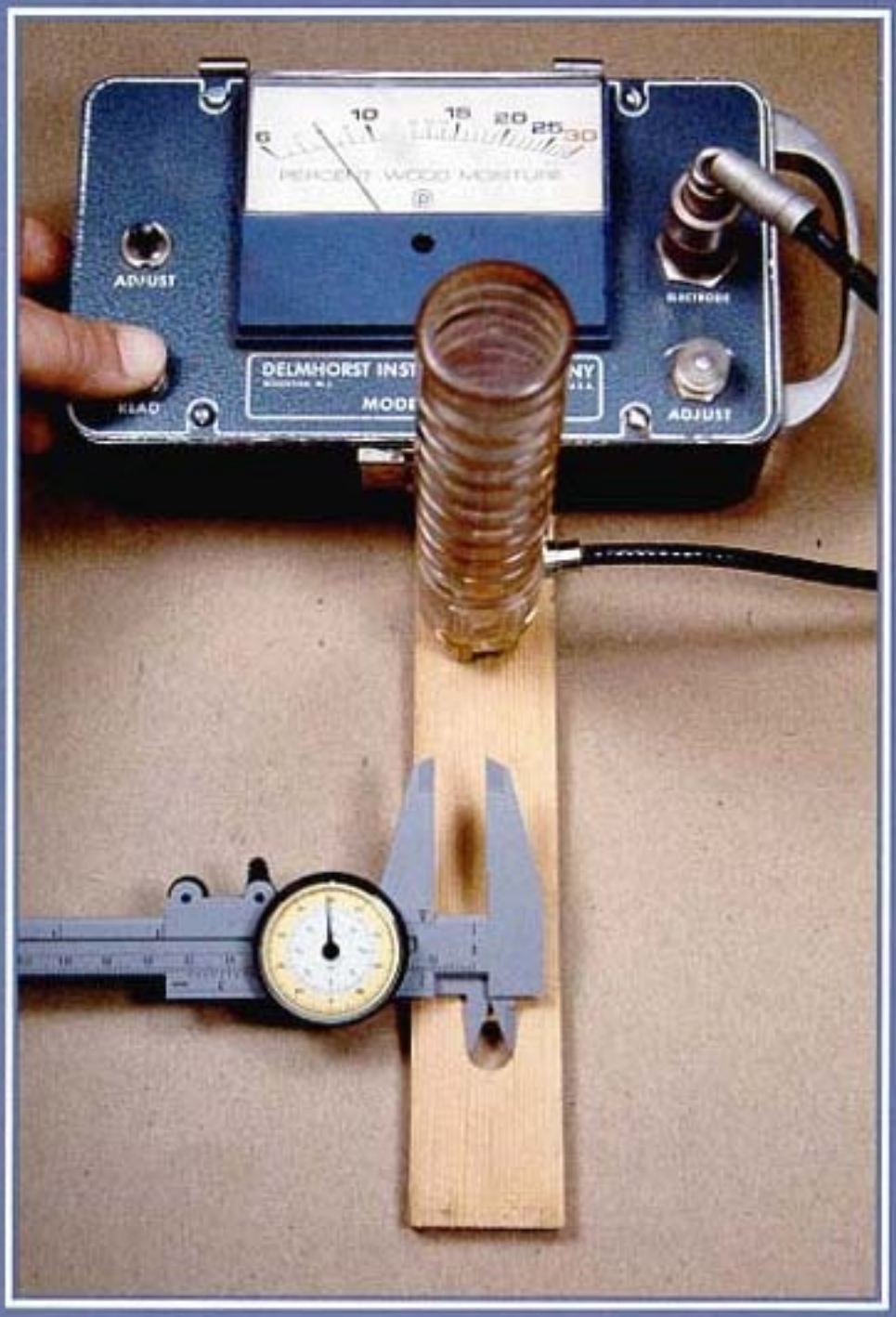
Piano Technicians
Journal
October 1988



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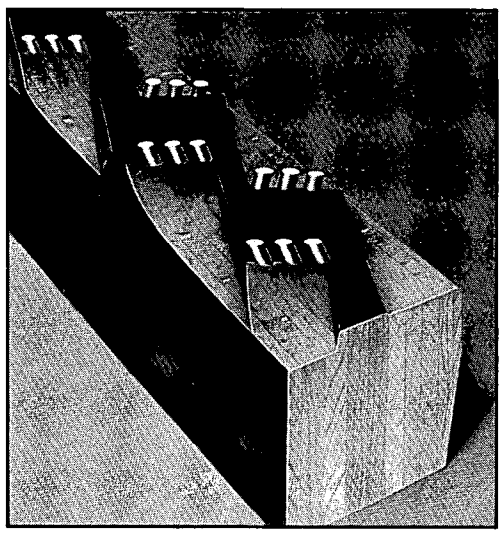

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The Piano Technicians Journal **October 1988**

Official Publication Of The Piano Technicians Guild, Inc.

Volume 31
Number 10

In This Issue...

Plus...

The Cover...

What does happen to a hole in a piece of wood as the moisture content varies? What does it have to do with piano work? See the Technical Forum for details.

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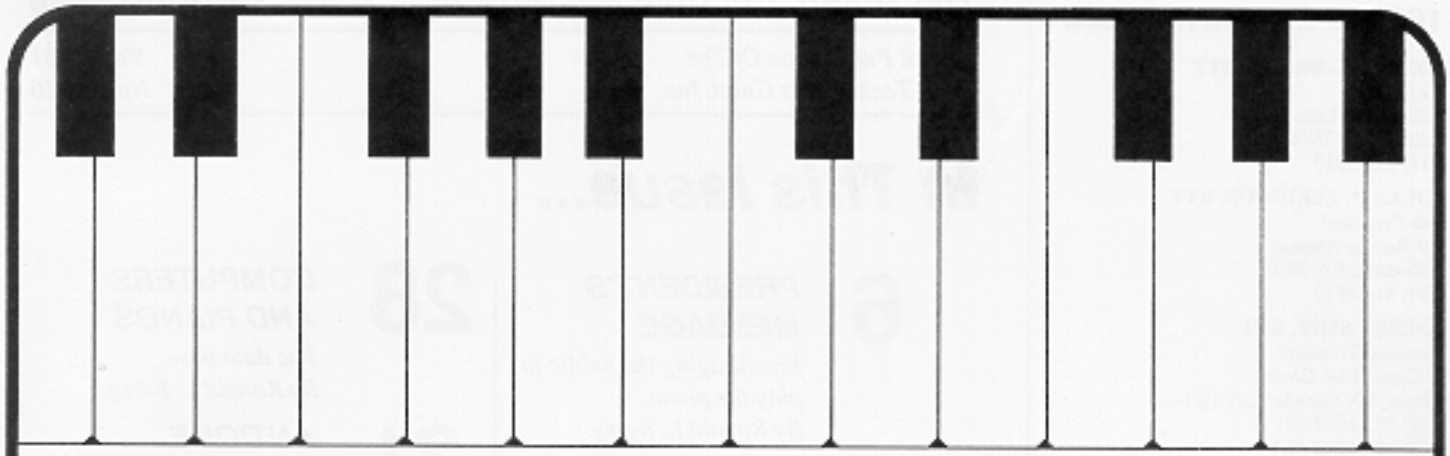

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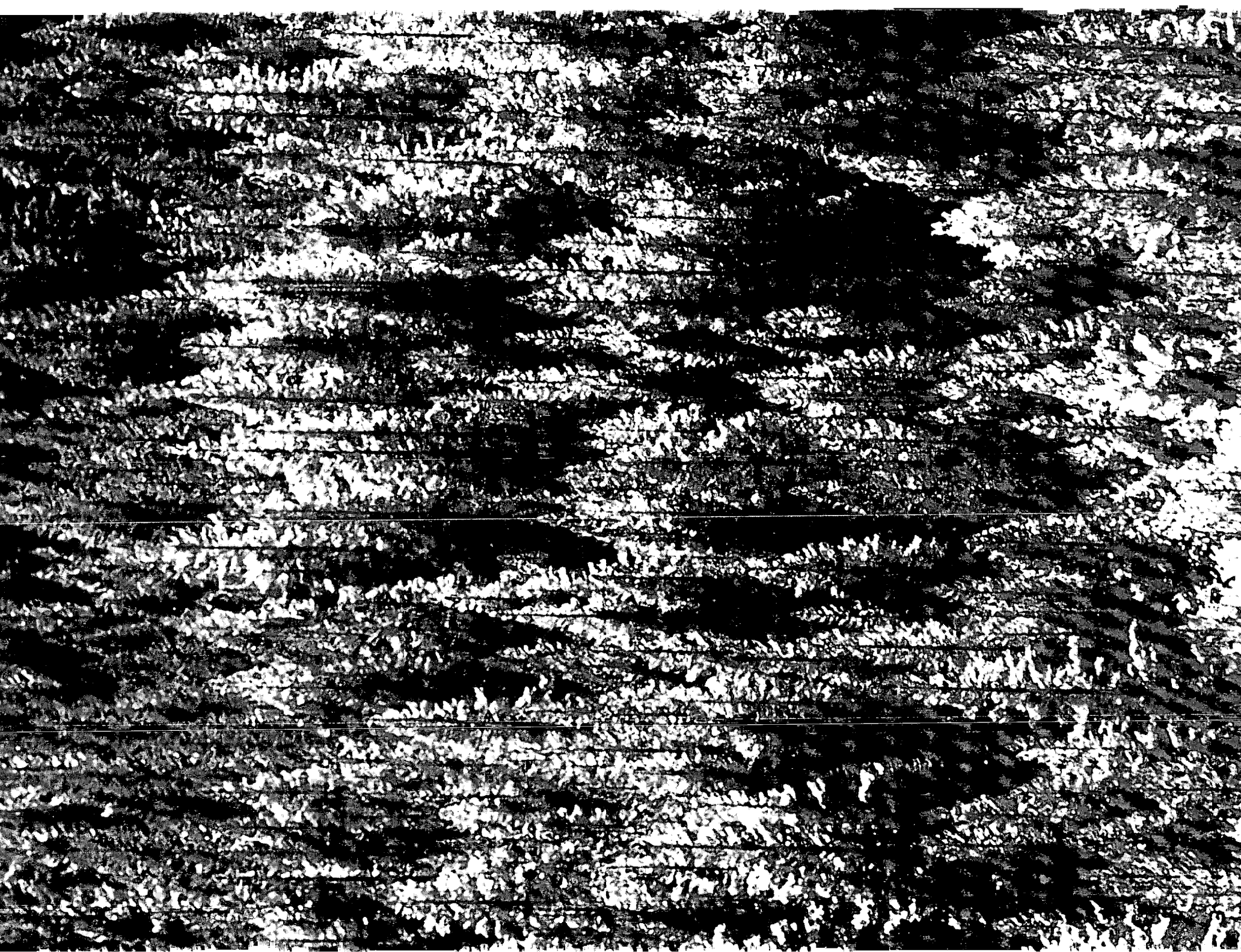

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President's Message

Ronald L. Berry
President

Encouraging The Public To Play The Piano

In my last president's message, I stated some main goals for the coming year. These were to work on the administration of tests and to enhance the status of RTT to make a greater difference between RTT and Associate. These are main goals on an internal level. We also have a goal on an external level that was expounded at the St. Louis convention in the piano summit meeting. That goal is to do all we can to encourage the public to play the piano. This is the heart of our industry. If people don't play and learn to play they won't buy pianos and those who have them won't have them serviced. Karl Bruhn, senior vice president of Yamaha and past president of the Piano Manufacturers Association International, addressed the opening assembly with some impressive figures. Piano technicians who tune four pianos a day throughout the year, multiplied by 3,500 members of PTG, make a staggering number of customer contacts which could have a large effect if used effectively.

What can a piano technician do to encourage someone to play the piano? First of all, your enthusiasm for the instrument will rub off if you show it. Do you have something you can play after you tune a piano? Many people never hear their piano played and are excited to hear what it can sound like. Do you have a good handle on who are the local piano teachers? I get requests constantly for the names of teachers.

Knowing the teachers and their personalities helps you try to match the customer with a teacher. Which teachers work well with young children? Which teachers are best for serious students? Which teachers are best for adults who just want to have some fun and don't want to take it seriously? The symbiosis between piano technicians and teachers is great. We need each other and our businesses complement each other. Supporting local teacher groups by purchasing advertisements in their directories is some of the most cost-effective advertising I do. Offer to do programs in piano technology for teachers' groups, exchange newsletters between your chapter and the teachers' groups. The Teacher Relations committee is developing a handbook for how to do teacher programs which is designed to help chapters set up these types of programs.

The technician-dealer link has been one of the weak parts of the chain. Too often, technicians have unrealistic expectations of what dealers should do to pianos and the dealers want technicians to work for little or nothing. Knowing your local dealers personally helps foster understanding and goodwill. We depend on each other. All new pianos need some service and technicians can use business that comes from dealers. Some dealers have even made service their strong suit and use it for their competitive edge. Technicians are called on regularly to give advice on buying new pianos. We, as technicians, need to know what lines the different dealers carry, something about how the dealer operates and perhaps even who are the key salespeople that you trust to send your customers to. Helping people find a new piano that they can be happy with will certainly be doing our part to help people play the piano. Dealers support technicians by offering their stores as a place to meet and sponsoring seminars in conjunction with manufacturers. While in some areas, dealers are not the nicest to each other, technicians who communicate with the dealers can help resolve some of the ten-

Continued on page 10

Tech Gazette

Yamaha Piano Service October, 1988

Parts, Etc.

YAMAHA PIANOS VIDEOTAPE

Recently, we have been receiving a lot of requests from piano technicians (and others too numerous to mention) for a Yamaha "factory video." So, if you're looking for a view from the inside, **"Yamaha Pianos"** will show you exactly that. This videotape is a brief "videolog" of piano construction **"THE YAMAHA WAY"** and takes you through a number of production stages from the lumber yard to the finished piano. "Yamaha Pianos" is one videotape, 21 minutes in length, that will appeal to a wide audience —from the piano technician to the beginning piano student. "Yamaha Pianos" should be available in late 1988 as part of the "Lending Library" of Technical Films through the Home Office of PTG. For additional information, see The PTG 1987-88 Resource Guide, Volume V, or contact the PTG Home Office.

Personnel Profiles

LLOYD WHITCOMB

To many of you, Lloyd Whitcomb, Technical Service Representative, is a familiar face at PTG events. A native of Oklahoma, Lloyd grew up in Kansas and attended college in Arkansas. His love for the piano grew from the musical interests of the entire Whitcomb family.

After moving to California, Lloyd began studying piano tuning and repair, and became a consultant to the Piano Parts Department in 1979. In 1981, Lloyd began his tenure as a full-time member of Piano Service. As the "senior" member of our Piano Service team, Lloyd's quick wit and fluent teaching style have made him a popular instructor at regional and national PTG seminars since 1984. Lloyd also provides technical education for in-house employees and is a co-instructor in our "Little Red Schoolhouse" technical program. Lloyd, his wife, Linda and twin daughters reside in Fullerton, CA.

MIDI Corner

More MIDI terminology:

ALGORITHM

In FM synthesis, an algorithm is an arrangement of operators. The algorithm determines whether each operator acts as a modulator or carrier.

CARRIER

In FM synthesis, an operator that contributes directly to the output of the synthesizer. The carrier output level determines the volume of the sound.

FM SYNTHESIS

A method of creating complex sounds by modulating one waveform by the frequency of another waveform. By changing the ratio of the two frequencies, a wide variety of harmonic structures can be produced or "brightness" of the resulting sound depends on the amount of modulation.

MODULATOR

In FM synthesis, an operator that modulates another operator. The output level of the modulator determines the complexity or "brightness" of the resulting sound.

OPERATOR

The basic functional block of FM synthesis in Yamaha synthesizers. An operator contains a digital oscillator and an envelope generator. In FM synthesis, one operator modulates another to produce a complex waveform. Each operator is identical, and the algorithm determines whether each operator acts as a carrier or modulator.

Yamaha in the News

ON TOUR WITH THE MIDI GRAND

Chick Corea is currently touring the United States with a C7E MIDI Grand. The twenty-five city tour will also feature keyboard artist Herbie Hancock. Chick Corea, regarded by many as "the jazz musician's musician", remains a leader in pioneering innovative musical styles, and has profoundly influenced a whole generation of contemporary artists.

As a pianist striving for greater artistic expression, Chick Corea entered the realm of electronics a number of years ago. After many years of performing with mainly electronic keyboards, Chick has a renewed interest in the acoustic piano. The MIDI Grand seems to be the perfect instrument for his unique blend of electronic and acoustic jazz.

Calendar of Coming Events:

1988:

October 14-16:	Texas State Seminar San Antonio, TX
October 20-23:	NY State Seminar Syracuse, NY
October 28-30:	Central IL Seminar Normal, IL
November 4-6:	NC Conference Greenville, NC

1989:

January 20-22:	Winter NAMM Anaheim, CA
February 17-19:	California State Fresno, CA

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Editor's Note

Larry Goldsmith
Editor

Letters — We Get Letters

One consistent comment about the *Piano Technicians Journal* during last summer's convention was a need to get more reader input into the magazine. To that end, a new letters column called the "Soundboard" is being inaugurated in this month's *Update*, and you'll read more technical correspondence in the editorial part of the *Journal* as well. Keep in mind, though, that you can't read these letters if readers don't write them. And that means you!

But first, a few requests. Keep letters brief and to the point, simply because space is precious. (Letters may be edited for style and length.) And please make them legible — typed, if possible. Technical correspondence should go to Technical Editor Susan Graham, 2967 Madeline St., Oakland, CA, 94602. Letters about tuning and tuning articles should go to Rick Baldassin, 2684 W. 220 N., Provo, UT 84601. And letters about organizational matters should go to the Home Office.

Let me briefly share a couple of the letters that have come in in the last few weeks. Ray Ternstron writes from Walnut Creek, CA:

This is my fourth year in the piano business full time and my fourth national convention. They get better each year! As I traveled home, I thought of something:

There were 15,000 pianos across the country that didn't get tuned last week! (1,000 members, three tunings per day, for the five days of the convention — 1,000 X 3 X 5 = 15,000 — for what it's worth!)

From Ed Pettengill of Binghamton, NY, came a suggestion for an article on piano safety with a "let the pros do it" angle, prompted by an account of a tragic accident he had enclosed from the local newspaper. Seems a local man had been helping his girlfriend move an upright piano when the pickup in which he and the piano were riding turned a sharp corner. The man "...was thrown from the back of the pickup truck and died when the unsecured 800-pound full-sized piano rolled out over him."

Another correspondent, who asked that his name not be used, sent in an old business card that he had found while going through some of his files. He asked that the poem on the back be shared, and suggested that other members might want to reproduce it on their own cards.

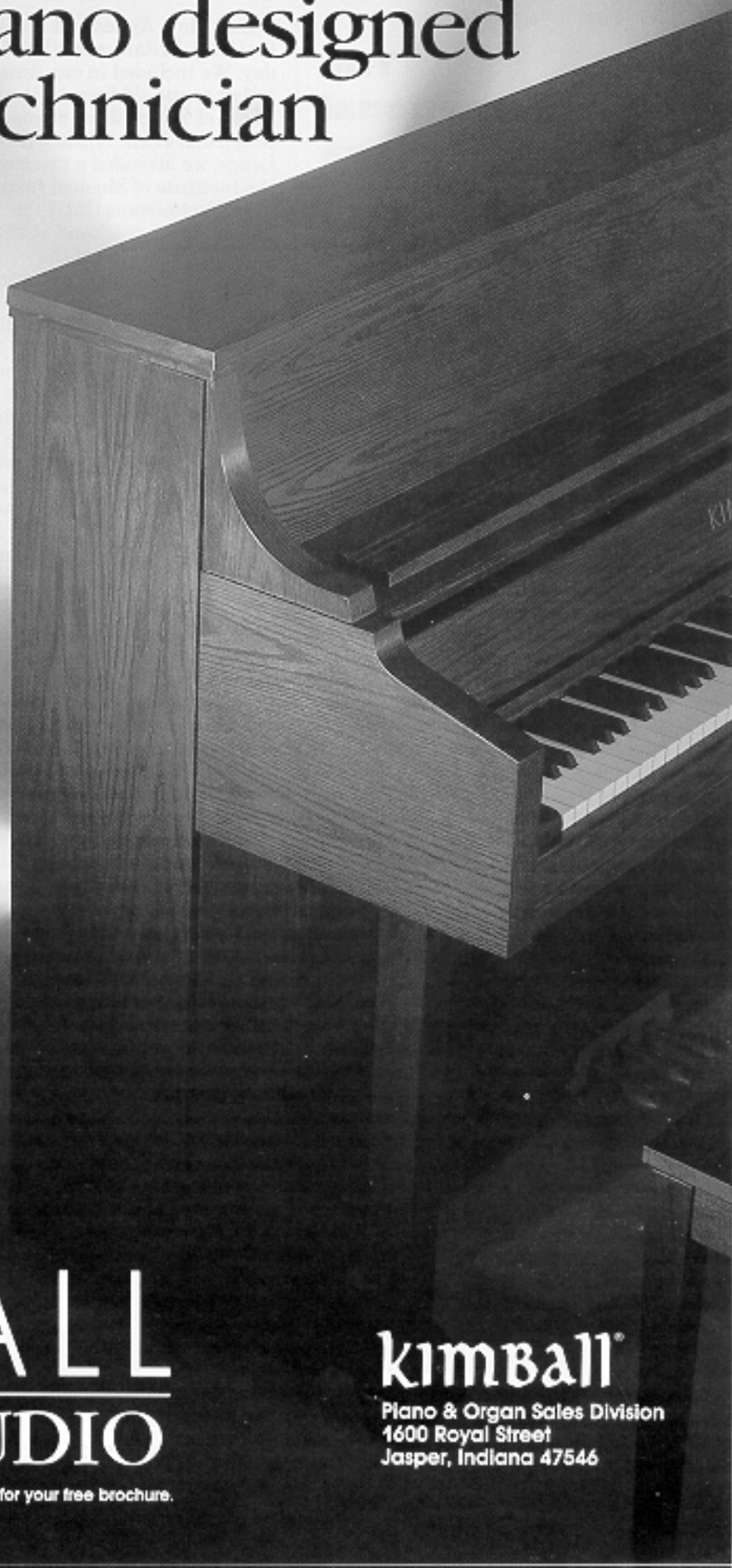
There is harmony in color
When the sun is dropping low,
And thru the fields of waving flowers
Lengthy shadows come and go.

There is harmony of spirit
When two old friends, tried and true,
Meet again for one short hour
As they often used to do.

There is harmony in music
When your uprights and your grands
Are re-tuned and put in order
By the man who understands.

These are just a couple of examples of the diversity of correspondence *Journal* readers send in. We look forward to sharing more with you in the months to come — as long as you share them with your *Journal* editors. ■

A studio piano designed with the technician in mind.



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The International Scene

Charles P. Huether
Chairman, International Relations Committee

Report From Britain

Last May, Agnes and I took off for Great Britain and a brief holiday. We included in our itinerary a visit to our old friends, the Longs of Ware. Many of you know Ralph and Jean. While with the Longs, we attended a meeting of the Institute of Musical Instrument Technicians (IMIT) in London and a weekend at the annual convention of the Pianoforte Tuners Association held at Marks Tey.

