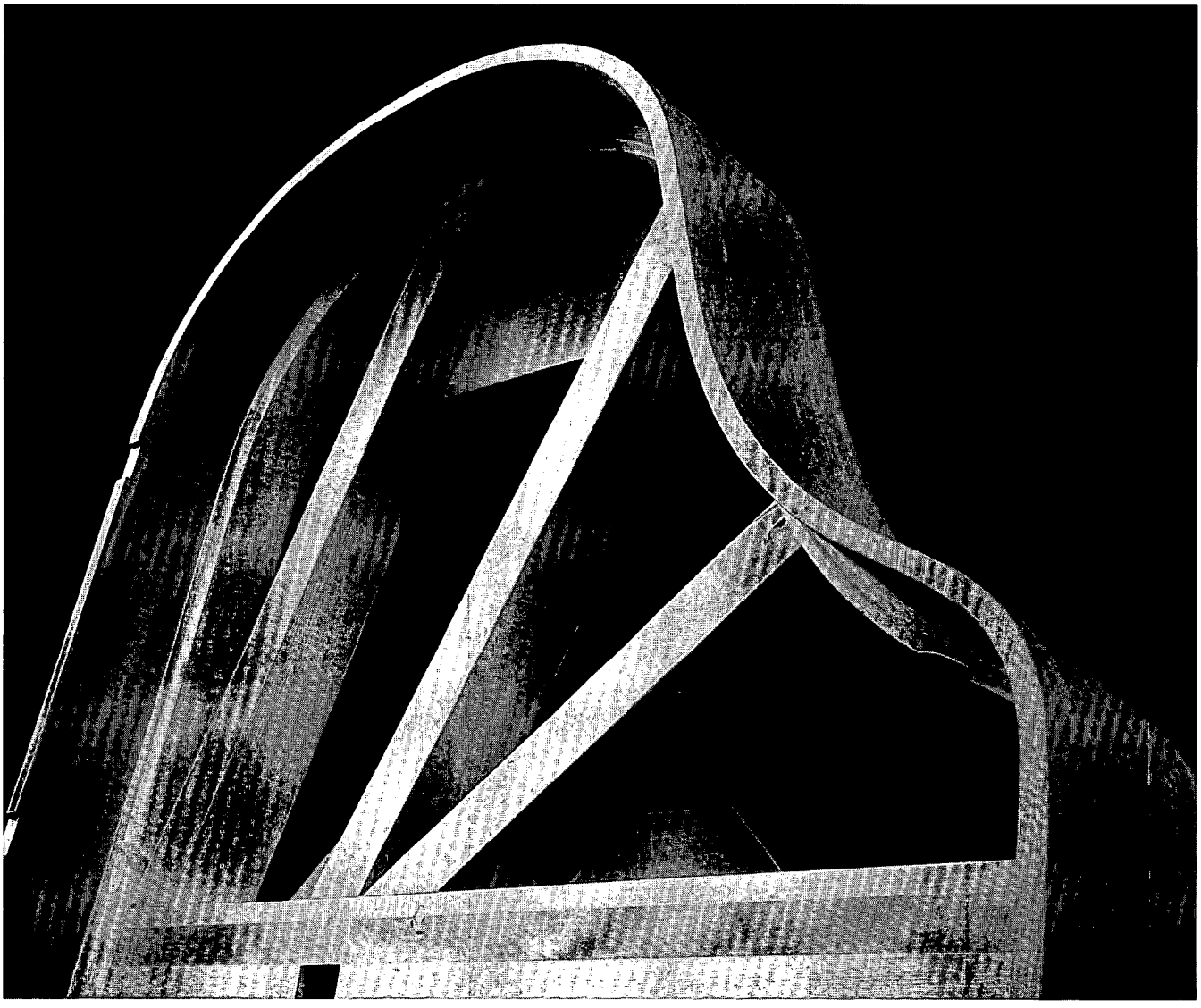
Piano Technicians Journal

May 1983



Fortress Steinway.

So begins the Steinway Grand Piano.

The basic frame, shown here, is so solid, so strong, so well made that even at this early stage of construction—before a note is played—the Steinway takes leave of lesser quality instruments.

Examine the curved rim. While other pianomakers build it in sections, we build it the hard way.

Inner and outer rims are rock maple, laminated in one operation into a rigid arch strong enough to withstand 20 tons of pressure from the strings.

Now take a closer look. The inner rim mount of the Steinway grand is beveled at an 88.5° angle so that the soundboard, when glued in, is forced to arch just enough to increase vibrancy and responsiveness.

Also observe that there are no metal connectors in a Steinway frame. We know they distort the sound and loosen with time.

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This homogeneous construction makes the Steinway grand a veritable fortress.

It will take us one full year to complete this piano. But it will last for generations.

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Piano Technicians Journal
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May 1983
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Editorial

Don L. Santy
Executive Editor

I enjoy reading the Chapter newsletters. They vary, of course. Some are simply announcements of the next meeting and others confine themselves to technicals and chapter business. Occasionally a newsletter contains original short essays of a philosophical nature; some of these are truly outstanding, showing a deep intellectual capacity in the realm of piano technology.

I will take the liberty of reprinting some of these from time to time (as I have in the past), since I believe they are worth sharing.

One that appeared in *Soundboard Buttons* from the **Twin Cities** chapter, by chapter president Mark Bunker, has a message that fits right in with our upcoming convention. Our conventions are the "great finale" of the Guild year. They are the "grand assembly," where folks from all over the country meet. The conventions pass on from year to year, each leaving its mark on the lives of those who participate. They excite and challenge those who attend for the first time. Our conventions are truly "legacies," as Mark has so beautifully pointed out — on the birth of his first son.

"LEGACY"

Benjamin Calder Bunker took his first breath March 19, 1983. The birth of one's first child is a time of celebration, fear and taking stock.

It seems to me that there are basically three things that we leave behind: our children, our work and our institutions. The first seems rather obvious. The second carries a lot more weight if your name ranks with Shakespeare, Chopin or Picasso. The third is one I would like you to take a closer look at.

Let's face it, most of us individually are not going to have a great impact on future generations. Our work is service. Even if we rebuild a piano so it will have another fifty years of life, that's still a relatively short period of time. So the actual work we do is transitory. Now, if in the process of doing our work we train someone who outlives us by fifty years and that person trains several other people who outlive him/her by fifty years . . . well, you get the idea.

Our institutions (our churches, schools, professional organizations) provide a framework whereby people with like values and interests are strengthened by each other. It may be that institutions are really our most important link to the future.

With continued hard work, the Piano Technicians Guild will outlive all of us. It will live to carry on a part of us to others not even born. Perhaps you'll agree that in terms of our profession, it's our most important legacy.

Here is another bit of wisdom for you to enjoy, an essay reprinted in the Indianapolis newsletter by the President of the Indianapolis Chapter. It's one which I think deserves a wider audience.

Like so many other people piano tuners need to be reminded from time to time to live in the present, and to enjoy the here and now. The following little essay by Hastings says it so well I would like to share it with you.

— Guy McKay

THE STATION
By Robert J. Hastings

Tucked away in our subconscious is an idyllic vision. We see ourselves on a long trip that spans the continent. We are travelling by train. Out the windows we drink in the passing scene of cars on nearby highways, of children waving at a crossing, of cattle grazing on a distant hillside, of smoke pouring from a power plant, of row upon row of corn and wheat, of flatlands and valleys, of mountains and rolling hillsides, of city skylines and village halls.

But uppermost in our minds is the final destination. On a certain day at a certain hour we will pull into the station. Bands will be playing and flags waving. Once we get there so many wonderful dreams will come true and the pieces of our lives will fit together like a completed jigsaw puzzle. How restlessly we pace the aisles, damning the minutes for loitering — waiting, waiting, waiting for the station.

"When we reach the station, that will be it!" we cry. "When I'm 18." "When I buy a new 450 SL Mercedes Benz!" "When I put the last child through college." "When I have paid off the mortgage!" "When I get a promotion." "When I reach the age of retirement, I shall live happily after after!"

Sooner or later we must realize there is no station, no one place to arrive at once and for all. The true joy of life is in the trip. The station is only a dream. It constantly outdistances us.

"Relish the moment" is a good motto, especially when coupled with Psalm 118:24: "This is the day which the Lord hath made; we will rejoice and be glad in it." It isn't the burdens of today that drive men mad. It is the regrets over yesterday and the fear of tomorrow. Regret and fear are twin thieves who rob us of today.

So, stop pacing the aisles and counting the miles. Instead, climb more mountains, eat more ice cream, go barefoot more often, swim more rivers, watch more sunsets, laugh more, cry less. Life must be lived as we go along. The station will come soon enough.

The International Scene

Fred Odenheimer, Chairman
International Relations Committee

The two most important events for the piano industry worldwide are the NAAM Convention and the Frankfurt Music Fair, one taking place in summer and the other in midwinter.

It seems to be a matter of prestige to be represented, to show your merchandise, and what is more important, to sell.

At the Frankfurt fair, early February, many manufacturers from a good number of countries were represented. Naturally, there was Germany with about 15 manufacturers; Austria (1), Canada (1), China, East Germany, England (7), Finland (2), France (1), Holland (1), Israel (2), Italy (2), Japan (5), Korea (4), South Africa (1), Sweden (1), Switzerland (1), Czechoslovakia (1), and U.S.A. (4). This may not be a complete list but one gets a general idea.

Interesting too is to look through a list of piano supply houses and manufacturers. These naturally include all firms from action makers to foundries, hardware, soundboards, etc. I counted 13 companies from Germany, two from England, one from Japan, one from Denmark, one from Switzerland and one from the U.S.A. Harpsichord manufacturers came from Germany (5), one each from Canada and Japan. It seems to me there were fewer organ manufacturers represented than in previous years.

The Frankfurt fair is not only important for sales and trade in Europe but it has worldwide importance, because it brings tradespeople and manufacturers from all over the world together.

It is hard to imagine that some of us may be on our way to Japan when this issue of the Journal gets to the reader. Those of us who are making part or all of the tour are looking forward to an exciting time, an experience that may never be duplicated. For those of you who had to stay at home, we will try to impart our impressions. It is but second best when you are not there! Meanwhile I hope you will not forget "Friends of IAPBT" and if you have not joined as yet, please do so at once.

Letters

Dear Don,

I have always given advertising a great deal of time and money in my piano tuning business. I have the Guild logos and car decals on the car and house. I have been stopped in parking lots and even at red lights in order to give people my business card.

However, the following note is a first for me:

"I have a friend who may want a piano tuned sometime in the next 6 months. Please call me with your name and telephone number,
Shirley
371-9216

P.S. Your sign is very clever."

This note was on my car windshield while I was inside a house tuning the piano. The sign she mentioned is,"Love thy neighbor; tune thy piano." I hope the Piano Technicians Guild will continue to have these decals available to members and that members will use them to their best advantage.

Thank you,
Bob Russell

President's Message

Ernie Preuitt
President

Once upon a time, a young man returned to his farm home after graduating from a distant boarding school. One morning, while seated in the farm wagon with his father on a local errand, he heard his father greet a passerby with "Good morning, Luke, you travelin' or goin' someplace?" Another he greeted in like manner, then another and another. The son finally broke his silence with, "Pop, why do you always say 'travelin' or goin' someplace?' Isn't it the same thing?"

"No, 'tain't," said the father. "Zeke, now, is takin' time off from his chores to go in town and play pool. Ole Grant, he's goin' over to pitch horseshoes with the neighbor. 'Most everybody we met this mornin' is just travelin'. All 'cept old Luke, now, he's goin' over to the Widder Jones' to plow her east forty. She'll have him in to dinner, they'll strike up a friendship, first thing you know they'll be married and Luke will not only have a wife, but he'll have that farm. No, son, 'tain't the same. All those other men were just travelin'. Ole Luke, now, he's goin' someplace."

This month of May, many people will be going to Japan, Korea, and China to see the wonderful sights and visit piano factories in that mysterious and most beautiful part of the world. The diplomatic corps of the nations have a tremendous task in dealing with each other, and treks such as this one can be of tremendous help to them in that task. At the Piano Technicians Guild convention in New York City in 1962, Van Cliborn made an appearance, not to perform, but to tell of his travels and what he could do to bring peace to the world. I instantly admired him for his attitude, although it was several years before I heard him play.

It will be money well spent by all who make this trip, if for no other reason than that we may contribute to peace in the world.

Of course the main objective of this venture is the Council meeting, on May 22nd and 23rd, of IAPBT. It will be interesting to see how far we have come these past few years. We are still in our infancy. Rome wasn't built in a day, neither was the Piano Technicians Guild, and neither will IAPBT, but given ample time, enthusiastic support, and intelligent leadership, it will be a guiding force in the world of piano builders and technicians. Each of you can support this world organization by sending $15 to the home office in Seattle and becoming a supporting member of IAPBT.

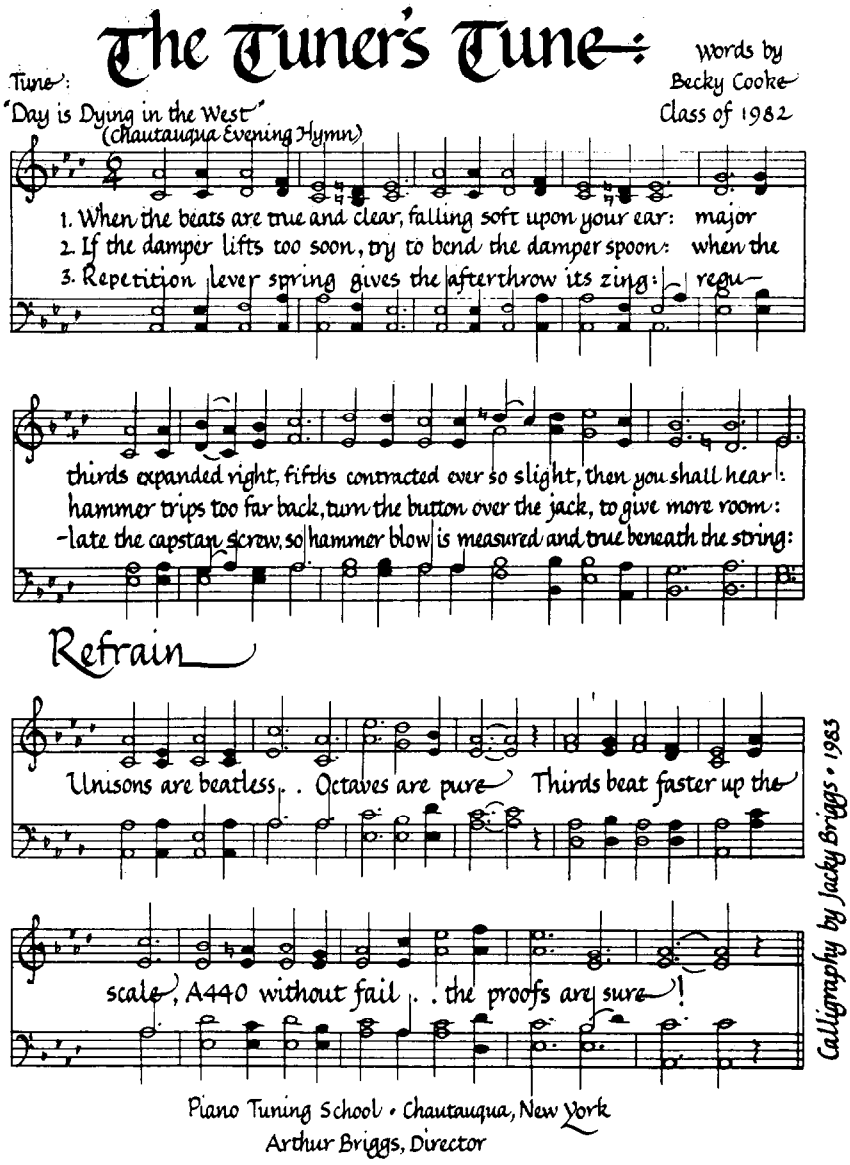
After the visit to Korea and Japan, many in the group will continue, at the invitation of the Ministry of Foreign Trade, into China. There we will see not only the Forbidden City, the great wall, Ming tombs and other wonders of the world, but we will have the opportunity to visit the piano factories and meet with our Chinese counterparts, the tuners and technicians.

No doubt there will be many times those on this trip will be asked to tell of their travels, but I hope none of us will overdo it and bore you with too much talk about our good fortune.

You know, as exciting as this coming event is, it takes second place to the coming 1983 convention in New Orleans next July. I will have much more to say about this next month. In the meantime, make your plans now to attend. We can't all travel to the Orient, but we can go to New Orleans.

It's good to travel, but while we're at it, let's go someplace.

Peace



Dear Mr. Santy:

I thought the enclosed might be of interest to your magazine. My husband, Art Briggs, is the Director of the Chautauqua (NY) Piano Tuning School, and each year has a very interesting class of students. Last year one of them wrote some words to a hymn tune and my husband was serenaded with the song during their closing exercises on the last day. I am in the calligraphy business, and so enjoyed setting pen to paper on the project. You can be sure, when this is sung by a group of fledgling piano tuners, on their last day of class, it was enough to bring tears to one's eyes!!

Regards —
Jacky Briggs

THE TECHNICAL FORUM

Jack Krefting,
Technical Editor

If you have attended one of our national conventions, skip this paragraph. Knowing what it is like, I'm sure you'll be there if at all possible. For those who haven't, believe me when I say that the experience will make more of a difference to you professionally than anything else you could possibly do during that week. Don't just come for the fun of it — although there will be plenty of that, too — but come for the educational experience of a lifetime. Ben McKlveen has assembled a faculty of about fifty fine instructors from all over the country, and you will have the opportunity to meet and talk with representatives of all the major manufacturers and supply houses, as well as the leading independent technicians. Sure, it will cost some money to attend; but that is money wisely spent as an investment in your future, and you can deduct every penny of it from your income tax. The dates are July 4-8, and we'll look for you in New Orleans.

Vertical Rebuilding

Last month we made a new treble bridge, and now we will install it. One important aspect of this job is to get the new bridge on the board in the right place; that done, the rest is easy.

If the new bridge has been carefully and accurately shaped to the conformation of the original, and if the old soundboard will be used again, the new bridge may be relocated by the outlined marks on the soundboard. Accuracy should be within reasonable limits here, say 1/16", but does not have to be really close because the bridge has not yet been marked out for pins and notches. One way to do this is to lay the old bridge atop the new one and, with a sharpened tooling pin of the same diameter as the tooling holes drilled in our last issue, punch an alignment mark in the new bridge as shown in **Figure 1.** Drill through the new bridge in the drill press or with a drill guide to keep the hole straight, and the holes will line up with those drilled previously in the soundboard. Use a go-bar deck or a bridge clamp to fasten the bridge to the soundboard, remembering to support the board and ribs from underneath. Two or three balance rail pins locate the bridge and keep it from sliding out of place when the glue is wet. **Figure 2** illustrates this point.

