PIANO TECHNICIANS
Journal
OCTOBER 1989

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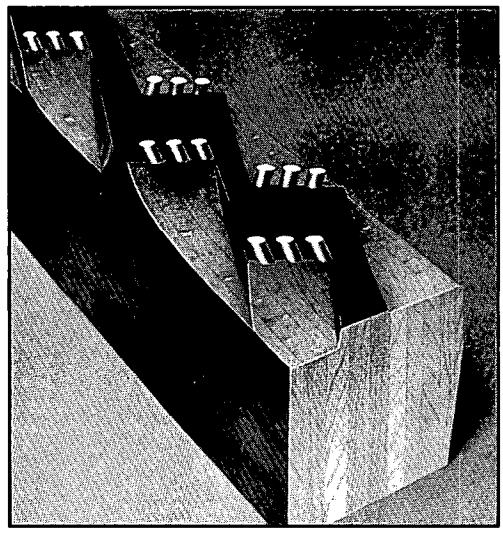

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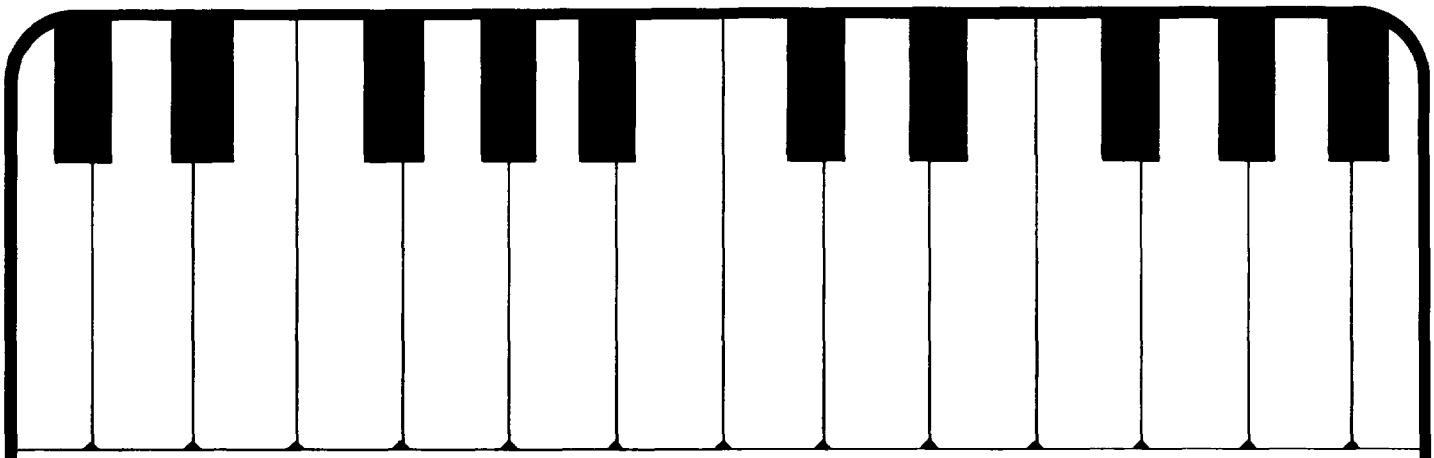

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PIANO TECHNICIANS
Journal

OCTOBER 1989 — VOLUME 32, NUMBER 10 OFFICIAL PUBLICATION OF THE PIANO TECHNICIANS GUILD, INC.

ABOUT THE COVER:

Technical editor Susan Graham uses a Foredom tool in bridge work. See "The Technical Forum," beginning on page 8.

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PRESIDENT'S MESSAGE

Details And Decisions

Ronald L. Berry, RTT
President

Details are an important part of our life. How much attention we pay to them and how we follow up on them makes the difference between doing things successfully or not. In rebuilding a piano it is the attention to details that separates the good job from the mediocre one. Quoting from the book, "Men, Women and Pianos", by Arthur Loesser, "... a fine tone quality is a grace that is only conferred upon an instrument as a reward for long, painstaking devotion to every detail and every essence of its construction, as the distillate of a steady fusion of diverse excellences."

Running an organization is just as dependent on details. Careful planning makes the organization run more smoothly which in turn allows the members to accomplish more for their efforts.

The first area of activity I want to discuss is meetings. Meetings need to be planned well ahead so members can be notified and attend. It is the chapter meeting that is the lifeblood of the organization and the place where most people gain benefit from the Guild. Meetings that are thrown together at the last minute will lack imagination and creativity and won't make as good use of the members' time. Running the meetings takes some preplanning. I have found that it is quite valuable to rehearse the meeting mentally. Doing this will often make you think of problems ahead of time when you can take steps to keep them from happening. Publishing the agenda for the business meeting in the newsletter will give people a chance to think ahead about the important issues. If people are better informed and know how they feel, the business meetings will take less time. When there is a lack of planning, people come up with spontaneous ideas to solve problems which look good at first but are found to have problems later.

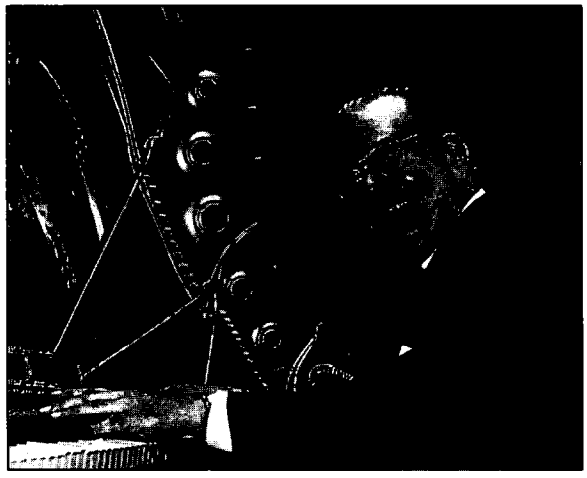
Along with meetings is the newsletter. This can be a simple postcard meeting notice or one of our professional looking newsletters that chapters have. The main function of the newsletter is to disseminate information vital to the operation of the chapter. There are many details involved in making a newsletter, but timeliness is a critical one. When I was newsletter editor for my chapter, I had my share of newsletters that arrived one or two days before the meeting for those in town and after the meeting for those out of town. All the planning done on the meeting itself will be lost if the newsletter doesn't reach the members in time for them to plan. Some chapters work out the whole year's meeting schedule at the beginning of the year and publish it in every newsletter. The time and place for each meeting is established ahead, then the details of each meeting can be put in during the month of the meeting.

What happens after the chapter makes decisions? How well are the actions that are taken followed up? Chapter decisions often involve paperwork or phone calls to make them happen. Everyone is busy with his own work but someone needs to follow up. It pays to make clear at the meeting who will follow up on the action instead of letting everyone assume that someone else will do it. How a chapter treats prospective members at meetings and how it follows up on them certainly runs the gamut from chapter to chapter. People are so glad to see their friends at the meeting that newcomers are often ignored and leave feeling that the Guild is a bunch of snobs. Appointing someone to be sure that newcomers feel welcome is a detail that should be taken care of. Many newcomers are waiting for an invitation to join, and this will require someone making a follow-up call to be sure to personally invite them to the next meeting.

Exams are the area of chapter management which is the most standardized in that the procedures are well documented. Still there are many details that must be attended to before the exam itself such as securing a location and manpower for the exam. Thanks to the guidance of the ETS committee, this facet of the Guild activity goes fairly smoothly in places where exams are happening. Unfortunately, there are some places where exams are just not happening at all and there is little inclination to make them happen.

Making an organization run well is a challenge that takes great attention to details. The rewards of working for an organization are many, especially when you believe in the goals of the organization and can feel that you are really accomplishing something by your work.

In Memoriam



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From The Home Office

Communication Is Key

Why do we join organizations like the Guild? Since we now have 3,704 members, I'm sure there are at least 3,704 good reasons for being a Guild member.

Still, most people join organizations like the Guild for one basic reason: self-improvement. This encompasses a wide range of more specific justifications: improving technical skills, learning how others run successful businesses, obtaining valuable industry contacts, attaining peer recognition in one's chosen field, giving something back in return for benefits already received, or simply developing friends who sympathize with the vagaries of a life in piano service.

> ***'Give a dozen people a task or goal, and you'll get a dozen ideas on how it should be accomplished.'***
>
> **Larry Goldsmith**
> **Executive Director**

For a technician in an area where pianos and piano technicians are relatively sparse, it may be the wealth of technical information in the monthly *Journal* and chapter newsletter. An urban technician may value frequent chapter meetings where the latest technical tips and product information are exchanged. Others may cite the Guild's democratic structure, which allows them a voice in setting standards for their profession.

There's a common thread here. All these reasons and justifications are based on cooperation. Joint action for the common good is what makes an organization like the Guild tick. And therein lie potential problems.

Operating your own business successfully is not for the weak-hearted. It takes self-discipline, single-mindedness and a strong personality, traits that do not necessarily lend themselves to a cooperative state of mind. Give a dozen people an organizational document, and you'll get a dozen different interpretations, how much different depending on how clearly the document was written. Give the same dozen people a task or goal, and you'll get a dozen ideas on how it should be accomplished. And probably none of them is completely wrong.

Through the years, the Guild's strength has been in the ability of its members to agree to disagree and still put the organization's best interests above their own disputes. We've all seen people who will debate an issue until tempers fray and then go out for a drink after the meeting like the old friends they are. Old enemies sometimes make the best friends.

Some Guild chapters are harmonious affairs where everyone sees eye to eye — debates are rare and when they occur, they are calm and reasoned. Others are based on an edgy truce between closely balanced opposing forces. Emotions run high and personalities clash. These two extremes can be found in any group of people in any profession. Who's to say which is better and more productive? The only certain thing is that the worst chapters are those that exist in name only — nobody's talking at all.

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Rebuilding: Tips, Procedures, And Tools

Susan Graham
Technical Editor

A change that taking the post of technical editor has made in my business is that I no longer have the luxury of doing all my own shop work. Like many of us with healthy businesses, I find that satisfying the demand for tuning, voicing and other in-home service, selling and delivering major jobs, and in general "driving the bus" uses up the time I have to devote to piano work. The night and weekend hours which used to be spent in the shop are now more likely to be spent at the word processor. If it weren't for the good fortune of inheriting Shari Weissman and John Ellinthorpe, two well-trained and extremely skilled shop technicians, I'd be in serious trouble—or else out of the rebuilding business.

Recently, however, I was temporarily saved from the service call ratrace by my civic duty: jury duty, to be specific. I recommend the experience; if nothing else, it has broken my habit of threatening to quit the piano business and go to law school. You think piano work is tedious!

After one day present at the courthouse I was excused to spend the remainder of the week on telephone standby: free to stay at my place of work but required to be available with an hour's notice. The result was an enforced week of shop work.

In all honesty, it was one of the most tiring, frustrating and happiest weeks I've spent in a long time. It got me re-involved with a lot of the little details of grand piano rebuilding, and has produced a loose collection of tips, procedures and tools which I intend to present this month.

The project for the week was getting a Steinway B ready for restringing. As we know, restringing a piano is rarely a simple matter of removing and installing wire (although with performance or heavily used new pianos, this may be the case). In general, the older the piano, the more incidental procedures are involved in successful restringing.

Agraffe Replacement

For instance, I usually replace the agraffes in older instruments, as well as in those which have been restrung previously or were in some particular climate or usage which suggests unusual agraffe wear. (Rusty wire can be quite abrasive, flattening the contact point as it is pulled through during unstringing: heavy use tends to have the same effect due to pressure from the exaggerated oscillation of the string).

If the agraffe is intact (not broken off, leaving just a stub in the plate), it should be an easy matter to unscrew it and install a new one. Right? Of course not. This is, after all, piano work.

First of all, there is the matter of size. Modern domestic agraffes come in 7/32" or 1/4" shank, both with a 36 thread (threads per inch). It is unreliable to use the age of the instrument as a clue to which size was installed, so remove a sample and measure it. One will also encounter instruments, particularly older European grands, which have a slightly different thread count and will accommodate neither size. In such pianos, there is often an aesthetic change to consider as well—some of these older agraffes are more substantial and quite differently shaped. They are part of the beauty of the instrument (and the added mass may very well affect voicing due to a more solid termination).

Another important consideration is alignment of the holes. Variation here can affect bearing at the bridge as well as at the agraffe, and can alter string height, which may affect hammer boring. Spacing from side to side is a factor, since this will affect hammer and damper alignment, and in some instances (particularly wound-string bichords) may be critical to keep strings from hitting each other.

In the case of this particular job, the new agraffes were bored so that the individual string holes were a good 1/32" closer to the base of the agraffe (fig. 1). I can't say for sure if this would have made a significant difference in increased bearing and lowered string height, but the situation didn't call for either change and my preference is not to make unnecessary alterations. (There are times when I have deliberately lowered agraffe height to increase bearing).

I opted to use a limited quantity of more suitable agraffes which were on hand, and then to ream and buff the remainder of the original agraffes and reuse them.

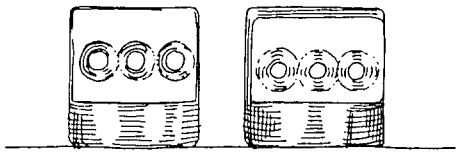


Figure 1

Agraffe Reaming

String-holes in the agraffe are counter sunk from both sides (fig. 2). The result is an hourglass-shaped hole with a very small point of contact for the string. Over time this con-

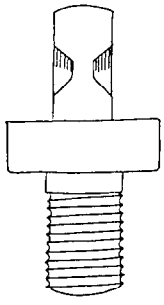
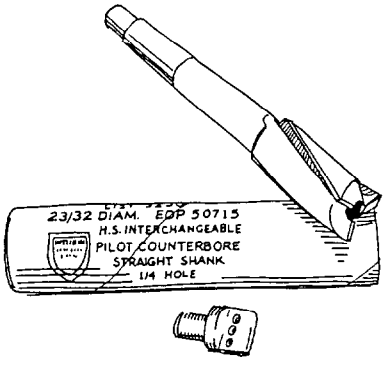


Figure 2

tact flattens or can burr, causing buzzing, zinging and all the other symptoms of poor termination. Abrasive cord, available from some suppliers and from woodcarvers' supply outfits, can be used to renew the holes. It is somewhat random, however, as is the use of a cello string or a tiny rattail file. To really recreate the hourglass shape, I recommend the reamer developed by Chris Robinson (fig. 3).

This tool is made by modifying a #2 5/64" Do-All center drill, which is a lathe tool available from the Do-All Company (1-800-Do-All-Co). The cutting portion must be turned down to 1/16" (tolerance is nominal: +/- .003). The neck must be turned down appropriately to meet the reduced point, and all cutting edges must be resharpened and refluted. It is a double-ended tool: have both ends

Figure 4



reduced, since the first attempt at using this tool frequently results in breaking off the tip.

The modification must be done by a good machinist used to doing precision work. I found one simply by going through the Yellow Pages and calling to find one who would do small cutter grinding jobs (his primary work is on aircraft—look for someone with a shop near an airport).

Chris also mentioned that a #1 bit, from the same source, will sometimes fit older grands with very small agraffe holes, without modification.

To allow clearance under plate struts, etc., Chris makes a tool holder for the bit by drilling a hole in a 6" length of 1/4" drill rod. The reamer *must* be used in a power driven tool: Robinson uses an air-driven drill (his shop is set up to run on air tools) which turns rather slowly at 400 rpm. This speed permits removing a tiny peel of brass from the agraffe hole, without either chattering (which happens if an attempt is made to ream by hand) or removing too much material (the usual result of too high a speed). He reams the hole from the speaking length side only. The angle of the plate surface from the tuning pin side usually interferes with straight access into the hole, and it is tricky to ream uniformly from both sides (there simply isn't enough material to leave much margin for error).

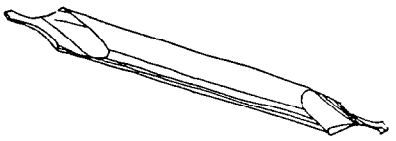
I chucked the bit directly into the Foredom tool handpiece, since I was using it on agraffes which had already been removed (in a happy but misguided assumption that they could be replaced) and access was not a problem. I always use the Foredom with the reostat foot control. In this case, the appropriate speed was determined by increasing it gradually with the bit engaged in an experimental agraffe until the bit just stopped chattering and started reaming. A wedge could be inserted to stop the control at that point, if you have difficulty maintaining uniform foot pressure. Experiment with an old agraffe, reaming it and examining the result with a loupe or magnifying glass to learn how much or how little pressure and time is required to do the job. If access to the agraffe while it is in the plate is a problem even with the tool holder extension, string the agraffes on a wire in order as they are removed, along with any washers which come loose. This gives you a fighting chance of fairly easy reinstallation, but no promises...

Agraffe Installation

For those who may be unfamiliar with installation, the agraffe must face in correct alignment with the strings, but must also be snug to the plate. If it seats just short of the correct alignment, it can be forced no more than 1/4 of a turn to align it; any more and you risk breakage, either immediately (aggravating) or in the future (worse still). If the agraffe cannot be aligned, it must either be shimmed with a thin washer made for the purpose, or have material removed from the base so it can be turned slightly farther.

The washers become available from suppliers from time to

Figure 3



time: at this writing, Schaff has them (although by the time this goes to print they may be out). Get them when you can and have them on hand: they are *not* a hardware store item. For shaving or grinding the base, I adapted Robinson's use of an end mill by locating a tool called a counterbore which has a similar arrangement of exposed blades which will shave brass from the agraffe base (fig. 4). With the two options, adding a shim or removing material, alignment is not difficult to achieve.

Before removing the old agraffes, make a pattern to record the facing or alignment of the agraffe to the strings (fig. 5). It can be done on a piece of masking tape, but my choice is a strip of clear mylar (art supplies). Drill small holes through the ends of the strip into the plate and "pin" it to the plate with brads (ideally, these holes are drilled where they will be covered with understring felt later). Use a scale or a strip of wood, held against the agraffe, and draw a line on the mylar which parallels the "face" of the agraffe. A Sharpie felt marker works well: these will make a permanent mark on almost any surface and are infinitely useful in the shop—we even number screws and other metal parts with them. The agraffe pattern is saved, and all the agraffes are removed

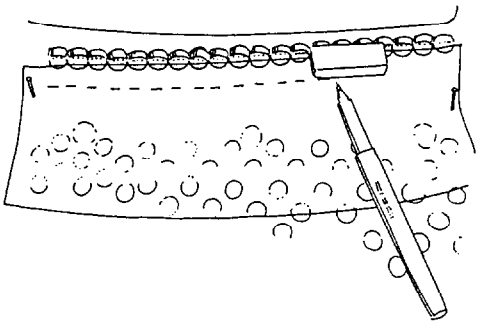


Figure 5

before the plate is sprayed.

