate Bridges Dan McMahon Al Acevedo David H Horine Randee E Haber Wallace Hall Lee Howe Vivian A Brooks Ralph M Barrus Jack Janes Ned Place Jack Caskey Edward Whitting Jr Paul Edwards Jack Reeves Kenneth Martin Steve Fordham Don Moore Jack Smaha Larry Crabb Kathy Combs Donnie Case Dan Frederick Fred Odenheimer George W King Roger A Hamilton Robert J Bovie Paul Kirchheiner Stuart Davidson Ed Solenberger Herschel Kockenower Nelson C Schantz Robert Dommer William C Fletcher Curt Boughton Ben Bailey E Charles Hanson Kevin Matthews Lindasue Darling Richard J Kawiecki Peter Wolford Roger Metcalf Lois Heindselman Takenori Hirahara Leon Levitch Bela Urban Gay Ornellas Robert S Bussell Fred A Fornwalt David Ilvedson Jim Sulkowski Mark E Clark Larry S Hiller Kathleen Hodge Glen R Hart Edward D Dowling Jim Currey Jon Miles Robert Hundley Michael Reiter Tim Strang Richard Davenport William W Tabor Mark Hullibarger Harvey Cornelsen Alan Eder Dale Probst Judi Edwards Walter A Brown Keith [illegible] Justice Tom Cobble Luc DuQuette Kevin Cory Terry Bannister Ty Reque Dale V Helle Dale S Erwin James H Johnson John P Nardine Cecil Culbreth Susan Graham Wayne Montag Richard G Lowman William E Garlick Frank Reigelman Lee Hintz Michael A Hart Horst Von Raven Timothy Johnson Robert Ballard Roger Gable Ralph Osborn Lucian Brown James Burton Marion B Little Helen Jones Christi Mickel Dave Hanger Mark Mastman Karla Pfenning Lyn Koford Richard A Dightman Paul E Bergan George A Defebaugh Ben Carlton Barry Heismann Art Jones Paul Stephens Joe Tom McDonald Kerry Nicholson Fred W Tremper John B Farrell Herbert A Dady Jr Susan M Deitz Ken Kajkowski Eugene M Rodder Robert Shoffner Frank Lima Gerald M Fruge John Bammes Brian Mott Robert L Onsley Karl E Hooker Charles Richey James Holloway Dick Bowman C W Buchanan Lawrence R Newhouse David Steele Debra Krichevsky Chris Cook Paul E Stewart Richard R Ridenhour Tom Sheehan Gordon Everson Harold Hollingshead Sam Pearlman J F Byers John M Sampson Paul Davis Mary Halbeisen John King David Hallowick Ronald G Gordon Tom Karl Larry E Johnson Roger Rittie James Dowling Joseph W Goheen Mary McNerney Paul Nedveck James Kozak David L Bennett David Merrill Bud Buetow Cecil Snyder Stanley Mittelstadt Pat Green Hans Sander Pete Remneff Kenyon Brown Douglas R Neal Craig Lege Norio Kawato John [illegible] Carol Dailey Bob Ottemann John Denker Charles Farinella Leroy Shultz Donn R Miller Clarke Houser Glen Monson Jerome McKay E Ward Guthrie Roger Stewart Chang Soo Lee Phillip L Mosley Rudolph A Pyka Robert Potter Dennis Scott J Steven Huie Ron Jensen Bernie Baker Robert I Bobst Ned Gilbert Jack A Ware Wade Muncy Harold E Miller Glenn A Brown Clarence P Stout Michael Mackinnon Michael W Morgan David Sposto Il Kwang Seo Phillip Rawson George Whyte Fred Haddad Abdrew E Flanders Kelly Ward Everett Story John Jeffery Daniel D Lundell Karl Stice Roger Osgood Sharon K Oberholtzer Johannes S Warger William G Glesner Jr Carroll Fisher Lloyd [illegible] David Neresoff Robert Sproule Ed R Schroeder Sam Merrill Jr Richard V Patrick Robert L Johnson Herbert Bridgman George Peters Wes Velkov Leonard Hanitchak Robert Hueller John F Wisneski Olan M Atherton Christopher R Carranza Brian Trainor Donald Lee Mitchell Earle L Bailey Mr Paul Magee Harry Firstenberg Robert McDonald Paul Van Dyck Bruce G Owens Sr Roger Snell Ronald Poire Denis Ikeler Dan Mc Spadden Brian Tetreault Robert Grijalva William B Sells Richard G Loomis Nathan