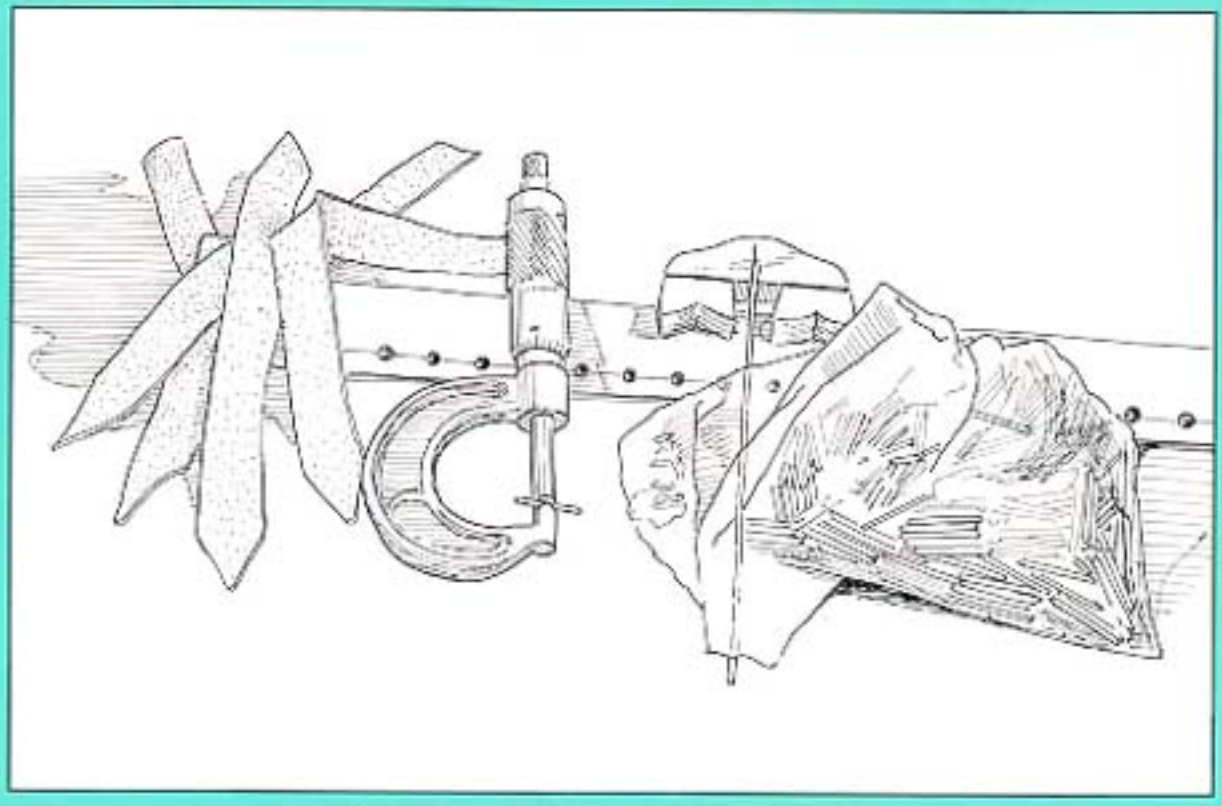
PIANO TECHNICIANS Journal

FEBRUARY 1991



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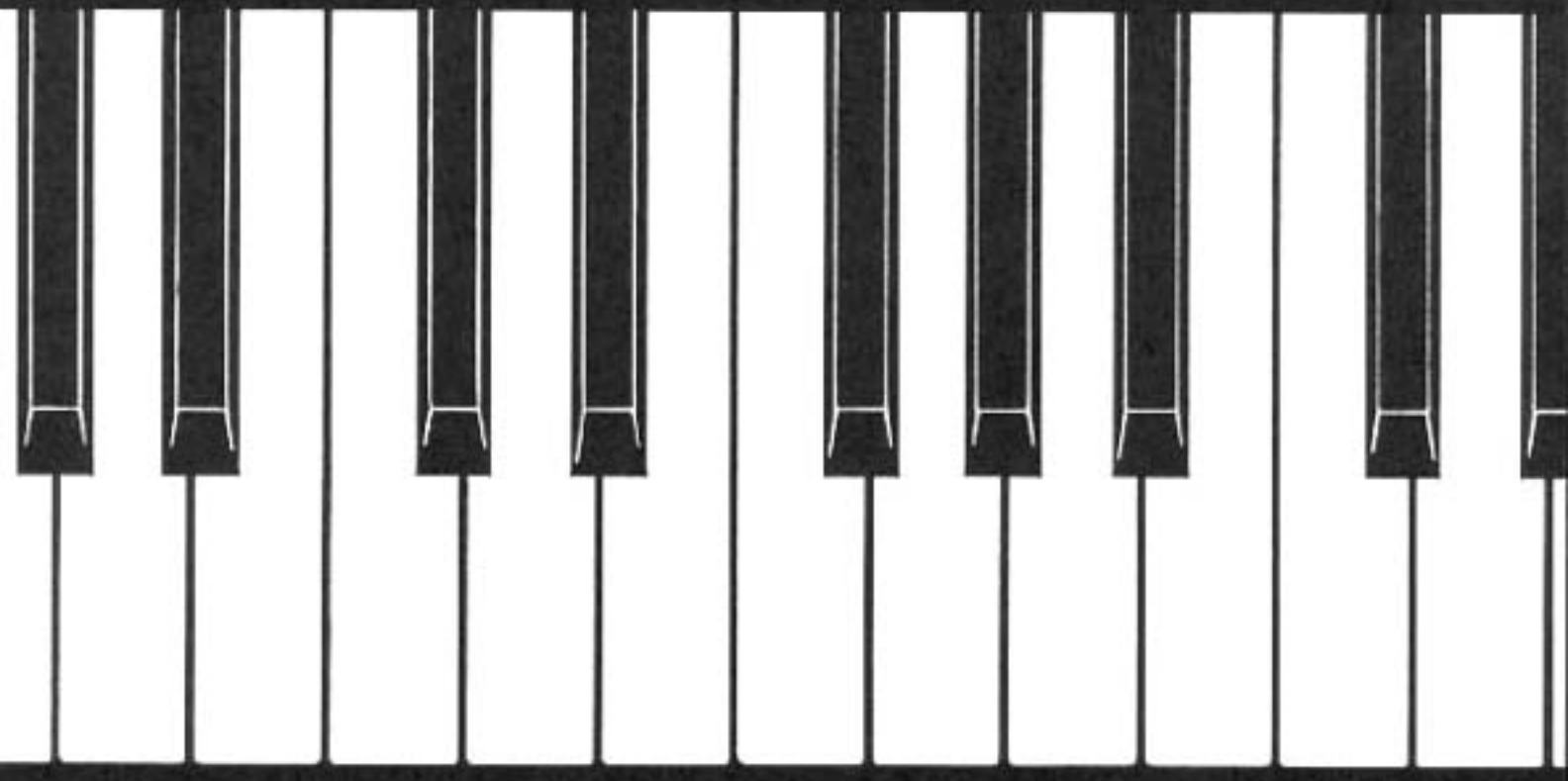

*SOURCES: Most recent 12 month acoustic piano data available - Dec.1988 through Nov.1989.
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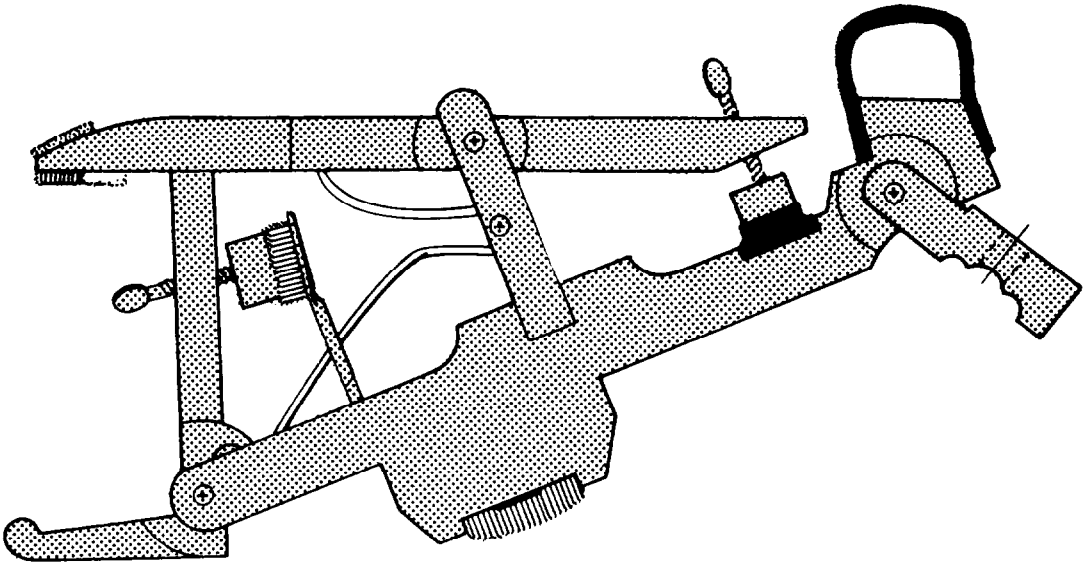

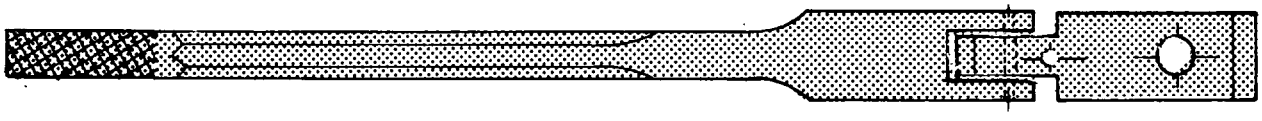

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PIANO TECHNICIANS
Journal

FEBRUARY 1991 — VOLUME 34, NUMBER 2 OFFICIAL PUBLICATION OF THE PIANO TECHNICIANS GUILD, INC.

ABOUT THE COVER:
Rebushing a guide rail system. See this month's Technical Forum beginning on page 18. Illustration by Valerie Winemiller.