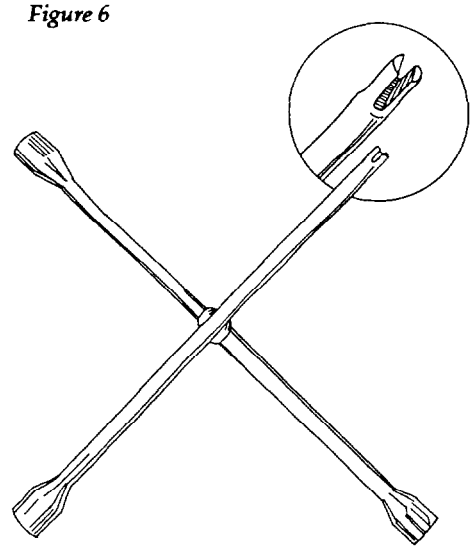
There is a tool that fits the combination handle sold by our suppliers which can be used to remove agraffes. However, the inimitable Richard Davenport has no patience with such slow work and has developed a series of definitive agraffe tools. I've had good success with copying his initial idea, which is to make a tool from a four-way lug wrench (fig. 6). The length of the "arms" of the tool must be enough to allow clearance over plate struts; beyond that, purchase the cheapest you can find. Hacksaw off one end and cut an agraffe-sized groove in the stub. If the diameter of the shank is too large, it will need to be reduced on a grinding wheel or lathe or it may bind where spacing is close. I used an abrasive rod-type blade in the hacksaw to cut the groove, although others have achieved the same result with a small grinding wheel in a Foredom or Dremel tool. After the crude cutting is done, deburr all edges with a file and/or a buffing wheel: brass agraffes are soft and may be marred if the tool is too rough. You will also find that agraffes are not a uniform thickness, which may require some re-cutting of the groove.

The cross arms of the tool act as a flywheel, so it can be engaged on an agraffe and spun, controlling it by loosely guiding the top arm. The problem which Richard encountered was an inclination of the tool to slip off and mar the plate. He has refined a T-shaped version of the same thing with a sleeve over the business end which prevents slipping.

If the agraffes seem particularly stubborn, you may want to use a small brush to put a drop of a penetrating ruster at the base of each one prior to removal. Don't spray it on, since the plate is going to be refinished, and it is a good policy to keep it as clean as possible (even though it will be washed thoroughly and wiped down with naphtha). Needless to say, if the job is being done without removing the plate from the vicinity of the pinblock, lubricants are definitely not advised.

Removing the agraffes permits easy access to the plate surface around them to clean it up and sand it smooth—another in the millions of little steps which make a good, clean appearance to a rebuilding job. The threaded holes are exposed, so use compressed air to dry

Figure 6



them after the plate is washed. Before I spray the plate I put roofing nails (thanks, Wally Brooks, for that suggestion) in the holes to keep finish out of them. (If you happen to use these gold-sprayed nails later, on your roof, it will afford all kinds of amusement to subsequent roofers).

Installing New Agraffes

After the plate is sprayed, install the new agraffes. The first step is to use the appropriate tap to clean and renew the threads in the holes. These taps are also *not* a hardware store item: order them from your favorite supplier and have them on hand. It isn't necessary to run the tap all the way down into the hole—only as far as the shank of the agraffe will extend. Be sure not to cross the threads. It would be fastest with the tap in an electric drill, but I do it by hand with a tap handle to keep a "feel" on the alignment.

After the threading is renewed, and armed with the Davenport agraffe tool, the counterbore and a package of agraffe washers, installing new agraffes is a relatively simple operation. As stated, the agraffe must face in the proper alignment, being forced no more than 1/4 turn but fitting snugly to the plate. It may be helpful in a case of one which does not fit to mark one corner of it with a Sharpie before removing it either to shave the base or add a washer: if a mark is made, it gives you a reference to determine how much effect either the shaving or the washer has had. Otherwise, it can be confusing—has the alteration been so effective to allow a complete revolution, returning the agraffe to the same incorrect alignment? Or did it do nothing? A little concentration should yield the ability to achieve consistent and predictable results in the fitting process.

The counterbore (or end mill) can be used to remove more substantial amounts of brass, substantially reducing the thickness of the base and lowering the holes closer to the plate. This will remedy the problem of holes in new agraffes being drilled much "higher" than the old ones, permitting control over bearing changes. Care must be taken not to force the resultant exposed, non-threaded portion of the shank into the threaded section of the plate, however. As pointed out by Isaac Sadigursky several months ago, this a major factor in causing agraffe breakage. If it is unavoidable to reduce the base this extensively (enough so there is an appreciable unthreaded portion of shank going into the plate), the threading at the very top of the agraffe hole in the plate should be reamed to provide clearance. This is done with an appropriately sized drill bit. It must be done carefully, since the drill bit is inclined to pull itself down into the hole. It is counterproductive to end up with no threads at all.

"Fuss, fuss, fuss," you say, over a very little part of a piano, and I agree. However, there is no question that the cleaner and more solid the termination points of the speaking length—bridge, agraffe and capo—the better. Tone is better, the piano is easier to tune and voice, and the customer is happier.

Speaking Of The Foredom...

A very handy, relatively small and inexpensive tool, the Foredom is the big brother of the moto-tool. Several models are available; I use the "S" series motor, the #44 B handpiece and the reostatic foot control (fig. 7). There is a set of graduated collets available, which is necessary for various sized bits.

Foredom Scrapes Bridges

This tool becomes more and more useful in the shop as one becomes accustomed to its use and abilities. For instance, I use it to "scrape" between bridge pins (see cover photo). The bit in this instance is a woodcarvers' item, available where Foredom or mototool accessories are sold. It is a fluted steel grind-

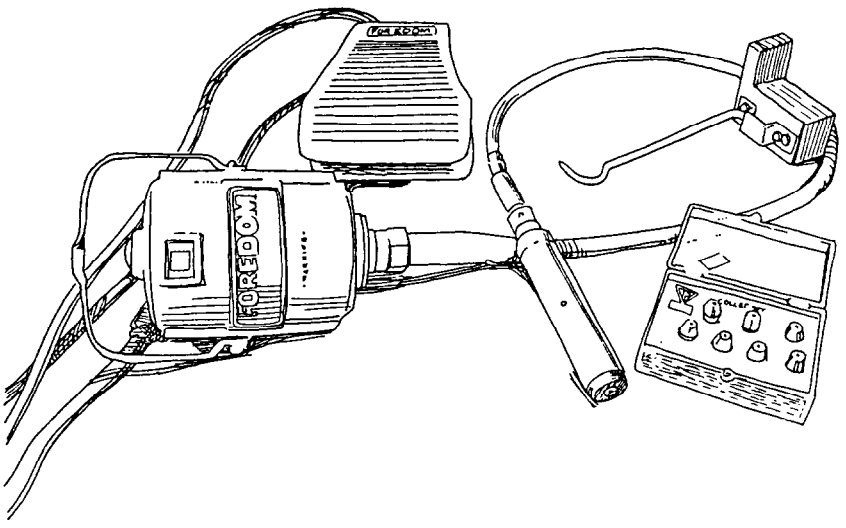
ing bit, pointed and conical, and fits between bridge pins. This permits removing built-up old finish, dirt, etc., which interferes with clean termination at the bridge pin. It also yields a very new, "finished" look to the bridges. Much like polishing the tops of the bridge pins (with a belt sander), this is a little detail which a customer may not notice specifically, but which contributes to the general impression of a well-done job.

The Foredom comes with a metal hanger which could be mounted to a wall or bench, but I fixed it to an L-shaped chunk of pinblock material so I can clamp it to any convenient surface. Varying the speed with the foot control, controls the speed of the cut and allows me to do very fine work as well as quick wood removal of a more crude variety. In the case of between-the-bridge-pin work, care must be taken not to gouge out too much wood but with a little practice this becomes a quick, fine operation, taking about 15 minutes to do both sides of both bridges. (This job used to take an hour, working with a very tiny chisel/scraper).

Foredom Shapes Hammers

The Foredom can be used to do anything a moto-tool will do. At the risk of causing shock waves, I find this includes shaping hammers (fig. 8). I never had much luck doing this with the moto-tool, since the high rpm of that tool inclines it to gouge and scallop—at least, in my hands. Once again, the speed control feature of the Foredom makes it a more appropriate tool. I use the small rubber drum and sanding bands available for the moto-tool.

Figure 7



Hammers which may need this kind of shaping are the softer, domestic style which often require quite a bit of felt removal when they are first installed to achieve tone without excessive use of hardeners. This topic could lead into a long discussion of the merits of various hammers, voicing methods, etc.—but it isn't going to (at least not now).

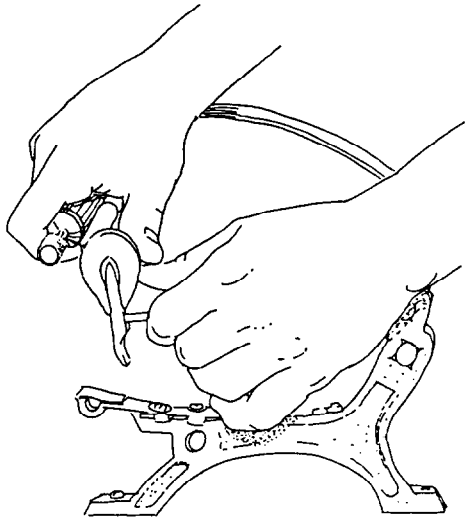
The hammers you choose to use in rebuilding are largely a matter of preference; many of us become accustomed to one style of hammer, learn to work with them, and prefer to stick with them. I also give consideration to maintaining some consistency with the original design of the instrument. For instance, I use Steinway hammers (New York) on New York Steinway pianos, and I do find they need shaping—sometimes a lot. To save time in the initial shaping process, I use the Foredom: the job is finished by hand with a sand paddle.

The Foredom is particularly useful in removing felt from the lower portions of the hammer—nearest the shank and the tail. Many times we concentrate too heavily on removing felt from the striking point, and ignore the excess hanging down below. This creates a lot of bad voicing: insufficient felt is left covering the molding, but the hammer is still too heavy and overweight either to sound or work properly with the action. Steinway is quite specific about the desirable shape; learning to achieve that shape (which I finally did, under the careful tutelage of the one and only Franz Mohr) is critical to working with their pianos. I think of this shape as the pointed end of an egg: rounded, but with a definite slope to the shoulders leading up to the strike point, and a similar slope going down toward the tail. Steinway has a technical bulletin on the subject and it would be best to consult them for an illustration.

One thing which I have come to realize is that if the hammers have had no shaping other than the rough sanding they receive just out of the press, shaping them is not a matter of slavishly following layers of felt around the circumference, but is a process of creating a specific shape out of the mass of wool. Layers are watched at this stage, but more to be sure of maintaining an even surface *across* the hammer. It is not to dictate that equal amounts of felt be removed from all points around the circumference of the hammer.

For instance, it is usual that only enough is taken off the actual striking point to even out any "cup" left when the hammers are cut apart. It is critical, however, to insure that the strike point felt is attached to the shoulder felt; otherwise a loose tuft may be left on the surface. This is the hazard many of us encounter in trying to achieve too pointed a shape.

Figure 8



As stated, it is often necessary to remove a quantity of felt from the very lower edges of the hammer. This may result in (or call attention to) a protruding staple: squeeze it with pliers to sink it into the felt (it can cause damage to the backcheck).

After I have achieved the basic shape with the Foredom, I finish by hand with 40- or 60- grit paper on a paddle. I learned from Mr. Mohr to use a plain slat about 10" long with the paper simply glued to it (spray adhesive) so there is no handle in the way and I can pull felt off with a long, efficient stroke. Once again, I am still more focussed on removing felt from the upper and lower shoulders and not the strike surface. Hit the hammer with the paddle at the beginning of the stroke, rather than simply laying it against the surface. This helps the sandpaper bite into the felt.

Sometimes I could swear I can feel with the paddle when I have reached the layer I want: the point at which excess soft felt has been removed and I have discovered a workable hammer underneath. Other times may require some trial and error, of finishing off the shaping and trying the action in the piano, only to decide that another complete filing is necessary. I finish off the hammers with finer paper (220) in a strip, backed with duct tape, to polish the surface and remove any remaining loose fuzz. Finally, I use an electric hammer iron to smooth the surface, being sure to keep the strike point level so it will strike all three strings simultaneously. Ironing can also be done with a conventional clothes iron—wool setting, of course. Prop the tails so the hammers are at strike position. Be sure to iron the entire surface of the hammer—shoulders as well as strike point. This has a slight shrinking effect on the outer layer of felt, which seems to improve the tension/compression balance and help the hammers' ability to rebound from the string.

Often, with good shaping, polishing and ironing, the hammers produce enough tone so the piano can be played for an initial break-in period before I need to add any chemical hardeners to the felt. It is acceptable and usually necessary to do some "juicing" (also a long topic not being discussed here) but I prefer to keep it to a minimum, hoping to achieve good tone and still have a resilient hammer.

Other styles and makes of hammers (particularly the hard-pressed) do not usually require as much shaping, and I do not employ the Foredom on them. Other soft-style hammers, such as Baldwin or Isaac, may occasionally require such heavy felt removal, but more often they require enough less filing so they are best done entirely by hand.

Hard-pressed hammers are quite different: they may require little or no filing and should not be attacked with coarse grades of paper. They may need the cup removed, or the edges "broken"—a slight rounding of the corner between the top surface and the side—but the primary voicing I do on these hammers is deep vertical needling to open up the felt and create more resilient shoulders, leaving a hard core just at the crown with sugarcoating over the strike surface itself.

Clearly, this is not detailed instruction in hammer shaping and voicing, but I wanted to mention the usefulness of the Foredom in some instances, and that lead me to make the point that different styles of hammers require very different treatment—we could go on and on.

The Foredom is a useful and manageable tool with a variety of functions for the imaginative technician. It is available through McCall Piano Service (who also carries a tiny belt sander attachment intended for hammer shaping—best use of this tool calls for the reversible model Foredom motor, also obtainable from McCall). It can also be found at some hardware stores and woodworkers' supply outlets. I'd be very interested to hear other uses that my inventive friends in the technical community have discovered—and I'll be sure to pass them along. ≡

And Now, A Few Words About The *Journal*:

In recent years the editorial staff (Larry, Rick, and Susan) has held a meeting during the international convention to discuss the *Journal* with any and all interested parties. Carl Root, as chairman of the Economic Affairs Committee, joins us to express the plans and needs of his committee, which is charged with preparing articles on business topics for the *Journal*. The International Relations Committee, with Ed Hilbert as chairman, also receives and submits appropriate material.

For the benefit of those unable to attend, here is a summary of the guidelines and suggestions for writing for the *Journal*:

1. Material in almost any format is welcome. This includes questions, brief technical tips, longer articles, book reviews, responses to other articles, and suggestions of interesting material in other publications which we may be able to reprint.

2. Typed, double-spaced hard copy (on paper, in other words) is suitable. The layout is done on a Macintosh at the Home Office. However, since both Rick and I are in IBM-style systems (mine is an AT clone and Rick's an Atari with some IBM capability), and since the material sent to the home office can be entered into the computer via a scanner, if it is good quality type on paper, this is currently the most useful form for submissions.

The scanner (and the editor) has difficulty picking up handwriting, including corrections on otherwise typed copy —it is better to type corrections on a separate sheet and indicate where they are to be inserted.

3. Artwork: Here again, good clean line drawings, done on *unlined* paper, scan nicely. Black and white photographs are also suitable. Photocopies of pictures, either from other publications or from prints, are useless—please send originals or other material which will photocopy well. Be sure to give exact credit of sources so we can obtain permission, if necessary. *Color*: the only place we currently use color (due to high publication cost) is on the cover. We always appreciate good cover art (although it may be some time before it is used). Color slides are the best format, and both "art" and functional shots are welcome.

4. Anyone wishing to do extensive work on a particular topic should contact the appropriate editor or committee chair, in advance, with an outline of the material intended for coverage and a writing sample. This prevents duplication of effort, and allows the editorial staff to gauge interest in particular topics. Material pertaining to tuning should be sent to Rick Baldassin, 2684 W. 220 N., Provo, UT 84601; technical material should be submitted to Susan Graham, 2967 Madeline St., Oakland, CA 94602; business and economic affairs should be sent to Carl Root, 3 Tapiola Court, Rockville, MD 20850; material pertaining to international relations should go to Ed Hilbert, 37 Pleasant St., Bristol, VT 05443; PTG-related internal affairs should go to Larry Goldsmith at the Home Office, 4510 Belleview, Suite 100, Kansas City, MO 64111.

5. If submitted material is a reprint from another source, be sure to include full name and address of the publication, date and issue number. We must have this information to obtain permission to reprint, and to give proper credit. (Due to our small circulation and the non-profit nature of the organization, we have success in getting permission to reprint: this is proving to be a valuable source of material).

6. "Gray pages" material sent to Larry Goldsmith sometimes can be included in the current issue if it reaches the Home Office by the first of the preceeding month. There is at least a seven week lag for all other material. The editors are charged by bylaws to acknowledge receipt of material within a month. This we strive to do; however, it may be some time before material is used in the magazine.

7. All material submitted is considered for publication. Unfortunately, the editorial staff does not have time to review and/or comment on innovative or controversial material which the author is not ready to see published. In other words, whatever we get, we may print.

8. The Editorial Advisory Committee serves as a review board, and is available to evaluate material submitted either by the editors or by writers wishing another opinion about their material *following review by the appropriate editor.* ≡

The Stretch Calculator: Another View

Rick Baldassin
Tuning Editor

Our first letter this month comes from Alan Cate, RTT, of the Los Angeles Chapter. Alan writes:

The letter from Patrick Poulson in the March issue of the Journal *and Ron Berry's reply in the July issue bring up some important points for those of us who tune using Dr. Sanderson's Stretch Calculator with either the Sight-O-Tuner or Sanderson Accu-Tuner. According to Patrick, three applicants, each using the Stretch Calculator program, failed the tuning exam because of notes judged to be flat in the range of C3 to A3. The piano was a Steinway D, and aural verification confirmed that those notes were indeed flat.*

Ron Berry is entirely correct in pointing out the importance of determining the best Stretch Number, and perhaps that was part of the problem in this case. But I have a different point to make in regards to the Stretch Calculator. Because of the way the Stretch Calculator program is constructed, it is susceptible, for some pianos, to giving poor settings for the lowest notes of its range (C3 to F3), even when the correct Stretch Number is being used.