Sobel Curtis B Moore Clay Lauve Robert Simmons Hal McRae Patsi Peters Kenneth Serviss R C Carbaugh Des Wilson Bobby Howington Daniel Dube Robert Ost Jean Sauve Charles Rullman Joseph B Martin Jim Rule Jeffrey C Sova Randy Potter Emily Goya Greg Dailey Karl M Roeder Mike Schoap Tom Castronnovo Jr Richard West Al Seitz James H Smith Jr Al Wood Mark Schecter Richard A Beaton Charles Hansen Kenneth Vesely Ed Turnage Michael T Redden Gaines Melyan Mike White Robert E Hurd Christopher Ris J B Tolbert Norman Wilson E A Frazer James Rayl Robert Lake Edward Miller Robert Burton Edward P Jordan Elmer Ruehling Hope E Morrow Ray K Wolff Bruce Silk David Trasoff Lawrence Bock Jack Watmore Jean Michel Stephen S Jellen Curt Corbige Randal Karasik Rick Shandling Robert H Watson Teri Powell Mike Reese Russell Widmayer William C Glesner Sr Ronald D Griffith Steven Sherlock David Rubin Harry E Berg Fred McNally Marla Muckula Richard L Smith Duke Lewis Robert A Anderson John Matthews Paul Seabern Eric M Joslyn Erik P Lingren Harold Dean Garten Alan W Elder Mark Shengle Barbara E Goetsch A Bruce Reese James Sims David A Colpitts Larry J Wicksell Stephen Craw Eben Loewenthal Glen Sipe Sidney Stone Max Springer Kenneth A Snow Edwin A Hilbert Jr Thomas Kaplan Jere Morris Asa Wilkerson Christine S Towne Greg Rorabaugh Brian Steward Thomas L Moyer Jerry Nilsen Jim Amlotte Art Shuter Vete Nowilk Dan Paris Jr Leonard Dickerson Dale S Garman Jimmy L Higgs Jack Baird Stanley Watkins Rose Winstanely Lloyd Ogden Whitcomb Carl Shechtman Bob Kenworthy Martin J Sweeney Don Wigent Webb Phillips Christine Lovgren David Secord Christopher Solliday Dale S Erwin Donald Loftus Stuart Anderson Henry Baskerville Dick Hobson Michael V Edwards Howard McQuigg Matt Walton Virgel Hale Alex Volchonok James V Verdugo Charles A Smith David W Pitsch Bill Wallis Tom Lowell Bryan Uhrig Robert Fenton Jack Frost E A Frazer Paul Francher Jeanne G Hansen Darrell Fandrich Kenneth Johnson William Swackhamer Michael J Vincitore Vernon Paul Williams George Wayne Yockey Alan Whipple Ernest Dege Gregory P Frank Bruno Tassoni Keith P Akins Norman Miller Don Korb Daniel N Kidd Joseph R Vizzini John Witey Elisha Gullixson Martin Wisenbaker Michael Richard Brose Ricky D Heeter Kim M Thomas Paul Schneider Robert W Erlandson Douglas Walton Bill Verity Richard Harris Allan Buchman Jeffrey Schuman L E Minton Art Wilkinson Edward M Joslyn Charles P Willis Stephen L Pearson Gordon Keller Claudia Ellison Robert McNabb Donald J Waldbillig Norman H Neblett William J Wright John Stephenson Bruce L Ziesemer Elizabeth Terrell Donald Rusu John E Hutton Bill McKaig Stan Taylor Robert G Sorensen Lucy M Urlacher Tom Seay John H Thoms Janice M Robson Jack Stebbins Jane Edwards Don Ferrier Joe Kasiner Mel Kirkman Ellen Altshuler Mark Wisner John S Lazzari Chris Teeter William Sherman Brandom Jr Douglas Latislaw Osni Cassab Kenneth J Mangold Matt Walton Richard A Kane Sue Schmuck Lex Parlova Donald C Poetker J Chester Barnett Edwin A Seymour Don Galt David L Olson Jacki Beck Frank Larkey Michael McLain Dale R Newhouse Todd Alessi Arthur Eriksen Kathleen Gilkey Ernest Juhn Yoichi Hiraoka Berge Kalaajian Laurence W Fish Phil Smith LaRoy Edwards Wayne Saucier Marvin Todd Margie A Williams William A Winters David Vanderlip Anthony S Wright Marianna M Schimelpfenig Daniel A Evans Richard A Caylor Ben McKlveen Paul Henderson John Beyers Francis Mehaffey Larry Prentice Randell Eriksen Joseph Stocks