The IMIT meeting was followed by dinner, where the guest speaker was Larry Adler, the famous mouth-organ player. Unfortunately he did not bring his instrument, so we had to be content with his very humorous and interesting speech. He is an excellent raconteur, and a good time was had by all.

The PTA meeting was reminiscent of one of our weekend seminars and included interesting classes on a variety of subjects. One of the teachers was Klaus Fenner, who many of you have met at various of our conventions. In addition to Ralph and Klaus, another PTGer in attendance was Odd Aanstad of Norway, whom we had previously met many years ago in Switzerland. Acquaintance was also renewed with Bill Kries and Jim Smith, whom we met in Philadelphia many years ago.

Both IMIT and PTA have asked for and received permission to excerpt technical material from our *Journal*. I was amazed at the wide acceptance and recognition our Piano Technicians Guild has achieved worldwide. It is something of which we can all be proud. ■

Continued from page 6

sion between them. Because dealers and technicians do have something to gain from each other, it behooves us all to develop those relationships. Dealers do a good deal to contribute toward playing of the piano. Much of their advertising is focused on the benefits of playing. They often have piano teachers at their store to follow up with lessons for those who buy pianos. Most stores also sell printed music and accessories.

Piano manufacturers are, for the most part, the largest businesses in this family of manufacturers, dealers, teachers, and technicians. They put large amounts of money into advertising and much of this relates to why people should play the piano. Manufacturers have shown their support for technicians, dealers, and teachers by offering qualified personnel for technical and sales seminars. Manufacturers have a long history of giving financial support to PTG. PTG, by endeavoring to make technicians better qualified, gives the manufacturers a place to turn when they need someone to help them solve warranty problems.

In short, we are all part of one family in the piano industry. Too easily, we can get short-sighted to see only the concerns of our own part of the industry. The industry as a whole has faced and has ahead of it some significant challenges. We don't operate in a vacuum; if we all pull in the same direction, we will keep the piano industry going for years to come. The one common area we can all work on is to encourage people to play the piano. If you don't play yourself, that's a great place to start. ■

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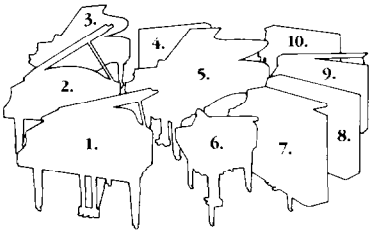

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THE
TECHNICAL
FORUM

There's A Hole In The Bottom Of The Key

Susan Graham
Technical Editor

The article on key bushing in the August issue emphasized the importance of a properly bushed key to provide a firm foundation for good action work. To round out the discussion on keys, we will concentrate this month on the balance rail hole. This can be the surprising source of a variety of action problems, but it is often ignored or subjected to hasty and inappropriate service techniques. Once again, not a glamor topic: it is, however, an area of piano function which needs to be understood and properly serviced or it may have an adverse effect on many aspects of performance.

To start with the theoretical, what are the requirements of the balance rail hole? It is the fulcrum of the key: it must be free enough to allow the key to rock up and down, but tight enough to prevent front-to-back slippage or excessive bouncing. Tightness creates the familiar sticking key and a heavy, sluggish action. Front to back play ("pulley" or "chucking") in keys creates noise, usually an elusive click which may occur at any point in the key travel as the edge of the loose hole slides forward to knock against the pin. This condition can also result in misalignment of the capstan under the wippen, affecting the geometry of the action; it creates a very unsatisfactory "feel" regardless of regulation. It prevents stable alignment of the front edges of the keys, creating a cosmetic problem. If the loose fit is at the sides of the hole the key may not be pulley but may still be noisy, clattering as it jumps up and down on the balance rail (a contributor to return noise). Looseness throws off the friction balance between key, repetition spring, and hammerflange pinning.

In adjusting the fit of the hole around the pin, then, we balance preventing noise, maintaining correct geometry and friction and allowing proper freedom of movement. We must keep in mind cause and effect, and refrain from creating one problem while solving the other.

This brings up the interesting and somewhat perplexing question of just how a hole in a piece of wood behaves. In particular, as the wood expands and contracts with moisture changes, does the hole enlarge and reduce, and, if so, when does it do which? After years of puzzling over this I'm extremely relieved to have found a logical and satisfactory answer. It comes from Jon Light at Kimball: he gets his information from Dwight Slocum, who is the in-house wood expert for the company (which makes furniture as well as pianos and as such does extensive research into wood behavior). Mr. Slocum experimented with holes in pieces of wood and found that the behavior is the same regardless of the dimensions or proportion of hole to wood (we are talking about solid wood, however, not necessarily laminates). His findings were as follows: As a piece of wood loses moisture, it shrinks: the dimensions of the piece become smaller.

This shrinkage is much greater across the grain than with it. The hole in the wood also gets smaller; the sides of the hole do not pull farther apart as the wood shrinks, as is commonly believed. In effect, it is as if you took a picture of the piece with the hole in it, and then had the picture reduced — the whole thing becomes proportionally smaller. Conversely, if the piece takes on moisture, it expands; the hole also gets larger. Another way to think of it is that the hole behaves as would the plug of wood which was removed. The stumbling block to all this is that, as piano technicians, we know perfectly well that keys stick in wet weather — and they stick because the hole has tightened around the balance rail pin, having clearly gotten smaller as the wood has expanded. The reason for this is the way in which wood takes on moisture. First of all, it takes on moisture three times more slowly than it loses it, making the reaction and stabilization period longer and less predictable. Areas of end grain (such as that in most of a balance rail hole) take on moisture faster than does side grain; exposed surfaces take on moisture faster than the "inside" of the wood (this is referred to as a moisture gradient effect). What happens in a balance rail hole is that as the exposed surfaces around the pin take on moisture and begin to expand, the interior of the wood has not yet begun to react: it resists the expansion of the outer layers of cells. Since these outer layers cannot expand into the interior of the piece, they grow into the hole where there is no resistance, causing a sort of localized swelling. The hole temporarily becomes smaller. Eventually the wood will reach equilibrium

(assuming that the high ambient moisture condition continues). At that point the hole will have become larger. We begin to understand how a key can stick long enough to bother a customer so we are called out to service it, but can have "cured" itself by the time we keep the appointment. This also speaks pretty strongly for a number of things: climate control, in the home and in the shop, especially in areas prone to frequent and pronounced fluctuations in humidity. It re-emphasizes the wisdom that wood should never be removed from a balance rail hole. Easing should be done by compression rather than by filing: since a sticking key may be a temporary condition, we need to ease it but we certainly don't want to remove wood which we may want later. (The implications of all this for action center pinning are also food for thought).

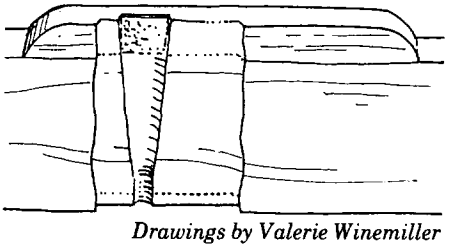
There is also the factor of the metal balance rail pin. If the hole is drilled or serviced while the wood is stabilized at a high moisture content, the key is placed on the pin and the wood then dries out — what happens? The hole shrinks, but since the pin is there, the wood crushes against the pin — and in the next wet season, the key first becomes even tighter, due to localized swelling, and then may become too loose....once it has reached equilibrium. The bottom line, of course, is that the piano has to work. We would make ourselves crazy trying to predict the weather, and it's impractical to carry wood moisture meters around just to service sticking keys. At least we have an understanding of what the key is doing, and why it is important to pay attention to the environment and exercise some caution in servicing key problems. Our thanks to Jon Light and Dwight Slocum for sharing this interesting and thought-provoking information.

As always, accurate diagnosis is the first step in service. The test for balance rail fit is to raise the key one inch at the front and see if it will slide freely back down the pin. In a vertical piano this can be done with the action in place. For this test to be accurate in a grand, the stack should be removed and a fingertip rested lightly on the capstan to simulate the weight of the action. The question is: how free is freely? There should be a sensation that the key is sliding down the pin, not falling rapidly as if dropped: a glide, not a crash. It may be necessary to break the inertia of the raised key with a very light tap to start its downward travel. If the key travels freely at first but slows as it approaches bottom, suspect the balance rail bushing rather than the hole. Before proceeding to ease, check the pin for corrosion or contamination; replace or clean the pin and recheck the key fit. If the key falls rapidly and rebounds at the bottom, check further for "pulleyness." This can be done by gently attempting to move the key forward and back. Another method is to tap against the keyfront to detect knocking which indicates looseness.

Always avoid raising the end of the key too high and jamming the edge of the hole against the pin, creating excessive inertia and preventing accurate test results. This practice also creates further problems. The sad truth is that technician error is a major cause of pulley keys: raising the key too high in testing, sloppy technique in removing keys from the frame, and incorrect easing all contribute. Keys should always be removed from the frame using two hands, lifting at the front and back simultaneously.

Before beginning any repairs, consider the anatomy of a key. As seen in figure one, the balance rail

Figure 1



Drawings by Valerie Winemiller

hole is round only at the very bottom of the key, and gradually widens (seen in cross-section) towards the top. Even the hole itself is slightly wider at the top than at the bottom. This shape is necessary to allow the key to rock, but it means that the section of wood which maintains the fit of the key to the pin is quite small. The hardwood inset or offset ("plate" or "shoe", respectively) sometimes found in the bottom of a key is there to provide a more solid and durable contact between key and pin. Unfortunately, eliminating this feature is a cost-cutting measure adopted in manufacturing, and keys we work on are less stable as a result. Whether the key is hard or soft, however, it is easy to see how a little easing can go a long way, since there is really very little wood to work with.

If the key is too tight at the balance rail hole, it needs to be eased. Two rules apply: don't create pulleyness, and don't remove wood which may be needed later. To accomplish this, easing is done at the sides of the hole, using a smooth burnishing tool to compress the wood. Most supply houses carry this tool, originated by Yamaha and dubbed a "CF" tool. It is available either in a separate handle or to fit the combination handle; it has an elongated, flattened triangular shape and is inserted into the balance rail hole from above and turned so it contacts only the edge of the hole. Pressure is applied to compress wood and ease the fit of the key around the pin. Pressure must be applied gently and gradually; avoid splitting the bottom of the key, and remember how little wood there is and how quickly it can be overeased.

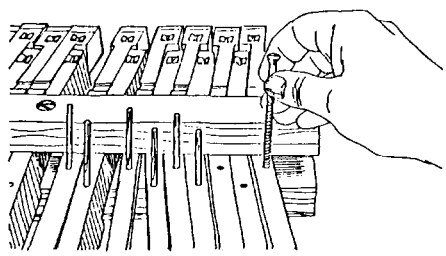
Pulley keys are such a nuisance that we hold as a time- honored rule that one must never ease the front and back edges of the hole. At the risk of howls of outrage clogging my phone machine for the next six months, I'm going to tell you that this is sometimes necessary (true confessions of a working technician...). Rather than ease the sides of the hole until the bottom splits out and/or the key is so loose it chucks from side to side at its base, if the key really is binding at the front and back, the hole may need to be rounded. It must be very carefully and gently done, applying virtually no pressure: just rotate the tool in the hole.

There are a number of procedures to repair pulley keys. If the problem is very slight it may be possible to restore shape to the hole by burnishing over it with the smooth, flat blade of the CF tool or

a similar tool. (This may also change the level of the key, which should be checked when the key is reinstalled). More severe cases are usually treated with glue sizing.

Glue sizing is done with a thin solution of water soluble glue and hot water. I use either white or yellow glue: hide glue tends to dry a little too hard and be noisy. Preventing excessive hardness is also the reason that the solution should be thin — no more than one part glue to four parts water; usually, even less glue. The desired effect is for the solution to soak into the wood, not create a ring of glue around the inside of the hole. Before I do any sizing, I steam-iron the holes — invert the keys in the key clamp, place a wet rag over the balance rail holes and use an iron to inject a little moisture into the keys. After this has dried, recheck the fit on the pins — if the problem was minor, this may have cured it. If not, proceed with the glue size. Sizing solution must be hot; a water bath in the glue pot is handy. A #10 wood screw is the perfect applicator. Dip the screw to pick up a drop of glue size and apply it to the inside of the hole (fig. 2). Put a balance rail pin into

Figure 2

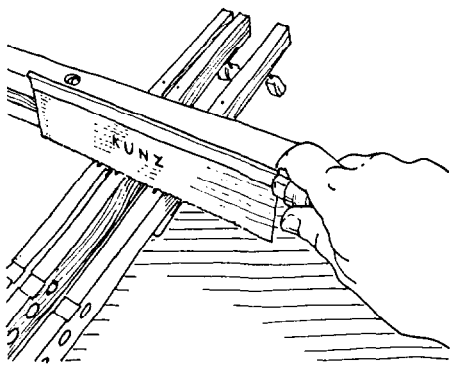


the hole to give it something to size around (saves time easing later). Either let the keys dry overnight, or give them a zap with the heat gun. The sizing must be completely dry before easing and reinstallation.

If one attempt at glue sizing still doesn't close the hole around the pin, a second one may. It does increase the chance of noise, however: either a little click or a slight squeak coming from the hole as the key rocks. Talc in the balance rail hole will help.

If the condition is extreme it is necessary to add wood, either as a veneer shim or an insert. The hole may need to be shimmed at the front or at the back, or both: this is determined by the desire to align the front edges of the key, returning the key to its original alignment, and by the degree of looseness. Try the key on the frame, chalk-mark the end towards which you want it to go and shim on that side. In other words, if you need the key to move to the front to align with its neighbors, you will be shimming at the front edge of the hole. One key is most easily done in a vise; if there are several, I put them in the key clamp. Cut across the very edge of the balance rail hole with a thin-bladed saw (figure 3). Either a fine-toothed

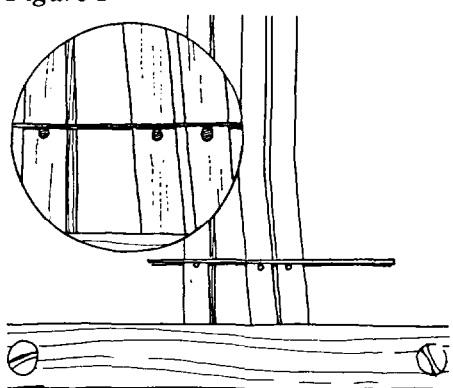
Figure 3



back saw used in joinery or the smaller back saws used by jewelers and guitar makers is suitable. The point is to create a cut which will hold a piece of veneer snugly - since veneer thicknesses differ, experiment on a piece of scrap to find a good match.

The cut should only be as deep as the round portion of the balance rail hole and should intersect the edge of the hole (figure 4). Remem-

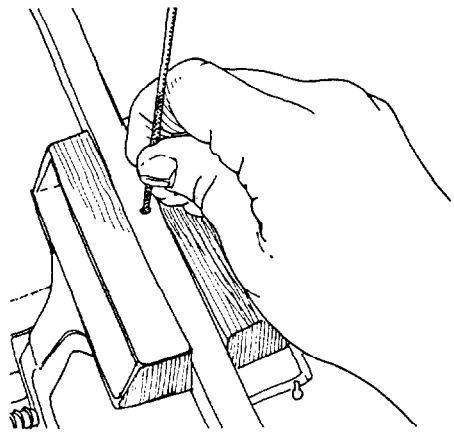
Figure 4



ber that the key has to rock: if the edge of the round portion of the hole is too high up the side of the balance rail pin, the key will bind at its highest or lowest point of travel.

If the hole is extremely enlarged, I use a filled (paste) epoxy to glue in the shim, positioning the shim so it will contact the balance rail pin and filling in behind it with epoxy. If the elongation is slight, the veneer shim will be enough; there will be solid wood behind it (on the opposite side from the hole) and it can be glued in with woodworking glue. In either case, after the repair has dried the hole must be re-rounded with a fine round file (figure 5). This is the point at which it is easy to begin the whole

Figure 5



elongation process over again...Work slowly and keep trying the key on the pin. As soon as it will fit over the pin without undue force, quit filing and use the CF tool if necessary for final easing and to create that slight enlargement at the top of the hole necessary to allow the key to rock.

Reports of noise and difficulty in alignment have always discouraged me from using the phenolic washers which are available as inserts to repair badly damaged keyholes. Rick Baldassin (yes, the tuning editor — he does do complete piano service, you know) and his partner, Carl Teel, have improved the insert system by modifying a standard plug cutter so they can cut birch or maple inserts to fit into the bottom of keys. They use the recess cutter sold as part of the keycraft kit to cut out the bottom of the key, although they remove the depth gauge from the cutter itself and use it in a drill press with the press stop set to limit the depth of the cut (apparently the depth stop on the cutter can damage the underside of the key). Just as with a

veneer shim, the depth of the insert is important — it must not be too deep or it will cause binding (the desired depth can be determed by measuring the depth of the round portion of a balance rail hole).

The plug cutter used is 3/8" in diameter, commonly available as part of a set from General, Sears, etc. This is an instance in which a cheap tool is desirable, since it must be drilled into for modification. The modification is done as follows: Make a holder for the plug cutter by drilling a 3/8" hole into a 1" piece of hardwood clamped to the drillpress table. The critical part is that the table of the drill press must be set to a height which will allow you to remove the 3/8" bit, place the inverted plug cutter in the hole just drilled, and chuck a smaller drill bit into the press to drill into the center of the plug cutter without changing the position of the table or the drillpress head.

This insures that the hole for the drill bit will be drilled exactly into the center of the plug cutter. The size of the drill bit to be installed into the plug cutter should be .003" - .004" bigger than the balance rail pin for the particular job: a standard .147" keypin requires a .150" or .151" bit, and so forth. Drilling out the plug cutter may require several bits (or sharpening one) — use plenty of oil and go slowly. Ultimately, the bit should fit into the cutter so it protrudes just slightly (about 1/16") from the cutting end. Clean out all the oil with lacquer thinner and solder or epoxy the drill bit in place. Rick uses one of the phenolic inserts inside the cutter to hold the drill bit centered and vertical while the epoxy dries.

The cutter will now cut plugs with a pre-drilled hole for the balance rail pin, centered in the plug. Rick suggests cutting the plugs more than twice as long as the depth of the recess in the key. This will give you something to grip as you turn the plug into place. Trim it off flush on a bandsaw and use the remainder of the plug in another key. Grain orientation is important; mark lines following the grain on the piece of hardwood stock before cutting the plugs. The grain should run parallel to the sides of the key, so that end grain is contacting the front and back of the pin (the areas subject to force as the key works). It can be tricky to determine the grain of a little glue-coated hardwood plug, so mark it first... Put a balance rail pin in a handle of some sort and break the plugs off the piece of stock by "grabbing" the center hole, rather than prying them off with a screwdriver or chisel which would damage the sides and prevent a good glue joint.

Lightly dress the bottom of the key on a sanding wheel and use a very fine file or the CF tool to ease the key and open up the inside of the plug to allow the key to rock if necessary (as described above).

The beauty of this system is that it duplicates the hardwood plates of high-quality keys. Once you are set up with modified plug cutters for the various sizes of balance rail pins, the system is always ready to go. You can do high-quality repairs to keys without worrying about whether glue sizing will work or how permanent it is. It re-creates a round hole with less trouble than the veneer shims. My thanks to Rick and Carl not only for developing this system, but for their willingness to share it.

This brings me back to my original point: good key work is critical to good action function. These repairs can be time-consuming (even properly easing a set of keys can eat up the best part of an hour) but the results are highly beneficial for a quiet and well-functioning action.

Changes In The Journal

At the recent convention in St. Louis, Rick Baldassin and I met

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with those who were interested in a general discussion about the *Journal* (such a meeting will be a regular feature at conventions from now on). One subject which was discussed extensively then, and which has been mentioned in some recent mail, is a desire to see more exchange of ideas — to make this section of the *Journal* a Forum in the true sense of the word. This is an excellent idea; it has always been my perception that this column should be such (yes, I do own a dictionary and yes, I do know the definition of forum...) Rather than editorial suppression, however, the reason that there has been so little in the way of differing opinions and techniques is simply that I have received very little! To encourage response, particularly short but worthwhile technical ideas and tips and additional or differing techniques and opinions, I will be starting a section in the Forum called "Is There Another Way?" (thanks to Carl Root and Fred Tremper, avid readers of *Fine Woodworking,* for the idea and title). Opinions expressed with be those of the individual writers and as a technical journal, we still have a responsiblity to print material grounded in logical thought and/or real experience (the right of our readers to get useful information outweighs the right of an author to be published...). I also hope we will not venture too deeply into acrimonious disagreement: if an idea has merit, it should stand on its own, not just as an attack on another way of thinking (although it is sometimes helpful to include a brief outline of an opposing view). A bit of controversy is lively, however: see Ed Swenson's column this month for a record of a dispute between two piano builders in the early 19th century.

Obviously, for this section to exist, you have to participate. There's no shortage of thinking going on out there, and I hope the informal format will serve as a reminder that ideas needn't be turned into elaborate articles just to be included. I'll also be publishing questions which I receive and can't answer, hoping that someone else will do so. We will begin this month with a response from Don Mannino to the center pinning articles.

There's also interest in war stories — perhaps in lieu of the now-defunct Dumb Sales Claim contest we should have a Dumbest (or Worst, or Funniest) Thing I Ever Did to a Piano contest. Do we have the courage to make fun of ourselves? I think so. (Comments about the state of the PTG and how it is functioning are to be included in a new section in the Update and can be sent directly to Larry Goldsmith.) Well, as I've said, for this to work you have to write to me, and my address is:

Susan Graham
2967 Madeline Street
Oakland, California 94602

Is There Another Way?

Don Mannino
San Diego Chapter

As an addendum to the series of excellent articles on recentering by our Technical Editor, I would like to describe a method which does not seem to be used by many technicians, but which is working very well for me. Instead of using tapered reamers, center pins in a Dremel tool or roughened center pins in a pin vise, I am now using broaches. These are straight reamers, about 5 1/2 inches long, with one end sharpened to a point, made of polished hard steel (music wire). I am using a set bought from Renner (they are called "Ausreibnadeln" in German), but they are also listed in APSCO's catalog supplement.

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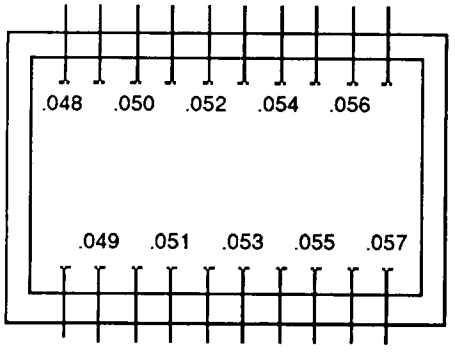
Broaches are supplied smoothly polished through their entire length, and can be used in that form as bushing burnishers only. To use them as reamers you must rough them up, at least on part of their lengths. Using a sharp (meaning fairly new) rough file, roll the broach between the file and a wood surface using the file's narrow edge, pressing quite hard. You should only work on about 1/2 inch near the center of the broach's length. Unlike roughing up a center pin, you are working with hard steel, so be sure to press hard enough to get good marking of the broach. When done, it should be about as rough as 220 grit sandpaper, and again, only in the center of the broach. Once the set has been roughed up, you should

not have to do this again for a long time, as the steel does not wear smooth with use nearly as quick]y as roughed up center pins. which are made of soft metals. I have one broach which has been used to ream at least four sets of flanges, yet it is still fine and ready for further use.