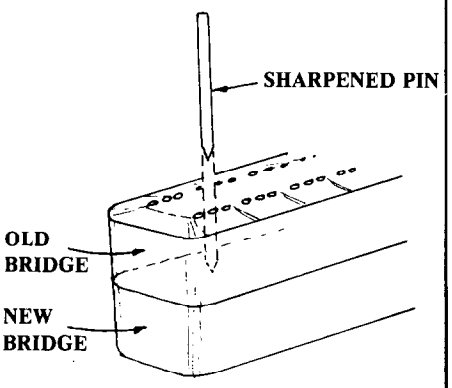


Figure 1

Now it is important that downbearing be verified, and corrections made if necessary before proceeding. Place the plate in position temporarily, with a few plate screws tight, and stretch a thread from the V-bar toward the hitchpins at various points, paying particular attention to the ends of the bridge since they will vary the least with humidity changes. The thread should just touch the top of the bridge as shown in **Figure 3,** and then the distance between it and

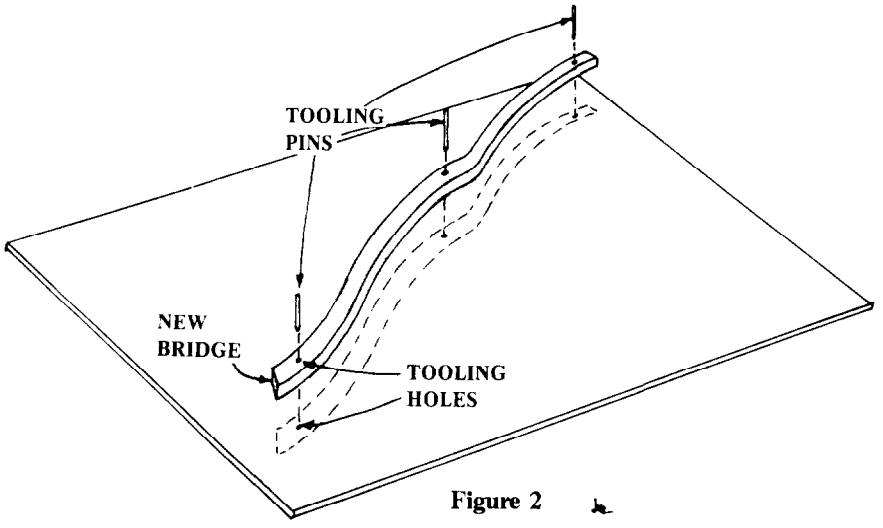


Figure 2

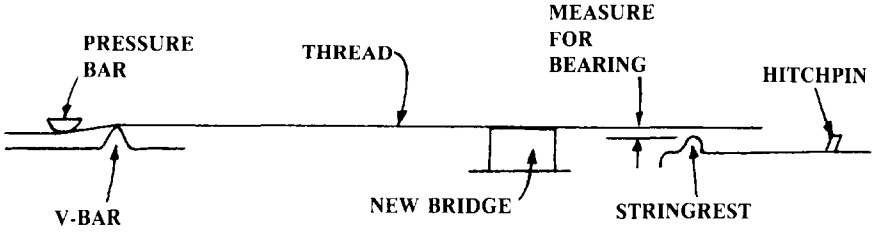


Figure 3

the string rest is measured. Saw cuts are made in the bridge, assuming it was made slightly thicker than necessary, with a backsaw as shown in **Figure 4** until the thread will lie in the saw cut and be the correct height above the string rest. The precise amount would of course vary with the humidity and the proximity to the end of the bridge and the edge of the soundboard, but in general the gap between thread and string rest should be between 1/32" and 1/16" at each end of the bridge, about 3/32" in the middle, and 1/64" on a suspended bass bridge. If the soundboard is new, we would expect considerably more bearing in the middle, possibly as much as 3/16".

When the saw cuts have been made, remove the plate and plane the bridge down to the level of the cuts. Plane so that the speaking length side of the bridge is slightly higher than the hitch-pin side by about 0.025" for positive termination but minimum downbearing. If you are measuring the height of the bridge on each side from the soundboard, the difference would be less than 1/32" but noticeable.

Now blacken the top of the bridge with shoe dye or something similar, taking care that the blacking doesn't wick down the sides. When the blacking has thoroughly dried, mask the area and spray the top of the bridge with Emralon or other teflon-type coating for lubrication. DuPont's SlipSpray works well for this, also. Don't use anything containing silicones, though, or there will be trouble later.

The Mylar or paper pattern comes out now. Fasten it to the new bridge with tape and make a punch mark where each bridge pin will be installed. Be sure the punch used to mark the bridge is small enough in diameter that the holes will be larger than the starting marks (a comment that shouldn't be necessary but is) and remove the pattern. Confirm the hole positions if that seems indicated — it never hurts to double-check — by again putting the plate in position and stretching a thread to see that the alignment is there. Downbearing can be double-checked at the same time.

Drilling a bridge seems to be simple at first, but isn't. Experienced technicians have made disastrous errors simply because they have failed to account for the angle of penetration of the bridge pins. We know that bridge pins must bottom out in their holes, and we know that they should be drilled at certain angles for optimum termination (clamp the string to the bridge) and, at the same time, good tunability (let the string slide easily across the bridge) — one more compromise which must be faced by the builder and the conscientious rebuilder.

Figure 5 illustrates the preferred bridge pin angles, which must be modified on occasion to prevent the intersection of holes within the bridge, especially in the tenor and middle sections of larger pianos where the front bridge pins of one unison are even with the rear pins of another, as shown in **Figure 6.** Use a drill bit that is 0.003" to 0.004" smaller than the pin.

Use some sort of depth gauge, such as a piece of masking tape around the drill bit, so all holes are the same depth. Check the length of the pins to be sure, because unlike tuning pins, bridge pins must bottom in their holes. If this is your first bridge, I recommend the use of an angled drill guide such as the one submitted last month by Russell Gordon.

When the holes are all drilled, notch the bridge with a very sharp chisel. Use a long-handled chisel with both hands — if you need a mallet, the chisel is dull — and start each notch by holding the chisel straight up and down with the

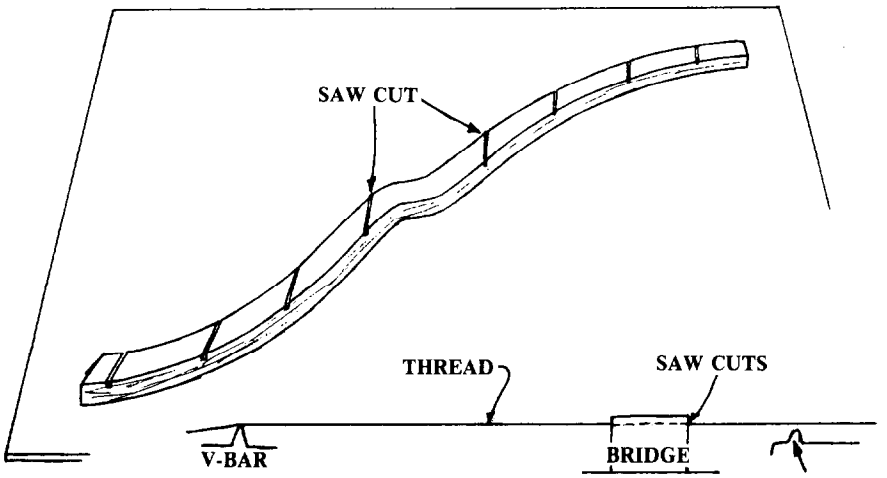


Figure 4

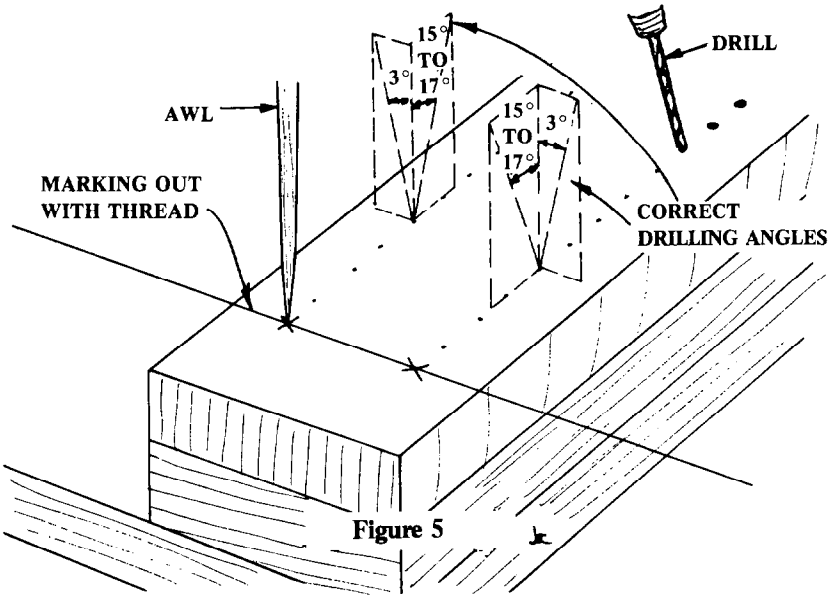


Figure 5

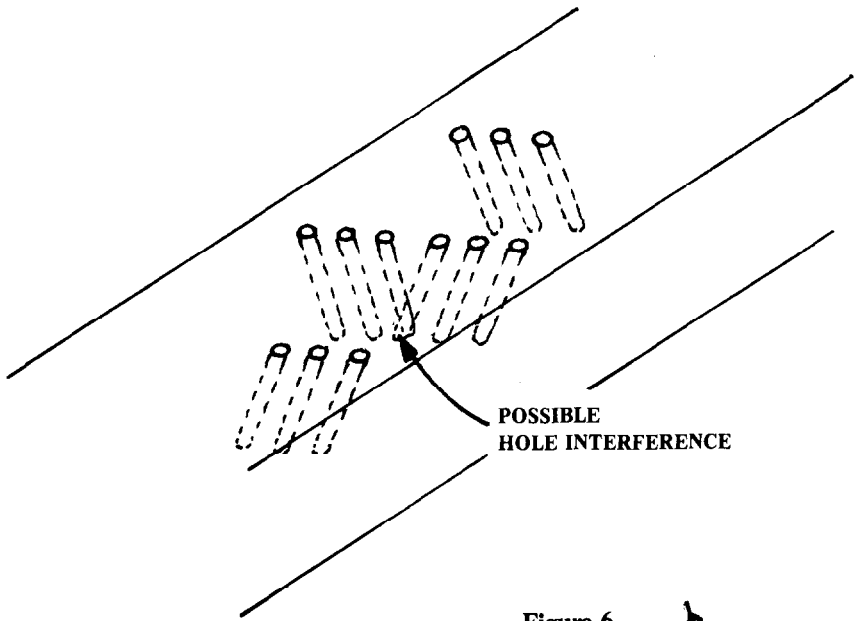


Figure 6

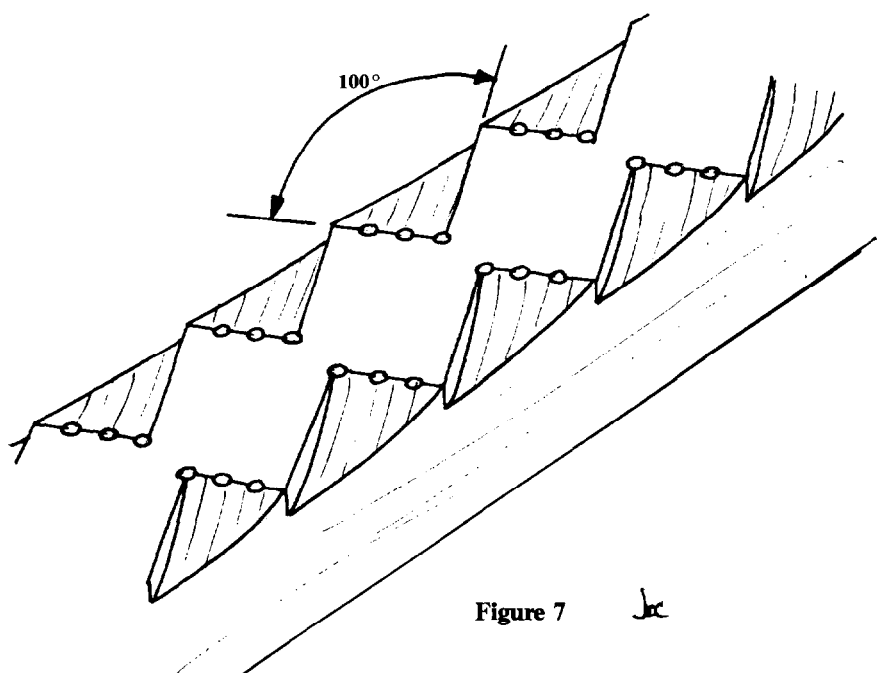


Figure 7

blade cutting through the holes of each unison. Give the chisel a firm bump with the heel of the hand so a clean line is discernible as shown in **Figure 7.** Make a similar but deeper cut to define the side of the notch, at about 100° (somewhat more than a right angle) to the first cut. The idea is to provide room for a string excursion on that note, but still leave enough material to support the end pin of the next unison.

Using a scooping motion, chisel out the material in each notch. With practice, each notch can be easily and cleanly done in one motion, but the beginner may want to use the safer but slower bumping method. This involves guiding the chisel with one hand and bumping the end of the handle with the other. The results will be more predictable, but cosmetically inferior because of the lumpiness left by multiple bumps of the chisel.

Cross-grain notching is the toughest of all, as even with the sharpest chisel there is a tendency for the wood to tear. The high treble of a vertically laminated capless bridge is the worst of all, and notching technique here will have to be modified to change the angle or use power tools or, conceivably, notch from one side to the other instead of from the pin holes outward. To get the curvature in that example, a woodcarver's gouge could be substituted for the chisel.

Drive all pins into the bridge, file or belt-sand their tops if desired for appearance, and the job is done. Finishing consists of shellac and varnish, as described in our March 1983 issue. Be careful not to get any finish on the blackened top of the bridge — don't spray finish on unless every bit of black area is masked off — or on the bridge pins, as this will cause rendering difficulties every time someone tries to tune the piano. The string must be firmly connected to the bridge by means of downbearing and sidebearing, but it must be free to move end-to-end through the bridge during tuning.

If soundboard buttons are desired, they may be installed at any time after the bridge is glued to the board. They have no acoustical function, but simply reinforce the glue joint. The most important thing to remember is to be sure that the screws do not touch bridge pins. I would rather leave the buttons out than take a chance on that.

Next month in this space, our topic will be recapping.

A Procedure for Weighing Off Keys

Tom Reed of Kirksville, Missouri, has written the following account of George Defebaugh's procedure. George has seen the copy and approved its publication, but wants it clearly understood that this is a procedure he uses in his private piano service business, and that it is not endorsed by any manufacturer. Here is Tom's account:

For grand pianos:

The entire procedure, briefly, consists of six steps.

1. The piano must be in good regulation, without excessive friction in the upper action or keys, which would affect the weight required to depress the keys.
2. Saw a number of jiffy key leads exactly in half, using a jig of some type, or a fence on a band saw or other power saw.
3. The action must be out of the piano, so that the dampers will not contribute to the weight on the keys.
4. Choose an appropriate weight. For grands, a reasonable standard is 53 or 54 grams, with a 50 minimum and 55 a maximum. Fifty three grams would be about a medium touch and more or less ideal. Fifty grams would be an extremely light touch for a grand. Shade the weighing toward 50 gm. in the treble if you wish a lighter treble touch.
5. Place a 53 gm. weight (for example) on the end of the key approximately over the front guide pin. The key should support the weight of the gram weight. Strike the hammer flange rail a moderate blow with the palm (or heel) of the hand, which should cause the key to sink to the *beginning* point of let off (when the jack tender first contacts the let off button), but not to the bottom of the stroke. If the key does not sink, place a half jiffy key lead on the top of the key near the balance rail, and repeat, sliding the jiffy lead forward until the key sinks. If the key sinks before striking the hammer rail, place the jiffy lead on the opposite side of the balance rail. If it is desired to include the weight of the screw with the jiffy lead when determining the position of the weight along the length of the key, the screw can be lightly taped to the jiffy lead, or placed loosely in the hole in the jiffy lead.
6. When the key sinks under the 53 gm. weight, check for up weight, which should be 20 gms. After the key is at the beginning point of let off, replace the 53 gm. weight with a 20 gm. weight. The key should bring the 20 gm. weight up to rest position with no assistance. If it does not, readjust the jiffy lead. When correctly positioned along the length of the key, mark the position of the jiffy lead screw hole with a sharp pencil. Later, transfer this mark to the side of the key with a square, so that the jiffy lead can be correctly positioned on the bottom side of the key. When all of the keys have been checked, fasten the jiffy key leads to the bottom of the keys, with screw holes all in the same direction. Be sure that the leads clear the key frame rails, slats, etc. Screw holes in the bottom of the keys may be punched with a sharp awl.

Apply the jiffy key leads either in front of or behind the balance rail, depending on where the added weighting is needed to produce the correct down weight and up weight.

It is possible to drill small holes through existing key leads to *reduce* existing key leading, however this requires that the action be reassembled again to test the keys.

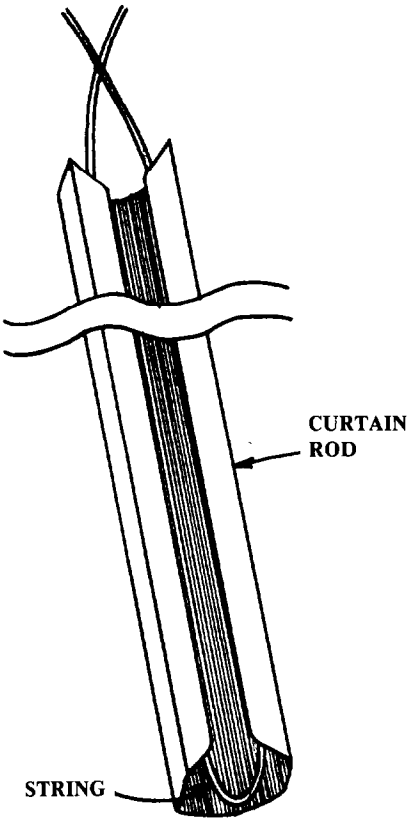


Figure 8

According to Defebaugh, if they get a round lead in the wrong place at the Steinway factory, "they knock it out, drill through the key stick, dowel the hole, and sand off both sides; the key is not weakened this way." A new round lead is then fitted into the key at the correct position.

For vertical pianos:

The procedure for verticals is the same as for grands, except that the testing must be done with the keys and action in the piano, of course. Fully depress the damper pedal, so that the dampers do not add weight to the keys. As with the grand, the key should sink only to the beginning point of let off. The underside of the key bed is a good place to strike with the hand to start the key downward.

The up weight may be slightly less than 20 gms. for a vertical; probably 18 or 19 would be the absolute minimum.

It is important in both grand and vertical that the touch be even throughout, regardless of whether the touch is heavy or light.

