PIANO TECHNICIANS

Journal

DECEMBER 1990

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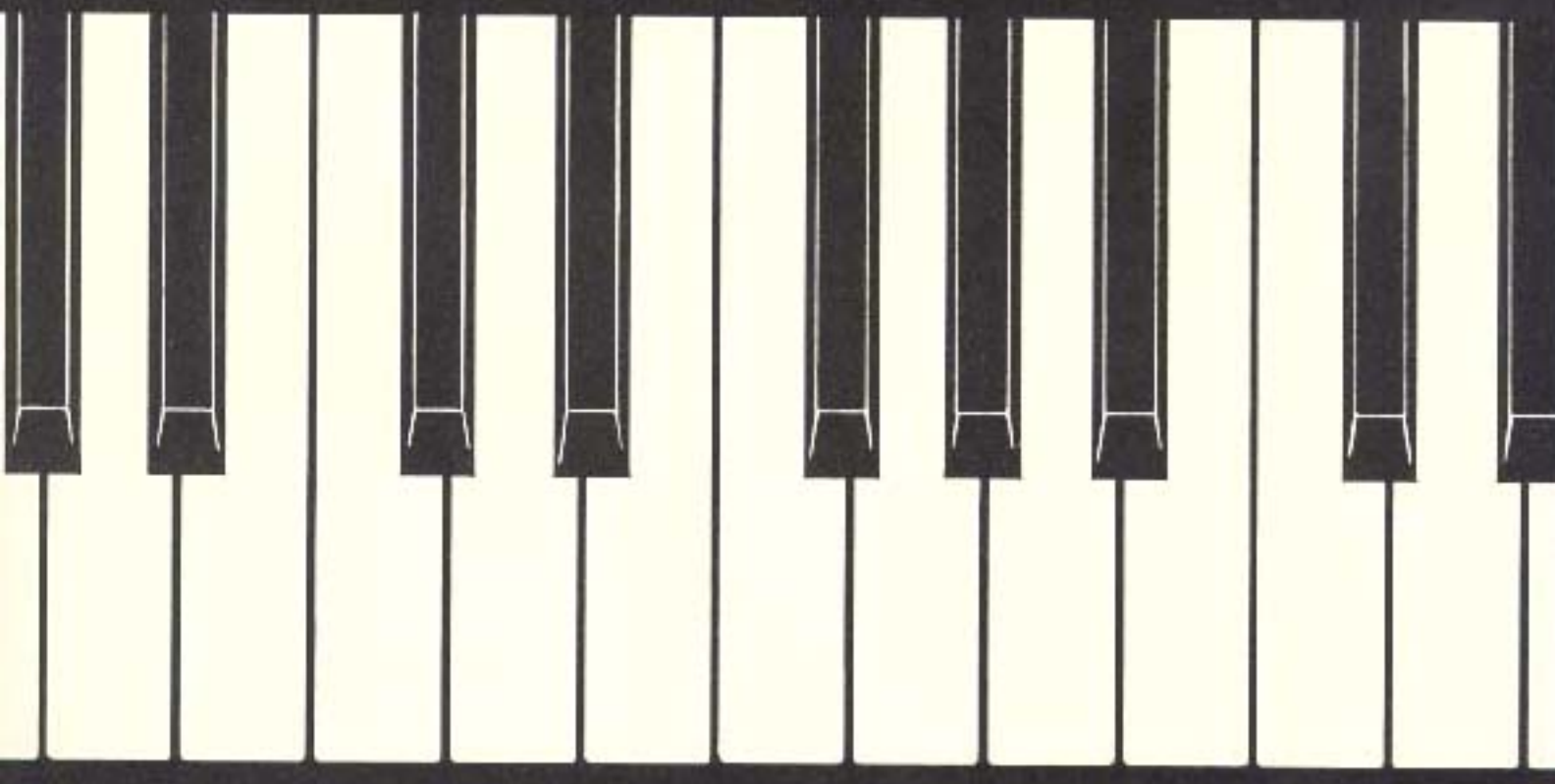

*SOURCES: Most recent 12 month acoustic piano data available - Dec. 1988 through Nov. 1989.
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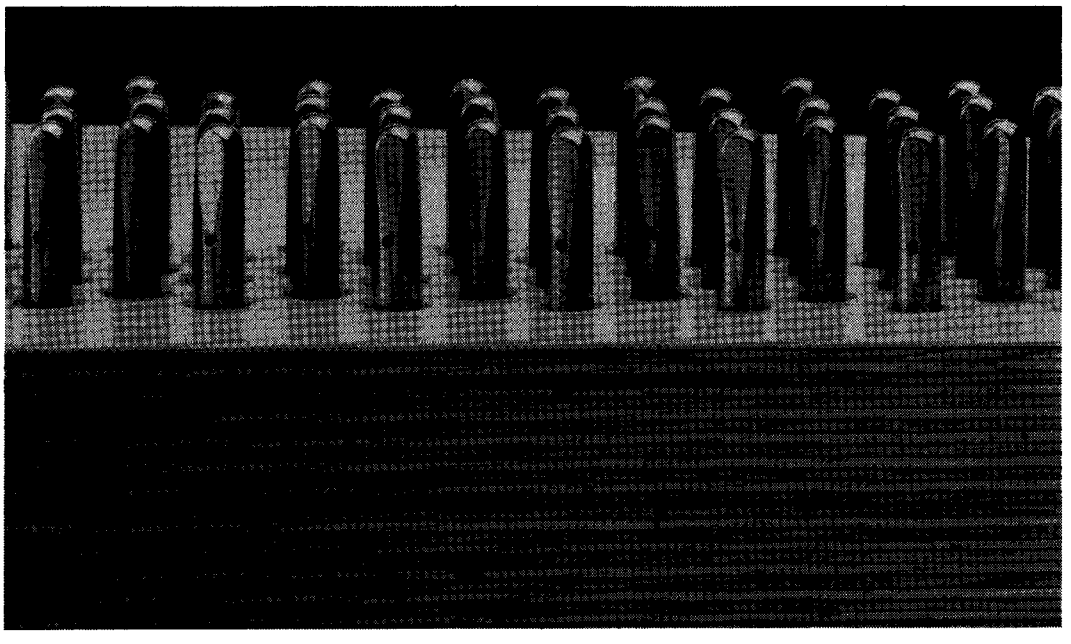
Delignit®

Multi-laminated beech pin block material



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PIANO TECHNICIANS
Journal

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At Young Chang, there's nothing too small to improve.

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President's Message

Help Music Make The Difference

Music needs our help.

Although the quality of education in the United States has received a great deal of attention recently, our national priorities have focused on math and science. Music and the other arts are in danger of being left out in the cold. It's time for those of us who make a living from music to give something back.

Nolan P. Zeringue, RTT
President

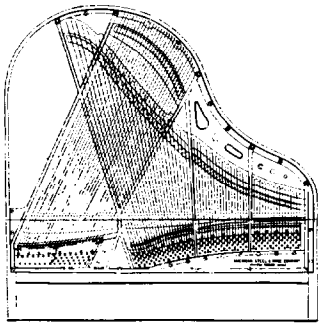
The entire music community — artists, teachers, manufacturers, publishers, retailers and technicians — has joined together in an unprecedented campaign to demonstrate the value of music in every child's education. A National Commission on Music Education, which includes artists ranging from Andre Previn to Billy Joel to Emmylou Harris, as well as elected officials, executives, and educators, will spearhead the year-long project. Their report, which will be presented to the Administration and Congress in March 1991, will focus on the impact of music on three major challenges in education today: children at risk, cultural diversity, and the workforce of the future.

But they can't do it without our help. Petitions are being circulated in support of the music industry campaign. I'm sure you've seen them in the *Journal* and other publications. We want to show our nation's decision-makers that the American public supports a strong music program in every public school. And it's up to us to mobilize that support.

As piano technicians, we come in contact each day with people from all walks of life and all economic levels. The only common denominator is the music we help them make. In a very real sense, we are music's ambassadors to the public we serve. I urge you to take these petitions into your own communities and gather as many signatures as possible before the campaign ends in February. Tell people what we're doing. Get other community groups involved in it. And don't wait for someone else to do it, or it won't get done. Think what music has meant in your own life, how important it is for our children to be exposed to those influences. Please join with me and the music community to make this campaign a success. The campaign's theme is "Music makes the difference." By working together, we can make a difference for music.

******

In this festive time of year, our thoughts turn fondly to our families and friends. Our pace quickens as the days grow shorter, yet we must stop occasionally to ponder the meaning of this joyous time. To you, my friends and colleagues, I send my wishes for the best the holiday season has to offer.



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From The Home Office

The Gift

Larry Goldsmith
Executive Director

This is a season of possibilities. Age does not lessen the childlike anticipation we feel in the presence of gift-wrapped packages. Nor does it affect the wonder we feel when we experience the miracles of our respective faiths during this holy time.

This is also a season of difficulties. We race from appointment to appointment, squeezing in bouts of shopping and grabbing a quick bite on the run. Credit cards are wrung dry long before retailers stop showing us all the things we absolutely must give and get. We battle bad weather and traffic, and when all is said and done, it matters not at all what is in those brightly wrapped packages. All that matters is that someone cared enough to give them.

For all its joy, this is also a season of depression and hardship. If we take the time to look, we probably see more human misery during this time of year than at any other. At no time do the misfortunes of others glare more strongly than when we are gathered in the abundance and warmth of family and friends. More people die during the holidays than at any other time of year.

We may drop a dollar in a bell-ringer's bucket. We may send a check to a Christmas-tree fund. But the contributions that matter most — those that involve our own time and effort — are the hardest to give, especially at this time of year. It is somehow a greater gift to make a present rather than buy it, to collect blankets for the homeless rather than to pay someone else to do it.

But we do what we can. For those in personal crises at this time of year, any contribution is significant. As our society becomes less able to support all of us, there will never be enough resources to completely alleviate everyone's pain and suffering, but we must make the effort. Any gift is better than none at all.

Perhaps piano technicians are more fortunate than most, in that the gift they are able to give is to the spirit rather than the body. For most of us, the music we hear is perhaps the most important symbol of the holiday spirit. Literally millions of people, even those in the depths of misfortune, hear it and are uplifted by it. And that would not be possible without the piano and the person who keeps it singing.

As you go about your rounds, reflect on the gift you give. Think about the closeness and warmth of a family gathered around the piano to sing the old familiar carols. Think about the church piano or the one in a nursing home, and their importance to those who will be comforted by music during this holiday season. Think about the lifetime of enjoyment a child will receive from learning to play the piano.

It is the gift of music, a gift to the spirit. And with spirit, all things are possible.

International Scene

PTG Plans Next International Tour

By Ed Hilbert
International Relations
Committee Chairman

Plans for the next PTG international tour are coming along very nicely. As in the past, this tour will be coordinated with the seventh bi-annual IAPBT Convention, being held this time in Seoul, Korea, during June of 1991. Exact tour dates are not yet firmed up but will be from mid-May through early June, 1991. While a few places on the itinerary are places we have gone before, most are not, so we can be assured of seeing and doing many totally new things. For example, even though we shall go again to Beijing, who can say that we really saw Beijing on the last trip?

Past trips have been both fun and educational. Some have also been very exciting — such as last time arriving in Beijing on the night of the massacre; or on the previous trip, visiting Eastern Europe right after the nuclear reactor at Chernoble had blown up.

Of course neither of these events were as exciting as the previous trip to England, at least not for me. It was on that trip that I met and fell in love with my wife, Emily.

Now, we can't guarantee such excitement and romance on every tour, but we can safely say that we are planning another wonderful tour to many interesting places. And as for business, we already have commitments from six factories and are expecting several more still!

Next month there will be more information with specific dates, costs, and more details on our itinerary. Having been on the last three trips, I can honestly say that our PTG tours are one of the best vacation opportunities for the money that you will ever see. And remember, it's tax deductible!

If you have ever wanted to see and experience the Orient, this is the trip you will want to be on. As in the past, reservations will be on a first-come, first-served basis. So apply now to receive further information and to get your name placed on the "interested-in-going" list. Write to: Ed Hilbert; 40 Pleasant Street; Bristol, VT 05443 (802) 453-3743.

Industry News

New Kawai Acoustic Piano Technical Service Manual

The Technical Support Division of Kawai America has completed a new technical service manual for Kawai acoustic pianos. This guide offers technicians, service personnel and tuners the information needed to adequately service and maintain Kawai acoustic pianos.

The manual provides instruction on the proper procedures for preparation of a new uncrated piano and includes a dealer checklist for grand and vertical pianos. Guidelines for proper regulation and servicing are provided as well. Over 50 photographs and diagrams illustrate the necessary techniques. The specifications and treble and bass string scales are listed for all current Kawai grand and vertical pianos.

Piano technicians may receive a copy of the manual by sending a business card to: Technical Support Division; Kawai America Corp.; 2055 East University Drive; Compton, CA 90220.

Educational Support Materials Available From American Music Conference

Three educational brochures that encourage parents to get (and keep) their children involved in playing music or to take up an instrument themselves as adults, are available from the American Music Conference. Any or all of these publications are ideal as "leave-behinds" for your customers of any age.

- *"Music And Your Child: The Importance Of Music To Children's Development"* Child educators, behavioral scientists, and medical doctors from around the world cite research into positive effects music can have on children's social, intellectual, physical development.
- *"Message To Parents: A Parent's Guide To Enhancing Your Child's Musical Experiences"* Developed to assist parents in helping children to enjoy a lifetime of creativity, self-expression and achievement through making music. Includes information about benefits of music study; selecting a teacher; supporting and encouraging child's music study; scheduling practice times; what to do if a child loses interest.
- *"Yes You Can! Learn To Play A Musical Instrument As An Adult"* Written to give adults assurance that music study is not only possible, but can be truly rewarding. Addresses issues such as fitting lessons into a busy schedule; finding a teacher whose methods and goals mesh with adults' music study goals, and more.

To receive sample copies (and information about ordering in bulk), send a number 10 (long), self-addressed, stamped envelope to "Brochures," American Music Conference, Department PTG; 303 E. Wacker Drive, Suite 1214; Chicago, IL 60601. If requesting one brochure, postage is 25¢; if requesting two or three brochures, postage is 45¢. Please be sure to include a note indicating, by title, which brochure you wish to receive.

Economic Affairs

Servicing The Rural Customer

Denele Campbell, RTT
Northwest Arkansas Chapter

Serving the rural customer is not a job all piano technicians perform. For several reasons, including location, economics and/or preference, rural business is not a frequent piano service topic. For the purposes of this article, however, we will be discussing rural piano business, and bringing up points of discussion which may prove useful even to the totally urban practitioner of our craft.

There are three categories which we will use to describe rural piano owners. The "long-time" rural refers to those who have earned a living primarily from the land for more than one generation. These "long-timers" are fairly self-sufficient, having learned to mend fences, plumbing and the roof, and fend for crops, livestock and self against the vagaries of Mother Nature. "Long-timers" go to town only when they have to.

"Short-timers" is a term we can use to describe those who have chosen to live in the country within their own lifetimes, rather than following an ancestral pattern like the "long-timers." Short-timers may most often be young families who are seeking a higher quality of life than they may believe available in an urban setting. Often these short-timers and their young children spend limited amounts of time on their rural property, since they are commuting to jobs, piano lessons, basketball games, etc.

Retirees are the third described group of rural piano owners. Retirees may have early life roots in either rural or urban families, but as a group recognize the privacy and scenic beauty as rewards of rural living. Retirees are generally the most affluent of these three groups of rural piano owners, having managed to gain sufficient material wealth to afford a rural retirement home and slower-paced lifestyle.

In discussing optimum business approaches for rural piano owners, it is important to recognize how these three different groups of people may view our services. For the long-timer, the piano is not so much a matter of culture or education as it is a historically intimate companion to the pattern of their daily lives. One-room country churches may serve the religious needs of long-timers, and the piano there, as well as in their home, is most often an old upright. I have found this is sometimes a conscious choice on the part of the customer, based on what they proudly declare is a "clear, ringing tone" or a "nice big sound." The long-timer's use of the piano may be limited in that many don't play Bach, but some do have proficient keyboard skills. One of our first jobs in providing proper service to this customer is to determine the range of uses demanded of the piano. (Of course, this is true for all types of customers.)

Long-timers won't generally be very patient with a technician who sweeps in, makes fancy noises about the piano's needs, and leaves a four-digit estimate for repairs which will put the piano in "tip-top" shape. The long-timers will usually appreciate the technician who shows them the insides, the problems, explains why a cracked bridge means a muddy bass, and lets them decide if the trade-off between the cost of repair is worth the value of a crisp, resonant bass. Long-timers also appreciate, and often demand, that they can help fix the piano. This doesn't mean that the technician sets out to teach the customer our trade. It does mean that if the keys come out for recovering and rebushing, the keybed may be cleaned by the customer. If the action comes out for hammer shaping or other repairs, then the customer is offered the job of wiping and cleaning the strings, plate, inside the bottom, etc.

Helping get the piano in good shape fits in with the long-timer's view of the world. It's a hands-on life he/she lives, and they won't appreciate spending their hard-earned dollars for a technician to do something they clearly see they could do themselves. They will resent a technician's bill, and attitude, if the technician does not recognize the long-timer's frame of reference.

Short-timers are usually very busy people, and perhaps busy doing things they'd prefer not to do. Unlike the long-timer who is busy but stays on the farm, the short-timer is busy on the farm, on the road, and in town. Actually, these folks may be trying to live two lives at once! They are financially dependent on their urban life, the job, for support, but would like to live full-time in the country. Perhaps the first thing to recognize about the short-timer is a tendency toward frustration.

Additionally, short-timers are often families, with the turmoil and work that goes with raising children. These are the customers who must make special arrangements just to have you out to look at the piano, either taking off work or having a neighbor, friend or relative come to let you in. Often the piano you find in their home is a basket case, something they found cheap just so the kids could take lessons. After finding one in Aunt Tilly's barn or the local flea market, they've managed to get the piano into the home with the help of a few good friends. There it sits, back casters broken and three feet from the wood-burning stove.

The short-timer needs the piano in working order but generally can't afford to spend a lot of money. Like the long-timer, these customers may have to "get by" with a less than great piano, and expect you to make the most of a

compromised situation. While making business decisions in these settings, the technician may find a limited range of options. The customer wants music out of a piano which may never be able to produce it. You are more of an educator in this situation than a technician. You must assess the needed repairs and offer a price you can afford, while giving the customer enough information to determine if the benefit is worth the cost.

Some options you may find yourself offering, against your better judgement: tuning a piano at the pitch it is on; repairing hammer shanks with soda straws or collars; gluing plastic heads on some keys while other old ivories are left chipped; ignoring structural problems such as cracked bridges, loose bearing pins, tuning pins driven to the coil and still barely holding; flange and key bushings that are essentially not there anymore, keys eaten halfway through by mice, and so on.

The long-time and short-time rural piano owners need technicians they can depend on to understand and accept their financial limitations. They will trust you to take care of their piano much as they trust the school bus to pick up their children or their veterinarian to take care of their cow. *If* you make the effort to communicate honestly about their piano. They will never call you again or recommend you if they feel you believe their business isn't as important as the society ladies' in town.

A somewhat different scenario may describe the third type of rural customer. In servicing the rural retiree's piano, a technician may often find it to be of higher than average quality. Since a greater material wealth has allowed the retiree to obtain a rural retirement home, you might infer this wealth has sprung from a better education, a more successful career, and/or a more privileged life. As a service person in this customer's home, you must operate under their expectation that you will be competent in the full spectrum of piano service. When you arrive to tune, don't be surprised if they expect a voicing on two or three troublesome notes. If they are concerned about whether the piano's new country home is having an adverse effect, you should be prepared to analyze heating, humidity, sunlight, etc. and offer your professional opinion and advice.