The Stretch Calculator covers a range of 3-1/2 octaves (C3-F6). It is usually the half octave that is problematic. Beginning at F#3 and moving upwards to F4, there is a series of 12 "octave-double octave" groups, that is F#3-F#4-F#5 through F4-F5-F6. The Stretch Calculator relates the notes in each of these groups by using the same coincident partial with slightly different cent offsets for stretch. Take, for example, A3-A4-A5. The Stretch Calculator specifies that the partial A5 be used for each note, and gives settings of 0.7 for A3, 1.7 for A4, and 3.0 for A5. This means that we are tuning a 4:2 octave which is 1 cent wide from A3-A4, a 2:1 octave which is 1.3 cents wide from A4-A5, and a 4:1 double octave which is 2.3 cents wide from A3-A5. These octaves and double octaves are constructed with a precise amount of stretch, perhaps more than some people might prefer, but a precise amount nevertheless. As we move down the scale past F#3 to F3 through C3, on the other hand, this relationship no longer holds true. Whereas F#3 is related to F#4 and F#5 in that the same coincident partial is used to tune all three, F3 and the notes below it have no such relationship to their octaves and double octaves. F3 is tuned using partial F5, but F4 and F5 are tuned using partial F6. Because of this, there is no way to control the amount of stretch at the 4:2 octave and 4:1 double octave. In other words, in order to tune F3-F4 as a 4:2 octave, we would have to control the 4th partial of F3 (F5), and the 2nd partial of F4 (F5), but the Stretch Calculator won't allow us to do this because it uses the 4th partial to tune F4, not the 2nd.

I can only assume that in creating the Stretch Calculator, Dr. Sanderson came up with the three octaves (F#3-F6) first, and then discovered that he could tack on, as it were, an additional six notes by extrapolating the descending progression of cent values for the 4th partials, and, of course, verifying that these values would work on a number of pianos. And it works. The Stretch Calculator almost always gives very good results (except for wrapped strings which extend up into the range of the Stretch Calculator on smaller pianos).

Recently, however, I encountered a new Bosendorfer concert grand which behaved similarly to Patrick Poulson's exam piano, that is, when tuned with the Stretch Calculator, the lowest octaves in the stretch range were clearly too wide. In this case, I found it necessary to raise the settings for C3 through E3. I have tuned other pianos where similar changes were necessary.

Another point touched upon in this discussion is the fact that pianos of the same make and model do not necessarily have the same tuning characteristics, particularly

Table 1: Note, Octave, And Cent Settings For A 5.0 Cent Stretch Number

Note	*Sat*	*Cents*	*Note*	*Sat*	*Cents*	*Note*	*Sat*	*Cents*
C 3	C 5	-3.2						
C#3	C#5	-2.9						
D 3	D 5	-2.5						
D#3	D#5	-2.1						
E 3	E 5	-1.7						
F 3	F 5	-1.2						
F#3	F#5	-0.7	F#4	F#5	0.6	F#5	F#5	2.3
G 3	G 5	-0.2	G 4	G 5	1.0	G 5	G 5	2.5
G#3	G#5	0.3	G#4	G#5	1.4	G#5	G#5	2.8
A 3	A 5	0.7	A 4	A 5	1.7	A 5	A 5	3.0
A#3	A#5	1.2	A#4	A#5	2.1	A#5	A#5	3.2
B 3	B 5	1.7	B 4	B 5	2.5	B 5	B 5	3.5
C 4	C 6	2.2	C 5	C 6	3.0	C 6	C 6	3.9
C#4	C#6	2.7	C#5	C#6	3.5	C#6	C#6	4.3
D 4	D 6	3.3	D 5	D 6	4.0	D 6	D 6	4.7
D#4	D#6	3.9	D#5	D#6	4.4	D#6	D#6	5.0
E 4	E 6	4.6	E 5	E 6	5.0	E 6	E 6	5.5
F 4	F 6	5.3	F 5	F 6	5.5	F 6	F 6	6.0

pianos which have been restrung or rescaled. The Bosendorfer mentioned above surprised me because it differed from what I had previously found tuning other Bosendorfers, including a concert grand of the same model, and only a few months older.

Our thanks to Alan for his letter. In order that we might more easily visualize what Alan was speaking about concerning the construction of the Stretch Calculator, I have printed the notes, partials, and cent settings for a 5.0 cent Stretch Number, in such a way as to illustrate the "octave-double octave" relationships to which Alan referred (shown inTable 1).

From Table 1, the octave and double octave widths in cents and beats per second can be calculated. Table 2 lists the 4:2 octave width for octaves F#3-F#4 to F4-F5, 2:1 octave width for octaves F#4-F#4 to F5-F6, and 4:1 double octave width for double octaves F#3-F#5 to F4-F6.

Dr. Sanderson specified that the Stretch Calculator give 4:2 octaves that were 0.5 bps wide. From Table 2, we can see that this is indeed the case. Notice that the progressions for the 2:1 octaves, and 4:1 double octaves are smooth progressions, as well. Alan's statements about the construction of the Stretch Calculator, with its octave and double octave relationships are correct. Although Alan does not mention it, the relationship for note F3 is valid as well. I will explain why this is so.

The Stretch Number in this case is 5.0. The Stretch Number is determined by measuring the difference between the 2nd and 4th partials of F4. Therefore, if we know the cent setting for the 4th partial of F4, the cent setting for the 2nd partial will be 5.0 cents below that. In this case, the 4th partial of F4 is at 5.3 cents, so the 2nd partial would be at 0.3 cents. Knowing the location of the second partial of F4, we can now calculate the cent width and beat rate of the 4:2 octave from F3-F4. The 4th partial of F3 is -1.2, and the 2nd partial of F4 is 0.3. This makes the 4:2 octave 1.5 cents wide, which translates to 0.6 bps. Note that this is in line with the F#3-F#4 octave, which also beats at 0.6. So far, we have shown the validity of the octave and double octave relationships for notes F3 to F6. Let us now examine notes C3 to E3.

It was Alan's feeling that Dr. Sanderson simply "tacked on" notes C3 to E3, by extrapolating the downward progression of cents. If this was the case, what assumptions were made in the process? Let us take a closer look.

If we were to measure the Stretch Number of notes C4 to E4, we could calculate the width of the 4:2 octaves from C3-C4 to E3-E4, as was done for the F3-F4 octave. When measuring the Stretch Number, the distance between the 2nd and 4th partials is measured. You may recall from our discussion of inharmonicity, that the inharmonicity constant for a note can be extracted by measuring the distance between two partials, then dividing by the difference of the squares of the two partial numbers. In this case, since the 2nd and 4th partials were used, if we divide the Stretch Number by 12 (4^2-2^2), we have the inharmonicity constant. Conversely, if we multiply the inharmonicity constant of a note by 12, we have what would be the "Stretch Number" for that note. (Please remember that for use with the Stretch Calculator, the Stretch Number for note F4 must be entered). If we assume that the inharmonicity constants progress smoothly, then the Stretch Numbers for notes C4 to E4 would progress smoothly, also. Let us assume that the Stretch Numbers for these notes were as follows:

C4 = 3.4, C#4 = 3.7, D4 = 4.0,
D#4 = 4.3, E4 = 4.6, F4 = 5.0

Calculating for the second partial as before would result as follows:

C4 = -1.2, C#4 = -1.0, D4 = -0.7,
D#4 = -0.4, E4 = 0.0, F4 = 0.3

Incorporating these projected 2nd partial values into our Stretch Calculator tables, we can calculate the cent width and beat rates of the 4:2 octaves below note F#3, as in Table 3.

As we can see (in Table 3), the 4:2 octaves from notes C3 to E3 behave very nicely, providing the Stretch Numbers (inharmonicity constants) progress smoothly, and are in line with those of

Table 2: Octave And Double Octave Width In Cents And Beats Per Second

4:2 Oct	*Cents*	*Beats*	*2:1 Oct*	*Cents*	*Beats*	*4:1 Db Oct*	*Cents*	*Beats*
F#3-F#4	1.3	0.6	F#4-F#5	1.7	0.7	F#3-F#5	3.0	1.3
G 3-G 4	1.2	0.5	G 4-G 5	1.5	0.7	G 3-G 5	2.7	1.2
G#3-G#4	1.1	0.5	G#4-G#5	1.4	0.7	G#3-G#5	2.5	1.2
A 3-A 4	1.0	0.5	A 4-A 5	1.3	0.7	A 3-A 5	2.3	1.2
A#3-A#4	0.9	0.5	A#4-A#5	1.1	0.6	A#3-A#5	2.0	1.1
B 3-B 4	0.8	0.5	B 4-B 5	1.0	0.6	B 3-B 5	1.8	1.0
C 4-C 5	0.8	0.5	C 5-C 6	0.9	0.5	C 4-C 6	1.7	1.0
C#4-C#5	0.8	0.5	C#5-C#6	0.8	0.5	C#4-C#6	1.6	1.0
D 4-D 5	0.7	0.5	D 5-D 6	0.7	0.5	D 4-D 6	1.4	0.9
D#4-D#5	0.5	0.4	D#5-D#6	0.6	0.4	D#4-D#6	1.1	0.8
E 4-E 5	0.4	0.3	E 5-E 6	0.5	0.4	E 4-E 6	0.9	0.7
F 4-F 5	0.2	0.2	F 5-F 6	0.5	0.4	F 4-F 6	0.7	0.6

Table 3: Projected Cent Settings And Octave Width In Cents And Beats

Note	*Sat*	*Cents*	*Note*	*Sat*	*Cents*	*4:2 Oct*	*Cents*	*Beats*
C 3	C 5	-3.2	C 4	C 5	-1.2*	C 3-C 4	2.0	0.6
C#3	C#5	-2.9	C#4	C#5	-1.0*	C#3-C#4	1.9	0.6
D 3	D 5	-2.5	D 4	D 5	-0.7*	D 3-D 4	1.8	0.6
D#3	D#5	-2.1	D#4	D#5	-0.4*	D#3-D#4	1.7	0.6
E 3	E 5	-1.7	E 4	E 5	0.0*	E 3-E 4	1.7	0.6
F 3	F 5	-1.2	F 4	F 5	0.3**	F 3-F 4	1.5	0.6
F#3	F#5	-0.7	F#4	F#5	0.6	F#3-F#4	1.3	0.6

** Calculated based on projected Stretch Numbers for notes C4-E4.*
*** Calculated based on actual Stretch Number for note F4.*

note F3 and above. Problems arise when this progression is not smooth, or is not in line with those notes above. This is common in pianos which have wound strings which fall in the lower range of the Stretch Calculator, as Alan has pointed out. Here, the inharmonicity often does not follow the rules shown in Table 3. For this reason, it is my recommendation that wound strings not be tuned as part of the Stretch Calculator, but individually as octaves.

Dr. Sanderson confirmed that Alan was correct in his assumptions about lower notes of the Stretch Calculator. He stated that the values for these lower notes were based on inharmonicity constants which decreased by a prescribed amount. He stated that you could project these constants for an octave or more below note F3, but felt in many cases, problems could be encountered. He found that in most cases, however, the projection down to note C3 worked out satisfactorily. He agreed that if the inharmonicity constants for notes C3 to E3 decreased faster than the Stretch Calculator projects, the octaves might sound too wide. This is probably the case with the Bosendorfer which Alan mentioned, and the re-scaled Steinway D on which Patrick took his exam, although this is speculation on my part, because I have never actually measured these instruments.

In conclusion, when tuning with the Stretch Calculator, it is important to listen carefully to notes C3 to E3, to make sure that the interval progressions behave nicely, and that there is a smooth transition into the bass. In addition, it is recommended that the Stretch Calculator be used on plain wires only, and not on wound strings, where the inharmonicity constants are less likely to progress smoothly.

Our thanks to Alan Cate for his letter and analysis. Our next two letters are in regard to the letter from Dennis Gorgas on the subject of actual frequencies to be entered into the inharmonicity formulas, which appeared in the August 1989 issue. The first is from Fred Tremper, RTT, of Morehead, KY. Fred writes:

I was interested in your response to Dennis Gorgas' letter in which you recommend using note numbers in a scaling formula instead of frequencies. It is possible, however, to convert note numbers to frequency quite easily. The formula that will do this is:

$$2^{[(n-1)/12]} * 27.5 = fn$$

Formula 1, where n = note number, f = frequency, and fn = frequency of a note. A = 440 Hz is assumed.

For example, what is the frequency of note A-49? Using Formula 1, we get the following:

$$2^{[(49-1)/12]} * 27.5 \text{ Hz} =$$
$$2^{(48/12)} * 27.5 \text{ Hz} =$$
$$2^4 * 27.5 \text{ Hz} =$$
$$16 * 27.5 \text{ Hz} = 440 \text{ Hz}$$

Using the figures you cited in your response, the frequency of note 88.375 (that is, note 88 plus 37.5 cents) is 4277.67, which is 91.66 Hz higher than the theoretical frequency of note 88.

The frequency for note 1, entered as 0.813 (or note 1 minus 18.7 cents) is 27.2 Hz, which is 0.30 Hz lower than the theoretical frequency of note 1.

If you have occasion to find the note number of a given frequency, the formula (which is the inverse of Formula 1) which will do this is:

$$12 * [\log (f/27.5)/\log 2] + 1 = n$$

Formula 2, where f = frequency in Hz, and n = note number. A = 440 Hz is assumed.

You can use Formula 2 to find the number of cents deviation from theoretical. For example, what is the cents deviation of the frequency 442 Hz? The answer is 49.079, which is read note 49 plus 7.9 cents.

As another example, I understand that G. F. Handel's personal tuning fork was measured at 415 Hz. Plugging 415 into Formula 2, we find the answer is 47.987, that is, note 47 plus 98.7 cents, which is almost note G#-48.

Finally, let me point out a typographical error in the sentence that begins on line 7: "Piano fundamental frequencies below A-49 are higher...." In this case, "higher" should read "lower."

Our thanks to Fred for his letter with formulas and correction. Using Formula 1 which Fred has mentioned, you can work with the note number, plus or minus cents, and still use the formulas which call for frequency. Another useful formula calculates the cent deviation between two frequencies. It is:

$$[\log (f2/f1) * 1200]/\log 2 = \text{cents deviation}$$

Where f1 and f2 are frequencies in Hz. Answer is in cents.

For example, if we want to find the cent deviation between 440 and 442, utilizing the above formula, we would find that the deviation is 7.85 cents.

The above formulas should be helpful to those interested in converting note numbers, frequencies, and cents. Our next letter comes from Kent Swafford, RTT, of Lenexa, KS. It is also in response to Dennis' letter. Kent writes:

I do not understand Dennis Gorgas' use of the term "equal temperament" in his letter published in your August Tuning Up *column. He writes, "The equations all use fundamental frequency values taken from the equal tempered scale. In a piano, A49 is the only note whose fundamental frequency is equal to its counterpart in equal temperament." His using the term "equal temperament" in this way seems to suggest that equal temperament is only theoretical, and that we use something other than equal temperament when we really use pianos.*

However, our musician customers use the term "equal temperament" to denote the modern tuning which aspires to the smooth progression of beat rates among chromatically ascending tempered intervals. (Actually, these are Bill Garlick's words; a musician might describe equal temperament as that tuning in which a given interval or chord has the same quality in any key). The point is, that to a musician, equal temperament is quite real and in use every day, and is distinguished from the unequal historical temperaments (just intonation, meantone temperament, Werckmeister well-temperament, etc.).

There are any number of ways we can acknowledge the differences between frequency tables and what we really tune. We can describe the equal temperament of frequency tables as abstract, theoretical, mathematical, twelfth-root-of-two, model, or textbook equal temperament. We can describe the equal temperament that we really tune as functional, practical, stretched(!), or real-world equal temperament. Take your pick, or make up your own, better terms.

Theoretical equal temperament has evenly spaced fundamental frequencies; real-

world equal temperament does not have evenly spaced fundamental frequencies, but even so, due to the smooth progression of beat rates of chromatically-ascending tempered intervals, real-world equal temperament is *equal temperament.*

Or at least that is what we call it. Our thanks to Kent for his letter. The issue here may be one of semantics, but there are some issues here I would like to address. Using Kent's "textbook" and "real-world" definitions almost denies that "textbook" equal temperament exists in the real world. Yet it does, and we as piano technicians have to distinguish it from what we tune on the piano for our musician customers on a fairly regular basis. When, you might ask? When they ask us to tune the piano to the organ, or to a synthesizer, or other electronic keyboard. What is our response? Usually, that we will do our best to tune the instrument to the same pitch as the other instrument (A49 is the only note...), but that because of inharmonicity in the piano, they will *never sound in tune with each other.* Since the electronic keyboard *is* tuned in equal temperament, the piano must not be, even though the temperament we tune the piano in we call "equal temperament."

I do not dispute that our aim is as Kent says to create a "...tuning in which a given interval of chord has the same quality in any key." Through the midrange of the piano, what Kent says about the increasing speeds of ascending intervals holds true, as well. In the last several months, however, many graphs and charts have been published which show thirds, fourths, and fifths turning inside out at some point in the piano. Let's face it, it's not equal. It's not even the same from one piano to another!

The problem is that we are trying to pin the same name on two temperaments which are at the same time very alike and very different. As long as we understand the differences, I have no problem calling what we tune on the piano "equal temperament" like Kent does, or using the term like Dennis does, to signify the tuning which is on organs and other electronic keyboards, which happens to correspond to the mathematical or theoretical model of equal temperament.

Our final letter comes from Charlie Huether, RTT, of Clifton, NJ. Charlie writes:

I wish to compliment you on the August article, "Before the Concert with Jeffrey Kahane." Your frank questions and answers provided a considerable insight to the mutual problems of technician and performer. I think it is a worthwhile item for reprinting and to carry around in one's tool kit for distribution to those customers who never seem to believe or to trust your attempts to convince them of the great importance of proper regulation.

You had a most cooperative and authoritative subject for your interview. You asked the right questions and I think we should all be pleased that he gave the right answers.

Thank you so much for your letter of support. I hope that these interviews have helped to provide insight, not only for us as technicians, but for the managements we work for, as well. Through better understanding and cooperation, all should benefit.

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

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Key Leveling

Bill Spurlock
Sacramento Valley Chapter

When approaching a piano, one of the first places your glance is likely to settle is the keyboard, and you are likely to gain a strong impression of the piano's condition from its appearance. Keys that are level, square, and evenly spaced project a sense of precision and order, while keys that wander up and down like the waves on the ocean are an outward indicator that all is not well inside. This "first impression" from the keyboard is obvious to the musician as well as the technician, making all key work deserving of our best efforts.