Thomas S. Reed
Kirksville, Missouri

Replacing Broken Strings

Question: *". . . I have a terrible time trying to replace broken tenor and treble strings, especially along about C4 to C5. Would you please give a detailed method that you use in doing this job, and I mean from beginning to end. What especially bothers me is (1) trying to keep the wire from tangling; (2) getting the wire in the pin becket hole, especially on a small spinet where the pin is so close to the pressure bar; and (3) getting the string length to come out right in relation to the three wraps of the coils. Also, do you make your coils on a dummy pin and then transfer them to the pin in the piano?"*

Gary C. Calvert
Coal City, West Virginia

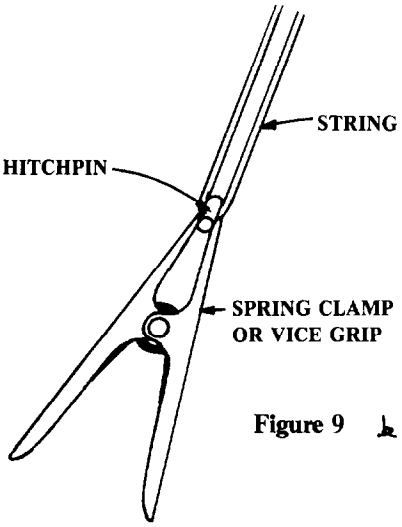


Figure 9

Answer: First let's decide whether replacement or repair would be the best choice in a given situation. I generally prefer to replace, but I will admit that there are times when knot-tying skills are invaluable, such as when a replacement isn't available in time for a performance, or when a new wound string will be so much brighter than its companions that the only decent tonal match would involve tying the old string. The article on this topic that comes the closest to being definitive would be the one by Yat-Lam Hong in the December 1977 issue.

If replacement is chosen, first mike the old string to determine the correct replacement size. Back the two affected tuning pins out about 1½ turns, figuring to transfer coils from a dummy pin so the pins won't be loose, and remove all pieces of the old string. Measure the distance from the hitch pin to the higher of the two tuning pins, double that distance, and add a foot for insurance. Cut that length of new wire and fold it double, making a neat round bend around a screwdriver shank. Insert the wire behind the action from the top as shown in **Figure 8,** using a common curtain rod to keep the wire from tangling. Loop the end on the hitchpin and keep it there with a small spring clamp or a vicegrip clamped to the hitchpin as shown in **Figure 9.** Start lifting the curtain rod, keeping some tension on the wire. When the rod is out of the way, pull up firmly on one end of the wire and cut it off about 2½ inches above its tuning pin. Wedge it between tuning pins as shown in **Figure 10** to keep it

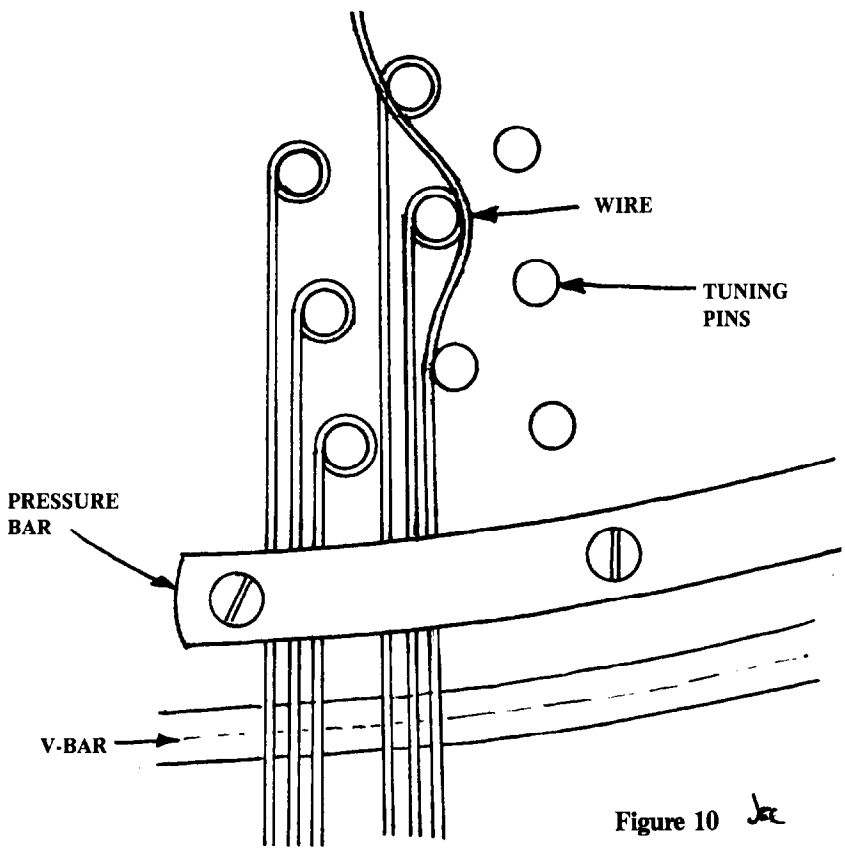


Figure 10

from flying around, and cut the other end in the same manner. Using a dummy pin, wind a coil on each end of the wire. Gently pry the becket out of the hole and insert the coils under the pressure bar, pulling them through with a string hook. If there is insufficient clearance to get the coils through, it will be necessary to slip the wire off the hitchpin and pull it up a few inches so the coils can be made after the wire is threaded through the pressure bar. To keep from losing the bottom end of the string, clip it to a neighboring string with a spring clamp, clothespin, trash bag tie, or safety pin.

Slip the new string coils over their respective tuning pins and squeeze the beckets into their holes with a needlenose plier or a similar tool. Pull the bottom around its hitchpin again, and then place both strings into position on the bridge. Lift the coils while chipping, double-check the beckets to be sure they are tightly bent into place, and the job is done.

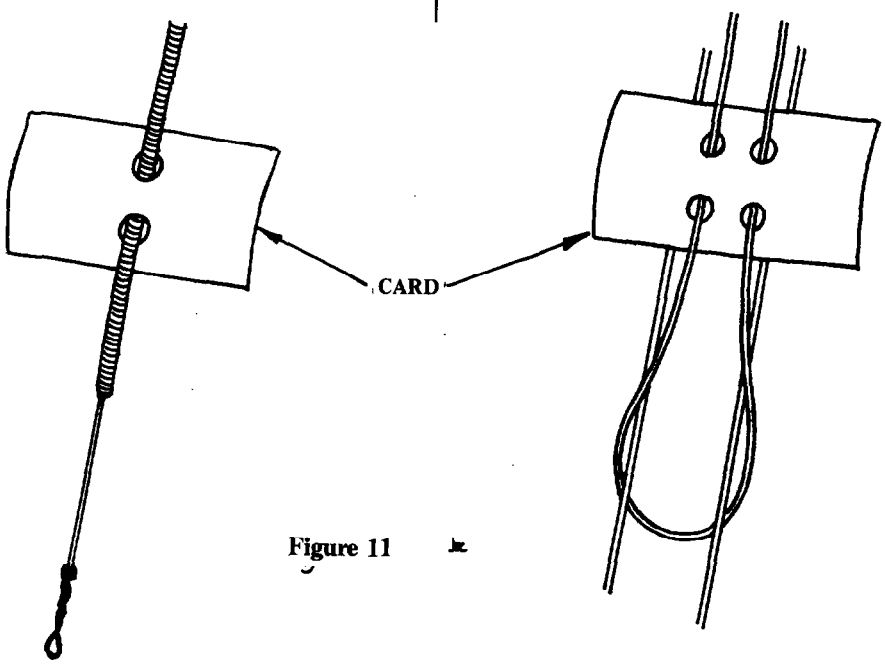


Figure 11

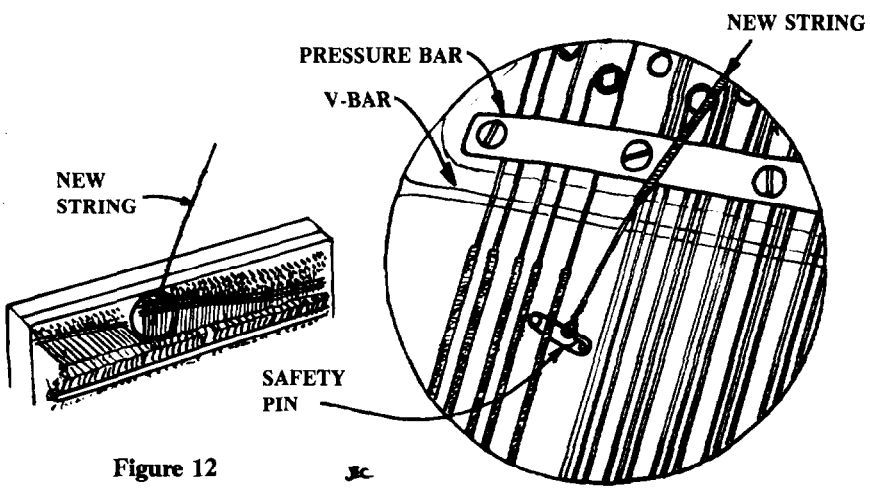


Figure 12

Some other methods have been suggested in the past by Larry Laravela of the Delaware Chapter, and these are reproduced in **Figures 11 and 12.** Both of these methods involve some form of attachment of the new string to other strings at the top, so that the new string can simply slide down the old one, making action removal unnecessary in most cases. Even when the bridge is right behind the action, it is sometimes possible to remove the top bracket screws and lean the action away from the strings for working clearance.

Tubby Bass Strings

Question: *"I know of numerous ways to bring life into tired, tubby old bass strings, including twisting, running fancy tools up and down to release dirt, and removing the strings and beating the floor with them. There is also the 'Ernie Juhn Method' of whacking the key very hard, quickly, and at the same time lowering the pitch, whacking the key again while pulling the string back up to pitch, etc. By the way, I've used the E.J. method many times with great success (I hope he doesn't mind my divulging his secrets).*

"My question is this: when replacing a string on an old tubby piano with bass strings that won't respond to any of the above, can I do anything to bring down the timbre of the new string to match that of the old? Sometimes they really stick out and sound worse than before . . ."

Art Jones
So. Jersey Chapter

Answer: I'm sure that Ernie Juhn (RTT, Long Island-Nassau Chapter) won't mind, especially considering his attitude and commitment to teaching.

It is possible to deaden a new string by rubbing vaseline on it, but so far as I know there is no reliable way to control the degree of deadness. Rather than do that, I would suggest replacing both strings of a two-string unison even if only one was broken, and then voice the hammer down somewhat. Naturally, if the client can afford a new set of bass strings that would be an even better idea.

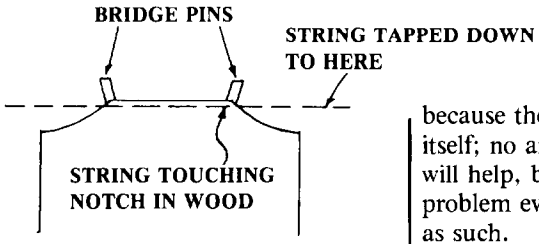


Figure 13

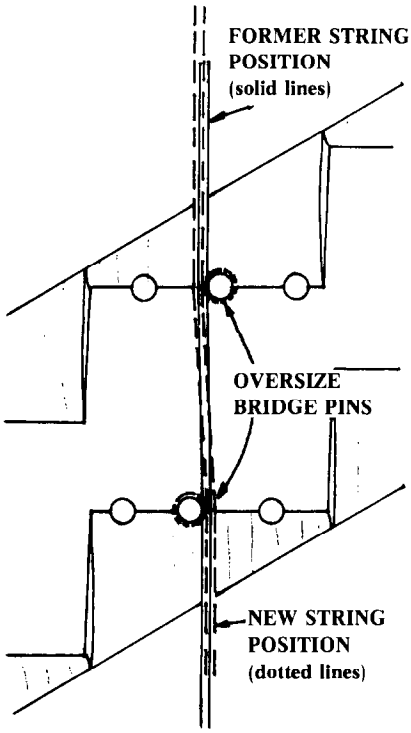


Figure 14

GRAND JACK CENTERING ANVIL

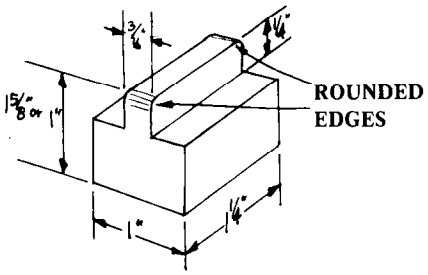


Figure 15

False Beats

Question: *"Has anyone ever eliminated a beat in one string when called for a tuning and is it worth the effort? . . ."*
Calman Rothstein
Brooklyn, New York

Answer: When two strings of a three-string unison are muted out and the note still beats, we have a false beat because the string is beating against itself; no amount of hammer technique will help, because it is not a tuning problem even though it manifests itself as such.

Nine times out of ten, in my experience at least, false beats occur because of poor termination; that is, one end of the speaking length of the string is not secure. If the speaking length varies, because of poor bearing or whatever other cause, so will the frequency of the fundamental and all its partials. The false beat is the result of one frequency not quite matching the other, and the solution involves anchoring the string so it cannot move at the termination points.

Most termination problems can be traced to the bridge, so that is where one might logically look first. Sometimes, particularly on new pianos, the strings were simply never properly seated on the bridge. Pushing them down onto the bridge cap usually solves the problem. Use a piece of brass or maple — anything softer than the string — and try to accomplish the task by pushing rather than tapping, as the latter can lead to grooves in the bridge if overdone even slightly. Such grooves lessen the downbearing and can cause buzzing because the string is then forced into the notch a bit as shown in **Figure 13,** which means that the speaking length no longer terminates at the pin and at the wood simultaneously as it should. To solve one problem, we have created another.

If the bridge pins are loose, the pin vibrates with the string, causing uncertain termination. The result will be false beats or buzzing or both, and the solution is to tighten the pins either with epoxy or by installing oversize bridge pins. The choice would be determined by the amount of sidebearing and the presence (or absence) of cracks in the bridge cap. If the sidebearing is minimal and the bridge is not cracked, the logical solution would be oversized bridge pins; as illustrated in **Figure 14,** this would increase sidebearing slightly while at the same time making the pins tight. On the other hand, if the bridge is already showing signs of cracking it could be because there is already too much sidebearing and oversize pins would exacerbate the problem. In this event, the recommended solution is epoxy in the bridge. Why epoxy? Because, in addition to being a very strong material, epoxy has great gap-filling properties. The usual objection to epoxy is that it is so hard that it cannot be easily removed later, and I would certainly agree that epoxy should never be used where later removal seems probable, such as hammer-hanging or soundboard shimming, but the thinking here is that if the epoxy doesn't hold, nothing else will either and the bridge will have to be replaced either way.

The other end of the speaking length should be checked next, assuming the bridge has passed inspection. The capo bar could be pitted, or there could be insufficient counterbearing; but in either instance the symptom is more likely to be a sizzling sound than a false beat. See whether spacing the string to one side has any effect, remembering that this also affects the sidebearing to a slight degree. A loose bridge pin might look all right, but the symptom might disappear when the string is spaced, making it appear that the problem is at the V-bar. If in doubt, loosen the string and see whether the bridge pin is loose.

Finally, the string itself could be defective. If there is a defect on the wire at a nodal point — a rust pit or a necked-down, fatigued area caused by overstretching — the string must be replaced.

Tip of the Month

Sally Jameson, who owns and operates one of the largest rebuilding shops in the country, says that her favorite glue for plastic keytops is wall tile cement. It is light in color (yellowish ivory, like the wood of the key), holds the key top securely, but allows for easy removal later.

Gadget of the Month

This is a grand jack centering anvil, illustrated in **Figure 15,** and described by its inventor:

"The one inch high block is inserted between whippens to support whippen edge. Tap top of jack to move same in

direction of supported side. Used while action and keys are still together. The 1-5/8" block is used similarly but when action is separated from keys and on bench."

Gene Elfes
Northern Virginia Chapter

In Conclusion

If there are technical topics that you would like to see covered in the *Journal*, please let me know. We try to have something for everyone each month, although obviously there will always be more for those of lesser experience because they have more to learn.

Please send all articles, tips, questions and comments to me:

Jack Krefting
Tech Ed, PTJ
2337 Royal Dr.
Ft. Mitchell, KY 41017

It's The Little Things That Count!

Gerald F. Foye, RTT
San Diego Chapter

On the subject of tools, consider the Phillips type screwdrivers which are so common today and which we should have in our tool kits. They are excellent for punching holes in motor oil cans and serve nicely for stirring paint. Piano teachers use them as a source of motivation for their students by grasping the tool at the shaft end and bashing the students' knuckles with the handle end.

I carry a number one and a number two in both standard and long lengths. (Long being the longest that will fit in my tool box.) I also carry a long thin Phillips and standard chisel end for those set screws in the grand fall board hinges. The thin tools were purchased at a store that sells electronics supplies.

Don't use worn tools. Either repair or replace them. In the case of worn Phillips screwdrivers — replace them. Also, if they have a sharp tip — which most do — grind off a small amount (about 1/32"). The purpose of doing this is that the mating recess in the screw often is not deep enough at the bottom to allow the screwdriver to seat properly. Thus, the screw head is routed out making it difficult or impossible to remove.

Coming Events

UPCOMING CONVENTION
THE PIANO
TECHNICIANS GUILD

1983 July 4-8
New Orleans
New Orleans Hilton &
Tower

May 13 & 14, 1983
INTERMOUNTAIN SEMINAR
Salt Lake City, UT

Contact: Paul Stephens
516 5th Street
Ogden, UT 84404

October 14-16, 1983
OHIO STATE SEMINAR
Mount St. Joseph College

Contact: Nancy Burkhalter
1053 West Broad St.
Columbus, OH 43222
(614) 268-9770

October 20-23, 1983
NEW YORK STATE CONFERENCE
Executive Hotel
Buffalo, New York

Contact: Charles Erbsmehl
4165 Ransom Road
Clarence, NY 14031
(716) 759-6126

May 12-14, 1983
PIANO TUNERS ASSOCIATION
CONVENTION
Claredon Hotel
Leamington Spa, England

Contact: Ralph Long
8 Baldock Street
Ware, Hertfordshire
ENGLAND, SG12 9DZ

October 2-4, 1983
FLORIDA STATE CONVENTION
Sheraton, Jacksonville Beach Resort Inn
Jacksonville Beach, FL

Contact: Barney J. Johns
3546 Oleander St.
Jacksonville, FL 32205
(904) 786-0868

September 16-18, 1983
ANNUAL WISCONSIN DAYS
University of Wisconsin at Madison

Contact: Bob Hohf
431 N. Main St.
Lodi, WI 53555
(608) 592-3731

More Than The Old-Timers Ever Taught Us About Tuning Stability (Part II)

George Krippenstapel, RTT
Connecticut Chapter
and Dr. William Trousdale
Wesleyan University,
Middletown, Connecticut

The Tuning Pin

The frictional resistance between the tuning pin and the pinblock is of several different types. The differences will cause the pins to feel different to the tuner. These differences in feel can be thought of in five categories: "draggy tight;" "clicky tight;" "normal;" "loose;" and "jumpy." This classification is based on both the amount and the differences between the coefficients of static and dynamic friction exhibited by the tuning pins as they are moved.

The force required to make the tuning pin start moving is called the coefficient of static friction, or "braking friction." When the pin actually begins to move, the frictional resistance usually drops somewhat and remains lower as long as the pin is moving, to a value referred to as the "sliding" or "dynamic friction" level. Tight pins are those whose coefficient of static friction is about equal to or larger than about 100-inch-pounds.

There are different types of tight pins. The division into the various types is based on the amount of drop in the coefficient of friction when the pins are in the condition of sliding friction. If the degree of drop is small or negligible, the pins may be thought of as "draggy." If the frictional resistance drops to a somewhat lower value into a range which is comfortable for the experienced tuner to control, the pins may be thought of as "clicky." If the difference is extreme, the pins are "jumpy." Tight pins are distinguished from normal ones in that with tight pins the level of force which must be applied to set the pin to begin tuning, usually about 100 inch-pounds or more, is large enough to cause a torsion or twisting in the pin which is significant in any consideration of tuning stability. It is desirable for tuning stability that the introduction of such a condition of torsion be minimized; if torsion is introduced, it must be removed.