Retirees are not at all interested in cleaning up their own keybed or strings. They expect prompt, reliable, professional service with a minimum of bother to them. If the piano needs work, they want to get it done so they can rest assured all is as it should be. They see their piano as a valued investment, and intend to maintain it as such. Unlike the other two categories of rural piano owners, retirees do not expect or demand a "work with me" relationship of a technician, but may demand big-city performance standards for instruments.

Rural retirees are a fairly small segment of American society, having been successful enough in the business world to afford rural retirement. Such success results from efficiency, good decision-making skills, shrewd financial planning, and often a certain kind of single-mindedness. Learning to recognize such qualities in a customer is an important business lesson for the technician, since the customer with those skills will not long tolerate a technician who doesn't exhibit some degree of those skills him/herself.

When facing rural customers of any type, a technician may benefit from seeing in his/her situation something of the old country doctor. You may travel on long, rough, dusty roads to a piano whose glory days are long past. You cannot make it young again. But you can lend your experience, through communication, to the piano's owner, enabling that owner to make the best possible choices toward the piano's care. You must be good enough to voice three shrill treble hammers on a Steinway grand, but not "too good" to take a live mouse family out of an antique green upright, missing all its ivories. You must have everything in your little black bag you might need to provide proper care, since the economics of rural piano service demand minimum return trips.

Ultimately, you must accept your role as the "fixer of the music," a vitally important job. If your career as a technician is primarily structured as a means to a financial end, then you won't find high satisfaction in rural work. If, on the other hand, your piano service career is primarily structured as a means to help people enjoy music, then rural customers need your telephone number. They'll pay your fee.

TECHNICAL FORUM

Grand Dampers

Susan Graham, RTT
Technical Editor

The phrase "grand damper work" has a remarkable capacity to strike fear in the hearts of piano technicians. The subject is regarded with such trepidation one would think it entailed sorcery, rather than only slightly more than the usual tedium and care for detail.

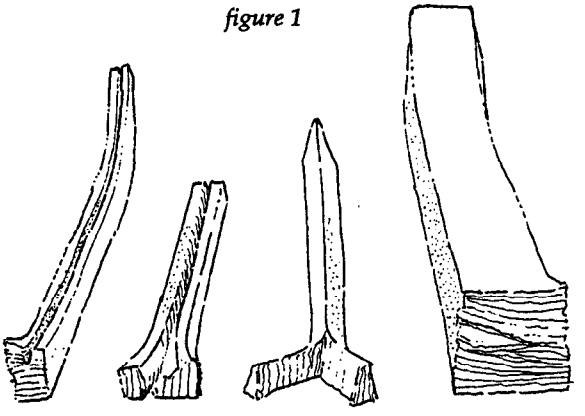
A lot of this fear is due to unfamiliarity. The damper system is tucked away in the action cavity where we don't see much of it: we don't even know what it really looks like. Unable to visualize possible sources of trouble, we're forced to go through the bother of unbuttoning the case, pulling the action, and peering into the dim recesses at the peculiar arrangement of wires, flanges and felt. Malfunctions are usually manifest in the interaction of hammer action and damper; since the hammer action must be removed to work on the dampers, there is no chance to scrutinize this interaction at close quarters. Many repairs must be done "blind."

All this makes the fear self-perpetuating: the system is unfamiliar, we avoid working on it, and it remains unfamiliar. As you may have guessed, I intend to try to dispel some of this fear with a series of articles on grand damper work.

We will approach the topic from a rebuilding viewpoint. This is how I learned to work on dampers. I think the approach is beneficial since it results in an understanding of the whole system, rather than isolated problems in need of troubleshooting. Covering this subject (or, at least, saying what I have to say about it) is going to take several months, and we'll have the NAMM show and directory issues to break things up. (I say this to caution you not to disassemble a damper system immediately and then wait for successive installments so you can finish the job).

A grand damper system is just a simple, gravity-operated device for controlling the duration and color of sound produced by the hammer action. The simplicity means that there are only a few requirements which need to be met in order for it to work properly. That same simplicity, however, means that *all* the requirements *must* be met or there will be trouble.

figure 1



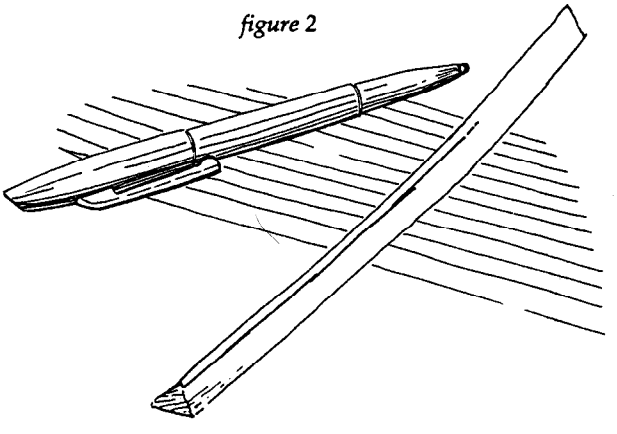
The first requirement is good condition of the individual components of the system, so let us begin by examining them.

Felt

In damper felt the layers of fibers are loosely packed and easily distinguishable as "grain" (figure 1). I think of the fibers as pipe cleaners: the sides are soft and fuzzy, while the cut ends are pointed and stiff. Grain orientation imparts various characteristics to the damper. Side grain will be quieter and more effective, but the cut end surfaces are more stable and can be more neatly and precisely trimmed. Virtually all flat damper felt is cut so the grain runs horizontally (to the string), which results in side grain contact (this is true of both stitched and unstitched flats). This horizontally grained felt will pack, settling after it is installed. It can be peeled, however, if necessary to adjust thickness. Peeling flats can also be beneficial in troubleshooting: the exposed surface of felt can pick up contamination from the strings, or it may be slightly "crusty" from manufacturing, and peeling will expose a softer, quieter surface. It is not advisable to peel stitched flats, since this will undo the stitching (sometimes just a spot of glue). Stitched flats are used because they damp efficiently: the four small points of felt support the entire weight of the head and underlever, making for very positive contact (figure 2). Stitched flats also make less thump as the damper pedal is released, since the points "brake" the damper a little as they spread on landing.

Flat felt is available in strips or precut blocks. If domestic suppliers do not have stitched flats suitable for grands (they are usually smaller than those for uprights, and stitched flats are difficult to trim successfully) they are available from Renner.

figure 2



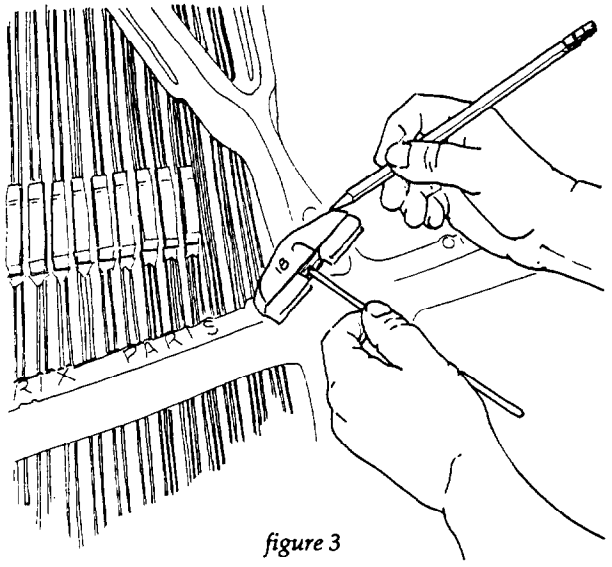


figure 3

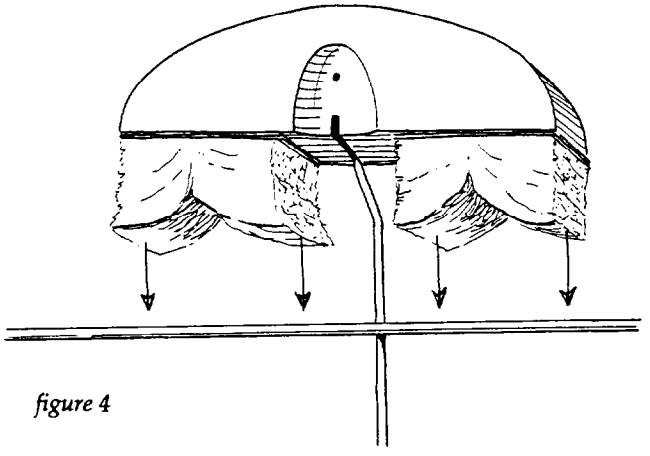


figure 4

Wedge felt usually comes in strips, usually with a vertical grain. Since a wedge drops down between or beside the strings, this grain orientation results in side grain contact with the string. An exception may be made in order to cut a wedge with a very fine point: horizontally grained felt holds its shape better in the cutting process. A disadvantage of horizontal grain is that the layers tend to pull apart under use: older pianos which have wedge damper felt curling or fraying are the victims of this tendency. Avoiding this condition is one reason to depress the damper pedal while inserting a temperament strip. This lifts the dampers free of the strings and avoids pinching and damaging the felt.

It's best to buy damper felt when it is on display (at conventions) so you can pick the most symmetrically cut wedge strips. Uneven thickness of the "legs," particularly in trichord felt, can make troubleshooting an endless and miserable job. In addition, before you cut strips into individual blocks, lightly line one side of the back (figure 3). If two wedge blocks are glued on the same head, keep those lines on the same side. This way, if there is a slight discrepancy in the thickness of the wedges, they at least will be symmetrical front to back, giving you a fighting chance of compensating for the problem by pounding or squeezing felt, adjusting head spacing, etc.

Vertically-grained wedge felt sometimes separates at the string contact, forming a ledge; troubleshooting may require that this be sanded off.

The primary function of colored backing on damper felt is decorative. The other purpose it can serve is to level the top surface of the heads — also a cosmetic consideration. To do this, the backing is glued on the heads separately from the damper felt itself. Sample heads in each section are placed in the piano with the correct piece of wedge felt in place (but not glued). A section of heads which sits lower than the adjacent heads can be double-backed with two thicknesses of the colored felt to raise them. This can also be done in the case of combination dampers (with trichord felt on the front and a flat in the back, or vice versa). It is important that the thickness of the flat allow the trichord to seat solidly. If not, the flat can be peeled, or the portion of the head where the trichord is glued can be backed with a white felt (such as muffler rail felt) to make the trichord "taller." If, on the other hand, the trichord is preventing the flat from seating, the flat can be backed, or it may be best simply to find a better match of felt.

Another advantage of backing the heads separately is that it allows stocking a greater variety of felt sizes without duplication just for the sake of backing.

Before you embark on damper rebuilding, try samples of felt. Best results usually come from matching the original thickness as closely as possible, making sure that combination dampers have compatible felt sizes and that the final level of the heads is suitably aesthetic.

Removal And Preparation

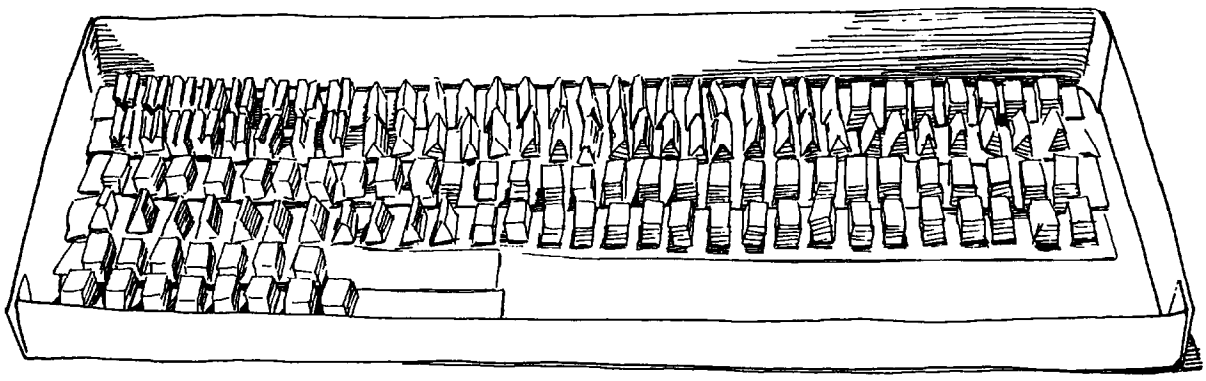
It may simplify regulation to record the height of the underlever from the keybed before disassembling the system. It's doubtful that this will be reset to exactly the same height but it will give you a reasonable starting point.

When replacement felt has been selected, remove the heads. In most cases, there will be set screws and the wire will simply slide out when these are loosened. At some point after disassembly, it is a good idea to give these screws a half-turn or so back into the underlever or run a piece of masking tape across them all to be sure they don't inadvertently walk the rest of the way out. Replacing any which get lost is very difficult. You may run into screw-in wires or other unusual systems requiring some ingenuity.

Keep the heads in order in a rack: two long slats nailed to a pair of upright end blocks, holes punched in the bottom of a box, etc. Do not let use of a rack lull you into a false sense of security, however. *Always* number the heads as they are removed (figure 4). If there are numbers already stamped on the heads, be sure they are in sequence — this can save time and aggravation searching the shop for a #57 damper which never was there (or wondering which of the #33s came first).

To my mind, putting in new damper felt and reinserting the dampers without first removing, inspecting and reconditioning the underlever system is simply asking for trouble. There is no easier time to do it, and there are so many little things which can be corrected so easily now which are so difficult (or impossible) later. If the pitman (the dowel or stick which goes through the keybed from the underlever tray to the trapwork) is pinned or otherwise fastened to the tray, it must be removed. One style (usually found in Baldwins) is held by a brass pin like a small hinge pin; it, in turn, may have a twist of wire or a cotter pin to keep it in place. This must be removed or clipped so the pin can be removed. The dowel-style pitman can be removed by dropping the trapwork lever from below.

figure 5



Removing the underlever tray will be easier if the upstop rail is either raised to its highest position or removed. If the sostenuto system is suspended from the belly rail, the rod must be removed. If it is desirable to remove the hangers as well, mark their location with pencil and number them with tape or a Sharpie felt-tip, which will write directly on metal.

There may be springs between the tray and the belly rail which should be removed and saved, along with any other connections which will interfere with removing the tray.

Most damper trays pivot on two end pins which are suspended in wooden blocks. The treble block must be removed to extract the tray. Mark an arrow to indicate which way is up on the block, and keep track of its screw and any shims which were in place to space and level it in the cavity. You can now remove the tray by sliding it toward the treble until the pin frees from the bass end block. If the bushing in the treble block is in bad shape, it should be replaced, and so should the bass — which will require removing the bass end block. Label as above (and include an appropriate B and T).

By the time the damper felt needs replacing the guide rail probably should be rebushed as well. (This is also a job which can be done independently of any other work except damper regulation: like rebushing keys before action regulation, it is relatively simple and can offer great benefits in performance and noise control). The guide rail is usually in two pieces — bass and treble — and is screwed to the soundboard at the front edge. Extracting those screws is usually easiest if the strings above nate bass strings with a dirty screwdriver shank. Keep the screws in order. There is usually felt underneath the rails which may have stuck to the finish in the board but a little gentle persuasion should work it loose.

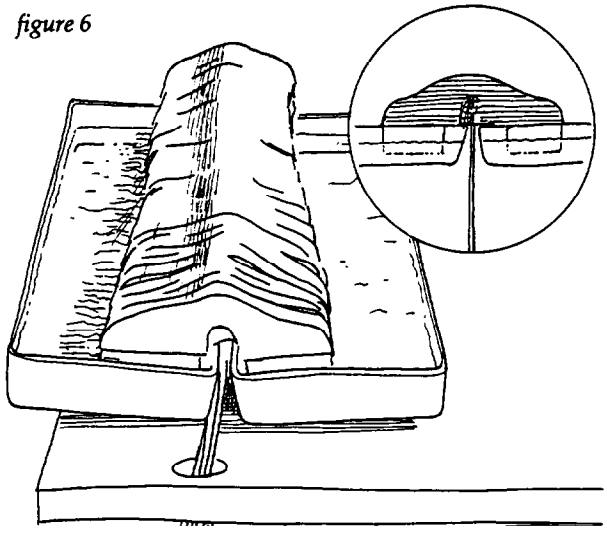
Cutting New Felt

My preference is to cut and prepare all the new felt before removing any of the old: others remove all but samples of the old felt and cut the new as they install it. By any method, it is important to maintain the same number, size and style of felt blocks.

Size and placement are critical for effective damping, and to avoid exiting unpleasant partials by contacting a node. There are reasons that two or more short blocks of felt are used, rather than one long one. The entire weight of the head and underlever is more concentrated on smaller blocks, and it permits straddling possible nodes. The designers of a piano give some thought to damper style and placement. Unless you have excellent reasons to do otherwise, duplicate their design. Efficiency of damping is a characteristic of a piano which has been designed to suit the maker — change it, and you change the voice of the instrument. Different styles of felt have different damping effectiveness: in general, wedge felt is more efficient (but can be noisier) than flat. The changes from wedge to combination to flat are given careful thought so this transition is gradual. All these things indicate duplication as the best course for the average piano technician. Also duplicate makers put the trichord on the back, because the strings are farther apart toward the bridge and the felt may seat more readily. Others prefer to put the trichord in the front. There may also be subtle changes in length of felt blocks and other features to be detected and duplicated.

Just to be on the safe side, I make a list of how many of each kind of damper, including whether the trichord felt on any combos is front or back, and, if there are short/long block combinations, which goes front. It is remarkably easy to get confused when holding a damper head upside down with rapidly gelling glue on it... Note alignment to front and back edges of the heads. Heads are likely to be somewhat rhomboidal: the felt may duplicate this shape or it may be more square, leaving a small corner of the head overhanging. It begins to seem like a lot of fuss, but remarkably little margin for error exists in felt placement and it is all too easy to stray onto a node and create unpleasant ringing or ineffective damping.

figure 6



I usually cut damper felt with the guillotine cutter our suppliers carry: I do recommend one with sturdy metal uprights and a rigid blade, rather than the lightweight models which hold razor blades. I have also had good results using pruning shears to trim damper felt: the shears have a heavy, stiff blade opposed by an anvil jaw which helps keep the felt from distorting or sliding around as it is cut. Other technicians may like Richard Davenport's idea of routing the various wedge shapes in a plank of wood so the felt strip can be laid in that and cut to length with a knife. Whatever is used, it must be sharp so it will cut and not compress or distort the felt.

If it is necessary to trim pre-cut flats to a final length it is advisable to keep track of which edge is factory cut, and to glue on the block so that edge is exposed. It is almost impossible to get as square and symmetrical a cut as the factory produces.

Good clean edges on damper felt are important: nothing looks more ragged than uneven or fuzzy dampers, and they will ruin the appearance of otherwise excellent rebuilding. Some technicians even dress the corners of the felt blocks with scissors after they are cut to length to eliminate any stray fibers.

If the wedge felt to be used drops down more than 1/8" below the string, it is a good idea to trim the pointed end. This will help prevent curling, reduce the "whistle" as the felt lifts past the string, and will also insure that the damper felt completely clears the string when the key is depressed. It may also be necessary to deepen the cut between trichord wedges, but I don't usually do this until later.

As I cut damper felt, it is laid out on a piece of double-faced tape (figure 5). When everything is ready and double-checked I remove the old felt from the heads.

There are three methods of removing damper felt: they involve muscle, equipment, or time. The muscle method is probably the simplest: scrape the felt off with a knife or scraper. This can be done one head at a time, or by putting small groups of heads upside-down in a vise and using a hook scraper. Care must be taken not to remove wood from the heads: it is important that the bottom surface of the head remain intact, level and flat. Chipping is most likely to occur at the front and back edges, so scrape from those surfaces in (toward the wire). Avoid damaging the wire, however.