Level, even, and stable keys are the foundation of action regulation. In this article I will present some methods for laying this foundation and will continue with further regulation steps next month.

Preliminary Steps To Key Leveling

Before we can level keys we must first be sure that the keyframe cloth and punchings are in good condition (not moth eaten) and that the backrail cloth is free of wood chips or other debris. (When one or two keys are found to be low in an otherwise level set, always check for something on the backrail propping up the back of the key.) Also, check to make sure that the key bushings and balance pin holes are properly eased so the keys can move freely. *Important:* worn balance pin holes in keys are caused as much by our using improper technique as by the owner's hard playing. Whenever a key is lifted up off the balance rail pin, it should be done carefully, by lifting the rear of the key somewhat as well as the front, to avoid binding and ovalling out the balance hole. Dirt piles up around the pin inside the mortise and causes the key to bind, which makes it necessary to manhandle the key to get it off, resulting in a "pully " key. The leveling procedure will be faster, easier and less damaging if the keys are all carefully removed initially and the dust blown or vacuumed out. The keypins can be cleaned if necessary and a dry film lubricant such as Slide-All or McLube 1725 (use no petroleum!) is sprayed on the pins. After this treatment the keys will seem to almost jump on and off the pins.

If an accurate job of spacing and squaring is to be done, worn key bushings must be replaced. On vertical pianos, capstan adjustments should be in the ball park so that the full weight of the wippens rests on the keys. For grand actions, capstans must be adjusted such that all hammershanks are up off their rest rail or felt. Also the grand keyframe must be bedded to the keybed, and the action stack mated to the keyframe.

Tools for Key Leveling

Various devices are available for measuring key level including the straightedge, the metal rack assembly which includes devices for measuring keydip, and the key level indicator which slides along the keybed while a floating plunger rides on the keytops. This last tool is the least useful, in my opinion, since it will transfer any unevenness in the keybed surface to the keytops. It also does not indicate whether the keys are square. The metal rack type leveling systems seem to me to be too complex and expensive to do a fundamentally very simple job.

My preference is to use a wooden straightedge, 3/8" to 1/2" thick so it will stand on edge on the keytops, and long enough (47 1/2") to span the length of the keyboard. These are available from supply houses, although I made mine by sawing off a 1/2" thick scrap of pinblock material and giving it a good lacquer finish. This laminated "straightedge" has stayed true for years. The straightedge can be rested on keys #1 and #88 which have been propped up to the desired height with the supports shown in Figure 1.

Figure 1: Propping Up End Keys to Support Straightedge

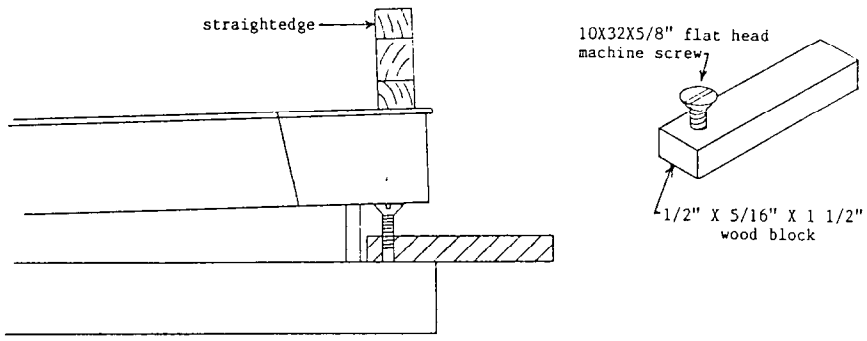


Figure 1

Some prefer a straightedge which is slightly crowned in the center, the idea being that the center keys get played more and will therefore settle more, so that they should start out a little higher. A crowned keyheight may preserve the level appearance of the keyboard a little longer, but the regulation will deterio-

rate just the same since any key settling results in a reduced keydip.

For inserting paper punchings I use a supply house punching lifter; these sometimes are made a little too wide to fit between keys easily. The lifter can be much easier to use if it is filed to just under 1/2" wide and the sharp edges are rounded and polished with a buffer. For leveling grand keys without removing the action stack, 5" long tweezers or various small medical forceps can be used.

Leveling Keys in Verticals

Let's look first at the vertical piano with under-key felt still in good condition but keys somewhat out of level from settling. Typically on such a piano the middle of the keyboard will have settled from compression of the balance rail punchings but the top and bottom keys might still be at their original height. Keys that have settled will have reduced dip, which together with other wear in the action can cause "blubbering" hammers or at least poor repetition due to increased checking distance. Some keys will also be out of square due to wear of the balance rail key bushings, and key spacing might be uneven due to wear of the front bushings.

In such a case we should first determine what remedy is appropriate for the situation. If the piano has a heavily worn action and keytops that are dished and chipped, then a careful key leveling job would be a waste of your time and the customer's money. Rather, shimming up the balance rail to take the sag out of the center keys and restore keydip will correct symptoms in a wholesale manner until the action can be rebuilt or the instrument replaced. If the instrument is basically in good condition a suitable approach might be to shim up the balance rail as needed until all keys are at or near the correct height, touch up the squaring and spacing, and then add paper punchings as needed to complete the leveling. By first doing a wholesale keyheight adjustment with shims under the balance rail, the job will go faster and be more stable than if we pile up thick stacks of paper punchings under each balance rail cloth punching.

When doing a touch-up leveling I proceed as follows: Lay a full length straightedge on edge across the keys and sight between the keytops and straightedge, looking to see if keys are out of square. Square keys by bending the balance rail pin toward the bass or treble using a soft (aluminum, brass, or wood) drift, not a sharp screwdriver which will nick the keypin. I like to use a 1/4" brass rod, held in a universal tool handle, with a dimple drilled in the end. This dimple keeps the tool from slipping off the top of the keypin and gouging key buttons as it is bumped with the palm of the hand (see Figure 2). Square the sharps in the same manner. Next, remove the straightedge and check the keys for even spacing. If the key bushings are loose you will have to compromise here. Space the naturals evenly, and center the sharps between the naturals, by bending the front keypins as in Figure 3. Be sure to place the spacing tool under the front punching to avoid nicking the pin. (Have you ever noticed a red dust on the tops of some front rail punchings? A check of the front pins will usually reveal a burr which is eating away at the key bushings). Whenever you space or square a key, you are moving the back end of the key as well; be aware of any capstan alignment problems or rubbing keys that might develop in the process.

Figure 2

Figure 2: Squaring Keys by Bending Balance Rail Pin

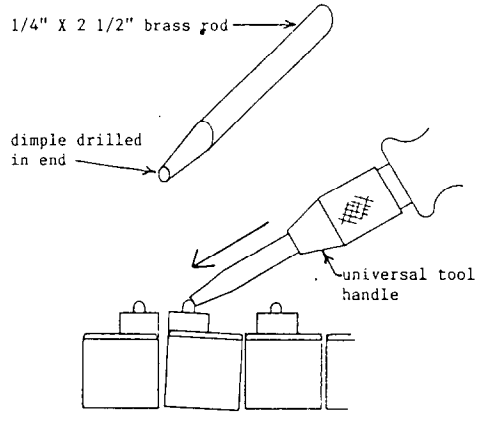
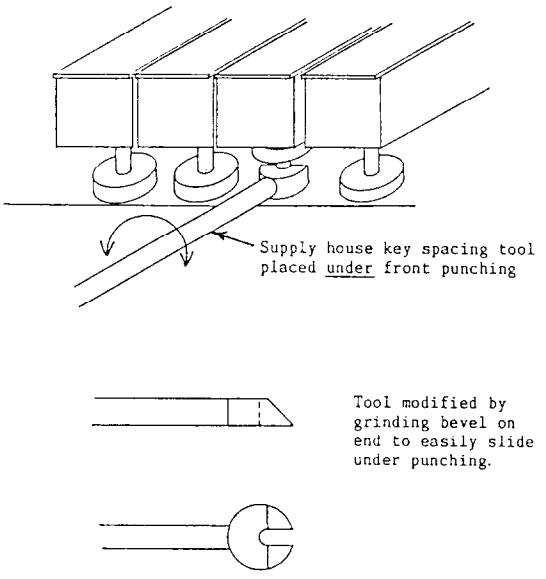


Figure 3

Figure 3: Spacing Keys



With squaring and spacing done, place the straightedge back on the naturals and lift it slightly around note 20 and tap it lightly on the keytops to reveal any keys that are too high. Do the same thing around note 70. Remove a thin paper punching from any key that is too high, and repeat for the sharps. Next, look for areas of the keyboard that are generally lower than the desired level, and estimate how much too low those areas are. These areas can then be raised in wholesale fashion by inserting shims under the balance rail at the appropriate points. Usually the balance rail is mounted to the keybed with four or five screws spaced evenly along the rail. Removing a few keys at each screw location will give access to these mounting points so that the rail can be pried up and shims inserted. Business card stock and writing paper are useful thicknesses of material to use here. To raise an area on both sides of a screw location, cut a V notch in the paper and slip it around the screw and all the way under the balance rail. To raise an area on one side of a screw only, place the shim only on the low side. Always re-tighten the screws before rechecking with the straightedge. This procedure should put all keys close to the right height in about 10 minutes.

In Baldwin pianos the balance rail rests on screw heads in several spots, and is held down against these "jacking" screws with screws from above. By

first loosening the screws that hold the rail down, the adjusting screws (accessible through holes in the rail) can be turned up or down to set rough keyheight easily. An inconvenient feature of some new pianos is a balance rail that is stapled and glued to the keybed, requiring leveling to be done entirely with paper punchings.

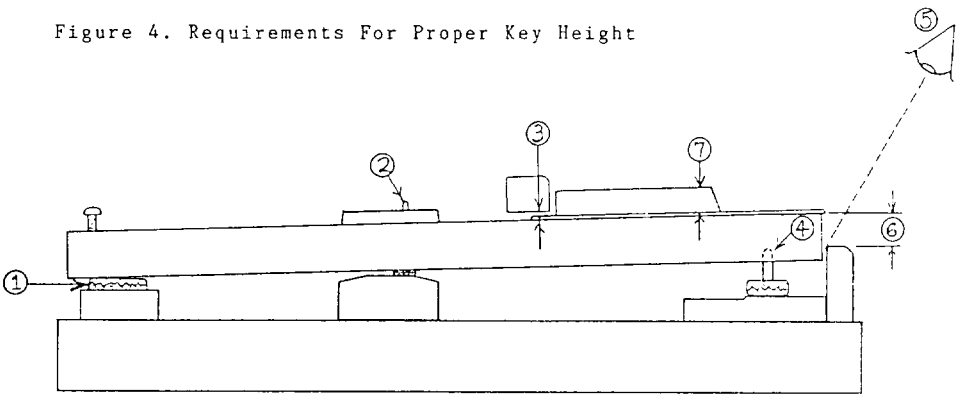
Once rough keyheight is set, put the straightedge back on the naturals and go along the keyboard laying out paper punchings half as thick as the gap you see between the level stick and the keytop. I have heard various schemes described for measuring the gap, but I really think this is making the job too complicated; once you have done this a couple of times you should be able to eyeball the gap and know very accurately which thickness of punching will do the job. Just label your punching containers in thousandths of an inch so you know their relative values. Lay the punchings on the keybed, in front of the key they are to go under, and *don't sneeze.* Remove the level stick and insert all the punchings *under* their respective felt punchings.(It is a waste of time to lay them on top of the felt with the intention of putting them under later, since the level will often be affected by their location.) As each key is replaced on its pin, play it two or three times while holding pressure down on the back end of the key to settle the punchings.

Replace the level stick and tap to check for any keys that are too high. Lay out paper punchings again as needed. Watch for any final squaring to be done. The fewer paper punchings you leave under the felt the more stable will be the leveling job; therefore as you insert additional punchings you should install one thicker paper in place of multiple thin ones when possible. Common lore is that multiple paper punchings should always be arranged with the thinnest toward the top. I have never heard a reason given for this, but placing them in this order does make it easy to combine like-thickness punchings into one thicker one.

After two times through the level should be getting very close; at some point you have to decide when you are at the point of diminishing returns. For me this point is when keys look and feel level, and when the discrepancies are quite small considering we're dealing with wooden sticks resting on felt pads. Follow the same procedure in leveling the sharps.

Figure 4

Figure 4. Requirements For Proper Key Height



① - Backrail cloth thickness must be such that capstan can be adjusted to correct height. Also cannot be so thin that front of key sits too high.

② - Balance rail pin should extend above key button to allow squaring adj.

③ - There must be enough clearance between keys and fallstrip or fallboard that keys can be lifted at least 1/16" at front. Fallstrip can be shimmed up if necessary.

④ - Front key pin should extend at least 3/16" into front bushing.

⑤ - Naturals should not be so high that bottom edges of keys are easily visible.

⑥ - Naturals must be high enough that they are still well above keyslip when depressed.

⑦ - Sharps should be approx. 1/2" above naturals. Sharps must be low enough that joint between sharp top and key wood is not visible above naturals, but high enough that they are still above naturals when depressed.

Setting a New Keyheight — Verticals

When the original key level is incorrect, or when we have replaced the under- key felt, it is necessary to determine a proper keyheight and to level all keys from scratch. If the piano is of recent vintage, a specification for keyheight may be available from the manufacturer; on older pianos specifications may not be available. However in either case there are certain parameters that keyheight must fit into that are easily determined from the piano.

Let's look first at choosing and installing replacement under-key felt. I would normally try to match the thickness of the original back rail cloth in order to maintain capstan height in the original range. A little guess work may be necessary here if the original cloth is severely moth damaged. The original cloth will usually be glued down only at the forward edge, with the rear half of the cloth (the part the key actually rests upon) left free. This method makes for more quiet key return than if the entire width of cloth is glued down. Some inexpensive pianos have a very narrow backrail cloth which is heavily glued down; these pianos generally have a lot of key return noise that can be reduced by replacing their backrail cloth with one of full width as above.

Having replaced the backrail cloth, we are then ready to determine a workable keyheight according to the parameters shown in Figure 4. These requirements will give us at least a range within which the keys will fit the case parts and will operate properly. Note that several of these requirements are interdependent so an average height will have to be found to best suit them all. However, some parameters can be adjusted independently. For instance, if the proper keyheight leaves insufficient front or balance key pin protruding into the key, using a thinner felt punching together with shimming up the entire rail will raise the pins without affecting keyheight.

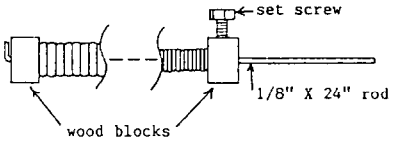
One additional consideration to be aware of in verticals with tall dowel type capstans and in grand actions is the effect of keyheight upon action leverage. As the front of the key is raised slightly, the contact point of capstan to wippen moves closer to the wippen flange center, resulting in slightly more wippen lift for a given keydip, and a slight increase in touch weight. The key word here is "slightly"; in my experiments I have found the effect of raising keyheight by 1/16" to be barely measurable. This information does tell us, though, that after key leveling we should check to make sure dowel capstans are all in line fore and aft as well as side-to-side, and their wires adjusted if necessary.

Having determined a workable keyheight, we next must choose a proper thickness of balance rail felt punching. One option is to select a relatively thick felt punching and then use a few paper punchings as needed to level the keys. However, thicker felt has more potential for settling than does a thinner felt, and if we're going to go to the trouble of doing a good leveling job we want it to last. Using a thin felt over a thick cardboard punching may be more stable but makes for a slower leveling job. I find it most expedient and stable to place a medium-thin felt punching over one .005" paper punching on each keypin, and to shim up the entire balance rail as previously described until most keys are at the correct height. If there are a couple of keys that are too high when the majority are correct, even after I remove the paper from them, it is not against my religion to file the bottom of the key slightly around the balance hole. I then proceed with leveling as previously described.

When replacing front rail punchings we might also wish to minimize settling of our keydip adjustments by using a thinner felt, and setting a rough keydip either by use of thick cardboard punchings or by shimming up the entire front rail. The latter method leaves more front pin sticking up into the key, and there may be some situations where the pin could bottom out in the mortise when the key is fully depressed. The "sponginess" of the front rail punching affects the touch of the piano; an overly firm front rail punching can give the unpleasant sensation of bottoming out

Figure 5

Figure 5: Felt Punching Compressor



against wood at the bottom of the key stroke. On the other hand, very spongy punchings are likely to settle more, and make it harder to judge a uniform keydip in the first place. I normally use "extra quality" front rail punchings, available from some suppliers, which are moderately firm and 7/8" rather than 3/4" in diameter. For the balance rail, I use either pitch pin punchings, which are made from firm bushing cloth, or medium-thin punchings. To pre-settle these I place all front rail and balance rail punchings on the fixture shown in Figure 5 and leave them under compression for a couple of days prior to use. The object here is not to turn felt into cardboard but just to eliminate most of the settling that we know is going to occur anyway.

When replacing under-key felt, it is usually best to discard all of the original paper punchings as well. At best they will be different colors than the ones you will be using, so you will not know what thicknesses they are. At worst they will be old and brittle, and may crumple as you slide your punching lifter under the felt punching.

Leveling Grand Keys

As previously mentioned, an important preliminary step to key leveling in grands is bedding the keyframe to the keybed and mating the action brackets to the keyframe. This work will probably not concern us when touching up the key level, but must be tended to before setting keyheight from scratch. For an excellent discussion of keyframe bedding see the Yamaha video tape, "37 Steps of Grand Regulation", or its accompanying book.

When setting a new keyheight on a grand action, such as after felt replacement, all adjustment must be done with felt thickness and paper punchings (balance rail glide buttons are *not* keyheight adjusters). This initial setting is easiest to do with the action stack removed so the keys can be taken on and off the pins. I use "key leveling leads" which clip onto the backchecks and cause the keys to stand up in front so I can choose an appropriate cloth and paper combination that will bring most keys up to the desired height.

The actual leveling could be done in the same manner. However, a more accurate job will result if the leveling is done with the actual weight of hammers and wippens on the capstans, rather than with a lead weight hanging on the backcheck; in other words, the action stack should be in place. To allow placement of paper punchings on the balance pins without removing the keys, the punchings are split and inserted through the keyframe from below. First, with keys 1 and 88 propped up and the straightedge in place, lay out the paper punchings in front of their respective keys. Next, cut a split in each punching with small scissors or centerpin nippers and slide each one partly under its front rail punching (to hold them in place when the action is stood up). Pad the stretcher to avoid scratching the finish with the drop screws, pull the action out, and stand it up on the backrail on the keybed. With the front rail leaning against the palm of one hand, lift a key slightly (not so much that the balance hole is strained) and hold it up with the fingers of that same hand. Then, reaching between the front and balance rails, use your other hand and tweezers to lift the balance rail felt up 1/2" or so, grab the paper punching and insert. For an excellent illustration of this technique see the aforementioned Yamaha video tape. Repeat the procedure for the sharps. Like many other operations, the first time you try this it may seem difficult, but isn't that what you thought the first time you tried to operate a tuning hammer? This method really is the most accurate and convenient means of leveling grand keys; just give it a try!