Normal tuning pins are those which are not so tight that turning them will introduce any internal torsion which will be important for tuning stability. Tuning pins which have braking frictions in the range below about 90-inch-pounds also exhibit characteristic drops to dynamic friction levels, just as tight pins. Once again, the drops may be small, moderate, or extreme. From the tuner's point of view, the difference is important for comfortable control; an extreme condition, which will cause the pin to feel "jumpy," introduces difficulties in controlling the relative tensions of the string segments (which difficulties will be discussed later). However, induced torsional molecular stresses are a negligible problem for tuning stability when pins are normally tight, assuming of course that no unnecessary stress is introduced by, for example, bending the pins. Small amounts of pin bending are probably in practice unavoidable, but the experienced tuner can surely reduce bending to a negligible amount.

Loose pins are a different problem again. The coefficient of friction of tight or normal pins is usually high enough that the downward pull of the string is by comparison negligible, and the pin will have approximately the same degree of resistance to tuning whether the pin is turned up or down. With loose pins the degree of sliding friction is so low that the pull of the string on a downward turn becomes an important factor, as the string will tend to keep the pin moving beyond the desired point. Pins which actually slip are too loose to be tuned, and must be repaired.

Jumping Pins

The first thing to do is to verify that it is actually the pins which are jumping. Jumping pins can easily be confused with a certain type of friction binding of the string on the belly felt between the agraffe and the tuning pin. The test for jumping pins is to note the sensation of turning the tuning pins under drag only (not impacting) and disregarding the consequence of the turning on the tuning. If, as the pin is turned, there is a sudden and extreme release of resistance with the pin advancing to a new position rather remote from the starting position, and if after repeated and concentrated effort, intermediate positions with smaller increments of pin movement are either impossible or possible only with extreme difficulty, then the pin is said to be "jumping." There is an extreme difference between the braking friction and the sliding friction of the pin. In the absence of sophisticated test equipment, this diagnosis can be reliably made only by an experienced tuner; an inexperienced tuner may not have the refinement of hammer control necessary to distinguish jumping pins from pins which are merely tight. Also, an inexperienced tuner may introduce a bending force to the pin which makes the pin additionally difficult to control, and incidentally distorts the top of the hole wall in the pinblock, to the general and permanent detriment of the smoothness of feel and the tightness of the pins. Fortunately, true jumping pins are rarely met in the course of typical piano work. Occasionally, a newly inserted pin, in a new or good pinblock, may jump immediately after installation. If there is no pathological condition present, the condition usually disappears in a day or two. If it does not, it may be a sign that the pinblock was not drilled properly. A drill bit which is overheated from improper use can scorch and glaze the walls of the pinhole. Some techni-

cians believe that this is caused by excessive drill feed speed. In any case, a jumping pin is a symptom of something mechanically wrong with either the pin or the pinblock. I conjecture that a pin which is severely out-of-round or badly bent might cause this condition, but I have never seen a jumping pin which can definitely be traced to this condition. More usually, it is due to some foreign matter in the walls of the hole in the tuning pinblock. A badly glued lamination in the wood might cause excess glue from the glue line to be dragged into the hole wall. The most common cause of the condition is grease or oil seeping into the pinblocks. In a grand piano all sorts of things can be spilled into it, such as furniture polish, coffee (the milk has fat in it) or other things. Furniture polishes in aerosol spray cans are dangerous, especially if they contain silicones. The spray cannot be confined and may cause serious damage. Some tuners have developed a variety of techniques for repairing this condition, some of which, to be sure, are more successful and permanent than others. The only absolutely sure way to correct the condition is to replace the pinblock, but there are other techniques which have been suggested. Some of these techniques involve removing the pin and coating the hole walls with varnish, fiberglass, quick-acting epoxy, rosin, pinblock tightener, etc. The problem cannot be treated in detail at this point, as it would be the subject of a separate article. If the problem is not too severe, it might be possible to do a stable tuning by paying careful attention to all the other factors involved. If the problem is too severe, there is nothing to do but stop and make some decision about repair.

The String

The music wire from which piano strings are made is manufactured by starting out with a large ingot of hot iron which has a precisely controlled carbon content and passing it through a successive series of diamond dies until the desired diameter is reached. The resulting wire has a high degree of tensile strength. The inner core of the wire is tough but flexible. The skin of the wire has been changed in molecular composition as a result of being worked and compressed by the diamond dies into a very hard layer, and this gives the string its strength. The string is said to be elastic; that is, when it is under tension, molecular forces in the string act as a force contrary to the applied tension. This is the usual state of affairs of a string installed in a properly designed new piano.

As we said, the string can be thought of in three segments. Each segment contains places where the string bears against some other material. This bearing causes friction when the string is moved during tuning. The string is also forced through bends of different angles at various points. Each bend which the string makes induces micromolecular changes over a period of time which result in a micro-regime of work hardening, loss of elasticity and increased stiffness. The change is related both to the steepness of the bend and the amount of time during which the string has been under tension.

The optimal condition for tuning stability occurs when the three segments — hitch pin segment, speaking length, and tuning pin segment — are at the same tension, when the speaking length is exactly at pitch, and also when there are no torsional stresses in the tuning pin. The piano at that point can be used for any amount of orthodox forceful playing without varying detectably in tuning.

As this statement seems to go counter to the experience of many tuners, and is indeed the crux of this article, it is imperative that it be examined in detail. Many tuners are prepared to contend that any tuning can be knocked out by sufficiently forceful playing. The actual effect on the string of forceful playing must be understood. Even an extremely forceful blow induces a completely negligible augmentation in the tension of the string. Nevertheless, many tuners have had the experience of having their tunings altered by forceful playing.

This observation can be explained as follows. The places where the string touches the bearing points give frictional resistance to movement. This resistance is not constant, however. As the string lies across the bridge, it is agitated up and down during playing. Since the friction is related to pressure, the pressure can be changed and relieved to some extent during the extreme points of each vibration. The force at right angles to the string at the moment of extreme excursion can be quite large under a forceful blow. If there is a difference in string tension between the speaking length and the hitch pin segment, this difference will tend to

equalize during those periods of maximum excursion when the friction is reduced. The effectiveness of forceful blows in reducing this friction is conditioned by such factors as the amount of downbearing (since if the bearing is near zero the change in friction will be large, while if the bearing is excessive, the effect will be greatly reduced), rusty strings, or the bridge pins being set at an extreme angle.

The same effect of momentarily reduced friction can also be observed in the case where the string passes over the capo d'astro bar. Forceful blows will also tend to equalize tensions between the speaking length and the tuning pin segment when the tuning pin segment interfaces with the speaking length at such a bar. The equalizing is equally effective regardless of whether the speaking length starts out at higher or lower tension than the other segments.

Effects and Uses of Pounding

Pounding is striking several forceful blows, *at least* as forceful as the loudest blow used in playing, or harder if possible. Pounding always assists in inducing equilibrium between the hitch pin segment and the speaking length. It is impossible to induce imbalance by pounding too hard. Pounding always helps settle instabilities and never contributes to creating instability. However, there are times when pounding is not advisable. On old pianos there is a risk that the action parts may break if they are old or weak. Also, the string may snap if it has been previously weakened, but this condition only occurs when the piano has been used heavily for some time and has hammers that are deeply flattened, because the force of the string against the pressure bar is large, and the capo d'astro bar, being unyielding, concentrates the point of fatigue. In addition, there is occasionally also an electrolytic action set up between the dissimilar metals of the capo d'astro bar and the string, which results in a knot of rust at that point, which degenerates the skin of hardened steel around the surface of the string and further weakens the string. The skin may also be weakened if there is a design incorporating a steep angle at the capo d'astro bar. Pounding is of little use for solving problems of friction or elasticity either in the tuning pin itself or if there is a binding problem in the tuning pin segment.

One misunderstanding about pounding ought to be cleared up at this point. Some tuners will pull a string sharp, then pound until the string goes down to correct tune. They then leave it at that point. Further pounding might cause the pitch to drop still further, however. The preferred use of pounding is *after* the correct pitch has been reached. This determines whether the pitch of the string will hold under forceful playing. If the pitch changes there is nothing for it but to retune and resettle the string.

Pounding is quite effective in equalizing the tensions between the speaking length and the hitch pin segment. It is also of some value in equalizing tensions between the speaking length and the tuning pin segment when the string passes over a capo d'astro bar. The effectiveness of pounding in this case is never as complete as in the former case. It is conditioned by the angle the string makes at the bar, and also by the presence and amount of belly fat that the string bears on between the nut and the tuning pin. Pounding produces substantially no effect when the string passes through an agraffe, because there is no room for the string to be agitated up and down. Since there are differences between the hitch pin segment and the tuning pin segment, the tensional inequalities which are caused by friction and work hardening at the tuning pin segment must be estimated and dealt with somewhat differently. Its presence and amount can be estimated by observing what I call "follow;" the tension between tuning pin segment and speaking length can be equalized by what I call "bookkeeping."

"Bookkeeping," in reference to piano tuning, is nothing more or less than keeping track of the relationship between the relative tensions of the tuning pin segments of the string and the speaking length. If one moves a tuning pin even the slightest amount either up or down, an immediate and proportional change should occur in the speaking length. If such a change does not occur, or if the magnitude of change is suspiciously smaller than expected, the difference between observed result and expected result must be attributed to a difference in tension between the tuning pin segment and the speaking length. This imbalance will eventually creep out and equalize the tensions of the string segments, causing the string to go out of tune. The tuner must reduce the imbalance to the smallest possible degree. If, as he is tuning, he introduces imbalances, he must, if his tuning is to be stable, be aware of and minimize them as much as possible.

Since pounding is, as we have said, quite effective in equalizing the tension between the speaking length and the hitch pin segment, bookkeeping is almost exclusively concerned with keeping track of problems of poor follow, that is, inequalities between the tension of the speaking length and the tuning pin segment. Several techniques will be suggested for dealing with this problem. However, as the string tensions cannot themselves be directly measured, bookkeeping is the only way to infer that problems exist.

"Follow"

The problem of moving a string from a stable condition below pitch up to proper pitch is different from lowering pitch. To pull a string up, one needs to add tension by turning the pin with the hammer, and any amount of force that is needed to overcome friction is available. To move a string down, the only force available to overcome friction is the tension of the string itself. It is necessary to estimate the relationship between the force available from tension and the friction. Upon encountering an unfamiliar piano, begin to turn one of the pins down, and note how much turning is needed to effect a just-noticeable lowering of pitch.

If the string drops in pitch almost immediately, it has a high degree of "follow." This condition is characteristic of freshly strung pianos and of other pianos with very little friction holding the string in place. Usually the strings will respond almost immediately to being pulled up in pitch. The piano typically will be easy to tune provided that

the tuning pins are manipulated properly. A freshly strung piano of course must be given time to settle. Once the strings lose their extreme freshness, a better assessment of potential for tuning stability can be made.

If, on the other hand, the tuning pin is moved a considerable amount down, and no reaction occurs, this indicates that the friction is high, and, although a considerable change in tension in the tuning pin segment occurs, the friction has locked the speaking length's tension. Unless carefully tuned, a string like this can drop in pitch radically over a short period of time. After assessing the follow in tension-lowering, the follow in tension-raising must be estimated. Most typically, strings with a low degree of follow-down are also low in follow when being brought up. An exception to this could occur if the piano is poorly designed and the tension of the string is exceptionally low. In that case not enough force is available to overcome friction down, but raising the tension overcomes whatever friction is present.

Correcting Problems of Follow

There are many ways of attempting to deal with the problem of high friction or resistance of the string in the tuning-pin segment. The list of techniques that I have heard of or used is long. Each technique varies in merit and in ease of use.

The most common approach to the problem of follow caused either by friction or resistance, although not necessarily the most effective, is to drop the pitch until the string is slightly but definitely flat, and then carefully approach the correct pitch from the flat side. There are many reasons to be suspicious of the reliability of this procedure. Tuners would not rely on it if they regularly saw the pianos on which they used it. Several days after the tuning they would be disappointed at the poor stability of the tuning in most cases. By dropping the pitch, an instability is reintroduced into the relative tensions of the speaking length and the hitch-pin segment. Also, as the string is pulled up, a large increase in tension in the tuning-pin segment is still necessary to overcome the friction, and this large difference can be responsible for the pitch of the string creeping sharp.

If the problem of follow is caused by fricitonal binding, the tuner might wish to consider some techniques for reducing the friction. One suggestion, used in the case of a string passing over a pressure bar, is to lower the strings in pitch, move them aside, and polish the pressure bar with a strip of fine emery paper. Do not use Adalox or Garnet sandpaper. Also, be sure to polish the string where it touches the pressure bar. This removes rust and small string indentations in the pressure bar and assists the slippage of the string in tuning. Another suggestion, if the string is binding because of rust on the string where it bears on the belly felt, is as follows: Lower the string tension about one semitone or more, if needed, move the string aside and rub a soft lead pencil several times in the string grooves on the felt, and also on the string where it will touch the agraffe or pressure bar, then return. The friction will be reduced, although the feel will not be that of a new string.

The foregoing techniques may be useful in some situations but are not indicated for all situations. They involve work beyond tuning and would seem to be more useful where one is dealing with a piano which one is planning to tune frequently. However, they will not solve all problems. If a piano is designed with a sharp angle between the speaking length and one tuning-pin segment, they are of no help. Some pianos have a sharp angle between the capo d'astro bar and the pressure bar, while some others, such as bass strings on some spinets, have a pin which positions the string at a sharp angle. The string itself causes the problem, which, although it may be aggravated by rust and friction, is really caused by a micro-regime of increased stiffness and lack of flexibility called "work hardening" at the point of the bend.

There is also a class of techniques which some tuners use which involves the application of liquid lubricants or grease or oil to the strings, felt, or pressure bar or agraffe. I will not engage in any further discussion of these techniques except to categorically warn against them. Oil creeps and can also be spilled or misapplied, and fluid can transport substances into the pinblock where they are a source of problems. If any damage occurs to the pinblock as a result of the use of any of these substances, professional ethics demands that the tuner who used them be held responsible. For safety's sake, it is imperative that the tuner explore less risky alternatives first. One alternative to the use of fluid is as follows:

When the friction at the agraffe or capo d'astro bar and the belly felt hampers easy movement, it is possible to restore the equality of tension in the string segments in certain cases by pushing on the strings. Indiscriminate pushing will, of course, do nothing more than create further imbalance. The key to success lies in keeping track of the components of the system and accounting for the relative tensions of the string segments. If, for example, when pulling a string up in pitch one turns a tuning pin and observes that the speaking length does not move, then one has to account for the discrepancy. Merely pulling the string up to exact pitch and then stopping does not account for the extra tension that we know is in the tuning-pin segment. Similarly, if one turns a tuning-pin down, and does not observe any immediate movement, one may not reasonably ignore the fact that he has very good reason to believe that there is a difference in tension between the tuning-pin segment and the speaking length. If I am dealing with a paino with poor follow, I sometimes proceed as follows, not always with success, to be sure: When I find a string that is flat, I begin to pull it up to pitch. I take careful note of the amount of movement which I must make at the pin before effecting any movement in the pitch. Most but not all of this movement needs to be backed out before the string can be considered stable. I draw the string the slightest measurable amout sharp. I then turn the tuning pin down the smallest amount that I can. I prefer to use an impact motion for this. I then push down on the string, displacing it between two and three string diameters. I do not violently and indiscriminately push on the string. For

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THE FULL TIME TECHNICIAN

by Clair Davies, RTT
Bluegrass Chapter

Dealing with the Dealer

The first goal of my career was to escape the hourly wage just as soon as possible. I left Steinway right after training, despite their kindness to me, when I began earning as much on Saturday independently as I was earning all week as an employee.

I was not the first, nor was I the last, to leave that comfortable company for bluer skies and better pay. Henry Zimmermann, who taught me regulating, left not long after I did.

Henry worried about my not making it on my own and had suggested I get a haircut. "People will think you don't wash," he said. But I *was* making it, despite the straggly hair on the back of my neck, and Henry slyly wondered how I got enough tunings. That was the year I sent letters to over 2000 piano playing members of Local 802, eventually getting a better than 7% response — 142 people with connections.

Henry was inspired by my initiative and, with a few ideas of his own, stuck his card in the time clock one last time, and moved to San Francisco, where he lived the rest of his life as a happy entrepreneur — after thirty years as a hired hand.

Being on an hourly wage is only one way of working for a dealer. The other way is when, in exchange for a contract price on the dealer's work, *you* get the customers and keep your own hours. Even working cheap, you will profit by working for a dealer in this way, because it's the *best source of new customers* you can have.

I've had that arrangement several times, when I had newly arrived in a community. And, although I would have much preferred full price for what I did, working cheap got me a good start.

At this time, I haven't worked for a dealer in ten years. Admittedly, I worry sometimes about losing first crack at all those nice clean new pianos, but a lot of them come to me anyway later on, privately, at full price. With a good reputation — and a two-drawer card file — I'll never have to work cheap again.

That's not to say *you* should not work for a dealer and work cheap. Do it, by all means, at least until you have accumulated enough customers of your own to make an independent business.

But don't be just an abject servant, content with picking up only what the dealer tosses your way. Settling for half-price showroom tunings, cut-rate house calls, and 100-mile trips for skimpy guarantee work will make you feel cheated, unless you actively take advantage of the situation.

Get a basketful of customers out of it. And get names from *them.* Fill your file. Make connections. Make it worthwhile to work cheap.

And don't waste time dreaming about getting a higher price than the dealer usually pays. It won't happen. If *you* don't work cheap, someone else will, and *he* will get the customers with which to build a business.

In the PTG, we talk and talk about how the dealer should learn to *value* better service, and learn to *pay* for it. But the dealer sees no evidence that better tuning or regulating would make better sales, no matter how fervently we talk it up. Most pianos sell out of tune. "We'll tune it before we bring it out," the dealer says, and dismisses the question with a wave of his hand. Case, name and price sell pianos. Two weeks on the showroom floor will teach you a lesson about that.

When a dealer talks about "good service" — and you will hear him use those words with yearning — he means whatever it is that gets unhappy customers off his back.

The big dealer here, a charming and successful man, loved by all the ladies, and who sells more pianos than all the other Lexington dealers combined, refers with a grin to his favorite tuner as "Short-cut Joe." Joe is cheap. "He gives me a really good price," says the dealer. And Joe gets rid of the customer, primarily with a line of gab.

Short-cut Joe has no business of his own to speak of, because although he satisfies his dealer, he leaves the customer unhappy. He amiably denies any need to ease keys. "I like a nice

firm touch," says he. His contempt for the public is famous. Few ever want him back. As a proud master of the 17-minute tuning, Joe conspiratorially tells of his delightful gambit of looking in the bench to see what piece is on top. If it's Book One, you get a Book One tuning. Joe will stay with the dealer forever. He will have to.

But the dealer is pleased. "I don't get any complaints on Joe," he says. No, probably not. The customers silently give up and go elsewhere. And this is just what the dealer wants — make the sale and be done. There is no profit for him in service.