Following the usual procedures, choose the correct size center pin so that it is tight enough in the birdseye, and mount a pin of that size in a pin vise. Be sure to leave it projecting far enough out of the pin vise to allow you to insert it completely into both sides of the flange for testing purposes. Choose the broach which is one size smaller than the center pin you are using. Mount it in another pin vise so that there is about 1/2 inch of smooth broach between the roughened section of the broach and the tip of the pin vise. Tighten the pin vise securely, as you will sometimes need quite a bit of force to push the broach through the bushings.

Select your first un-pinned flange and press it onto the broach as far as it will go, all the way up to the pin vise. If the broach is

Illustration 1



mounted correctly, the flange will first have passed over a fairly long smooth part of the broach, over the roughened part, then onto the short smooth section near the pin vise. This insures that both sides of the flange get the same amount of reaming, which is very important for consistency and good operation of the center. When you pull the flange back off, it will ream the bushing some more, then the long smooth section will burnish the cloth, smoothing the nap as you go. You may twist the broach as you slide the flange off if you feel, as some do, that the nap should be laid down in the direction of the pin's rotation. Now test the reamed bushing with the new center pin which is mounted in the other pin vise. Test each side individually, and if it feels correct, you can press it on all the way and test the friction with a spring-type gram resistance guage. lf it is too tight, run the broach through it once more and try it again. If it is still too tight, move up to the next size broach, continuing until you find the size which works best.

It is important to be alert while you are choosing the broach size — if you choose carefully the rest of your pinning will go better and turn out with more consistency. Think about how many passes it takes to make it fit well and how tight the broach feels on the smooth part as you are pulling it out. Older, used cloth does not seem to want to be burnished as much, so I will sometimes use a smaller broach and work the rough part in the bushing many times until it feels quite free. With new parts, the broach one size larger than the pin you will be using often works best, as long as you have not roughed it up too much. One pass will ream the bushing enough, and the smooth section of the broach will be tight enough to do a good job of burnishing. Also, the simplicity of the process will insure consistency throughout the set. After you have done the first five or six flanges, you can start Listening to some good music and put your hands on automatic pilot. You should find that it is not necessary to test each flange with the new center pin after the first few. If you use the smooth part of the broach as a judge of the relative tightness, you can tell if you need to run the flange over the rough section an extra time before moving on to the next one. In essence you are using one tool to ream, burnish and test the fit. If you are having trouble with one side coming out tighter than the other, check again to see that the flange is passing completely over the rough area on the broach. If so, the cloth is just being stubborn (or may have been lubricated!), and you will have to carefully ream that one side alone.

As has been said many times before, if the cloth has been lubricated consider replacing the parts. Every lubricated action I have ever recentered has gone sluggish on me after a few years, even when I attempted to clean the cloth before reaming.

After all of the flanges are reamed, reassemble them with their other parts. You can test each flange with the spring gauge or swing-test them if you want, but you will be surprised at how accurate you can be after a little practice just moving the parts with your fingers and judging the resistance by touch.

To store the broaches, cut a piece of felt or cloth (heavy bushing cloth or something similar) about four by 12 inches, cut a piece of paper about the same size and place it over the felt. Poke the broaches through the paper and cloth near the bottom, then back through again near the top. Write the size on the paper next to each broach. This will allow you to store the broaches neatly and in order, eliminating the need to measure them before each use.

If you find yourself needing to do much recentering, try this method, especially if it has seemed to be tedious work in the past. I think you will find that broaches make your work both fast and accurate. Once the job has been shortened to a few hours or so, you will find that the added evenness of touch and easier regulating will more than justify the small amount of time taken to recenter the parts before regulation. ■

Illustration 2

Broach for Reaming action Centers.

Tuning Class Reviews, Part II

Rick Baldassin
Tuning Editor

Last month several of the tuning classes presented at the St. Louis convention were reviewed. These included "Aural Fine Tuning — for Electronic Tuners" taught by Dr. Albert Sanderson, "A Master Class in Temperament Tuning" taught by Bill Garlick, "Learning to Listen" taught by Joel Rappaport, "Please Speak Up — I Can't Hear You" taught by Dr. Barbara Bohne and Dr. William Clark, "So You Want to Be a Concert Technician" taught by Norman Neblett, "Tempering the Untemperable" taught by Michael Kimbell, "Equal Temperament" taught by William Stegeman, and "Pitch Raising" taught by Sid Stone.

This month, we will conclude the convention review with "Basic Piano Tuning" by George Defebaugh, "Pitch Raising" by Ruth Brown, and "Listening With Your Accu-Tuner" by James Coleman, Sr. The review of George Defebaugh's class is by James Coleman, Sr. and Rick Baldassin. Ruth Brown and James Coleman, Sr. were asked to provide a synopsis of their mini-technical classes.

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Basic Piano Tuning

When you want a good basic course given, it is always good to have a seasoned veteran give it. This was certainly the case with "Basic Piano Tuning" taught by George Defebaugh, a 1 1/2 hour class which was offered three times during the convention. George began with the basics of hammer technique, what position to use, what movement techniques to use, and what type of hammer tips to use for various pianos. The class period was topped off with an actual demonstration of his famous Defebaugh Temperament, where he tunes by the faster beating intervals such as 3rds and 6ths, and checks with 4ths and 5ths to see that they are relatively smooth.

Having been a drummer, George has a beautiful sense of rhythm. Since his days in the service, he has developed a perfect memory for the standard marching speed of 120 beats per minute. This gives him a standard for the F3-D4 6th, and the G3-B3 3rd. He can accurately calibrate all other 3rds or 6ths as slightly faster or slower than the intervals he sets early in his system because of his built-in drummer's metronome.

For those of us without this "built-in" metronome, a standard metronome is quite helpful in establishing

basic beat speeds as a basis for our temperament. If the metronome is set at 120 beats per minute, and the pulse sub-divided into sixteenth notes, the result would be eight beats per second. The same technique with the metronome set at 105 beats per minute would result in seven beats per second, and a setting of 136 beats per minute would yield nine beats per second. Beat rates of approximately seven, eight, and nine form the basis for George's temperament.

George strongly advocated the exclusive use of the "A" fork, and recommended that the fork be checked frequently for accuracy. It was stated that direct pitch transfer from the fork is unreliable, and note F2 was used as a test note. The object was to tune A4 such that the beat rate from F2-A4 was the same as F2-A fork. The same test would be used if an audible pitch source other than a fork was used. The next step is to tune A3 to A4 as a wide 4:2 octave (M3 < M10).

The next step is to tune F3 to A3 at ≈ 7 bps. This is followed by tuning D4 to F3 at ≈ 8 bps. Test to see that the A3-D4 4th is not more than 1 bps. The next step is to tune A♯3 to D4 at ≈ 9 bps. Test to see that the F3-A♯3 4th is not more than 1 bps. These notes form the foundation for George's temperament.

It was stated that the actual beats in the piano are slower than the theoretical rates due to inharmonicity. In addition, it was mentioned that the fast beating intervals were favored in this system to give a more musical sound. The object was to create a nice progression of M3rds and M6ths, with no objectionable 4ths and 5ths. The opinion was expressed that a musical octave could not be achieved using the slow beating intervals.

Continuing with the temperament, C♯4 was tuned to A3, slightly slower than the A♯3-D4 M3rd. G♯3 was then tuned to C♯4 at less than 1 bps. C4 was then tuned to G♯3, slightly slower than the A3-C♯4 M3rd. The F3-C4 5th was also tested. F♯3 was then tuned to A♯3, slightly faster than the F3-A3 M3rd. The F♯3-C♯4 5th was also tested. D♯4 was then tuned to F♯3, slightly faster than the F3-D4 M6th. B3 was then tuned to D♯4, slightly faster than the A♯3-D4 M3rd. The F♯3-B3 4th was also tested. G3 was then tuned to B3, to fit in the chromatic progression between F♯3-A♯3 and G♯3-C4 M3rds. The G3-C4 4th and G3-D4 5th were also tested. E4 was then tuned to G3, slightly faster than the F♯3-D♯4 M6th. The C4-E4 M3rd, B3-E4 4th, and A3-E4 5th were also tested. Finally, F4 was tuned to G♯3, slightly faster than the G3-E4 M6th. The C♯4-F4 M3rd, C4-F4 4th, A♯3-F4 5th, and F3-F4 octave were also tested. Parallel M3rds, M6ths, 4ths, and 5ths were then played.

Finally, the inside 3rd-outside 6th test was used. It was stated that the inside 3rd should beat at about the same speed as the outside sixth. To test, first play the G3-B3 M3rd, followed by the F3-D4 M6th. Move up a semi-tone and repeat, etc. Complete the test by playing all four notes at once, F3-G3-B3-D4, and listen for sonority. Move up a semitone and repeat, etc. It was stated that this creates the piano vibrato, and that if this sonority is present, the tone will carry better.

This class was held in one of the larger rooms and was well attended. Time was given to answer questions even from beginners. His well chosen anecdotes kept the class alive at all times.

My thanks to Jim Coleman for his help in the review of this class.

Mini-Technical Review

There were five mini-technicals offered on tuning. These were half-hour classes offered once during the convention. Of the five, three were reviewed last month. The final two will be reviewed this month. The reviewer in each case is the instructor, who was asked to present a synopsis of the class.

Class title: Pitch Raising Instructor: Ruth Brown

New tuners usually begin by learning the fundamentals of beat rates, partials, hammer technique (pin setting), and so forth. The key concern is with setting the perfect temperament, when a much more basic problem looms.

We learn from experience that changing pitch gets us into trouble, and retreat. Either the tuner ends up leaving pianos where they find them, or a variation on this theme becomes the preferred approach: raise to A-440, charge a token additional fee, and tell the customer to "be sure to call me again in a few months." Neither of these alternatives does the piano, its owner, or the tuner any long-range good. While the customer may initially like the price, they soon realize that something was lacking, and if they return to that tuner, it may be more out of habit than respect.

All tuning is pitch correction — but at what point is the change large enough to warrant extra labor and extra fees? Sometimes a 10 to 15 cent change will easily hold, yet other times five cents is far too great a movement.

There are four major factors which affect pitch: 1. Time (gradual drop in tension), 2. Humidity (decrease or increase in tension), 3. The degree of change in the course of tuning, no matter what the cause of the piano's having been off pitch, and 4. New strings and structural settling.

A solid, stable tuning cannot take place until the change will be no more than a beat here and there. The main reason is the settling of the string itself. The tension must be correct in the speaking length, and have moved across all segments of the full string length, like water in canal locks. Picture the midrange of an upright: Pull up a string, first from the tuning pin to pressure bar, then to the V-bar, and across the V-bar into the speaking length, until the tension there, and the pitch you hear, are correct. The string has not yet moved over the bridge surface, or around the bridge pins. At this point, a "test blow" cannot help but change the tension. This is easily demonstrated to a customer with a rubber band held on the edge of the piano, on an angle. Pull on the upper end of the rubber band, and the lower end will not move. To add to the problem, you are changing not one, but roughly 230 strings, so there are structural reactions to the increased tension.

When humidity changes are the culprit, you are compensating at the tuning pin for changes which occurred in the soundboard, making stability impossible as the humidity continues to change. You could elect to tune only at "heat on/heat off" times, but this is a disservice to the piano owner, as the resultant unbalanced string tension leads to structural problems. Assist the cus-

tomer in correcting the humidity problem for the good of the piano's longevity and your own reputation.

In a pitch correction of 1/2 tone or more, go over the piano four times — first just to A-440, then re-raise to roughly 442-3, third to a nicely settled 440, and then tune. It is referred to as pitch correction followed by tuning. The substantially-larger-than-tuning fee includes a follow-up tuning one to two weeks later.

Class Title: Listening With Your Accu-Tuner Instructor: James Coleman, Sr.

Mr. Coleman introduced his subject by mentioning that one can get free ear training while using an Accu-Tuner. His demonstration showed how to measure a stretch number from note F4, store it, and then to tune the temperament in the same order as you would tune your favorite aural temperament.

He used his F3 to A4 temperament (see August 1988, pp. 32- 33), starting with A4, using the machine as his reference. Then the A3 was tuned roughly by ear, then using the F3 as a reference, the A3 was refined so that the F3-A3 third test was approximately 1/2 BPS slower than the F3-A4 tenth. He deliberately left the A3 a little high to see if anyone would pick up on it. He then pointed out that the red LED's were moving slightly clockwise. When the rotation was stopped, the 3rd-10th test sounded better.

His next note to tune was the F3. This was tuned to approximately 7 BPS. He demonstrated two methods he used to gain accuracy for this interval (counting with the use of a metronome, and his own natural nervous system speed). The next note tuned was F4, which was tuned using C♯3-F3 third being slightly slower than the C♯3-F4 tenth. This works even though the C♯3 has not been tuned yet. At the end of each of these steps, the Accu-Tuner was checked to see that the notes were also tuned accurately with the machine.

The C♯4 was next tuned to balance in between the A3 and the F4 so that there would be a good balance between the four Major Thirds: F3-A3, A3-C♯4, C♯4-F4, and F4-A4. In checking this balance it was shown that the F3 was too sharp, causing the F3-A3 third to be too slow to fit in with the other thirds. Lo and behold, the Accu-Tuner showed the same thing. The pin had not been settled properly and the pitch had risen. When this was corrected by machine and by ear, the resulting balance was beautiful.

From this point on, he guaranteed that anyone who could tune fairly good 4ths or 5ths and could use 3rds and 6ths could not fail to get a good temperament because there would be at least two or three additional aural tests for each note remaining to be tuned. He turned the machine out of his view as he tuned the remaining notes so that only the audience would be able to see the LEDs. The last note he tuned had at least five checks, and the temperament came out very good.

His favorite comment was that "when you tune aurally and use the machine, you have the best of both worlds." The machine will keep you from skewing your temperament in one direction or another, and aural tuning will keep you honest with the machine. Either method will help detect careless errors left by the other method.

As a handout, he had prepared a sheet with Stretch tunings which departed slightly from those in the Accu-Tuner, in that they give tighter octaves. The normal Stretch tunings will provide octaves that give 1/2 BPS difference between the standard 3rd-10th tests. These new values will provide for 1/4 BPS dif-

Stretch Values For 1/4 BPS 4:2-Type Octaves

Stretch Number			*3.0*	*3.5*	*4.0*	*4.5*	*5.0*	*5.5*	*6.0*	*6.5*	*7.0*
Note Played	Oct. Set	Part. No.	*	*	*	Cents Deviation			*	*	*
F6	6	1	3.4	3.9	4.3	4.7	5.2	5.6	6.0	6.5	6.9
E6	6	1	3.1	3.5	3.9	4.3	4.7	5.1	5.5	5.9	6.3
D♯6	6	1	2.8	3.2	3.6	3.9	4.3	4.6	5.0	5.4	5.7
D6	6	1	2.6	2.9	3.3	3.6	3.9	4.3	4.6	4.9	5.2
C♯6	6	1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8
C6	6	1	2.1	2.4	2.7	2.9	3.2	3.5	3.7	4.0	4.3
B5	5	1	1.9	2.2	2.4	2.7	2.9	3.1	3.4	3.6	3.9
A♯5	5	1	1.7	2.0	2.2	2.4	2.6	2.8	3.1	3.3	3.5
A5	5	1	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2
G♯5	5	1	1.4	1.6	1.8	2.0	2.2	2.4	2.5	2.7	2.9
G5	5	1	1.3	1.4	1.6	1.8	1.9	2.1	2.3	2.5	2.6
F♯5	5	1	1.1	1.2	1.4	1.6	1.7	1.9	2.0	2.2	2.3
F5	6	2	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.4	6.9
E5	6	2	2.8	3.2	3.7	4.1	4.6	5.0	5.4	5.9	6.3
D♯5	6	2	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6
D5	6	2	2.2	2.5	2.9	3.3	3.6	4.0	4.3	4.7	5.0
C♯5	6	2	1.9	2.2	2.5	2.9	3.2	3.5	3.8	4.1	4.5
C5	6	2	1.6	1.9	2.2	2.5	2.7	3.0	3.3	3.6	3.9
B4	5	2	1.3	1.6	1.8	2.1	2.3	2.5	2.8	3.0	3.3
A♯4	5	2	1.1	1.3	1.5	1.7	1.9	2.1	2.3	2.5	2.7
A4	5	2	0.8	1.0	1.2	1.3	1.5	1.7	1.8	2.0	2.2
G♯4	5	2	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.8
G4	5	2	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	1.3
F♯4	5	2	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.9
F4	6	4	2.9	3.5	4.1	4.6	5.2	5.8	6.3	6.9	7.4
E4	6	4	2.6	3.1	3.6	4.1	4.6	5.1	5.6	6.1	6.7
D♯4	6	4	2.2	2.6	3.1	3.5	4.0	4.4	4.8	5.3	5.7
D4	6	4	1.8	2.2	2.6	3.0	3.4	3.8	4.2	4.6	5.0
C♯4	6	4	1.5	1.9	2.2	2.6	2.9	3.2	3.6	3.9	4.3
C4	6	4	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6
B3	5	4	0.9	1.2	1.4	1.7	1.9	2.2	2.5	2.7	3.0
A♯3	5	4	0.6	0.8	1.0	1.2	1.4	1.7	1.9	2.1	2.3
A3	5	4	0.3	0.5	0.7	0.8	1.0	1.2	1.3	1.5	1.7
G♯3	5	4	0.1	0.2	0.4	0.5	0.6	0.8	0.9	1.1	1.2
G3	5	4	-0.2	-0.1	0.0	0.1	0.2	0.3	0.4	0.5	0.6
F♯3	5	4	-0.5	-0.4	-0.4	-0.3	-0.3	-0.2	-0.1	-0.1	0.0
F3	5	4	-0.8	-0.8	-0.8	-0.7	-0.7	-0.7	-0.6	-0.6	-0.6
E3	5	4	-1.1	-1.1	-1.1	-1.1	-1.2	-1.2	-1.2	-1.2	-1.2
D♯3	5	4	-1.4	-1.4	-1.5	-1.5	-1.5	-1.6	-1.6	-1.7	-1.7
D3	5	4	-1.6	-1.7	-1.8	-1.9	-2.0	-2.0	-2.1	-2.2	-2.3
C♯3	5	4	-1.9	-2.0	-2.1	-2.2	-2.3	-2.4	-2.5	-2.6	-2.7
C3	5	4	-2.1	-2.2	-2.4	-2.5	-2.6	-2.7	-2.9	-3.0	-3.1

ference between the 3rd-10th tests for octaves.

There is one tuning class which has not yet been reviewed. It was entitled "Efficient Piano Tuning" taught by Charles Huether. Its review will come in the form of a series of articles written by Charles Huether which will deal with the class material. These will appear in the near future. This concludes the review of the Tuning and Tuning-related classes offered at the St. Louis Convention. In all, there were 34 hours of classes relating to tuning. I hope the reviews were able to convey at least a part of the knowledge which was offered.

Letters

Our first letter this month comes from Jim Moon, of Oberlin, Ohio, and is in response to the article about the inharmonicity formulas which appeared in the July 1988 issue. Jim writes:

I have just carefully read the column on inharmonicity (July 1988) and I find it very disappointing because it appears to be written primarily to support a pre-conceived conclusion. There are too many loose ends of which I will mention just a few.

The "pre-conceived conclusion" is obviously that the Roberts formulas are wrong and the Sanderson formulas are correct. The data presented clearly demonstrates only one thing; the measured inharmonicity deviates from the calculated inharmonicity. That is the only substantive conclusion I can reach from the article.

The first detail I would question is how you actually measured the inharmonicity. The article contains no information on this point. As far as I am concerned, unless a sophisticated harmonic frequency analyzer is used to determine the actual frequency of the various partials and this information compared with the theoretical, or calculated, frequency of the partials in question and the differences converted to cents, you do not really have a valid measurement on which to judge the accuracy of the formulas in question, especially if you used an instrument designed to operate in accordance with said questioned formulas.

I am not so sure I buy the concept of an "inharmonicity constant." As the partial number increases the subdivision of the string into segments becomes more complex with the segments becoming shorter as the number increases. This has to increase the influence of the stiffness of the wire which can be demonstrated by taking various lengths of the same diameter wire and observing which ones resist bending more, the short ones or the long ones. Since we are dealing with a "variable," how can we have a "constant?"

Why the question about inches versus mils? 0.001 inches is one thousandth of an inch. 1 mil is one thousandth of an inch. They are identical. Only the labels are different, plus there is considerably more convenience in taking notes when you do not have to write a decimal point and however many zeroes it takes to record the measurement being written. The mil is a perfectly respectable unit which you will find used in such places as the Handbook of Chemistry and Physics. *It certainly does not warrant your obvious objection.*

The original Roberts formulas included in the article show a serious omission; there is no provision for the influence of the tension. It is to his credit that he realized it and changed his formula for "S." In case any would doubt the importance of tension on inharmonicity compare the resistance of bending of a piece of wire anchored at only one end with one under the kind of tension found in a piano. Tension has a very real influence on inharmonicity.

The reference to the concept that the copper wrap (or any other material, for that matter) does not serve to add inharmonicity really covers only one facet of the picture. The purpose of any wrap is to add mass to the string without reducing its flexibility (In fact, it increases the string's flexibility) so that it can produce the desired low frequency. It is the fact that the wrap can be varied while using the same core that allows the adjustment of inharmonicity to make possible the elimination of big jumps in inharmonicity with the end result being a more uniform tone requiring less voicing, improved tunability, tuning stability and pitch definition in the low bass.

This is the crux of the whole inharmonicity study. There is not much real value in knowing exactly how much inharmonicity there is in a certain string (unless you are one who delights in flaunting your knowledge in front of your customers). The real value is for rebuilders who need to be able to give their customers the best possible results and frequently have very little to go on. The only real value is to be able to compare note-to-note inharmonicities for the sole purpose of making the inevitable changes as small and as smooth as possible. It makes absolutely no difference whose formulas are used as long as this comparison can be made consistently. Articles such as the one that triggered this letter can be very confusing to the inexperienced and should not be published as absolute truth, especially when they are the result of obviously subjective motivation.

Our next letter comes from Dennis Gorgas of Edmonds, Washington. It is in response to a copy of a letter he received from Jim Moon. Dennis writes:

I just received a copy of "An open letter to Rick Baldassin" sent to me by Jim Moon of Oberlin, Ohio. Were I to consider writing a letter of chastisement to a tuning editor, I would do so and then put the letter away for a year or two. Upon re-reading the letter I would no doubt toss it in the trash can, realizing its absurdity.