The equipment method uses a power sander to remove the felt. This is usually done on a disc. Once again, it is important not to round off the head, or damage the wire.

The time method is to soak off the damper felt. I like this because it involves no physical effort. Other things can be accomplished while the heads soak so the time is not a problem. I also think that soaking does the best job of removing felt and glue without damaging the head.

The plating on the damper wires is important so I don't want them in contact with the soaking solution. I made shallow soaking trays by cutting down some plastic drawer organizers to about 1/2" deep. They are used in pairs: one for the front blocks and one for the back. With the heads in the rack, the wires hang between the two soaking trays and down through the slot in the rack (figure 6).

The soaking solution is the standard hot-water-and-wallpaper-remover. The mixture must be very hot to be effective; proportions are roughly what's suggested on the jar of remover. Although adding a small quantity of acetic acid might speed the process, the solution does splash around some. Acetic makes it very corrosive on wires and the finish on the heads. At this point I haven't refinished heads or polished wires but there's no point in creating extra work.

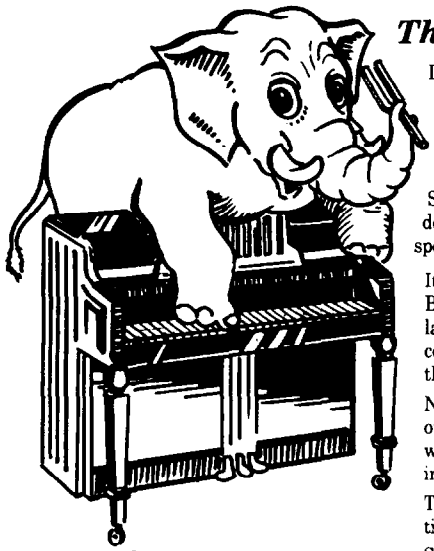
I mix the solution and pour it into the trays where the heads are already waiting. It isn't necessary to fill the trays completely: the felt will wick up the liquid. In many cases, damper felt begins falling off almost immediately. In almost all instances, it will come off cleanly within 30 minutes. Then I remove the trays, wipe the heads dry, and put them in a clean rack. With several pairs of soaking trays, the whole set of dampers can be removed at once, while you are working on guide rail bushings, making phone calls or having lunch.

Moisture from soaking must evaporate before new felt can be glued in place, but there's plenty more to do. The wires must be cleaned with a low-abrasive brass polish. Brasso has worked well for me, since it contains enough ammonia to cut any grease and is just abrasive enough to clean the wire without damaging the plating. I don't use any polish which leaves a film, such as Nevr-dull. I also don't recommend steel wool, since it can damage plating. The wire may then corrode: where it passes through the guide rail this can cause sluggishness. If the plating is already seriously damaged or deteriorated, the wire should be replaced. Wires should also be checked for nicks or bends where the set screw contacted them: deburr these with fine emery paper, straighten them out (not the upper bends for spacing, just the lowest section which goes into the underlever) and deburr the cut end of the wire if it is rough. Be sure that the wire is tight in the head: glue size or put on a drop of super glue if it is not. I do not lubricate damper wires.

The finish on the heads is important for appearance. They may clean up sufficiently with fine steel wool and alcohol or naphtha, or it may be necessary to sand and refinish them, either in ebony or with a clear coat of lacquer. Keep finish off the wires you just cleaned. Spend the time necessary to clean up the heads nicely, for they are very visible.

We'll continue next month with underlever inspection and servicing, guide rail rebushing and so forth. To close, I wish you all a safe, happy and peaceful holiday season and a bright and prosperous new year!

REMEMBER YOUR FINEST TUNING?



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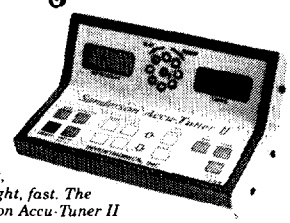

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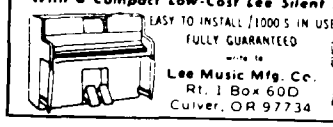

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TUNING UP

More On Interval Tests

Rick Baldassin, RTT
Tuning Editor

During the past month, I received a telephone call from one of our members who had a couple of questions about tuning. He prefaced his questions by stating the amount of reading and research he had done to further his knowledge on the subject. After listening a few short moments, I was convinced that this individual had researched the materials he cited, and understood well the concepts put forth. I awaited his question, eager to answer. His hunger to gain this knowledge was very refreshing to me. I have met a few such individuals over the past several years, putting the pieces together. What a pleasure it is to help such an person. It is one of the the meaningful rewards of this job.

His questions were simple: Why was it that when using an interval test, such as the M3-M10 test for the 4:2 octave, that it was not critical for the reference note to be in tune? Also, how was it that the P4-P5 test could give the same result as the M3-M10 test?

The question was not specific to this one example, but was asked so as to be applied to all of the interval tests which he knew. Let us take a moment and review the answer which I gave him.

In very simple terms, as long as the test interval is tempered on the proper side, it does not matter precisely where the test note is tuned. If the octave has been tuned pure at the 4:2 level, then the beat rate will be the same between the third and the 10th, whether the reference note is tuned such that the third and 10th beat at 0.5 BPS or 15 BPS. If the octave has been tuned wide at the 4:2 level, by say 0.5 BPS, then the 10th will always beat faster than the third by that amount, and the difference will remain constant. The third might beat at two BPS and the 10th at 2.5 BPS, or it could just as well be 13 and 13.5. The "half beat" would remain the same. The important thing is to make sure that the beats for the third and 10th are on the wide side (since Major thirds and 10ths are expanded intervals), and to tune the reference note such that the beat rate is in a range which is easy to hear.

In the case of the P4-P5 test, since this test is also a test for the 4:2 octave, the difference between the fourth and the fifth will also be 0.5 BPS for the above example. In this case, the fourth would beat 0.5 beats faster than the fifth. As long as the test note is tuned such that the fourth is beating on the wide side, and the fifth is beating on the narrow side, it does not matter precisely where the test note is tuned. The rates could be one BPS for the fourth and 0.5 BPS for the fifth, or five BPS for the fourth and 4.5 BPS for the fifth. In any case, the half-beat difference would remain constant. Let us take a minute now and look at why.

First, we must know what the interval tests are proving. Although we have gone through this procedure in the past, we will take the time again here. To know what an interval test is proving, we must look at the interval ratios for each of the test intervals. In the case of the M3-M10 test, the ratio for the M3 is 5:4, and the ratio for the M10 is 5:2. Since the fives are common to both intervals, the test measures (or proves, if you will) the octave at the 4:2 level. In the case of the P4-P5 test, the ratio for the P4 is 4:3, and the ratio for the P5 is 3:2, since the threes are common to both intervals, the test is once again for the octave at the 4:2 level.

Knowing that these interval tests do indeed test for the octave at the 4:2 level, how is it that the exact placement of the test interval is not critical?

To simplify the explanation, let us not even deal with the concept of inharmonicity. We will assume that the notes of the octave are A3 and A4, and that the fourth partial of A3 and the second partial of A4 have been perfectly matched at 880 Hz. In the case of the M3-M10 test, the test note would be F3. Looking at it this way, it should be clear to see that it doesn't really matter what the fifth partial of F3 is beating at. If the fifth partial is sounding at 873 Hz, the difference between 873 and 880 is the same as the difference between 873 and 880. The same seven BPS would be present whether the 880 Hz was coming from the fourth partial of A3 or the second partial of A4. If the fifth partial of F3 were sounding at 878 Hz, then there would be two beats between 878 and 880, in each case. In regard to the P4-P5 test, assuming the fourth and second partials were still tuned at 880 Hz, the third partial of the test note, D4, could be at 881 Hz, or 888 Hz. In the first case, there would be +1 BPS between the fourth partial of A3 (880) and the third partial of D4 (881), and -1 BPS between the third partial of D4 (881) and the second partial of A4 (880). In the second case there would be +8 BPS for the fourth, and -8 BPS for the fifth. Same, same.

Let us look now at the case where the 4:2 octave was expanded by 0.5 BPS. This would mean that if the fourth partial of A3 was sounding at 880 Hz, then the second partial of A4 would be sounding at 880.5 Hz. In the case where the fifth partial of F3 was sounding at 873 Hz, this would give seven BPS for the F3-A3 third (873 and 880), 7.5 BPS for the F3-A4 10th (873 and 880.5). In the case where the third partial of D4 was sounding at 881 Hz, this would give one BPS for the A3-D4 fourth (880 and 881), and 0.5 BPS for the D4-A4 fifth (881 and 880.5). In any case, the difference while looking at partials four and two would be 0.5 BPS.

I mentioned earlier, that it was important that the test intervals be at least tempered correctly (on the proper side of pure). This is not so much an issue when the octave level being tested is tuned pure. In the case where both the fourth partial of A3 and the second partial of A4 were sounding at 880 Hz, the fifth partial of F3 could just as well be sounding at 883 Hz. Even though the M3 and M10 would be beating at -3 BPS, the rate would be the same, and prove that the 4:2 octave was tuned pure. But let's look at the example where the fourth and second partials were not sounding at the same pitch, but were expanded by 0.5 BPS, 880 and 880.5 Hz, respectively. With the fifth partial of F3 sounding at 883 Hz, this would give -3 BPS for the F3-A3 third (883 and 880), but only -2.5 BPS for the F3-A4 10th (883 and 880.5). In this case, even though we know the octave is wide at the 4:2 level, the test shows that the M3 is faster than the M10, which under normal circumstances would indicate that the octave was narrow at the 4:2 level. This is because the M3 and M10 are contracted in this example, rather than being expanded, as they should be in equal temperament.

Similarly, if the third partial of D4 was sounding at 880.25 BPS, this would give +0.25 beats for the A3-D4 fourth (880 and 880.25) and +0.25 beats for the D4-A4 fifth (880.25 and 880.5). Even though we know that the octave is expanded by 0.5 BPS, this test would lead us to believe that the octave was pure at the 4:2 level, with the beat rate of the P4 being the same as the P5. This is because in the above example, the fifth is expanded, rather than contracted, as it should be in equal temperament.

As you can see from the above examples, while the exact placement of the test note is not critical, it is critical to the extent that the test intervals involved are tempered properly.

*****

This month, we have a letter from Virgil Smith, RTT, of the Chicago Chapter. Virgil writes:

I am enclosing a copy of my temperament which may interest you. Many who use it in this area like it very much, and though it was published earlier in the Journal, *I don't think there was enough explanation to make it understandable. Here is an attempt to make it understandable:*

This temperament is a completely different approach to temperament tuning. It uses minor thirds to achieve greater accuracy, and it lets the piano tell you the interval beat speeds that work best for that particular instrument. It allows greater accuracy in the first steps, thus largely eliminating the necessity for re-doing the beginning steps when the final steps don't work out. It starts from A, and includes the notes from D3 to D4.

1. Tune A4 to fork and A3 to A4, using F2 as a guide.

2. Tune F3 to A3 at approximately seven BPS. This is the only beat speed mentioned; every other beat speed is relative.

3. Tune D4 to A3 (fourth). Checks: F3-D4 sixth beats faster than F3-A3 third, and the A3-D4 fourth will have a definite slow beat.

4. Tune D3 to A3 (fifth) and to D4 (octave). Checks: The octave must sound clean; D3-F3 m3rd beats faster than F3-A3 M3rd, but slower than F3-D4 sixth; A#2-D3 third beats slower than A#2-D4 10th; D3-A3 fifth has a very slow beat.

5. Establish speed of fourths for the particular piano being tuned. Tune G3 to D3 (fourth), and E3 to A3 (fourth). Checks: A#2-D3 third with A#2-G3 sixth, and C3-E3 third with C3-A3 sixth (each sixth must beat faster than the third); E3-

How To Tuna Fish

An Essay Of The Situation
An Attempt To Sharpen Your Tuning Sgills

Dan Schmidt

(Editor's Note: The late Dan Schmidt was the son-in-law of James Coleman, Sr. This article has been used by permission. Making copies without written permission of the copyright owner is prohibited).

It has come to my attention that there are many people out there asking themselves and their piano tuner, "Oh yeah, sure. Hey you can tune a piano, but how do you tune a fish (or Tuna Fish)?"

Most tuners tend to Clam up when asked this question. This is either out of ignorance or they are Shellfish and don't want to share their knowledge. Well, here are a few tips that will help you answer this all important, Sole searching conundrum that has puzzled philosophers, atomic physicists, and fisherman since tuning was invented.

First and foremost among the prerequisites for tuning a fish: You must know its scales, for a fin tuning, the scales have a tail to tell.

Most Tuna and Salmon are easy to tune, but they sound canned and tinny. With proper voicing Salmon can really smoke.

It is generally not recommended that you try tuning a fish if you are hard of Herring.

Never drink before attempting to Tuna Fish. Tuning a fish Pickereled is never a good idea, it's a bad Halibut and the tuning will usually turn out Crappie and the people will Carp.

For an outstanding low end, with good response and rich full-bodied resonance always choose the Bass.

Never try to tune a Shark, Barracuda, or Piranha, they tend to bite and are always sharp. Whereas all the Rays and Flounder stay flat.

It is best to tune a fish off Florida, for that is where you will find the Keys.

For sheer volume and carrying power, any member of the Cetacea family can really Whale. It's a big job but they're versatile; good for almost any Porpoise.

As for tuning Flying Fish, well you'll just have to wing it. Trout, you tune on the fly.

Always remember: there is nothing deader than a Mackeral.

I have found that proper attire adds to the professional look of the professional fish tuner. For example, the female tuner might wear a Herringbone suit and fishnet stockings. I prefer to wear a Sharkskin suit with Hushguppies. ≣

G3 m3rd with D3-F3 m3rd (E3-G3 m3rd must beat faster than D3-F3 m3rd); both fourths beat at the same speed. The m3rd is a very sensitive interval. If the fourths beat too fast, the E3-G3 m3rd will be too slow, and if the fourths are too slow, the m3rd will be too fast. The correct speed of the E3-G3 m3rd ensures the correct speed of the fourths.

6. Establish the correct speed of M3rds. Tune D#3 to G3 (M3rd) and G#3 to E3 (M3rd). Checks: E3-G#3 M3rd beats slightly faster than D#3-G3 M3rd; D#3-G#3 fourth beats the same speed as D3-G3 fourth and E3-A3 fourth. There is only one place to tune these two notes that will fulfill these requirements. The correct fourth may be tuned higher or lower until the thirds properly relate.

7. Tune F#3 to D3 (M3rd) slightly slower than D#3-G3 (M3rd). Check: D#3-F#3 m3rd beats slightly faster than D3-F3 m3rd and slightly slower than E3-G3 m3rd.

8. Retune F3 to A3 (M3rd) if necessary. Check: F3-G#3 m3rd should fit between E3-G3 m3rd and F#3-A3 m3rd.

All notes between D3 and A3 are now tuned. Before continuing, check all intervals and make any minor corrections necessary. Check the three fourths, the four M3rds, and the five m3rds for complete consistency. If all are correct, the rest is easy.

9. Tune A#3 to the following three notes: D#3 (fifth), F3 (fourth), and F#3 (M3rd) so that all intervals match their lower neighbors. The F#3-A#3 M3rd will beat faster than the F3-A3 M3rd, and the relationship between how much faster the F3-A#3 fourth is than the D#3-A#3 fifth will be established and maintained throughout the entire tuning.

10. Tune B3 to the following three notes: E3 (fifth), F#3 (fourth), and G3 (M3rd), so that all intervals match their lower neighbors.

11. Tune C4 to the following three notes: F3 (fifth), G3 (fourth), and G#3 (M3rd), so that all intervals match their lower neighbors.

12. Tune C#4 to the following three notes: F#3 (fifth), G#3 (fourth), and A3 (M3rd), so that all intervals match their lower neighbors.

13. Retune D4 if necessary, so that the A3-D4 fourth matches the other fourths, the A#3-D4 M3rd matches the other M3rds, and the G3-D4 fifth matches the other fifths. Also, re-check the D3-D4 octave.

As the final check, to insure a completely accurate temperament, listen and make any final adjustments by playing up chromatically by fifths, fourths, Major thirds, Major sixths, and minor thirds. Don't be satisfied until each interval progresses smoothly and consistently.

*****

The beauty of Virgil's system is that it uses the initial steps to divide a larger interval (in this case, the fifth), into smaller intervals (in this case, semitones), and then uses these initial notes as anchors from which the rest of the notes can be tuned. As you can see, by the time the remaining notes are tuned, they are actually being tuned to three different notes in a systematic fashion. In addition, procedures were employed to determine the proper speed of the fourths and Major thirds for the instrument being tuned. For me, a system such as this, which establishes the proper beat speeds for intervals, and lays the foundation early, seems to work out better than systems which have you tune long chains of intervals, only to let you know that it didn't work out, just when you thought you were through!

Our final submission this month is from the late Ed Buck, RTT, who was of the Boston Chapter. Some time after Ed passed away, Dr. Sanderson told me of an idea that Ed had about chipping pianos. I later mentioned this idea of Ed's to Wally and Vivian Brooks while I was visiting with them, and a short time later, Vivian, being the organizational wizard (wizardess?) that she is, produced it for me. This is what Ed had to say:

I remember (in the not too distant past) spending several days trying to bring a newly strung piano up to pitch so it could be tuned. It was probably longer than several days, and I know it was exceedingly frustrating. Technicians I have talked with have said it takes from four to 20 passes to get a newly-strung piano up to pitch, that is some say they can chip to pitch in four passes, and others say it takes at least 20 passes before the piano is ready to be tuned. Now, I believe the piano can be brought to 10 cents sharp in two passes, and in under two hours. Here's how.

With sufficient tension to keep the coils tight, start chipping to settings in Program #1, (listed on page 21) .(Program #1 is intended to be used with a speaker/amplifier connected to the oscillator output of the Sanderson Accu-Tuner.) *Chip to pitch by octaves, starting with all the C's, then all the C#'s, then all the D's, etc. It helps to do the second octave first, so the bottom octave can be chipped with the aid of the second octave to listen to. When completed, the piano will be approximately 50 cents flat throughout. The sawtooth chipping pattern (cent offsets)* (of tuning program #1) *produces an even flatness throughout the piano. Once this even flatness is achieved, the standard pitch-raise procedure built into the Sanderson Accu-Tuner can be used to bring the piano to 10 cents sharp on the next pass with the use of Program #2 (listed on page 19). On the second pass, simply start with note A0 and progress chromatically through note C8. Voila! A piano 10 cents sharp, and ready for tuning. I recommend tuning it 10 cents sharp.*

More will be said about this technique as Al Sanderson and I use it, and hopefully get some feedback from others who use it or have questions concerning it.

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Sadly, Ed Buck never got a chance to test his theory to the extent he wanted to. Some time ago, I asked Dr. Sanderson if he felt it would be Ed's wish to publish this work and get feedback on it. Inasmuch as Dr. Sanderson felt that this was Ed's wish, I have published his ideas at this time. Over the past year, I have used this system, and while my experience has shown that the system could use some of the refinement which Ed desired, the system basically works. Any of you wishing to try this system and caring to share your feedback may do so by writing to Dr. Sanderson or me.

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

Rick Baldassin
Tuning Editor
2684 W. 220 North
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Program #1: Sawtooth Chipping Pattern
Tune by octaves starting with C. Use speaker.