Setting White Keydip

Since the proper keydip dimension depends upon other regulation dimensions, I will save discussion of choosing a keydip for next time. For now, let's assume that we know what keydip we want and are ready to set it. Assuming we are to use a dip block on the naturals, we will be judging a key's dip from the level of adjacent keys. Therefore the accuracy of our dip adjustment depends upon the accuracy of the leveling and

squaring job we have done. As I mentioned at the beginning, key leveling is the foundation of our regulation. If the piano in question has worn, dished keytops and worn key bushings, squaring and leveling will be compromised and it will be a waste of time to get too fussy with keydip settings.

Whatever the circumstances, keydip setting involves making two judgements on each key: first, we try to depress the dip block and key with the same force each time, and next we judge whether the top of the dip block is even with adjacent keytops. I find this process tedious because it involves the two separate movements/judgements of depressing the key and then sliding the finger over to feel the neighboring keyheight. If I feel the neighboring key to be lower, then my next thought is that maybe I'm not pressing the dip block down hard enough. This may not be one of life's major dilemmas; but, with 52 keys to adjust, any streamlining helps. I have found that the simple dip block modification shown in Figure 6 makes setting dip simpler and more accurate. When this dip block is depressed, at the instant the key hits bottom I have my "reading" in the form of a visible movement of the neighboring keys (in the case of excessive dip) or the absence of any clicking of the cross piece on the neighbors (in the case of insufficient dip). Since this is a one-step test, it is very fast to move from key to key and therefore maintain a uniform pressure on the dip block. This tool works especially well when keytops are dished and uneven; since our leveling stick rested only on the high spots of the keytops, the cross piece of the dip block will reference the same spots and automatically ignore the low points. The result is a more consistent dip setting achieved with less guess work.

Figure 6

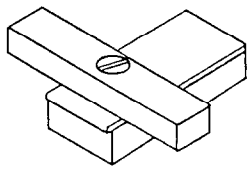
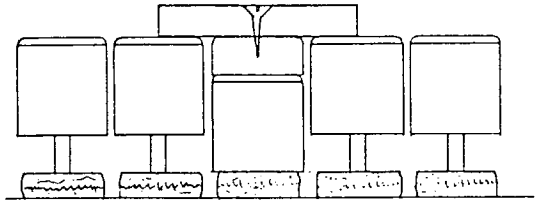


Figure 6: Modified Dip Block



Conclusion

We hope this series has been useful. Perhaps this is a good time to restate our philosophy that "basic skills" are nothing less than the component parts of so-called advanced work. If we rush to make our first pinblock before mastering neat stringing techniques, or take on the job of hammer replacement before fully understanding regulation principles, the end result will suffer. However, by giving proper attention to the basics we do better work at all levels.

Next month I'll continue with a look at vertical action regulation. ≡

Drum Repetition (Very Rapid Repetition Of One Note)

Kenneth Sloane
Cleveland Chapter

The following article was originally published in three sections in the Cleveland, OH, Chapter Newsletter *Butts and Flanges*. The analysis of the problem outlined in the article is fairly straightforward—certainly nothing out of the ordinary. The indicated repair, however, definitely has a controversial air about it; and I highly recommend researching all alternatives before trying it yourself. In fact, the repetition problem I was dealing with probably should have been placed in the hands of the manufacturer as a warranty issue. It was my decision to research the action problem as indicated in the article—a decision arrived at because of my own curiosity and because, aside from the repetition problem, the piano was well liked.

I think it also wise to mention that even though the repair increased touch weight (as measured with weights at end of key) a gram or less on most notes and no more than two grams on any note, the problem of inertia must be taken into account. In the December, 1988 *Journal*, Darrell Fandrich and Chris Trivelas have an excellent article about this; anyone interested in doing high quality work should familiarize themselves with the concepts they discuss. In regard to my action, I am sure I added some inertia to the system, but I want to have more feedback from the pianists before I alter anything else. I hope you enjoy the article.

This article was part of a letter to Seinway & Sons about a new model "D" piano that the Oberlin Conservatory of Music recently purchased. In addition to other correspondence, it outlined the procedure I used to isolate the variables that contributed to poor drum repetition on many notes of the piano. The following is a copy of the above-mentioned procedure plus a short paragraph to orient the reader to the problem:

I found many notes that would play intermittently during drum repetition, several of these sticking when the rear shoulder of the hammer jammed against the check (the key would not move down at this point). I may add that different "touches" at the keyboard help or exacerbate the condition. I suspect that the speed of the finger on and off the key plus the depth of the finger into the key and the height of the finger off the key all are variables that the pianist adds in helping to determine the success of a note's repetition. There were notes on our new "D", however, that would not repeat reliably with any finger technique. And in our business, even one bad note out of 88 during a concert is not acceptable; so I picked two of the worst offenders (#'s 17 and 38) and followed this procedure:

Symptoms Before Working On Notes

Number 17 would miss a stroke after a few sequences of drum repetition, the rear shoulder of the hammer jamming against the check, creating a stuck note.

Number 38 would miss strokes occasionally during drum repetition and eventually become stuck as above.

The malfunction in both of the above cases happens so quickly and during such rapid movement of the action parts that it is impossible to actually see what is causing the failure. I suspect that either:

a. the jack is not returning under the knuckle sufficiently for the next repetition;

b. the jack is "slipping out" during a stroke of a key;

c. possibly a combination of a and b is responsible.

Assuming my suspicions are correct, what causes the jack to function properly or not? What aspects of regulation give the jack time to situate itself properly under the knuckle for the next stroke of the key? The remainder of this article will analyze these questions and hopefully give us some answers that we can put to practice in our daily work routines.

Measurements Made For Troubleshooting

	Downweight	*Upweight*
#17	57 grams	26 grams
#38	59 grams	27 grams

The downweight is excessive, but the relatively high upweight indicates downweight problem is associated more with mass than with friction (better key weighting would help). Though the high downweight imparts a heavy touch to the key, the high upweight will actually enhance repetition because of a more snappy return of the key. I could easily talk more about these two measurements and their relationship to one another, but that's another subject a together.

Friction levels in Table 1 are acceptable with the exception of the hammer flanges which are below their recommended minimum of three grams.

Table 1: Friction Levels In Action Centers

Hammer	*Flange*	*Support Flange*	*Rep. Lever Flange*	*Jack*
#17	1 Gram	3 Grams	4 Grams	2 Grams
#38	.5 Gram	3 Grams	8 Grams	2 Grams

However, the pinning was firm on these centers with no appreciable wobble on side play. This is actually characteristic of centers such as used in our new "D" (made by Renner of West Germany) that have a bushing cloth impregnated with a black material (graphite) for lubrication. It can be a blessing in disguise at the hammer flange because if friction at the repetition lever flange is also low and/or weight in the hammer assembly is not sufficient (worn hammers, for instance), the reciprocal spring that serves both the repetition lever and the jack has to be set so light to avoid a "blubbering" hammer that the tension to effect a positive return of the jack is sacrificed. However, I have dealt with similar situations before without repinning and managed to get good drum repetition; so I decided to experiment with the pinning as it was.

Spread Measurement (Distance Between Hammer And Support Flange Centers)

I took sample measurements of this distance throughout all sections of the action. It varied between 4 13/32" and 4 7/16". Steinway's specification for this distance when they used their New York - manufactured action parts was 4 13/32". The action in question used Renner parts, and I am not sure that the specification is the same. Visual inspection, however, showed the relationship between these centers to be acceptable as the back edge of the knuckle core when the hammer assembly was in its proper rest position. See Figure 1.

The figures in Table 2 are average numbers for each section. In no category did the extremes in any section vary more than 1/16" except with string height in the bass which varied almost 3/32". The hammer flange center height (the vertical distance between the keybed and action center, and be reminded that it can only be measured on the bench) varied only 1/32" between sections. Repetition seemed to be more reliable in sections where hammers were closer to the theoretical bore.

Table 2: Actual And Theoretical Hammer Bore Analyzed

	Bass	*Tenor*	*High Ten.*	*Treble*	*Extreme Treb*
String Height	8 1/32	7 3/4"	7 3/4"	7 23/32"	7 21/32"
Ham. Fl. Center Height (Subract Above)	5 3/4"	5 3/4"	5 3/4"	5 23/32"	5 3/4"
Theoretical Ham. Bore	2 9/32"	2"	2"	2"	1 29/32"
Actual Hammer Bore	2 7/32"	1 29/32"	1 29/32"	1 29/32"	1 29/32"
Steinway Specs	2 1/4"	1 15/16"	1 15/16"	1 15/16"	1 15/16"

Let's examine those hammers bored less than the theoretical quantity. Given a constant rest position in regard to the shank, a shorter hammer has to travel more distance than a longer on its ascent and descent to and from the string. Of course, we can compensate for this with the capstan adjustment, but only so far. If we raise the rest position of the hammer assembly too high, we lose the "straight-line" relationship between the jack and the knuckle core (see Figure 2). Because the knuckle will probably compress more when the initial force of the key is *not* applied directly under the bottom edge of the wooden knuckle core, I suspect we lose power. Experience tells me that when this condition occurs (a high rest position of the hammer assembly, i.e.) we also run the risk of poor repetition—I am sure for the same reason as the suspected power loss with the compression of the knuckle causing the jack to "slip out" more easily.

Also, varying the hammer bore for any one note while keeping the same tail length will cause the distance between the hammer at maximum check point and the string to vary. It will also vary the time it takes for the different bore hammers to travel the slightly different distances. Obviously, the hammer with the longer bore can go through a repetition sequence more quickly than the hammer with the shorter bore because the distance as described above is less for the longer bore hammer.

The Length Of The Tails

The tail length (measured from the hammershank center to the end of the tail) was very close to Steinway's specifications. They recommend 1" for note one in the bass graduated to 15/16" for the last bass hammer and 1" for the first tenor note graduated to 7/8" for note 88. The tails on the "D" were very slightly longer.

A Brief Summation Of Material To This Point

In previous sections of this article, I searched for the following:

1. Things that would indicate a problem associated with friction or mass.
2. Things that would cause the jack to line up poorly with the knuckle.
3. Conditions that would initiate too much or too little movement for action parts.

In my search for the above, I checked the following:

1. For proper alignment of action rails and hammer action to key frame.
2. Friction at bearing areas and making sure that movement was smooth throughout applicable travel margins.
3. Dimensions of action parts and spatial relationships between them.
4. Upweight/downweight.

Figure 1

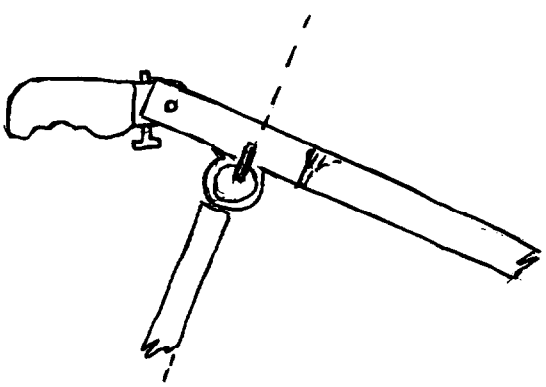
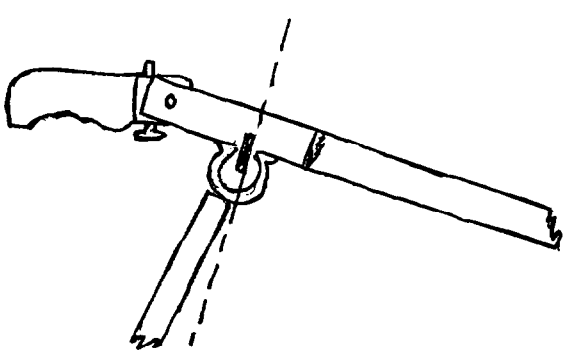


Figure 2



Things I did not do were change knuckles, turn knuckles around 180 degrees (reverse nap), or polish jack tops and repetition lever windows. I personally felt that there was not too much friction in this area (we do need some) since upweight/downweight figures I had indicated no excessive friction in the action, and my suspicions were already leading me in another direction.

Procedures I Tried To Improve Repetition

One question many of you readers may be asking at this point is, "What about the regulation of the action?" As a prelude to all the technical investigation outlined above, I thoroughly checked what I refer to as the "nuts and bolts" part of regulation—namely, the more common adjustments we perform on a routine basis as part of the job. This involves operations such as checking keys for freedom of movement, setting hammer height with the capstan, bending back check wires, positioning jacks under knuckles, etc. I was especially careful on my problem piano to set the checking as high as possible and the tension of the repetition spring on the repetition lever great enough so that the hammer had a snappy rebound on release of the key. The high checking stops the hammer closer to the string (less distance to travel for next repetition) and also stops the knuckle higher so that the jack can return under it more quickly. The snappy rebound of the hammer also aids the quick return of the jack; and the increased tension of the repetition spring, since the jack also relies on it for its sprung movement, serves to return the jack more positively.

I have been successful in fixing poor drum repetition in the past with this kind of "high-string" regulation, but it didn't do the trick with this piano. I went over the above again and this time paid special attention to placing the jack sufficiently under the knuckle and adjusting the height of the repetition lever at the jack window to facilitate good jack return. Poor repetition still persisted.

Repinning To Help Repetition

I decided to add more friction at the hammer action center which would also force an increase in tension of the repetition spring to compensate for the added friction in the hammer assembly. I repinned #17 from 1 gram to 4 and #38 from .5 grams to 3, reregulating as necessary. A point of interest here is that to accomplish the change in resistance for each center, I changed the original nickel silver plated pin (I believe that is its composition) with a brass pin of the same size. The different coefficients of friction for each material in contact with the bushing cloth dictated the different resistance levels when each was placed in a common center. However, note #17 showed no improvement; and note #38 was questionable, still missing strokes during rapid repetition.

Recontouring Hammer Tail To Help Repetition

In the following illustrations, Figure A shows a Steinway hammer with an area designated as a trouble spot. This hump is left during their manufacturing process when the checking surface on the hammer tail is prepared by cutting off (at a 14 degree angle) a small piece of wood. I believe the motive for leaving this hump on the hammer is to keep the checking adjustment more permanent, the hump theoretically preventing the hammer from "sliding down" on the check as it wears and compresses. I feel that if all the checking surfaces are oriented to each other properly, the hump is not necessary; and Susan Graham has an excellent article in the January, 1988 *Journal* about setting up the back check area correctly. I, therefore, took hammers #17 and #38 and sanded this hump off each using the procedure I employ when shaping new hammers. A brief description follows:

With the hammer removed from the action rail, I use a simple jig and a table disc sander to create the approximate 2.5" radius as shown in the illustrations below (Figures B and C). The different thicknesses of hammer cores and the hammer felt close to the shank on tenor hammers (the felt lifts those hammers off the end of my jig slightly) account for the variance in radius; but it is small and insignificant in its effect on checking.

With this recontouring, there was much improvement in repetition for #17 but none for #38. The operative force here for the improvement in #17 is higher checking. The hump is in a position on the hammer that causes it to rub prematurely on the back check as it (the back check) is bent inward to realize higher checking. Without it, higher checking is possible; but we're still not perfect.

Extending The Tail Of The Hammer

This part of the article deals with the solution of the repetition problem by extending the tail of the hammer. Figure C of the below illustrations gives the dimensions of the modification; but before I get into the specifics of the advantages and disadvantages of this remedy, I think it is appropriate to take a look at the checking area of grands in general. Also, as I mentioned previously, Susan Graham included some valuable information about the topic in her January, 1988 Technical Forum.

Analyzing The Checking Area

The checking area of the piano looks pretty straightforward upon first inspection; but as I tried to conjure up some clever ways to "tell it all," I quickly discovered it wasn't going to be that simple. I am sure it is one of the many areas in our modern piano whose evolutionary development was the result of many empirical efforts. Without getting overly involved, suffice to say that I have to deal with the movement of two separate arcs that must barely miss one another during the playing of the key yet intersect while the key is held down after the hammer strikes the string; and the intersection must occur with the two shapes having the proper orientation to one another to ensure checking that is both high and positive (no "blubbering").

On my Steinway "D" action, checking was not high enough. It could easily be argued that factors not directly related to the checking area were responsible (plate too high, for example), but I will discuss these more thoroughly in the summary to follow. Besides, changing the plate height was certainly out of the question; and early experimenting with the repetition problem showed that higher checking would probably do the trick.

Initially, I recontoured the hammer tails to get rid of the bothersome hump I find on all Steinway hammers. Along these lines, Kevin Leary, a good friend and fellow professional from the Cleveland Chapter, described an interesting alternative to me for contouring hammer tails. Rather than a 2 1/2" radius as I use, Kevin feels, "If you can't get high checking without having the

hammer drag on the backcheck, the back of the hammer can be shaped flatter (larger radius than 2 1/2") with just enough of a gentle curve at the bottom of the tail to prevent it from digging into the backcheck." In theory, this would be a better shape for the checking surface of the hammer; but on Steinway hammer tails, the non-checking side of the hammer has a coved area. Any radius much greater than 2 1/2" would create a thin spot in the hammer tail between the innermost edge of the cove and the backcheck side. This could be unsafe structurally, inviting a fracture at the thin spot. I know Kevin does not use Steinway hammers; and his method, I'm sure, works well with those hammers. They probably have longer tails than Steinway hammers anyway, making high checking easier to achieve and less of a problem in general. Besides, the recontouring I did with the 2 1/2" radius allowed the check to be bent in far enough so that checking occurred at the tip of the tail. In other words, the length of the tail was the limiting factor. Also, I am especially fond of the procedure I use to shape hammer tails at the checking surface because it provides uniformity from one action to the next and, in one quick operation, removes the shank end left sticking out after gluing and shapes a very funtional checking surface with a high coefficient of friction between it and the backcheck (needs no additional abrading).

Many of you may have asked at this point why I did not try raising the backchecks. When I measured their height (from the top of the key where the backcheck wire enters to the top of the backcheck), I found them to be at specs with a height of 2 1/2" in the bass graduating to 2 5/8" in the extreme treble.