I think Jim's objections are without substance. For example, the device you used to read the partial frequencies was indeed a "sophisticated harmonic frequency" measuring device and not biased in its readings in any way.

I think the concept of an "inharmonicity constant" is a good one because it gives us a basic figure for comparison without having to specify a partial number. Perhaps it should be called an "inharmonicity coefficient" instead. Although partial division in a string is anything but linear, there can still be a constant term involved.

When you mentioned the mil and 1/1000ths of an inch difference used in the two equations, I think you meant it as a warning to use the proper units in the respective systems. To mix units would be to invite errors in the decimal places of the results.

As far as the original Roberts formula omitting the Tension term, this is not so. Tension is in both equa-

tions, however in the original it is "incognito," so to speak. Roberts' latest (newest) formula for stiffness is below.

Since A = .89 for copper wrap, Roberts simply let (A/1.07) be substituted by .89, and now the equations are identical, and both contain the factor "T" (tension), as we can see!

Finally, Jim says "there is not much real value in knowing exactly how much inharmonicity there is in a certain string...." Anyone involved in scaling or re-scaling pianos knows differently. The amount of inharmonicity is a very important design parameter, especially when evaluating an existing string scale. Without this knowledge, we would be designing on the basis of loudness, tension, or percent of breaking point. Although this is indeed possible (and often done), using the amount of inharmonicity as a design parameter is preferable, and when used, all of the other design factors usually fall into place accordingly.

Jim's letter tells you one thing for sure — your articles are being read!

$$S = d^4/139430L^2T$$

where $T = 2^{(m/6)}(Ld/802.6)^2\,(1¢B)$, *and* $B = .89[(D^2/d^2)-1]$.

Plugging "B" into the "T" formula yields:

$$T = 2^{(m/6)}(Ld/802.6)^2\,\{1 + .89[(D^2/d^2)-1]\}$$

Entering "T" into the "S" equation yields:

$$S = d^4/139430L^2[2^{(m/6)}(Ld/802.6)^2\,\{1 + .89[(D^2/d^2)-1]\}].$$

Clearing away some brackets and dividing the numerics yields:

$$S = d^4(802.6)^2/139430L^2(2^{(m/6)}L^2d^2)\{1 + .89[(D^2/d^2)-1]\}.$$

Since $802.6^2/139430 = 4.62$, $L^2xL^2 = L^4$, *and* $d^4/d^2 = d^2$, *the final "new" Roberts equation is:*

$$S = 4.62d^2/2^{(m/6)}L^4\{1 + .89[(D^2/d^2)-1]\}.$$

The "original" Roberts equation for "S" is:

$$S = 4.62(d^2/L^4)/2^{(m/6)}\{1 + (A/1.07)[(D^2/d^2)-1]\}.$$

By placing L^4 *where it belongs, the final "original" Roberts equation is:*

$$S = 4.62d^2/2^{(m/6)}L^4\{1 + (A/1.07)[(D^2/d^2)-1]\}.$$

Our thanks to Jim Moon and Dennis Gorgas for their letters relating to the article on the inharmonicity formulas. Let me assure you that my motivation in writing this article was simply to answer Dennis' question, which was a question I had myself, and had never gotten around to finding the answer. It was my feeling to that point that I had programmed the Sanderson formulas incorrectly, since the inharmonicity values from the Sanderson formulas were lower than from the Roberts formulas, and were expected to be higher, since they also accounted for the additional inharmonicity from the step in double wound strings.

The partial readings were taken with Accu-Tuner serial number 423. To my knowledge, this is as accurate a pitch measuring device as is available, and pitch measuring devices are not inherently biased toward one formula or another.

The inharmonicity constant, or coefficient is present in both formulas, though not as obvious in the

Roberts formulas. As Roberts explained in his series, his formulas gave the relative inharmonicity between the desired partial and the fundamental, hence the multiplier (n^2-1) as opposed to n^2, n being the partial number. If we disallow the concept of the inharmonicity constant, neither of the formulas are of use to us. Research in the *Journal of the Acoustical Society of America* and elsewhere overwhelmingly supports the fact that the inharmonicity progresses at the rate of the square of the partial times the coefficient.

In Jim's letter, he makes the statement, "It is the fact that the wrap can be varied while using the same core that allows the adjustment of the inharmonicity...." It is my experience that changing the wrap, or overall diameter of a string on the same core does not change the inharmonicity significantly, but changes the tension. If we want to vary the inharmonicity, we change the core wire. If we want the tension to remain the same, we maintain the same overall diameter. Basically, core wire affects inharmonicity, and wrap affects tension. It is true that we may change the inharmonicity by changing the length of the wrap (or length of the unwrapped ends), but if these lengths remain the same and only the wrap diameter changes, then only the tension will be affected significantly.

I agree that this is a very important subject and invite responses from Dave Roberts and Dr. Sanderson if they so desire. Certainly the contributions of both Roberts and Sanderson in the area of inharmonicity cannot be overlooked. After all, it was Roberts' articles which sparked my interest in the subject in the first place. ■

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Provo, UT 84601

The 'Tap-Test' Or, If Your Soundboard Talks, Listen To It

Nick Gravagne
New Mexico Chapter

Before any plank was put into place, MacAlpine and Tom and anyone else who happened to be about held a consultation over it. First they examined it very carefully, and then they bent it, tapped it, listened to it, and, as I live by bread, I swear that once, at least, I saw MacAlpine tasting it. At any rate he applied his tongue to the wood, and then went through all the motions of an expert tea-taster — even to that final feat of expectorating through the clenched teeth with precision and gusto.

The Southseaman — *Westyn Martyr*

To my knowledge soundboard makers have not yet taken to tasting spruce wood in order to test its piano-worthiness; but judging by the conversations held by some of us as to where the best trees are, number of annual rings acceptable, and a host of assorted scientific and near-magical criteria, I wonder if that day is not far off. Testing, selecting, rejecting and discarding are daily fare in rebuilding shops and the favorite techniques, processes and standards are more closely associated with the smell of hide glue and the crunch of wood chips underfoot than computer printouts.

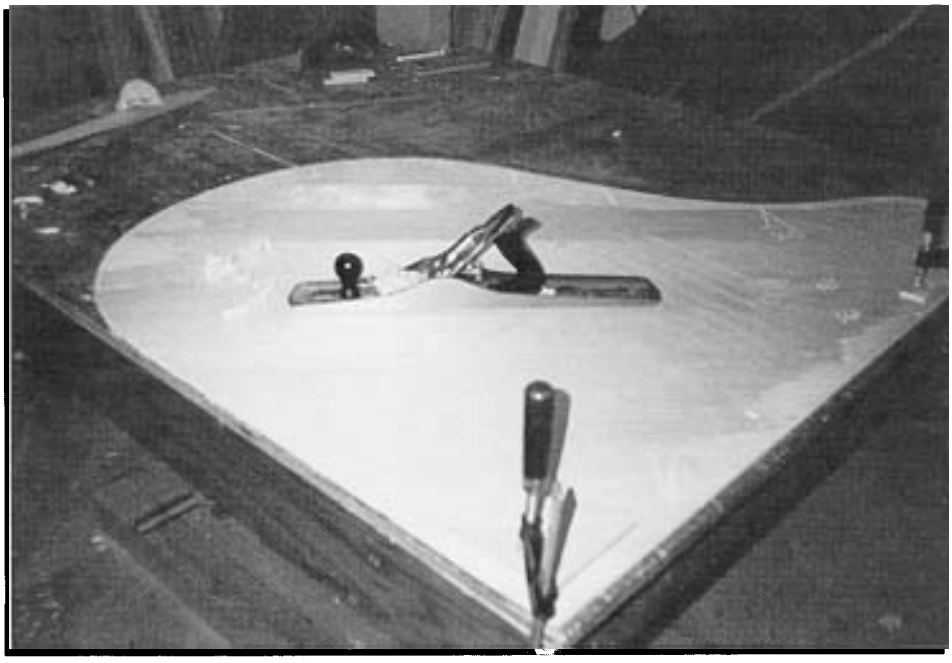
For example, there is a test made on old soundboards after string and plate removal which is as effective as it seems primitive. Referred to as the "tap-test," or other such names, it is simply accomplished by sharply tapping the soundboard with the side of the fist and LISTENING. Is there a boom or a thud? A crowned and resilient soundboard will give out a definite bass drum-like sound, complete with discernable pitch, attack, swell and decay. In fact, a struck soundboard should have everything we would normally expect in characteristic piano tone, including ring time, although soundboard ring time is short. (As the soundboard gets larger, the pitch is lower but sustains longer, same as piano strings. Two recent Steinways, models 0 and M, with replaced soundboards, had ring times of one to two seconds).

Steinway M replacement board

New soundboards, properly made and installed, invariably exhibit this effect — old boards rarely do; or they do in one area while another is dead.

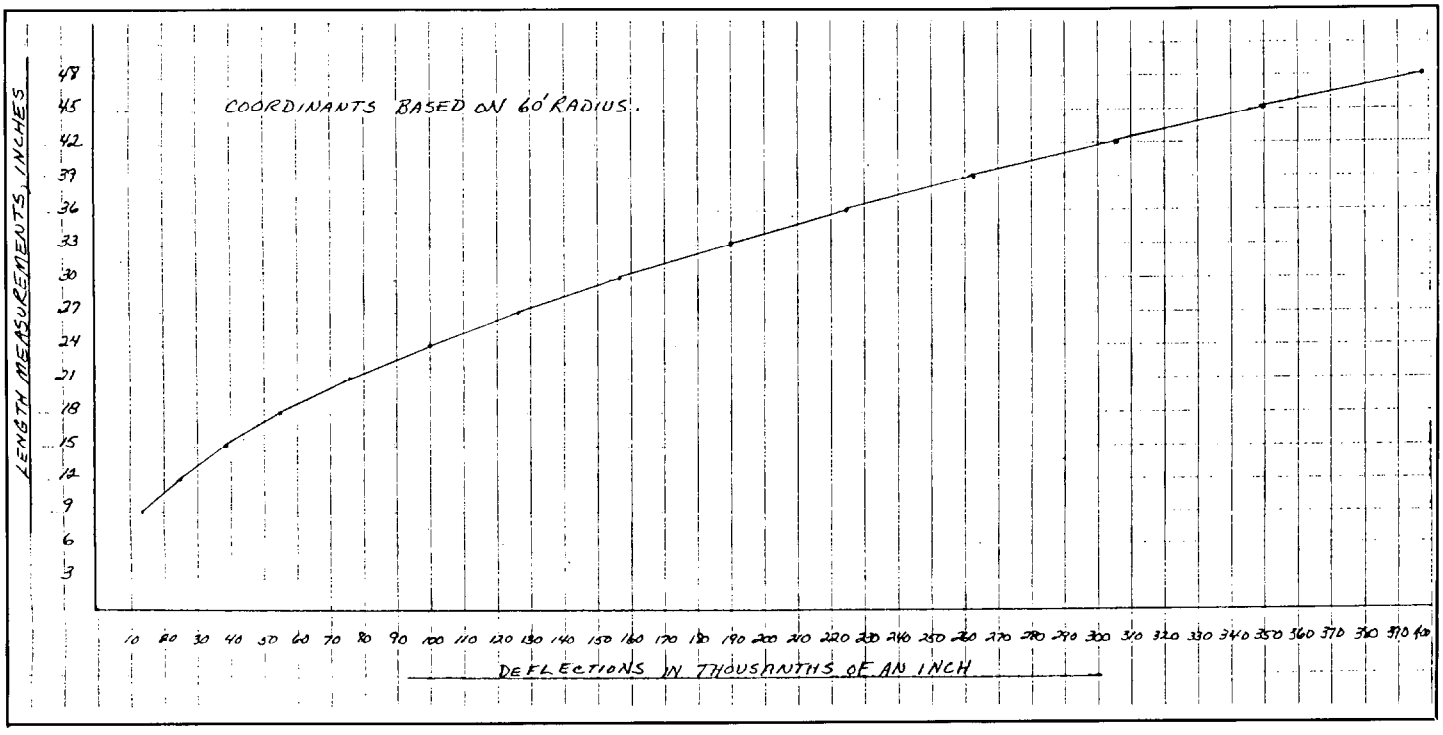
This series has repeatedly made reference to "the fully crowned soundboard" and its relationship to downbearing and tone. Full crown in the soundboard is not subjective, or open to wide interpretations; it can be measured, it can be seen by the trained eye, and, generally speaking, it can be heard. When full crown is evident it exists EVERYWHERE to some measurable extent ACROSS the grain and, in virtually all pianos, ALONG the grain as well. This crown along the grain, which is not naturally introduced into the soundboard in the crowning process, is automatically forced into the board upon installation to the inner rim and is a bit smaller in curvature than that which exists across the grain.

That this straining of the soundboard along the grain upon installation is conducive to superior tonal effect is at least debatable, but there is certainly reason to subscribe to this belief. I have in my possession a sales tool made by a one-time leading piano maker which consists of a tuning fork secured upright at its shank to a thin spruce board. When the fork is struck by a piano hammer the tone is amplified by the spruce board; however, when the board is physically bent upward to a crown, the initial feeble tone increases in volume and fundamental clarity. A child can hear the difference.



Grading the spruce sheet

When the board is relaxed the tone becomes once again flaccid and dull. What is interesting in this little experiment is that the spruce board must be forced to assume the crowned shape and physically restrained in that position for the tone quality of the tuning fork to be improved. It would appear that the elastic behavior of wood, its resilience, and the exploitation of this property through the introduction of strain energy in the soundboard, has as much to do with good tone quality as the acoustical properties of the wood itself. As has been noted, modern soundboards are naturally crowned across the grain through ribbing and along the grain through installation. The board is resilient so long as it retains the elastic property to spring back to a natural, uninhib-



ited state. Since this essential property cannot be seen in an old soundboard, measurements must be made to check its shape and the board must be sharply rapped and listened to. Resilience is the life-blood of a soundboard.

The basic architecture of a fully crowned soundboard, then, is essentially that of a springy dome. All domes incorporate a three-dimensional stress system which enables them to take a vertical load at any point and radiate the pressure outward and down to the dome's foundation. In the case of a soundboard, pressure from down-bearing is converted to lateral loads which run along the ribs, along the grain and along everything in between. These loads are resisted in full by the rim and belly rail. A soundboard/case is an amazingly strong unit so long as crown (dome) exists; the higher the dome the stronger the unit. When a soundboard has lost its crown it has not only lost its ability to resist loads with the pin-point accuracy of the dome, it is also devoid of that springy and elastic property which is indispensable in a vibrant soundboard. But how flat is flat?

The graph at Figure 1 is a handy device for finding crown deflection for a 60-foot radius base*. Measurements for length, although usually taken across the grain, can be taken along the grain or oblique to the grain. The vertical line of the graph designates these length measurements in inches while the horizontal line is the crown deflection relative to a particular length and the unit of measure is in thousandths of an inch. For example, a length of 24 inches should relate to a crown deflection of .100 inch. Since there is nothing linear about a circle the graph line is predictably curved. The photo at Figure 2 shows an easy way to make these measurements. The two upright blocks of wood are seven inches tall; so, if crown exists, the tape measurement made to the center of the underside of the straightedge will be less than seven inches. The difference is the deflection amount. The blocks may be placed at any desired distance across the grain (as in the photo) or along the grain. Several measurements can be taken at various lengths in a matter of minutes. A direct reading tape measure with the little window and locking device simplifies matters. Compare the findings to the graph in Figure 1. You might consider enlarging the graph and hanging it in your shop.

"

The board is resilient so long as it retains the elastic property to spring back to a natural, uninhibited state. Since this essential property cannot be seen in an old soundboard, measurements must be made to check its shape and the board must be sharply rapped and listened to. Resilience is the life-blood of a soundboard.

"

Measurements made on old soundboards invariably indicate deflection values which are lower than the graph numbers due to a partially or completely sunken crown. But if there is a crown deflection found at ALL places, even though lower than the graph values, and the soundboard demonstrates resilience in the tap-test, (and the board isn't seriously cracked), the soundboard is probably okay to retain in the rebuild. In a nutshell, a fully crowned soundboard has crown deflections more or less per the graph across and along the grain and passes the tap-test; a reusable, old soundboard is like the fully crowned board in all respects but has less crown.

Two recent experiences will shed some light on this. After making the crown measurements on a first-class grand we found minimal deflections (1/16") in the center and bass portions and almost zero in the mid to treble areas. Readings along the grain were also minimal to flat. There was one minor short crack. The tap-test was a dud. We decided to remove the board. After this was done, the soundboard seriously REVERSED crown by an amount almost equalling the positive crown it once had. Another first-class instrument showed a little better crown deflection, no cracks, and the tap-test revealed some resilience but there was a large dead spot at the middle area in front of the long bridge. We removed the board and it too reversed crown. In both cases the only reason for positive deflection values at all was due to the board being glued to a beveled inner rim.

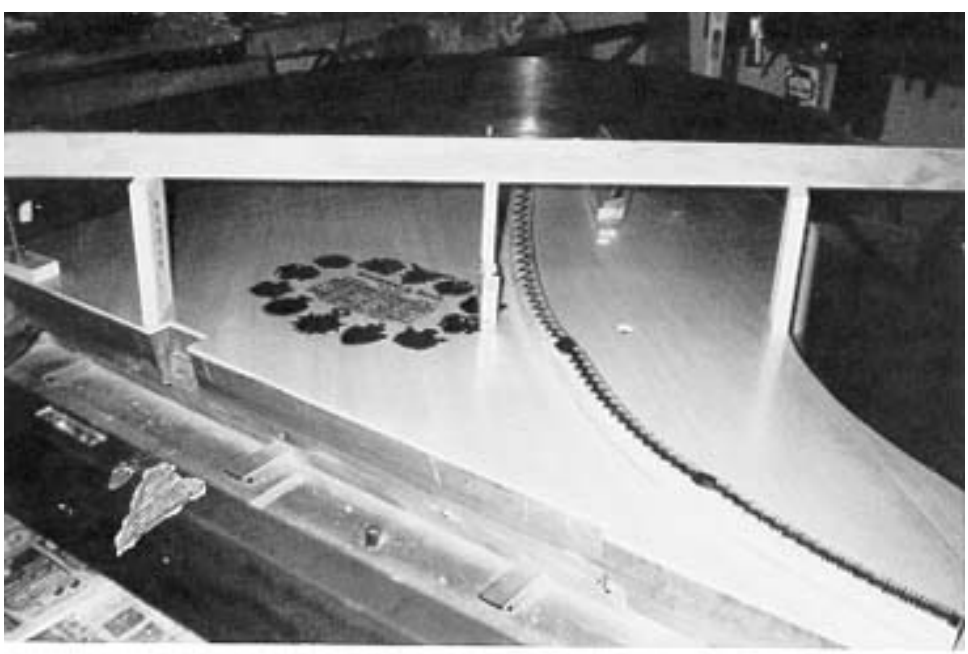


Figure 2

The tap-test thuds were the key indicators of serious problems, more so than the measurements. (Obviously I am talking here in ideals, i.e., ignoring the huge and arbitrary factors of economics, consumer unawareness and even propaganda. In addition, we are all aware of the piano with the flat, or near flat, soundboard which sounds wonderful.)

Is it possible for a soundboard with full deflection values to sound tight and unresponsive in the tap-test? Certainly, but it is hard to say why since we weren't there when the soundboard was made and installed. And there are many unseen devices and forces at work over time, having crept in, as it were, like termites. In an old piano, for instance, the glue joint at the rim may have weakened, although the board seems to be attached well enough. A rigid connection of soundboard rim is imperative. The usual procedure for soundboard removal is ramming, or popping it out whole. The piano is placed on its side and a ram (two by four board) is literally crashed into the ribs as close to the inner rim as possible. (Don't do this in front of your customers unless they have great powers of imagination.) In the majority of instances the board will come out in one piece. But the interesting thing is that some boards just about fall out with only a few bangs while others take a considerable battering before they give out. Clearly, all glue joints are not created equal; some pianos live better lives than others. Inspections of rims after soundboard removal reveal in many cases crystals of hot hide glue in pockets and other indications of a less than good joint. Also, for a long time hot glue was the only glue used and, insofar as factory soundboard installation goes, there was no time for idle chatter when it came time to install the board. But some days on the floor went better than others and I'm convinced that more than one soundboard was pressed to a rim where the hot glue had begun to gel, at least in places.

How important it is that a flexible diaphragm should vibrate uninhibited by reflecting off a thoroughly rigid foundation was really brought home to me a while ago. Most grands have a strip of quarter-round molding glued to the top of the soundboard at the inner case joint. A long strip can be found along the long side of the soundboard and sometimes a short strip can be found at the high treble edge of the soundboard. In addition, most grands have a treble cap of hardwood which sandwiches the soundboard to the bellyrail; it is installed with glue and brass screws. These trim pieces are, of course, secured after the soundboard has been installed, being glued and sometimes further secured with brass screws. After having installed these pieces in my usual fashion (glue and brass screws even in the long quarter-round strip) and, while the glue was still wet, I nonchalantly rapped the soundboard with my fist only to find that the nice boom tone which had been there the day before had now fizzled into a thud. Upon a moment's reflection I surmised that the soundboard vibration were somehow being sapped by the infirm and as yet unsolid condition of the trim pieces, I was correct. The next day, when all was solid and hard, the boom was back.

The point here is that anything is possible when we are assessing soundboard and, in general, complete instrument responsiveness; and we rip out of our work the very soul which makes it artistic and human if we relegate our involvement with the piano to quantitative terms only. Measuring is necessary, but as a means to an end. Although we can make too much of it, let's remember what the proverbial Scotsman said after having been asked to explain in dry and technical terms his defense of a certain belief: " 'Tis better felt than tell't." ■

* Thanks to engineer Dick Ochsnard for his assistance in computer programming.

COMPUTERS

AND PIANOS

The Data Base

Ron Berry
Indianapolis Chapter

So far in this series we have discussed hardware, word processors and spreadsheets. This month I want to talk about data bases.

When you think about a computer and the kinds of things it does, you usually think of things that a data base can do. One data base advertised "to get your computer to do the things you bought the computer for in the first place." A data base is a program in which you set up a format to store data. It allows you to access that data in a variety of ways. Think of a data base as a set of file cards which can be organized by name, address, zip code, phone number, etc., all at the same time. You can search for all the 46220 zip codes, or you can sort the whole list by zip code to print mailing labels.

Data bases fall into two types, file management systems and relational data bases. A file management system is very much like our file cards. You can call up the file card ("record" in computer terms) by any criterion, but you are somewhat limited in reporting functions with the data. These systems are usually easier to learn to use and may offer all you need to run your business. Relational data bases offer a hierarchical structure which would be like having each card of our file cards equipped with a small box of cards with data relating to that individual card. These subsystems can go many levels deep if necessary. One way this might be used is to have a record for each of your customers and then subrecords for each of their pianos. That way, a church with 14 pianos would have them all under one record for that church. You could also keep a separate subrecord each time you service the piano. This approach can often speed up searching for data. Picture your data as a pyramid. If you know information in the higher parts of the pyramid, it will take less time to follow that track rather than just searching across the bottom of the pyramid.