The last dealer I worked for said maybe I was trying to be *too* good. (Do you think I charged him too much?) Another dealer, for whom I've *never* worked, told me it didn't matter who he sent on a "free tuning," because little girls' ears weren't trained yet and couldn't tell the difference. A quick job was good enough.

No doubt, most people with new pianos are ignorant of fine tuning, but it's unwise to make it the basis for policy. Underestimate little girls at your own risk.

It's unwise to underestimate *anybody.* You can *depend* on their knowing more than you think they do. The dealer can give poor service and survive. The public, incredibly, will forgive him and continue buying his pianos. The public will not forgive *you.* Disregard the wholesale price you're being paid and get the thing in tune and fix the sticking keys, even going beyond the ostensive needs of the customer, if not out of respect, then as a margin of safety for yourself. *You* want to keep the customer, not get rid of him.

So if you're going to work for the dealer, don't be a Short-cut Joe or Bob or Sally. *Do the job right.* That you work *cheap* is no reason to do cheap *work.*

You are in a certain danger when in regular contact with a dealer. If you're not watchful, the counter-top camaraderie will breed in you an "us-against-them" philosophy in regard to the public, and down will go the quality of your work.

The dealer's usual cynicism about the buying public will infect you with the same disdainful attitude, translating directly into irresponsible service.

Too easily, you will become a partner in crime. Too easily, you will be drawn into helping dump inferior instruments and inadequate work on the people who come into the store. You will end as a duplicitous shill for the dealer, taking secret commissions on sales, thus ending your loyalty to the customer.

Make no mistake, your loyalty belongs to the customer. When you give unguarded allegiance to the dealer, you risk ceasing to care about the interests of your customers, or your customers-to-be, and you sow the seeds of your own failure. Keep faith with the public, and with yourself, and let the dealer take care of himself.

Now that I've made angry all the dealers — and all the tuners who labor devotedly for them — let me try to save myself.

I readily agree that there are technicians who choose to work indefinitely for someone else for the considerable benefits of the prestige of association and a reliable income. I'm sure they get along just fine. I'm sorry my heart is not with them, but it just isn't.

It's easy to be part-time in this business — almost anybody with a little brass can do that. It's hard to be full-time, and harder yet to be full-time and *independent.* Talent alone is no guarantee of success. I feel for the talented, independent people who, almost as a corollary, hesitate to deal with a dealer, thereby passing up one of their best resources for business building.

If you have just been described, be practical for a while. Make use of the dealer. Do it for yourself.

Sound Background

Jack Greenfield, RTT
Chicago Chapter

Italian Keyboard Stringed Instrument Design and Tuning

Harpsichords Gain Prominence in Baroque Music

The advance of keyboard stringed instruments during the Baroque era was closely related to the progress in musical style and tuning that began early in the seventeenth century. Previously these instruments had served primarily for use in practice by organists. Harpsichords were also used in performance of light secular music. With the introduction around 1600 of the music-drama which soon became opera, the harpsichord became prominent in providing *basso continuo* background for solo vocal recitative. In such composition, the written accompaniment is merely a line of bass notes with figures above or below indicating chordal structure. In performance, as the cellos and double-basses play the written notes, the harpsichordist improvises an appropriate chordal background. This brought to attention the outstanding qualities of the harpsichord as a solo instrument. Its use in the performance of toccatas, fugues, and other serious music formerly reserved to the organ then spread rapidly.

Italian Harpsichord Design

The basic harpsichord design was established by the Italian builders of the sixteenth century. The typical Italian harpsichord was a long light box of thin wood with one curved side, similar to a guitar or lute in construction except for shape and size. The sides of the harpsichord were formed of cypress or cedar. The full bottom, made of a softwood known as deal which was a type of pine or fir, was glued or nailed to the sides with small triangular pieces of wood for reinforcement. Most Italian harpsichords had cypress soundboards reinforced with light spruce ribs. Spruce soundboards, rare before 1600, were used by some Italian builders later. Modern authorities consider the fewer existing instruments with spruce soundboards superior in tone to the larger number with cypress.

Until about 1700, the plain case built without legs was no more cumbersome to carry than a modern string bass. When not in use, the harpsichord was placed in an ornamental outer case and stand built by a cabinetmaker.

Most Italian harpsichords were strung with two sets of *choirs* or strings tuned in unison plucked by two rows or *registers* of jacks facing in opposite directions with one jack from each register riding on the same key. The upward motion of the jacks was limited by the jack rail, a bar of wood with felt padding on the underside. For tuning, the jack rail was removed so that the registers — the slotted upper jack guide rails — could be moved to slide either row of jacks out of position so that only single strings were plucked since there was no stop mechanism to shift registers for plucking single strings in normal playing.

The compass was generally C_2—C_6, occasionally several notes further on either the bass or treble end. This range, which corresponds to the pitch of a set of organ pipes starting on C_2 produced by an open organ pipe about eight feet long, is called "eight-foot pitch" in harpsichords also. Another term for this pitch range in harpsichords is "unison pitch." Two choirs of eight-foot pitch strings tuned in unison, plucked by two registers of jacks, is specified a "two- by eight-foot disposition."

Scaling in Italian Harpsichords

In typical Italian harpsichords, string lengths from the top to 2½-3½ octaves below were scaled close to just temperament ratios with a 2:1 ratio for notes an octave apart. For comparison, White's octave ratio for piano strings is 1.94:1. The remaining lower "foreshortened" harpsichord bass strings were thicker to compensate for reduced length ratios. A customary index of harpsichord scaling is the length of C_5. On this basis the usual scale of Italian harpsichords is considered short, as low as 9" (.010" wire) in some, compared to as high as 17" in modern harpsichords. The figure for the same note in the Klepac chart for pianos is 13.5" (.038" wire). Although the upper treble strings of the short scale are shorter, due to the doubling of the length in descending octaves the lower strings are approximately the same lengths as in instruments with later scaling which started with longer upper treble strings but used a smaller octave factor. The short, relatively thinner upper treble strings of the

Italian scaling were under less tension. While these instruments were less sonorous and weak in solo, the lucid tone, described as "dry and transparent," blended well with other instruments and could still be heard distinctly in ensemble performance.

Other Keyboard Stringed Instruments

The other members of the harpsichord family — the spinet, virginal, ottavino or octave spinet, and the clavicytherium, a vertical instrument — were popular Italian instruments primarily for home use. Strictly speaking, only the large wing-shaped instrument is identified as a harpsichord. All use the same type of action.

Spinets are smaller instruments with only a single set of strings tuned to eight-foot pitch covering about the same range as harpsichords. Spinet strings run from the left diagonally away from the keyboard on the right. Although in general spinet cases were shaped to conform to the direction and scaling of strings, there were differences in the contours of the instruments built in different countries at different times. Among the various forms were: wing-shaped, triangular, trapezoidal, pentagonal, and other polygonal shapes.

Virginals are almost identical with spinets. The main difference is in the direction of the strings which run parallel to the keyboard and the rectangular or oblong shape of the virginal. There are several different and equally unverifiable stories giving the origin of the words "virginal" and "spinet."

The ottavino or octave spinet, a small, easily carried rectangular instrument with shorter strings tuned an octave higher in four-foot pitch, was used only for practice. The clavicytherium or upright harpsichord had a more complicated action because the jacks did not drop back in place by their own weight but had to be pulled back.

Clavichords, with an entirely different type of action, were the simplest and most inexpensive of the instruments for domestic use. They were built as long rectangular boxes without a stand but intended for placement on a table. The keyboard, set in one of the long sides, usually had a compass of C_2-C_6 or less by several high treble notes. Stringing was usually two per note with the strings running from hitch-pins on the left diagonally away from the keyboard passing over a bridge on the right to tuning pins on the extreme right. Many of the earlier clavichords were fretted; that is, several different keys struck some of the same strings, but produced different tones because the tangents struck at different points, thus giving different speaking lengths. Early Italian clavichords paired notes in the following combinations: C/C$^{\#}$, D, E^{b}/E, F/F$^{\#}$, G/G$^{\#}$, A, B^{b}/B. By fretting and use of the short octave in the bass, it was possible to make a cheap portable instrument measuring only 4' x 1'.

Except for the clavicytherium, which became popular later, large numbers of each of these instruments were built in Italy throughout the sixteenth century and good examples of each are still in existence. Italian designs were considered the standard and served as models for builders in other countries until the rise to prominence of the Ruckers and other Flemish builders around the end of the sixteenth century. Praetorius' 1619 *Musical Treatise* contains illustrations showing a harpsichord, spinet, clavicytherium, and clavichord with characteristics considered typical of Italian design. Mersenne, writing in 1638, indicated the clavicytherium to be a new instrument in use in Italy but rare elsewhere.

Keyboard Patterns

The bottom octave of sixteenth and seventeenth century keyboard stringed instruments was almost always "short." In one typical pattern, the bottom note, apparently E, was tuned as C and apparent F$^{\#}$ and G$^{\#}$ were tuned as D and E. Such a bottom note is symbolized as C/E. By the early seventeenth century when the missing notes were needed, split keys were introduced: D and E played by the front sections and F$^{\#}$ and G$^{\#}$ played by the rear. The note B^{b} was a normal key. A similar arrangement was used in keyboards starting with a short G octave. Harpsichords were also made with extra keys for alternate tuning of sharps and flats. These were known as enharmonic harpsichords.

In addition to the later rejection of the ancient Greek and just tunings for practical music, the instruments built from the mid-1500s to early 1600s with special keyboards designed to demonstrate these scales were failures also, because of their own faults: they were too complicated and too difficult to play, tune, and maintain. Zarlino designed an instrument with all sharps split and with extra keys between E and F, and B and C, giving nineteen divisions to the octave. The historian Burney described Zarlino's harpsichord as he observed it in his travels in 1770. Vicentino designed even more complicated keyboard layouts. An instrument said to have been based on his ideas was built by Vito Trasuntino of Venice in 1606. Each normal accidental key was divided into four sections and inserted between each B and C, and E and F. Extra accidental keys were divided into two sections, giving thirty-one keys to the octave. A tetrachord or four-string monochord with marked interval divisions was provided for tuning. This instrument is now on display in a museum in Bologna.

Less ambitious enharmonic instruments with only a few split accidentals to provide alternate meantone intonation of sharps and flats were more successful and became fairly common in seventeenth century Italy. There were some compositions written specifically for them. Before the idea died out in the next century, Johannes Zumpe built an enharmonic square piano with seventeen notes to the octave in 1766. A small number of enharmonic instruments built from the early seventeenth century on have survived. Some contain the split sharp short bass octave layout also.

Harpsichord Design Variations

While many of the harpsichords built in Italy from the fifteenth through eighteenth centuries and still in existence resemble each other closely, there are others that vary in the design

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The Eclectic's Notebook

Christopher S. Robinson
Connecticut Chapter

Introduction and Allegro

When used as a noun, the word eclectic refers to a person who draws his opinions and knowledge from diverse sources, systems, and styles. That definition would certainly apply to many of the fine people who share their livelihood in the piano service trades. Often this diversity is seen by the inexperienced as contradictory or inconsistent. But some of us would prefer to view it as harmonic and poly-rhythmic, just like our everyday existence. I suppose that the important factor here is how the individual in question prefers to relate to his or her surroundings. That is, we have the freedom to regard those surroundings with suspicion, as being unpredictable; or we could accept the same environment as cohesive and multi-colored.

As I begin The Eclectic's Notebook, I recall with great affection and gratitude the experiences of a young man beginning his journey into the piano service industry. It was confusing, reading all those books with their diametrically opposing viewpoints, and listening to all of those technicals and lectures, so many of which seemed to conflict directly with the information presented in the last. What became slowly and painfully clear with the passing of time and the gaining of experience, was that it would be necessary to "internalize" and make valid for myself the information that I was being exposed to. Put another way, when one makes a learned technique work for himself, it becomes valid. If it cannot be made to "work," then it is not valid; not, at least, for the individual in question.

This, then, is my introduction and invitation to you. Please accept the information you can use and validate for yourselves. That which you cannot abide please forgive, and that which you find useless, please forget. You are offered one promise, however; everything I write about is in daily use by a working piano technician of accepted skills and technique.

Let's begin at the beginning, or at least one of the beginnings . . . "My piano just doesn't sound good," or so the story goes. Well, WHY doesn't it sound good? Do you know? What is it specifically that makes a piano tone, or collection of them, sound "good?" Perhaps it would be wise if we both stop for a moment and try to break down a piano tone into its component parts. Thus dissected, perhaps it will begin to reveal to us the ways in which it may be tamed. Incidentally, we shall not discuss "overtones" or the harmonic series here. To be sure, the presence of predominant partials is what makes a piano sound like a piano rather than a clarinet, but our ability to exert control over those partials is very limited. To wit, if someone were to say to us, "there is no/too little sixth partial in this note," would either of us know how to put it in? Let's look at tone in terms of time (X-axis) and volume (Y-axis). See **figure 1;**

Please note that the tone has been broken down into three component parts: attack, dwell, and decay. While this illustrative graph is not completely accurate, it will do for our discussion. Attack is the character of the tone from the point that the mechanical wave form is initiated, to the point that it achieves its maximum acoustical volume. Decay, sometimes also called "release" by the electronics whiz-kids, is the character of the tone as it decreases from its point of maximum volume to inaudibility. Dwell, a term that this writer thinks he coined, is the character of the tone between the audible attack initiation, and that point on the curve when the volume in decay equals the volume perceived in the initiated attack. Each one of these components is highly flexible, and very responsive to the skills of the technician who has disciplined himself to be sensitive to them.

Let's describe each of these three ingredients in the recipe of sound. While it is perfectly true that what makes a piano sound different from a clarinet is each instrument's overtone series, as

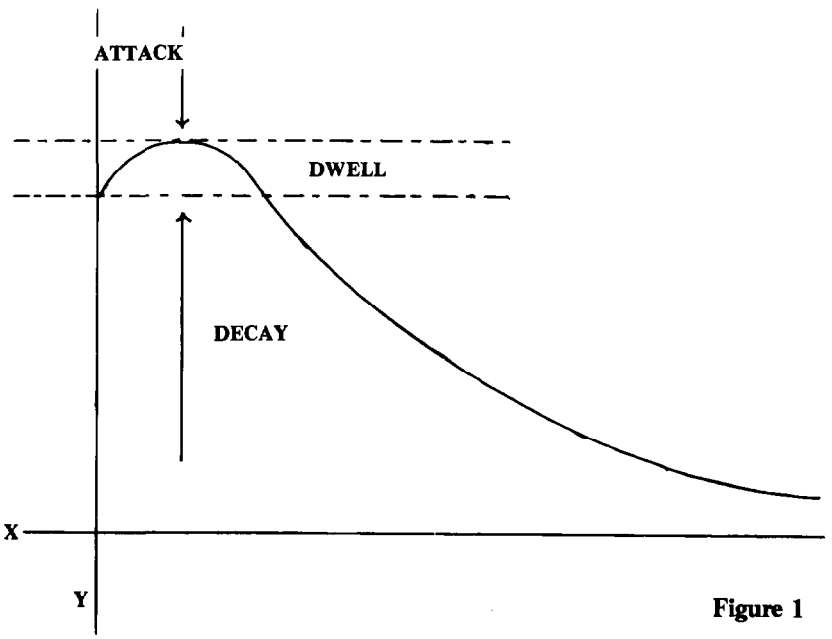

Figure 1

mentioned earlier, it is equally valid to point out that what makes these instruments unique is the manner in which they initiate, maintain, and allow to "die off" each sound that they produce, whether singly or in sequence. A snare drum and a banjo have an EXPLOSIVE attack configuration coupled with a narrow dwell figure and a very quick decay line. The Hawaiian, or steel guitar, and the solid-body electric guitars have an extremely long decay period coupled with a very broad dwell figure. Classical guitars, harps, and the string family all have a sound when plucked which is characterized by a relatively slow attack, a broad and defined dwell curve, and a fairly quick downhill slide into silence.

In the modern piano, it is possible to exert an astounding degree of control over these three very necessary components. How then do we talk about these components with the piano owner? Is the attack harsh, explosive, percussive, quick and clear, gentle, or muddy? Is the dwell, or predominance of the note, clear and well-articulated, or does it fail to stand out to the point that it is "lost" when played among other notes? Is the decay long enough so that held notes and chords can be sustained without the piano "dying" on the player? Is the piano tone described as being dull, dead, or clunky? Can the piano be said to have a singing tone? Can it be described as a "live" instrument? Whatever series of words are chosen to describe what we hear, it is essential that we discipline our senses to isolate and define for ourselves in our own terms the component parts of piano sound.

It might be a good idea to do some thinking about the aural perceptions of tone that have been defined above. First of all, IT IS POSSIBLE TO CONTROL THE NATURE OF ATTACK WITHOUT AFFECTING THE PERFORMANCE OF DECAY. That is, within reasonable limits, the tone-regulator may increase or decrease the percussiveness of the start of a piano sound without necessarily reducing the length of its sustaining quality. The reverse is also true; IT IS POSSIBLE TO INCREASE THE LENGTH OF THE DECAY FIGURE WITHOUT ALTERING THE QUALITY OF THE ATTACK INITIATION. The tone-regulator's ability to exert control over the dwell figure is a bit more complicated, however.

In most cases, ALTERATION OF THE DWELL CONFIGURATION WILL RESULT IN A CHANGE EITHER OF THE ATTACK FIGURE OR THE DECAY LENGTH.

Next month it will be our job to begin to break down exactly what parts of the piano assembly are most directly related to those parts of piano tone that have just been discussed.

Old Timers

Continued from page 20

treble strings I use an upright hammer shank, and for bass strings I use an old piano hammer set on end in a large dowel. Care must be used on bass strings so as not to damage the winding.

I then observe the result. Normally the string does move down to correct pitch. A few sharp blows will then prove the stability of the hitch-pin segment. If, however, the string has not moved, I repeat the procedure, turning the pin lower by the smallest possible amount, then pushing gently once again and observing. By proceeding cautiously, I can very frequently achieve correct tuning as a result of pushing down from the sharp side in this manner. Pushing on the strings is somewhat time-consuming, if this technique is conscientiously applied. The extra time is not always appreciated by the customer. The occasions when this does not work can be classified as situations where the binding is severe. If, in such situations, in addition the pins are very tight, the combination may defeat the tuner's best efforts. The experienced tuner will be obliged to exercise his judgment in balancing the serviceability of the instrument against the requirements and expectations of the piano owner.

(to be concluded)

PIANO APPRAISALS

A Pretty Sticky Wicket

Joseph Anthony Meehan, RTT
Maine Chapter

I. QUALIFICATIONS and REASONS

Qualifications

Not everyone is qualified to appraise the value of a piano. But an awful lot of them do it. Not every piano tuner-technician is qualified to appraise pianos. But an awful lot of *them* do it.

Let's skip all the bologna and get right to the heart of this matter. In the natural course of things (and you can quote me here) it falls on us, the piano tuner-technicians of the world, to make decisions and assign values. It's logical. After all, we're the poor slobs who eat hammer felt and stick 16½ gauge into our fingers. Fair is fair. But I go back to the big statement of the day. "Not all piano tuner-technicians are qualified to appraise pianos." *But they should be!* Why aren't they? Basically it's because most good and serious tuners are too busy working to tune and repair the things to devote the time necessary to ascertain values.

Time, effort, thought and risk are the virtues that make a professional piano appraiser.