Piano Technicians Guild Board Of Directors

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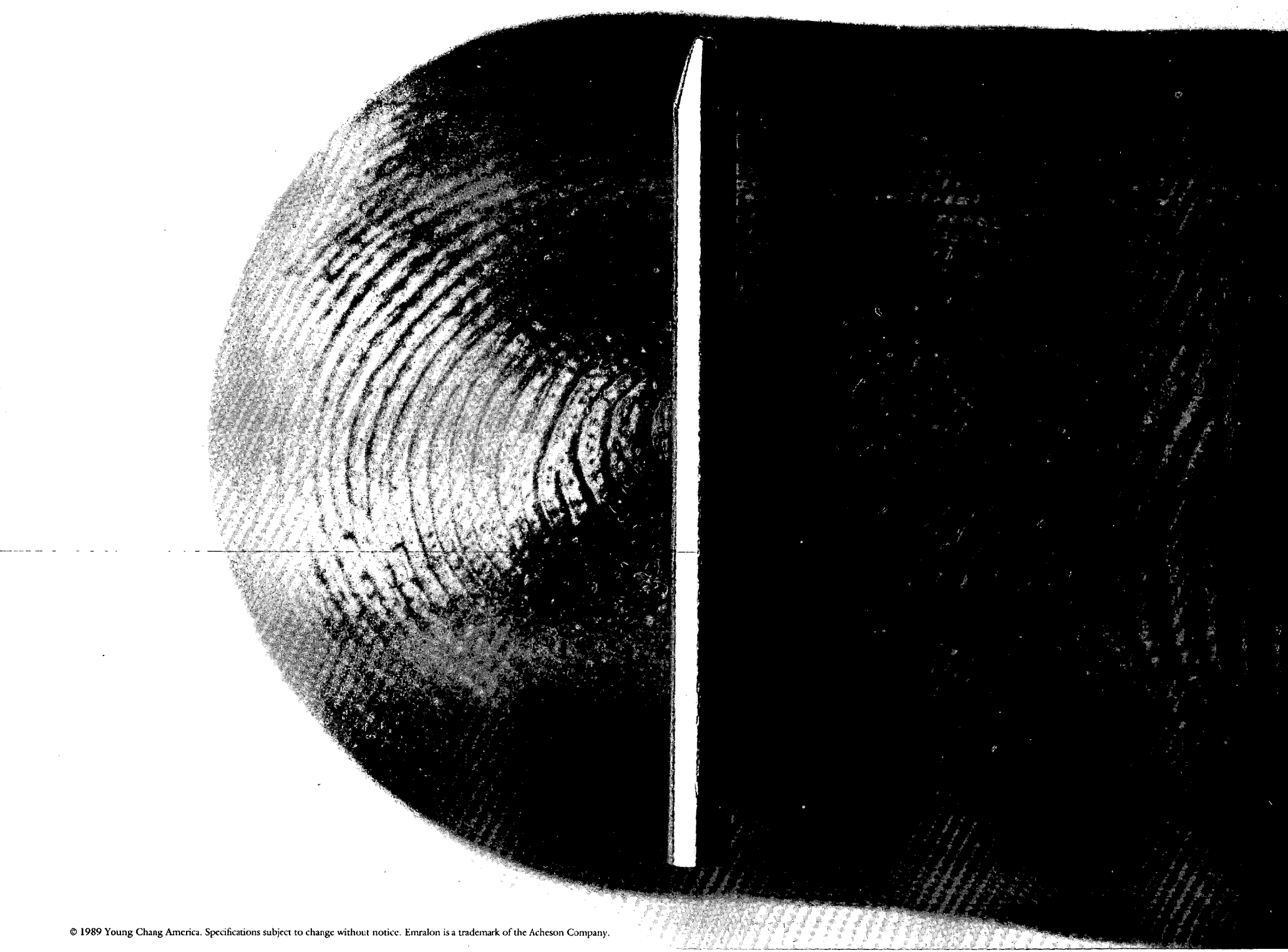

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President's Message

PTG — An International Organization

Nolan P. Zeringue, RTT
President

Eleven years ago this month Bob Russell as President wrote, "Is the Piano Technicians Guild an international organization?" Isn't it strange that we still haven't convinced all of our membership that we are indeed an international organization. There are many who still refer to the National Officers or to the National Convention.

Many of us have tried hard to always refer to the Piano Technicians Guild as an international organization, but I guess old habits die hard. We are most certainly an international organization based solely, if on nothing else, on the participation in the activities of the Piano Technicians Guild by so many people from all parts of the world who are in the field of piano technology. It has become apparent to technicians everywhere how ready and willing the Piano Technicians Guild is to share knowledge and educational opportunities to anyone who is willing to be a part of us.

The Piano Technicians Guild is a very important part of IAPBT which is the only international association of organizations in various countries of the world. I feel meeting every other year with these organizations from other countries has been profitable to PTG. We have had the pleasure of hosting some members of other organizations at our PTG conventions nearly every year.

The piano does transcend languages, nationalities, and political beliefs. We are all in the profession of piano technology, therefore, it does not matter what little corner of the world we call home; we will all share the same interest in the piano.

We have been fortunate to have secured instructors from other countries to teach at the PTG conventions. Quite possibly this has been because of our international status in having some of these instructors from other countries as RTTs or International Correspondents of PTG.

I feel the established contact with other organizations/technicians around the world has been most beneficial to PTG and to other organizations. I can think of no negatives. We must be an international organization. We have to be if we are thinking about what is best for our profession, the piano.

From The Home Office

An Invitation...

Larry Goldsmith
Executive Director

Everyone should have to justify his or her existence occasionally. For most people in the piano service business, that moment comes not when the client tries out the completed piano, or when he or she writes out a check, either with or without a smile. The moment comes when the piano needs service again. Was your service good enough to warrant a return engagement? Or will someone else be asked to do it better, or cheaper, or friendlier?

For the Piano Technicians Guild, that moment of truth comes every year about this time. Annual dues are due — past due, actually — and each member asks himself or herself the obvious question: "Is membership in this organization worth $114 to me?"

The Guild is more than a monthly magazine, more than an annual convention and institute, more even than the chapter programs each month. It's a chance to build something, to stand up and be recognized as a professional. More than any organization I know, the Guild depends on input from its members. It's not some anonymous "they" that exists only to perpetuate itself. Without thought and direction from its members, the organization would lose its way and flounder.

Some exciting things are coming up as the Guild moves to help its members prepare for the uncertain business climate ahead. But those things cannot be accomplished without input from the individual members they are designed to benefit. The invoice for Guild dues is not just another bill. It's an invitation to participate in something very important.

As this is written, the Portland Chapter is planning to honor Emil Fries on the occasion of his 90th birthday this month. Mr. Fries, founder of the Piano Hospital and Training Center in Vancouver, WA, may well have the record for length of membership in the piano service industry. He joined the National Association of Piano Tuners, one of the organizations that preceded the Guild, in approximately 1936. He held dual membership in NAPT and the American Society of Piano Technicians until the two merged, and has been a member of the Guild ever since. Through the years, he has personally touched the lives of literally thousands of piano technicians all over the world.

Such commitment and service is rare, of course, but it does give us a lesson: one individual, through persistence, dedication, hard work and simply being a nice guy, can make a difference in this world. The good guys do win a few now and then.

Campaign Forums Held; Petition Deadline Near

Testimony presented at public forums last fall in Chicago, Los Angeles and Nashville focused on the benefits of learning music at an early age and emphasized the need for increased support of music education. The forums, sponsored by the National Commission of Music Education (NCME), featured testimony from music celebrities such as Wynton Marsalis and Roseanne Cash, as well as educators, students and business leaders.

Speakers discussed the need to remain in touch with our musical heritage, benefits of music in shaping young minds and personalities, and the increasing threat to music education from a tightening economy and a perception among the public that music is not as important as subjects like math and science.

The NCME campaign, sponsored by Music Educators National Conference (MENC), the National Association of Music Merchants (NAMM), and the National Academy of Recording Arts and Sciences (NARAS) began last summer.

Meanwhile, the commission's "Music Makes The Difference" petition drive is nearing its conclusion. Completed petition forms must be sent to the commission by Feb. 20 for presentation at the end of the campaign. Petition forms have been published in several issues of the *Journal* and were distributed to all PTG chapters. Guild members are encouraged to participate fully in the campaign and to obtain as many signatures from adults of legal voting age as possible.

Testimony from the forums, as well as other research, will be gathered into a final report from the commission to be delivered to Congress and the Bush administration during a national invitational symposium on America's Culture at Risk. The symposium will be March 6-7 in Washington, D.C.

For more information, or for additional petition forms, contact NCME at 1902 Association Drive, Reston, VA 22091-1597.

KEYSTONE

A Historical Tour

Webb Phillips, RTT
Southeastern Pennsylvania Chapter

The Southeastern Pennsylvania Chapter (SEPA), the cornerstone of the Keystone State, is your host chapter to the Keystone of Better Piano Service convention. When you come to this summer's convention, you will not only be attending a record breaker, with the finest classes ever, but you will be in one of the finest vacation and historical sections of the country. You name it, and we not only have it, but the finest version of it. We are working very hard to make this the best ever for you.

Yes, I mean you. So get your reservations in early. We want you — here — in July.

Your 1991 international convention will be in the Adam's Mark Hotel, which is on the boundary line of Philadelphia and Montgomery counties.

Of course anyone thinking of this area may immediately think of the city of Philadelphia and the Liberty Bell, but most of the history of the Revolutionary War really took place in Montgomery County. I'd like to share just a few things with you, to whet your appetite for seeing an area which played such a great role in the history of this country's independence.

Less than 300 years ago, this forest-covered territory was the home of the Lenni Lenape Indians, a branch of the Delaware Tribe.

Nature lovers know that this is the location of the Audubon Wildlife Sanctuary, the first American home of famed artist and naturalist, John James Audubon. That home alone, filled with his works, is worth the trip.

If you are a history buff, as I am, you may want to become a foot soldier (or mechanized) and follow the path through a large part of Montgomery County that forever will be remembered in this country's history.

From the hotel, let's take a 15-minute drive to the King of Prussia area and enter Valley Forge National Park. Although Montgomery County was the scene of many skirmishes and encampments, the one most remembered is George Washington's encampment here from December 1777 to June 1778. This is where Washington's sorely tired men were recognized, disciplined and strengthened for the successful campaigns which followed.

I visit Valley Forge Park quite often, continually amazed at the defensive strategies employed by the great military minds that won our freedom for us. You can drive around the park for the entire day checking battle emplacements, the soldiers' huts and the odd cannons. The house which was George Washington's headquarters still contains the original furniture, as well as many of George's personal things, such as eyeglasses, wigs, watches and false teeth.

Staying in the park, go to the picture-perfect old stone church museum. Ben McKlveen found this so fascinating last year that I could hardly get him to continue on to the next stop — he just found it too interesting to leave. When you do leave, your next stop should be the new museum, where you can spend many more hours learning of the problems and the deeds of men such as the Generals Lafayette and Von Steuben, Baron DeKalb, Colonel Dewees, Thomas, General Anthony Wayne and others.

Let's follow George's trail back through King of Prussia, through Broad Axe and into Fort Washington — approximately 10 miles. Here we can check out more historical sites while having a fine meal at ye olde beef and ale house. This will revive you for a visit to nearby Hatboro, which was stuck with this name because they made hats here for the Revolutionary Army. This was also the locale for the famous battle of the Crooked Billet.

Now, continue another 15 miles to Bowman's Tower, where you can climb the tower and be the lookout all over again for George as he prepares to cross the Delaware before the battle of Trenton. Of course, in July I don't think you'll need to worry about any ice cakes floating down the river. Instead, you may want to break out the picnic basket and have a little lunch in Washington's Crossing National Park.

Rather than crossing into Trenton, I suggest that we head down river to visit the Port of History. Of all the submarines and other ships one may inspect here, I find the USS Olympia, Admiral Dewey's flagship, the most interesting, especially for its armaments.

By now, all but the diehards will be ready for a return to the hotel, but there may be some who will choose to continue on to inspect Ft. Mifflin, just downriver, or Daniel Boone's homestead, or even Brandywine battlefield. (This is the battle site where the British, under General Howe, defeated General Washington's forces in their advance on Philadelphia in 1777.)

Incidentally, how many of you were aware that the British won most of the battles?

Continuing on this trip, as you go westward into

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... Of Better Piano Service

The Philadelphia Story

Ernie Juhn, RTT
1991 Institute Director

Did you ever feel confused about how to voice a piano — why various manufacturers recommend different procedures? Why is it that some of the finest concert technicians use different methods than others who are just as qualified? If you attend the 1991 Convention in Philadelphia, there is a pretty good chance that you will return with a lot more knowledge and a better understanding of the subject. We will have more than five different instructors covering voicing and tone building. Tuning from A to Z. The simple, the sophisticated, the everyday, the concert tuning. Tuning by ear, machine and both. Classes on tuning the bass and setting the temperament. If you have been a piano tuner for many years or, if you just started recently, you can expect to broaden your knowledge at the Technical Institute of 1991.

If action work is your bag there is plenty to look forward to in July at the Adam's Mark in Philadelphia. Filing hammers on vertical pianos, installing grand hammers, regulating vertical and grand pianos. There will be classes on business and how to get over your first fear of computers.

For those who are into rebuilding and restoring of pianos, there will be plenty of interesting classes. There will be classes on pinblocks, plate preparation, bridges, soundboards and stringing. Ever try to remove a pinblock from a Steinway or Mason and Hamlin? If you would like to see how to do it fast and easy in a few minutes — just make sure to register for the 34th PTG Convention and Technical Institute in Philadelphia.