JUNE **UPDATE** 1990

Published Monthly For Members Of The Piano Technicians Guild, Inc.

Pennsylvania State Promotes Piano To Public

A public piano exposition and sale was held in Pittsburgh March 30 through April 1, 1990, in conjunction with the Pennsylvania State Convention. The event was sponsored by the Pennsylvania State Conference, and run by its Trade and Public Relations Committee, consisting of Keith Bowman, Fred Fornwalt and Gary Nelms.

Several major area piano dealers worked cooperatively with this committee to display a balanced selection of about 50 pianos, representing many prominent brands. One of the banquet rooms at the convention site was utilized for this purpose. The visiting public was able to make side-by-side comparisons in a single acoustic environment. Newspaper ads were the primary means of publicizing the event, supplemented by a large mailing from the Pittsburgh Chapter. As an additional incentive, prizes were offered, including a CD player, free tuning certificates, and musical novelties. A dealer-provided fund was created to pay for advertising and promotion, managed by the state conference.

The Piano Technicians Guild was represented by a display booth promoting qualified service. "The Unseen Artist" and the new National Piano Foundation (NPF) video, "The Possible Dream," were available to be viewed. Members of the Pittsburgh Piano Teachers Association took time from their schedule to staff a booth opposite PTG's. In addition, there were two smaller displays — NPF, for which pamphlets and holders were provided, and Dampp-Chaser, with specially prepared packets.

Our purpose in organizing this expo was twofold. First, working with dealers to create a

continued on page 3

Meet Your Board Members

Lisa Gray
Assistant Editor

Danny Boone

For 20 years before he became a full-time piano technician, South Central Regional Vice President Danny Boone served as a minister of music and education in various churches, working with choirs of all ages.

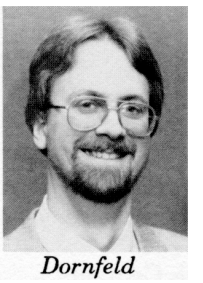
Boone

His interest in piano work dates from his childhood, when he remembers tinkering with the old upright in his home instead of practicing. He followed through with his musical interests, and later earned a B.A. in Music from Howard Payne University in Brownwood, Texas.

Before leaving his choir director position for health reasons in 1974, Danny had already been tuning part-time for six years. He was self-employed for a short time before his current employer, Baylor University in Waco, Texas, called, looking for a piano technician. Besides being the resident technician at Baylor, Danny also maintains the University's carillon, an instrument purchased in 1985 under the

continued on page 2

Bruce Dornfeld



Dornfeld

In 1982, Bruce Dornfeld was one of the first to join the newly chartered Waukegan, IL, Chapter and later served as its president for three years. Over time, he has seen much growth and development.