Time

You just *can't* do a first-rate appraisal in 15 minutes. Too much off-the-cuff goings-on have made this an extremely sticky business. When you are not able to spend the time to thoroughly evaluate a piano "as is" and make projected evaluations — then don't get involved with appraising. Recommend someone else!

Getting in the car, driving the necessary distance, lugging the tools, moving pianos away from walls, prying out actions, etc., take as much time as any regular service call.

Since time is all most of us have to sell, don't do *free* estimates or appraisals. Charge a fair price, otherwise you'll soon develop the wrong attitude (i.e. people will take terrible advantage of you). So make sure you're covered. Offer to deduct estimate charges if a "go ahead" is given on the spot. However, be professional — it's a professional service. Time — don't let people waste yours.

Effort

As I mentioned, appraising takes as much physical effort as tuning or repairing.

It takes effort on the telephone dealing with an always unpredictable public whose desires might not always agree with yours. The hardest part of all is the mental effort to explain to various thick-skulled members of the race in non-technical jargon why a particular piano is or is not a good investment.

Thought

The first criterion is your working knowledge of piano construction. Sure, it helps a lot to know how to tune and repair the beast. As an appraiser, however, you have to view the product as a whole (i.e., a many-faceted musical instrument). We've all seen excellent piano tuners who are not excellent when it comes to piano tone. Good voicers will tell you it is subjective, but there are some clear-cut examples to go by. A lot of work on a lot of really fine pianos helps improve an evaluation of tone.

The rest of piano construction we learn in school, from books, from other technicians, factories, etc. It doesn't take too long in this business to tell a well-constructed instrument from a sloppy one.

Perhaps the most important ingredient of thought and effort is our ability to be aware of the constant changes and fluctuations in the piano market, both new and used. If you don't know what is happening around you regarding piano sales, you have to learn. Knowledge of the market is essential to good appraising. Later I'll explain how to obtain this knowledge.

Risk

Last but not least is a qualification I call *risk*. Your reputation is on the line when you put a price on a piano. Don't risk your reputation needlessly. Don't let me mislead you. By no means do I set myself up as god of piano pricing, nor even as some sort of pseudo-expert. There's just no such thing. My decisions are based on my knowledge, years of experience and the market at the time of appraisal.

All in all, the prices represent one man's opinion and only that. Sometimes the best guide in addition to all the rest is common sense. Do your homework, keep an open mind, and the rest will come easy.

Reasons

Here comes the fun part. What in the world is the reason for having a piano professionally appraised? Why not let the individual or insurance company take potluck and the devil may care?

Are you ready? Well, here's the reason behind all this:

Out of the blue, Mrs. Stanley Whatsisface calls, and after giving you the history of the Whatsisface family and their undying need for more and more pianos, asks for your service in the form of an appraisal on a piano that she has found advertised in the *Daily Sucker* (where our motto is: A new subscriber is born every day) for 500 beans. Andy Rooney would ask the obvious right away: Why $500? Why not $498 or $650? In other words, where the hell did that price come from?

Three days earlier at Mrs. Whyaduck Whynotachicken's house the scene was

set like this. Mrs. Why (that's what her friends call her, and because I don't want this series to run into the next generation, I will too) says to her husband, "Wilbur, you know nobody's used that old roller piano for a while (actually it was 29 years to the day since the last roll, 'Don't Get Around Much Anymore' bit the dust), so I think we ought to sell the damn thing."

"Good idea, Ma, how much?"

"Well, it's a good piano 'cause Emily's cousin's friend played it and said it was one of the best she'd ever played on." (The fact that Emily's cousin's friend has been moldering in her grave for the last 17 years has little bearing here.)

"In that case, Ma, you should get around 500 for a piano like that."

"Good, Wilbur, I'll put the ad in the *Sucker* tomorrow."

I have found that most used piano prices aren't determined by piano technicians, or even antique dealers, not even by a pianist. No, in reality, Wilbur is out there setting the market trends.

Wilbur is the reason to learn to do professional piano appraising.

More Reasons to Appraise

Do you like the true life adventures in piano intrigue? Here are some cases that show the need for professional help.

A) Called in to appraise a birdcage upright made in Scotland last century, recently purchased in Hawaii. Pretty case, but . . . pinblock laminations visually separated in the worst way. Strings rusted in place so badly that even lowering the tension caused breakage.

Value of this piano "as is" — about $100 because of the exotic woods used in construction of the case. Bottom line: client had recently paid $1,600 to a private party.

B) Asked to appraise a Knabe Grand in excellent shape — needing some tuning and regulation, but otherwise very impressive. Value, as is, $3,200, asking price $500. Client bought the piano that afternoon.

C) Piano in question was a Baldwin Acrosonic manufactured in 1968. As is, $1,200 . . . asking $200 . . .

D) 1915 Steinway Upright — very worn, needing lots of repairs and parts. As is, $600 . . . asking $1,750 . . .

E) Yamaha G2 Grand 1967, asking $7,000. Pinblock partially doped, case fair, hammers very, very hard. As is, $2,800 . . . asking price was same as new price at the time.

Seems like it would make a lot more sense for an informed public to go for the long term warranty. If only they knew!!

In the next issue we'll be describing the physical appraisal, including how to socially conduct an appraisal and techniques that will save you time and lost motion.

Shoptalk

Susan Graham, RTT
San Francisco Chapter

Just Scraping Along

It's said that you never appreciate how big an elephant is until you have to wash one. Scraping, sanding and refinishing a soundboard can be much the same. However, if repairs have been made or the old finish is crackled and dirty, refinishing will greatly improve the appearance and may extend the life of the board. Whenever a piano is restrung, it is an opportunity to make this dramatic and visible improvement.

The skill and methods used to remove the old finish affect the final result as well as the time and effort required to do the job. Therefore, it's worthwhile discussing removal methods as well as how to apply the finish. It may seem tedious, but, in the words of the inimitable Jack Krefting, would you prefer that I bore you with an article on scraping or scrape you with an article on boring?

Old finish on furniture is usually removed using a chemical stripper. Although they are messy and unpleasant, chemical strippers do a good job of loosening old finishes so they are more easily removed. Unfortunately, this option is not open to us when we work on soundboards. Cleanup would be difficult to accomplish without endangering the case. Harsh chemicals are ill-advised for this delicate sheet of spruce; glue joints could be weakened, resulting in bridges coming loose, the planks of the soundboard separating and the whole affair coming loose from the case. Wood bleaches are not used for the same reasons: they might damage the resonating quality of the wood as well as weaken the structural integrity of the board. We are stuck with dry scraping and sanding to prepare boards for refinishing.

Technicians have devised scrapers from chisels, plane irons and other tools, and there are scrapers available from cabinetmakers supply stores, hardware and paint stores. No single tool is effective for the entire job; there are both large open areas and small tight corners, and there is old finish to remove and then wood to smooth. All of these require slightly different equipment and techniques. I've found that a standard cabinet scraper (which is a 3x5 rectangle of flexible steel) and 1" and 2" paint scrapers (curved blades on handles) enable me to get all but the trickiest bits of varnish; for very tight spaces I use a 1/8" wide woodcarver's chisel which is also used to scrape between bridge pins. Even a shimming knife can be used, turned on its side so the point reaches under the cantilever section of the bridge. (This does require resharpening the tool.)

The characteristic of a tool which makes it a scraper is that it has a wire edge — a tiny hook formed by curling over the edge with a burnisher after the tool is sharpened with a file and stones. Woodworkers are accustomed to using a scraper to smooth hardwood (skillfully done, this gives a better result than sanding). They will teach you to square up a scraper by working the sides and the edge with a file, a coarse stone, and then progressively finer stones down to extra fine Arkansas. The scraper is edge up in a vise; after a square, sharp edge is achieved, the burnisher is held perfectly parallel across the edge and drawn along it to "mushroom" the steel. Then the burnisher is tilted and drawn along the corner of the edge to curl it over into a hook. I attended a sharpening seminar several years ago, but somehow it seemed that although the techniques I learned to sharpen chisels and planes made them easier to use, scraping soundboards got harder. Finally I went to another sharpening seminar, this time given specifically for piano technicians, and picked up two tips about scraping. For one thing, the teacher pointed out that spruce is so soft it is difficult to scrape it smooth as one can hardwood — the wood tears and bubbles up under the scraper. Changing the angle of the wire edge or the position of the scraper helps, but it often works best to scrape to remove the old finish and then sand to smooth the spruce itself. If, as you scrape, the wood begins to get rough, try changing the direction in which you are working, tilting the scraper forward, or resharpening the edge and reducing the

angle of the wire hook. If this doesn't help, switch to sanding. The same teacher remarked that it is easier to cut a tomato with a knife which hasn't been finely honed. The reason is that as an edge is sharpened, it becomes serrated; the steel comes off unevenly, leaving teeth. As the edge is worked on finer stones, the teeth become finer. With something that has a tough skin, such as a tomato — or a layer of old varnish — it is helpful to leave these teeth slightly coarser than usual so that the tool will grip. Therefore, a scraper sharpened to only a medium fineness will remove finish better; if you want to scrape the spruce for smoothness, the edge must be resharpened very finely so it will peel off shavings without much pressure being applied.

There is no particular starting point for scraping (other than keeping in mind that it must be done with the grain). Shimming or rib repairs should be completed. Epoxy-treat the bridge pins if necessary, and DAG and burnish the tops of the bridges first; the old finish helps repel spilled epoxy or graphite and a scraper can cut a cleaner edge between the DAG and the wood than can be painted with a brush. Remove the nose bolts, marking them first with tape so they can be returned to approximately the same height (and numbering them so each bolt goes back in its original hole). Tape off the nose bolt and plate screw holes and cover or remove the damper action. Then, the logical place to begin is to sharpen all the scrapers, get a fresh cup of coffee, turn on the radio, put on your dust mask and get to work.

I do the tedious work of scraping the bridges first. The notches and sides are usually done with the 1" scraper (being careful not to mar the soundboard with a corner) and then the little chisel (sharpened to a hook) is used to clean between the bridge pins. This not only ensures good string termination, it makes a very clean-looking job. It is an important step, especially if you epoxy-treat the pins. There should be *no* visible accumulation of epoxy on the bridge.

Paint scrapers with handles are pulled towards you. The handle and curved blade limit the scraping angle so they are not suitable for bare wood but can do a good job removing finish since the handles enable you to use more back muscle. Cabinet scrapers are held with two hands — the fingers at the edges and the thumbs in the middle to flex the scraper and push it. They can also be flexed and drawn towards you if you have the hand strength.

You want to remove the old finish but not tear the spruce, and you want to remove a uniform layer of wood so the final color is even. Often one layer of finish will scrape off easily, but there will be a shellac layer underneath which sealed the board and is more in the wood than on it. I suppose in theory this layer could be left and finished over so long as none of it is cut through (creating stripes); but I wouldn't trust it. Removing this layer is the moment when the wood may tear. If the mentioned solutions don't help, switch to a medium grade "sandpaper." Use a good quality paper such as garnet or aluminum oxide which will really cut and not shed sand particles; it should be open-coat, since spruce produces so much dust. Always use a block when sanding. It is impossible to achieve a smooth surface with just the paper under your hand; without firm backing the paper will dig into soft spots and ride over hard grain lines. Sanding blocks should be backed with felt to prevent heat from building up and to do less damage should the corners contact the case. Power equipment is nice but it must be a top-quality finishing sander if orbital. Cheaper orbital sanders are too slow and make larger orbits which leave visible swirls. If you haven't spent about $100 on a sander, it won't work for this job. A reciprocating sander which follows straight grain lines is suitable but belt sanders are extremely hazardous, being inclined to sand

troughs in spruce. The point is that this soft wood will show cross-grain or uneven sanding in marks which are almost impossible to remove.

In tight corners where the block won't reach, fold several sheets of sandpaper together for stiffness. Sometimes it is possible to remove bits of finish from these areas with steel wool, which is less likely to leave cross-grain scratches. However, use coarse steel wool since the finer grades leave grey dust worked into the wood.

These almost-inaccessible places are a challenge. If there is a molding strip along the straight side, it can be gently pried loose with a chisel and removed. This will enable you to scrape close to the case for a perfect edge when the strip is replaced. There are other areas difficult to sand and there may be stains which don't sand out. Spot-sanding and digging out every bit of stain or finish may create depressions in the wood which will catch the light and be quite obvious since the new finish will highlight any such areas. Although I have tried spot-bleaching stains, they were either ineffective or else left an area which was just as noticeable, being white, as it would have been if left dark. Therefore, although we strive to achieve perfectly clean boards before refinishing, it sometimes is better to leave a bit of stain or varnish rather than work the board over until it resembles driftwood. Nobody is representing this as a brand-new piano, and a few signs of honest age aren't going to detract from an otherwise beautiful board.

As a general rule, use no coarser a paper than needed to remove the old finish, and switch to finer papers as soon as possible. I might use an 80 grit paper to remove the last of the old finish, but go to 180 and 220 as soon as it seems practical. By the time I reach 220 I am sanding bare wood. Depending on how the job goes, I then go to 320 or even 400. Once in that range, count strokes and try to sand the entire board the same amount with each grit to remove the same amount of wood overall. This helps maintain evenness of color as well as surface. After sanding with 400, clean up the dust and dampen the whole board with a wet rag. When this dries, the board will have a fine nap on it. As the board is sanded, some wood fibers are bent rather than cut off. Dampening raises and stiffens them so that when the board is again sanded with 400 or 600 papers, it practically polishes the wood. If this dampening step is eliminated, more sanding will be necessary after the sealer coat; I use orange shellac as a first coat and don't want to sand it much or the color becomes uneven. Dampening also gives an idea of the color of the finished board and highlights rough or uneven places while it is still easy to correct them.

Finishing products have changed; many now use synthetic resins or vehicles which have different characteristics from traditional materials. The finishing lore we take as truth may no longer be accurate but it still seems that the choice for soundboards is between lacquer and varnish; shellac alone lacks durability and water resistance, as do the penetrating oil finishes. Lacquers are sprayed (usually) and varnishes brushed (usually) so one may be preferred over the other as a matter of convenience. Lacquer is applied in multiple coats, varnish usually in one; varnish makes a thicker but more flexible finish than does lacquer. Since lacquer dries much more quickly and is rubbed out, dust is less of a problem; a good result with varnish requires dust control. In summary, both finishes are excellent and the choice comes down to preference. Mine is for varnish.

Using varnish means I have to clean the shop (a devious motivation if ever there was one). After the final sanding, I vacuum the floor and the benches and blow the dust off the shelves, lights, and other overhanging fixtures. The beams of the piano are cleaned — you'd be surprised what floats up through nose bolt holes. Use compressed air to blast dust from between bridge pins and out of case corners, and pick up any particles with a tack rag. When this has settled, tack-rag again and apply the shellac.

It's possible to get shellac crystals and mix your own, but most of us just run down to the store and buy some ready-made. It has a short shelf life, so the can should be dated and not more than a year old. Old shellac stays gummy forever, and adding more alcohol only makes it thin and gummy. Orange shellac in cans is thick and very orange; thin it — usually 4-8 parts alcohol to shellac. (Try the color on a section of the board which will be hidden.) The thinner the shellac the easier it is to spread evenly but it must have enough body to seal the wood. (White shellac can be used but I prefer the warmer color of orange.) If there are shims or stains to blend, you may wish to make the board a little darker than usual, but remember that the top coat usually darkens the board a little more. Shellac isn't fussy to apply — just avoid puddles and thick edges — and it dries quickly.

Bridges are given a very light finish to avoid any possibility of restricting vibration and to keep from gumming up the termination points of the strings. They need only one coat of thinned varnish and are not shellacked.

After the shellac has dried, the board is sanded with 600 paper to smooth the surface and even out the color. This is the time to apply the soundboard decal so it will be protected by the top coat. Be certain that the decal is completely dry before proceeding.

Once again, attack the dust. Get all the dust produced by the final sanding out of the piano. Use an ordinary spray bottle to mist down the floor and the shelves to settle any dust in the air (don't spray directly over the shellacked board). Turn off the heater or any device which circulates air. The ideal time to do this is late afternoon so that after cleaning you can leave the shop while the dust settles. Try also to plan to leave the shop immediately after varnishing. Otherwise, even if you remove every speck from the piano, the dust you stir up moving around will settle on the finish, giving that stucco effect. A separate room which can be closed off is ideal. Otherwise, leave the dust to settle overnight; when you go in to varnish, walk in quietly, wear a synthetic shirt so you don't shed lint, tack-rag gently, stroke on the finish and leave immediately — without slamming the door.

McCloskey's 0092 Crystal Clear Heirloom finish has a good thickness and gloss of finish and it is easy to apply. Spar varnishes tend to be too thick

and yellow, and the heavy polyurethane finishes are overkill on a soundboard — this isn't a gym floor. A durable but flexible finish is what we are after, not the dipped-in-plastic look.

Thin the varnish about 2 to 1 for the bridges. Coat them first, using a narrow brush. Avoid piling up finish at the pins by stopping just short of them. It is likely that some dust will be pulled from the notch so use a separate brush and container for the bridges and carefully tack-rag the board beside the bridge before continuing.

Varnishes used to be tricky to apply but they now have good self-leveling qualities and even can be applied with a disposable foam "brush." Being old-fashioned, I still use pure bristle brushes; but these must be very clean or you are better off with disposables.

Varnish under a light positioned so you can sight sideways and find dry spots. Apply the McCloskey's straight from the can in a very wet coat, stopping just short of puddles but being sure the whole board is covered. Avoid stirring up bubbles working the finish over with the brush — just stroke it on good and wet and then leave it alone. There will be tiny bubbles but these will disappear. If a bristle falls out or other foreign object appears on the board, stab at it with the brush to pick it up — fingerprints are one thing which won't self-level.

Although the can claims that a dust-free state is achieved in 30 minutes and total hardness in 4-6 hours, don't believe it. Leave the piano undisturbed for as long as possible — overnight is best. Although varnish doesn't continue to harden as does lacquer, it seems to toughen up over several days, so avoid setting heavy objects on it or leaning on the board when the finish is fresh.

You should now have a beautiful finish with the characteristic deep gloss of varnish. If you prefer a more matte finish, it can be cut with fine steel wool, but the material dries too soft to rub up to a gloss again. Leave it alone and take extra precautions against dust if you like a glossy finish. Varnish is the traditional soundboard material, still in use in some factories, and it is easy to apply for a very fine result if the surface has been properly prepared and a few precautions are taken to keep it free from dust while drying. What better excuse could you have to knock off early and go fishing?

Sound Background
Continued from page 24

of their stops, registers, keyboards and other details. Some instruments with major differences were experimental. Not all of the surviving instruments are in their original form but many were altered to incorporate some new feature later when they were rebuilt. One type of modification was the conversion of enharmonic harpsichords to twelve-note octaves in the later years of the eighteenth century when well-tempered intonation replaced meantone. Most of the experimental designs were impractical and the instruments ended up as merely museum curiosities; however, the replacement of harpsichord jacks with hammers and the introduction of a new action by Bartolomeo Cristofori around 1700 turned out to be the invention of the piano.

1982-1983 MEMBERSHIP/BOOSTER CLUB

Membership Is Everybody's Business

Charles Huether
Vice President

Many years ago the Piano Technician's Guild Inc. asked members and interested industry people to comment on their personal experiences belonging to and with members of the organization. The replies were interesting and inspiring. We are reprinting a few of them. Keep in mind that they are about twenty years old.