Most piano manufacturers from all over the world will present technical classes on how to service their product and some of the finest, most successful independent technicians and rebuilders will be there to participate in one of the most ambitious technical institutes. There is more and more. Make sure to read "The Philadelphia Story" in the following issues of the *Journal*.

Dutch country, you should include a visit to the world-famous Railroad Museum, at Strasburg. The sight of so many of these giant iron monsters of harnessed energy under one roof is awesome. They're all here, whether monstrous or dwarfed, the old steam, diesel and electric engines. Included is the famous GG-1, the first electric engine ever (designed and engineered by the father of one of our customers). Did you railroad buffs know that for every steam engine on the road, there was one in the roundhouse? But for every five diesels, only one backup was needed. The GG-1 made it possible for an advance to only one backup to 10 working engines.

A good camera is a necessary piece of equipment. You can also take a ride on one of the old iron horses — the adults enjoy this more than the kids.!

Gettysburg

Of all the things I could write about in this area, though, the one which touches me most, and may you, is the most studied battlefield in the world, Gettysburg. If you really want to study Gettysburg, you should take at least two or three days. Even then, you'll wish you had another week. I have never heard anyone give what I feel is an adequate description of Gettysburg. It is impossible to describe the impact this battle had on the history of the entire world. It's impossible to describe the impact this visit will have on you for the rest of your life. Even after several visits, you may find it impossible to absorb all the military diplomacy, maneuvering and history that took place here.

This is the battle that marked the turning point of the civil war. This is the site where Lincoln delivered the famous Gettysburg address. Gettysburg National Military Park is the site of the three-day battle of Gettysburg which took place July 1,2, and 3, 1863. Historians have written more about this battle than any other in history.

continued on page 17

Commercial Insurance And The Risk Management Process

Janet Leary, RTT
Economic Affairs Committee

Why should a business purchase a commercial insurance policy? How do you choose a good policy? Is a tool and bailee policy adequate? This article will answer those questions plus give you additional information so you can make better insurance decisions for your business.

The first part of this article will cover a topic called risk management. Managing risk is a three-step procedure — identify your risk, estimate the probability of loss, and determine the alternatives. The alternatives you can choose from are risk avoidance and control, risk transfer, risk retention, and insurance.

The second part of this article will give you a capsule summary of the major types of commercial insurance policies: multi-peril policies, multi-line policies, and liability package policies. Also included in this article is a segment on tool and bailee coverage.

Risk Management

Risk management is the process of planning activities of a business to minimize adverse effects of accidental losses at the least possible cost. What is risk? The uncertainty of a loss. There are basically three types of risk — personal risk, property risk and liability risk.

A comprehensive commercial insurance policy protects against all three of these basic risks, and further breaks them down into subcategories of coverage depending on your specific needs and willingness to spend money on insurance. Tool and bailee insurance is one of these subcategories. By itself it may not cover all of the above mentioned risks unless it is added to a comprehensive policy to make the policy more complete. More about that later.

The actual risk management process is a three-step procedure that should precede any decision to buy insurance.

Step 1: *Thoroughly identify your risk.*

Some examples of risk are: theft of tools in your auto; theft of tools in your shop; damage to your client's piano in your care and custody; damage to your client's piano in another technician/refinisher's care and custody; medical costs incurred if your client falls on your icy walk; and explosion from using flammable substances in a poorly-ventilated shop.

Get out a notebook and start listing in one column all the possible scenarios where your business may be exposed to risk. In a second column list the perils that may actually cause the loss for each identified risk. Some examples of perils are — fire, water damage, theft, vandalism, etc. What impact would the loss have on your business, or possibly on your personal net worth? In a third column identify in dollar amounts how severe the loss can be.

Step 2: *Estimate the probability of a loss.*

List these probability figures in column four. If the probability of a loss is very remote and the potential damage is very low, why concern yourself? If however, the potential damage would be substantial, it's time to investigate the alternatives. The degree of the loss is relative to your personal situation. If your tools are stolen from your auto, and you have no replacements, your loss is not just limited to the actual tool cost, it also includes the loss of income until you can order and receive replacements from your supplier.

Step 3: *Determine what your alternatives are in managing risk.*

There are four primary methods to treating risk:

Method 1: Risk Avoidance and Loss Control.

Not always a possibility such as in the case of an accidental injury, lightning, floods, etc. There are ways, however, that you can avoid risk or control possible losses: keep a fire extinguisher on hand if you are refinishing; take all means of protection when using power tools; keep your chisels sharp; store flammables in closed containers in a cool area; install sturdy locks and/or an alarm system; ask your client to kindly remove their priceless artifact from the piano rather than taking the responsibility yourself; use a clean drop cloth when disassembling any part of a piano that may leave dirty residue on costly rugs or carpeting; keep all tool cases out of sight in a locked car.

Method 2: Non-Insurance Risk Transfers.

This means that risk is assigned to a third party. This can be done through contracts, leases, and hold-harmless agreements.

If, for example, you take a piano into your shop, or send it out to another technician/refinisher, you or the subcontractor are assuming the risk. A risk transfer may be accomplished by including in the contract (your client signs) before the work ensues, that the client's private homeowner's policy will cover any possible loss while the piano is in your shop. Most good homeowner's policies cover property outside the home while in the care and custody of others. Ask your client to call their insurance agent to verify that the piano is listed and covered.

If your client signs the contract, but their insurance company refuses to pay, you may still be liable by default. If your contract language is ambiguous or if your legal jurisdiction has no precedent for the interpretation of tailor-made contracts,

you again may have to cover the loss. If your bailee policy does not cover your client's piano off premises and damage occurs — you're going to have problems! A risk transfer of this type should be used only as a buffer if all else fails.

Method 3: Risk Retention.

This means that the business retains all or part of the loss. If the exposure cannot be transferred, insured, controlled or avoided it must then be retained. This method is used: a. when no other method of handling the loss is available, b. the worst possible loss is not serious, and, c. the potential loss is highly predictable.

The level of risk retention your business should incur is relative to your ability to cover the loss either from current receipts, assets held in reserve that are specifically earmarked to cover potential losses, or borrowing.

Method 4: Insurance.

If you decide to enroll in a commercial insurance policy you must decide on the deductible you are financially comfortable with, the insurer or insurers you will use, the terms and language of the contract, and finally you must periodically update and review your policy.

Never buy a policy unless you can physically have a copy of the actual insurance document. How can you compare your business needs against what the policy offers if you have no idea what's in the fine print? It's like buying an auto without knowing what you'll be getting.

Now that you have identified your risk, estimated the loss probability and decided how you will manage your risk, it's time to implement your plans. Since implementation will most likely involve purchasing some sort of a commercial insurance policy, the remainder of this article will delve into the nuts and bolts of the commercial insurance contract.

The Commercial Insurance Policy

Commercial insurance policies are extremely complicated and confusing. The main reason is that there are so many types, each with their own specific set of exclusions and limits of liability. Years ago insurance lines were separated — property, liability, glass, crime, inland marine, auto, etc. Today we have combination or package policies. A package policy usually starts out with some sort of property coverage, either on a building or its contents. It is then often combined with general liability insurance.

Special Multi-Peril Policy

It's possible to develop a package protection for a business with a basic fire policy attaching additional forms and endorsements as needed. This type of a policy is called a "special multi-peril policy" (SMP). If you started out with a homeowners policy, and gradually added to the policy for business use, you could possibly have this plan. This policy type may be cumbersome and more costly if you're looking for comprehensive coverage.

An SMP policy combines property and casualty coverage in a single package. There are generally four sections to this policy — property coverage, liability, crime, and boiler and machinery. You can fill in many of the gaps with additional endorsements and riders.

Multi-Line Package Policies

The multi-line package policies are replacing the older special multi-peril policy in the business insurance market. These policies are set up to combine most commercial property and liability loss exposures all in one policy. There are generally fewer gaps of protection in the policy, and the premiums should be lower than individual policies or SMP policies. Two basic types of multi-line property policies:

1. *Commercial Property Insurance Contract:*

This is a property and liability policy containing one or more of the following coverage parts:

Property

Which includes buildings, business personal property of the insured, personal property of others in the care, custody and control of the insured. If 80 percent coinsurance requirement is met, additional coverages apply such as 30-days coverage on newly acquired property, property off premises, etc. Other provisions and extensions of coverage can be added on an as-needed basis.

Business Income Coverage

When damage is done to insured's building or business property that inhibits the continuance of earnings, the loss of earnings and the expenses of the insured to resume normal operations are covered.

Inland Marine

This type of insurance grew out of ocean marine insurance. It covered property from the point of departure to the point where the ship landed. Inland marine was developed in the 1920s for land transport. This policy type is where you'll find the bailees' customer form, the contractor's equipment form (tools coverage), plus dozens of other coverages.

Crime

This includes theft by employees, theft of money and securities, and business contents. This insurance can include burglary insurance (including money and securities in a safe with forcible entry), robbery (off-premises and messenger with threats of bodily harm), and theft (get broad coverage which doesn't require forcible entry or threat of force).

Commercial Auto

Boiler And Machinery

Commercial General Liability

Farm

2. *Business Owners Policy:*

This policy is designed for small- to medium-sized businesses. In this format you could buy a standard named-perils policy, or a special form that covers all direct physical losses except those specifically excluded. The coverage is divided as follows:

Buildings

Which include appurtenant structures, permanent fixtures, machinery and equipment, personal property for maintenance, outdoor furniture, trees and shrubs, etc. Coverage is on a replacement cost basis with no coinsurance requirement. You must however, carry insurance on the full replacement cost of the property.

Business Personal Property

Property owned by the insured on a replacement cost basis for no more than the amount listed on the declarations page. Also covered is your client's property held by the insured off-premises with a coverage limit of up to $1000.

Deductibles

$100 per occurrence for property losses, $250 deductible for crime losses, no deductible for loss of income cover-

age, with a combined deductible maximum of $1000.

Business Income Coverage

No maximum dollar limit, but it has a maximum time limit of 12 months.

Optional Property Coverage

This includes burglary and robbery coverage of business personal property. It also includes money and securities used in conducting the insured's business on- or off-premises. Coverage limits are generally $5000 on premises and $2000 off premises.

Business Liability Coverage

A comprehensive liability program with limits of liability of $300,000 to $1,000,000. Fire legal liability combined not to exceed $100,000. Additionally you will find a medical payments section. The limit is generally $1,000 per person and not more than $25,000 per occurrence.

Liability Package Policies

If you are a piano dealer who does a fair amount of advertising and has a lot of traffic at your retail establishment, you may still feel uneasy with the liability coverage in the multi-peril policies mentioned earlier in this article. The following segment of this article will outline additional liability package policies which may be of interest to you.

The most common liability package policies are the following:

Comprehensive General Liability (CGL)

A form of liability coverage that protects against bodily injury and property damage that arises out of business operations. The following are limits of coverage you should compare to what you're offered in liability coverage.

Bodily Injury And
Property Damage Liability

Units ranging from $300,000 to $1,000,000+ depending on the exposure being insured against.

Personal And Advertising Injury Liability

No physical injury or physical property damage. This covers against libel, slander, false arrest, etc. Limits on liability can range anywhere from $500,000 to $10,000,000 depending on your exposure.

Medical Payments

General range for limits of liability per person — $1,000 to $5,000; with a maximum for each accident of $10,000 to $25,000.

Broad Form Comprehensive
General Liability (BFCGL)

This can be added to CGL. As a package this endorsement includes blanket contractual, broad form property damage (which eases the care, custody and control exclusion), personal injury with no "exclusion c," advertising injury liability, host liquor liability, etc.

Umbrella And Excess Liability

An additional layer of catastrophic liability protection that has higher limits of coverage than your basic liability plan and fills in gaps of missing coverage.