Some data bases can do calculations. This is important. We are trying to keep all our customer and income records on one system. You either need a data base that can calculate or an integrated word processor-spread sheet-data base program which can easily transfer data from data base to spread sheet to do the calculations.

Most programs are controlled by one of two methods. The first is a menu-driven program. The program gives you a list of things it can do and you select from these choices. Often you will have several levels of menus just as in a restaurant you might have a menu that says:

Appetizers
Soups
Entrees
Salads
Vegetables
Desserts

Once you have selected "desserts," you might get another menu that says:

Cakes
Pies
Ice Creams
Pastries

Once you have selected pies, you might get:

Apple
Cherry
Chocolate
Pecan

Menu selection can be made in a number of ways. The most basic is that each choice has a number or letter beside it and by pressing the number or letter the programs go on with that choice. Some menus have a list of choices with one highlighted. You use "up" or "down" arrow keys to move the highlight to the choice you want. Then press "return" to enter that choice. The more sophisticated Macintosh computer has a mouse (a small box with a button on top) that you move around on your desk to move an arrow around the screen. You move the arrow until it points to something you want to do. Then press the button. The treatment of secondary menus on the Macintosh is interesting. The first level menu is a row of choices along the top margin of the screen — you move the arrow to one choice, press the button and move the arrow down and a second-level menu pops up. Moving the mouse moves a highlight in this menu, then letting up the button selects that choice. Touch screens are also available on some rather expensive computers where there are sensors in the screen that can tell when your finger is touching a selection on the screen.

The advantage of a menu-driven program is that it is easy to learn to use. you don't need to remember anything, just choose from among the choices. The disadvantage is

that you must go through the levels of menus. If you know right off that you want pecan pie, you can't just go right to it. You must choose at each level of menu.

Command based programs require that you learn a set of commands (often control codes — you press the control key which is like another shift key and press a letter while holding it down). This system allows you to jump to any function you want right away but requires that you learn the commands. Command based programs are more flexible; some will allow you to define a key function as a whole collection of key presses.

A few high power Data Bases aren't programs but are really programming languages. You can do absolutely anything you want but must write a program to do it. These languages are written to do the kinds of things you need to do with a Data Base. They make complex reports much easier than they would be in BASIC language.

Then there are hybrids of these systems. The program I use on my Apple is a menu driven program that also allows "user programs" in a special language so that if the main program won't do something you need to do, you can write a routine to do it (much easier said than done)! This is a good back door to have. Even if you had to pay someone else to write a program it might keep you from having to change to another system and reenter all your data.

There are several programs available specifically for piano technicians which have tried to figure out everything you may ever need to do and were written to handle these cases. This would save you from having to learn about a Data Base and tailor it to your situation but it would also make it difficult if not impossible to change the program if your needs change. If the support from the writers of the program is good, getting changes made may not be a problem. Some of the custom programs that are available now are well thought out and can be learned without learning a great deal about computers. The best thing small personal computers have going for them is flexibility. Large mainframe computers can handle more data but making even small changes can be difficult and usually requires a professional programmer.

Data Bases require that you set up a blank form to store your data. This is where you tell the computer that you want name, address, zip code, phone, last date of service, brand of piano, etc. and set up the format of how this information is displayed on the screen. You do have to make some important decisions at this point. This is probably the hardest part of setting up a Data Base system. You need to analyze carefully what information you want to keep. You need to determine how much space you are going to allow for each field (fields are spaces in the Blank Form where you will enter your data, for example you will have a field titled "Name" where you will enter the customer's name). One whole Blank Form with all its fields is called a "Record". While 20 letters is usually enough for anybody's last name, you may want to put a

customer name like "Universal Church of God in Christ" in the name field, and you must leave enough space if you want to do this. Next month I will discuss how I set up my blank forms for my customer records and expense records.

Take heart, if all this planning ahead seems too much. A good Data Base will allow you to add or delete fields even after all your data has been entered. A Data Base that doesn't allow this could be a real headache later on. Some will only allow you to add fields at the end of the record once that data is entered, but many will allow you to add fields even in the middle of the blank form. You may have to go through a reorganization process, but you will have the flexibility to change your mind about your Blank Form. I had a case where I had a field to put the next date service was due. I would enter a date 6 months after the last tuning when I entered the service call. I later decided that I would have more flexibility by keeping the last date of service in that field. Because of the way I had set up my form, the program couldn't change these dates automatically, but I was able to write a program which called up each record and found the latest date from among the tuning records and put that date in that field in place of the next date due. This is the kind of flexibility you get with small computers.

Another feature I found important in a Data Base is the ability to print the data in any order on a report. Some programs only allow you to print out the data in the order that it is on the Blank Form. A better program will allow you to rearrange the fields to be printed how ever you want them.

I mentioned earlier that you need a Data Base that will do calculations. This can be either having a field that is calculated from other fields on the same record or doing a report where it calls up all the selected records and keeps a running total of the amounts in a specific field. I keep expenses records on a Blank Form with a field for "Account Number" to categorize the type of expense. Each record corresponds to a check written. The report function totals the amounts as it goes. When it comes to a new account number it subtotals and draws a line then continues totaling the next account number. I will go into further detail on this next month.

I find that I use the Data Base for almost everything. I did use a Spread Sheet for accounting but have even put all that on the Data Base. My Data Base and Word Processor are from the same manufacturer and are compatible which allows me to transfer data between them. I can have a Data Base find all the customers in the 46220 zip code and instead of printing them in a report I can have them print as a text file on a disk. Then I can use this file for a mail merge with a form letter and have individually typed letters to all those people selected from the Data Base. This is a little less convenient than using a program which has a Data Base and Word Processor available simultaneously. But it stands to reason that a program which has all three functions using the available memory space would have to give up something from the three separate programs each using the full memory space. Large programs can be broken up by function and then the computer can access the disk to load the part of the program needed for that function.

I should reiterate that some Data Bases will be disk based, that is, they immediately put your record on the disk when you enter it and must access the disk to search for records. Some will be RAM based where the whole collection of records fits into RAM and the disk is used only to load the whole system and to save it when the computer is turned off. While the RAM based system is much faster to use when the computer is on, I have gone with a disk based system. Most of our record entering is putting in 4 or 5 new records every day, with a disk based system you just enter them and they are added to the disk. With a RAM based system you have to load the whole system, add the new records then save the whole system.

Next month I will get into the details of how I set up my Data Base to tailor it to my business.

ANTIQUE
RESTORATION

The Battle Between Two Early Piano Builders

Edward E. Swenson
Ithaca College

In place of my usual feature on piano restoration, I offer this month a translation of an article by Jakob Bleyer (1778-1812) in which he accuses his colleague, the piano builder Martin Seuffert (?-1847), of stealing his piano-building methods. Both men claimed to be the inventor of the first usable upright piano. What is fascinating about this article today is the detail which Bleyer includes about kiln-drying wood with salt-water steam, the importance of a strong laminated frame, and early stringing scales. How much did early fortepiano builders know about the science of their craft? This forgotten source gives many clues. Because of the difficulty of translating some of the archaic German technical terms, the original terminology is included in brackets. many of Bleyer's comments are not immediately understandable in the 20th century. For example, what does he mean when he speaks of the "magnetic" quality of kiln-dried wood?

Intelligenz-Blatt
of the *Allgemeinen Musikalischen Zeitung*
No. XVII, November 1811, Columns 73-77

Historical Description
Of The Upright Fortepiano:
Invented by Wachtl
And Bleyer in Vienna

The word invention is taken here in its wider meaning. We inscribe on each of the name plates of our upright pianos: "Invented," because ours were the first usable upright pianos. Upright harpsichords existed already at the beginning of the 15th century. More than 40 years ago, keyboard instruments were being built that one called upright fortepianos. At that time, such fortepianos were only rarely served up as special treats. But if one had a closer look at such a mechanism, one could certainly see the drops of sweat that had gone into it on the part of its inventor. One took, as far as the musical usefulness of the instrument was concerned, the inventor's dedication as the work itself. One praised the creator's patience and called him an artist.

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That it may be necessary to acquire a knowledge of physics, acoustics, mechanics, and mathematics in order to invent and produce a good and functional upright pianoforte, was believed as little by the piano makers of the past as by those of today.

Every inventor has the right to indicate on his product, that he is the inventor. On the other hand, it is ridiculous that anyone should accord himself the honorable title of inventor on the basis of a badly made piece of work.

But when someone copies the invention of another and then wants to claim for himself the honors as the inventor, then this is not only ridiculous but also shameless. (Such ridiculous audacity is committed by the local piano builder Martin Seuffert; he imitates our invention and inscribes on all of his name plates: "Invention of Martin Seuffert of Vienna." I would like to know what justifies this miserable presumption??)

For seven years now we (Wachtl and Bleyer) have been producing fortepianos, mostly uprights, based on our own invention. The piano-loving public had been flooded for several years by upright pianos, and the upright had lost all of it credibility. But this fact did not frighten us as we knew that the problems in these fortepianos were not due to the nature of these instruments but rather originated from the lack of theoretical knowledge on the part of their makers.

Our first upright fortepiano had the shape of a pyramid. it was entirely double-strung, and yet we could place it next to any triple-strung grand piano. Since our first experiments measured up to our expectations, we wanted to bring the square *(quer)* fortepiano into a pleasing standing position and at the same time give it an all-around perfection. In this, too, we were successful. Everyone acknowledged that our upright *quer*-fortepianos were far superior to the horizontal ones. In two years, we produced large uprights in five, and standing square fortepianos in three different models. From now on, the improvement of these instruments progressed slowly but steadily. The most important factor was to give the diameter of the strings a proper proportion, since anyone who simply trusts the wire manufacturers is often shamefully deceived. Not that they lack skill. No, rather, since their customers do not pay exact attention, one often finds under two wire sizes one wire thickness, and under one size, two wire thicknesses. Furthermore, one can very easily be convinced that the wire manufacturers do not all use the same (wire) gauges. We gave our own fork-shaped wire gauge (saitenlehr) the following adjustment: between two strings *a* and *b* whose diameters stand in a 1 to 2 relationship, 15 steps were inserted, and in such a way that if one should mark down the diameter of all the strings in their proper order, a geometric series would emerge. If the instrument is to have a homogenous tone, then the thickness of the strings must increase and decrease in geometric proportion. Consequently we have 17 numbers from *a* to *b*. The local as well as the Nurnberg strings have only six wire sizes between *a* and *b*, and even if one should insert half sizes, this would still only add up to 15 sizes whose half sizes are frequently the source of errors.

Most of the refinements had to take place in the stringing scale *(Mensur)*. Due to blind tradition and so-called improvements, this had become so out of proportion that one could no longer recognize the original octave relationship. How much the uniformity of sound suffers under a misshapen scale and a stringing whose numbering has no proportion, can easily be understood. No doubt one could answer that uniformity of sound can be equally produced by skilful hammer leathering. Yes, indeed, but how long will this forced uniformity last? Based on a controlled experiment, for which two apparatuses and one monochord had to be constructed, we determined the length and diameter of the strings, as well as the most accurate tension for the tones f"" and small f. On the basis of these tones, the other 47 insertable tones, which together have to constitute a geometric series, were developed and from this we derived our octave raltionship of 1 to 1.9458608.

Considering the importance of maintaining tuning stability, everyone will concede how important it is to build the strongest possible case *(Kasten)* so that it cannot warp. But many might be unfamiliar with the fact that the weakness of the case structure *(Sarge)* can ruin the originally beautiful sound of an instrument. There exist many examples of the latter. Many a bungler is so fortunate as to get a pretty sound from his instrument. But should the case structure *(Sarge)* be made of inferior material or carelessly built, then the case structure shifts out of place and puts pressure on the soundboard through which it loses its free elasticity, and the sound becomes lost to such an extent that often nothing remains but a hammered dulcimer *(Hackbrett)* with a keyboard. (Hang a singer by the throat and then let him sing.) If one builds a frame in the usual manner, that is, with solid framing members, and furthermore even braces the sides, then one finds within half a year, on removal of the soundboard, that due to the tension of the strings, amounting to 90 centners (4,500 KG or 9,922.5 lbs.) all of the braces will have been compressed into the casewall by the depth of a line *(bei einer Linie)* deep into the case walls *(Walden)* and have now become quite loose. In order to maintain tuning stability, it is not enough only to build a proper frame with solid wood construction. A good frame must not only be (A) strong but (B) soundly built, in order to participate in and reinforce the amplitude of the sound. In April 1808, we built the first case *(Kasten)*, according to our newly developed method. This case did not suffer from the problems mentioned above, and furthermore, it filled conditions (A) and (B) most adequately.

In fact, the entire shape of the sounding-corpus *(Resonanz-Sarge)* with its beams and braces is constructed out of a layering of strips that are only one inch *(ein Zoll)* thick. On top of the first layer, the second one is glued in such a way that it covers and joins the seams *(Fugen)* of the first — and then follows the third layer identical to the first, the fourth to the second and the fifth to the first. Here the braces *(Streben)* cannot press in because they are intimately bound to the contiguous parts, thus lending the case a natural coherence, through which the exceptional acoustical purposes (in the piano) were very well met, since it is well known that a solid body is an excellent sound trasmitter. (See Chladni's *Akustik*. Vogler's *Data zur Akustick,* the note on p. 36)

All of the wood is artificially kiln-dried. In this we followed the good example of Mr. Mundinger (a local citizen and master cabinetmaker) who has been using such a method for the last 12 years. Only a few woodworkers are aware of the advantages in treating the wood in such a manner. Most claim that only time dries wood out. But if one lets wood lie in the open air for 50 years, it will not dry to the point of being magnetic(?), something which does occur, however, within eight days if the artificial drying method is used. At a later date we conducted an experiment with a soundboard whose wood-grain ran diagonally *(in Schiefer Richtung)* under the strings. This was an idea that had already been tried out by our oldest predecessors, and had been rejected as unexpedient. What was crucial, however, was the correct selection of wood, the proper thickness of the soundboard and the correct joining of the same, in order to get a soundboard that, as Chladni rightly points out, is capable of accepting any vibration of the strings. We maintain that a soundboard constructed in the usual way can never attain such a high

degree of flexibility and free elasticity, qualities that greatly increase the singing sound *(Sand und Klang)* and the evenness of tone in an instrument. Such a soundboard, furthermore, never warps, something that happens with other soundboards to such a degree that the bass strings bump against it. The timber used for the soundboards and keyboards is steamed for 48 hours before going into the kiln. The hot steam of salted water penetrates all the pores of the wood and dissolves the resin found within the pores, and draws it out onto the surface of the wood where one can see it in the form of brown drops.

One can easily see that a soundboard thus treated will not only be more lasting but also more suitable for its acoustic function. The action of our upright fortepiano was of German design. We were not happy with it , and I thus invented two years ago an action in the English style, by which the sound gained much strength and beauty. The action on our large, upright fortepianos also is of the German type and has, due to some improvements, been brought up to a higher degree of perfection than the German action attached to a German grand piano. It is equal in simplicity to the latter, but in durability and playability, it far surpasses it, and these two qualities are still absent today in all the other upright fortepianos.

Some pianists have rightly remarked that the tone of our upright fortepianos seems too strident *(grell)* to the ear. This fault has been remedied when we started using a sound-cover (*Schalldeckel*, an English invention).

In Conclusion

Experts who want to take everything that I call an improvement into consideration will find that I do not exaggerate when I claim that our upright fortepiano *(Forte-Piano en Giraffe)* has in all respects a huge advantage over the grand fortepianos, with the sole exception, that due to their upright position, one cannot use them for concerts. But it is precisely this upright position that gives the instrument a far better disposition. The strings as well as all vibrating parts vibrate with much greater ease, and thus amplify the sound with more power than a horizontal body which is supported at four to five points and is thus rendered incapable of vibrations. In addition, our forte-pianos have only three pedals *(Mutationen)*: forte, lute stop and una corda. On request we will also install the bassoon and the Aeolian harp, but never the soundboard drum and the cymbals *(Cinelli)*

Vienna, on Oct. 5, 1811. —
J. F. Bleyer

Martin Seufert's Response
Allgemeinen Musikalischen Zeitung
Intelligenzblatt
No. V, May, 1812

Vindication

In the issue number 17 of the *Intelligenzblatt zur Allgemeinen Musikalischen Zeitung* (November 1811) which I have just received, on the upright fortepianos by J.F. Bleyer, I am reprimanded as a shameless person because I had dared to claim that I had been the inventor of an instrument that is supposedly invented only by Bleyer and Wachtl. I would treat the bitter falling-out with silence, since Bleyer has died in the meantime, if it were not for the fact that my honor has been deeply compromised and my credibility has been diminished by his article.

I thus owe it to myself to make public the following comments in this newspaper which is famous for its impartiality. Bleyer, who was at first a cabinet-maker and only recently learned to build pianos with one of the local masters, entered into business with Wachtl and me seven years ago, and we worked together on the invention of the new action and the improved design of the upright fortepiano. Where we gave it, on the basis of cooperative thinking and planning, the degree of perfection that is so adequately described in Bleyer's article in the Intelligenz-Blatt, and where, as equal partners in the business, we put our names together on all announcements and name plates.

During these six years of partnership, Bleyer never insisted that he was the sole inventor of these improvements. It was enough for him to see his name together with ours, and thus also to share the earnings.

But when, for many reasons, I was forced to break from the company, and when I began to practice on my own the art that I had learned in my earliest youth from my father, the court organ builder Seuffert from Wurzburg, only then, at the onset of my mastery, I availed myself of my right to add to my name the title of inventor (the same title that the other two put on their name plates immediately after our separation). When Bleyer became increasingly aware of the good marketability of my instruments, his jealousy finally was awakened. He has taken refuge in slander and spitefulness of one kind and another in order to undermine my good reputation here as well as abroad, to make my advancement more difficult and to appropriate for himself and his partner all hors and praise.

Moreover, he also sought the above-mentioned falling-out, to rob me of the natural share that I deserved as collaborator on the improvement of the instruments...

One should not speak badly of the dead. On the other hand, truth never emerges at the wrong time and even if I had read the *Intelligenz Blatt* during Bleyer's lifetime, I would not have defended myself in any other way.

But I am cheered by one maxim which has been tested by time: that the unkind means by which Bleyer has tried to damage me usually fail in their aim. Only the judgement of men who understand art, and not the individual profiteering faultfinders, will determine whether and to what extent my labors either recommend themselves or deserve just criticism.

In the meantime, obstacles such as the sort mentioned above will not keep me from striving towards perfection. I love and practice my art with reflection and exertion. The current price of the upright as well as the grand fortepianos in both the German and the English style will be sent to any music lover, along with drawings of the different shapes of the upright fortepianos.

Martin Seuffert
Civic organ and instrument maker
auf der Wieden, No. 75 & 76 ■

ECONOMIC AFFAIRS

Cheaper By The Dozen

Carl Root
Economic Affairs Committee

For many of us, independence is an important component of a career in piano service. We are willing to take all the blame, responsibility, and, of course, credit for every business decision so long as we are permitted to proceed without the aid (interference?) of others. I would like to explore an example of group involvement which is desirable, even enjoyable, and often overlooked — purchasing tools and supplies in quantity at a discount.

Let me relate a few personal examples. In addition to my RTT status, I am also a member of the Washington woodworkers Guild. Several years ago, a WWG member determined that there was sufficient interest in clamps to arrange for a bulk purchase. The manufacturer provided several copies of its catalog, and orders were taken during several meetings to give everyone a chance to participate. Most clamps came six to a box; if you wanted a partial box, you could split an order with another member. I can't recall the exact discount, but I was pleased with the value received and now have an assortment which is used frequently.

On another occasion, we placed an order for sandpaper. It may seem outrageous for a non-refinisher to buy a box of 100 sheets of 120-grit garnet paper, and I have to admit that I still have most of the box left. However, the money saved still exceeds the interest that would have been earned in the bank. The additional storage space needed to stock larger quantities than immediately necessary is offset by the convenience of always having a supply on hand.

We recently placed an order for router bits. I have not yet traded up to the high quality router I would like, and have therefore not used some of them as much as expected. However, the savings on these kinds of purchases gives you some room for error. Even if a couple bits are never used, they are, in effect, free.

Another cooperative effort suggested the pooling of labor rather than capital resources. On the cover of the fourth issue of *Fine Woodworking* magazine is a Scandinavian cabinetmaker's workbench. Plans for the bench are included in the feature article along with a thorough discussion of how to build it. When I first read the article, I was exhilarated by the thought of using a bench of this design but was discouraged by the sheer size of the job and the lack of a radial arm saw which seemed essential to complete the project. About a year later, this article was referred to at a WWG meeting and I took the opportunity to poll the members to determine their interest in participating in a production run of this bench.

Seven of us now have our dream workbench. We worked in groups of twos and threes on weekends and occasionally on weeknights until the job was com-

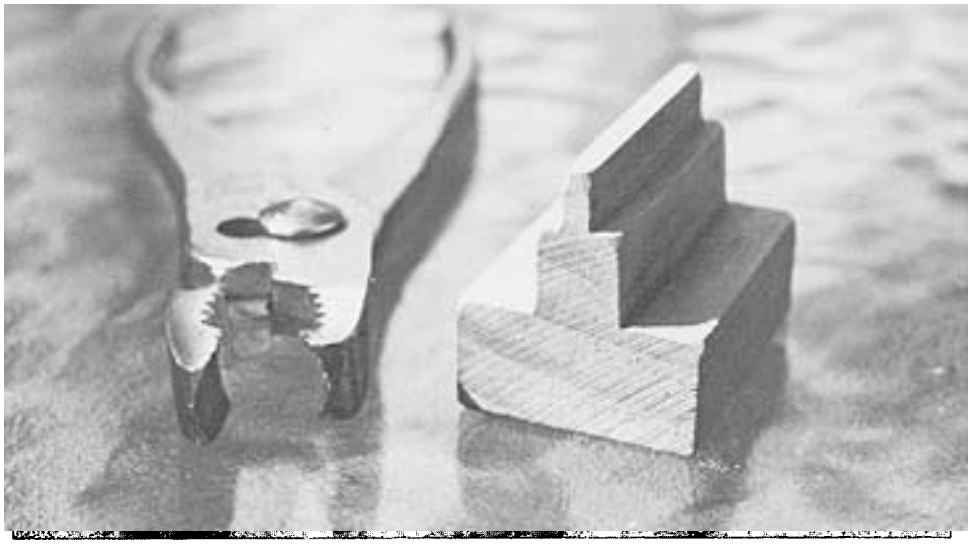
pleted. As expected, the experience, skills, and equipment that each of us brought to the task covered all bases. I can't claim that I actually saved money since I could have earned enough doing piano service work to cover the cost of a new bench. Instead, the primary benefit was the joy and satisfaction of working with others on a unique and challenging project. We didn't save money on hardware, but the lumber order did qualify for a discount. Delivery was also included in the purchase price — no small consideration when you're dealing with hundreds of board feet of 10-foot long 10/4 stock. If this kind of project seems overly ambitious, the same concept can be applied by PTG members to a series of smaller projects. Classes on the local and national level, as well as *Journal* articles are good sources for designs for jigs and fixtures suitable for piano restoration work.