Of this progress, Bruce reflects, "It has been rewarding watching and helping people who are fairly uninvolved grow into successful business people. It's also been great to see the chapter succeed. The chapter is a very close-knit group with much spirit and camaraderie. Beside our regular meetings, we still meet once a week, generally for five to six hours, to work on rebuilding projects."

Those rebuilding projects would have come in handy when Bruce started working on pianos. In 1969, when he was in high school, he managed to get an old upright which had a lot of problems. When he first began, the self-teaching was through books at a local library, and continued much later with private

continued on page 2

In Respectful Memory...

Larry S. Hiller

Larry S. Hiller, 37, died February 11, 1990, of injuries sustained in an automobile accident. He was born March 1, 1952, in Kansas City, MO.

A graduate of the North Bennet Street School of Boston in 1972, Larry tuned and serviced pianos in the Boston area, including pianos used in concert performances for the Boston Pops.

After moving to Connecticut and starting the Hiller Piano Repair and Rebuilding Service, Larry became an RTT member of the Connecticut Chapter in 1984. During the years of his membership, he served as Chapter Programs Chairman and Properties Chairman; in 1986 he was named the Connecticut Chapter's "Technician of the Year" in recognition of his many chapter activities, including procuring and moving pianos during regional seminars and helping out in chapter piano rebuilding projects.

He is survived by his wife, Mary Anne Eve Hiller of Milford, CT, and his mother, Helen E. Hiller of St. Petersburg, FL. He is also survived by his sister, Teresa M. McQuade and his two nieces, Lauren and Elise, of Lenox, MA.

Mary Anne Eve Hiller

A. Tony Novinski

The Wichita Chapter will miss one of its charter members with the passing of A. Tony Novinski on January 24, 1990.

Tony served the Wichita Chapter as an officer by holding each of the elected positions at various times. He offered many hours of service and was always a willing participant in its activities and promotions.

Tony taught many classes at the national, regional and chapter seminars. He trained several aspiring technicians in tuning and rebuilding.

Suffering declining health in recent years, Tony still continued shop work even into retirement. He was preceeded in his death by the passage of his wife Ethel by less than a year.

For their many years of interest and service to our chapter we owe Tony and Ethel Novinski a debt of gratitude, and they will both be missed and remembered.

Marty Hess

Boone...

direction of a committee Danny chaired.

Danny has been an instructor at state, regional and international Guild seminars, and served on several committees. His experience gained from working on the Examinations and Test Standards Committee has resulted in several new exam sites at universities and colleges. Danny has also compiled one annual index of articles to the *Journal*, and has worked on a five-year index to be published this July. Being president of the Texas State Association for two years, directing their state seminar in 1984, and getting the association incorporated are other ways Danny has been involved in PTG.

Danny has been South Central RVP since 1988, and has since helped reorganize three ailing chapters. What Danny says he has enjoyed most about being an RVP is, "meeting chapter members, helping them with their problems and developing their good points."

Much of Mexico is in PTG's South Central Region, and there is little organized activity in the profession of piano technology there. Danny has worked in this area in an attempt to promote the profession and increase the opportunities available to local technicians. He has directed and taught at two seminars in Mexico City.

Danny joined the Dallas Chapter in 1967, and the Heart of Texas Chapter in 1974, where he was president for two years, and continues to be involved. "Our chapter always has quality meetings,

continued on page 4

Dornfeld...

tutoring from PTG members and classes. He began going to PTG-sponsored technical seminars in 1979.

In 1979, he began his own business, which he terms "a typical piano service, although I may work on more grands than most technicians, often spending half or most of a day at one residence."

He previously worked at Baxter-Travenol Laboratories for two years after earning a Bachelor of Music from Roosevelt University in Chicago. He had worked as a laboratory animal technician during the summers at G.D. Searle, where his father was a research chemist.

Bruce is proud of the contributions to the arts and sciences his parents have made.His father, Clinton, earned a second doctorate, in clinical psychology, after retiring. His mother, Dale, recently retired after teaching high school art for 15 years, actively continues her interest in the arts. Traveling is something their whole family enjoys. Bruce has traveled all around the states, in Canada, Mexico, and Europe. Bruce's father resides in Florida, his sister in the San Francisco Bay area, and a stepbrother in Tokyo.