Piano	SAT	Cents	Piano	SAT	Cents	Piano	SAT	Cents	Piano	SAT	Cents
A 0	A 2	-41.2	G 2	G 2	-21.5	F 4	F 4	- 1.0	D#6	D#6	20.1
A#0	A#2	-47.8	G#2	G#2	-28.2	F#4	F#4	- 7.7	E 6	D 6	13.6
B 0	B 2	-54.4	A 2	A 2	-35.0	G 4	G 4	-14.5	F 6	F 6	7.2
C 1	C 2	20.6	A#2	A#2	-41.6	G#4	G#4	-21.2	F#6	F#6	0.8
C#1	C#2	14.1	B 2	B 2	-48.3	A 4	A 4	-28.0	G 6	G 6	- 5.5
D 1	D 2	7.7	C 3	C 3	29.0	A#4	A#4	-34.7	G#6	G#6	-12.0
D#1	D#2	1.2	C#3	C#3	22.3	B 4	B 4	-41.5	A 6	A 6	-18.2
E 1	E 2	-5.2	D 3	D 3	15.6	C 5	C 5	35.8	A#6	A#6	-24.3
F 1	F 2	-11.7	D#3	D#3	9.0	C#5	C#5	29.1	B 6	B 6	-30.3
F#1	F#2	-18.1	E 3	E 3	2.3	D 5	D 5	22.3	C 7	C 7	47.7
G 1	G 2	-24.6	F 3	F 3	- 4.4	D#5	D#5	15.6	C#7	C#7	41.8
G#1	G#2	-31.0	F#3	F#3	-11.0	E 5	E 5	8.8	D 7	D 7	36.0
A 1	A 2	-37.5	G 3	G 3	-17.7	F 5	F 5	2.1	D#7	D#7	30.0
A#1	A#2	-44.3	G#3	G#3	-24.4	F#5	F#5	- 4.6	E 7	E 7	24.0
B 1	B 2	-51.0	A 3	A 3	-31.0	G 5	G 5	-11.4	F 7	F 7	18.0
C 2	C 2	25.8	A#3	A#3	-37.8	G#5	G#5	-18.1	F#7	F#7	12.0
C#2	C#2	19.0	B 3	B 3	-44.5	A 5	A 5	-24.8	G 7	G 7	6.0
D 2	D 2	12.3	C 4	C 4	32.8	A#5	A#5	-31.4	G#7	G#7	0.0
D#2	D#2	5.6	C#4	C#4	26.0	B 5	B 5	-37.9	A 7	A 7	- 6.0
E 2	E 2	- 1.2	D 4	D 4	19.3	C 6	C 6	39.5	A#7	A#7	-12.0
F 2	F 2	- 8.0	D#4	D#4	12.6	C#6	C#6	33.0	B 7	B 7	-18.0
F#2	F#2	-14.7	E 4	E 4	5.8	D 6	D 6	26.5	C 8	C 8	25.0

Program #2: Second Chipping Program
Use with automatic pitch raise calculator

Piano	SAT	Cents	Piano	SAT	Cents	Piano	SAT	Cents	Piano	SAT	Cents
A 0	E 3	1.6	G 2	D 5	8.9	F 4	F 6	13.6	D#6	D#6	14.0
A#0	F 3	2.5	G#2	D#5	9.1	F#4	F#5	10.4	E 6	E 6	14.3
B 0	F#3	2.5	A 2	E 5	9.1	G 4	G 5	10.6	F 6	F 6	14.7
C 1	G 3	2.5	A#2	F 5	9.1	G#4	G#5	10.9	F#6	F#6	17.0
C#1	G#3	3.4	B 2	F#5	9.8	A 4	A 5	11.2	G 6	G 6	17.6
D 1	A 3	4.0	C 3	C 5	7.1	A#4	A#5	11.5	G#6	G#6	18.0
D#1	A#3	4.0	C#3	C#5	7.4	B 4	B 5	11.8	A 6	A 6	18.4
E 1	B 3	4.6	D 3	D 5	7.7	C 5	C 6	12.2	A#6	A#6	19.0
F 1	C 4	5.8	D#3	D#5	8.0	C#5	C#6	12.5	B 6	B 6	19.9
F#1	C#4	5.8	E 3	E 5	8.4	D 5	D 6	12.9	C 7	C 7	20.6
G 1	D 4	6.1	F 3	F 5	8.7	D#5	D#6	13.2	C#7	C#7	21.5
G#1	D#4	6.1	F#3	F#5	9.1	E 5	E 6	13.7	D 7	D 7	23.0
A 1	E 4	6.1	G 3	G 5	9.5	F 5	F 6	14.0	D#7	D#7	24.0
A#1	F 4	6.1	G#3	G#5	9.9	F#5	F#5	11.8	E 7	E 7	24.3
B 1	F#4	6.1	A 3	A 5	10.2	G 5	G 5	12.0	F 7	F 7	24.6
C 2	G 4	6.8	A#3	A#5	10.5	G#5	G#5	12.2	F#7	F#7	25.8
C#2	G#4	7.1	B 3	B 5	10.9	A 5	A 5	12.4	G 7	G 7	26.4
D 2	A 4	7.3	C 4	C 6	11.3	A#5	A#5	12.6	G#7	G#7	29.2
D#2	A#4	7.5	C#4	C#6	11.7	B 5	B 5	12.8	A 7	A 7	31.2
E 2	B 4	7.8	D 4	D 6	12.1	C 6	C 6	13.1	A#7	A#7	33.3
F 2	C 5	8.6	D#4	D#6	12.6	C#6	C#6	13.4	B 7	B 7	36.4
F#2	C#5	8.5	E 4	E 6	13.1	D 6	D 6	13.7	C 8	C 8	39.0

Collecting And Saving

Norman Neblett, RTT
Los Angeles Chapter

It seems to me that it is important to collect and save. After all, we might need some of the things we accumulate during our lifetime. People call this habit being a *Pack Rat.* I am inclined to think that this tendency is inherited.

My mother was a *Pack Rat.* When she died, I had to sort and dispose of all her personal things. It took me about two weeks. I can't say that I did not enjoy this. There were some things I had not seen for 30 years. There was a tremendous urge to save them. Sadly, I realized that there was not room in my house, since I had a collection of my own.

In complete frustration, I asked my lawyer what to do. Practical man that he was, he advised that the Salvation Army be called and let them pick it up. After all, it is the charitable thing to do. I sat there in her house and watched them clear it out, furniture and all. This does not mean that I had not sorted through everything. No one should be that careless.

For two years our garage was loaded with the sorted items I had saved. I never looked at them during that time. My wife finally put her foot down. If I did not clear that junk out of there so she could garage her car, she was going to divorce me. Divorce is a serious matter.

This effort proved to be profitable. At the bottom of a box of old dishes, I discovered several pieces of cut glass crystal. They turned out to be wedding presents to my grandmother. I wonder if she was a *Pack Rat?*

My oldest daughter is a collector and saver. Five years ago she and her husband added 2500 square feet to their home. It included a huge master bedroom and separate walk-in closets with built-in drawers. My son-in-law is very neat and organized. The clothes and shoes in his closet are arranged by type: Informal, sport, business, and formal. His socks and ties are sorted by color.

When my son-in-law built the addition, he made my daughter agree not to put anything of hers in his closet. The last time I visited them, Phillip told me that every closet and drawer in the house was filled with her stuff. He did not mind because he had his closet, but to him, the frustrating thing was that the insides of every closet and drawer looked alike.

My gossipy grandson informed me that Phillip is building a room divider in the large master bedroom with built-in drawers. In self-defense, I suppose.

I wonder if my young granddaughters will be *Pack Rats?* They will have computers, and then be able to catalog and find what they collect.

It seems to me the best solution to this problem is to die or move. ≡

At Large

Two Reasons For Turning On Ears And Machine At The Same Time

James Coleman, Sr., RTT
Phoenix Chapter

In my mind, there are two main reasons for using the ear and machine at the same time. First, the machine provides a continuing support for ear training. Second, the trained ear can and will pick up inadvertent errors made while using the machine.

In support of the first statement, I have been in the piano business for almost 50 years, and I am still learning more about better tuning. Okay, I'm a slow learner!

Here is a guide for temperament setting, or midrange tuning. After measuring the stretch number and storing it in the usual fashion, set the tuner on A4. If the piano A3, A4, and A5 are within a cent or two, you may proceed to tune, otherwise, do a pitch raising job first. Here is the tuning procedure:

1. With the machine still set on A4, use two rubber or felt wedges (or a split rubber mute) to isolate the center string of A4 and tune it solidly. Advance wedges one position toward the bass, and tune the right string of A4 to the center string.

2. Set the machine a half-step down to G#4, and tune the center string of G#4 solidly.

3. Advance wedges one position toward the bass, tune the right string of G#4 to its center string, and tune the left string of A4 to its center and right strings. Listen to the complete unison. If it is not perfectly clean and solid, re-check and fix it.

4. Set machine to G4, and tune center string of note G4 solidly.

5. Move wedges one position toward the bass, tune the right string of G4, and the left string of G#4 to their respective unisons.

6. Set machine to F#4, and tune the center string of F#4 solidly.

7. Move wedges one position toward the bass, tune the right string of F#4 and the left string of G4 to their respective unisons. Listen to the quality of the unisons.

8. Set machine to F4, and tune the center string of F4 while playing the F4-A4 M3rd. If you can't hear a definite beat of 13 to 14 BPS, the A4 unison is probably not clear.

9. Move the wedges one position toward the bass, tune the right string of F4 and the left string of F#4 to their unisons.

10. Set the machine to E4, and tune the center string of E4 while playing the E4-G#4 M3rd. Listen to the two parallel M3rds. Is the F4-A4 M3rd still clear and is it faster than the E4-G#4 M3rd? Is the E4-A4 P4th less than two BPS?

11. Move the wedges one position toward the bass, tune the right string of E4 and the left string of F4 to their unisons.

12. Set the machine to D#4, and tune the center string of D#4 while playing the D#4-G4 M3rd. Listen for clarity and evenness in the three parallel M3rds available now. Are the M3rds slowing down? Are the two available fourths nearly the same beat rate?

13. Move the wedges one position toward the bass, tune the right string of D#4 and the left string of E4. Re-check all available intervals.

14. Set the machine to D4, and tune the center string of D4 while playing the D4-A4 P5th, listening for an almost pure quality of sound. Also, listen to the D4-F#4 M3rd, and compare it to the other M3rds available. Any irregularity will indicate a careless setting of the note initially, or a poor unison.

15. Move the wedges one position toward the bass, tune the right string of D4 and the left string of D#4. Re-check all available intervals.

16. Set the machine to C#4, and tune the center string of C#4 while playing the C#4-G#4 P5th. Strive for the same quality of sound in the fifths, and a smooth digression of the M3rds. Check to see that the fourths all have a similar quality.

17. Move the wedges one position toward the bass, tune the right string of C#4 and the left string of D4. Re-check all available intervals.

18. Set the machine to C4, and tune the center string of C4 while playing the C4-G4 P5th, or the C4-A4 M6th, or the C4-E4 M3rd. Compare the C4-A4 M6th with the D4-F#4 M3rd for near equality.

Continue tuning down the scale in similar fashion. The machine will keep the M3rds and M6ths well in line, but the quality of the fifths and fourths will more easily indicate any variations. There may be unavoidable variations due to poor scaling even when the notes are accurately tuned to the machine. In this case, I appeal to the hierarchy of sonority. The order of purity of sound goes like this: unisons perfectly adjusted, octaves well balanced, fifths evenly adjusted, fourths evenly adjusted, M3rds smoothly progressing, M6ths smoothly progressing, m3rds smoothly progressing, and m7ths smoothly progressing.

Continuing down the scale, somewhere around G3, compromise may become necessary. From the one note F4, which is the note we measure to determine the stretch number, the stretch calculator cannot predict what the stringing situation may be on any particular piano, but there are certain general traits that will indicate a possible variation of the settings to be advantageous. For example, a piano which has a low stretch number and does not have a noticeable fore-shortening of strings in the tenor section, may want to have its settings

raised from 0.1 to 0.5 cents by the time you get from F3 down to C3. An opposite example might be in a piano which has wound strings on the same bridge in the tenor, where some foreshortening of the plain strings is obvious. In this case, one might find it advantageous to gradually lower the three or four lowest plain strings, and make a jump in sharpness in the upper wound strings. this could help the sonority of the octaves, and prevent a big change in the sonority of the fifths. When this is done, it will always be done at the cost of the evenness of the m3rds, and some irregularity of the M3rds and M6ths. But after all, *you* didn't build the piano that way.

The scale up from A#4 can be tuned while listening with the fourth below. For example, set the machine on A#4, and tune A#4 while listening to the F4-A#4 P4th. Of course, thirds, fourths, fifths, sixths, octaves, 10ths, and 12ths are available for comparison. I tune while playing the fourth because the lower note of the fourth does not interfere with the dot pattern of the machine (just as the upper note of the M3rd, P5th, or M6th did not interfere with the dot pattern when tuning from A4 down into the bass), and I can get quickly into the ballpark and also hear the sonority of the interval when the dots are stopped. I still listen to the sonority of the fifths and 12ths.

On a decent piano scale, the thirds, 10ths, and 17ths will be well matched, because it is built into the stretch calculator. At the top of the stretch tuning (F6) the single octaves will be stretched about one cent. The double octave will be stretched just a few tenths of a cent. The triple octave will usually be just slightly flat. The 12ths will be slightly flat, and the 19ths will be flatter. This is still the best balance of intervals. Most tuners will tune F#6 in the *TUNE* mode so that it will be at least as sharp as the second partial of F#5 and not sharper than the fourth partial of F#4, in other words, not sharper than a pure double octave. This procedure can be followed up to note C8, using the larger interval tests, such as the M3-M17, M10-M17, P12-P19, and so on.

In conclusion, tuning unisons as you go insures that you are matching the most important of all sonorities. ≡

PRACTICALLY SPEAKING

Grand Action Touchweight, Part I

Bill Spurlock, RTT
Sacramento Valley Chapter

The subject of touchweight has been discussed in a number of *Journal* articles during the last two years. At the risk of being redundant, I would like to follow my series on grand hammers with my own touchweight articles — not to contradict anything that has been presented before, but just to put in my own two grams worth on this often-neglected aspect of action work.

Why Do We Need To Know About Touchweight?

There are several reasons that we piano technicians should have a working knowledge of touchweight. First, we often receive comments from pianists that the "touch" of a piano is too heavy or light. Sometimes there really is a weight problem but other times voicing, room acoustics or regulation problems might be giving the pianist an impression that an action is too heavy or light. Having the ability to make touchweight measurements and knowing how to interpret them are essential to accurate diagnosis. Secondly, weight and friction are important factors in an action's repetition speed. As we shall see, touchweight measurements can diagnose both weight and friction problems in an action and thus are invaluable in analyzing performance problems. Third, pianos are designed to have a certain playing resistance and key return speed so they will function properly and feel "normal" to pianists. As discussed in the preceding articles on hammer selection and shaping, hammers have a major effect upon the touchweight of an action. Thus, the keys of new pianos are weighted to give a proper touchweight for the original hammers. Later, when we come along and fit replacements, we may be altering the factory designed touchweight of that action. Here again, the ability to make touchweight measurements allows us to select appropriate replacement hammers and shape them correctly. For the finishing touch on action rebuilding job, we can then make fine adjustments in friction and key weighting as necessary to achieve a uniform touch across the keyboard, just as the factory did originally (on the better makes).

What Is Touchweight?

The touchweight of an action consists of two measurements: First, there is the downweight, which is the minimum weight (placed on the end of the key) that will cause the key to depress from the rest position to the point that the jack tender first touches the let-off button. Second, there is the upweight, which is the maximum weight the key will lift back up to its rest position, starting with the jack just touching the let-off button but not tripped. Both measurements are made exclusive of the damper system, with the action on the bench or else with the pedal depressed.

Before we fall too much in love with touchweight, it is important to realize what these measurements do *not* do. They are essentially static measurements of an action, made with the key and hammer barely moving rather than under actual playing conditions where the action parts accelerate quickly from a stop and suddenly reverse direction. Thus touchweight values by themselves can not tell us everything about how an action feels under playing conditions. Also, these measurements are limited to the first two thirds of the key stroke, before escapement takes place, and so cannot detect aftertouch. And as already mentioned, touchweight measurements cannot satisfy a pianist's complaint about a heavy touch if the real problem is poor regulation, poor voicing, or just a gutless piano.

Despite these limitations, touchweight measurements are invaluable when used intelligently. To understand what information the downweight and upweight measurements can give us, let's look at the simple analogy of a teeter-totter. Let's first assume that the pivot point of this teeter-totter has a perfect frictionless bearing. There is a weight on the low end and an empty box on the other. We begin pouring sand into the box; after adding 50 pounds of sand, the end with the box seems just about to tip down. We add just one speck of dust and the end of the teeter-totter with the box tips down. Therefore we can say that the downweight (D) of the teeter-totter is 50 pounds. If we then remove that last speck of dust, the box tips back up. Thus, the upweight (U) is also 50 pounds. Downweight and upweight are equal here because there is no friction in the bearing.

Let us now assume that we leave the teeter-totter out in the rain over the winter, and our imaginary frictionless bearing gets rusty and develops some friction. Now when we repeat our measurement of downweight we add 50 pounds and nothing happens. We continue adding more sand until after we have added 55 pounds the teeter-totter tips. Thus our D is now 55 pounds instead of 50 pounds. To measure upweight, we now remove sand but find that the teeter-totter will not tip back up until there is only 45 pounds left in the box. Thus U is now 45 pounds rather than 50 pounds. Now with the friction in the bearing, U and D are not the same.

In the example above, some of the 55 pounds of downweight was necessary to overcome the weight at the other end of the teeter-totter, and the rest was needed to overcome the friction of the

pivot point. There is a simple way to determine how much of our downweight is due to friction and how much is due to weight in the mechanism, by using only our measurements of D and U and a simple formula. With apologies to those whose eyes glaze over at the sight of algebra, I will derive that formula here:

As our downweight (55 pounds of sand) pushed the teeter-totter down, it was overcoming both the weight resistance (Wt) and the friction resistance (F) of the mechanism. Therefore we can say that D=Wt+F.

In lifting the upweight (45 pounds of sand) back up, the weight resistance (Wt) of the teeter-totter had to overcome the friction, as well as the upweight. Therefore we can say that: Wt=F+U.

Combining the two equations to eliminate Wt leaves: D=(F+U)+F, or (D-U)/2=F.

Applying this formula to our teeter-totter tells us the friction in our rusty bearing F= (55 pounds-45 pounds)/two = five pounds.

While most of us do not care how much friction is found in playground equipment, we do need a method of measuring frictional resistance in piano actions. It turns out that this same formula, together with measurements of U and D, gives us the means to measure that friction.

What Should Measurements Be?

The equation F=(D-U)/2, together with a knowledge of what values of F, D, and U are normal, gives us a valuable tool for evaluating actions. Here are some guidelines on what to look for in making touchweight measurements:

Upweight is really the most important aspect of touchweight since the action can only repeat as fast as the key can return, and the amount of weight the key can lift (the upweight) is a measure of key return speed. It is the weight of the hammer and other action parts that pushes down on the capstan to lift a key back up, so U obviously decreases as hammers become lighter due to wear. The action parts must work against friction both during key depression and key return. Therefore increased friction reduces U.

Twenty grams is usually cited as a minimum U for good repetition, although this figure leaves little safety factor; if action pinning tightens up, knuckles become flattened, or as hammers become lighter due to filing, U (and key return speed) will decrease.

Downweight ranges from 45 to 60 grams for the most modern grand actions in good condition. Leads are inserted into the front halves of the keys during manufacture to help overcome the weight of the hammers and other action parts. In this way, the manufacturer can adjust the downweight to a norm, but must leave adequate upweight to ensure reliable key return speed.