Compatriots — Not Competitors

In this age of retirement, as I look back over the road I have traveled, I now have time to appreciate more fully the help I received in solving so many of the problems I met along the way. Advice and help . . . beyond price!

It was my good fortune in 1923 to be accepted as a member in the N.A.P.T. Since that time I have attended twenty-one National Conventions; six of N.A.P.T.; nine of A.S.P.T.; and six of Piano Technicians Guild. I did so attend because I had proof positive that each convention was a profitable investment for me. The Technical Institute classes were a never ending source of information, and, each year proved to be better than all preceding years, so, what more need be said? (Just as a Revival Meeting aims to revive the energy of the faithful as well as reach the sinner, so does the Institute aim to refresh the Craftsman while aiding the apprentice.)

I like to think that in my own way, I have been able to give a little knowledge to some brother; if I have done so then I certainly have had it returned many, many fold.

Another thing: I never felt that I had a competitor in the Guild, I had only compatriots.

Sincerely grateful,
Vic Jackson

Manufacturer Assesses Piano Technicians Guild

The Wurlitzer Company is proud to be a member of an industry wherein the technical craftsmen versed in the service and maintenance of the product — the piano — have associated themselves in an organization having the high motives and calibre of The Piano Technicians Guild.

Membership in an organization of this type is almost essential to the technician who is seriously interested in maintaining a high level of competency and service to the public. The information of all kinds stemming from a well organized and administered group such as The Piano Technicians Guild, plus the friendly association with fellow members having the same goals, provide a sound basis for the continuing successful and satisfying service to piano owners. As a manufacturer, The Wurlitzer Company is pleased to have the service of its product in the hands of members of The Piano Technicians Guild, and will continue to make our modest contribution to the educational program at P.T.G. meetings and seminars.

We wish The Piano Technicians Guild a full measure of success in its endeavors.

Very truly yours,
THE WURLITZER COMPANY
William A. Rolfing,
Vice President

Specialized Age

In this age of specialization, the skills and talents of fine piano technicians are in greater demand than ever. Membership in The Piano Technicians Guild provides professional craftsmen a unique opportunity to impart to and to hear from their associates the latest knowledge and techniques of their trade. The training of newcomers to the field is a program of vital interest and value to piano manufacturers, merchants, and teachers, as well as to technicians.

We look forward to continuing to work in close harmony with The Piano Technicians Guild and its associates.

Sincerely,
D. H. Baldwin Company
James M. E. Mixter,
Vice President

The enthusiastic response of long ago encourages us to ask for letters today. If you would like to write telling of your experiences concerning benefits of belonging to the Guild we would be most appreciative. Send your letters to: Membership, c/o Editor, Piano Technicians Journal.

Booster Club	Pts.	Mbrs.
ALLEN, Jon	1	1
ANDERSON, Vernon A.	5	1
ATHERTON, Olan M.	2	2
BAIRD, John H.	1	1
BALIGIAN, Agnooni C.	1	1
BANTA, Norman	5	1
BARBER, Edward D.	5	1
BEATON, Richard	4	1
BECK, Jacqueline	3	3
BERRONG, Jack	2	2
BITTINGER, Richard	6	2
BLANTON, Tom R.	1	1
BLOCH, John	4	1
BOURDON, Donald W.	1	1
BOYNTON, Richard B.	1	1
BRADY, Stephen H.	1	1
BRIDGES, Nate	1	1
BRILEY, James E.	3	1
BROOKS, Walter	6	2
BROWN, Glenn	1	1
BRYANT, Ken	1	1
BUYCE, Harold R.	2	2
CALLAHAN, James	4	1
CASWELL, Alan R.	5	1
CHURCHILL, Kenneth R.	3	3
COATES, Timothy C.	5	1
CONNER, J. Stuart	1	1
CRABB, Larry	15	5
DAVIES, Clair	4	1
DE ARMOND, C. Earl	4	1
DEROCHER, James E.	4	1
DETAR, Brian S.	1	1
DELLINGER, Ray	8	4
DENNIS, Robert R.	4	1
EATON, Wendell E.	4	2
ERLANDSON, Robert	1	1
EVANS, Daniel A.	4	1
FLEGLE, Richard A., Sr.	3	3
FLOYD, R. Errol	2	2
FREIDIN, Irving	5	1
GARRETT, Joseph A.	1	1
GEIGER, James B.	7	3
GRIFFIN, Rudolph	5	1
GRIFFITH, M. Laverne	1	1
GROSSMAN, Matthew	1	1
GUERRA, Edward F.	5	1
GURDA, Robert	9	2
GUSTAFSON, David	1	1
HAINES, F.L.	1	1
HAINES, Roy	3	1
HALE, David	1	1
HALE, Robert	10	2

Booster Club	Pts.	Mbrs.
HARMON, Clayton	1	1
HAWKINS, Marshall B.	5	1
HEETER, Ric D.	5	1
HESS, James N.	4	1
HESS, Marty A.	1	1
HITT, Henry L.	1	1
HOHF, Robert	10	2
HOSTETLER, Robert	1	1
HOUSTON, James	4	1
HOWENSTINE, Richard	1	1
HUFFORD, Robin	3	1
JONES, Joel	1	1
JORDAN, Wayne	6	3
KEAST, Lawrence J.	1	1
KEYES, Otto R.	4	1
KINSER, Bill	4	1
KLINE, Albert	5	1
LAGOY, Martha M.	4	1
LANDIS, Glenn A.	3	1
LARAVELA, Larry	4	1
LARKEY, Frank	1	1
LEARY, Janet	1	1
LITTLE, Mary Davis	1	1
LOEFFLER, W.J.	4	1
LOVE, David	4	1
LUY, George	1	1
MACKINNON, R. Taylor	1	1
MANHART, Hugh J.	1	1
MARCIANO, William	4	1
MARTIN, Edward E.	1	1
MASTAGNI, Angelo	3	1
MAYR, Vitus J.	9	2
MCVAY, James I.	1	1
MEHAFFEY, Francis	1	1
MEISSNER, Walter	1	1
MILLS, Fred	1	1
MIZELL, Wade	1	1
MOBERG, Jonathan	4	1
MONROE, Paul	1	1
MOORE, Robert	1	1
MOTSKO, William R.	1	1
MURRAY, Samuel	1	1
NICHOLSON, Dennis	1	1
NICHOLSON, Steve	1	1
ORR, Ronald	2	2
PENNINGTON, David L.	2	1
PERKINS, Robert K.	2	2
PERRY, Mark J.	1	1
PHILLIPS, Webb	9	2
PREUITT, Ernest	4	1
RANDOLPH, Terry	3	1
ROSENFELD, Jim	1	1
QUINT, Richard B.	1	1
SANDERS, Charles	1	1
SANKEY, Lee M.	5	1
SCIORTINO, Joseph	8	2
SILVA, E. Michael	4	1
SMITH, Sheldon P.	3	1
SNYDER, Willis	5	1
SPURLOCK, Bill	4	1
STALCUP, Rocky	4	1
STONE, Sidney O.	7	3
THOMAS, Dean	2	2
THOMAS, H. Vince	4	2
THOMPSON, Treacey	1	1
TRUAX, Richard	4	1
TUBLITZ, Evan	6	2
UPHAM, Russell	1	1
VERHNJAK, Karl	6	2
WALKER, Elizabeth K.	1	1
WALSHE, Robert C.	5	1
WELTON, T. Scott	4	1
WEST, Ivan	4	1
WHALEY, Denzil	1	1
WIGHT, Blais	1	1
WILEY, John	5	5
WILLIAMS, Vernon P.	1	1
WINN, Lloyd	5	1
WOLF, Bob	8	2
WONDRA, Lola	4	1
WOOD, Edwin	2	2

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DELLINGER, Ray.
GRIFFIN, Rudolph
HALE, Robert
HAWKINS, Marshall B.
HOHF, Robert
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1982-1983 Reclassifications

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VALDEZ, Fred
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Fountain Valley, CA 92708

ZOPF, Bill D.
20891 Balgair Circle
Huntington Beach, CA 92646

Harry Berg and Ernest Dege Families Steamboatin' on the Mississippi Queen to the 1983 Convention in New Orleans

A recent letter received from member Harry Berg outlined an experience you might want to look into. THE LAST GREAT AMERICAN ADVENTURE! The Bergs and Deges are flying to Memphis, birthplace of the Blues; boarding the Mississippi Queen, the most regal paddle-wheeler of them all, for a riverboat journey to New Orleans and the 1983 convention.

Just to tease you a bit . . . Harry stated that they would board the Mississippi Queen the evening of June 17th. Day 2 they will be sailing — day 3 the ship will stay in harbor while passengers take in Vicksburg, Mississippi; they travel that night and then on day 4 take in Natchez, Mississippi. Set sail again on day 5 and spend the morning in St. Francisville, Louisiana. Day 6 take in Houmas House, Louisiana, in the morning and day 7 arrive around mid-day in New Orleans.

Your days and nights will be filled with gala dining, dancing, exciting riverboat entertainment, and a host of fun-filled Steamboatin' activities. You will go gently back in time to cotton and sugar plantations, sleepy riverboat towns, and battlefields from the war that almost dissolved our nation.

Check your schedule and get in touch with your local travel agency. Ask about steamboatin' — the last great American adventure.

1983 Institute

Ben McKlveen
Institute Director

A story is told about the attractive young matron who approached the golf pro at her country club. "Charles," she said, "this is my friend, Charlotte Harris. She would like to take a golf lesson with you this morning." "Fine," replied the pro. "Mrs. Harris, I can take you at 10 o'clock. Mrs. Stewart, would you like to take a lesson today also?" "Oh, goodness no!" responded the matron. "Why Charles, don't you remember? I learned yesterday." Good golfers find this story amusing because the game of golf involves constant study and practice if it is to be played with any skill. The field of piano technology is much the same. We need reminding, coaching, expanding and continuing education if we are to maintain high standards of service to our customers.

Last month I outlined some of the programs that will be taught at the 1983 Institute at this year's national convention. Several of these classes are being repeated because the information contained in them cannot be assimilated in one hearing. Then too, there are always new people who come to our conventions who have never heard these classes before.

Ernie Juhn will repeat his class on trouble shooting. It has been one of the most popular classes wherever Ernie teaches. His material not only covers service problems but his approach also includes tactful customer relations and perceptive diagnostic techniques.

Pinblock installation will be taught by a new team this year. It will be solid basic information excellently presented by **Richard and Shirley Kingsbury.**

Norman Neblett will be with us again this year. He will not be teaching voicing. Instead he will do a class on pedals, lyres, and trapwork called "From the Bottom Up." It is an excellent class, thoroughly researched and presented in Norman's inimitable style.

Steve Fairchild will give you another chance to unravel the mysteries of piano scaling. Steve has continued the work started several years ago by Dave Roberts, the "calculating technician."

There will be a new business class this year. **Webb Phillips** from Devon, Pennsylvania, will be instructing. He brings a wealth of professional business experience to this class and presents it in a clear and logical manner.

Steinway will be there with **Joe Bisceglia; the Baldwin crew, Willard Sims and Jack Krefting,** will teach about hammer construction and vertical dampers.

Some special features I would like to call to your attention include a class by

1983 Institute Classes

REPEAT	INSTRUCTOR
Auro-Electronic Tuning Techniques	*Bowen*
Shop Business and Operation	*D. Snyder, W. Snyder*
Installation of Upright Hammers, Shanks, and Butts	*Brandom (Everett)*
Grand Dampers	*Edwards, Caskey*
	Dennis, Utsonomija, Nishio (Yamaha)
Steinway Servicing	*Huether*
Historical Survey of American Piano Industry	*Johnson, Reuter, Weisensteiner (Kimball)*
Grand Regulation	*Juhn*
Vertical Piano Trouble-Shooting	*Neblett*
From the Bottom Up	*Robinson*
Progressive Grand Regulation	W. Snyder, D. Snyder
Grand Hammer Installation	*Heischober*
Advanced Player Repairs	*Heischober*
Advanced Player Forum	*Selected Technicians*
Private Tuning Tutoring	

NEW CLASSES	INSTRUCTOR
Basic Tuning Class	*Stegeman*
Electronic Tuning	*Sanderson*
Basic Vertical Regulation	*Wurlitzer Team*
Hammer Construction and Voicing	*Krefting*
Vertical Dampers	*Krefting - Sims (Baldwin)*
Voicing	*Hunt - Jameson*
Wood Joints	*Geers*
Home Computers in Your Business	*S. Nicholson*
Pinblocks	*R. Kingsbury - S. Kingsbury*
Woven Felt Manufacturing Use and Problems	*P. VanStratum*
Keyboard Building	*W. Brooks*
Comparison of Aural and Electronic Tuning	*J. Coleman - G. Defebaugh*
Rescaling Problems	*S. Fairchild*
Pinblock Plugging	*B. Russell*
Audiologists and How we Hear	Dr. C. Berlin
Business Class	
Tools	*J. Harvey (Kawai)*

Peter Van Stratum about how woven felts are manufactured. It is fascinating. **Cliff and Tony Geers** are doing a class about difficult wood joint repairs and soundboard repairs. Don't miss this one. **Mr. Ralph Hollender of Dampits, Inc.,** will do classes on the nature of wood, relative humidity and its effects on instruments, and wood seasoning. **Bob Russell** will discuss the process of pinblock plugging for those difficult cases where pinblocks are built into the cabinet. **Charles Huether** is repeating his interesting class called "Pianos — From Whence They Came." It is an in-depth look at the early history of the American piano industry. The University Forum is in the capable hands of **Yat Lam Hong and Martha Lagoy.** There will be tutoring and testing and a number of interesting product clinics.

Make your plans, send in your reservations. Don't let this wealth of opportunity and information pass you by. See you in New Orleans!

CHAPTER CONTEST — BE A WINNER!!

Promote Attendance at the 1983 Convention New Orleans, LA July 4 — 8, 1983

You will want to enter this contest not only to create interest, excitement and ATTENDANCE at your 1983 convention but to win one of the exciting prizes named below.

RULES

FIRST PRIZE — FILM "Music of Sound"

Awarded to the Chapter with the largest percentage of PAID member registrations to the convention.

SECOND PRIZE — SET OF TECHNICAL INSTITUTE TAPES

Awarded to the Chapter with the second largest percentage of PAID member registrations to the convention.

THIRD PRIZE — FOUR COPIES OF THE CLASSIFIED INDEX

Awarded to the Chapter with the third largest percentage of PAID member registrations to the convention.

The winning chapters will have special recognition at the convention.

GET ON YOUR MARK
GET SET
GO!!!!!!

WIN

The Piano Technicians Guild Convention New Orleans, La. Part IV

What's that you say? You like food? you like to go to fun places and eat tasty food when you're away from home?

Cher, that, in itself, is reason enough to come to New Orleans. This town knows how to cook and how to eat. Where else would you find a major highway called Chef Menteur? We've got two delicious, unique local cuisines: Cajun and Creole.

The Cajuns originated their cuisine in the south of France and took it with them when they fled to Nova Scotia and finally to Louisiana. "Creole" refers to the descendants of the French and Spanish settlers of New Orleans — the Creoles were the residents of New Orleans when the Americans took over.

Many of the classic New Orleans dishes, like gumbo and crawfish etouffe, came from these two cuisines. But you can't ignore the influence of good old Southern cooking, the American Indians, and the nearby Caribbean on New Orleans food.

The following is a list of some of the favorite restaurants of the locals. *These are just those restaurants within walking distance of the Hilton Hotel.* That means the French Quarter (F.Q.) and the Central Business District (C.B.D.). The price range is listed as (I) inexpensive, (M) moderate or (E) Expensive.

This partial list is just to create a little interest for coming to New Orleans to find the best food in the world! Whatever your taste in food, it's here!

Many thanks goes to Joe Helmer of the New Orleans chapter who put this information together, and will have a much more complete list by convention time to pass out to members in attendance. All you have to do now is to come to New Orleans in July and put on some weight. The more weight you put on, and it's very easy to do that, the more Joe will know that you appreciate his efforts. Come on to New Orleans in July — we'll see you all there!

Nolan P. Zeringue
Local Host Chairman

New Orleans Restaurant Guide

Maxcy's Coffee Pot
714 Saint Peter (FQ) 523-8215
Creole Breakfast
(I)

Mr. B's Bistro
201 Royal (FQ) 523-2078
Attractive place, good food
(M) to (E)

Mother's
401 Poydras (CBD) 523-9658
Very popular lunch place, sandwiches of freshly baked French bread, waiting line, but the staff is fast.
(M)

Napoleon House
500 Chartres (FQ) 524-9752
Small but enjoyable menu, sandwiches, ice cream. The building is loaded with the charm of the French Quarter.
(I)

Port of Call
838 Esplanade (FQ) 523-0120
Best burger in town — they grind their own beef. Funky atmosphere.
(M)

Popeye's Chicken
621 Canal (CBD) 561-1021
Fast food chicken chain, *spicy* crusty chicken. (You can order it mild.) Good buttermilk biscuits.

Raintree
437 Esplanade (FQ) 944-0793
Health food restaurant (Creole style). Quite popular, especially for breakfast.
(M)

Ruby Red's
435 Esplanade (FQ) 945-1167
Burgers. A bar with lots of atmosphere.
(I)

Veracruz
1141 Decator (FQ) 523-9377
Tasty Mexican food.
(M)

Acme Oyster House
724 Iberville (FQ) 523-8928
Excellent oyster bar (raw & fresh). Good sandwiches.
(I)

Antoine's
713 Saint Louis (FQ) 581-4422
Excellent food, many examples of classic New Orleans dishes. Crowded. Having reservations means you'll be treated much better.
(E)

Asia Gardens
530 Bourbon (FQ) 525-4149
Chinese
(I)

Bon Ton Cafe
401 Magazine (CBD) 524-3386
Cajun-influenced restaurant.
Upper (M) to (E)

Broussard's
819 Conti (FQ) 581-3866
Good food, classic New Orleans style.
(E)

K-Paul's Louisiana Kitchen
525 Chartres (FQ) 524-0420
Talented Cajun-born chef Paul Prudhomme (also trained in Creole cuisine) experiments a lot — usually it's very good. Two different menus for upstairs and downstairs.
(M) to (E)

La Marquise
525 Chartres (FQ) 524-0420
Good French pastry shop. Reasonable prices, nice courtyard in back.

Mamma Rosa's
828 N. Rampart (FQ) 523-5546
Delicious thick crust pizza, good sandwiches.
(M)

Marti's
1041 Dumaine (FQ) 524-6060
Popular. Mostly Creole.
(M) to (E)

Maspero's
601 Decator (FQ) 523-8414
Good sandwiches. Usually there's a line.
(I) to (M)

Buster Holmes
921 Burgundy (FQ) 523-8402
Tasty soul food (Creole). Funky place — a cherished New Orleans restaurant.
(I)

Cafe Sbisa
1011 Decator (FQ) 561-8354
Creole style.
(M) to (E)

Castillos
620 Conti (FQ) 581-9602
Mexican. Slow service.
(M)

Eatgood Revival
534 Saint Phillip (FQ) 523-9328
Health food restaurant.
(I) to (M)

El Liborio
334 Decator (FQ) 381-9680
Cuban.
(I) to (M)

Galatoire's
209 Bourbon (FQ) 525-2021
Excellent food, classic Creole cuisine. Reasonable prices, no reservations, waiting line.
(M) to (E)

Green House Patio Restaurant
300 Bourbon (FQ) 586-0300
In the Royal Sonesta Hotel. For when you want a New Orleans Dessert.