Tool And Bailees

How does the tool and bailees policy we hear so much about fit into this insurance maze? The tool portion of this insurance coverage is a contractors equipment form. This is where equipment and tools, plus clients' property in your "care, custody or control" are covered.

The bailees' customer coverage policy protects the property of others and holds it in his care, control and custody against liability as the result of damage that may be incurred to the bailor's property. The bailor (your client) is the person who turns over possession of the property to the bailee. The bailees' customers coverage, and the contractors equipment policy are two of countless inland marine coverages. These two policies are individual policies, not package policies.

In the contractors equipment form, newly acquired property is covered for 30 days after which it must be listed to be properly insured. Covered property does not include property while loaned, leased or rented to others, unless you provide the operator. In the case of renting out pianos, I assume this means all moving, set-up and teardown. Vandalism, theft or other dishonest acts of you, your employees or other agents are not covered. Coverage is 80 percent of actual cash value of the items involved at the time of the loss, with possible penalties if you are not carrying sufficient insurance in relation to the value of your business personal property.

Money and securities are not covered. Some of the excluded perils are inherent vice, latent defect, deterioration, rust, corrosion, extremes of temperature, freezing, lightning, windstorm, explosion, theft or attempted theft, vandalism or malicious mischief, mechanical or electrical breakdown, water which backs up through sewers or drains, etc.

The bailees' customer policy provides coverage without the need to prove negligence on the part of the insured. Covered property means personal property of others that is in your care, custody and control. Property not covered includes money and securities, customers' property accepted for storage, property in the custody of other bailees unless the property is at a premises listed on the declarations page, or in the custody of a carrier for hire. This means that your client's piano would not be covered at your subcontractor's shop under a typical bailee policy, but would be covered under their policy — that is, if they're insured.

The bailees' customer policy excludes water-related losses such as flood, tidal waves, wind-driven waters and sprays, mudslides, and water that backs up from a sewer or drain. It also excludes theft of property from a delivery vehicle left overnight, unless the vehicle is in a fully enclosed and locked building.

I hope this article was of some help to you. It's not meant to be the final word on commercial insurance — it's only the tip of the iceberg. If you follow the risk management process, and put all your considerations and questions on paper, your insurance agent will be more equipped to find the policy that suits your needs if insurance is what you're seeking. ≡

"Music is the electrical soil in which the spirit lives, thinks, and invents"
—Beethoven

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INTERNATIONAL SCENE

Plans For Tour Coming Along

Ed Hilbert, RTT
International Relations Committee Chair

Plans for the 1991 PTG Orient Tour are coming along nicely. We shall be touring China, Taiwan, Hong Kong and Korea with factories, as well as wonderful sightseeing being planned. So far, we have three factories in China: in Beijing, The Beijing Piano Co.; visiting the Great Wall, the Forbidden City, Tiananmen Square, the Zoo (with giant pandas!), the Summer Palace, the Ming Tombs and perhaps other attractions. Shanghai, throughout the centuries, has remained one of China's most open cities to the outside world. As such, it offers a strong international atmosphere. Some possible sightseeing here may include: the Yu Yuan Garden, the Jade Temple, the Shanghai Botanical Gardens (second largest in the Orient), Suzhou (a very unique small city nearby).

In Macau, we shall visit the Hastings Piano Co., which is exporting to the U.S. This city is claimed by China and governed by Portugal. In essence, this is a 16th to 18th century Portugese city with a European flair. It also has an extraordinary nightlife and is considered to be the Las Vegas of the Orient. There is definitely something here for everyone.

Perhaps you're starting to get a feel for the kind of interesting trip this will be! We shall spend two days in Hong Kong and then on to Taiwan and Korea, briefly described now...

In Taiwan, we shall visit both Kawai and Yamaha factories. Tom Liu president of the Taipei Piano Technicians Association assures us we shall have a warm reception with many interesting things to do and see.

In Korea, we are planning to visit the Samick, Sojin and Young Chang factories. Bo Jung Lee, past president of the Korean Association of Piano Tuners will be helping us coordinate our factory visits and is looking into the possibility of seeing some smaller factories or shops. I have been to Korea twice and can attest to its beauty and varied cultural opportunities. On the last PTG trip we didn't have much time for touring. This trip we shall see much more of Korea.

Also, while in Seoul, we shall have the opportunity to attend the seventh Biennial IAPBT Convention on June 2, 3 and 4. Here we can visit with other technicians from many countries and share with each other about our profession and cultures.

The tour dates are May 16 through June 6, 1991, 22 fascinating days touring the Orient. As of December 20, we already have 22 potential tour participants; and since we can only comfortably accommodate 35 people, I would encourage you to call or write soon to receive more information. Contact: Ed Hilbert, 40 Pleasant Street, Bristol, Vermont 05443, (802) 453-3743.

INDUSTRY NEWS

New Traveling Library Is A "Pupil Saver"

An audio/visual presentation of 42 compositions chosen for their special appeal to young pianists is now available from the National Piano Foundation.

Funded in part by a grant from the National Association of Music Merchants, *The New Music Review Library: Pupil Savers!* was compiled by Joanne Smith, Associate Professor of Music and Director of Keyboard Studies at the University of Michigan. The title, *Pupil Savers!*, was coined by Louise Bianchi, Professor Emeritus of Southern Methodist University, while preparing a workshop and magazine article on teaching materials to motivate students to continue lessons when they were thinking about quitting.

The presentation is designed for rental to teachers' associations and piano pedagogy departments. The library contains overhead transparencies of the musical selections and an accompanying audio cassette. The audience hears helpful narration, followed by performance highlights of each piece.

In addition, participants will receive a comprehensive list of the compositions, the 14 publishers represented, and a selection of NPF brochures.

For information on renting the *Pupil Savers!* traveling library, contact Madeleine Crouch, National Piano Foundation, 4020 McEwen, Suite 105, Dallas, TX 75244 (214) 233-9107.

continued from page 17

All the great generals of the world (Rommel and Desert Fox, Patton, Eisenhower) came here to study this site, and the strategies employed by the great General Robert E. Lee, General George G. Meade, and their subordinates.

The Gray Army of 75,000 men marched unknowingly right into the Blue Army of 90,000 men. After only three days, casualties for the Gray numbered 18,000, and for the Blue, 20,000.

I assure you, your time here will be an unforgettable experience, and will stay with you for years to come. The majestic and sacred monuments and sites will always haunt you to return.

You can spend days in the war room just studying the maps, the deployment of troops and the battle strategies — both planned and accidental. Photograph Little Round Top, or the site of the famous Picket's Charge, Cemetery Hill, where Picket's Brigade charged into the murderous northern fire. You can visit McPherson's woods, reading the endless number of markers and monuments which show where the regiments of the Iron Brigade were positioned. See Lee's headquarters, Lee's statue. Study Longstreet's route — the famous Devil's Den — Bigelow's Battery — Culp's Hill — and many, many more of the unforgettables of the bloodiest and most memorable battle in American history.

If you like history (and who doesn't?) I'm sure any of this will really be the icing on the cake when you come to the convention this summer. If not, you just let us know what you are interested in seeing or doing, and we will try to accommodate you.

See ya at Adam's Mark!

National Music Systems Inc. Introduces Upscale Digital PianoPlus

National Music Systems Inc. has introduced a new system called Upscale Digital PianoPlus, which adds 40 digital voices and MIDI capabilities to any 88-note acoustic piano.

The system features an electronic control panel that's installed below the piano keyboard cabinetry. The panel contains computer chips carrying 40 digitally recorded sounds and voices ranging from grand piano, jazz organ, harpsichord, electric piano, pipe organ and honky tonk piano to brass, choir, vibes and string voices. Vibrato and other sound enhancements are included.

Various acoustic sound muting systms for vertical pianos are available from National Music Systems so the digital sounds can be played alone, along with the acoustic sound, or so that the acoustic sound can be played without the digital sounds. A muting system for grand pianos is on the design board.

The Upscale Digital PianoPlus also has a MIDI-compatible strip of trouble-resistant optical key-switches that goes underneath the keyboard itself. The control panel's computer circuitry automatically adjusts these switches to provide greater dynamic range and to compensate for key dip.

Upscale's $995 price tag includes the control panel, MIDI keying strip, silencer strip and pedal switches. (A professional discount is available for piano technicians.)

For more information on Upscale Digital PianoPlus, contact National Music Systems by calling 1-800-284-3755 or 1-315-792-7680 or by writing the company at 1720 Burrstone Road; New Hartford, NY 13413.

TECHNICAL FORUM

Rebuilding Damper Systems

Susan Graham, RTT
Technical Editor

As the December article remarked, it tempts fate to rebuild a damper system without removing and inspecting the underlever tray (also known as the "back action"). Many little things can go wrong in this system, and many subtle improvements in performance and ease of regulation are achieved with good servicing. It's easy to do now and a real nuisance later.

Unless the system is virtually new, I replace the tray felt. It makes setting uniform pedal lift easier, and pedal operation quieter. If there are individual return springs for the underlevers, swing them to one side so the underlevers can be lifted for access to the tray felt. This prevents damaging the springs by forcing them past the normal position.

Scrape or sand off the old felt, leaving the wood underneath intact but removing any paper or cardboard shims. You may find an occasional damper tray which has warped. This is usually due to a design with the tray return spring at one end and the pitman contact at the opposite end. In severe cases, these trays need judicious planing — or the entire assembly can be replaced.

Replace the old tray felt, keeping the thickness match as close as possible. Glue only the back edge so that shims can be slipped in under the front when needed for pedal lift regulation.

While the springs are still freed from the underlevers, check action center pinning. Damper system pinning should be quite loose. As long as there is no excessive side play or noise, better to be on the loose side than too tight. In particular, the top flange center should be free — about equivalent to pinning in a jack (one to three grams). The centers can be "gang-tested" by inverting and swinging the tray to watch for tightness at the flange. Then hold the tray in a normal position and gradually tip it over, gently shaking it to make the top flanges fall over of their own weight. They should not have to go much past vertical for this to occur, and it should happen uniformly. Apply the appropriate action center treatment *now*, rather than waiting until you have problems of slow and leaky dampers.

Check the leads in the underlevers. This is done by supporting the lead and underlever on one side with one hand and pressing against the lead with a screwdriver blade or similar tool. The supporting hand will pick up any movement if the lead is loose. Any which are should be re-expanded to fit tightly. I use a spring-loaded prick punch (a common hardware item — mine happens to be a General tool). These punches have an internal spring-and-cam and are simply operated by pressing against the lead until the cam releases the spring and imparts a "blow" to the movable point (figure 1). This can be done in the piano with the system installed if necessary, although it will usually be necessary to drop the tray and/or raise the upstop so the offending underlever and lead can be isolated. A pliers-type center pin punch can also be used as a lead spreader — several punches into the soft metal should expand it sufficiently.