I have experimented with raising backchecks before, never effecting much of an increase in checking height. This result, at first, was puzzling to me; however, I finally realized that pulling the check up higher on its wire did not change the point at which the hammer dragged on the backcheck. What did change was the contact point of the hammer tail on the backcheck, and the slight increases in checking height that sometimes occurred were not a result of raising the checks per se, but of this change in contact position. When the backchecks were raised on their wires, the checking point was frequently changed to a flatter, less compressed, and less worn portion of the check's surface. The additional surface area for contact between the hammer tail and the check that this new checking position provided produced the slightly higher checking—not (to repeat myself) the raising of the checks per se. Be reminded, also, that raising checks can cause the rear shoulder of the tenor hammers to jam more easily against the check.

Why Longer Hammer Tails To Raise Checking

Short of drastic changes like lowering the plate to bring the strings closer to checking (effectively raising the checking height), my choice to extend the tails of the hammers was one of the few alternatives I had. It may have been more expedient and/or appropriate to raise the hammer action on the key frame or put on new hammers with a longer bore, both of these addressing problems inherent in my "D" action; but the piano sounded very good with the set of hammers it had, and the extensions on the tails, as per diagram C, provided for very rapid repetition. A fringe benefit associated with the extensions, also, was that the longer tails with their gradual contour (2 1/2" radius) provided more contact between the tail and check than before. The end result was absolutely positive checking on virtually all blows, no matter how weak or strong.

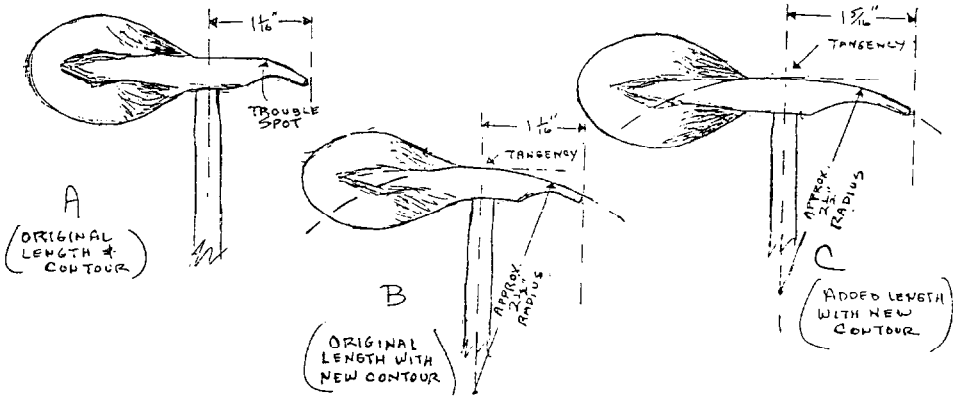
Conclusion

As you may already suspect and as the alternative repairs in the previous paragraph indicate, the repetition problem originated from serious manufacturing error. The proper plate height/action height relationship was not built into the piano. I have measured other "D" pianos, one with a similar repetition problem and one without; and the problematic one has similar manufacturing defects. Lenny Gottrich, a respected, Cleveland, Steinway dealer technician called me after reading the first two articles in this series (it was published, initially, in three parts in the Cleveland Chapter newsletter) and commented to me about the plate height errors he had seen in many new Steinways. I feel that the Steinway piano is, conceptually, the greatest piano I have ever worked on; and it truly saddens me to witness such inexcusable errors creeping into its manufacturing process. I only hope that it can be reversed.

Related Articles To Follow

In a future article, I want to describe the actual extending process of the hammer tail (cutting of extension and hammer, orientation of grain, gluing procedure, etc.) and the effect it has on touch resistance (virtually nil!). I also want to discuss, in more detail, things mentioned that were considered as possible contributors to the problem: things like upweight/downweight relationship, pinning, and hammer bore. It also would be nice to look at the alternative cures I mentioned and to analyze the over-centering problem that must exist in certain areas of the "D" because of the actual bore dimensions being shorter than the theoretical. Analyzing New York parts versus Renner parts would also be interesting because dimensional variances between the two result in different ratios of hammer action movement per unit of key travel. Though the analysis would be complex, this, too, should be investigated in regard to repetition problems.

And by the way, the Oberlin faculty that have played the piano—especially those that went through the before and after variation—love the touch and find the repetition is equal to any piano. Successive strokes of the key during drum repetition occur with minimal depression of the key and are very positive.



Lengthening Tails For Better Repetition: The Process

Tristan Francis
Shop Manager, Piano Technician Department
Oberlin Conservatory of Music

Ken Sloane (see previous article) concluded that the main factor inhibiting repetition was a poor relationship between action and strings: checking occurred too far from the strings. Obviously, lengthening the tails for higher checking would be more expedient than either lowering the plate or raising the action. What follows, then, is the procedure for doing so.

New Specifications

As indicated in Ken's article, he arrived through experiment at a new tail specification of 1-5/16", 1/4" longer than the existing tails. He found that a tail longer than 1-5/16" ran the risk of hitting the support flange on its return to rest. As illustrated in Fig. A, the new length is achieved by extending our customary arc (2 1/2" radius; see Ken's article) to the plane of the inner, non-checking surface of the hammer core. Ken made trial alterations to several hammers which determined that these specifications produced superlative repetition, regardless of finger technique. At this point he showed me what he had done and turned the remainder of the project over to me. Since I had to lengthen the tails of the entire heavy-use area (our re-contouring sufficed in extreme bass and treble), I had to find a method with which to speed the process.

Cutting Old Tails And New Blanks

I devised the jig in Fig. B out of scrap wood and mounted it to the miter gauge of our band saw to ensure uniform 45 degree cuts through the old tails. Note that the path of the blade emerges from the tail just *behind* the end of the shank. The blanks for the new tails were cut from a close-grained maple stock, with the grain oriented along the length (with the tangential grain across the checking surface) as in the existing cores. I cut them oversized and with the requisite 45 degree angle for the glue joint. Then I very carefully sanded any irregularities from the gluing surfaces of each assembly.

Gluing

Using the angled trough we normally use for laying our hammer sets to be hung (Fig. C), I laid out the (tail-less) hammer assemblies with the gluing surface up. After applying fresh wood glue to both surfaces, I manually pressed them together, visually lining the blank up with the existing core. Since we generally work with unbored and unshaped hammers in parts replacement, we shape the *sides* of the tails to favor a vertical tail, regardless of the pitch of the hammer above it. I find that a tail that checks straight into the check aids spacing in the pitched areas, allows even wear into the check (which prevents the formation of ridges in the leather which can hinder re-regulation) and provides more positive checking. I kept this in mind when positioning the new tail blanks. Several seconds of manual pressure (with care to avoid slipping at the glue joint) were all that were required for the glue to hold without clamping. The assemblies were then allowed to dry overnight as in Fig. C.

Shaping The New Tails

Using a compass set at the prescribed 2 1/2" radius, I roughly scribed the arc for the checking surface on the blanks. An unaltered Steinway hammer served as a rough template for the coving. I then rough-cut these contours on the band saw, free-handed. Using our tail-shaping jig (Fig. D), I sanded the final checking contour on the stationary disc sander. Again, I favored the vertical tail, sighting it up with the knuckle rather than the hammer. The coving was fine shaped using a rat-tail rasp and a sandpaper covered dowel.

Finally, the hammers were re-installed and the regulation was checked. All told, this procedure took less than two days' time, including the overnight drying time for the glue. As Ken indicated in his article, the piano which instigated all this now has superb repetition—as good as any of our finer grands.

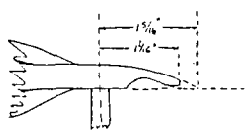
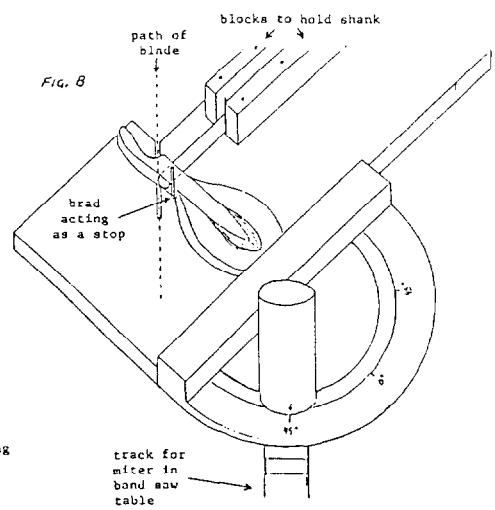
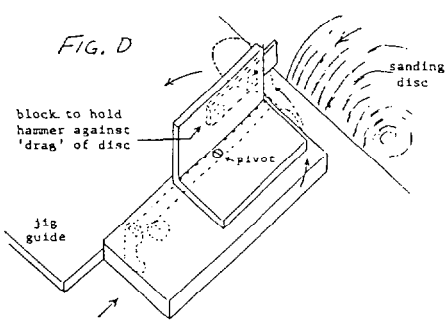
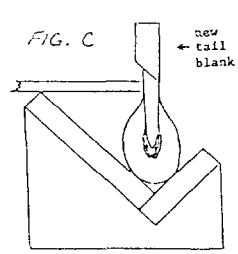


FIG. A







New Soundboard, Old Bridge, Part II: SettingThe Plate

Nick Gravagne
New Mexico Chapter

We left off in the in the August '89 issue having installed a new, soundboard with the original bridge attached. It has been pointed out in past articles that, unless the bridge top is variable through planing, the plate must be set according to the bridge height dimension. That is, the plate's z axis (height) location is here a function of bridge height, which is the reverse of typical piano building. Since the keybed-to-strings dimension must be more or less maintained according to original specs there is not a lot of leeway for setting the plate's z position. Still, given a new, fully-crowned soundboard, the parameters are usually sufficient to comfortably accomplish the job; in fact, many times just placing the plate back to its original z position works out fine with a little rear string rest support-height manipulation.

Of course, the reason that the original bridge is being reused is that it was found to be too good to discard altogether or to require recapping. Although this isn't common, it does happen. Even more typical is a bridge which otherwise is quite good—pins, notches, structural integrity and general tidyness—at the lower half of the long bridge but needs recapping in the top two treble sections.

The Conditions

The new soundboard panel has been carefully planed so that the thickness of the spruce directly under the bridges is essentially the same as the original panel. The soundboard has been installed in the case with the attached original bridge. Since the replacement board has adequate crown it is obvious that the combination of original bridge height and new soundboard crown will restore all the missing downbearing which was discovered in the tear-down investigations. Not yet installed are the pinblock or the plate support system (such as dowels). The pinblock support shelves have been cleaned out. On hand is the plate (which has not necessarily been re-gilded but has had the capo bar bearing reworked and new agraffes installed if appropriate). If plate support dowels are going to be installed, the undersides of the plate bosses at the lag holes will have been trued (as explained in a previous article). The nosebolts have been turned in to their original heights. These will serve to support the plate at its original z location in the middle areas during trial downbearing fittings. Sometimes the nosebolts alone can support the entire plate (which is quite rigid) but other times the front of the plate needs to be supported from the keybed with small jacks and blocks of wood. One jack in the bass and one in the treble is enough.

The Process

The plate is lowered into place and set on the nosebolts. It is not locked into place with the nosebolt cap nuts; it simply sits on the bolt shoulders. If jacks are needed at the pinblock area for front supports they go in next. Supports at the perimeter of the plate are unnecessary. The keybed-to-strings dimension should be checked against tear-down notes by measuring to the underside of test strings which should be located and secured in the high treble and low bass parts of the plate. The idea is to have the plate sitting evenly on all the nosebolt shoulders (check with mirrors and flashlights) when the required dimension is correct. There should be very little adjusting, if any, to bring this keybed-to-strings dimension into spec. It is important to reset this spec for two reasons. The first has to do with maintaining proper action mechanics. The second relates to the condition of front bearing: it is possible to manipulate a plate such that the rear downbearing angle looks perfect but there is no front bearing because the front of the plate has been raised too high. Maintaining the string height dimension avoids this pitfall.

If the plate height needs to be adjusted in order to achieve the proper string height dimension, do so by lowering or raising the jacks and nosebolts. When the correct dimension has been set, place stand-up gauges (such as the combination damper underlever/string height gauge or a quick shop-made version) in place on the keybed. These gauges should not touch the plate or the reference strings. They should stand just alongside the strings thereby indicating the correct height. Later on in the adjusting process a glance will tell how far the plate/reference string has moved as a unit from its original position.

Downbearing can now be checked at several places on both bridges. The carpet thread test, as has been explained in past issues, can be used here but it is a limited and time-consuming process as measurements must repeatedly be made of the gap existing between the test string and the rear string rest. Since the plate may need adjusting up or down many such measurments will have to be made and re-made.

For a better way, refer to Photo 1. Ignore the fact that the nosebolt cap nuts are in, and that the perimeter plate screws have been installed and the piano is being restrung. Imagine that the plate has been temporarily installed as explained above. Notice that a bubble gauge is sitting on the rear segment of a test string. This test string is actually a length of small gauge music wire (size 10 or so, .024") which has had a loop tied in for attachment to the hitch pin. The tuning pin end of the string has been secured to, and wound around, a dowel arrangement as shown in Photo 2. The idea is to get the string up to a tension and then locked there so you can move

Photo 1

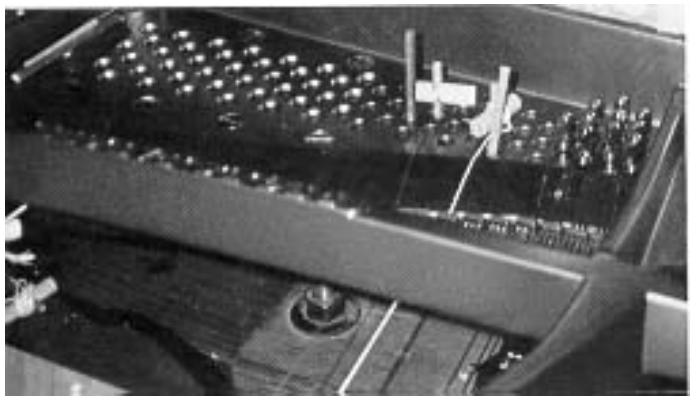


Photo 2

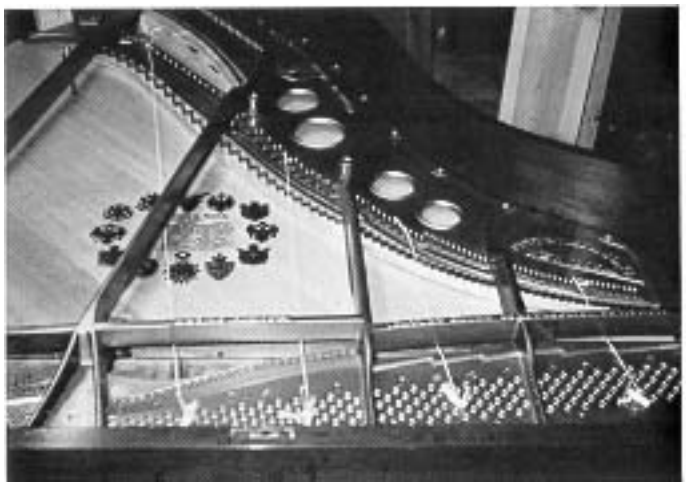


Photo 3

Photo 4

about freely. Using the wind-up arrangement at Photo 2 without a pinblock in place will necessitate some device under the tuning pin holes to prevent the dowel from tipping forward when under tension. The white string in the photos, which even when under tension is too flexible to support any sort of downbearing gauge, only serves to make the understanding clear as the small gauge music wire can barely be seen in a photograph. When several of these test strings have been hooked up and wound to tension we have something which looks like Photo 3. Rear string rest cloth strip samples should be in place under the strings. If the instrument has duplex bars (or whatever), these should also be in place. Now the plate can be raised or lowered and the test strings simply left alone to ride on the plate and bridges.

Gauges

The downbearing condition can now be ascertained very quickly with the bubble gauge. Level the gauge on the speaking string segment and then check the rear string angle away from level. I generally set downbearing angles at 1.5 degrees on new soundboards. If the bearing tests are too shallow, lower the plate a bit by turning down all plate supports. If the tests indicate too much bearing, raise the plate a bit. Now here is where you must integrate your thinking to include several pieces of information at once. From the standpoint of this article, these pieces which must be integrated are many and varied and cannot possibly be covered here. Still, an example set of conditions and appropriate responses might go like this. The bearing in the middle areas is just right, but is too heavy in the upper two treble sections. The right side of the plate is raised by turning the nearest nosebolt, but when this is done the middle bearing loosens a little. So perhaps a thinner understring cloth should be used in the middle area in question or maybe it would be better to build up the too-heavy-bearing sections of the treble and not move the plate at all (which would be my choice). Remember all through these tests that the string height dimension must be held at, or very close to, the original spec, so keep referring to the gauges set on the keybed for this purpose. Generally, most of the bearing adjustments can be made through choosing and adjusting the rear string rest cloths and shims. Uniform downbearing is an ideal but be prepared to make minor compromises.

Although a bubble gauge is convenient it still must be leveled to each of six or more test strings. The gauge in Photo 4 shows my Woody Woodpecker gauge (so named for obvious reasons). The woodpecker part is glued to a short arm which pivots on a square upright, thin block of wood. The pivot should be a friction fit so the two parts of the gauge can stay slightly locked. To set the gauge, rotate the woodpecker point to 1.5 degrees away from the plane defined by the bottom of the upright block. Use a protractor to set. To use the gauge set the bottom surface of the upright block on the speaking string segment and see if "woody's beak" is sitting above the rear string segment or sits below it as ascertained by letting the beak not touch the rear string but, rather, allowing it to fall just to the side of it. Once set, the gauge can be used at all test strings without resetting. It's not as accurate as the bubble,

but it is close enough.

Whatever gauge is used, take care not to apply excessive pressure to the speaking side of the test string. Develop a technique which allows the gauge to rest lightly on the string while you prevent its tipping off.

Lock It In

When the bearing has been satisfactorily set in this manner, make sure that all nosebolts are in fact turned up and touching the underside of the plate. Now install the cap nuts. If the Baldwin plate support system will be used at the perimeter do nothing at this time. But if dowels are going to be used, measurements should be taken now.

The New Pinblock

There are actually four thickness dimensions which need to be measured, one at each "corner" of the block as measured from the pinblock shelf to the underside of the plate. That is, the front and back gaps at both the bass and treble ends where the new block will finally sit must be measured. This information will dictate how the new block must be dimensioned so as to accommodate the downbearing conditions as just set. You might find it easier to start out with a slightly too-thin block, but of uniform thickness, and figure out what combination of shims or blocks or both would be necessary to make up the difference. The shims, which might work out to be wedges (as oriented front-to-back) should be glued to the underside of the block.