"Even though we are spread apart, we get opportunities to visit regularly. Sharing my family's enjoyment of traveling has come in handy in my RVP position," Bruce says.

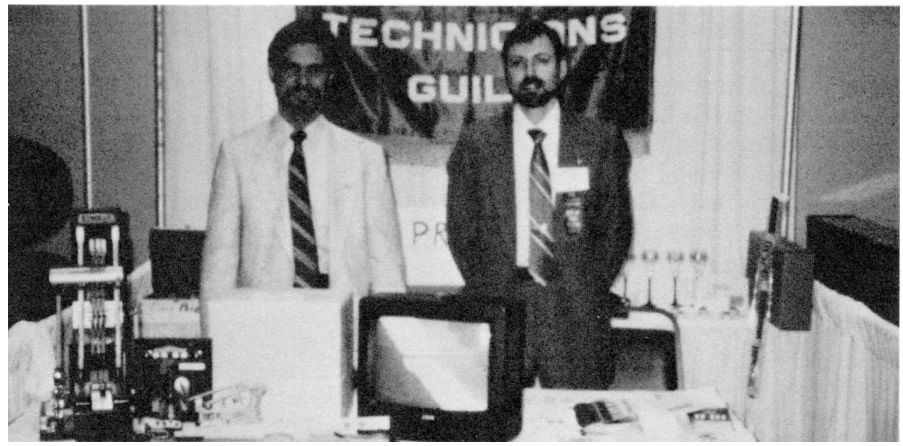
Bruce has been the Central East Regional Vice President since 1988. He likes communicating with many different people, which he feels is essential to

continued on page 4

PA State...

publicly-oriented event provided an opportunity to promote the PTG. More importantly, working with other trade factions, in this case dealers and teachers, in itself was a significant step in bringing the industry closer together in promoting the piano.

Although the actual turnout for this event was lower than hoped for, the sale was financially successful. This was the important factor for determining the feasibility of duplicating this effort elsewhere. Now that the program has been run, some insight was gained for making refinements. If you think this promotion/sale would work in your area and would like further information, feel free to give me a call.



Pennsylvania members Fred Fornwalt, left, and Keith Bowman operated a booth during the Pennsylvania State Conference March 29-April 1. Conference organizers worked with local piano dealers and music teachers to produce a piano exhibition that was open to the public. Not pictured; Gary Nelms.

In addition to the participants, I would like to acknowledge David Barr and the Pittsburgh Chapter for the original concept as well as their material support. Thanks also to Pennsylvania state officers, other PTG members and the Home Office staff for their assistance. I am confident we will be hearing more about industry-united efforts to promote piano usage.

Keith A. Bowman

Western MA And ME Chapters Introduce Proposal

The Western Massachusetts and Maine Chapters present the following proposal for your consideration.

The membership classification structure of the Guild has been receiving more and more criticism by both RTTs and Associates. There is a lingering state of unrest and uncertainty concerning the present and future direction of the Guild.

It is obvious from all the problems and unrest created by our present two-category system that change is indeed in order. The following proposal is offered as an equitable solution.

In order to distinguish between RTTs and other members, and in order to advance the Guild in a healthy, productive direction, we propose the following three-category system of classification:

- RTT
- Apprentice
- Affiliate

The RTT category shall remain as presently defined in our Bylaws, with the current exams, etc. intact.

The Apprentice category shall consist of all members working in the field as tuner/technicians who have not yet taken or passed the RTT Exams, as well as those persons in training to become tuner/technicians. The Apprentice shall be required to take the RTT Exams within a five-year period after joining the Guild, and a minimum of once every two years thereafter until he/she passes said exams.