A one gram increase in hammer weight causes a five to seven gram increase in both D and U, and vice-versa. In the previous articles I pointed out the importance of using replacement hammers of the correct weight in order to avoid an excessively heavy touch. Likewise, as original hammers wear and are filed, they cause the touch to become lighter. A single moderate filing can lighten a hammer by 1/4 gram, and therefore reduce D and U by 1 1/2 gram. Over its life span, a hammer can lose close to one gram in felt, lightening the touch by five grams or more.

Friction averages 15 grams in the bass tapering to 10 grams in the high treble, for actions in good condition. The main sources of friction in such an action, in order of importance, are the hammershank centerpin and the knuckle/repetition lever interface, and the capstan/wippen cushion contact. The friction will be higher in the bass for two reasons. First, hammershank pinning is usually tighter in the bass (if all hammer/shank assemblies are to be pinned to swing the same number of times, those with large hammers will require tighter fitting pins than those with small hammers). Second, rubbing friction at the knuckle and capstan will be greater in the bass, where the heavier hammers push the rubbing parts together with more force.

The list of friction sources above assumes a properly regulated action in good condition. Such friction is a normal and desirable part of the touch. However, actions in need of service can have abnormally high friction from many additional sources. Tight key bushings, tight balance pin holes in keys, extremely tight wippen centers, rubbing between adjacent action parts and burrs on capstans are common offenders.

Over time, friction can increase significantly as action parts wear. This is especially true of knuckles, which flatten out and present more rubbing area to the repetition levers. Wippen cushions also become dished, increasing contact with the capstans and trapping them in holes. Tight action centers, of course, increase friction. This is a greater factor with the hammer centers than with the wippen flanges: Increasing the hammer flange friction (measured at the flange) from five grams to eight grams will increase the friction measured at the key by about five grams, while the same increase in wippen flange friction only adds about 1/2 gram.

Improper service procedures can cause the worst friction problems. The dreaded graphite grease, when applied to knuckles, will do nothing but add intolerable friction to the action. One technician in our state makes a practice of applying mineral oil to wippen cushions and knuckles, causing the actions to all but seize up.

Inertia is the resistance to movement that all objects have. In a previous article I used the analogy of two teeter-totters, one with a 40-pound child on one end and a 50-pound child on the other, and another with a 400-pound Sumo wrestler on one end and a 410-pound Sumo wrestler on the other. Both teeter-totters are within 10 pounds of being in balance. However, it is apparent that if you walked up behind each and tried to pump them up and down, you could oscillate the children much faster and easier than you could the wrestlers.

Likewise, inertia is a factor to consider in the weighting of piano keys. An action with very heavy hammers and lots of key leads might have a similar D and U to one with light hammers and few leads, but inertia levels will be far different.

How Action Condition Affects Touchweight

In order to get a feel for how touchweight can change with action condition, let's follow a typical grand piano action through life. Let's assume this piano is a Steinway, made in the 1920s, which originally had its keys weighted in the factory to give a D of 55 grams in the bass tapering to 48 grams in the high treble. Action centers, etc. were

properly pinned so upweight was 25 grams in the bass tapering to 28 grams in the treble. Friction was : (55-25)/2+15 grams in the bass and (48-28)/2=10 grams in the treble. The original hammers were very light in weight, so relatively little lead was required in the keys to achieve an acceptable touch.

Over the years, the piano was played heavily; the hammers became quite worn and were re-shaped several times. Eventually, the bass and tenor hammers had lost about 1/2 gram of felt; by itself this would have reduced D and U by about three grams. However, by this time the knuckles had flattened out and the wippen cushions were dimpled, which increased action friction by about four grams. Therefore the downweight decreased three grams because of lesser hammer weight, but increased four grams due to friction, leaving it only one gram higher than original or about 56 grams. However, the upweight decreased by three grams due to the felt loss and decreased by an additional four grams due to the friction, causing U to drop from 25 to 18. U was now slightly below the normal minimum of 20 grams; however, repetition was still good enough for average playing.

The piano was then moved to a more humid climate, and sat unused for 10 years. During this time verdigris developed in the hammer centers, causing them to tighten up. This added five grams of friction to the touch, bringing D up to 61 grams in the bass. The added friction also slowed key return of course, reducing U from 18 to 13 grams. The owner decided to start playing again, but discovered that the touch felt sluggish. He complained about a "heavy touch" to his piano tuner, who agreed that the action did seem stiff. The tuner suggested that he could "reweight the keys" to make the touch lighter. This sounded good to the owner, so the tuner proceeded to attach "jiffy leads" to the keys just in front of the key buttons.

Upon trying out the piano, the owner could feel the keys were easier to press down all right, but at the same time the action felt even more unwilling than before. What was the problem? The problem, of course, was that the tuner had only thought about the downweight and had ignored upweight. The jiffy leads had reduced the downweight from 61 grams to 50 grams, but had also reduced the upweight from 13 grams to only four grams. So, while it took little effort to depress the keys, you practically had to wait for them to come back up.

Unsatisfied, the owner consulted another tuner, who replaced action parts to eliminate the verdigris and wear problems. He also replaced the hammers, but used very large, heavy replacements with hornbeam moldings instead of mahogany as original, and did not adequately arc the tails or taper the sides. Now the downweight was high again, about 70 grams in the bass. Because friction problems had been corrected, however, upweight was also very high at 34 grams. Key return was now very quick, but the touch was uncomfortably heavy.

A third technician was called in at this point, who made measurements of upweight and downweight for several keys in the action. Using the touchweight formula, the technician determined that friction was in the normal range on most keys, except for the occasional tight key bushing or rubbing action part. Thus the measurements told the technician that weight, and not friction, was the cause of the heavy touch. This weight problem could have been caused by non-original action parts that had altered action geometry, by removal of the original key leads, or by heavier-than-original hammers. After inspecting the regulation and action spread, the technician decided the hammers were the problem. To confirm this, he removed one of the new hammers and dry-fitted a more appropriate replacement, finding that D was now 55 grams and U 25 grams.

At this point, the technician gave the owner two options: First, he could retain the heavy hammers, but put them on a weight reduction program of generous tail arcing and tapering, as well as some felt removal. Experimenting on one sample revealed that this would reduce the touchweight from 70 grams to 60 grams If a lighter touch was desired, some additional lead would have to be added to the keys. This option would be the least expensive, and would make the action somewhat more agile by removing some mass from the system. However, the hammers would still remain heavier than the originals so the inertia in the action would remain higher than when the action left the factory, especially if additional leads were added to the keys to further reduce D.

The technician recommended a second option of replacing the overweight hammers with something more like the originals, in order to achieve the desired D and U without having to add excessive lead to the keys. This way, the action inertia would return to the original, factory designed level.

The scenario above illustrates some typical results that can occur when action work is done with no awareness of its possible effects upon action touch. With a basic understanding of touchweight, we can do much better work by fitting hammers appropriately, paying some attention to action spread, etc. during parts replacement, and tending to friction points.

The next step up in refining the touch during action work is to make touchweight measurements on all 88 keys, and adjust friction and key weighting as necessary so downweight, upweight, and friction are uniform from note to note. While not practical to do on all pianos, this work is essential if we are to do the best possible job on a quality grand piano. Look at it this way: We carefully re-pin action parts for even friction, we measure key dip, let-off, hammer blow, etc. to make sure that the regulation is uniform, and we fuss over the voicing to make sure the tone is even. A logical further step is to measure touchweight on all keys. The value of the procedure is that it identifies differences in friction and touchweight that we would otherwise not be aware of, and allows us to add another dimension of evenness to an action. The factory key weighting was done to match the original hammers and action parts; if we are to at least duplicate the original quality we need to reevaluate the touchweight after fitting new parts.

Next month I'll conclude with an article on the step-by-step procedure for achieving a uniform touch after action rebuilding. ≡

GOOD VIBRATIONS

Making And Installing New Bridge Caps

Nick Gravagne, RTT
New Mexico Chapter

If buying a ready-made bridge cap doesn't appeal to you, then you have no choice but to make your own. If this appeals to you, then you are no doubt very familiar with hand and power tools, and probably have made a stab at producing a couple of bridge caps, and are reading these articles to get a better handle on the process.

We will begin by assuming several things: first, that the previous articles have been read and understood (more or less); second, that the position and location of the old bridge top has been recorded, and that paper patterns or rubbings have been made; third, that the old bridge top has been reduced one way or another, and that the remaining bridge body has been plugged and made ready to receive a new cap; fourth, that (for the purpose of simplifying this article) the new cap height has been decided upon for downbearing without need of plate setting. These being so, it is time to make a new cap from a raw piece of hardwood. But what wood?

Choice Of Cap Material

Quarter-sawn maple comes to mind first. It is, and has been for years, a favorite bridge wood due to its enormous strength, yet it is not unduly stiff. It also carves nicely, providing you've got a chisel sharp enough to cut titanium. Another type of capping material in favor today is laminated beech as used by some European makers; it is now available from some suppliers in sheet form. I tend to use solid maple on the best pianos, with perhaps laminated beech in the bass. A few sources of bridge top material are listed at the end of this article.

What About Milling?

I buy maple boards in two ways—surfaced (i.e. reasonably smooth) to 3/8", and rough to something like 5/8" to 3/4" thick. Both thicknesses come in lengths of about five feet and in random widths of three to five inches. For the most part I use the 3/8" material, saving the rough, thicker stuff for unusual applications. Knowing that I have a piece of ready-surfaced maple on hand dictates to me from the outset how far down I want to reduce the old bridge top. Since 3/8" equals 0.375 inch, it is my usual practice to reduce the original top by about 0.325 leaving the remaining 0.50" as security for final trimming after the new cap has been glued on. The other reason I like to use ready-surfaced 3/8" thick stuff is that I don't have to turn to my loud, obnoxious thickness planer for mill work; or if I do, I need it for a much shorter time since taking a 3/8" board down to 0.300" goes much faster than if starting with a rough 5/8" piece. (although this may be a personal affliction, I find it hard to gracefully vanish from a coffee and danish into the din of 220 volts of roaring, naked power). But perhaps you've reduced the old bridge top by 1/4". Should the thickness planer be required to mill the 3/8" cap material down to, say, 0.280", remember to run the cap through the machine with the glue joint surface *always* down as many (if not most) planers, due to the rubber rollers which press the wood down to the bed, will cut the first and last three inches to a thinner dimension than the length in between. Jointer planers can also be used to mill short lengths of cap material, but they're not as sweet to use a thickness planers. When using a jointer take shallow cuts and be sure to push down hard with your push-through gadgets; use two such gadgets and try to cover the whole length of cap. If you plan to get serious about capping, though, you need at least a decent "home-owners" thickness planer. Know your machines and how they will help, or hurt your efforts.

Capping The Top Two Treble Sections

Let's imagine a typical scenario where the top two treble sections (about 35 unisons) need replacing. If the surfaced 3/8" cap wood is going to be used, it is obvious that the old bridge top should not have been reduced by more than 3/8". But trying to reduce the top by *exactly* the thickness of the new cap material is like trying to do a perfect tuning while raising pitch by 20%. I don't recommend it. The ideal is to have some new cap to trim down, but as little as possible. Since the tenor cap has not been routed down, there will be a step, a joint where the new cap must meet the old.

The first thing to do is to find a maple board wide enough to cover the entire two sections. Photo 1 (although a recapping job for a new soundboard) shows a cap board wide enough to cover the two treble sections, making unnecessary an additional joint between them. (Note that the bridge in the picture is upside-down). The original arrangement in Steinways, however, is that not one piece, but two pieces were chosen to cover the sections so as to take the best possible advantage of long-grain-orientation in each. I do not always follow suit, but will explain both approaches. In any case, there is no rule or holy grail-orientation angle that either summons angelic tonal response, or minimizes splitting except on straight (un-notched) bass bridges where you must avoid placing an entire line of bridge pins in the same grain line.

Let's begin with the wide board. Orient it so its top surface can be smoothly planed in the direction of note #88 (this makes carving the front notches easier) and lay it on top of the bridge to

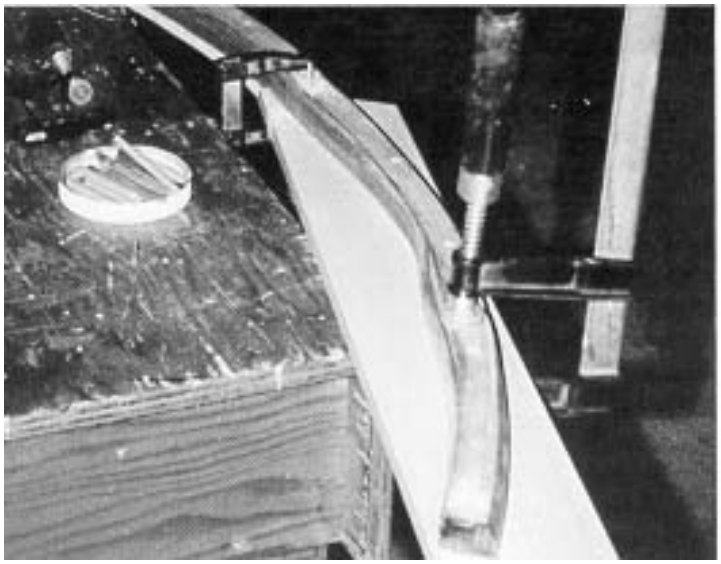


photo 1

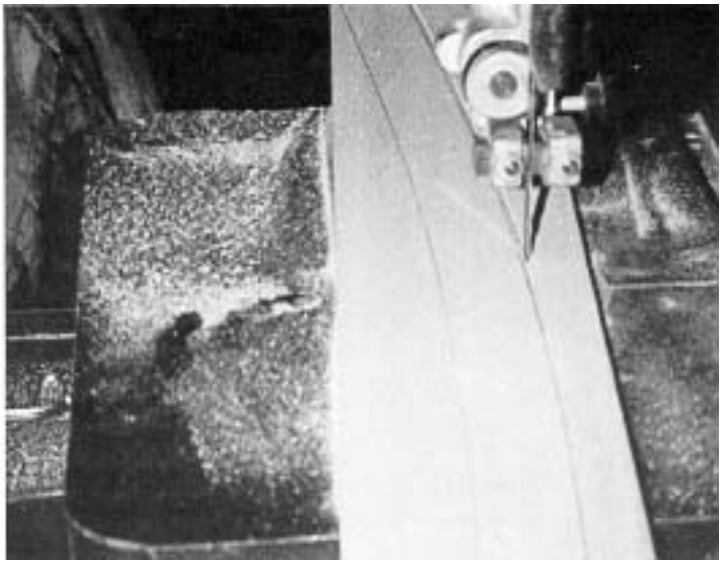


photo 2

photo 3

photo 4

be covered. Since the tenor cap is still in place, one end (the tenor end) of the new material will have to temporarily sit on top of the original tenor cap. Next, a pencil line is drawn on the underside of the new board to indicate the angle cut required to allow the new cap to sit down on the bridge body, and flush up to the old cap. This pencil line is not so easy to get perfect, so a little trial-and-error is in order. Use a short pencil and do the best you can: that is, get it close. Now take the board over to the band saw and make the cut; return it to the bridge to see if, when butted up hard to the old cap, the board still completely covers the routed down bridge body. If so, sand out the band saw marks on the disk sander and try the fit again. If, however, your first cut was off — that is, when hard-butted against the old cap the board no longer covered the entire bridge body — make corrections at the disk sander until the butt joint and body coverage are good. Corrections can be made at the disk sander by slightly changing the angle. Don't get hung up about this butt joint: Make it as neat as you can (one gets better at such things), but don't waste hours, or feel that it must be good enough for a photo in *Fine Woodworking* magazine.

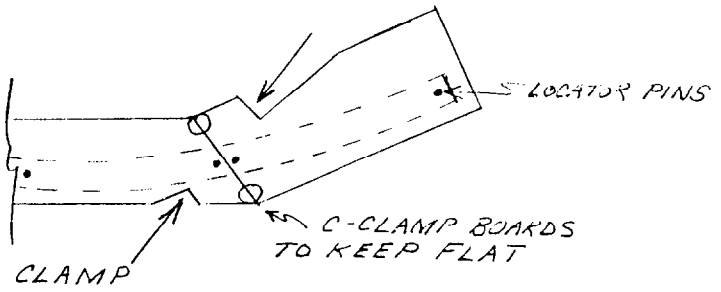
Position And "Pin" The Cap Into Place

What happens next depends on whether or not you drilled the 1/8" registration holes (as explained in a recent article on "locations"). If you have, you now need to spot those holes on the underside of the new cap. A sure and simple way is to find two (or three) BBs (yes, as for guns by the same name). Place the little round BBs on top of the holes and place the new cap over these, making sure it is tightly butted to the tenor cap, and with a rubber hammer tap the cap sharply over the BB closest to the butt joint. A small, but quite definite round dent will have been made in the underside of the cap which will serve as a locater dimple. Take a 1/8" bit and run it through the dent at the drill press. Return the cap to the bridge and pin it with a drill bit, or with a piece of 1/8" dowel, to the body. Repeat the process with the other holes and BBs until the cap is pinned to the body.

Now take your short (but sharp) pencil and draw a line on the underside of the cap using the bridge body as a guide. This line, of course, indicates where the cap needs to be cut to shape at the band saw. On wide boards it is sometimes impossible to get the pencil to reach the bridge in order to draw the line. If so, two cuts are necessary; the

first, a rough clearance cut to allow the working space for the actual contour line to be drawn, and the second, final, cut to shape. Photo 2 shows the final cut being made. Don't try to be too fine; allow a bit of waste overhang for final trimming with a router. A cut and pinned cap is shown in Photo 3 (although it is for a tenor section of bridge).

FIGURE 1



Position And "Brad" The Cap Into Place

If you haven't drilled the 1/8" registration holes, drive two or three brads into the bridge body at places where they will not interfere with pinhole drilling, and clip off their heads leaving 1/16" or more protruding. Position the cap and drive it down with a rubber hammer. You should be able to remove the cap and replace it without trouble onto the brad locaters.

Glue On The Cap

With scrapers and possibly sandpaper clean up the glue joint surface of the cap. Blow it off and glue it on to the bridge body per the last article in this series. I do not believe there is anything to recommend any modern wood glue over another for this application. If you do, follow your star. But keep in mind that a fast-drying glue demands a very quick application of your clamping system. I routinely use slow-drying glues for all cap work, unless they are very short spans. The brads in the bridge body will act as anti-skid agents when pressure is applied. But pay attention: if your new cap is pinned with the 1/8" dowels, you still need the brads for gluing. If you use the dowels for anti-skid agents they will be glued in place with the cap, and you need access to those holes to pin your rubbing into place.

Be moderate in your need to wash away glue squeeze. If you are too thorough, the water will wick into the edges of the joint creating, when dry, a pinhole appearance at the joint. It is best to clean away the worst of the squeeze saving the final cleaning with scrapers and sandpaper after the waste of the new cap has been routed off.

A Two-Piece Cap As A Single Piece

If you are going to recap these top two treble sections with two caps rather than with one wide cap, more work is involved, and a butt joint between the two sections will be necessary. This arrangement exists on Steinway and other fine instruments. The approach for the rebuilder is identical to the plan above, except that the fitting and pinning must be done in two stages: That is, fit and pin the cap piece which butts to the old tenor cap, and then fit and pin the highest cap in like manner.