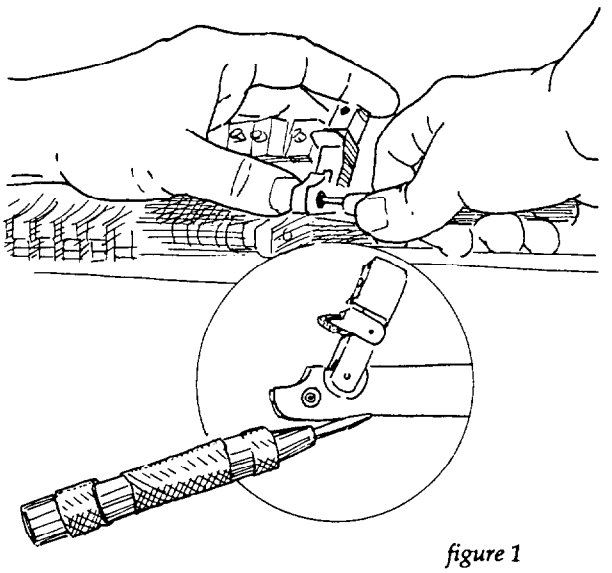


figure 1

Modern damper systems have metal collets pressed into the wood of the top flange: the damper wire drops through a hole in the top flange and a corresponding hole in the collet. A set screw threaded in the collet tightens onto the wire to hold it in place. Older systems may have set screws threaded directly into the wood. It is quite easy to exert too much pressure and split the top flange tightening such set screws, so be gentle. More troublesome still are screw-in damper wires, which thread directly into the top flange, and various other antique and exotic systems such as those found in the old Decker, which employ two pins protruding from the top flange: one pin is serrated and can be turned as a ratchet to raise or lower the wire for lift adjustment. If you are patient and skilled, these systems may permit accurate adjustment. If not, and you are reasonably skilled in the shop and equipped with a drill press and enough ingenuity to design a holding fixture to clamp up the top flanges, (similar to the one used to hold grand hammer shanks for tail shaping) you may want to install metal collets and screws — they are available from suppliers. Careful alignment and size of the holes drilled are required, since the collets are only press-fit and will cause a lot of misery if they are loose in the wood and can turn or rattle. On the other hand, those screw-in wires....

As part of the inspection routine,

take a damper wire and run it down into each and every top flange hole to be sure there is free clearance (figure 2). If it binds now, it is sure to bind later, making regulation difficult. Either the wood has swollen and should be eased, using the appropriate size drill bit in a pin vise (*not* running in an electric drill — think of your action centers!) or else the collet has turned slightly, misaligning the holes. Turn it back so the holes line up — this may require tightening the screw all the way down and using it to turn the collet in a clockwise direction. Stick the damper wire down into the top flange while you do this so you can feel it "click" as the holes align.

Underlever springs are press fit in the back of the flange, and held with a shoe peg. Be sure the fit is still tight. The blocks of felt in which the spring heads ride should be cleaned or replaced, and the heads of the springs cleaned with brass polish. Reinsert the springs. If the tails are loose and pulling up out of the flange, apply a drop of thin super glue to solidify them in place. This is necessary to maintain even spring pressure. These springs can be purchased from Steinway and added to systems which lack them if additional damping pressure is required (keep in mind that this will add to the aggregate "weight" of the action).

Speaking of Steinway: on their older pianos, and undoubtedly on other makes as well, the underlever flanges are not screwed but only glued to the tray. These glue joints do fail. Unlike newer designs with the flanges situated vertically (facing toward the keybed) these flanges lie horizontally on top of the tray. This makes them excruciatingly difficult to reglue if they become loose in the piano (although you can work glue in and apply clamping pressure with a screwdriver or similar wedging device. Sometimes.) By all means, check these joints now by inserting a thin blade between each flange and attempting to wiggle it. Reglue any which are loose. Some technicians install screws in these flanges: a number eight, 3/4" pan head sheet metal screw is appropriate. Drilling is best done on a press.

Chances are that you'll want to replace the pitman contact leather. This is a convenient time to remove the old leather, although I wait to glue on the new piece until I am actually regulating the system: sometimes the combination of different sizes of new felt throughout the system will require a considerably different thickness of leather.

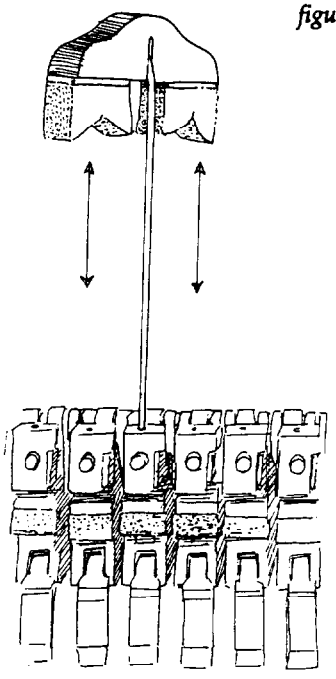
Other styles of pitman contact also need servicing. Rebush the pinned type, making sure that the connecting block is firmly glued to the tray, and do whatever else is appropriate for various other systems.

The same logic for examining and reconditioning the underlever tray applies to the guide rail. Rebushing the guide rail greatly reduces damper system noise and enhances control. As with key end felt replacement, guide rail rebushing is something I often include with high-level action regulation even if damper felt is not being replaced: it makes good damper regulation much easier and the overall job much more satisfactory. It's a job that isn't worth thinking about: if there's any question, do it. (I confess that it does happen to be one of my favorite jobs in piano rebuilding.)

You can soak out guide rail bushings with the same hot water and wallpaper remover solution used to remove head felt. This does impart moisture into the wood, however, and the job comes to a halt while it disperses. In addition, the bushings are often dirty and moisture seems to carry stains into the wood. In most cases, I "dry-punch" the bushings out using the drill press. (A note of thanks to Wally Brooks for this procedure). This method simply requires that you find or make a strip of scrap wood which is the necessary thickness to fit under and support the lip of the guide rail. Drill a hole in that strip — about 1/2" diameter will do fine. Clamp it to the press table. Locate a drill bit with the same diameter as the bushing holes and chuck it into the press *with the unfluted shank exposed*. Align each bushing under the bit shank and lower the spindle to punch it out. A "punch" motion rather than a slow press works best. With practice, you will be able to pop out a whole railful of bushings cleanly and with no damage to the wood. If they are stubborn, I sometimes presoak them with the removal solution, and then punch them out immediately. This softens the glue so the job is neater but gets the moisture out before it has time to travel into the wood.

Depending on the neatness with which the bushings are removed, you may want to clean up and renew the countersink. Most domestic pianos are countersunk on the underside of the bushing hole. The new bushing should be expanded into this enlarged area as it is installed: this is one of the main things which holds the bushing in place. Some grands, particularly of European manufacture, will have a countersink on both the top and bottom of the rail. The bushings are installed with no glue whatsoever. It is only by being expanded into these countersinks that they are held in place (in profile, it has an hourglass shape). In any case, if there is glue and felt residue in either the countersink area or the hole through the guide rail, clean it up carefully with a rat-tail file or the properly angled countersink bit (or even a drill bit tip if it matches the angle).

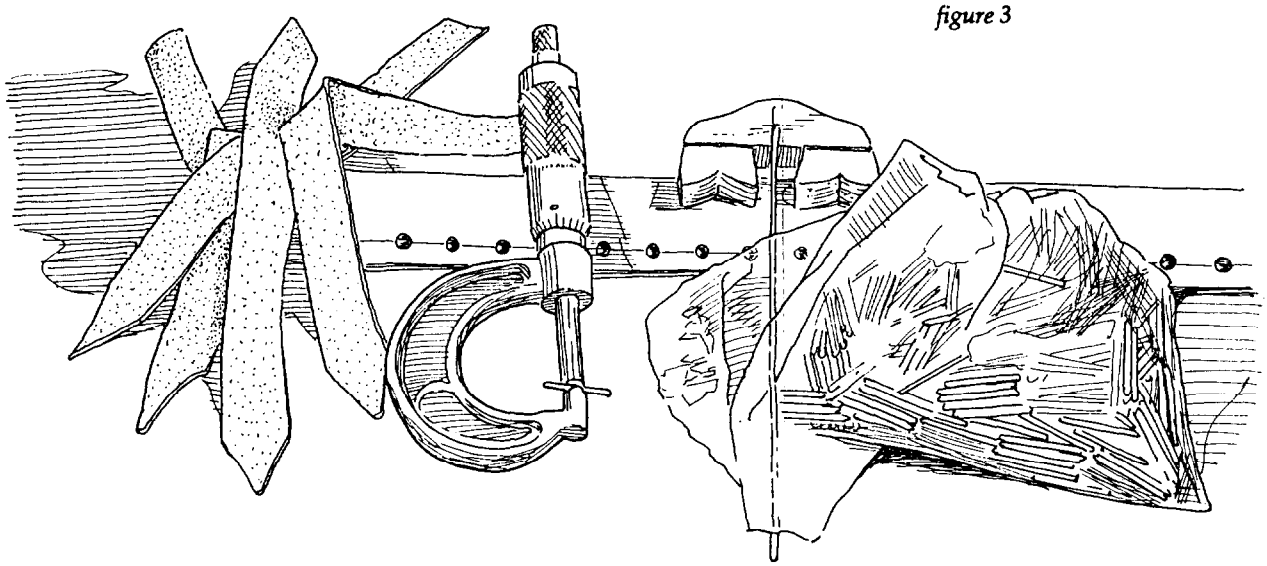
figure 2



When you look down into a grand piano, you don't exactly see the guide rails — but they aren't completely invisible either. Like shining the tops of bridge pins, clean surfaces here will add to the overall impression of a thorough job.

I scrape, sand and refinish the rails after the bushings are removed, since it gives a chance to smooth out any splinters caused in the unbushing process. An aerosol can of clear gloss spray lacquer is convenient for finishing jobs such as these, since there is no clean-up and the material dries quickly and the job can proceed. I simply keep a can or two from my local hardware store on hand. Since the bushings are put in with an

figure 3

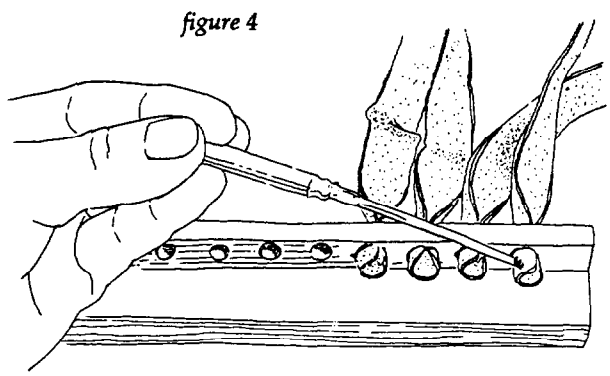


absolute minimum of glue, and since none of the glue should contact the felt inside the actual cylinder of the bushing hole (only the lower edge in the countersink), I don't worry about the finishing material getting into the holes. (Just an aside for you cautious types).

There are, of course, a few tips about bushing guide rails. The first is to use several short strips of cloth, rather than one long one. Determine the correct width of the strip: save a sample old bushing or multiply the diameter of the hole by three (yes, purists, it should be pi, which is 3.14159...) and make the strip that width. The strips should be torn, rather than cut. Tearing produces fuzzy edges which will tend to knit together as the bushing is formed inside the hole. It works well, therefore, to tear the strip slightly over width and then pull a strand or two from each side to get to exactly the correct size and work up a nice fringe of free fibers.

Thickness of the cloth is important for the proper fit around the wire: tight enough to guide it securely and quietly, but not so tight it will be sluggish or bind. It can be determined by installing samples (with no glue) and tying a wire through them. The question always arises of what to do about the older guide rails (again, Steinway) which had double layer bushings. In these, the layer which contacted the wood was thin felt which was glued in place; the inner bushing which actually contacted the wire was bushing cloth held in place by friction and fiber action with the felt. It can be difficult to find two thicknesses of suitable material which together will not be too thick. The options are to carefully punch out the inner bushing and replace it with the thinnest cloth available, or to replace both with a very thick cloth. At one time I obtained a yard of .090 thickness bushing cloth from American Piano Supply — we affectionately refer to it as "the gonzo cloth." It's almost as thick as thin action cloth and has proven useful only for these bushings. The disadvantage is that thick cloth acts like a sponge and is prone to soaking up ambient moisture and causing sluggishness. In most cases, however, if we size and then iron these bushings after installation they stabilize and do not cause problems.

figure 4



It should go without saying that any reference to bushing cloth refers to high quality dense cloth unless specified that a lesser grade is suitable. There has been a suggestion that one side of a piece of bushing cloth is smoother than the other, and that this side should contact the wire (or keypin). If you're able to determine such a difference, congratulations, and orient the cloth appropriately.