Instead of measuring the pinblock-to-shelf gaps you might consider cutting and fitting blocks of wood into the gaps. These blocks will then be used to gauge the new pinblock thicknesses at the ends. Be careful not to spring the plate up in the process or your gauge blocks will be too thick.

Final

Remove the plate and install dowel supports if appropriate. Install the new pinblock. When the plate is installed for the last time you might want to take a quick carpet thread bearing test for assurance sake. If the new block is going to be glued and doweled in, consider a temporary dry-fit with pinblock screws only. Lower the plate in again for a test fit and bearing check to make sure that everything is fitting together correctly and no measuring mistakes have been made.

ECONOMIC AFFAIRS

The First-Time Call

Carl Root
Economic Affairs Committee

How you approach your first time service calls will determine the success or failure of your business. It's as simple as that. If the piano owner is left with a positive impression when service has been completed, you will have a better chance of adding their name to your list of regular customers. Regular service is what this business is all about because the needs of the piano, player, and technician are all better served with this arrangement.

To be sure, there are tuners who manage to stay in business even though they have a poor record of repeat business. Some survive by attracting a large number of first-time calls with large ads and low tuning fees. This approach may benefit those customers who want only minimum performance from their pianos and wish to spend no more than an occasional nominal tuning fee. However, the piano will suffer from this approach since its performance will be limited to the player's assessment of its service needs. The tuner will suffer as well because he will be deprived of the security that comes from maintaining a loyal clientele, as well as a decent income eroded by higher advertising overhead and lower fees.

Most of us recognize the benefits of building a business of regular customers. Yet all customers started as first time calls. Your challenge is to keep the needs of the piano, player, and technician in perspective as your service policies evolve. Don't sacrifice the needs of one while attending to the other two. They are often in conflict so this goal must be kept in focus constantly as you try to maintain a balance.

The first contact with a new customer is invariably over the phone. If you are asked for your tuning fee, give a straight answer and know in your gut that your fee is appropriate for the type of service you provide. My response is: "My *basic* tuning fee is $___." If they want to discuss price and service, I have given them a lead by using the word "basic" which they may want defined. In any case, I find out when the last service was, what kind of piano they have, and where they are located. Then I explain that pianos that have gone without service for a while often need more service than those kept on a regular schedule. I assure them that I will not hand them a bill for an amount larger than the basic fee without first discussing what services I would recommend, when they should be performed, and what they will cost. I want them to realize that they will have a say in the total cost of the service and corresponding performance level of their piano.

The reason they ask for your tuning fee is because it's often the only thing they can think of to start a conversation. They want to get a sense of who you are and whether or not you are genuinely interested in providing them with the appropriate service. They may in fact be looking for the cheapest tuner, but usually, if they ask at all, it's to make sure your prices are in line with other professional technicians and consistent with their expectations.

When I arrive at the customer's home, I disassemble the piano to allow for an inspection and an evaluation of how it plays. Do not fail to ask the piano owner if there are any malfunctions to report! It is often assumed that you will pick up on every little thing that is wrong with the piano. I probably will notice most, if not all, of them, but I need to know what bothers the piano owner. It is easy to forget that we are servicing the piano for their use, not ours.

The minimum performance that I want on a first-time call necessitates making repairs and adjustments so that all the notes work reasonably well, eliminating all offensive noises, and adjusting the piano's pitch to A-440. We are talking about preliminary coarse adjustments to touch, tone, and pitch. Are you ready for this provocative line? A fine tuning may not be part of my service-recommendation for a first time call! I will start my defense of this policy by stating that just as I try to keep the customer's, piano's, and technicians's needs in balance, I also keep the three aspects of the piano's performance in balance—touch, tone, and tune. I have seen too many pianos in the field that appear to have been tuned regularly, but the tone and especially the regulation appear to have been ignored. To justify this service approach, you will have to convince me that the player is quite sensitive to variations in pitch but can not detect the same degree of variations in regulation. In my experience, most recreational players *can* feel the difference after I've serviced a neglected action even if I am limited to just an hour or two of adjustments. They may not have asked for service to the action, but no one ever told them it was adjustable!

Does this comprehensive service approach have to be implemented at the expense of high tuning standards? I am not doing a once-through capstan regulation for free, but you aren't doing a pitch raise for free either. Or are you? Some say they do, but I find a lot of pianos that I know have been tuned, flat. Wouldn't it be better to bring the piano all the way up to pitch and sacrifice a small amount of accuracy than to leave it flat or to work for free? My tuning fee is determined by the service requirements of the majority of my regular customers who do not require large pitch adjustments to their pianos. I can't afford to spend the extra time on neglected pianos without charging for it. In fact, I

often spend a bit *less* tuning time on a first time call and here's why.

I expect to spend *more* time than usual providing several types of non-tuning service at no additional charge. Minor repairs and adjustments that have been overlooked during previous service or have accumulated during the years of customer neglect are often necessary and more noticeable than a higher level of tuning. I might replace a missing cabinet screw, adjust pedals, reglue a loose hammerhead, twist a bass string—the list goes on. Do not fail to point out these improvements to the customer whether or not they were specifically mentioned. In addition to correcting things that have obvious symptoms, a thorough inspection of the piano, though not necessary on every regular service call, is mandatory on a first visit. An equally important "service" that you will perform on a first time call is customer education. Pamphlets, books and itemized recommended work on your bill are all helpful, but these aids must be supplemented with discussion which will relate the piano's condition to its current use. Piano service is a personal service. You may not like the idea of compromising your standards for any reason, but I would rather think of this approach as custom service.

Even if I knew that all customers that came to me for service to their neglected pianos would convert to a regular schedule, I would still be reluctant to pitch-raise the piano at no charge and continue with a fine tuning at the same visit. Here are several reasons why I consider that to be a bad business practice.

1. A pitch raise takes a minimum of fifteen minutes of hard work, usually longer. That's over my time limit for extra work at no charge.

2. Non-tuning service — inspection, adjustments, repairs, and education—usually take more time than a pitch raise and require a higher level of expertise and experience to do well compared to the average tuning. The time spent on these items, customer education in particular, cannot be compared to the time spent by a salesman, for example, since he hopes to make a profit or a commission that will exceed the value of the time spent. You, on the other hand, will have to work for every penny that you make.

3. It is difficult to integrate new customers into your daily schedule if you insist on staying until everything has been completed to your satisfaction whether you charge for everything or not. If you schedule an extra hour that turns out to be unnecessary, then you've lost that hour. If you prefer to book solid for months in advance or do not expect to return to that service area soon, this two-visit policy may not work for you.

4. I think a piano tuning will be more stable if some time has been allowed to elapse between a major pitch raise and a fine tuning. I have heard assertions to the contrary and would like to see data from controlled experiments if anyone has gone to the trouble. In any case, my policy is not based on this belief alone.

5. I get no pleasure from punishing a customer for his neglect. Neither do I wish to reward him by providing him with more service than my regular customers receive for the same fee. If you wish to encourage regular service, you are giving a mixed message.

6. I want to avoid handing a customer a larger bill than expected on the first call. The higher figure often registers as "the tuning fee" and discourages future service.

Most first time customers find it reasonable and acceptable that they will have to make up for one of the tunings that they have missed during years of neglect. I usually schedule a fine tuning two weeks after the first call. If you have demonstrated your competence and personal interest during the non-tuning service discussed above, you will find that you can now sell regulation, voicing or other improvements along with the following. There will be times when a fine tuning will not necessarily be part of your recommendation for additional service. Sometimes the piano service budget simply won't allow you to do the kind of work that you think the piano deserves. In these cases, tell them how much time you would spend if it was your piano and what services you would perform. Then explain what service you are recommending as a compromise and show how it will yield an improvement that they will appreciate.

Next time you are called out to service a neglected vertical piano, look it over, spend a few minutes on simple repairs and adjustments, raise the piano up to pitch and give it a quick tuning. Now, play the piano and ask yourself: "If I were going to put another hour or so into this piano with the goal of increasing its ability to provide musical enjoyment, what work would I do?" Maybe it would be a solid tuning, but you may find that quick adjustments to key level and capstans, or repairing the bench, or climate control, or filing the hammers will have a higher priority. Sell the "whole job" if it's appropriate, but don't insist on a perfect tuning before looking at the rest of the piano.

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Membership Status

Northeast Region	836
Northeast RTTs	545
Southeast Region	598
Southeast RTTs	401
South Central Region	321
South Central RTTs	216
Central East Region	622
Central East RTTs	405
Central West Region	367
Central West RTTs	261
Western Region	622
Western RTTs	421
Pacific Northwest Region	327
Pacific Northwest RTTs	223
Total Membership	3742
Total RTTs	2472

Coming Events

Oct. 1-3, 1989	**Florida State Conference & Seminar** Clarendon Plaza, 600 North Atlantic Ave., Daytona Beach, FL 32018 Contact: Walter Pearson, 1128 State Ave., Holly Hill, FL 32017-2728 (904) 255-4804.
Oct. 6-8, 1989	**Ohio State Conference** Holiday Inn North, Dayton Contact: Francis Hollingsworth, 2271 E. Spring Valley Paintersville Rd., Xenia, OH 45385 (513) 372-1981.
Oct. 13-15, 1989	**Texas State Association** Lubbock, TX Contact: Bob Johnson, 3224 92nd, Lubbock, TX 79423 (806) 792-9712.
Oct. 20-22, 1989	**New York State Conference** Queensbury Hotel, Glens Falls, NY Contact: Robert Reeves, RD #1, Galway Rd., Ballston Spa, NY 12020 (518) 885-5472.
Oct. 27-29, 1989	**North Carolina State Conference** Hyatt Winston-Salem Contact: John Foy, 195 Fayetteville St., Winston-Salem, NC 27107 (919) 773-1754.
Jan. 5-6, 1990	**Arizona State Seminar** Aztec Inn, Tuscon, Arizona Contact: Kathleen Kattija-Ari, 4743 East Bellevue, Tuscon, AZ 85712 (602) 326-4936
Feb. 16-18, 1990	**California State Conference** Irvine Hilton, Orange County Contact: Austin Mason, 25842 Ave., Cabrillo, San Juan Capistrano, CA 92675 (714) 661-1416
Mar. 2-4, 1990	**South Central Regional Spring Seminar** Hilton Hotel, Santa Fe, New Mexico Contact: Joanie Wagoner, Rt. 4, Box 50-C, Santa Fe, NM 87501 (505) 984-8179
Mar. 29-Apr. 1	**Pennsylvania State Convention** Warrendale Sheraton Hotel Contact: David Barr, 524 Jones Street, Verona, PA 15147 (412) 828-1538
July 7-11, 1990	**33rd Annual PTG Convention & Technical Institute** Hyatt Regency Dallas at Reunion Contact:Piano Technicians Guild, Inc., 4510 Belleview, Suite 100, Kansas City, MO 64111 (816) 753-7747.

THE AUXILIARY EXCHANGE

President's Message

From as far back as I can recall, it has been difficult for the Editor of the Auxiliary Exchange to obtain copy for her pages. Now and then after drumming and "dunning" her associates, she is rewarded with an article about the *Louisiana Swamp* or *Striking It Rich in Piano Tuning* or *Yuletide Customs Around The World* or *Gold or Wool or Silk or Stress*. The remainder of articles are generally about what to anticipate at next year's convention, or a reprise on how much one enjoyed the past Convention and what special event was really outstanding.

These pages must be treasured by our Auxiliary. If our membership does not feel the need or interest in submitting copy, space might revert to the Guild where such concerns as technical data, advertisements and such would be printed. At one time there were several chapters in the Auxiliary and their officers submitted accounts of activities and information about individuals in their chapters. Our Editor has not heard about any programs, activities or events that have occured to members of our Auxiliary. It is late August as I write my column for October and in a few weeks we'll think of Thanksgiving and Christmas. Surely there's been some exciting, absorbing activities occurring in your lives which you might like to share with the membership. Let our Editor know. One time our former president, Ginger Bryant titled one of her pieces "Use It Or Lose It"—she was referring to *time*. That prophetic title might also apply to the pages of our Auxiliary Exchange! Don't let it happen.

Agnes Huether, President

From The Editor's Mailbag

Smack dab in the middle of the August "Dog Days" we received a few letters with news of how several individuals continued to "holiday" after the annual convention with additional travel. One account was in iambic pentameter or close to it! Enjoy!

From our forty-ninth state, Alaska, Ginny Russell writes: *"My trip to Alaska was terrific—we spent one weekend in Fairbanks where George (son-in-law) was directing the U.S. Army Band in an hour and a half 'old-fashioned parade for Gold Rush Days. We were housed on an army base and had dinner at the northernmost Denny's! Wow! On our return to Anchorage we spent time in Denali National Park, viewing nine grizzlies, many moose, caribou, ptarmigans, mountain sheep and such fauna. We had excellent, spectacular views of Mt. McKinley from the base in Anchorage. Their residence at Ft. Richardson is quite nice and Candy and George would like to purchase some land so they can build a home in Alaska when they retire. George caught many of the famous Alaskan salmon which we charcoal broiled and it was soooo good."*

Ginny also recounted a four hour boat ride in the bay of Alaska. From past experience she knew to remain out on deck in the prow of the vessel despite biting cold weather. As a reward she

Holiday '89

In July we hit Portland, for our convention,
Saw beautiful coastland and falls, not to mention
Famous Mt. St. Helen's and majestic Mt. Hood;
And our PTG music and friendships were good.

Then breath-taking Yellowstone, where elk and moose
And buffalo, wandered through camp on the loose.
We saw damage done by the fires of '88,
Admired "Old Faithful" and geysers as great.

Early one morning, in the Tetons Chris biked
Then 'round Lake Jenny all of us hiked.
In her freezing waters Erik did swim,
While the rest of us waded, and marvelled at him.

White-water rafting "The Colorado" was fun;
We hung on for dear life, and got some good sun.
We couldn't have done it without a "pro" guide—
The wild rapids make it a dangerous ride.

The Royal Gorge was GORGE-ous, indeed.
We rode cable cars across, at a slow speed.
Cripple Creek was charming, with century-old fun,
And that's where ye olde tyme photo was done.

We visited Colorado colleges, for Chris—
An exciting time in our lives, is this!
His first choice is Gunnison—W.S.C.
"The coldest spot in the nation," you see.

Then oh, what a job, tending our "zoo",
Teaching beasts where to potty, and what not to chew!
But as you might guess, our hearts they have smitten;
They're family now, this puppy and kitten.

Both Wim and I are on Church Boards now;
I'm Secretary of Christian Ed.—God knows how!
Wim is a Deacon, and we're both Choir singers,
And Chris, Wim and I all belong to Bell Ringers.

Chris joined us in tuning pianos—how neat!
Both boys have grown to be over six feet.
Erik's in Band, and enjoys his percussion;
The amount they can eat defies all discussion!

Erik's Band goes to Florida for Christmas break,
And soon now, his Driver's Exam he will take.
Then we four Blees will all be driving—
Departing and meeting each other arriving!

Jan Blees, Webster Grove, MO

saw a pair of whales playing, also a number of dolphins, a mother sea otter with her baby frisking about with a baby octopus. In addition to the marine life she saw many, many puffins, arctic terns, a number of bald eagles, an eagle's aerie with two young eaglets, glaciers, brown bears and many, many wonderful nature sights. Ginny was delighted to spend this time with her daughter, son-in-law and two grandchildren. They are all thriving well in our thirty-year-old state. (Alaska was admitted to the Union January 3rd, 1959, although the territory of Alaska was purchased from Russia in 1867 by the then Secretary of State William H. Seward for $7.2 million. This enormous bargain was called Seward's Folly, but it's proven to be our greatest purchase.)

Editor

Arlene Paetow enjoyed the great Northwest. She and her husband Bill did not fly East as soon as the convention was over but stayed a bit longer to take in the trip to Posey, view Mt. St. Helen's, the magnificent forests, waterfalls and rivers. But while she enjoyed the tag-on trip, the highlight for Arlene was our tour of the Japanese Gardens. So read on and note the effect the tranquil gardens had on her.

The Japanese Garden

On a beautiful sunny Wednesday in Portland, OR, the P.T.G. Auxiliary sponsored an outstanding tour which included the internationally famous Rose Test Gardens, World Forestry Center, the Pittock Mansion and the Japanese Gardens. I savored the roses, reveled in the splendor and opulence of the Pittock Mansion and especially enjoyed our luncheon at the Chart House. It was the Japanese Gardens, however that spoke to my soul!

From the moment we entered the Main Gate a feeling of peace and serenity was evident. The "Daimyo" Gate—or that of the feudal lord was guarded by stone lions; the male on the left with his right paw on a ball symbolizing power and the female on the right whose left paw rested on a lion cub, guiding and protecting the nation's young. The essential elements of the Japanese Garden are water, stones, paths, sculptured ornaments, waterfalls, bridges, garden plants and trees. We were more than delighted and soothed by all of these.

It is said that water brings a stillness and a sense of peace to the soul of man and this aura reached out to us almost at once. Every bank of stream or lake was laid out to deepen this impression and water, especially moving water, plays an important role in all gardens. The sound of just a drop of water falling upon the surface of a stone water basin, or the contemplation of a deer-chaser (Bamboo Sozo) which employs tubes of bamboo, filling one weighted piece just enough to pour out its captured fluid, leaves one relaxed and refreshed.

The garden is nearly a monochrome and the eye is feasted on an unbelievable variety of shades of green brought about by the almost exclusive use of evergreen shrubs. Conifers are preferred here and the pine is most often seen. Light colored blossoms, such as the plum and cherry appear in Spring, as well as camellia and azalea. The delicate Japanese iris also lends its pale note of beauty.

One frequently encounters the stone lanterns which were used in Japan for the Tea Ceremony, when it was held at night. They were then set up and lighted with a torch flame for light. There is a breath-taking antique five-tiered Pagoda Lantern framed by a wisteria arbor. This unusually beautiful lantern was given to the city of Portland by its sister city, Sapporo, Japan. It is the work of an imperial artist and is classified as a "Japanese Treasure". It is a traditional Buddhist Pagoda and bears the name "Goju-no-to" or five story tower, symbolically representing earth, water, fire, wind and sky. The nine rings at the top depict the nine heavens and the very top is in the shape of a lotus blossom, a symbol for Buddha.

Another of the many interesting lanterns to be found here is "Yu-Ki-Mi" or the Peace Lantern given to the city of Portland by the Mayor of Yokohama in 1954. It now may be seen on the east edge of the upper pond across from the Tea House and adds its note of peace and harmony to the surroundings.

Travelling full-time with a registered Guild tuner-technician does not always permit one the most relaxed frame of mind, but now I have found a new source of inner tranquility. I have but to recall these gardens designed by Professor P. Takuma Tono, an internationally renouned authority on Japanese landscaping. It is then I can begin to regain some of that personal quietude.