On the subject of wood, I've heard complaints about the difficulty of finding quarter-sawn hard maple. You can solve the problem by purchasing thick boards, say 10/4, of flat-sawn stock. Rip the boards into 2 1/2-inch widths where the grain is horizontal and leave the vertical grain stock as wide as possible. The horizontal stock can be rotated 90 degrees and resawn to suit. Thick, unsurfaced kiln-dried wood may be harder to find in small quantities and will be discounted if the order is large enough.

Scandinavian cabinetmakers workbench.

Here are two examples of tools that can be made in a typical rebuilder's shop with a minimum investment in time and materials. The becket pliers are an example of modifying a common tool; the wippen support block is an example of making a tool from scratch.

Becket pliers — Designed by the late Gene Elfes, RTT, the tool is used to squeeze the bend in the wire snug up against the tuning pin. Buy a pair of inexpensive six-inch pliers. Cut 1/4 inch off the tip



Becket pliers and Wippen support block.

of one jaw. Grind off the grooves on the upper portion of the inside faces of both jaws to produce concave surfaces.

Wippen support block — Designed by Yamaha, the tool will support the wippen while it is still mounted on the stack when a jack needs to be spaced to keep it from rubbing against the side of the window in the repetition lever. The wippen rests on the block's narrow ledge on the side towards which the jack should be spaced. Tap the top of the jack gently with a small, smooth-faced hammer. Making just one of these blocks is almost impossible. To make about a dozen, mill an 18-inch length of hardwood 1 1/8 inches square (ripping shorter stock is more dangerous and less accurate). Set the table saw so that the rip fence is 1/2 inch from the outside of the blade which protrudes 1/4 inch above the table. Feed the front end of the stock through the saw. Now, on the second pass, lead with the other end of the stock producing a second slot on the same face with a 1/8-inch tongue in the middle. Repeat the procedure with the fence set at 3/8 inch from the outside of the blade and the blade height at 5/8 inch. (Rip in two passes on a smaller saw.) Now set the fence at 5/8 inch and the blade height at 3/8 inch to remove the waste on both sides. Use the bandsaw to slice off 1 1/2-inch blocks. Sand all edges (with 120 grit garnet paper!) to make the block user-friendly.

Interest in group purchasing among PTG chapter members in our region has surfaced from time to time. Since our work is labor intensive and requires only a modest investment in materials and supplies compared to most other professions, the motivation behind group purchases or production runs has often been convenience as much as saving money. Usually, it's a matter of having the tool through cooperative effort or not going to the trouble of buying or making the tool at all. For example, finding a supply of shoemaker's pegs and usable sole leather took several visits to local shoe repairers before I could find a supply. Anticipating that everyone else will run into the same dead ends, doesn't it make sense to simply buy a large supply of these items and bring them to the next chapter meeting for distribution at cost?

Years ago many chapters distributed Carl Schmeckel's book 'A Piano Owner's Guide' because they could be bought for a 40 percent discount in quantity. Now Larry Fine's 'The Piano Book' also deserves extensive distribution to chapter members and their clients, especially teachers. The books can be ordered and distributed either by the chapter or an individual member at a similar discount.

Now I know what you're thinking. "I'm going to buy a huge quantity and get left holding the bag when no one wants this stuff." Well, let me assure you that I have bought all kinds of tools and supplies over the years without any orders to go on, just an assumption that other technicians' needs were similar to mine. I have never, ever, been stuck with leftovers. In fact, the reverse is usually the case. You will find yourself turning down eager buyers because you underestimated demand. I have brought glue, various lubricants, brass drifts for seating strings, books, mailers, and other items. Some are off-the-shelf items, some are only available in quantity, some have been modified for piano work, and some were made from scratch.

Think of it another way. The next time an instructor mentions a special tool as part of a chapter tech session, wouldn't you be pleased if that tool was made available for purchase after the meeting? If you'd like to be on the receiving end, why not be on the giving end, too. Oh yes, make a record of each sale to keep the tax man happy. ■

Calendar Of Coming Events

Date	Event
October 7-9, 1988	**Ohio State Conference** Rodeway Inn, Columbus Kim Fippin; 37 University St.; Westerville, OH 43081; (614) 890-2197
October 14-16, 1988	**Texas State Seminar** El Tropicana, San Antonio Leonard Childs; 7867 Lark Ridge; San Antonio, TX 78250; (512) 647-3648
October 20-23, 1988	**New York State Seminar** Quality Inn North, Syracuse Arthur Nick Smith; 730 Park Avenue; Syracuse, NY 13204; (315) 478-1669
October 28-30, 1988	**Central East Regional Conference** Sheraton Inn, Normal, IL Robert Morris; 1729 D Valley Road; Champaign, IL 61820; (217) 356-9781
November 4-6, 1988	**North Carolina State Seminar** Comfort Inn Sam Corbett; Rt. 3, Box 115; Grifton, NC 28530; (919) 524-5016
November 19, 1988	**Baltimore Annual One Day with Susan Graham** Omni Hotel, Baltimore Christie Cornetta; 10 Draw Bridge Ct; Baltimore, MD 21228
January 6 & 7, 1989	**Arizona State Seminar** Ramada Inn, Phoenix Gary Miles; 3722 W. Port Royale Ln., Phoenix, AZ 85023; (602) 942-2588
February 17, 18 & 19, 1989	**California State Conference** Centre Plaza Holiday Inn William Barrett; 1151 S. Chestnut, #136; Fresno, CA 93702; (209) 453-1839
March 30-April 2, 1989	**Pennsylvania State Convention** Brunswick Hotel, Lancaster, PA Dick Bittinger; 107 W. Main St., P.O. Box #51; Brownstown, PA 17508; (717) 859-3111
May 25-June 4, 1989	**PTG Orient Tour** Charlie Huether; 34 Jacklin Court, Clifton, NJ 07012-1018; (201) 473-1341
June 10-13, 1989	**IAPBT Conference** Kyoto, Japan Charlie Huether; 34 Jacklin Court, Clifton, NJ 07012-1018; (201) 473-1341
July 10-14, 1989	**32nd Annual Piano Technicians Guild Convention & Institute** Red Lion Lloyd Center, Portland, OR Home Office; 9140 Ward Parkway; Kansas City, MO 64114; (816) 444-3500

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Rochester, NY 14607

Owen J. Roth
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Rochester, NY 14607

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Rochester, NY 14626

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Bloomsburg, PA 17815

Philadelphia, PA — 191

Nicholas J. Natale
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Cedar Rapids, IA 52403

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Salt Lake City, UT — 841

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64 Judith's Fancy C-11
St. Croix, C'sted, VI 00820

REGION 6

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Ralph L. Miyashiro
67 Brisa Riberaamar #B
Rancho Santa Marga, CA 92688

Membership Status

	1988	1987
Total Members	3609	3538
Total RTTs	2476	2536
Northeast	830	757
Northeast RTTs	545	550
Southeast	577	545
Southeast RTTs	385	386
South Central	315	303
South Central RTTs	219	232
Central East	613	602
Central East RTTs	414	419
Central West	406	408
Central West RTTs	302	303
Western	868	870
Western RTTs	611	646

The Auxiliary Exchange

President's Message:

It is with pleasure that I greet you as president of the Auxiliary. I accept the role and will do my best to carry out the duties and expectations of this office. It is not my Auxiliary, it is our Auxiliary which implies participation and support from each member. So many of you were supportive with your suggestions and recommendations in the past that I look forward to hearing from all with ideas, "how about we.." and "would it be possible to .." and such. To you young members I'm sure we might expect a host of innovative concepts, proposals and programs not only for our annual convention but also for stories and columns in our Auxiliary Newsletter and Exchange. Your individual contributions will give a fresh new look, added depth and a vibrant color to our efforts.

In another part of this page you will read an account of our 1988 Convention as detailed by our Recording Secretary, Bert Sierota. To those who attended the convention you will recall that enclosed in the convention packet was a P.T.G.A. Convention evaluation questionnaire which was to be completed before the end of the convention to serve as a guide for planning future Auxiliary programs. There were 38 forms completed and inserted in the ballot box provided in the Auxiliary room. Of that number, two of the forms were from non-members. We are pleased to report that the anonymous forms contained no complaints, no criticisms, a few proposals and a hearty bunch of kudos to the Auxiliary president and her team for all that they have done. Be assured that the suggestions for future programs will be shared with Institute directors at the convention planning meeting and if possible will be considered for the annual convention in Portland, OR, in 1989 or Dallas, TX in 1990.

Agnes Huether
President

Tid-Bits

It was a hundred years ago on October 9th that the Washington Monument was opened to the public. Vistors crowded in to the steam-operated elevators for the 12-minute ride to the top of the 55-foot stone needle. In this month also, 50 years ago on October 30 1938, Orson Welles alarmed America with his realistic radio drama, "War of the Worlds." The "invasion" from Mars left in its wake $200,000 dollars in law suits filed against CBS and Orson Welles.

Agnes Huether, Editor

St. Louis Convention

The 1988 convention held in St. Louis, MO, was second only to Toronto attendance. There were 145 spouses present of whom 104 were Auxiliary members and 41 non-members. It was great meeting with friends from past conventions again and exciting to make friends with newcomers. At the Opening Assembly, 75 responded to roll call representing 29 states and Canada, as well as a guest from the Virgin Islands. Pauline Miller of Los Angeles offered a memorial in honor of Betty Buck, Marjorie Evans, Bernice Seymour, Jacqueline Nilson, Bertha Schwendeman and Gladys Springman. Pauline expressed the importance of each and every Auxiliary member. The Auxiliary activities were planned and enjoyed by many. Nine Auxiliary past presidents attended: Ruth Pollard, Pauline Miller, Esther Stegeman, Luellyn Preuitt, Ginny Russell, Helen Pearson, Jewell Sprinkle, Julie Berry and Louise Strong. The entertainment at our Tea was quite special. We were fortunate to have the recipients of the Scholarship Fund Awards to perform for us.

At the Council meeting it was

voted to publish another cookbook to be sold in 1989. Council voted the Auxiliary donate $50.00 to the Scholarship Fund in honor of deceased Auxiliary members. A Bylaws change proposal from the Cleveland chapter recommended elimination of the Members-at-Large category and making everyone a chapter member. This was tabled for more research.

The Council elected the slate of officers presented by the Nominating Committee which is boxed on these pages. The Nominating Committee for the term 1988-89 is Pauline Miller, Chair, Deanna Zeringue and Judy White. The Revitalization Forum held on Friday, with Julie Berry as moderator was very interesting with many expressing opinions, suggestions and modifications for the future. All in all the convention was certainly a huge success.

Bert Sierota
Recording Secretary.

More Convention

From Judy White, our Recording Secretary, who also designates the regional Sunshine Reporters, the following assignments have been made and accepted:

Central West
Claudette Balamut
4200 Arthur NE
Columbia Heights, MN 55421

West
Ivagene Dege
2056 Milan Avenue
S. Pasendena, CA 91030

Southeast
Mabel Hiatt
30 East Gray Street
Sandstone, VA 23150

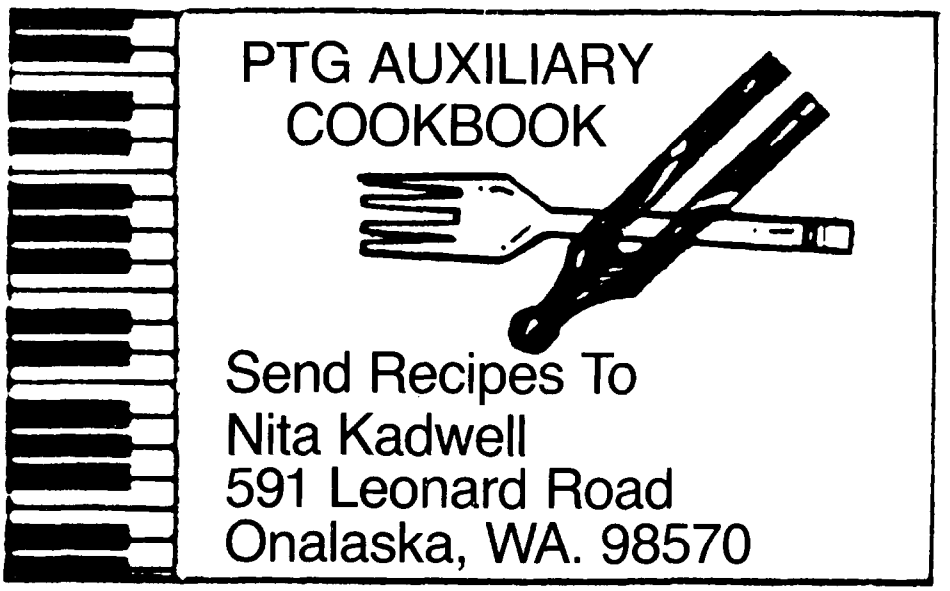
Northeast
Marge Moonan
811 Amherst Drive
Rome, NY 13440

Central East
Nancy Strouss
2278 Arcadia
Lima, OH 45805

South Central
Beva Jean Wisenbaker
1103 Walton
Houston, TX 77009

These Auxiliary members will make every effort to send greetings to members in their area on the occasion of their birthday or wedding anniversary in addition to "get-well" and sympathy cards if they are informed about an individual. The Sunshiners are a special group and often unheralded. They keep in touch with the membership that often can not attend annual or regional conventions because of health or demands of home and family. In these days of hi-tech communication via phone, TV or VCR it's always nice to receive a warm note or greeting card in the mail.

Editor



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34 Jacklin Court
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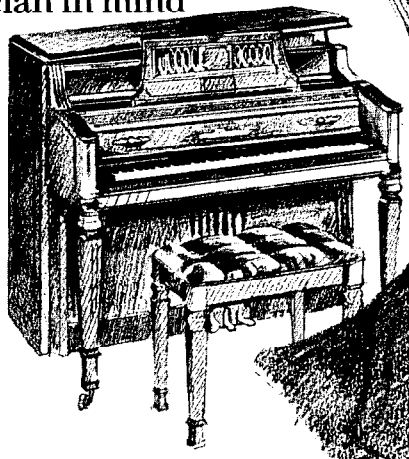

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THE PIANO TECHNICIANS GUILD, INC.
BYLAWS, REGULATIONS & CODES
(Amended July, 1988)

B - BYLAWS
R - REGULATIONS

BYLAWS

PREAMBLE

Recognizing the need for a united piano technicians organization to achieve the highest possible service standards and to effectively promote and improve the piano tuning and servicing industry generally, the American Society of Piano Technicians and the National Association of Piano Tuners merged to form a single professional organization to be known as The Piano Technicians Guild, Incorporated, under Articles of Incorporation in the State of Illinois, August 21, 1958.

Article I - NAME

The name of this organization shall be The Piano Technicians Guild, Incorporated, hereinafter referred to as PTG, a nonprofit corporation under the laws of the State of Illinois.

Article II - Purpose, Objectives and Principles

A. Purpose
PTG is organized to:
a. Constitute subordinate bodies in order that its aims,purposes, and benefits may be more easily and advantageously shared by its individual members. It shall not deny membership to any person because of race, color, creed, sex, or national origin.
b. Be democratic in its government and all its functions.
c. Promote the interest of the Piano Technician.
d. Promote music and the use of the piano and all other musical instruments.

B. Objectives
AND will strive to do so by:
a. Developing ongoing programs of technical and professional development.
b. Providing economic and social support and assistance for members.
c. Providing a vehicle for exchange of ideas and support on all levels.

C. Principles
ALWAYS aiming to:
a. Provide the best possible piano service to the music world.
b. Provide such service in an ethical way, keeping the piano user's needs and best interests uppermost.

Article III - Membership

Section 1 - Classes of Membership
Members shall consist of two classes:
a. Franchised
b. nonfranchised
Franchised members shall be classified:
a. Registered Technician Active

b. Registered Technician Sustaining

Nonfranchised members shall be classified:

a. Associate

b. Honorary

Section 2 - Definitions of Membership Classifications

a. Membership in the Piano Technicians Guild is open to all individuals with a professional or avocational interest in piano technology. Only individuals may become members.

b. Registered Technician Active shall have met the minimum technical requirements as listed in Article IV. He/She shall enjoy all the rights of membership without restriction. These rights shall include but not be limited to receiving the Piano Technicians Journal, the PTG death benefit insurance policy, the right to vote, the right to be represented in council, the right to hold all offices, the right to serve on all committees, and the right to chair committees.

c. Registered Technician Sustaining shall be a Registered Technician of at least ten (10) years outstanding service who has suffered permanent disability or no longer earns substantially from piano service. His/Her dues shall be paid by PTG in the interest of retaining him/her as a member so that PTG may continue a mutually beneficial association with the honorable practitioners of the art. A Registered Technician — Sustaining member who returns to substantial or active piano service shall surrender sustaining membership status and resume payment of current membership dues.

1. Registered Technician - National Sustaining shall be those proposed by the Executive Board and shall continue such membership as the Board directs.
2. Registered Technician - Chapter Sustaining shall be those proposed by chapters and approved by the Executive Board and shall continue such membership as the Board directs.

d. Associates shall be Nonfranchised members who have met the requirements of the Bylaws as described in a. above and Article IV. They shall receive the Journal and be included in the PTG death benefit insurance policy. Associate members may not vote and are not counted toward chapter voting strength in Council. They may hold chapter office, excluding those of President or Vice President. They may serve on committees, but may not be committee chairmen.

e. Honorary members shall be those upon whom PTG has conferred such membership because of outstanding service to the profession of piano technology or in the manufacture, design, or promotion of pianos or their use. Honorary membership shall be conferred when

1. The Executive Board has unanimously nominated a candidate for honorary membership, and
2. A Majority of chapters, responding to a mail ballot within thirty (30) days, responds in the affirmative.

Section 3 - Advertising

a. Registered Technicians shall have the exclusive right to use the emblem herein depicted. This emblem may not be used or displayed by any company or corporation or in connection with any "dba" unless the Registered Technician's name accompanies it. The only exception is that it can be used by the Piano Technicians Guild in literature designed to explain it.

b. Registered Technician Active shall have the exclusive right to use the following titles:

1. Craftsman and/or Registered Craftsman
2. Registered Tuner Technician abbreviated RTT after surname
3 Registered Technician abbreviated RT or Reg.Tech. after surname

c. Associate members shall have the right to use the PianoTechnicians Guild name along with the words "Associate Member" in letters no smaller than those used for "Piano Technicians Guild". The PTG name may not be used or displayed by any company or corporation or in connection with any "dba" unless the technician's name accompanies it.

Article IV - Application and Examination

Section 1 - Application

a All applicants must use the official PTG application form.

b. All applications must be processed through Chapters except those of Honorary Members.

c. Applications for membership taken at conventions or seminars must be referred to the Chapter for ratification by the Chapter, which shall be responsible for checking the references of the applicant. In the event a Chapter fails to ratify a prospective member, a full report shall be filed with the Home Office within 90 days stating the reasons for that action.

d. All applications must be processed within 90 days.

Section 2 — Examinations

a Only PTG members in good standing may take the Registered Technician examinations.

b. To achieve a Registered Technician rating a candidate must make a grade of at least 80% on each of the three examinations. Grade averaging shall not be permitted. Failure to make 80% on one or parts of the exam will not require retaking the exams passed at 80% as long as they are the current approved exams, completed within a four year period.

c. Associate members members may apply for Registered Technician exams at any time they desire to do so. Exams shall be taken as follows:

1. The written exam must be taken first and should be administered by a chapter. If the member fails to receive a score of 80%, no further exams are taken and the member remains an Associate member. Any RTT member may administer this exam.
2. After the written exam has been passed, the member may take the technical or tuning exam in

whatever order available.

3. If the member passes all three exams with a score of 80% or better he/she will be reclassified as a Registered Technician. The tuning exam shall be administered by three examiners, at least one of whom is a Certified Tuning Examiner.

d. All examinations given shall be the Council-approved examinations used without deviation.

e. All examinations may be given at any approved testing site as long as all requirements for equipment and qualifications of examiners are met.

Article V - Obligations, Discipline and Good Standing

Section 1 — Obligations

Each member of PTG is by membership obligated to observe the laws of PTG and of the chapter in which membership is held. Further, each PTG member is obligated to maintain conduct which will reflect the ethics and attitudes in the PTG Code of Ethics.

Section 2 — Discipline

Any member who fails to observe the PTG obligations shall be open to discipline. Such failure shall be charged only by following the procedures specified in the Disciplinary Code, except that Associate members who have been members for less than 2 years may be removed from membership for cause by a two-thirds vote of the chapter.

Section 3 — Good Standing

a. A continuing member shall be in good standing when all dues and fees have been paid as required by PTG and the chapter, and the obligations of membership are met.

b. A reinstated member shall be in good standing when all dues and fees have been paid as required by PTG and the chapter and the obligations of membership are met. Additionally, the member to be reinstated must again pay the application fee as well as the required examination fees if reinstatement requires the member to be re-examined.

Article VI - Membership Dues and Fees

Section 1 - PTG Dues

a. Per capita dues for Registered Technicians shall be $114.00 per year, US funds.

b. Dues for Associate members shall be 100% of the RTT dues.

c. PTG Home Office shall return to Canadian chapter of origin, twenty percent (20%) of dues their members pay to PTG prior to April 1 of the dues year. No rebate will be allowable on dues paid after that date. Canadian chapters must apply annually for this rebate stating how the money was spent during the previous year. Rebate money must be used to promote PTG in Canada. Money spent in the prior year in excess of that year's rebate can be carried over to the next succeeding year.

d. Membership dues shall include subscription to the PTG Journal and the PTG Update.

e. An active member drawing social security benefits may elect to pay PTG dues at one half the normal rate, providing that the member signs an agreement making the PTG special fund the sole and exclusive beneficiary of the PTG death benefit insurance policy for as long as the reduced rate of dues continues. The beneficiary may be changed when the member resumes full rate of dues payment.

f. In cases of inability to pay, a chapter may vote to maintain a member on PTG roll by paying a token annual fee of one-third of Registered Technician dues directly to the home office. This payment shall maintain the member's good standing, Guild insurance, Journal subscription, and all other benefits.

g. A token annual fee of one-third of Registered Technician dues shall be paid for Chapter Sustaining Members by the sponsoring chapter. This payment shall maintain the member's good standing, Guild insurance, Journal subscription, and all other benefits.

h. A member may continue membership and pay no annual Guild dues provided that the member:

1. Has a minimum of ten years continuous membership in the Guild and has reached the age of sixty-five.
2. Is no longer significantly engaged in any form of piano work.
3. Agrees to pay the cost of the Guild death benefit insurance or consents to drop from the insurance program.
4. Agrees to pay a cost established by the Board of directors for receiving the Piano Technicians Journal or consents to drop from the Journal mailing to members.
5. Has approval of the chapter.

Section 2 — Dues Year

The dues year for all members shall be from January 1 through the following December 31.

Section 3 — Collection of Dues

a. All PTG dues shall be billed and collected by the Home Office.

b. Dues shall be due January 1 of the billing year. Dues shall be considered delinquent if not paid by January 31.

c. Membership benefits (including Journal subscription) will be suspended for all members who have not paid their dues by January 31. A notice of delinquency shall be sent to the persons effected during the first week of February. If no response is received to the delinquency notice within thirty days, the name shall be dropped from the membership rolls, and the person will be required to submit a new application as per Bylaws, Article VI, section 6 - Reinstatement.