Something that works well (although one might not think so) is to butt-glue the two new cap sections per the clamping arrangement of Drawing 1. Notice that for the clamps to be able to apply pressure at right angles to the joint, small landings had to be cut into the waste areas of the new caps, and parallel (or thereabouts) to the glue joint. Place a bit of waxed paper under the joint, butter up the end of the highest cap with a hard, fast drying glue, position the cap on the pins or brads, and clamp the butt joint shut. Of course, try a dry-fit first. You may need weights or some sort of hold-down system on the caps to prevent them from lifting when the butt joint is clamped. And you will probably need two small C-clamps, one on either end of the joint (and clamping perpendicular to the joint) to hold the two sections in one continuous horizontal plane. Now we all know that an end-grain glue joint amounts to an evil transgression of woodworking doctrines, but in this case, sin a little and confess it later. When dry, and after the bridge body contour lines have been drawn underneath, the two joined sections can be lifted off as one piece and taken to the saw for cutting. In addition, gluing it on as one piece is easier and, finally, the finished product, after trimming, leveling and notching presents that *Fine Woodworking* joint you were after earlier.

Trimming The Waste Overhang

By now you are aware of my general aversion to power tools. But when trimming the waste overhang, the bite of a bullet is sweet indeed as I reach for my router or laminate trimmer. Fitted with a flush cutting carbide trimmer, this tool, for all its self-important bluster, quickly gets after that overhang, flush-cutting the new cap to the body in a few minutes, neatly, costing no body fatigue, and requiring no special skills. Still, some notes on router operation are in order.

Chuck in a flush-cutting carbide laminate trimmer bit. Please make sure it is carbide, and that it contains the ball bearing roller guide; these bits are not expensive, especially considering the work they save. (If unsure as to exactly what this bit is, or looks like, ask around and check your woodworking catalogs). Adjust the depth of the bit down far enough so the roller rides on the bridge body, and the cutting flutes are positioned to trim the cap edges; the roller guide prevents the cutters from moving in beyond the edge of the bridge body. On overhanging bridges (where the front bridge body side, rather than being perpendicular to the soundboard, cants backward at a quite noticeable angle) you must set the roller to ride *just* below the cap glue line or you will end up shaving off part of the bridge body along with the new cap waste material — not necessarily bad if plenty of room exists from the bridge edges to the pin holes. Still, avoid doing this if possible. Remember to push the router base down flat on the cap surface as tipping one way or the other will cause the cutters to either miss trimming away a bit of overhang, or else cut a small scallop out of the edge of the cap. The latter mistake is not at all serious since notching will remove the scallop anyway. Standard practice is to run the router such that the cutter is spinning *into* the work. Think of it this way: Moving on dry ground, a car and its wheels are "moving" in the same direction; the router bit and the router should *not* be moving in the same direc-

tion. Imagine a car sliding forward on sheer ice while its driving wheels are vigorously spinning in reverse; that's how routers and bits should operate. When the waste overhang has been powered off, clean up with scrapers and sandpaper, but take care to avoid gouging and marring the soundboard.

Reducing The New Cap To The Target Dimension

Unless you went to great pains to make it so, your new cap will not stand at precisely the correct height for downbearing, but will rather stand a bit taller than it needs to. The new cap now requires trimming to depth. However this is done, it would be a shame to inadvertently remove too much material. Set a target. Let's say that according to your initial analysis and recorded measurements (or plate hanging techniques for determining downbearing) the target height of the bridge, which usually varies along its length, calls for it to stand in one area at 1.250" at the front of the bridge. Using calipers, measure up from the soundboard and mark on the side of the new cap with a very sharp pencil, or awl, this dimension. Do this everywhere there exists a dimensional change. Your marks on the side of the cap will be parallel to the cap surface. Now take a sharp chisel and gouge out small pieces of maple just above your marks, and at at the edges of the cap, until you have beveled down to the mark and no farther. Now take a pencil and blacken in these little F-cuts. Appearing from above as little dark, fingernail-looking cuts, they will act as lowest-limit guides and targets when the bridge top is cut down: The idea is to reduce the top rail until there exists just a hint of them showing.

What tool to use for cap reduction? Again refer to previous articles on old cap removal since the tools and techniques are similar. Case obstruction is an ever-present curse to freedom of tool movement, and any tool has its pros and cons. If all else fails you can always power-sand with a disk sander chucked into an electric drill. To use, tip the disk (they're usually firm but flexible) so that one "edge" makes contact while the other is free. Develop a technique of "walking" the disk along the cap length while avoiding side-to-side tipping. See Photo 4. Use rough 50- or 60-grit paper for first wood removal, followed by gentler paper as the target is approached. Swirls can be removed by scraping and in-line block hand sanding, which will also tend to even out the slightly irregular surface left by the disk sanding. Rehearse the technique on a simulated maple bridge. Wear a dust mask.

At this point the new cap has been installed, trimmed flush to body, and reduced back to the target dimension. Left to do are the blacking of the top, positioning of the rubbing and punching of the holes, drilling the holes, notching the cap, pinning the cap, and varnishing the notches. The experienced bridge maker would complete these steps (for the upper two treble sections) in four to six hours depending on personal habits of pacing, breaks, and bodily well-being. It is finicky but rewarding work made sweeter by a well placed danish and cup of Maxwell House.

We'll pick up the discussion from here in the next installment. ≣

Sources Of Bridge Cap Material

Webb Phillips, 1836 Stout Drive, #16, Ivyland, PA 18974, (215) 674-2555. Boards come 3/4" rough or 3/8" surfaced; widths three to six inches; length five feet. They will ship only one board if that's what you want. Sold by the square foot.

Pianotek (Bob Marinelli), 214 Allen, Ferndale, MI 48220, (313) 545-1599. Their catalog listing reads, "5/8-inch thick top quality rock maple, approximately 12 grains/inch." Sold by the square foot.

American Piano Supply, Box 1055, Clifton, NJ 07014, (201) 777-3600. Stock #37314 bridge capping material. Catalog reads, "laminated, densified beech produced by the makers of Delignit. Sheets are approx. 1/2" thick, 24 inches by 48 inches."

SOUND BACKGROUND

Acoustics Theories Of Thomas Young

Jack Greenfield, RTT
Chicago Chapter

Piano Influence On 19th Century Acoustics

The close of the 18th century saw the end of the importance of the harpsichord and the establishment of the piano as the dominant keyboard instrument of music. The harpsichord had reached its highest stage of development. The piano had a long way to go, presenting new challenges for scientists who worked in acoustics, as well as for the builders who made the instruments.

Young's Wide Range Of Interests

Thomas Young (1773-1829), a prominent scientist at the start of the 19th century, one of the leading physicists in research on musical acoustics, included studies that concerned the piano in his wide range of projects. Young was a highly talented scholar. Educated as a physician, Young divided his time between maintaining a medical practice and study, research, writing, and lecturing as a physicist. While his major interests were in the physics of light and the physiology of vision, his work in musical acoustics contributed to the advancement of the science. Included among his important studies were: development of new formulas for transverse vibrations of strings; Young's law stating the effect of hammer striking or plectrum location on the partials in the tone produced by a vibrating string; investigation of the phenomenon of interference by waves; a definition of the "modulus of elasticity" that established the absolute measurement of elasticity used in some important acoustical formulas; and a report on contemporary circulating irregular temperaments.

Young Biographical Summary

Young was the eldest son of a fairly well-to-do family in southwestern England. He was a gifted student. He had great ability to learn languages and he mastered mathematics, physics, and chemistry while still in his teens. After four years at medical schools in London, Edinburgh, and Gottingen, he received an M.D. degree in 1796. He continued his medical studies on a part-time basis for another seven years at Cambridge University. During this time he alternated between periods of residence in Cambridge and in his permanent home in the fine London house he had inherited from his wealthy uncle, a prominent London physician.

Young began independent research while still a student. After his election to the Royal Society in 1794, he took an active part in its activities for many years. During the period in which he was enrolled at Cambridge, he had ample time for his own investigations in physiology, physics, and chemistry. In addition, in 1800 he began to establish a medical practice.

In spite of his intensive professional activities, Young maintained an active social life. Through the influence of his uncle and marriage into a prominent family, Young enjoyed the acquaintance and friendship of important persons of culture and social status.

Young began to write on his own investigations while still a student. He remained a prolific writer on a wide variety of topics throughout his entire life. Beginning with experiments in physiological optics, Young next turned to the physics of light. Noticing the similarities in the properties of light waves and sound waves, Young began to study acoustical phenomena. His scope of interests continued to expand throughout his life as he continued to lecture and publish articles, scientific papers and other writings on mathematics, chemistry and other sciences. He developed his theories by experiment, mathematical analysis and reasoning. In some experiments with vibrating strings, he studied the motion by observing light reflected from the string itself. Young was the first scientist to use the term "frequency" for the number of vibrations per second.

Beginning in 1813, in the final phase of his life, Young turned away from most of his work in science and he became involved in Egyptology. He excelled in this field also, becoming one of the first authorities who was able to create a vocabulary of hieroglyphics.

"Young's Law" And The Action Of Piano Hammers

A collection of reports that included some of Young's important work in musical acoustics, "Outlines Of Experiments Concerning Sound And Light," was published in 1800 in the *Proceedings* of the Royal Society. Among these studies was a presentation of the theory which became known as "Young's Law," that when a string is struck or plucked at any point of its length, any mode of vibration which has a node at that point will be suppressed. Modes whose motion is great at that point will be favored. For example, if a string were struck exactly at its midpoint, the vibrations corresponding to all even-numbered partials would be suppressed. The fundamental and the odd-numbered partials would be strong producing a different tone quality, one that had a hollow sound. If the strike point were at 1/3 the length, the vibrations corresponding to the third, sixth, ninth, etc. partials would be suppressed. This tone would sound less hollow.

Young's law provided an explanation of why harpsichords had differed so greatly in tone quality. Builders of harpsichords had adopted no standard

distance for the contact of the jacks with the strings. This was generally from 1/2 to 1/7 of the speaking length and varied for different strings in the same instrument. Jacks for the lute stop, added to instruments built in the 18th century, varied from 1/9 to 1/20 of the speaking length.

Although Cristofori built some of his late pianos with hammers striking at relatively uniform distances, Stein and other early piano builders did not. Late in the 18th century, John Broadwood, then a leader of the industry, initiated investigations to determine the optimum striking location. Broadwood obtained the assistance of two scientists, Tiberius Cavallo and Edward Whitaker Gray. As a result of their experiments, they recommended that strings be struck at 1/9 the speaking length. Until that time, Broadwood pianos had been built with the single bridge and long bass strings of harpsichords. In adopting the 1/9 speaking length strike point location, Broadwood introduced the divided bridge, moving the bass section closer to the front so the shorter bass strings would enable the actions to be more compact. Broadwood also moved the hammer line for the high treble even closer to the ends of the strings since this made the higher partials more prominent. The Broadwood design changes were soon adopted by other piano makers. Young's theoretical analysis indicated that the 1/9 speaking length distance was favorable because at that point the dissonant ninth partial would be silenced.

Later during the 19th century, piano makers began to experiment with pianos built with hammers that struck the strings at other distances. By trial and error they discovered that they could improve the sound of some notes by placing the hammers to strike at 1/8 or 1/7 the speaking length. The high treble notes, however, sounded best with closer striking distances. Scientific acoustical investigations showed that the modes of vibration corresponding to the nodes at the point of hammer contact were not completely suppressed.

It has also been observed that factors other than Young's law have an effect on the partials produced. In particular, the duration of hammer contact has considerable influence. Duration of contact is increased by: distance of the contact position, mass of the hammer, softness of the hammer and the enlargement of the area in contact as the hammer tips become flattened from use. Increasing the contact time has the effect of damping the upper modes. In the high treble where it is desirable to emphasize upper partials, the hammers are smaller with sharper tips and they strike closer to the string ends.

According to the explanation of Benade, hammers remain in contact long enough to set up additional vibrations in the two segments between the hammer and the termination points. These vibrations are superimposed on the vibrations of the entire speaking length. While the energy of the lower frequency vibrations of the longer segment is diffused in the complex vibrations of the string, the vibrations of the shorter segment supply the modes that are suppressed by the hammer striking at a nodal point. For example, if the hammer struck at 1/7 the speaking length, the shorter segment would provide the seventh, 14th, etc. partials.

Interference Of Sound Waves

Among the other experiments described in the 1800 publication "Outlines of Experiments...," was Young's work that shows the similarities between the wave motion of sound and light and a demonstration of the principle of interference. In this experiment, light from the sun passed through two tiny parallel slits in a window shade, toward a screen in a darkened room. When either slit alone was open, a solid patch of light appeared on the screen. When both slits were open, Young observed a series of darker rainbow-colored bands where the light patches overlapped. Young reasoned that there must be some interference between the light rays which he explained by his wave theory of light. With an analogy to the interference of water waves, he speculated that the waves in each of the light beams were exactly 180° out-of-phase, with dark bands resulting from the coincidence of the "crests" of one set of waves with the "troughs" of the other.

In physics, the term interference is applied to the *super position* or combining of waves from two different sources that travel in the same medium. Sound does not travel by lateral wave motion like water waves but it is transmitted longitudinally in alternate pulsations of compression and rarefaction in the air. If sound waves of equal frequency and strength are exactly in phase, the compressions and rarefactions coincide in *constructive* interference to produce a combined sound twice as loud as the sound from a single source. If the sound waves are exactly out-of-phase, one wave's compression cancels out the other's rarefaction and the sound is completely suppressed by *destructive* interference. In intermediate situations, the sound intensity ranges in between twice as loud to complete silence.

Interference by the sound waves of musical tones is a common occurrence. The effect can be illustrated by a simple tuning fork demonstration. If a tuning fork is rotated slowly while held near the ear, the sound will be heard to rise and fall. The sound is suppressed in the positions in which the sound waves from the prongs, vibrating in opposite directions, reach the ear in opposite phase and cancel each other out. In musical performance by groups of the same instruments playing in unison, the effect of interference between sound waves that vary in relative phase are a factor that produces the undulations in tone which distinguish the sound of a group from the sound of a single amplified instrument. In organ building, similar pipes of the same pitch are placed as far apart as possible to avoid the suppression of their sounds that could occur when their tones vibrated opposite in phase. Another cause of objectionable interference is the distortion of musical tones caused by the sound waves reflected from the walls of a room with poor acoustical design.

Interference by two waves which are slightly different in frequency produces beats — a periodic rise and fall in intensity. These pulsations are caused by alternate constructive and destructive interference at a frequency equal to the difference in frequencies of the two waves. To illustrate, assuming a difference of one beat per second, two waves beginning their first cycle exactly in phase produce maximum intensity. At 1/2 second, the waves have separated to opposite in phase, intensity is now at its minimum. Intensity then begins to rise as the "peaks" of the faster wave approach the "peaks" of the slower to give maximum intensity again at the end of the one-second period.

Young's Modulus
In Acoustical Formulas

In 1807, the Royal Society published the transcripts of a series of lectures Young had delivered several years previously. In his lecture "Passive Strength And Friction," Young introduced an absolute measure of elasticity that was more specific than given by Hooke's law of elasticity. (January 1990 *Journal*, p.30) Hooke's law indicates that within the limits of perfect elasticity, the relative change in dimensions or shape of a body is proportional to the applied force per unit area. Hooke's law applies to tension, compression, and shear or torsion. Young presented a concept that applies specifically to rods and wire. In wording that was rather obscure, Young in effect defined "modulus of elasticity" as a constant value for the applied force per unit area to the stretch or compression per unit area. The constant defined by Young is usually referred to as "Young's modulus" or the "stretch modulus" to differentiate from the constants for other types of elastic deformation such as the "shear modulus" and the "bulk modulus."

Later in the 19th century, Young's modulus was expressed in its present form as the ratio of stress — the force applied to unit cross-sectional area, to strain — the elongation per unit length. Young's modulus in formula form is shown by:

$$Y = \frac{\text{stretching stress}}{\text{longitudinal strain}} = \frac{\text{force/area}}{\text{elongation/length}} = \frac{F/A}{E/L}$$

The values for Y and stress can be expressed as lb/in^2 or N/m^2 (newtons per square meter). The conversion factor is 1 $lb/in^2 = 6.895\ N/m^2$.

In round numbers, the approximate values of Young's modulus for steel wire are: $Y = 30 \times 10^6\ lb/in^2$, or $20\ N/m^2 \times 10^{10}$

The value of Y for actual samples of wire may differ considerably depending on mechanical history.

By definition, the elasticity of a material such as wire is its ability to return to its original length after the tension is released. If the applied stress exceeds the elastic limit however, the elongation becomes permanent. Slight permanent elongation or "creep" may also occur as wire is held under extended continuous tension.

Young's modulus (Y) is a factor in the following acoustical formulas:

1. Calculation of the elongation of a string for evaluation of piano scaling — Galt and Roberts formulas (February 1977 *Journal*, p.13; October 1980 *Journal*, p.30; January 1981 *Journal*, p.20).
2. Frequency (f) of longitudinal vibrations in music strings (L = string length) $f = (Y/\text{mass density})^{1/2}/2L$ Longitudinal vibrations are usually too weak and high in pitch to be noticed.
3. Frequency of the first mode lateral vibrations of rectangular bars in percussion instruments (T = thickness, L = length). $f = 1.03\ (Y/\text{mass density})^{1/2}\ T/L^2$
4. Inharmonicity: formulas for calculating the approximate frequency of a vibrating musical string have been derived by combining a formula for a perfectly flexible string with a formula for a very long thin stiff bar. The formula for a stiff string under tension can be shown as: $fn = nf_1 (1 + Jn^2)$; where fn = frequency of nth partial and f_1 = frequency of the fundamental. For unwrapped strings: $J = \pi^3 d^4 Y/128TL^2$; where d = diameter of the string. T = tension, and L = length. The value J provides an index of inharmonicity.

In other formulas that have been presented, the mathematical constants and conversion factor to cents are combined into a single mathematical constant. ≣

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AT LARGE

Inertia

Alan Vincent, RTT
Young Chang America
Los Angeles Chapter

Inertia can be defined as the tendency of a body in motion to remain in motion and one at rest to remain at rest. Inertia is the product of mass (weight) and velocity (in the case of a grand piano action, the velocity is partially achieved through leverage). Inertia is important to the performance of the grand action as both the key and hammer move up and down and these movements are equally important. If we were to attach a 1/2" key lead to a piece of string and, letting out about six inches of string, twirl the weight around with our hand, the weight could be caught safely with the other hand. If the weight were let out on 20 feet of string and then spun around, it might do considerable damage to anything it happened to strike. The added leverage achieved with the longer string would result in an increased velocity of the weight. The greater velocity creates more inertia even though the weight has not changed in mass. It would also require considerably more effort or energy to move the weight on the longer string. Along the same lines, increasing the amount of weight (or mass) at the end of the string would also increase the inertia.

In order to further understand inertia, we can consider two different levers. Lever one is 40 feet long, has a central pivot, is made of a light wood and weighs 100 pounds. Lever two is the same length and leverage ratio but is constructed of cast iron and weighs 100 tons. It would be very easy for an average person to start lever one moving and also to stop its movement. Lever two would be very difficult to move and difficult to stop once it began to move. Although the leverage is the same in the two levers, the greater weight of lever two results in much greater inertia.

The keys of a grand piano action could be analogous to the levers described above. The addition of weight to the key in order to reduce the downweight could in fact result in a detrimental increase in the resistance encountered when playing the piano because of increased inertia. The added weight creates inertia within the key which must be started and stopped by the pianist when playing (The added weight of the front key lever must also be overcome by the weight of the action parts and hammer in returning the key to the resting position. This is the quantity measured as upweight). With regard to inertia, both the static and dynamic weight must be considered. In the above example, the added weight used to reduce the static downweight of a key resulted in an increase in the dynamic weight which is felt during playing. The heavier the key (or hammer), the more the inertia. Again, if excess weight and friction are present during the weigh off and counterbalanced with excess lead, the inertia will be so great that the action is likely to perform so poorly that it is effectively unusable. It is important that the technician understand all factors contributing to touchweight so that the cause of a problem can be correctly identified and corrected. The use of leads to overcome weight, friction or leverage problems will result in even worse action performance even though the static downweight may be within an acceptable range.