We may not legally restrict the advertising of membership in PTG to only one category of membership, nor may we require our present Associates to upgrade their classification. The existence of an Apprentice category will serve to clearly mark the difference between those of our members who have taken the stringent RTT Exams and those who have not. The use of the term "Apprentice" should make this difference more obvious to the public, as well. The emphasis thereby placed upon this major difference in status will act as an incentive and motivate the aspiring RTT to upgrade his/her classification. The time requirements for taking the RTT Exams are meant to encourage the Apprentice to attend chapter meetings, seminars, and special tutorial classes in order to improve his/her skills and subsequently attain the status of RTT.

The Affiliate category shall consist of all members who do not provide the services of a piano tuner/technician. Examples include piano retailers, piano movers, refinishers, platers, piano component manufacturers, piano rebuilders, piano manufacturers and remanufacturers, miscellaneous piano industry support personnel, etc.

We feel the need to have an all-encompassing category of support personnel for and of the Guild. These members who support the industry but have no

continued on page 4

Proposal...

intentions of tuning and servicing a piano in the home are of infinite value to our organization. As reported by the RT Membership Study Committee, the difficulties encountered in producing standardized examinations for the various skills possessed by the members in this Affiliate category lead, at this time, to their inclusion in a common category of membership.

Teacher Relations Committee Chairman David Rostkoski, left, and Past President M.B. Hawkins represented the Guild during the recent Music Teachers National Association convention in Little Rock, AR. Also helping to staff the booth was committee member Monica Hern.

Boone...

even though it's a small chapter. We enjoy the good fellowship," Danny says.

"The knowledge I've received from classes and the *Journal*, and the fellowship with technicians in the Guild," are the most valuable things Danny feels he has gotten from PTG. "This business is one you learn mostly on your own. Sharing problems with others helps a lot sometimes," he says.

Of the future of PTG, Danny says, "I think the most important thing PTG can do is work for recognition among the piano-owning public. We need to strengthen our outreach to piano teachers. By this and other efforts, such as advertising, ultimately the public will recognize the importance of those who are registered technicians."

Danny's family is a music-oriented one. Both of his daughters are musicians, and his wife, Barbara, is a pianist and harpist. She will play the harp for the Auxiliary at this year's annual convention in Dallas. On that note, Danny adds, "I look forward to welcoming everyone to the big PTG Roundup in Dallas this July."

Knoxville Chapter members, from left, Dennis Mayhew, Frank Hambright and Tom Graves were among the instructors and organizers of the chapter's first one-day seminar, April 7. Seminar registrations exceeded organizers' expectations, attracting 44 attendees.

Dornfeld...

the RVP position. The effectiveness of PTG as an organization is one of Bruce's concerns. He wants to see things put into use that will make the system work better now and long after he is in any type of leadership position. This is why he initiated a Council delegate training program.

"Bringing thoughts and ideas from people in my region to the Board, and later seeing those ideas become part of Guild operations is rewarding," Bruce says, "Knowing I've helped to make some lasting contributions to the organization is something I feel really good about."

Bruce is also concerned with the involvment of PTG with other groups in the piano industry. He was instrumental in getting PTG to join the National Piano Foundation. "I see the industry as being like a piano bench. The four legs are the manufacturers, teachers, dealers and technicians. Without these four legs being strong and firm, the piano player can't continue," he says.

Bruce promotes the piano on a daily basis by teaching programs for local teachers' associations, and for the general public through his chapter. He also shows the "Unseen Artist" video to his customers, passes out NPF as well as PTG literature, and keeps a local teachers' directory for customer use.

The most important things Bruce feels he has gotten from PTG have changed over time. He says, "First, and still, it is the technical knowledge, which has become second to the network of professionals who are also friends. Then there is the feeling of self-esteem PTG can give you. This comes with the feeling of doing good work at whatever level you are on."

Bruce's involvement in the arts is not limited to music. He is a member of the Chicago Art Institute and Museum of Contemporary Art. Reading what he calls "the great books," canoeing, kayaking, and camping are his favorite ways of keeping in touch with reality.