Section 4 — Application Fee

a. The Application Fee shall be a non-refundable $30.00. Half of the fee shall be sent to the Home Office. Half of the fee will remain with the Chapter.

b. Upon receipt of the ratified application and fee, the Home Office shall process the application as an Asso-

ciate member. Billing for dues shall be sent payable from the beginning of the month following acceptance into membership.

Section 5 — Resignations
A member in good standing shall have the right to resign membership in PTG.

Section 6 — Reinstatement
Any former member wanting reinstatement must make application as a new member. The application fee will be assessed but back dues will not. Former Associate members may be readmitted to their former classification without examination. Former Registered Tuner-Technician members must take examinations and pay the required examination fees, unless their original examinations had the same form as those in use at the time of reinstatement.

Article VII - Nonmember Participation

An "International Correspondent" is a person who lives outside of the PTG jurisdiction as described in these Bylaws but who wishes to maintain contact with the field of piano service and technology through a continuing relationship with PTG. Application for such a nonmember affiliation must be made through the Home Office with approval by the International Relations Committee. International Correspondents will receive the Journal and other PTG mailings and be entitled to discounts if attending PTG functions similar to those granted to members. To cover costs, International Correspondents will be billed annually a fee equal to 60% of regular membership dues. The International Correspondent status will cease should the party involved move into the area of PTG jurisdiction as stated above. At that time, regular membership is encouraged, and the person must be processed as a new member.

Article VIII - Journal and Update Objectives

a. The PTG official magazine shall be the Piano Technicians Journal, which shall be published by the home office under direction of the executive director as a means of bringing technical knowledge and advancement to the members. The PTG Journal shall be open for subscription to nonmembers and the industry.
b. The PTG Update shall be an official publication of PTG and subscriptions shall be open only to members.
c. The PTG Journal and PTG Update shall be the exclusive property of PTG.
d. The Journal and Update shall be sent at no charge to each member in good standing.
e. Spouses of deceased members may subscribe to the PTG Journal for one (1) year following the member's death at the annual rate of five dollars ($5.00). After the first year, regular subscription rates shall apply.
f. In all publications, use: (in lieu of the pronouns "he," "his," "him,") pronoun combinations "he/she," "his/hers," "him/her," or suitable neuter pronoun wherever applicable.

Article IX - Chapters

Section 1 - Purpose Subordinate bodies chartered under these Bylaws shall be known as chapters. The purpose of chapters shall be to implement the purpose, objectives, and principles set forth in these Bylaws.

Section 2 - Charter and Name

a. Five or more Registered Technicians may apply for a charter to establish a new chapter. The application shall be signed by the regional vice president.
b. Each new chapter shall select a name which is geographically descriptive and which must indicate reference to the state or province, etc., in which it is located.

Section 3 - Chapter Members

a. Chapters in which Registered Technician membership declines below five must justify continuation of the charter to the Executive Board or the charter shall be revoked and members transferred to other chapters.
b. A Registered Technician member in good standing may join more than one chapter, provided
   1. The member is listed at the PTG home office with only one chapter for official PTG mailings, for calculating the minimum Registered Technician member requirements for chapters, for the purpose of calculating chapter delegate strength for Council sessions, and for election as a chapter delegate or alternate to Council sessions.
   2. Any chapter membership other than that described in 1 above, shall be properly shown on all appropriate membership lists as a local chapter membership only, and shall also show name and location of other chapter memberships held.
   3. Each chapter shall establish its own rules governing chapter dues, voting rights in the chapter, privileges and obligations, etc., for any PTG member granted local chapter membership.

Section 4 Jurisdiction and Transfer

a. The jurisdiction of a chapter shall be the territory within a radius of seventy-five (75) miles from the City Hall of the chapter seat. In cases where chapter jurisdictions overlap, such overlapping territory shall be considered concurrent jurisdiction.
b. Each member, except Honorary and members, shall be a member of a chapter, or one of the chapters, which has jurisdiction over the area where the member lives and/or works. Upon moving into the jurisdictional area of a chapter or chapters, the member shall join the chapter, or one of the chapters, within ninety (90) days.
c. The chapter shall accept the application on presentation of the transferee's membership card, together with a letter of transfer from the president or secretary of his or her chapter. The letter shall state that the member is in good standing in accordance with Article V, Section 1, of the PTG Bylaws.
d. When a new chapter is proposed within the jurisdiction of an existing chapter, the board(s) of the existing chapter(s) must be notified in writing at least two months before the new chapter is chartered. The new

chapter must be approved by the RVP and by a simple majority of the existing chapter(s). The Piano Technicians Guild Board of Directors shall have the power to overrule if requested. No portion of an existing chapter's name may be used without its consent. New chapters must either send a representative or a letter through the RVP to the Council Meeting at which the new charter is approved.

Section 5 — Chapter Laws

a. Chapters shall operate under their own laws, which shall not be in conflict with the laws of PTG.
b. Chapters shall have the right to have boards, trustees, committees, etc., within the chapter framework as provided by the chapter laws.
c. All matters of law and all elections must be determined by the individual members in attendance at a regular meeting or at a called meeting of which all members have been given due and timely notice.

Section 6 — Chapter Officers

a. Chapter officers shall be elected annually and shall take office during the three (3) month period, April, May, June of each year.
b. Only Registered Technician members shall be eligible to hold chapter offices of president and vice-president.
c. Chapter secretaries shall inform the PTG president, PTG recording secretary and executive director, and Journal editor of all changes of chapter officers.

Section 7 — Chapter Meetings

a. Chapters shall meet at least three times a year in stated meetings. No business can be legally transacted by a chapter at a called meeting unless proper notice has been sent to all franchised members at least ten (10) days in advance.
b. The franchised members of a chapter must be given due and timely notice of any alteration of time or place for a stated or regular chapter meeting.
c. Where proxies are allowed, chapters may only use a written proxy and no person may hold more than two proxies.

Section 8 — Chapter Finances

a. All chapters shall be self-supporting and have authority to assess and collect chapter fees and dues.
b. Chapter funds shall be deposited in the name of the "Piano Technicians Guild, Inc., (chapter name)," in a federally insured depository.
c. It is recommended that chapter treasurers be bonded at the discretion of the chapter officers.
d. PTG shall have no interest in chapter funds beyond amounts due to PTG from the chapter.

Section 9 — Chapter Dissolution

In the event of dissolution of a chapter by vote or other action of the chapter membership, the net assets shall be applied as follows:

a. All liabilities and obligations shall be paid or satisfied or adequate provision shall be made therefor.
b. Any assets belonging to members or others shall be returned or conveyed, if the assets are held under such requirement.
c. Any assets not obligated under the above shall be conveyed to the Piano Technicians Guild Steve Jellen Memorial Library in the name of the chapter.

Section 10 — Subordinate Bodies

The Piano Technicians Guild recognizes all organizations of chapters and assemblies brought together to advance the purpose, objectives, and principals set forth in these Bylaws.

Article X - Regions

Section 1 — Purpose

There shall be six PTG regions and their purpose shall be to encourage increased membership and to advance the purpose, objectives, and principles set forth in these Bylaws.

Section 2 — Regional Divisions

a. The Northeast Region shall include the following states and provinces: Atlantic provinces (New Brunswick, Nova Scotia, Newfoundland, Prince Edward Island , Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Quebec, Rhode Island, Vermont, Delaware, and Ontario.
b. The Southeast Region shall include the following states and the District of Columbia: Alabama, Florida, Georgia, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, Washington, D.C., the Virgin Islands, and Puerto Rico.
c. The South Central Region shall include the following states and part of Mexico: Arkansas, Louisiana, New Mexico, Oklahoma, Texas, and that portion of Mexico east from the eastern border of Sonora.
d. The Central East Region shall include the following states: Illinois, Indiana, Kentucky, Michigan, Ohio, West Virginia and Wisconsin.
e. The Central West Region shall include the following states and provinces: Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wyoming, and the Canadian provinces of Manitoba, Saskatchewan, and Alberta.
f. The Western Region shall include the following states, provinces, Guam and parts of Mexico: Alaska, Arizona, British Columbia, California, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington, and that portion of Mexico including Sonora and Baja, California.

Section 3 — Regional Officers

a. Each region shall be served by a regional vice president elected to serve for one (1) year in caucus at the annual Council session.
b. Each regional vice president shall be a member of the PTG Executive Board.

Article XI - Legislative Body

Section 1 - Authority

a. The legislative body of PTG shall be the Council, with rights and duties to
   1. Establish the general policy of PTG.
   2. Amend the Bylaws and Regulations of PTG.
   3. Approve budgets, fees, dues, levies, and assess-

ments of PTG.
4. Elect the officers of PTG, except that regional vice presidents shall be elected in accordance with PTG caucus rules.
5. Grant or revoke chapter charters.
6. Determine subordinate geographic jurisdictions.
7. Issue orders to the Executive Board that are in accordance with the Bylaws and Regulations.

b. The Council shall recognize as legal all actions and transactions in accordance with the Bylaws and Regulations which are approved by the Executive Board in legal session.

Section 2 - Council Meetings and Quorum

a. The Council shall meet at the time of the annual PTG convention, and at other times when properly summoned, unless the Executive Board by two-thirds vote determines that conditions exist which render a meeting not feasible.
b. Delegates representing a majority of the franchised members of PTG shall constitute a quorum.

Section 3 - Voting

a. The voting membership of the Council shall be composed of a delegate or alternate delegate from each chapter.
b. Each chapter delegate or alternate delegate shall carry one vote for each franchised member in good standing in the chapter.
c. An elected officer of PTG shall not be eligible to serve as a delegate to Council.
d. The elected officers shall be ex-officio members of the Council with privilege of debate and motion but with voting privilege only on matters of procedure.
e. On procedural matters, each Council member shall have one vote.
f. On all other matters, voting shall be as in Item e. above, except that, on a call for division on any vote except a ballot, the vote shall be by franchised membership representation.

Article XII - Officers, Nomination, Election, and Duties

Section 1 - Elected Officers

The elected officers of the PTG shall be president, vice president, treasurer-recording secretary, and six regional vice presidents.

Section 2 - Qualifications

a. Any Registered Technician in good standing shall be eligible for nomination and election to office.
b. All candidates shall sign a certificate of consent to serve if elected.
c. All candidates shall sign an affidavit of eligibility in accordance with items a. and b. above, before the election is held.
d. Candidates may submit no more than fifteen (15) lines of typed qualifications to the nominating committee for consideration.
e. A candidate for the office of regional vice president must be officially listed by the PTG Home Office in a chapter and live within a 75 mile radius of the regional boundary as a member of a chapter within the region and live either inside the regional boundary or no more than 75 miles outside of the regional boundary.
f. Employees of PTG shall not be eligible for election to any office, with the following exception: those employees who are members of PTG may be elected to chapter office.

Section 3 — Nominating Committee

a. A nominating committee of five members shall be elected at the annual Council session to serve for the next term.
b. Each region in caucus shall select one or two candidates from members of the region in attendance at the Council session. Members may not stand for election who have served for the last two consecutive years on this committee.
c. The nominees shall be presented in person to the Council for election to the committee. The five receiving the greatest number of votes shall serve for one (1) year. The nominee receiving the greatest number of votes on the first ballot shall be named chairman of the committee. Tie votes shall be broken by any suitable method approved by the Council.
d. Those nominees receiving the sixth and seventh highest number of votes shall be designated as first and second alternate committee members and shall be required to fill any vacancy occurring in midterm. The number of members actively serving on the nominating committee shall be five at all times.

Section 4 — Duties of the Nominating Committee

The nominating committee shall

a. Request nominations for all PTG offices, together with consent to serve certificates and affidavits of eligibility and qualifications, through an announcement in the December issue of the PTG Journal. Any chapter may submit a nomination. Any member in good standing may offer his or her own name for consideration.
b. Select one or more candidates for the offices of president, vice president, and treasurer-recording secretary. Qualifications shall be considered in making selections.
c. Prepare a list of nominees showing the committee selection for president, vice president, and treasurer-recording secretary, and all of the nominations received for the three offices and for the offices of the six regional vice presidents.
d. Submit the list to the home office, together with the candidates' qualifications, no later than April 1 for distribution to the membership no later than seventy (70) days prior to the annual Council session.

Section 5 — Nominations from the Floor

a. Additional nominations may be made from the floor for any office by accredited delegates at the Council session.
b. Nominations for regional vice presidents may be made in the regional caucuses by delegates from the region.
c. Qualifications, consent to serve certificates, and affidavits of eligibility shall be submitted before the election of any candidate.

Section 6 — Election of Officers

a. Election of president, vice president, and treasurer-recording secretary shall take place in Council session.
b. All elections shall be by ballot except where there is one nominee, in which case the election may be by voice vote or show of hands.
c. A majority vote shall be required for election to any office except that a two-thirds vote shall be required for reelection to a third (or more) continuing term in the same office.
d. Election of regional vice presidents shall be in individual regional caucuses in accordance with regional caucus rules adopted by the council and shall take place after the election of the president, vice president and treasurer-recording secretary.

Section 7 — Term of Office

a. Elected officers shall hold office for one (1) year from installation or until a successor assumes office.
b. All PTG officers shall be eligible to serve no more than two (2) consecutive years in the same office unless re-elected by a two-thirds vote of the delegates.
c. An officer who holds an office for more than six (6) months shall be considered to have served for a full year in calculating the reelection requirements.

Section 8 — Vacancies

a. In case of a vacancy in the office of president, the vice president shall become president.
b. A vacancy in any other elective office may be filled for the balance of the term by a two-thirds vote of the Executive Board provided the work load of the vacant office demands replacement before the next Council session.
c. In case of death or incapacity due to medically verifiable illness which restricts an officer from properly fulfilling his/her duties of office, the President, upon agreement of the rest of the Board that such incapacity exists, can appoint a replacement provided the work load of the vacant office demands replacement and that appointment is approved by a unanimous vote of the Executive Board.

Section 9 — Duties of Officers

a. President - The president shall be the head of PTG and shall be its official spokesman; serve as chairman of the Council and the Executive Board; make all non-elective appointments, subject to approval by the Executive Board; fill any vacancy in any committee; replace incapacitated or inactive committee members except where otherwise provided in these Bylaws; and exercise a general supervision over all affairs of the PTG.
b. Vice President - The vice president shall assist the president in the discharge of presidential duties, in the absence or disability of the president perform the duties of president, coordinate the work of all standing committees at the direction of the president, and keep the president informed of committee problems and progress.
c. Treasurer-Recording Secretary — The treasurer-recording secretary shall act as secretary to the Council and to the Board and be responsible for the accurate production of minutes of all Council and executive Board sessions; maintain an up-to-date copy of the PTG Bylaws and Regulations, Council orders, Board policies, and contracts; be an authorized signatory to fund transfers, withdrawals, etc., and keep a file record of these transactions; and process Board members' expense reports, keep a file copy, and forward one copy to the home office.
d. Regional Vice President - The regional vice president shall exercise a general supervision over the chapters and the membership within the region, promote the welfare and harmony of PTG, act as the president's deputy in any matter on authorization from the president, be membership chairman for the region, be the advertising representative in the region for the PTG Journal, attend major meetings held by chapters in the region whenever feasible, and assist in forming new chapters. Regional vice presidents may appoint assistants (such as state chairmen) to help with duties within the region. Expenses incurred by such assistants will be covered by the Regional Vice President allowance subject to prior approval. Regional vice presidents shall take all reasonable steps to ascertain the views of the region on significant issues facing PTG prior to Board and Council sessions, and shall report promptly to chapters in the region with information on the action taken.

Article XIII - Executive Board

Section 1 - Composition

The Executive Board of the PTG shall be composed of all elected PTG officers and the immediate past president who shall serve for a period of one (1) year. They shall serve for periods coinciding with their terms of office.

Section 2 - Authority and Duties

The Executive Board shall

a. Implement and carry out all Council orders.
b. Be directly responsible for the hiring of the executive director.
c. Administer the business of PTG in conformity with the Bylaws and Regulations and Council directives.
d. Present a recommended budget to the council annually with itemized actual expenditures from the two previous years.
e. Recommend fees, dues, and assessments and set PTG Journal subscription and advertising rates.
f. Issue temporary charters pending Council action.
g. Try judicial cases where required by the Disciplinary Code.
h. Designate an independent accountant each year to oversee the organization's books and accounting system.
i. Authorize an annual accounting review and report by an independent accountant.
j. Authorize an audit and report whenever deemed necessary or requested by the Council.

Section 3 - Quorum

A quorum of the Executive Board shall be six members.

minimum of conflict and overlapping. All proposed assemblies' dates and programs shall be submitted to the conferences and seminars committee for approval.

c. All assemblies shall be self-supporting. If a deficit should occur, the indebtedness shall be the responsibility of the sponsors.

d. Assemblies shall have no authority over the membership and shall have no legal status in decision-making except with regard to the establishment and funding of such sessions.

Article XVI - PTG Home Office

Section 1 - Administration

The Executive Board shall hire an administrator for the PTG home office who shall have the title executive director.

Section 2 - Duties

a. Operate the home office for PTG, maintaining all necessary books and records in accordance with the accepted procedure.

b. Hire necessary personnel to operate the PTG administrative work within the PTG budget and under direction of the Executive Board.

c. Prepare a proposed annual budget for the following fiscal year. Submit the budget proposal to the Executive Board. After the Board has approved the budget, distribute to chapters as required by these Bylaws.

d. Annually and whenever directed, make available to the Executive Board all budgets, financial reports, records and recommendations.

e. Make all budgets, financial reports, records, and recommendations available to the PTG Council.

f. Coordinate conventions.

g. Make all necessary records available for audit or other accounting examination or survey as directed by the Executive Board.

h. Distribute agenda books and proposed amendments to the Bylaws to chapters and the Executive Board seventy (70) days prior to the opening of the PTG convention.

i. Provide for the Council an annual report of activities of the PTG home office, together with all documentation necessary to clarify the report, and recommendations and suggestions appropriate for future PTG programs.

j. Provide administrative supervision and operation of the PTG convention as directed by the Executive Board.

k. In all publications to instruct the editorial board; only to accept articles and classified advertising for publication that do not discriminate against any person because of race, color, creed, sex, or national origin.

Article XVII - Finance

Section 1 - Fiscal Year

The fiscal year of PTG shall be from January 1 through December 31.

Section 2 — Budget

a. A proposed budget for PTG shall be prepared by the executive director and submitted to the Executive Board as directed by the Board.

b. The Executive Board shall review and may amend the proposed budget before approving the document for presentation to the membership.

c. The budget, as approved by the Executive Board shall be distributed by the home office no later than April 15 to all chapter presidents in sufficient quantity for all franchised members of the chapter.

d. The PTG Council shall review and may amend the proposed budget before approving the document.

Section 3 — Emergency Reserve Fund

a. A minimum of one percent (1%) of PTG annual income shall be deposited in a separate savings account to be known as the PTG emergency fund. The Executive Board shall have the power to invest, encumber, and disburse the fund and its earnings as it deems necessary and in the best interests of PTG.

b. Control of the emergency fund may be delegated by the Executive Board to an emergency reserve fund committee, composed of the president, vice president, treasurer-recording secretary who shall be chairman, immediate past president, and the executive director.

c. Two signatures shall be required for transfers or disbursements from the fund and only then upon specific authority furnished by the treasurer-recording secretary of official action by the Executive Board or the emergency reserve fund committee. A full accounting of all transactions involving this fund shall be made to the Council annually.

Article XVIII - Parliamentary Authority

Roberts Rules of Order Newly Revised shall be the rules of the PTG in all cases not covered specifically by these Bylaws, Regulations, and other PTG rules and documents.

Article XIX - Amendments

Section 1 - Amendments to the Bylaws

a. The PTG Bylaws may be amended at any Council session by a two-thirds vote of the delegates.

b. Amendments may be proposed by a chapter, a committee, or the Executive Board.

c. Proposed amendments must be submitted in writing, with supporting arguments, to chairmen of the bylaws and regulations committee no later than February 1.

d. The amendment deadline with the appropriate date shall be published in the Journal Update at least two hundred (200) days prior to the opening meeting of the Council session.

e. The bylaws and regulations committee shall process the proposed amendments in accordance with the duties of that committee and submit them with committee recommendations to the Update editor one hundred and five (105) days prior to the opening meeting of the Council session.

f. The home office shall distribute the proposed amendments to all chapters at least seventy (70) days prior to the opening meeting of the Council session.

Section 2 — Amendments to the Regulations and Codes

a. The Regulations and Codes may be amended at any Council session by a majority vote of the delegates provided notice of the amendment has been given exactly as for amendments to the Bylaws.
b. If notice of the proposed amendment has not been given as required for the Bylaws, the Regulations may be amended at a Council session by a two-thirds vote of the delegates.

Section 3 — Emergency Provision

Any exception to the procedure for giving notice of proposed amendment to the Bylaws must first be approved by a three-fourths vote of the Executive Board before the amendment may be presented to the delegates. A two-thirds vote of the Council in favor of considering the amendment shall be required before it may be placed on the floor for debate and vote. A three-fourths vote shall be required for adoption of the amendment.

GUILD REGULATIONS AND CODES

Article I — Awards

The Piano Technicians Guild shall make the following awards:

1. Hall of Fame — There shall be a Hall of Fame to honor those who have shared their talents, time and loyalty to our profession so that we may have what is ours today. Therefore, the Piano Technicians Guild has instituted this Hall of Fame record wherein names with tributes and profiles of honored ones may be preserved and remembered.
2. The Golden Hammer Award to one (1) member each year for outstanding service and dedication to the Guild over a period of years.
3. The Member of Note Award to not more than four (4) members each year for recent outstanding service and dedication to the Piano Technicians Guild.
4. The Guild may make an annual award, with the approval of Council, to the person, organization or business deemed by the Executive Board to have done the most to promote public interest in the piano industry.
5. Chapter achievement awards shall be given each year by the Chapter Management and Achievement Committee, the awards to be developed by chapter size and to be graded for effort, success and merit of yearly activities.

Article II·Committees

Section A — Committee Rules

1. The chairman of a committee shall be responsible for performance of the committee and shall supply the Guild recording secretary with a written copy of all reports for the minutes.
2. On request, a committee chairman shall make a report of progress to the president or the board.
3. A committee chairman shall have the privilege of enlisting members to serve with the appointed membership if such action will promote the action of the committee.
4. No employee of PTG shall serve on any elected committee.

Section B — Standing Committees

1. Awards -
   a. The Awards Committee shall be composed of five one of whom may be from the piano industry. Each member shall be from a different region.
   b. If a chapter nominates an Awards committee member to receive an award, the Awards commmittee member must either resign from the Awards committee or decline the nomination.
   c. The Awards Committee shall complete its work by March 31 of each year. The person(s) so honored will be recognized at the following Annual Convention during the opening session.