Please consider two different weights installed in a key. Weight one is two inches from the balance rail and weight two is six inches away. When the key is played, both weights will be in motion for the same amount of time. Weight #2 will move a greater distance in the same amount of time and will develop more inertia. This can be confirmed using the formula of $I = M \times R$ squared. If we consider the weight (or mass) of each key lead as 18 grams, weight two would develop 800 percent more than weight one.

Often, a touchweight problem could be caused by an accumulation of several minor problems. The following is a checklist of items one should use when servicing a touchweight complaint.

1. Check action centers, balance rail holes and keybushings for freedom.
2. Check capstan screws for burrs, sharp edges and proper location.
3. Check keyframe pins for rust, pitting or roughness.
4. Check hammers for proper shape, "fuzziness," size and weight. Voice piano for more brightness if needed.
5. Check action spread.
6. Check keyleads for number and placement.
7. Check for other sources of friction such as jacks rubbing against the repetition lever and keys rubbing each other.
8. Check knuckles for wear, shape and foreign substances such as graphite or VJ Lube.

Most technicians are familiar with the above work but may not have considered it as a part of touchweight service. The touchweight of the action comprises many small factors and will be affected by many forms of action service.

In summary, it has been the intention of the author to illustrate the importance of the grand action as a primary tonal producing element of the piano. The action condition greatly influences the tonal production of the instrument and changes within the action provide the technician with the broadest range of control in improving the tone. One cannot always replace a soundboard or rescale a bass section, but improvements in the action can always be accomplished. A thorough knowledge of the grand action is essential if you wish to become an accomplished technician.

1990 *Piano Technicians Journal* Index

Danny L. Boone
Heart Of Texas Chapter

The numbers refer to the page on which the article may be found.

Coming Events

Jan. 4-5, 1991	**Arizona State Seminar** Tempe, AZ Contact: Gary Miles; 3722 W. Port Royale Lane; Phoenix, AZ 85023 (602) 942-2588
Feb. 22-24, 1991	**California State Convention** Radisson Hotel, Sacramento, CA Contact: Patrick C. Poulson; 15474 Airport Road; Nevada City, CA 95959 (916) 265-6739
March 8-9, 1991	**South Central Regional Spring Seminar** Bentley Hotel, Alexandria, LA Contact: Elizabeth Ward; 1012 Warren Street; Alexandria, LA 71301 (318) 443-0327
March 14-17, 1991	**Pennsylvania State Convention** Allentown Hilton Hotel, Allentown, PA Contact: John J. Zeiner, Jr.; 830 Hanover Avenue; Allentown, PA 18103 (215) 437-1887
March 20-22, 1991	**Pacific Northwest Conference/Convention** Tyee Hotel, Olympia, WA Contact: David J. Stocker; 9324 Littlerock Road SW; Olympia, WA 98502 (206) 786-TUNE
April 25-28, 1991	**New England/Eastern Canada Regional Seminar** Sonesta Hotel, Portland, ME Contact: Joseph Bacica; P.O. Box 6834; Portland, ME 04101 (207) 773-1779
July 13-17, 1991	**34th Annual PTG Convention & Technical Institute** Adams Mark Hotel, Philadelphia, PA Contact: PTG; 4510 Belleview, Suite 100; Kansas City, MO 64111 (816) 753-7747

AUXILIARY EXCHANGE

President's Message

The house is filled with the last of our garden flowers — zinnias, marigolds and cosmos — all cut in a last gasp, staggering effort to defeat the "Snow Queen," better known as Old Lady Frost! The staggering resulted from a superhuman attempt to get every house plant, rubber tree and diefenbachia indoors before that cold breath promised by the weather man hit them!

This valiant effort couldn't even begin until we returned home from the day's tunings, so with flashlights in hand we persisted and succeeded. Life is like that, I guess, and the old adage about persistence paying seems to still hold true.

Snow Queen and Lady Frost are a not-so-gentle reminder that all those warm, exciting holiday times are coming fast upon our heels. You spouses with PTG Auxiliary Chapters are planning parties of the season, I'm sure, and others of us PTGA members at large may be planning soon to attend a PTG Chapter bash to help celebrate the joys of the season. May this, then be my Christmas and Happy Holidays Greeting to you all! Let there be wonderful fellowship, happy times and peace for us all — Everywhere!!

Replies To Our Questions

In the August edition of this column we solicited replies to these three questions: 1. How did your spouse or friend get into piano technology? 2. How does your spouse or friend feel about being a piano technician? and 3. How do you feel about your spouse or friend being a piano technician?

Here are some replies to the questions: *Doris Menges* of La Grange, Indiana, speaking of her husband *Bill*, said, "When he was in college he needed some extra money, and we lived with a music professor at Morehead State College in Kentucky. The professor tuned pianos on the side, and he said, "If you stay out of my territory I'll get you started." That was in 1949." *Doris* said *Bill* likes tuning because it is not as stressful as other things he has done. "I think it is a good outlet now that he is retired. When he has just a couple to do in a church or somewhere I go with him," she said.

Phyllis Tremper of Morehead, Kentucky, wrote this about her husband *Fred*: "We were piano sitting for a friend, and this thing was taking up room in our den and *Fred* couldn't even play it because it was so out of tune. So he bought a hammer, having taken a few lessons in music school earlier and tried to tune the octaves. He got bitten by the bug!" How does *Fred* feel about being a piano technician? "He *loves* it," *Phyllis* replied. "This is his third profession since college and he loves it. I think it is great," Phyllis wrote. "Because he's happy, and did you know on a scale of 1-100 on stressful jobs, piano tuning rates way down at 83. That means he'll live longer with me. Hope we reach 100 together... When you enjoy the work you do for a living, it's not work, right? So *Fred* doesn't 'work' for a living."

Joannie Morris of Champaign, Illinois, told us her husband *Bob* was interested in tuning in college but he didn't go into it immediately. "He worked in a music store and sold pianos," *Joannie* said. "He took a correspondence course. He loves it. I'm glad he is a piano technician because he'll never retire. He has the best of both worlds."

We are still interested in receiving more responses to our questions. Send your thoughts to Julie Berry, 6520 Parker Lane, Indianapolis, IN 46220-2259.

Friends Forever

Cleveland, Ohio, was the setting for the Ohio State Conference held in October, 1990. Spouses gathered from near and far to greet new friends and renew continuing friendships: *Joannie Morris*, IL; *Agnes Huether*, NJ; *Alma Demille*, ON, Canada; *Julie Berry*, IN; *Deanna Zeringue*, Thibodaux, LA; *Sarah Lampiasi*, Los Angeles, CA; *Celia Bittinger*, Lancaster, PA; to name a few. Twenty-two ladies in all shared the excitement of this great fall weekend in Ohio. Our program opened with a combined class given by *Dick Bittinger* for everyone attending the conference. The slide program was entitled, "Shops in U.S. and Canada." Piano technicians' shops were presented in slide form, and what a unique experience. So many ideas on what to do with your space in order to use it to the fullest.

Friday morning we all created a holiday wreath under the creative guidance of *Georg Cetrone*. *Georg* had many interesting items for us to glue on our wreath, such as nuts, pine cones, dried flowers, artificial leaves, etc. Each wreath was different. *Nancy Carnicom* filled her wreath to overflowing as did *Norma Moon*. *Helen Hollingsworth* was the first one done, and her wreath was simple, pretty, and would add a warm welcome to any door.

Following our craft session it was off to the horse races! Lunch in the clubhouse followed by an afternoon of fun. Of course, *Ginny Russell*, *Marilyn Ritchie*, *Marjorie Gorski*, and *Melody Kean* spent their time at the betting windows before each race. All in all, betting or not, everyone enjoyed the excitement. We discovered that *Carol Miller* and *Mary Gilmore* were great winners on paper, however, they didn't make it to the window often enough to make too much money.

Friday evening was a get-together for everyone. Fellowship, piano talk, and "catching up" on events in our lives filled the evening.

Saturday morning we boarded a bus and began our tour of downtown Cleveland. Our first step was the Playhouse Square Theater Complex. *Doris Menges*, *Doris Zimmerman*, and *Dolores Matson* found the features of these restored theaters magnificent. *Eleanore Miller* and *Sarah Lampiasi* loved the chandeliers and marble accents.

Charlie and *Daniel Berry* were

happy to be "on stage" looking out at the invisible audience. Following this 1 1/2 hour tour, we boarded our bus for a stop at "The Avenue," a new shopping complex in the Terminal Tower Building on Public Square. Lunch and shopping for two hours was the plan. And, of course, at the end of the two hours it was ironic that most of us should find each other at the ice cream store! (Great minds think alike!)

We had saved some time with the bus company to offer a short tour before returning to the hotel. It was nice to have a large ore freighter coming down the Cuyahoga River just as we were touring the flats, Cleveland's industrial area... then off to University Circle and our museum area, just for *Agnes Huether*...then up the hill through Shaker Heights and the Shaker Lakes...and finally home to the Days Hotel. A fun filled day...and tonight the banquet.

It was amazing that in just two hours we all looked so rested and ready for a banquet with all the trimmings. Following our dinner, speeches, and door prize drawings, we were treated with the listening music of the Contemporary Jazz Connection for the evening.

Sunday morning *Melody Kean* gave a class on stress. Relaxation was a focal point of this class enjoyed by all who attended. Life without stress is a constant battle.

Ron and *Julie Berry* provided a grand finale to our weekend with a joint business class with the spouses. We learned that togetherness is the key to success. Working together for common goals is good for everyone... even piano tuners and their spouses.

Bottom line..... *A good time was had by all!* -Ginny Russell

A Thought For The Season

Everybody knows about the holiday rush. Those of us who live around piano technicians know that when it comes to fitting more things into a schedule than a schedule can reasonably hold, piano technicians take the Christmas cake. I hope you will find an extra minute in your own schedule to share a late-night cup of eggnog with your technician at the end of a long day or to give a soothing back rub to a person who has tuned one too many pianos for the back muscles to handle. Your technician may not be as available as you would like this time of year, but the extra money always comes in handy and the music of the season will sound sweeter because those extra pianos got tuned in time for the parties and programs.

A Thought For The Day

Life is a poem, if you know how to live it;
Life is a song, if you know how to sing it;
Life is a drama, if you know how to act it;
Life is a game, if you know how to play it.

Ruth Pollard, a lady who has supported our Auxiliary since its inception, submitted the poem above along with a correction to be made in her article which appeared in September's column. "Millie Stein's name was Mildred, not Millicent," Ruth wrote. "We seldom heard her name. She always signed the name Millie — even her Christmas cards. It was Millie and Charles Frederick."

Need A Gift For The Upcoming Holiday Season?

Give a PTGA Cookbook and add clever kitchen magnets or pot-holders! Write or call
Nita Kadwell, 591 Leonard Road, Onalaska, WA 98570
(206) 978-4913

Auxiliary Exchange Editor
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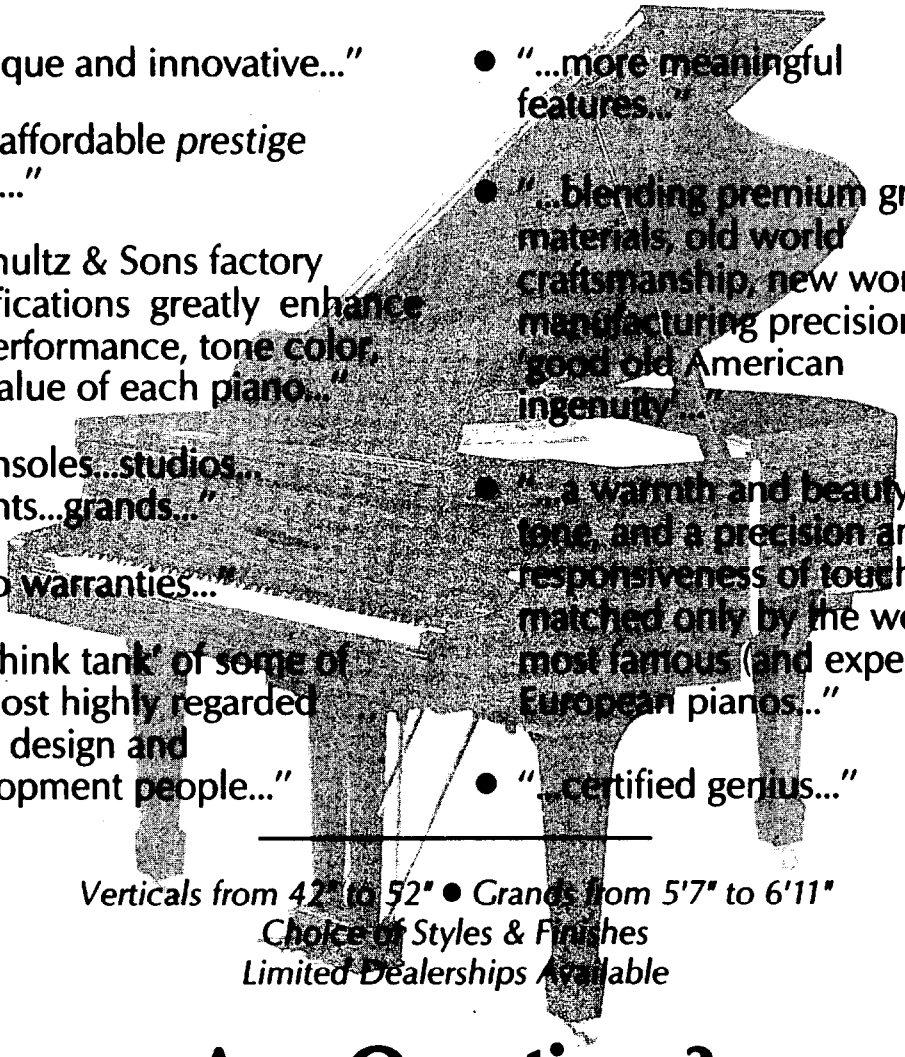

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Tech Gazette

Yamaha Piano Service December, 1990

YAMAHA PIANO SERVICES EXPANDED!

The Yamaha Disklavier™ Piano has enjoyed a rapid sales growth in today's piano market. With the expansion of the Disklavier™ line which now includes MX100B uprights, MX80 consoles and a number of grand piano models, this remarkable product line is seeing even greater popularity than we had originally envisioned.

Of course, these pianos will call for unique and specialized requirements in the realms of service. In anticipation of those service needs, and in order to better serve the growing base of Yamaha piano customers, Yamaha Piano Services has expanded.

With the addition of new staff and new assignments, Yamaha Piano Services will now be better equipped to allow additional emphasis for both Disklavier™ and traditional pianos.

Bill Brandom, Digital Acoustic Piano Service Manager

Bill Brandom has taken on the responsibilities of overseeing Disklavier™ Piano Service. Bill's background with Yamaha during the development of the Disklavier™ piano allows him the extensive knowledge in traditional piano technology, MIDI (Musical Instrument Digital Interface) and electronics technology necessary to serve the diverse requirements of this new line of acoustic pianos.

For the traditional piano side, Ray Reuter has joined the Yamaha team. Ray, whose name will no doubt have a familiar ring to many of you, comes to Yamaha with an extensive background in the piano industry, will head up piano services for the traditional side of the Yamaha piano line.

Ray Reuter, Piano Service Manager

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DECEMBER **UPDATE** 1990

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

1991-92 Nominations Are Open...

M.B. Hawkins, RTT
Nominating Committee Chair

We tend to take a great deal for granted. In other words, we assume a lot. We suppose that things exist or happen without proof. This allows us to sometimes be less concerned than we really should be. As members we must not forget that we are distinct parts of a complex whole. That whole is, of course, our professional organization. We are responsible for its continuation. As such we need to be aware of many things... one of which is that our elected officers are elected to one-year terms.

This is the time of year we should, as individuals, review the guidelines we use to keep this machine on track. A quick review of page eight in our October 1990 *Journal Supplement* will refresh us of our elected officers' duties.

In order to comply with our Bylaws, the Nominating Committee is requesting nominations for President, Vice President, Treasurer-Recording Secretary, and seven Regional Vice Presidents to serve on the Board of Directors for 1991-92.

After reviewing page eight as suggested, make your nominee selections known to other members of your chapter at the monthly meeting. Chapters may submit nominations as a chapter and any RTT member in good standing may submit his or her own name as well for consideration by this committee.

Don't sit back and take for granted that others will take care and do the necessary things. If you are happy with the job being done by the incumbents, let them know by nominating them. If you are not satisfied, make your choices known.

When nominations are received by the committee, the proposed member will be sent a Consent-To-Serve form and information on the duties of the office. Each nominee may submit up to 15 lines of typed qualifications together with the signed Consent-To-Serve form. The committee will prepare a list of its selections for the Executive Committee of President, Vice President, and Secretary-Treasurer along with a list of all nominations received for all offices. These lists will be submitted to the Home Office no later that April 1, 1991 for publications in the May 1991 *Journal*.

Nominations must be submitted no later than February 1, 1991, to Marshall Hawkins; P.O. Box 386; Oxon Hill, MD 20745 or call (301) 576-2757.

Why You Should Contribute To PTG Foundation

Ronald L. Berry, RTT
Foundation Vice President

In the dues billing again this year you will find a form to contribute to the Piano Technicians Guild Foundation. Questions often arise about what the Foundation is and what it does. PTGF has been set up with a special tax status to make your contributions to it deductible. Contributions can be designated so you can honor or commemorate someone important to you. Contributions of any amount are gratefully accepted.

What does PTGF do with the money? Its focus is to use the money in benevolent ways that will help piano technicians and the whole music industry. Presently, PTGF gives a scholarship to a nationally certified member of Music Teachers National Association who presents a course of continued study. The scholarship is advertised through MTNA and the winner is selected jointly by representatives of MTNA and PTG. Besides helping the teacher, this gives PTGF some recognition among MTNA teachers. This scholarship is presented at the MTNA banquet during their convention.

The PTGF Board just recently decided to give a scholarship of convention registration and test fee to an Associate member who takes his or her RTT examinations at the convention. Watch for details in the *Journal* and talk to your chapter president for an application.

continued on page 2

Focus On Ethics: Are You An Ambulance Chaser?

David R. Duncan, RTT
Ethics Committee

In a recent episode of the "Wizard of Id" one of the characters couldn't get close to the bar for a drink because of a crowd of attorneys attending a convention. This character went around the corner and made a noise like an ambulance siren. All the lawyers made a hasty exit, briefcases in hand. I am told that some attorneys specialize in cases involving accidental injuries.

Many of us are called upon from time to time to make estimates for repairs of damage to pianos as a result of fire, water, transporting, etc. This may be an opportunity for the unethical to make a tidy sum at the expense of the insurance company.

We are the experts and often the claim is paid without further question based on our opinion.

Several years ago I was called to do an appraisal on a piano damaged(?) because the washing machine had overflowed and wet the carpet under the bass end of the piano. I found an almost new, good grade, console piano. I was told that the owners had moved the piano within 20 minutes after the washer leaked. A careful inspection inside and out revealed no damage whatsoever. Zero, zip, none. I wrote same in my report and gave it to the customer. She then showed me an estimate from another technician(?) which stated that all felt, including the hammers, would have to be replaced due to moisture damage and the bill would be almost $1,000.

Ethics is not a matter of doing whatever you can get away with, at least to me it isn't. It is a matter of being honest in any situation with my customers, even if it means passing up that opportunity to rip off an unsuspecting insurance company. I believe that, in the long run, it will result in being called back again when service is needed, referrals to possible new customers, etc. Word does get around, you know, both the good and the bad!