Haji Baba
733 Saint Peter (FQ) 525-9127
Lebanese
(M)

Jonethon's
714 N. Rampart (FQ) 586-1930
Excellent food, elegant art deco restaurant.
Very (E)

AUXILIARY HIGHLIGHTS

The Piano Technicians Guild Auxiliary invites wives, husbands and friends of technicians to sign up for our convention program.

The registration fee for Auxiliary activities admits one to the following:

* An Entertaining Reception on Tuesday
* A Scrumptious Luncheon on Thursday

plus

* An Introduction To New Orleans so you'll know what to see and how to get there
* Lots of musical entertainment
* The Auxiliary Council
* A meeting with the Piano Technicians' Sketch Artist
* Admission to one institute class
* Auxiliary classes on Piano related topics
* Auxiliary classes on general interest topics

AND MORE

ALSO . . . you can buy a ticket for a SUPER 2 PLANTATION and LUNCH TOUR which departs from the hotel Wednesday morning. The bus will take you to Nottoway and Houmas House Plantations with lunch at Jean Lafitte's Restaurant and bring us back to the hotel for just $30.00 apiece. The tour is open to anyone at the convention.

PIANO TECHNICIANS GUILD CONVENTION AND TECHNICAL INSTITUTE JULY 4-8, 1983 THE NEW ORLEANS HILTON HOTEL

Registration Form

Name _____

Home Address _____

City _____ State/Province _____ Zip _____

CHAPTER NAME _____ Nickname for Badge _____
(If not the same as above)

☐ Member ☐ Non-Member
☐ Visually Handicapped ☐ Will be Staying at the Guild Headquarters Hotel

Spouse's Name _____ Nickname for Badge _____
(If Attending) *(If not the same as above)*

REGISTRATION CUTOFF DATES

Check Boxes and Total

		Staying at the Headquarters Hotel
GUILD MEMBERS		
Postmarked by May 2	☐ $ 90.00	☐ $ 85.00
Postmarked after May 2	☐ $110.00	☐ $105.00
NON-GUILD MEMBERS		
Postmarked by May 2	☐ $175.00	☐ $170.00
Postmarked after May 2	☐ $195.00	☐ $190.00
SPOUSES		
Auxiliary Member	☐ $ 35.00	☐ $ 30.00
Non-Auxiliary Member	☐ $ 45.00	☐ $ 40.00
SPECIAL CLASS		
PRIVATE TUNING Tutoring	☐ $ 35.00	☐ $ 35.00
Banquet (optional)	☐ $ 30.00	☐ $ 30.00
Closing Luncheon (optional)	☐ $ 15.00	☐ $ 15.00
TOURS		
MISSISSIPPI RIVER STEAMBOAT CRUISE Tuesday Evening, July 5 (Includes Dinner and Entertainment)	☐ $ 25.00	☐ $ 25.00
SUPER 2 PLANTATION AND LUNCH TOUR Wednesday, July 6 (Sponsored by Auxiliary)	☐ $ 30.00	☐ $ 30.00
TOTAL ENCLOSED	$_____	$_____

OPTIONAL TOUR HIGHLIGHTS

When you register for the 1983 Convention **don't miss the boat or bus** by not signing up for the two optional tours offered.

LOCAL HOST CHAPTER SPONSORED

MISSISSIPPI RIVER STEAMER CRUISE - Enjoy dinner, New Orleans jazz and a cruise down the Mississippi River. The cruise will be offered Tuesday evening, July 5, and is being planned by the Local Host Chapter. The paddlewheels will start churning and members will be loaded aboard right next door to the hotel. Step aboard and relax to the sights and sounds of New Orleans. Only $25.00 per person.

AUXILIARY SPONSORED

SUPER 2 PLANTATION AND LUNCH which departs from the hotel Wednesday morning. The bus will take you to Nottoway and Houmas House Plantations with lunch at Jean Lafitte's Restaurant and bring you back to the hotel for just $30.00 per person. The tour is open to anyone at the convention.

Tickets for optional functions must be bought no later than 48 hours before the event.
NOTE: Spouses of Guild members and/or children age 16 or over may register for Institute Classes at Piano Technicians Guild member rate. Guides for visually handicapped technicians may attend classes at no charge.

DO NOT WRITE HERE

Cash _____ Check _____ Money Order _____

Date Rec. _____ Priority Number _____ Chapter No. _____ Member No. _____

Amt. Pd. _____ Classification _____

Auxiliary Exchange

President's Message

Dear Members and Friends of the Auxiliary,

May in Indianapolis is always an exciting month, for May here turns everyone's thoughts to our well-known automobile race, the Indianapolis 500. In a manner similar to what New Orleans does in preparation for Mardi Gras each year, the people of Indianapolis begin sprucing up the city in preparation for the 500 Festival. The lines on the streets will be repainted. Festival banners will be hung on all the lamp poles downtown. High school bands get their uniforms cleaned. Black and white checkered invitations, flags, and party decorations appear in all the stores. It is a happy time for the city in general, and people enjoy getting caught up in the excitement. They feel better about their city; if civic pride ever has a chance to creep up on a person it would happen at such a time.

Did you ever think about sprucing up your business? Sometimes, especially after a long winter during an economic recession, a service business can certainly become a drag. It may seem like the technician in the family is working harder but enjoying it less — and making less money. A person can get tired of telephone messages and impending deadlines on rebuilding jobs. Maybe your business needs a shot in the arm!

Pretend for a moment that there is going to be a festival for your business. It's time to fix things up and get them looking their best. Why not start with your business cards and business stationery. Is that the same old logo you have been using for the past twenty years? If it is still effective maybe you will want to keep it, but if your business has changed a lot over the years, maybe it is time to upgrade your image. This time when you order stationery you might be in a position to order a higher quality paper stock or more exquisite printing.

Now lay out all your current ads on the desk, from the ad in the Yellow Pages to the blurb in the Little League program. What do your ads say about your business? Is there any sprucing up to be done in this department?

Why don't you look around at your office machines. Does the typewriter need a thorough cleaning so the "e"s and the "g"s aren't filled in with black? How long has it been since you changed the tape on the answering machine? Maybe you can spare a minute to mend some of the dog-eared file folders and throw away the outdated price lists from suppliers.

We won't even begin to talk about the sprucing up that could be done around the workshop, but you and I both know there is probably more that could be done there than every place else put together.

So what is the end result of sprucing up the business and putting it into festival shape? It seems to me that if business pride ever has a chance to creep up on a person it will do so when you start looking around for ways to spruce up your business. The more you put into it, the more you will begin to get out of it. And unfortunately, it is when we quit caring about the image we project that the business begins to suffer. After your spruce-up campaign it may even be a little bit easier to answer the phone with a lilt in your voice that relays the message "I'm glad you called our business!"

Tune in to New Orleans tout de suite!
Julie Berry

Nominations for Officers

The Auxiliary's nominating committee has forwarded the following slate of candidates for publication at this time. This slate will be presented to the Auxiliary Council at the New Orleans convention. At that time nominations from the floor will also be in order.

PRESIDENT ..... Belva Flegle
Minneapolis, MN

FIRST VICE
PRESIDENT ..... Louise Strong
Rome, GA

SECOND VICE
PRESIDENT ..... Norma Lamb
Los Angeles, CA

RECORDING
SECRETARY ..... Helena Thomas
Edinburg, PA

CORRESPONDING
SECRETARY ..... Bert Sierota
Philadelphia, PA

TREASURER ..... Ginny Russell
Mayfield Hts., OH

Marian Damon
Nominated for HLM

Marian Damon (Mrs. Walter Damon) of Milwaukee, Wisconsin, has been nominated by the Cleveland Chapter for Honorary Life Membership in the Piano Technicians Guild Auxiliary. Marian has been a noteworthy supporter of the Auxiliary for many years, serving in many official and unofficial capacities. Many of you may be familiar with her more recent work on the Sunshine Committee or her earlier contribution as editor of this column for several years. The Cleveland Chapter

nomination will be presented to the Auxiliary Council in July. Congratulations, Marian!

Cruising Down the River

I just spoke by phone with Mr. Nolan Zeringue, the local host chairman for this year's national convention. I asked him to fill me in on some of the details for the Mississippi Riverboat Cruise we will be taking on Tuesday, July 5th. He told me it is going to be a fun thing, not formal at all. To board the huge air-conditioned Riverboat *President,* we will just need to go out the front door of the hotel and walk across the Spanish Plaza. The dock could hardly be more convenient. We will cruise on the river for well over an hour as we feast on a Cajun style dinner of red beans and rice, fried chicken, and other local delectables. Bar service will be available. The boat has an outside observation deck, and the entire boat has been reserved for our group. Nolan has personally arranged for a traditional New Orleans Dixieland Band to play for us as we cruise and relax, unwinding from the convention's more hectic activities and enjoying the pleasure of each other's company. Daylight will just be slipping into evening as we cruise so we will have a great opportunity to view the city of New Orleans from the river. Since we will be returning about 9:00 or 9:30 p.m., there will still be time for the energetic people to go out on the town after the cruise. This dinner cruise, a good value at $25 a ticket, promises to be a night to linger pleasantly in your memory long after the bills have been paid. I think it is one of the don't-miss festivities of convention week.
-J.B.

Speaking of don't-miss activities, be sure to sign up for Wednesday's tour of two plantation homes with lunch at Jean Lafitte's Restaurant. You will find ticket information on the orange and blue convention brochure which came to you in the mail.

A PAUSE FOR ETHICS

(This month we begin a mini-series about ethics in the piano service business. We invite you to react with your thoughts and experiences about this important subject.)

Let's reflect on a piano technician's obligation to assess the value of a customer's piano. First, we probably should realize that the value of a piano can involve a certain amount of subjectivity. A certain piano can have great sentimental value to a family but none whatsoever to the piano technician. And a lower-priced piano may have an extra value to a family which has had to choose between that piano or none at all.

If a technician has been hired to tune a piano, has he/she also been hired to assess the piano and tell the family his/her opinion of its value? One technician I know feels duty-bound to tell a family if he thinks their piano is a pile of junk. Often he goes one step further and blames the situation on the people who sold them the piano or the company who made it. On occasion a family might have been perfectly happy with their piano before the technician entered the home and dreadfully discouraged after he offered his opinion. This technician happens to feel he is ethically bound to offer his professional evaluation when he feels it is something the piano owners should know.

What is in the best interest of the customer: to make the customer pleased with the piano and glad to have it sounding better than it did before the tuning or to let the customer know just what weaknesses the piano has? Perhaps the answer to this dilemma is hinged to the possibility of making the situation better. If the family has purchased an inexpensive piano it seems very probable the technician will be able to find things about the piano that could have been done in a better way. One major reason that some pianos cost more than others is because more care and precision goes into the manufacture of more expensive pianos. If a family has paid a lower price for the piano in the first place they have not paid for that extra care and precision.

Certainly a technician should distinguish between defects in a piano that might be covered by its warranty and weaknesses that are inherent in the piano's design and construction. Some technicians seem to feel it makes themselves look better when they are able to point out faults in a piano, but it may not make the customer feel better at all.

It would seem that before mentioning a piano's weak spot to a customer (unless the customer has, of course, specifically requested an evaluation of the piano) the technician should assess the cause of the weakness. If the weakness can be corrected and such a correction would enhance the owner's enjoyment of the piano, or if the weakness is a defect which might be covered by the warranty, then it seems the technician should draw the customer's attention to the weakness. If, on the other hand, the weakness is something that all pianos of that make or model possess and nothing can be done to remedy the situation, then it seems to be both pointless and ill-advised to draw the customer's attention to something he/she may not have previously noticed.

What do you think?

Come on and meet me at the Hilton!

As you register for this year's convention and make your travel plans, please notice the discounts which are available to people staying at the convention hotel. You can receive $5 off your registration fee and your technician can receive another $5 off his or her registration fee if you both stay at the Hilton. The nice part about this is that it is a fine and logical place to stay. The other hotels in the area will be the same price or higher. We have gotten a special convention rate of $70 per night at the Hilton. The Hilton is right on the Mississippi River and has its own outdoor pool and indoor tennis club. The rooms are very nice, the restaurants are great, and the place is beautiful. It is convenient to all the convention activities and to the heart of New Orleans. Come on and meet me at the Hilton!

CLASSIFIED ADVERTISING RATES are 25 cents per word with a $7.50 minimum. Full payment must accompany insertion request. Closing date for ads is six weeks prior to the month of publication.

Box numbers and zip codes count as one word. Telephone numbers count as two words. Names of cities and states count as one word each.

Send check or money order (U.S. funds) made payable to the Piano Technicians Guild, to Classified Ads, THE JOURNAL, 1515 Dexter Avenue North, Seattle, WA 98109.

The Journal does NOT provide blind box service. Please include a mailing address and/or telephone number with your ad.

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

STROBOTUNER ST-II used little. Good condition $250 or best offer. Also technicians tools. List on request. **HENRY BELLANCA 1921 S. SEMORAN BL. — C, ORLANDO, FL 32807 TEL (305) 273-0942.**

PIANOS FOR SALE — Always on hand, 150 to 300 uprights! Plain case, art case and players. Also 50 to 150 grands at all times, as is or rebuilt. Excellent brand names — no junk! All set up for inspection. Lowest possible prices. Call for quotes: **Owen Piano Wholesalers, 2152 W. Washington Blvd., Los Angeles, CA 90018. Telephone (213) 883-9643.**

ZUCKERMANN HARPSICHORD KITS — A real challenge for the interested technician. Factory direct shipment at factory prices. Troubleshooting and advice for kit builders. **Authorized Agent Yves A. Feder RTT, Harpsichord Workshops, 2 North Chestnut Hill, Killingworth, CT 06417. Telephone (203) 663-1811.**

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

GRAHAM ANDERSON, Piano Rebuilding and Repair, 1225 Bennett Drive, Alabaster, Alabama 35007. 20 years experience with Steinway — London. Specializing in replacement of action rails. Also available **GENUINE IVORY KEY TOPS** replaced. Call or write for free estimates. **Area Code 205-664-2527 or 205-663-6449.**

TOOLS FOR SALE, cost $1,000, sale at $500. Conn Strobotuner, model ST 11, new condition — $155.00. Strobotuner Model ST6, good condition $50.00. **Jim Hoffman, 302 Quaker Ridge, Timonium, MD 21093. (301)252-0254.**

PIANO TUNING COURSE — June 27 - August 12, 1983. Summer School, Chautauqua, NY 14722. Concentrated 7-week, hands-on experience — Tuning, regulating and repairing pianos. For information contact: **Arthur Briggs, Director, 1013 Fairmount Ave., W.E., Jamestown, NY 14701, (716) 489-3496.**

A GUIDE TO RESTRINGING will guide you safely through a restringing job with confidence. Increase your income with fully reconditioned, fully rebuilt, fine old pianos. Now almost forgotten, they're out there somewhere in our good old USA, ten million of them! Why not make up for lost income due to the present recession — NOW's the time, not LATER. The price? Less than the cost of a single tuning. A GUIDE TO RESTRINGING, enlarged second edition. Perfect binding — $30.00, hard binding — $35.00. Order from: **John W. Travis, P.O. Box 5359-0359, Takoma Park, MD 20912.**

ACCURATE ELECTRONIC TUNING!! Substantial improvement over any published method. Clearly written instructions. Easy-to-learn routine. Designed for use with Hale Sight-O-Tuner — can be adapted for others. $10.00. **Don Hardin, 2620 Cypress Ave., Stockton, CA 95207.**

COMPLETE HOME STUDY COURSE in Piano Tuning, Regulating and Repairing. Write or call for free brochure. **Aubrey Willis School of Piano Tuning, P.O. Drawer 15190, Orlando, FL 32858. Phone: (305) 299-3690.**

KEY RECOVERING MACHINES for sale. Prices on request. Send self-addressed envelope. Or build your own — send $15.00 for plans, photos, instructions (refund w/purchase of machine). **Solenberger Piano Service, 1551 Lynn Court, Santa Rosa, CA 95405.**

COMPUTER SOFTWARE. Increase your income, not your price. A $3,000 computer/printer system runs my program and much more. Write for free seven page user guide. **Kent Busse, RTT, 1660 W. 104 Street, Chicago, IL 60643.**

FOR SALE: MODIFIED SIGHT-O-TUNERS. Available immediately. All machines have temperature stabilization and precision components insuring 1/10th of a cent accuracy. Lowest prices on complete modifications including oscillator and filter outputs, magnetic pickup and auxiliary inputs, instructions to The Octave Division Temperament system, year guarantee. Call for quotes on trade-ins, new and used SOT, modified and unmodified, or send your unit in for repairs or modifications. **DAVID PITSCH, RTT (801) 225-0156.**

BANFF CENTRE SCHOOL OF FINE ARTS, a progressive institution dedicated to serving excellence in the arts, offers a unique opportunity to apprentice and established piano technicians interested in furthering and refining their skill in intensive concert level maintenance, tuning, repairing and rebuilding of a large number of grand and upright pianos. The successful applicant will want to make full use of the expertise and equipment available and at the same time apply his/her skills in the areas mentioned above in assisting the staff technician. We are looking for a person who is a permanent resident of Canada. This position is from mid-September 1983 to end March 1984 on a salaried basis. Applications should include a resume stating background and experience, and are to be directed to the **Manager of Music Programs, The Banff Centre School of Fine Arts, Box 1020, Banff, Alberta, Canada, T0L 0C0, before the deadline of June 1, 1983.**

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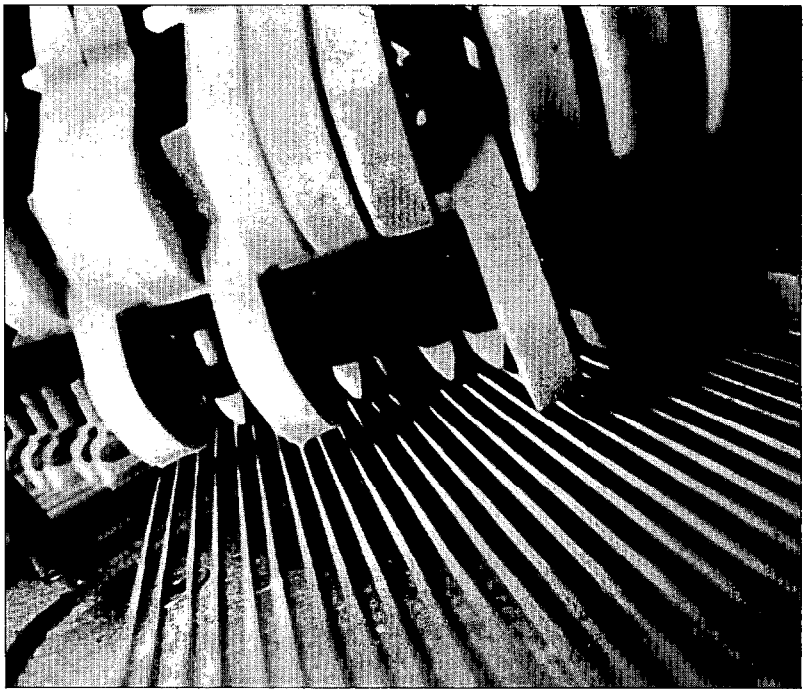

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