Make yourself three or four strips of the right width and thickness — figure that the total amount of cloth needed will be about 68 bushings of 1/4" each — a total of 27", plus extra to cut a tapered point at the end of each strip, and enough extra so the strips can be handled easily.

Just as the most accurate keybushing is done with precisely-sized cauls left in place during drying, the best guide rail bushing also uses a caul around which the bushing is sized: in this instance, bridge pins. Select an appropriately-sized pin by measuring the damper wire, and finding a pin which is .003-.010" larger (figure 3).

I like to work with the guide rail clamped in a vise, since this makes it stationary and frees both hands for tools. I use hide glue, prepared quite thick so it will not wick into the cloth, and the breakaway blade knife which has the sharpness of a razor blade with a more convenient handle. Cut one end of each strip to the tapered point as shown. All four strips are pulled through from the bottom until about 1/8" is left protruding below the underside of the lip of the rail. The "seam" of the bushing should not be directly to either side: if the wire wanders in travel, it will tend to find that weak spot and work into it, and then rattle against the adjacent damper or string. I put the seam at about two (or four) o'clock so it isn't directly to the front or back either: the rotation of the underlever as it lifts tends to throw the damper backward (and then, of course,

it rebounds forward) so a seam here is inadvisable as well.

Apply a very small spot of glue to the exposed lower edge of the strip (figure 4). There shouldn't be enough so it can be spread across the cloth as it is on a keybushing. All you want to do is "tack" the bushing in place at its lower edge. Pull the cloth slightly farther into the rail, so the glued portion is in the lower part of the countersink, and use a pointed dowel to expand the cloth to fit it into the wood. Work gang fashion: pull all the strips through, apply glue to them all, pull the rest of the way and expand. Then trim them all flush with the top of the rail (figure 5), and insert a bridge pin in each (push the pin in from the bottom, initially holding a finger over the top of the hole to prevent displacing the bushing).

After all the bushing is completed and the glue dried, some technicians like to wet the bushings with methanol. Just as a "dip" sizes a flange bushing around a center pin, this will relax the fibers of the cloth and allow them to form around the bridge pin. Let them dry thoroughly (overnight) — heat application is not necessary.

I size bushings by ironing. For this, I use a homemade tool devised by Bruce Clark, who has not only field technician experience, but extensive design and manufacturing experience with Falcone and Sohmer to his credit. This tool utilizes a Weiler 25-watt soldering iron which will accept screw-in tips. (They do make some with fixed tips so pay attention when purchasing.) To make the tip, cut a 2 1/2" length of 3/16" threaded (24-count) brass rod (available in almost all hardware stores). Chuck this up in a drill press and hold a file against the lower end while the press is running and turn down the end to a small, smooth pin. Once again, a diameter a few thousands of an inch greater than the wire is appropriate. Smooth it with emory paper, and it's ready to go (figure 6, top and middle). Simply screw it into the soldering iron and allow it to heat up, and it then can be run in and out of each bushing to smooth and size it. The overall length of brass acts as a heat sink and prevents the tip from getting so hot it burns the cloth.

This iron has been extremely helpful in stabilizing bushings, especially where a very thick cloth has been used. I've made another bit for it by drilling a one-inch deep 5/64" hole down the middle of another length (this one is a little longer — about three inches) of the brass rod and then working it down on the grinder and with a file until the exposed portion is the same shape and size as the umbrella stave tool we sometimes use to ease tight damper guide rail bushings while the damper is still in place (figure 6, lower right). The sides of the bit need to be flattened by grinding so it can slip between heads. This bit can be used to iron bushings while the dampers are in place, although remember that the whole bit and shank of the soldering iron are hot and don't burn yourself — or the finish on the adjacent damper heads.

figure 5

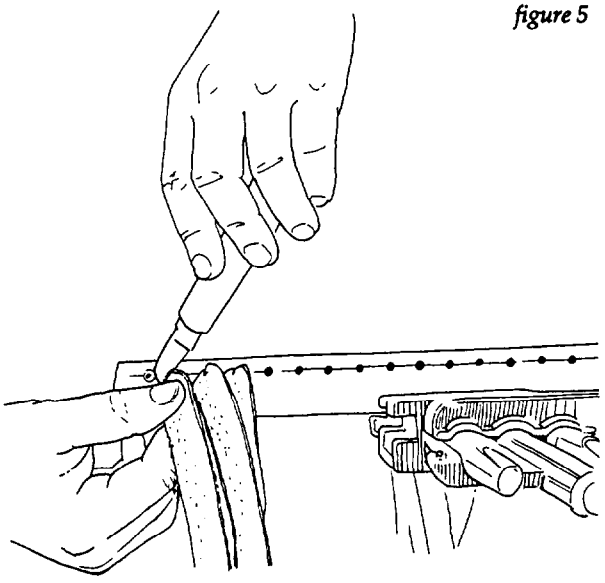
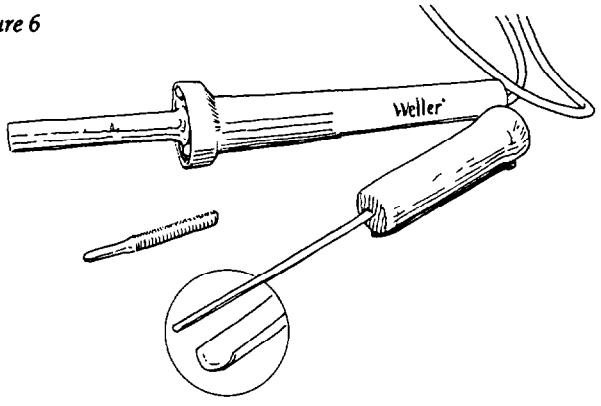


figure 6



Just as key easing must make a dimensional change in the wood to be permanent, guide rail bushing easing will not be effective if it only involves squashing cloth. The heat process makes a permanent change in the dimension of the wool cloth.

Replace the cloth on the bottom of the guide rails if necessary. It's a favorite nesting place of the common piano-eating moth, so be sure to take care of it. Felt is fine, or use up that inexpensive bushing cloth, which can be dyed to a more satisfactory red with Rit brand Scarlet dye (the premixed liquid is less bother than the powder).

Another good use for the cheap cloth, especially if dyed a royal red, is to back damper heads. The previous article discussed the possibility of doing this to level heads for a more uniform appearance as they sit on the string — sometimes the most functional felt does not yield this aesthetically pleasing result. Backing heads rather than purchasing pre-backed felt can enable a greater variety of size and shape to be stocked without duplication just for the sake of that little flash of red.

Back heads in groups. Lay a strip of cloth at the edge of a workbench. Pick up as many heads as make a comfortable handful. Put glue on the front (or back) of the heads and press them down on the cloth — this is done at the edge of the bench so the wires hang over the edge out of the way. Trim around the outside of the group of heads. Repeat the process for the other side. I use hide glue which sets up very quickly, but I do

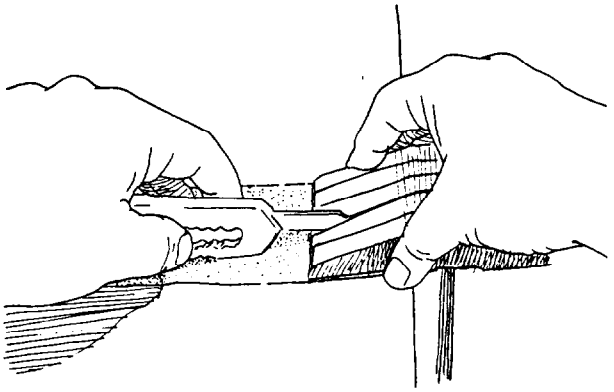


figure 7

go through and do all the heads in little groups of four or five (my idea of a handful) and then go back and slice between the heads with the breakaway blade knife (figure 7). You'll quickly get the hang of just how tightly to hold the heads together and pressed down on the bench while still permitting the blade to get between them. If you have trouble, try waxing the blade. A final note on prebacked heads is that in gluing on the actual damper felt you will need to use more glue than would be necessary gluing to wood — the cloth backing soaks up the glue and will starve the joint if a little extra is not applied.

And speaking of gluing on damper felt, that's where we'll pick up in *two* months — next month is the annual NAMM report (I warned you not to start damper jobs counting on these articles as installment plan instruction, didn't I?) So, until then... ≣

TUNING UP

Temperament Systems

Rick Baldassin, RTT
Tuning Editor

I recently had an experience with tuning stability which I feel merits repeating. I have a friend who is a recording engineer at a studio here. Not long ago, we were having dinner. Afterward, he asked me if I thought it would be a good idea for him to acquire a tuning lever and learn to pull in unisons. Without hesitating, I told him "*no*" and then inquired as to why he asked. He told me that he was having a problem with the piano at this studio. It seems the studio manager would have the tuner come over right before the session, and within 10 minutes, there would be notes terribly out of tune, and the session would have to be cancelled. Needless to say, recording studios don't like this. I asked who the tuner was, and he replied that he was not sure what his name was, but that he tuned there regularly. He also told me that one day, in an effort to salvage a session, the studio manager called a tuner from a local dealer to "touch-up" the problem notes. I told my friend there was definitely a problem, either with the tuner, the piano, or the environment. I suggested next time, they call me, and I could look over the instrument, check out the environment, and give it a good tune. After this, I should be able to isolate the problem.

A few days ago, a call came asking me to come look at the piano and tune for a session. When I arrived, I played through the instrument, and found the tuning to be reasonable, excepting for a high D which sounded like C# and D being played at the same time. I knew that sound, I had heard it before — just prior to the string breaking. I figured if I was going to have to replace the string, I may as well do it first off, so I pulled the left string back up to pitch while pounding on the note, fully expecting the string to break, but it didn't. I scratched my head, and figured it must have been the tuner. I went ahead and began the tuning. When I got into the Capo section, I could hear a number of false beats, and determined that seating these strings was in order. Upon completing this, I resumed the tuning. When I got to the D, sure enough, it was beating like a semi-tone. I figured that the string must have really been riding up on the bridge pin, and that seating must have really knocked it out of tune. I pulled it up again, and continued on with the tuning. When I reached the top of the treble, I went back to check the D again. It wasn't beating like a semi-tone any more, but it wasn't really clean either. I pounded on the note several times, and could get it to go out of tune. I pulled it up to pitch several more times during the course of the tuning, hoping to stabilize the note. Each time, I would consider another possible reason as to why the note would not stay put. But this was not a replacement string, the tuning pin torque was more than adequate, the pin was not jumpy, the bridge pins were tight and the bridge cap was not split out, the string was seated on the bridge, the hitchpin was not bending forward, there was not excess friction in the stringing felt or through the bearing points, the string left the hitchpin in a straight line over the duplex bar to the bridge, the coils on the tuning pin were tight, and the becket was squeezed in. What was left to check? Every time I would pull up the note, I would check another item, and find nothing. I felt like I was going nuts, and the note still would not stay in tune. The stupid string acted exactly like a string which was ready to break, yet my repeated tuning and pounding failed to break the thing.

I was ready to leave my engineer friend one of my mutes, and tell him that when he heard the note go out of tune, to insert the mute, and silence the offensive string. Then I glanced down again at the tuning pins. This time, I happened to notice the becket. This piano had been restrung some time before, so none of the beckets looked that great, but while the other beckets formed a rather sharp angle into the hole in the tuning pin, this becket looked a little rounded, even though it was squeezed tightly into the hole in the tuning pin. Time was becoming an issue, so I had a decision to make, either to let the tension down and pull the becket out, or leave the thing alone and hope for the best, like the other tuners had done.

I went ahead and let the tension down, and removed the becket from the hole. As soon as I did, I could see that the becket was not as long as the diameter of the tuning pin. I assumed that when the piano was restrung, the technician was careless, and let the string slip out while he was making the coils on the pin, and that this sloppiness accounted for the rounded look of the becket. A closer look showed that the rounded shape was due to the wire stretching, and that the wire was no longer round in this area, but flattened.