How fortunate are those who live in the Portland area! They can view these five traditional gardens in any season and thus capture the mood of ancient Japan while absorbing the wonders to be found in over 5 1/2 acres. They may draw in by quiet reflection the restorative emanations from the Flat Garden-"Hiraniwa", the Strolling Pond Garden "Chisen-Kaiyui-Shiki", the Tea Garden "Rojiniwa", the Natural Garden "Shukeiyen", and my personal favorite, the Sand and Stone Garden "Seki-Tei" with its ancient fable from Japanese mythology about the seven starving tiger cubs that were saved by Buddha.

Arlene Paetow, Vice President

Want to join P.T.G.A.?

P.T.G.A. is an active support group for the Piano Technicians Guild. For information about joining, please write or call our Membership Chairperson:

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

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STEINWAY B OR C; 88 keys; spade-toe leg; pre 1910 or pre #140,000 (or later, if old-style case); walnut or mahogany. **Geneva DeWitt (818) 790-0287 or 1155 Oak Grove, San Marino, CA 91108.**

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

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Tech Gazette

Yamaha Piano Service October, 1989

MIDI Corner

YAMAHA PIANO SERVICE COMPLETES THREE TRAINING SESSIONS FOR THE DISKLAVIER™ PIANO

The first three seminars for piano technicians devoted exclusively to overall service for the Disklavier™ piano have been completed, and more are scheduled.

These 3½ day sessions, held in-house at our corporate offices in Buena Park, CA, equip piano technicians with a full understanding of all functions of the Disklavier™ piano, and prepare them in all aspects of diagnosing and servicing these instruments.

Check this and subsequent issues for upcoming seminar dates. Or call Yamaha Piano Service toll-free at 1-800-854-1569 for more information.

Back row–left to right: LaRoy Edwards, Robert Conrad, Michael Kemper, Larry Newhouse, Peg Brown, Jim Rule, Charles Hansen, Bill Brandom; front row–left to right: Hank Tamaishi, Yoji Suzuki, Dean Garten

Personnel Profiles

HIROMI TAMAISHI

Hiromi (Hank) Tamaishi is a Concert and Artist Piano Technician performing service for André Watts, Michael Tilson Thomas, and the growing list of other renowned artists choosing to perform on Yamaha pianos.

To his U.S. post, Hank has brought a long list of credentials dating back to 1967-68 when he studied at the Yamaha Piano Technical Academy. Since then, he has worked in many areas of the grand piano factory, as well as in Piano Technical Service in the Tokyo, Chiba, and Hiroshima Branches.

Hank and his wife, Mariko, have two small children and reside in Fullerton, CA. He enjoys golf, table tennis and fishing.

Yamaha in the News

CASADESUS COMPETITION FINALISTS ALL CHOSE YAMAHA PIANOS

All three finalists in the Robert Casadesus 8th International Piano Competition performed on Yamaha concert grand pianos both in preliminary competition and in the winners' recitals held August 20, 1989 at the Cleveland, Ohio Institute of Music.

Sergei Babajan (Armenia, USSR), Nicholas Angelich (USA) and Megumi Kancko (Japan) took first, second and third prizes, respectively, in a strong field of competitors from nearly 20 nations. Their choice of instruments again highlights the acceptance of Yamaha pianos among concert performers and artists. Congratulations one and all!

Yamaha will participate in:

DISKLAVIER™ SERVICE SEMINARS

#4 October 24-27, 1989
#5 November 28-December 1, 1989
#6 January 30-February 2, 1990
#7 February 20-23, 1990

PTG SEMINARS

1989

Oct. 1-3	Florida State
Oct. 13-15	Texas State
Oct. 20-22	New York State
Oct. 27-29	North Carolina State

1990

Feb. 16-18	California State

LITTLE RED SCHOOL HOUSE
Jan. 8-12, 1990

WINTER NAMM SHOW
Jan. 19-21, 1990

YAMAHA®

OCT. **UPDATE** 1989

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

Dates & Deadlines

October 19-22, 1989
RTT Tuning & Technical Examinations, CTE Recertification. New York State Conference, Queensbury Hotel, Glens Falls, NY. Contact: Stephen Snyder (518) 854-3888.

October 27-29, 1989
RTT Tuning Examination. North Carolina State Conference, Winston-Salem, NC. Contact: John Foy, (919) 773-1754.

November 25-26, 1989
RTT Tuning & Technical Examinations. Elizabethtown, PA, Area Examining Board. Contact: Mike Carraher, (717) 367-8256

January 1, 1990
1990 dues due.
Deadline for submission of awards nominations to Awards Committee. Contact: Bob Morris, 1729 D Valley Road, Champaign, IL 61820.
Proposed bylaws changes due to Bylaws Committee. Contact: Sharla Kistler, RD #8, Box 461, Allentown, PA 18104.

January 31, 1990
1990 dues delinquent

February 1, 1990
Deadline for submission of officer nominations to Nominating Committee. Contact: Teri Powell, 1666 W. 261 St., Harbor City, CA 90710.

March 2, 1990
Members who are delinquent in 1990 dues to be dropped from roster.

July 7-11, 1990
33rd Annual Convention and Technical Institute. Hyatt Regency Dallas. Contact: Home Office, 4510 Belleview, Suite 100, Kansas City, MO 64111.

1990 Dues Process Begins

Invoices for 1990 Piano Technicians Guild dues will be mailed to all members early in November. Dues will officially be due Jan. 1, 1990, will become delinquent Jan. 31, 1990, and those whose dues are unpaid by March 2, 1990, will be dropped from the membership rolls.

The dues-collection process, especially the collection of chapter dues, has been streamlined this year. In addition, members will be able to pay dues by credit card — either Visa or MasterCard.

Invoices sent to members of more than 50 Guild chapters also will include chapter dues. These chapter dues will be collected by the Home Office and disbursed to chapter treasurers after the March 2 drop date. Chapter officers will receive a printout this month verifying amounts to be collected and members' names and addresses. The chapter dues billing will include only those who are actually members at the time invoices are prepared — chapter dues will not be collected from those who join after the November mailing.

The dues invoice will also include members' names, addresses and phone numbers as they appear in the Home Office computer records. When you receive your invoice, please verify that this information is correct — your listing in the Guild's 1990 membership directory will include that information. The directory, which will be published as the April issue of the *Journal,* will include only those members whose dues have been paid by March 2.

1990 membership cards will be mailed to paid-up members beginning in December.

'Friends' Support International Efforts

Although membership in the International Association of Piano Builders and Technicians is not open to individuals, Guild members and others can support the international piano community by becoming "Friends of IAPBT."

An annual contribution of $15 brings an IAPBT membership card and IAPBT pin, as well as a subscription to the quarterly IAPBT newsletter, which will now be published in the Guild's Home Office. Contributions will be used to fund Guild participation in the international organization, which also includes technicians' organizations in Japan, Taiwan, Korea, and Australia.

A contribution form will be included in the upcoming Guild dues mailing.

FRIENDS OF IAPBT

The Soundboard

Letters from readers on organizational matters will be published in this space each month. Letters should be concise and may be edited for length and style.

To The Soundboard:

There comes a time when one has so many people to thank that the task becomes too big to handle. Such a time for me is right now.

Starting with my years as an instructor in Piano Technology at North Bennet St. School in Boston, MA, latterly working at Steinway & Sons, and most recently at the convention in Portland, I have been blessed with an almost overwhelming outpouring of support and encouragement from friends and colleagues in the the Piano Technicians Guild and throughout the world of the piano.

So many of you will never know how deeply I have been affected by this. There is no way I can properly thank all of you for your many thoughtful kindnesses. I hope that this letter of appreciation and thanks will go at least some way towards expressing my feelings about a very wonderful experience.

My thanks to each and all of you.

Bill Garlick

To The Soundboard:

I am writing in rebuttal to David Barr's recent article, "Self Esteem and the Piano Tuner", which appeared in the July 89 issue of the *Journal*.

It seems inappropriate for Mr. Barr's article to have been presented under the heading of the Economic Affairs Committee. The viewpoints expressed in the article were overly pessimistic to say the least, and were too generalized to be a fair and accurate report on the state of our profession today. Therefore I am submitting this rebuttal, with the hope that our membership will be given the opportunity to read a more positive assessment of our trade.

It is difficult to agree with Mr. Barr's findings regarding the "slow but constant erosion of the self-esteem of most piano tuners," or the "endless interwoven barrage of negativity surrounding us." Those statements just don't make any sense to me at all.

I have been a full-time practicing piano technician for 14 years; 13 of those as an RTT. Piano service has been my sole occupation the entire time. During this time, my standard of living has definitely very steadily increased.

I would be the first to admit to feeling financially pinched, but that is not at all due to any real or imagined lack of income. Rather it is due to my past failure to avoid the trap of overspending my income via credit cards. I have since learned, the hard way, that much self-esteem can be had in learning to live within one's means.

In all this time, I have heard only one tuner say that he wasn't making a good living in piano work. All of the RTT's I am acquainted with, and most of the Associates, have all the work they can handle. Many of these tuners have bought homes and are raising families. Unless my friends are very good at concealing their troubles, I don't see them having a hard time making ends meet.

Mr. Barr's statements regarding the piano's place and value in society also are skewed toward the negative. Judging by the amount of music books, pencils and erasers I have to remove from the pianos I service, I would say it looks like some serious "tedious" work is being done at these pianos. Usually, it is the electronic keyboards that I see lying unused in a corner of the room.

All of the piano teachers I know are booked completely, some have waiting lists for students they cannot yet accommodate.

The morale at our chapter meetings is very high; I doubt our morale would be so high if many of us felt we were not performing a valuable service, or not contributing to society. As for me, I am tuning an average of 25 pianos per week, and hardly a day goes by when one or more of my customers doesn't thank me for having called to remind them to get the piano tuned.

There is no need to feel that we piano technicians are no longer needed; the acoustic piano is here to stay and so are qualified piano technicians.

Mark Mestman, RTT

To The Soundboard:

I attended Dr. Sanderson's class on aural tuning for electronic tuners at the Portland convention. As a result I was convinced that the Council made the right decision in raising the aural requirement for electronic tuners to 80 percent.

I was impressed with Dr. Sanderson's presentation and with the capabilities of the accutuner. The problem with machine tuning is not the machine, but rather the imperfect piano. A temperament was set using the accu-tuner after determining the correct stretch factor, but there were problems because of the imperfect piano. Considerable aural tuning skill would be necessary in order to improve that temperament and the rest of the tuning.

It was evident that a good machine tuning without the aural refinements could be a

Continued on page 4

Northeast Region — Chapter Activities Varied, Exciting

Ruth Brown
CMAC Regional Director
Northeast Region

The Northeast region has had a fantastic year, with a wide variety of technical programs, field trips, seminars and social events. A brief rundown:

Several chapters wrote to us about their press releases, teacher seminars and other publicity-minded projects, including working with local MTNA groups. One is planning to take the new PTG movie on the road. Yet another has a chapter telephone number listed in the Yellow Pages.

Three chapters have initiated a different approach for technicals — one holds a "problem clinic" or group discussion rather than a one-person technical, twice yearly. The other two are taking advantage of all the newly available material on the technical test, and use it for review or for newer members. Three chapters visited piano factories or related facilities, and one had a slideshow of a plant in China.

Three chapters held full-fledged conventions, while two others hosted one-day seminars. Another set up a day-long business program. The editor of one newsletter volunteered to be a guinea pig during her tuning exam, enabling the chapter to see the test first-hand.

Two chapters rebuilt and sold pianos.

Newsletters are sent by 14 chapters, and CMAC reports come in from far and wide. This column is based on gleanings from the CMAC reports.

The social calendar includes many dinners, special banquets and get-togethers, and one lobster/clambake!

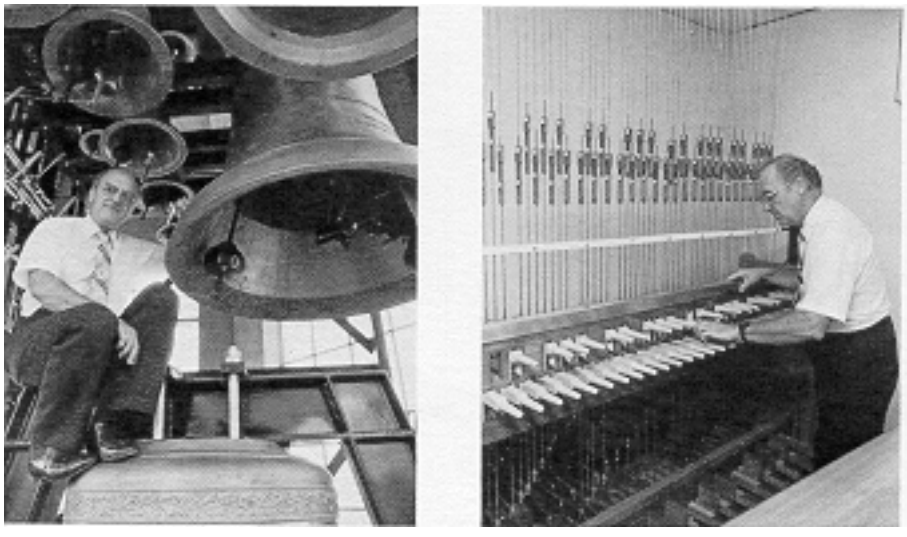
Many business programs have been held, including January visits from CPAs and a wide range of technician-given small-business topics.

RVP Boone Leads Drive For New Carillon

Piano technicians are often called upon to work on many types of keyboard instruments, but few have an opportunity to service a carillon, much less spearhead a drive for its purchase. Danny Boone, South Central RVP and piano technician for the School of Music at Baylor University in Waco, TX, is part of the story behind the Baylor's new McLane Carillon.

The Cullen F. Thomas Chimes, located in the tower of Pat Neff Hall on the University campus, began malfunctioning in the late 1970's. Boone, who knew little about the operational system of the chimes, voluntarily began working on them. For the next several years, he was able to keep instilling life into them whenever they broke down.

Gradually, the chimes, which were installed about 50 years ago, reached a state where even his special talents were not enough. Lack of parts and old age finally tolled the death of the system. Boone, who had grown quite fond of the music provided by the chimes, refused to let them die, and began seeking new avenues for the repair or replacement of the instruments.



Danny Boone, piano technician at Baylor University, poses with the school's new carillon. Boone led a drive which resulted in the purchase of the carillon (Baylor News-Journal photos).

In 1985, he was named chairman of a select committee to find a way to bring the music back. For the next two years, Boone guided the search. In 1988, alumnae Drayton McLane and his family added their support with a donation of $325,000 for a new carillon. The new carillon was specially cast for the University at a foundry in France and arrived in the fall of 1988. The new carillon was featured in the *Baylor News Journal*, a magazine published by the school's office of public relations. Boone's dedication and determination are part of the reason music still rings over the Baylor Campus.

In Respectful Memory...

Arthur Tofte, RTT

Arthur (Art) Tofte, RTT, of Henrietta, TX, passed away September 1, 1989 in Wichita Falls, TX. A native of Minnesota, he was a Charter Member of the Texoma Chapter, and a Chapter Sustaining Member of the Guild.

Tofte, 76, was a retired salesman for McCarty Music and a member of Elks Lodge and Lake Arrowhead Baptist Church.

Survivors include two daughters, Gloria Simmerman and Shirley Dunn; a son, Arthur Jr.; five sisters, Edna Berger, Lillian Brandt, Irene Ulschaffer, Elsie Lockett, and Esther Bolwby; four brothers, Ray, Merly, Sandy, and Clarence; and seven grandchildren.

He was a dedicated PTG member and will be missed by all who knew and worked with him.

Jimmy Gold

Raye McCall, RTT

Raye McCall, RTT passed away July 30, 1989 following several months of illness. He was a very active member of the Pomona Valley Chapter where he had held several offices, including Vice President and President. He was also a life member of Optimist International.

Raye and his wife Ruth operated a Rebuilding Shop in Pomona. In addition to regular Piano Service, they maintained an inventory of rental pianos and also rebuilt reed organs. After learning about the use of epoxies and adhesives, they expanded their operation to include the sale of glues, lubricants and other related items to piano technicians.

Raye's expertise (especially in Player Piano maintenance and restoration) gained him national prominence and teaching assignments at our National Conventions as well as giving many programs and teaching at local chapters and state conventions. He was to have headed up the individual tutoring program at Portland this year, but his illness prevented him from attending.

For many years he was in charge of putting on the annual Pomona Valley Chapter Seminar, and for several years he was the Convention Coordinator for the California State Conference. His many activities earned him a "Presidential Citation" at the 1989 Convention in Portland.

His mechanical aptitude led him to a hobby of restoring old clocks and he became known for his skill in that area. Before becoming a Piano Technician, Raye had been a professional photographer and his expertise in that subject was also well known.

Religion played a very important part in Raye's life. He was very active in his church and his marvelous singing voice was a natural complement to choir.

A very large crowd was present for Raye's funeral which was held on August 3rd at his church. Following his wishes, the church choir sang and one might have thought that heaven had joined us here on earth because the music was so beautiful. Raye has touched many of us and his presence will most certainly be missed.

Paul Seabern

P.R. Pays Off In Pennsylvania

Members of two Pennsylvania chapters used their attendance at the recent Portland Convention and the recognition their chapters received in this year's Chapter Management and Achievement awards program to obtain publicity for the Guild in local publications.

Keith Bowman and Jim Hess of the South Central Pennsylvania Chapter and Mike Carraher of Reading-Lancaster, PA, had a photo taken during the convention with their chapters' awards and distributed it to eight area newspapers, along with an expanded version of a Guild press release prepared for convention-going RTTs. So far, the photo and release have appeared in the *Elizabethtown Chronicle* and the *Towne News.*

The South Central Pennsylvania and Reading-Lancaster Chapters received first prize awards in the Small Chapter and Intermediate Chapter categories of the Chapter Management Awards. The press release, which briefly described convention activities, was distributed to RTT members at the convention for use in their hometown publications.

Soundboard...

quality tuning. I found myself wondering and asking how many aural tunings meet that standard—about 50% according to Dr. Sanderson. Certainly an aural tuner would need to score considerably higher than 80% on the tuning test to tune as well. It is easy to see why the electronic tuner needs a comparable tuning score to be able to improve an excellent machine tuning.

As I see it, the finest tuning is possible aurally or electronically with aural corrections. Therefore, top quality work, electronic or aural, requires a test score that demonstrates superior aural skills.

Virgil E. Smith, RTT
Chicago Chapter