   Hall of Fame Award

   d. Any member in good standing may nominate candidates for the Hall of Fame and a resume of the candidate must accompany the chapter's choice of nomination.
   e. After committee chooses no more than two recipients, the chairman may request more information for the Hall of Fame Record Book (if needed, from other sources throughout the country other than the recipient's chapter, or other nominating chapters).
   f. The Recipients shall be presented with a certificate suitable for framing and a lapel pin, if living and present. If the honoree(s) are not present, the award(s) shall be forwarded to the local chapter president who will bestow the honors in an appropriate manner.
   g. If the honoree is deceased, the award shall be made to a member of the family. (In this case, the certificate only would be adequate.) If the award to the deceased cannot be made at the convention, then the certificate shall be forwarded to the local chapter president nearest the recipient who will present the award in an appropriate manner.
   h. All persons elected to the Hall of Fame shall be additionally honored by having a picture, if available, and a short history outlining their contribution to the piano industry included in an honor roll to be displayed in a prominent position at each convention. After the convention the book will then be returned to the National Office for safekeeping.
   i. Eligibility qualifications for a person to be considered for nomination to the Hall of Fame should include the following:
      1. Long-term dedication to the causes, ideals, and

2. Outstanding personal and professional integrity to the point of being an inspiration to others.
3. Outstanding contributor and implementer of ideas, programs, etc., resulting in a definite improvement and upgrading of the piano industry as a whole.

j. Suggestions for nominations shall be solicited through a form in the monthly chapter mailings, with the chapter form completed and a resume of the nominee to be sent to the committee chairman no later than December 31.

k. After convention, resumes of unselected nominees shall be sent back to the chapter for them to update the resume and again submit the following year if so desired.

2. *Bylaws and Regulations* (See Bylaws Article XVIII, Section 1.) — There shall be a Bylaws, Regulations, and Codes Committee, as required in the Bylaws, to counsel any member or members wishing to amend the Bylaws, Regulations and Codes, and present to the Council at the proper time any resolutions to amend, together with their recommendations to adopt or reject, with full reasons assigned. The chairman of this committee shall serve as parliamentarian in the absence of a professional parliamentarian.
3. *Conferences and Seminars Committee* — There shall be a coordinating committee for conferences and seminars. This committee shall consist of three members, the vice president and two (2) regional vice presidents appointed by the president. Coordination of all conferences and seminars will be handled with the end in view of eliminating conflicts, centralizing information and providing assistance and expertise in developing curricula and staff.
4. *Chapter Management and Achievement Committee* - There shall be a Chapter Management and Achievement Committee which shall function to develop programs whereby chapter officers can develop management skills and participate in interchange of chapter management ideas. A chapter achievement award shall be given for categories of chapter size annually. This award shall be part of the program of the committee to promote chapter activity and vitality.
5. *Chapter Newsletter* — There shall be a Chapter Newsletter Committee, whose principal duties shall be the promotion and development of active chapter newsletters.
6. *Chapter Program Development* - There shall be a committee to research and develop useful technical, business, historical, and social information and materials and suggest ways in which this information and these materials could be used to enhance the program part of a chapter meeting.
7. *Economic Affairs* - There shall be a committee for economic affairs to study past, current and future economic trends and advise members accordingly.
8. *Editor Advisory* - There shall be an Editor Advisory Committee composed of three (3) Registered Technician members, none of whom shall hold higher office than chapter president. This committee will be elected by Council for a two (2) year term. The committee shall be available to consult with and advise the editors on material for Journal publication, either at the editor's request or at the request of other parties.
9. *Examinations and Test Standards* — There shall be a committee on examinations and test standards, to supervise the uniform administration of the Registered Technician examinations, to evaluate the current testing procedures and standards, and to propose such changes as may be needed to improve uniform test administration and meet the current needs of PTG.
10. *Internal Code of Ethics* - There shall be a standing committee for PTG internal code of ethics.
11. *International Relations* - There shall be a committee on international relations. This committee shall be responsible for fostering relations with organizations and individuals in countries outside the regional jurisdiction of the Piano Technicians Guild, who are in the piano industry, especially piano technicians. The committee will be responsible for Piano Technicians Guild Tours to these countries. It shall review and approve or reject applicants for International Correspondent status.
12. *Members Rights* —

a. There shall be a Members Rights Committee, composed of three (3) members who shall be nominated and elected by the Council. The incoming president shall designate which of those elected shall serve as chairman.

b. Any aggrieved member or any chapter presenting a complaint through the Members Rights Committee or any other channel shall be obligated to provide in advance a detailed written copy of the points of such complaint to the person or committee against whom it is directed.

c. The duties of the Members Rights Committee shall be

—To study the problems of those who feel they have cause for grievance.
—To consider their opinions and advise them of their rights under the circumstances prevailing.
—To plead their cause to the proper body for consideration (Council and/or Board).
—To make certain that every member receives and enjoys all the rights and privileges which are due.
—To make certain that no member shall be denied a courteous and constitutionally proper hearing.
—To ascertain all the facts which are pertinent to any grievance which is brought to its attention.
—To conduct an investigation into the facts of any grievance in such a manner that PTG shall not be embarrassed by an improper decision.
—To be certain that full factual knowledge pertinent to the matter is made known to all parties concerned.

d. It shall be the privilege and duty of a member who has a complaint registered with the Members Rights Committee to be present at the Council meeting when the Members Rights Committee makes its report, and shall have the right to be

heard if he or she so desires. Should the Members Rights Committee fail to present the case to the Council, the member shall have the right, at the conclusion of the Members Rights Committee report, to personally present the case directly to the Council.

13. *Minutes Approving Committee* — There shall be a Minutes Approving Committee which shall review the draft copy of the Council minutes for accuracy and approve the final draft. They shall report in the Journal Update upon their approval of the Council minutes.
14. *Nominating Committee* — See Bylaws, Article XI.
15. *Teacher Relations* — There shall be a committee on teacher relations to promote education and understanding with music teachers and to develop educational programs for use with teachers' groups.
16. *Technical Institute Evaluation* — There shall be a committee on technical institute evaluation, whose duties shall relate to a regular study and evaluation of the technical classes held at each PTG annual convention, and how said annual convention may be better served with new or different technical classes.
17. *Trade Relations* — There shall be a committee on trade relations, to promote the mutual good will and welfare of the Guild, its members, piano manufacturers, dealers, teachers, and all piano technicians.
18. *Visually Impaired* — There shall be a Visually Impaired Problems and Affairs Committee to serve the special interests of the visually impaired members.

Article III — Membership

Section A — Death Benefit

1. The Council hereby authorizes the Board to establish a death benefit plan in the minimum amount of one thousand dollars ($1,000) for eligible members and authorizes the expenditure of a portion of the dues for this purpose.
2. The executive director shall be the administrator of the death benefit plan, thereby authorized to remit premiums, appoint the agent of record, and make the necessary legal reports.
3. Sustaining members of both classes shall be covered by the PTG death benefit, providing the coverage was in effect at the time of election to sustaining membership.

Section B — Dues

1. Dues Date for New Members — A new member shall first be liable for dues beginning the first of the calendar quarter after acceptance to membership. The date of acceptance to membership is construed to mean the date on which approval is granted, and recorded on the application form, by a duly constituted body or officer of PTG.
2. Chapter Dues Collection — Chapters may elect to have chapter dues billed and collected by the home office. Chapter dues will be included in their entirety as part of the first payment. Such dues will be reported and sent to participating chapters in April.

Section C — Resignations

Conditions and procedures under which a member may resign in good standing are

1. A member without indebtedness to the Guild or a chapter, and otherwise in good standing has the right to resign in good standing.
2. Resignations to escape delinquent dues, or other financial obligations or expulsions, need not be accepted. If dues have not been paid as provided in JP-3 and JP-39, the member may be dropped.
3. A chapter member wishing to resign must obtain concurrence of his chapter and notify the PTG home office before he becomes delinquent. The resignation request shall include the reasons for resigning and the effective date; if the reasons are not valid, the chapter should attempt to get the request withdrawn.
4. The home office shall ascertain the status of dues and other obligations of the member and notify the officers concerned.
5. Upon receipt of acceptance from a chapter or regional vice president of a resignation, the home office shall remove the name from the rolls and confirm the action to the person involved.

Article IV — Organization

Section A — Budget and Finance

Any and all recommendations for increasing The Piano Technicians Guild annual budget shall be accompanied by a suggested method of obtaining the funds.

Section B — Assemblies

Where more than one (1) chapter exists in a state, province, or similar area, annual assemblies should be held for the primary purposes of

a. Selecting a chairman and a secretary to serve until the next such assembly, whose duties shall be to act as coordinating officers and a clearing office for matters peculiar or relating to the area.
b. At least one Executive Board or staff member should be present and assist in the program of each such assembly.
c. To exchange ideas and work cooperatively for the improvement and expansion of Guild activities in the area.

Section C — Council

1. It shall be the duty of the chapter secretary to provide proper credentials for the chapter delegate to the Council and to see that such credentials reach the hand of the Guild recording secretary before the opening of a Council session.
2. One (1) alternate delegate for each chapter may be seated at the Council table and must sit only with the delegate if present. The alternate may speak to a motion with the delegate's consent. Alternates are not permitted to vote if the delegate is present. If the alternate does vote with the delegate present, he or she will be subject to discipline, such discipline being loss of accreditation at the Council table and removal from the meeting.
3. A resume of the Council minutes shall be distributed

to each member.

4. It is the sense of the Council that it is in order for a chapter to bear all or part of their delegate's expenses in attending a Council meeting, but illegal to pay him or her for time spent in serving as a delegate.
5. The executive director's expenses shall be paid to all Council and Board meetings.

Section D — Home Office

The home office shall prepare and have in readiness a list of current PTG members for supplying to any proper inquirer for the same.

Section E — Membership In Other Organizations

1. When PTG membership in another organization is authorized by the Council, such membership shall be renewed annually until rescinded by the Council.
2. The Guild shall sponsor The Braille Technician in the amount of two hundred dollars ($200.00).
3. The Guild shall be a sustaining member of the Music Teachers National Association at twenty-five dollars ($25.00) a year.
4. The Guild shall be a sustaining member of the Music Educators National Conference to the amount of twenty-five dollars ($25.00) a year.
5. The Guild shall make an annual donation of one hundred dollars ($100.00) to the American Music Conference.
6. The Guild shall be a member of the International Association of Piano Builders and Technicians.

Article V — Standard Tuning Test

Section A — Qualifications for Membership

1. This test shall be administered by a Standing Committee called Examinations and Test Standards Committee, under the supervision of the Executive Board.
2. The test shall be personally administered and given only by a Certified Tuning Examiner.
3. The test shall be given at committee approved sites where basic requirements are met. These sites can include Certified Test Centers, Conventions, seminars, and other group or regional meetings and chapters.
4. In administering the test, all the procedures outlined below shall be followed in every case so that all tests will be given fairly and the results will be comparable.
5. Test sites shall meet the following requirements:
   a. The facility shall be available for uninterrupted use for the period needed.
   b. A good quality five foot nine inch or larger grand piano with only plain steel strings above note B27 shall be used.
   c. Necessary supplementary equipment, calculator, and measuring device shall be available.
   d. There must be three examiners, who are Registered Technicians. At least one of the examiners must be a Certified Tuning Examiner.
   e. If one of the Certified Tuning Examiners is visually impaired, there shall be a non-visually impaired Certified Tuning Examiner present.
   f. The master tuning shall be done by a Certified Tuning Examiner assisted by two Registered Technicians.
   g. Test site may be at an annual convention, group or regional seminar or meeting, or at a chapter.
6. Other Requirements
   a. The applicant shall be screened for membership by the chapter and as required in the Bylaws.
   b. Application to take the tuning test shall be made to the local chapter, which shall arrange a convenient testing site.
   c. Applicant shall pay a test fee to cover costs of administering the test in addition to the normal application fee.
7. Requirements for Visual Tuners
   a. Chapter examination committees shall, when pre-examining an applicant, student, or apprentice who uses the "visual method" be fully satisfied that:
      1. The "visual" instrument used is sufficiently accurate and critical to ensure an acceptable tuning if properly used.
      2. The applicant has and applies the skills necessary to achieve solid tuning to the same degree as is expected of an "aural" applicant.
      3. The applicant knows why "stretching" is necessary and knows how to adjust his "visual instrument" to achieve acceptable results.
   b. In order to pass the official RTT tuning exam with the aid of a visual instrument, the examinee shall:
      1. First, with the instrument in the room (and available for use) pass all parts of the exam, except for the unison part, at 80% or better; and
      2. Second, with the instrument removed from the room, pass the unison part aurally at 80% or better and then retune octaves 3 and 4 aurally and score 70% or better on Pitch, Temperament, and Midrange.
      3. A 'visual' tuner who passes all except the aural re-tuning of octaves three and four need only retake and pass that aural portion and pay half the current tuning exam fee.
8. All procedures for actual preparation and administering the test follow in the Committee-approved "Examination Manual."

Section B — Examinations and Test Standards Committee

1. Committee Requirements
   a. The Examinations and Test Standards Committee is a standing committee appointed by the President with the approval of the Executive Board. The President shall designate the chairman. The President and Vice President shall be ex-officio members.
   b. The committee shall include one Certified Tuning Examiner from each region and other advisors and administrators as needed.
2. Duties
   a. Recommend to Council, for approval, any changes in tests and/or procedure. This includes tuning, written, and technical tests.
   b. Administer the Certified Examiners pool.

c. Recommend candidates for this pool to Board.
d. Approve all testing sites. This will be done by the regional committee member or another well-experienced CTE appointed by the regional committee member and who will report back to the regional committee member. All travel and lodging expenses to be reimbursed by the new test center.
e. Recommend test fees.

3. Certified Tuning Examiner Qualifications and Duties
   a. They shall administer and grade the tuning test.
   b. To qualify as a Certified Tuning Examiner, the member shall:
      1. Be an aural tuner.
      2. Sign consent to serve as examiner and indicate willingness to give the time needed to oversee exams.
      3. Pass each category of the test at 90% or better. If qualification is not achieved, the candidate may attempt the exam again when ready but is limited to three free examinations in any five year period. If this limit is exceeded, the examinee must pay the test center the usual test fee.
      4. Successfully complete instructions on procedures used during the test, use of qualifying measuring equipment and performance of required calculation, except that visually impaired persons need not perform those aspects of instruments use which require eyesight.
      5. Be recommended by the exam committee to Board for approval.
      6. Be approved by a Board majority.
      7. After an RTT has qualified at the examiner level, he/she must get sufficient training to be recommended to the Board for certification within 3 years. If the candidate fails to do this or decides not to become a CTE, he/she must return the handbook to the Home Office and pay the current tuning exam fee.
   c. A new Registered Tuner Technician member who passes the tuning exam at 90% or better, may begin training for Certified Tuning Examiner after one year and signing the Consent to Serve form. If training begins within 3 years after passing the tuning test, the exam need not be retaken.
   d. Certified Tuning Examiners shall receive travel and lodging expenses if they are required to travel over 50 miles and/or spend more than one day for master tuning and/or testing. Expenses are to be reimbursed by the sponsoring test center.
   e. No Certified Tuning Examiner shall advertise that he is an examiner. f. Certified tuning examiners shall be recertified after five years and before the end of the sixth year by passing exam procedures prepared by the Examinations and Test Standards Committee. This examination is to be conducted at a test center other than the CTE's own chapter and will require the attendance of the regional committee member or a CTE, appointed by the regional committee member, who has passed the recertification exam.

DISCIPLINARY CODE

(Jurisprudence and Punitive Action)

1. The final authority in all matters of jurisprudence shall be the Council, sitting as a court of appeal and review. It shall not be required to hold a new trial, but shall review the evidence taken in previous trials of the case and shall have the right to summon and question witnesses, if deemed expedient to the exercise of justice. It may also consider new evidence.
2. The following offenses shall be deemed offenses against PTG and shall be dealt with in accordance with the Penal Code:
   a. Malfeasance in office.
   b. Gross violation of established moral principles.
   c. Premeditated and/or continued violation of professional ethics.
   d. Willful conduct contrary to the interest of fellow members.
   e. Conviction of a criminal offense in a court of law.
3. The definition of delinquency in the payment of dues, fees,levies, and assessments, and the procedures to be followed in the dealing with such delinquencies, shall appear in the Penal Code.
4. A member shall be considered delinquent in dues if said dues are not paid by January 31. If said dues are not paid within the following 30 days, action shall be taken in accordance with JP-3.
5. When a member fails or refuses to pay dues, either chapter or Guild, the executive director shall, after proper notification, drop the delinquent member from the membership.
6. Proper notice is hereby defined as written notice sent to the last known address, or handed to the accused by the chapter secretary, at least 10 days in advance of hearing or trial, or dropping from the rolls for dues delinquency.
7. The penal jurisdiction of a chapter shall extend over all members of the Guild within its jurisdiction, as chartered, and over all of its own members wherever they may reside.
8. It is a proper duty of each chapter to take cognizance ofthe conduct of any member of the Guild within its jurisdiction and for any violation of the Bylaws, Regulations, and Codes to vindicate the law and administer justice. Provided: that the Guild officers are answerable only to the Council for acts growing out of their official duties.
9. Offenses outside the jurisdiction of any chapter shall be heard and determined by the Board, whose findings shall be subject to proper appeal to final authority.
10. Failure to conform to the provisions of the Bylaws,Regulations, and Codes or denial of inherent

rights thereof to a member or members, shall be cause for the revocation of a chapter charter.

11. No member can be reprimanded, suspended, or expelled for any cause whatever, other than nonpayment of dues, except on written charges and specifications and after having received proper notice of trial.
12. Any franchised member has the right to prefer charges within the chapter.
13. All charges must be made in writing, signed by the member or members making them and specifying, with reasonable certainty, the character of the offense and the time and place of commission, to which shall be attached the names of witnesses, if any.
14. When a member has been charged with a criminal offense and has been convicted of same in a court of law, a certified copy of the findings of the court in said cause shall be competent evidence and shall be considered with all other evidence in the case.
15. All charges must be heard and determined by the chapter. In no case can this be left to a committee.
16. Charges shall be presented at a stated meeting, read, and spread upon the minutes. The president shall set a time for trial and order the secretary to furnish the accused with a true copy of the charges and specifications, together with the names of the witnesses, if any, and give him or her proper notice of the trial. All franchised members of the chapter shall be given notice of the time and place of trial by first-class mail at least 10 days in advance of trial date.
17. Trial procedure shall be prescribed in the Penal Code.
18. The chapter president shall act as presiding officer in all trials in the chapter or appoint a member to preside.
19. On request of the accused, the chapter president shall appoint another officer.
20. Should a chapter president be charged with an offense, the charge shall be laid before the Guild president, who shall appoint a member of the PTG to act as presiding officer in all matters having to do with the case at chapter level.
21. The chapter secretary shall serve as trial reporter, except when the secretary is the defendant, in which case the chapter president shall appoint a trial reporter.
22. All written evidence must be preserved by the trial reporter and all oral evidence must be recorded on magnetic tape, or otherwise transcribed, which shall likewise be preserved, so that all evidence will be available in case of appeal.
23. Any member of the Guild may act as counsel for the accused or the chapter.
24. Witnesses may be presented who are not members of the Guild, provided they do so voluntarily, and their credibility may be properly established
25. The presiding officer shall see that proper pleas of not guilty are entered for the accused and that the trial is properly conducted. The presiding officer shall decide as to the admissibility of all evidence and testimony offered, and all points of law and order which may be raised.
26. Should the accused appear and plead guilty to the charges and specifications, no further evidence is necessary unless the accused wishes to offer evidence in mitigation of the offense. This shall be permitted, after which evidence in rebuttal shall be permitted, after which penalty shall be fixed.
27. Before proceeding to trial in the absence of the accused, and after the charges are read, a plea of not guilty must be entered upon the records.
28. At the time set for trial, if the accused fails to appear, the presiding officer must make due inquiry and be satisfied that the accused has had proper notice of the trial, and copies of the charges and witnesses, if any, and if not, the trial must be continued to a future time. In either case, a member shall be appointed to appear for the accused, whose duty shall be to preserve to the accused every right under the laws of the Guild and, if the accused has had proper notice, the case shall then be heard and decided as though he or she were present.
29. Sworn affidavits may be presented as evidence but, when entered, shall on request of either party be grounds for continuance of the case in order to make proper rebuttal thereto.
30. The rules of evidence shall be, as far as applicable, the same as in the courts of law, except that no oath or affirmation shall be required of the witnesses.
31. The accuser shall first enter all evidence to sustain the material allegations of the charges; then the accused shall introduce the evidence to disprove the charges or in mitigation of the offense; then the accuser may offer evidence in rebuttal and the accused may offer evidence in rebuttal, and here the evidence must close. The object of the trial is to get the facts and the greatest latitude should be allowed in receiving evidence, ever keeping in mind the rights of each side must be respected.
32. Immediately after evidence is taken, each side shall have the opportunity to be heard, the prosecution having the right to open and close the argument. The accused shall then retire and a ballot shall be had on the guilt or innocence of the accused.
33. Only franchised members present shall vote on the question of guilt or innocence.
34. In case of multiple charges, each must be voted separately.
35. If the accused is found guilty as charged in one or more of the specifications, the membership shall fix one of the following penalties:
    a. Expulsion
    b. Suspension, indefinitely.
    c. Suspension, for a definite time.
    d. Fine.
    e. Reprimand.
36. The vote shall be taken in the above order until a majority decides the issue. If, however, none of the first four are decided upon, the accused shall automatically be subject to reprimand. If the accused is present the presiding officer shall proceed to administer the reprimand. If the accused be absent, he or she shall be properly notified to appear at a set time for reprimand and, should he or she fail to appear at such time or show a satisfactory excuse for non-attendance, shall stand suspended.
37. Should suspension for a definite time be fixed as a

penalty, the time may be fixed by motion and vote, but the longest time proposed must be voted first.

38. A chapter may grant a new trial on the ground of newly discovered evidence which would indicate, with reasonable certainty, a change in the findings.
39. In cases tried by the Executive Board, the Board will hold trial, determine guilt or innocence, and fix penalties in accordance with the above section.
40. One who has been convicted in a chapter or Board trial shall have the right to appeal the case within 60 days after conviction to the Members Rights Committee sitting as a court of appeal and review.
41. An appeal shall be in writing and contain a statement of the case and the exception taken to the decision or judgement appealed from, and the ground upon which the appeal is based.
42. An appeal shall be placed in the hands of the Chairman of the Members Rights Committee who shall make arrangements with the Committee to review the case at its earliest opportunity. All records and recordings of an appealed case shall be turned over to the Chairman of the Members Rights Committee for use by that committee.
43. One who has been convicted in a chapter or Board trial and has completed an unsatisfactory appeal with the Members Rights Committee shall have the right to appeal the case to the Council within 60 days after the end of the review by the Members Rights Committee.
44. An appeal shall be in writing and contain a statement of the case and the exception taken to the decision or judgement appealed from, and the ground upon which the appeal is based.
45. An appeal shall be placed in the hands of the Guild recording secretary who shall inform the president, who will make arrangements for the Council to review the case at its earliest opportunity. All records and recordings of an appealed case shall be turned over to the Guild recording secretary for use by the Council.