No wonder the string sounded like it was ready to break. It was. But not at the capo bar where they normally do, or even where the coil leaves the tuning pin, but the string was stretching beyond its limits at the becket. I cut the becket off, and proceeded to straighten a portion of the coil to make a new becket. It was fortunate for me that the person restringing this instrument was not too careful at getting the precise number of coils on each pin, and that this pin had ample. I was able to reinsert the becket, and pull the string back up to pitch without breaking it. I had purposely made the becket too long, such that it protruded through the hole in the pin. I wanted to insure that this becket was

not too short. I contemplated trimming the length by cutting it off, then decided for safe measure, to bend this extra length back around the pin, like some of the manufacturers do. I was able to do this with a small pair of vise-grips. I made sure this area of the tuning was stable by checking and retuning this string and the neighboring strings. When I left, I was confident that the piano would stay in tune for the session.

You may wonder why I just did not simply replace the string. I will admit that what I did took longer than it would have to replace the string, but you must understand that a replacement string is a real pain in a performance situation. The original string was already stretched, and because all I did was make a new becket from part of the coil, the bends in the wire were still in the same places. Seeing that the string did not break when it was pulled back up to pitch, it definitely was the best choice possible. Now if the string had broken when pulled up to pitch, this would have been a different matter, showing that the wire had fatigued in several places, and that replacement was dictated.

What can we learn from this? First, that there was something structurally wrong which was causing the note to go out of tune, and that it was not the fault of the environment or the tuner (except to the extent that he was irresponsible by not finding the problem, thereby inconveniencing the customer). Second, that it was important to check all possible causes of the problem, and eliminating those possibilities which prove to be within acceptable limits. Third, that a course of action had to be planned, considering the time involved and the performance requirements. Put this one in the back of your head for the next time you come across a note that just will not stay in tune.

*****

Some time ago, I mentioned that I had electronic setting instructions for a Direct Interval temperament system which I had printed. I came upon these instructions when I was searching my files for the letter from Dr. Earl Kent, which I referred to last month. The instructions were actually part of a paper which talked about equal temperament and types of electronic tuning. I have decided to print the entire paper here.

Conditions Which Exist In Equal Temperament

In an effort to better understand equal temperament and tune it on the piano, either aurally or electronically, understanding the conditions which exist in equal temperament will help in choosing a system which best satisfies these conditions. The conditions which exist in equal temperament are as follows:

1. Fundamental frequencies progress in the ratio of the 12th root of two to one. This system assumes that the fundamental frequency of the upper octave note is exactly twice the frequency of the lower octave note, and that the fundamental frequencies of all of the temperament notes are equally spaced within the octave.

2. Cent spreads are the same for like types of intervals. This means that all of the Major thirds are 13.7 cents wide, all of the fourths are two cents wide, all of the fifths are two cents narrow, and so on.

3. Beat rates for contiguous intervals are in the ratio for the type of intervals involved. For instance, the interval ratio for a Major third is 5:4. The beat rates for two contiguous M3rds (ex. F-A, A-C#) would be in the ratio of 5:4 (or 4:5 if you consider the lower third first). Likewise, contiguous fourths would be in the ratio of 4:3, and contiguous fifths in the ratio of 3:2.

4. Beat rates of parallel intervals of like type progress in a uniform manner going up the scale. This means that if we listen to a series of parallel M3rds, that as we ascend the scale, each new third should be faster than the previous third. The same would hold true for fourths, fifths, M6ths, etc. In equal temperament, the precise amount of increase from one interval to the next is the ratio of the 12th root of two to one.

In theoretical equal temperament, all four of these conditions exist simultaneously. With inharmonicity present in the piano, it is impossible to get all four conditions to exist at the same time. The best equal temperament for the piano, however, would exhibit as many of these conditions as possible.

Types Of Electronic Temperament Setting

Let us take a moment and look at a few types of electronic temperament setting, and see which of the above conditions exist in each.

1. Tuning Fundamentals with no stretch: This type of tuning satisfies condition number one, but because of inharmonicity, conditions two, three and four will not exist.

2. Universal Chart Tunings: Because these charts are averages, and most tune fundamental frequencies with some stretch, it is possible that none of the above conditions may exist.

3. Stretch Calculator Tunings: This method will nearly always satisfy condition number four, and may come close to satisfying conditions two and three, but will not satisfy condition number one.

4. Direct Interval Tunings: Will best satisfy conditions two, three and four, but will not satisfy condition number one.

Since the human ear cannot detect the fundamental frequencies beating against each other in the temperament, condition number one is not important in practical terms for piano tuning. From the above we see that stretch calculator tunings and direct interval tunings are best suited for piano tuning.

The Stretch Calculator

The stretch calculator was developed by Dr. Albert Sanderson, and is a patented system which is based on the measurement of the inharmonicity of note F4. Once the inharmonicity or *stretch number* is measured, the stretch calculator gives the cent settings for 42 notes ranging from C3 to F6. Many have asked how so many notes can be tuned from the measurement taken from just one note. The answer is that the notes tuned by the stretch calculator are *not* tuned from just one measurement. Let us look a little more closely at how the stretch calculator works.

When the stretch number is measured, it is the measure of the difference in the inharmonicity of the second and fourth partials of F4 (read on F5 and F6). Between F5 (the second partial of F4) and F6 (the fourth partial of F4) lie the fourth partials of all of the temperament notes. By taking this inharmonicity difference (the stretch number) and dividing it into 12 parts, the fourth partials of the temperament notes can be set quite accurately. In addition, the intervals which include these fourth partials, such

as the Major third (5:4), and fourth (4:3) will be very well in tune. Since the Major sixth is a M3rd plus a fourth, the Major sixths will be very well in tune, as well.

This system assumes that the inharmonicity in the temperament progresses smoothly, and that the note measured (F4) is characteristic of the other notes it is surrounded by. In other words, the better the piano is scaled, the better this system will work.

Having measured the stretch number, settings for the 13 temperament notes F3 to F4 are calculated. How then are the remaining 29 notes calculated?

As stated, the stretch calculator tunes the fourth partials of the temperament notes. When F#3 is tuned, it is tuned via its fourth partial, or F#5. If F#4 is tuned to this F#5 setting as well, a 4:2 octave has been tuned between F#3 and F#4, and experience has shown that the 4:2 octave works best in this region of the piano. If F#5 is also tuned to this setting, a 2:1 octave has been tuned between F#4 and F#5, and a 4:1 double octave has been tuned between F#3 and F#5. Experience has also shown that some stretching of these octaves must take place in the overall scheme of the tuning, and the stretch calculator does this stretching.

Thus one can see that the notes outside the temperament have been tuned to partials of the temperament notes (F#3, G3, etc.), and not from the original stretch number measurement.

As stated previously, the stretch calculator tuning satisfies at least one, and up to three of the four conditions which exist in equal temperament. This makes it the most accurate *simple* tuning system available. The direct interval methods are more accurate, but considerably more complicated.

Direct Interval Tuning

As can be seen from the analysis of conditions which exist in equal temperament, the direct interval tuning best satisfies three out of the four conditions found in equal temperament. The direct interval systems are all complicated, with several steps, and require a great deal more time than the stretch calculator method. For the most critical situations, however, the direct interval tunings provide the best results. There are several direct interval tunings for the temperament in use, and they all bear a great deal of similarity.

The earliest record of a direct interval tuning to my knowledge, was created by Don Foli, of Vancouver, B.C., Canada. It was published in *The Piano Technician*, in September, 1957. The system is identical to the one which I use, and it is presented here. The original system published in 1957, was an aural system which listed theoretical beat rates for the intervals being tuned. Since that time, it has become known that tuning to theoretical beat rates is not the best practice in piano tuning because of the effects of inharmonicity. Instead, the same procedure is used to set like intervals with the same cent spread, which places the beat rates of these interval in the proper ratios.

Foli-Baldassin Direct Interval Temperament

Electronic Setting Instructions

(Editor's note: The following system was written for the Sanderson Accu-Tuner, abbreviated SAT, but could be applied to other tuning devices with 0.1 cent accuracy, and proper filtering capability.)

Step 1 - *Tune A4* at 440 Hz. Set the SAT on A4, cents display on 0.0. Tune A4 to this setting.

Step 2 - *Tune A3*. Set SAT on A5, play A4, stop the display with the cents buttons. Any additional stretch desired in the octave is accomplished by lowering the number in the cent window (zero to one cent is acceptable). Tune A3 to this setting.

Step 3 - *Tune F3*. Make an educated guess at the proper cent spread for the thirds. Grands generally have a larger spread (12.5 to 14 cents), while uprights generally have a smaller spread (11.5 to 13.5 cents). From the present SAT setting, press *shift-rst*, then subtract your third spread guess. Tune F3 to this setting, and remember your guess.

Step 4 - *Tune C#4*. Set SAT on C#6, play A3, and stop the lights with the cents buttons. Press *shift-rst*, then add your third spread guess with the cents buttons. Tune C#4 to this setting.

Step 5 - *Tune F4*. Set SAT on F5, play F3, and stop the lights with the cents buttons. Any additional stretch desired in the octave is accomplished by raising the number in the cent window (zero to 1.3 cents is acceptable, and this number should be slightly larger than the amount of stretch used in the A octave). Tune F4 to this setting.

Step 6 - *Measure C#-F third*. Set SAT on F6, play F4, and stop the lights with the cents buttons. Press *shift-rst*. Play C#4 and stop the lights with the cents buttons. The number in the *cents* display should match your guess, *if* you guessed correctly. If not, calculate the correct third cent spread by adding the total of cents spreads for F-A, A-C#, and C#-F thirds, and dividing by three. Re-tune F3 (Step 3), C#4 (Step 4), and F4 (Step 5).

Step 7 - *Tune A#3*. Set SAT on F5, play F3, and stop the lights with the cent buttons. Press *shift-rst*. Make an educated guess at the proper cent spread for the fourths (probably about two cents), and add this guess using the cents buttons. Tune A#3 to this setting.

Step 8 - *Tune D#4*. Set SAT on A#5, play A#3, and stop the lights with the cents buttons. Press *shift-rst*, and add your fourth guess, using the cents buttons. Tune D#4 to this setting.

Step 9 - *Tune C4*. Set SAT on C6, play F4, and stop the lights with the cents buttons. Press *shift-rst*, and subtract your fourth guess using the cents buttons. Tune C4 to this setting.

Step 10 - *Tune G3*. Set SAT on G5, play C4, and stop the lights with the cents buttons. Press *shift-rst*, and subtract your fourth guess with the cents buttons. Tune G3 to this setting.

Step 11 - *Tune B3*. Set SAT on B5, play G3, and stop the lights with the cents buttons. Press *shift-rst*, and add the third spread with the cents buttons. Tune B3 to this setting.

Step 12 - *Measure B-D# third*. Set SAT on D#6, play D#4, and stop the lights with the cents buttons. Press *shift-rst*. play B3 and stop the lights with the cents buttons. The number in the *cents* display should match the third cent spread. If the B-D# spread was *bigger* than the third spread, then the fourth guess was *too big*. If the B-D# spread was *smaller* than the third spread, then the fourth guess was *too small*. Calculate the proper fourth spread by taking the difference between the B-D# spread and the third spread, and dividing by four. Subtract this amount from the fourth guess if the guess was too big, or add it if the guess was too small.

Step 13 - *Re-Tune* A#3 (Step 7), D#4 (Step 8), C4 (Step 9), and G3 (Step 10) to the proper fourth spread. Re-tune B3 (Step 11) to the proper third spread.

Step 14 - *Tune F#3*. Set SAT on A#5, play A#3, and stop the lights with the cents buttons. Press *shift-rst*, and subtract the third spread using the cents buttons. Tune F#3 to this setting.