Students Visit Piano Factory

We at Perkins School appreciate very much the opportunity afforded our students to visit an excellent and modern facility for the building of pianos, such as Kimball. The hospitality provided us by Mr. Roger Weisensteiner, Technical Manager, and his associates, Judy Weikert, Larry Leonard, and John Light were par excellence, bar none. We learned a great deal about how a piano is born from the tree in the forest to the final tuning given each piano before shipment to dealers' showrooms. We look forward to our next class trip. Thanks again, Roger and Kimball.

Robert Perkins

Perkins School of Piano Technology students on their August 1990 visit to the Kimball Piano Factory.

Foundation...

PTGF also considers grants for academic research in the field of piano technology. The Foundation recently awarded a research grant to Daniel Russell of Northern Illinois University to assist in his work with the acoustic characteristics of piano hammers. As his work continues, you'll read more about this in the *Journal* as well.

PTGF is currently in the final step of publication of two books. One is the "Calculating Technician" by Dave Roberts, which is now available, and the other is an updated version of "The Piano Action Handbook." PTGF is considering becoming a full fledged publisher which would take on publication of books by other authors.

PTGF is a separate entity from PTG and depends on your contributions to survive. Commemorate someone important to you and send a little extra with your dues billing. Thank you.

Scheduling Piano Service Appointments

Carl Root, RTT
Economic Affairs Committee

This is an economic affairs article rather than a PTG survey report. Like the last three articles, it appears in the *Update* section rather than the white pages because it contains data from the survey which is considered proprietary information.

There are topics for articles that I had pushed to the back burner because I suspected that my business practices and goals were quite different from most members. I designed the survey in part to gather data to either support or contradict my assumptions. I have seen articles in the *Journal* and in newsletters from all parts of the country where the writer assumed that what he did was what everyone else was doing. I knew that what he did wasn't what I was doing. The more I have talked to members from around the country, the more I have become convinced that there is considerable diversity in our membership, not so much in what we do — nearly all of us tune pianos — but how and why we do it.

It's a good thing I waited for the survey results before writing an article about scheduling. Waiting for the phone to ring turned out to be the most popular method for scheduling appointments. This does not necessarily mean it is the most effective. We find that members who use this method tuned fewer pianos and had a slightly smaller income on average.

prescheduling:	7%	$24,000	456
reminder cards:	16%	$23,000	507
reminder calls:	29%	$21,000	464
waiting for calls:	34%	$20,000	394
other method:	9%		
no response:	5%		

A comparison between the other three methods is curious. Prescheduling wins in the average income category, and reminder card users tune the most pianos. If we look at what Carol Beigel, RTT, calls the "rich tuners," those in the highest net income category ($48,000 or more), we find that more technicians checked waiting for calls and reminder calls than the other two categories.

preschedule	15 records
reminder cards	15 records
reminder calls	23 records
waiting for calls	23 records

The data suggests that there is no one right way to schedule appointments. Each method has advantages and disadvantages depending on business goals, makeup of clientele, geographic location, etc.

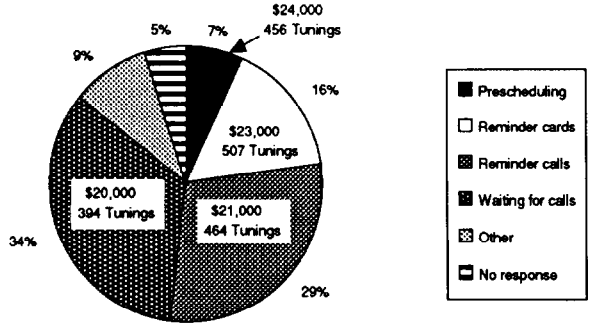
Prescheduling

PTG has a five-part piano service appointment form that is sold by the Home Office. Parts one and two serve as reminders to the customer and technician and show the date and time of the next appointment. Parts three and four will serve as receipts for the work that will be done. Part five is a hard copy that can be used as a service record for the technician's files. Each copy contains the following text in the upper left corner: "Please reserve the following time for my next tuning appointment. I understand I will be contacted for confirmation a short time before this date." Another important feature is a place for the customer's signature. This reinforces the commitment, although changes in date and time can and do take place. I understand this system now exists as a computer program, but I have not seen a copy.

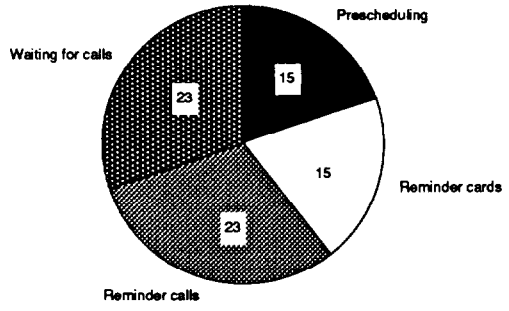
This method is suitable for a variety of business requirements. Technicians who service outlying areas should consider using it, although the data shows that the choice of scheduling methods for rural and small town technicians is virtually identical to the national average.

Continued on next page

Scheduling Method — Income/Tunings



Scheduling Method — Those Who Earn More Than $48,000



Scheduling...

Prescheduling as part of a full daily schedule has a greater chance of working when customers have predictable and flexible hours. You can also preschedule appointments if you are able to accommodate specially scheduled late afternoon, weekend, or evening appointments. In order for this method to work as a primary scheduling method, I suspect the customer must have the impression that getting an appointment with you at a time that is convenient for them will be difficult because of demands on your schedule. You may have another job and have relatively few hours to devote to a private clientele. You may have an established business with people waiting for weeks or even months before you have an opening. Piano owners would surely welcome a commitment on your part at the time of the previous appointment under these circumstances.

Reminder Cards

Computers have made large mailings to clients or prospects a simple task. Labels can now be generated with the push of a button. Without a computer, typing out all those addresses must be an ordeal, but many technicians have turned this task into an advantage by having the customer fill out the postcard themselves at the time of the previous appointment. Seeing their own handwriting in the mail must be a positive reinforcement of their earlier request to be contacted. Some piano owners really need to be contacted by mail since they never seem to be near their telephone and aren't motivated to call. You will probably mail twice as many cards as appointments scheduled, but postage and printing costs should not be too excessive.

Making Reminder Calls

Some technicians reject this method for a variety of reasons. The following quotes are from colleagues. "It's a young man's game." "It sounds like begging." "I don't like the rejection." My perception is quite different. I have used this method from day one because it is the best way to generate the highest number of appointments from a list of clients. If you have even modest powers of persuasion, then this is a good method to use. Given that most of us are tuning so many consoles for children taking lessons, we don't need to be reminded that many people are ambivalent about regular service. They need to be *sold* (there's that ugly word) on the benefits of regular piano care. Work up a canned presentation for the phone without sounding impersonal. Be prepared to spend a few seconds gently coaxing a commitment from them. My standard opening is: "I'm calling to see if we can schedule a piano service appointment." Don't ask if they want one, or if the piano needs it.

In the recent years before I bought a computer, I filed all the service records according to month and then again by area when that month came due — all by hand. I now have a fairly simple program, written in dBase, which generates a call list every month. As before, records are sorted by region and map coordinates to minimize driving. Each record in the list includes last name, phone number, last service, last call, and scheduling notes. You might be justified in claiming that this method is the most expensive since it is best implemented with a computer, but a computer is used for so many other tasks that running my business without one is now unimaginable.

My income would be cut in half if I used any other scheduling method. At least, that's my fear since I have no way of knowing short of actually changing to another method. Busy signals, messages never delivered, people who are never home, frequent postponements, and incessant talkers are a nuisance, but this is balanced by the many times I have walked into the office, made four phone calls to people who live within five minutes of each other, and had four appointments for a day's work. Now what could be simpler?

People will get accustomed to your regular calls and come to rely on you. My customers have indicated that they prefer a reminder by phone to any other scheduling method. Why? That's what they're used to. It never ceases to amaze me when I call someone who then tells me that their piano has developed a problem and that they knew I would contact them soon. It's as if we had agreed that they would not be permitted to initiate a call! If you don't call, they may get someone else because they thought you were no longer interested.

Waiting For The Phone To Ring

Reminding a piano owner that it's time for their piano to be serviced is part of my piano service package. Beyond that, I'm amazed that technicians can schedule 15-20 appointments per week without taking the initiative. When did you last visit the dentist? When did you last change the oil in your car? I get reminders for both of these services and appreciate them because I can't keep track. Many people (dare I say most?) simply don't remember when their pianos were last tuned — or who tuned it, or how much it cost, for that matter.

Don't people wait until there's a pressing problem with a key (oops, sorry about the pun)

Continued on next page

CMAC Helps Chapters

Webb Phillips
Chairman, Chapter Management And Achievement Committee

One of the primary charges of the Chapter Management and Achievement Committee is to develop programs to help chapter officers gain management skills, and to promote interchange of chapter management ideas.

One of the things we did this past year was to have a contest of all chapters making videos of their business, or business and technical meetings, so they could be shown to other chapters throughout the country. We had a lot of response, a lot of films, a lot of good ones. We ended up choosing three. They are all on the same parallel and all a little bit different, so we divided the prize money equally.

Supposing a friend asked you to be a guest at a meeting of an organization to which they belonged, and they wanted to get you interested in joining. Which would impress you the most? — a group of people sitting around having a partially organized bull session, dressed like they just came in from a shop, with little or no order that resembles any kind of meeting, let alone a business meeting? *Or* where people come dressed as business people and there is an organized business meeting, with a good technical program either before or after the meeting? Which would impress you, and which type would you rather join? I'm sure you would be much more impressed by the latter, and would feel proud to be part of such an organization.

One possible reason for not having that style in many of our chapters is that many tuners, or tuner-technicians, feel we are not really business people. I don't feel that way.

Many times when we change officers and the Chapter Management Manual and other important instructions, which can help the new officers, may not get transferred, or have been lost.

Usually, newly elected officers want to make a good impression, and have goals they want to set for the chapter. However, being intimidated by their peers, they do not want to appear stupid or awkward in the new office, so they fall into the same pattern as their predecessors, good or bad.

I'd like to use for an example our national seminars, where we find nearly everyone in Council, as well as our national leaders, dressed as good, successful business people. Council has a parliamentarian, to make sure the meeting is run by a standard set of rules, and in a good business manner.

Why not have our chapter meetings be just as important as our national meetings? Are we as

Continued on next page...

Scheduling...

before calling you? Don't you have to travel in different directions to deal with urgent calls while others wait impatiently? There are several areas that I service only once a month at best, and I won't go until I can create a full day's work. Can enough people in an outlying area be counted on to call at the same time?

After a day of working in customers' homes, I'll usually have to spend a half an hour or so on the phone that evening. I would like to spend the rest of my time with my family without interruption. I have recently set my answering machine on the second ring so I won't be tempted to run to my office. It works. Even a Yellow Pages caller will leave a phone number. I can't imagine being interrupted several times on a daily basis, which must be the case with many of you who wait for calls.

Denele Campbell, our most recent addition to the Economic Affairs Committee, employs an answering service. The base rate is $30-45 per month in her area, and covers a specified number of calls before per call charges are added. You can activate it whenever it suits you, just like an answering machine. The benefit of this system is that many callers still prefer talking to a real person despite the increased use of machines in private homes during the last decade.

One benefit of waiting for calls is that when a client calls, they need service and want you, not someone else. Having that dynamic reinforced on a daily basis must give you a good feeling. There are also probably fewer failed appointments since the idea for service originated with them.

Perhaps the best scheduling method is a combination of all four. If I had a mailing label generator integrated into the customer file in my computer, and if I had a stock of preprinted reminder cards and prescheduling cards, I would be more inclined to use those methods occasionally. What PTG volunteers would be interested in developing this type of business support for their fellow self-employed technicians?

CMAC...

chapters less worthy? I don't think so. Chapters are the backbone, cornerstone and foundation of this wonderful organization, and we should have the same formal attitude towards a chapter business meeting as we do an international one.

Why not start now, and make it your number one goal?

Now we have the three tapes, by Golden Gate, Dallas, and Connecticut. They are all good, all different, and they all have a lot to offer. And remember once again, if you are taken by a friend to visit an organization where they had a business meeting, what type of business meeting would impress you enough that you would want to join that organization?

I'd suggest that as part of your technical program, you have your whole board, definitely all of your officers, and as a technical, your whole chapter, watch all three of these films. They can be very educational. There are a lot of ideas in them.

I'd suggest you use your Chapter Management Manual in conjunction with these films. Especially study the section under "President," and "Welcome new President," where the essential tools and techniques necessary for good productivity are listed.

We are still looking, we still don't have the ideal film, and I feel when some chapter comes up, which I hope is yours, with the ideal film, we'll have more prize money for you. So, let's work on it.

Let's make this organization professional, from top to bottom.

Tammy?

Dues Due

Remember that 1991 PTG dues are due January 1, and will be delinquent January 31.

PTG Merchandise

Show your pride in *your* Organization!

Piano Technicians Guild Tie, in gray $25.00

RTT logo jewelry*

Lapel Pin .....$5.00 Stickpin $5.50
Tie Bar .....$5.50 Earrings (clip) $7.50

Coffee mugs, both with blue printing

Clear pedestal.....$5.00 (4/$16) White .....$4.00 (4/$13)

Publications

"The Unseen Artist" videotape — VHS $29.95
"Cumulative *Journal* Index Supplement," 1984-1989 .....$5.00

PTG Business Kit*

"Piano Technicians Guild" stamped in gold on gray portfolio. Includes assortment of PTG brochures, plus billing pad, appointment forms, service stickers, calculator, pen, notepad. $80.00

**Sold only to Registered Tuner-Technicians®*

Order from: Piano Technicians Guild, Inc. (816) 753-7747
4510 Belleview, Suite 100
Visa/MC Kansas City, MO 64111 *Shipping not included*

Music Makes The Difference

Keith Bowman
S.C. Pennsylvania Chapter

I hope you all have heard about the music community project to enlist public support for education in music and the other arts in our public schools. "Music Makes The Difference" is the result of unprecedented cooperation among all segments of the industry, including PTG.

According to the National Commission on Music Education, recently issued national goals in education have, for the most part, not incorporated music and other arts as part of a balanced curriculum for our children.

This project includes three forums this fall to receive input from teachers, parents, students, and others with a commitment to music and it's importance in education. Based on these forums, a report will be written and presented by a blue ribbon commission at a National Symposium in Washington, D.C., this early March 1991. The commission consists of 60 individuals, including Steve Allen, Leonard Bernstein, Bruce Christenson (PBS), Jack Coffey (NAMM), Karl Haas, Billy Joel, Jack Lemmon, Henry Mancini and Andre Previn, to name but a few.

Another component of this project is a national petition campaign, to inform the American public and gain their support. Spearheaded by the National Association of Music Merchants (NAMM), a goal has been set at six million signatures by the campaign's conclusion on February 28, 1991. As our Immediate Past President Ron Berry has stated, we are in a unique position in that we make a large number of direct contacts with the public in a relaxed setting. Individually, and through our chapters, we can make a substantial contribution by taking advantage of these contacts to seek petition signatures.

In the context of service in the home, the extra time spent discussing this issue is a good investment in customer relations. People like to talk about their own musical experiences, and this affords the opportunity to know more about them. If they belong to an organization or group sympathetic to education in music, they may be persuaded to participate in the campaign. This interaction shows your customer that you care about more than just servicing *their* musical needs and have a concern for the education of our children and a desire to protect the cultural values of our society.

If you service a school district, college or university, you should find the music department very receptive to this campaign. Other performing and fine arts departments should also be contacted. Student unions and support groups like booster clubs, choral societies and any parent organizations are a good source of participation. Music retailers, symphony associations and chamber groups, theater and opera associations, art societies, public radio stations, private music teachers and church choirs are all potential supporters. Working with your chapter members, you should be able to identify a good number of groups and organizations in your area.

There are many ways that your chapter can promote this campaign. Since the Music Educators National Conference and Music Teachers National Association are participating in this project, a chapter mailing to area members could be of benefit. It may lead to the possibility of joint advertising in local and regional publications.

Besides the regular petition sheets from NAMM, a signature reply card is available that can be printed and inserted into programs for concerts, recitals and other productions. As this campaign builds momentum, a timely press release to local papers could have some impact. If limited by financial considerations, the same business that support area cultural events may be willing to underwrite a promotion or advertisement, if presented with a written proposal. You can best evaluate the most effective ways to draw support from your area.

If you don't already have a petition kit, you can get one (as well as quantities for groups) from NAMM by calling 1-800-767-6266. Ask for Pat Page, Market Development Administrator. The packets include information and instructions, and Pat can answer any questions you may have. If you need any clarification about any of the above, please give me a call.

The fundamental purpose of this campaign is to draw the attention of politicians, decision makers, and the American public to the importance of education in music and the other arts. This purpose can only be achieved if we all take an active role in this effort. The success of "Music Makes the Difference" is contingent upon motivating yourself, your chapter and those you know in the music community.

Correction

In the recent PTG Examiner Newsletter, Christine Lovgren was erroneously identified as a CTE Trainee, when she is in fact, a CTE. Sorry about that, Christine, and thanks again for helping out in Dallas.

Michael Travis

Dates & Deadlines

December 17, 1990
RTT Tuning and Technical Exams. Skyline College, San Bruno, CA. Application deadline: November 17, 1990. Contact: Neil Panton, 5 Cedar Court, Menlo Park, CA 95025 (415) 854-8038

January 1, 1991
1991 dues due.

January 5-6, 1991
RTT Tuning and Technical Exams. Southern California Area Examining Board. Contact: Carl Lieberman (213) 392-2771

RTT Tuning and Technical Exams. Puget Sound Chapter Test Center, Tacoma, WA; Application deadline January 10, 1991. Contact: Wayne Matley, 2502 Harmony Lane, Enumclaw, WA 98022 (206) 825-6921

January 26, 1991
RTT Tuning and Technical Exams. Pacific Northwest Regional Test Center, Portland, OR. Contact: David Peake (503) 761-4800.

January 31, 1991
1991 dues delinquent.

February 1, 1998
Deadline for nominations for 1991-92 officers due to Nominating Committee Chair.
Deadline for amendments proposed for 1991 Council to be submitted to Bylaws Committee Chair.

March 1, 1991
Deadline for committee reports for inclusion in 1991 Council agenda book.

March 4, 1991
Members delinquent on 1991 dues to be dropped from roster.

March 25, 1991
RTT Tuning and Technical Exams. Skyline College, San Bruno, CA. Application deadline: February 25, 1991. Contact: Neil Panton, 5 Cedar Court, Menlo Park, CA 95025 (415) 854-8038

April 6, 1991
RTT Tuning and Technical Exams.. Austin Chapter Test Center. Application deadline: March 6, 1991. Contact: Bill Cory; 711 Landon Lane; Austin, TX 78705 (512) 472-9358

July 12-13, 1991
Council Meeting. Philadelphia, PA, Contact: Home Office; 4510 Belleview, Suite 100; Kansas City, MO 64111 (816) 753-7747

July 13-17, 1991
34th International PTG Convention & Technical Institute. Philadelphia, PA, Contact: Home Office; 4510 Belleview, Suite 100; Kansas City, MO 64111 (816) 753-7747

October 11-13, 1991
RTT Tuning and Technical Exams. Texas State Seminar, Austin Chapter Test Center. Application deadline: September 11, 1991. Contact: Bill Cory, 711 Landon Lane; Austin, TX 78705 (512) 472-9358

Membership Status

Northeast Region	842
Northeast RTTs	537
Southeast Region	612
Southeast RTTs	393
South Central Region	329
South Central RTTs	213
Central East Region	648
Central East RTTs	399
Central West Region	382
Central West RTTs	257
Western Region	620
Western RTTs	404
Pacific NW Region	352
Pacific NW RTTs	235
Total Membership	3,785
Total RTTs	2,438

PTG's 34th Annual Convention & Technical Institute
July 13-17, 1991
Adam's Mark Philadelphia