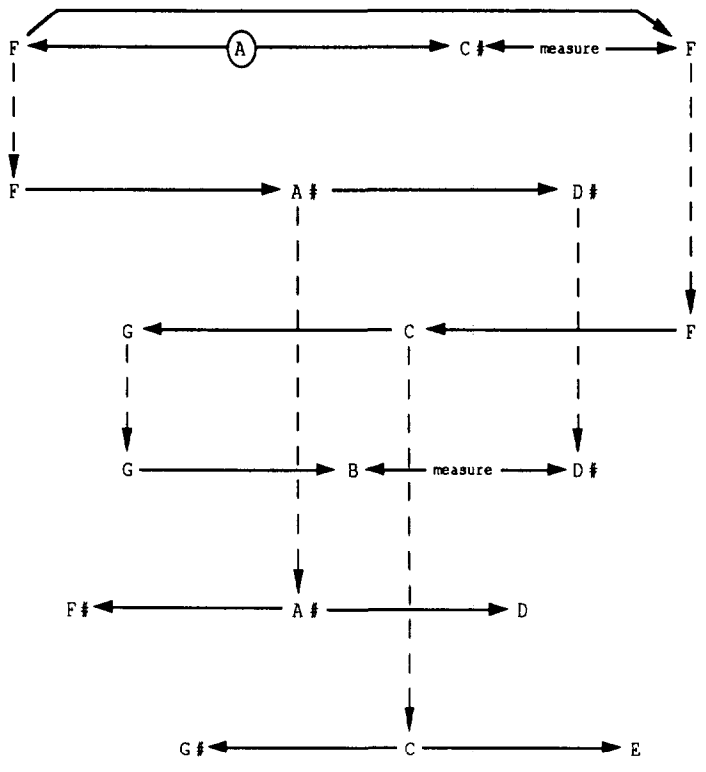
Step 15 - *Tune D4*. Set SAT on D6, play A#3, and stop the lights with the cents buttons. Press *shift-rst*, and add the third spread using the cents buttons. Tune D4 to this setting.

Step 16 - *Tune G#3*. Set SAT on C6, play C4, and stop the lights with the cents buttons. Press *shift-rst*, and subtract the third spread with the cents buttons. Tune G#3 to this setting.

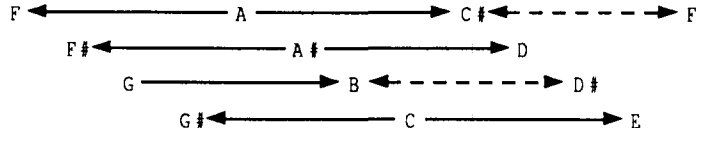
Step 17 - *Tune E4*. Set SAT on E6, play C4, and stop the lights with the cents buttons. Press *shift-rst*, and add the third spread using the cents buttons. Tune E4 to this setting.

Step 18 - *Record Settings*. Make a record of settings for temperament notes at their fourth partials (F3 at F5 to F4 at F6) for future use. Record in memory, if desired.

Foli-Baldassin Direct Interval Temperament System Roadmap



The Four Chains Of Contiguous Thirds



Foli-Baldassin Direct Interval Temperament

Aural Method

Step 1 - *Tune A4* to fork. Test with F2 for equal beating.

Step 2 - *Tune A3* to A4 using M3-M10 test. M10 should be faster than M3 by zero to 0.5 BPS. If using P4-P5 test, the P4 should beat faster than the P5 by zero to 0.5 BPS.

Step 3 - *Tune F3* to A3, estimating proper speed for the instrument (six to seven BPS).

Step 4 - *Tune C#4* to A3 so that the beat rate of the A-C# third is in a ratio of 5:4 when compared to the F-A third.

Step 5 - *Tune F4* to F3 using M3-M10 test. M10 should be faster than M3 by zero to 0.5 BPS. If using P4-P5 test, the P4 should beat faster than the P5 by 0 to 0.5 BPS. This difference should be the same as was used in tuning the A octave.

Step 6 - *Test C#4-F4 third* to see if it is in a ratio of 5:4 when compared to the A-C# third. If C#-F is too slow, then F-A was set too fast, or vice-versa. Do *not* stretch the F3-F4 octave to make C#-F fast enough. Slow down F-A, repeating steps three, four, five and six, until the 5:4 ratio has been established in the contiguous thirds.

Step 7 - *Tune A#3* to F3 (fourth), slightly expanded. The M3-M6 test will prove expansion of the fourth if the third beats slower than the sixth. Also test A#3-F4 5th.

Step 8 - *Tune D#4* to A#3 (fourth) such that A#-D# beats slightly faster than F-A#. Test also with M3-M6 test.

Step 9 - *Tune C4* to F4 (fourth) to about the same beat rate as the A#-D# fourth. Test with M3-M6 test. Also test F3-C4 5th.

Step 10 - *Tune G3* to C4 (fourth) to about the same beat rate as the F-A# fourth. Test with the M3-M6 test.

Step 11 - *Tune B3* to G3 (third). It must fit between the F-A and A-C# thirds.

Step 12 - *Test B3-D#4 third* to see if it fits between the A-C# and C#-F thirds. In addition, B-D# and G-B must be in a ratio of 5:4. If B-D# is too fast, then the fourths were tuned too wide, or vice-versa.

Step 13 - *Re-Tune* A#3 (Step 7), D#4 (Step 8), C4 (Step 9), G3 (Step 10), and B3 (Step 11), until all criteria set forth in steps 11 and 12 are met.

Step 14 - *Tune F#3* to A#3 (third). It must fit between the F-A and G-B thirds. Test the F#-B fourth and the F#-C# 5th, FA#-F#B-GC parallel fourths, and FC-F#C# parallel fifths.

Step 15 - *Tune D4* to A#3 (third). It must fit between the A-C# and B-D# thirds. Test A-D fourth and G-D 5th, AD-A#D# parallel fourths, F#C#-GD parallel fifths, and FD-F#D# parallel sixths. In addition, the A#-D and F#-A# thirds must be in a ratio of 5:4.

Step 16 - *Tune G#3* to C4 (third). It must fir between the G-B and A-C# thirds. Test G#-C# fourth, G#-D# 5th, parallel thirds, fourths and fifths.

Step 17 - *Tune E4* to C4 (third). It must fit between the B-D# and C#-F thirds. Test B-E fourth and A-E 5th. C-E and G#-C thirds must be in a ratio of 5:4. Test all parallel intervals.

Step 18 - *Record Settings*. Make a record of settings for temperament notes at their fourth partials (F3 at F5 to F4 at F6) with an electronic device for future use, if desired.

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Please note that the steps in the electronic and aural methods are the same. It would be particularly useful and instructive for those using the electronic method to use the aural tests given in the corresponding steps in the aural method. In addition, those using the aural method could benefit by recording their hard work with an elec-

tronic aid and using it as a basis for the beginning of a repeat tuning.

I hope this information proves useful to all of you. Until next month, please send your questions and comments to:

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At Large

String Friction And Its Coordination With Pin Friction In Tuning Mechanics

Bill Ballard, RTT
New Hampshire Chapter

Rick Baldassin's account of his week with Garrick Ohlsson's Bosendorfer and the accompanying reprints on the articles on the mechanics of tuning make for a decisive frontal assault on the subject of tuning stability. The explorations of tuning mechanics by Daniel Bowman and Norm Neblett, among others, are vital to our understanding and control of tuning pin and string movement. Without that control, how can we expect to put things on the mark with the minimum of manipulation? What I would like this article to add to the collective knowledge begins with some further notes on pinblock grip and its influence on hammer technique, as well as how much or little pinblock grip is actually required for tuning stability. I'll discuss string friction and its sources. The second installment of this article will cover what I call the coordination of string friction and tuning pin friction, including the three monkey wrenches which make tuning mechanics such a baffling subject. And, for a rousing anti-climax, I'll discuss the surprising little that we can do about the matter.

Many things are involved in the piano's staying in tune, some of them having to do with hammer technique, others not. Keeping track of tuning pin torsion, making your pitch changes in a few highly accurate movements (even avoiding unnecessary ones where possible), shunning "flag-poling" or bending of the pin, and strong test blows with the finger or forearms to confirm the toughness of your work. These are all fundamental to solid tuning. Above all, the basic remedy for tuning instability is more tuning. Of course, we shouldn't overlook the factors beside proper tuning hammer technique, which are necessary for tuning stability. Among the obvious are sufficient pinblock grip, the structural integrity of the block and case, stability of climate conditions, and the piano's workload (the number of hours use per week as well as the kind of use).

And don't expect to do your best work on a piano which is not well-Kenzoided*. Ohlsson's Bosendorfer with its strings on driven up the bridge pins is one good example of this. Another is the string of a trichord which is 20 mils higher than its partners: when their tuning is being forged at the *fff* level, its blow is down in the mezzo range. Kenzoiding is important psychologically as well. We piano technicians are no less human than the musicians we work for, and are just as easily distracted by impurities of sound. Have you ever worried your way through a unison which had perfectly audible partials and was free of false beats, only to realize after two minutes that what was keeping you dissatisfied with each pass was the accompanying whine from the lid hinge?

With all of these things as background, I would like to move the discussion away from what's happening at the tuning pin to analyze what the string has to go through to get to its destination, the speaking length. This is the domain of string friction, and once we've explored it, we'll have the second half of this subject. However having the second half is not as vital as having both halves, because my experience has been that how easily a piano lets me tune it is primarily a matter of how string and pin friction combine and coordinate.

Let's start this discussion with a few working terms. I'll speak of the "tuning system," and by that, I mean the overall mechanical arrangement. Mason & Hamlin's Screwstringer is one such system. What we work with every day is the combination of a steel pin set in a wooden pinblock panel and steel wire which travels over bearing points to get to the speaking length. The important feature of this system is that both the pin and string are springs and must be approached as such. What is string friction? It is the drag on the wire at its bearing points between the tuning pin and the speaking length (the stringing felt pads, duplex nuts, capo and pressure bars and agraffes). String friction is a combination of the wire's pressure (perpendicular to the tension) on the various bearing points as it's pulled over them, the amount of corrosion on the wire, and contamination (or worse, disintegration) of the stringing felts. String friction slows down the transmission of changes in the wire from the tuning pin to the entrance to the speaking length. It can be sensed just as easily as tuning pin friction. As your hammer turns the top of the tuning pin, wire is being let off or taken up at the bottom of the coil. At some point in the turning of the hammer, you'll hear a change of the speaking length's pitch. That's the point at which the wire change at the tuning pin (or some portion thereof) has made it into the speaking length. That, in its simplest form is what I will refer to as the transmitting of wire change from the tuning pin coil to the speaking length. (As an example of string friction, during a tuning, your hammer technique might falter as you cross the mid-treble break from agraffes to capo bar. Slight differences in friction between these two kinds of speaking length entrances can have a noticeable effect on the feeling of the tuning.)

Another important idea is the coordination between string friction and tuning pin friction. In that first example, the way pin friction and string friction combined was a friendly one, creating no great mechanical problems in the tuning. But the best examples of this coordination are instances better described as spastic. For instance, after the initial chipping of your rebuilt piano,

you sit down to give it the first bona fide tuning. Gleaming wire slips easily over through new agraffes and over fresh stringing felts. However, because pinblock grip is still up in that initial high torque, you have to pull several yards of wire onto the pin before the block lets the entire length of the tuning pin move. All the yardage beyond that called for by the desired pitch change in the speaking length has to be returned. That's no problem because of the current low string friction. But the excess yardage isn't necessary for a solid tuning, and certainly makes difficult an expedient one. (I smiled the first time I read of Daniel Bowman's "Marshmallow Zone": it reminded me of my early multilaminate pinblock installations before I was hipped to the correct driving fluid. Pins used to break off at the becket (usually at 350 "/#), and I would know that this was underway because the feeling of spring steel gave way to one of a Mars Bar being twisted). I'll refer to the test blow as a "tension spike" because that's exactly what it is.

As we shall see, one important determinant of this coordination is which of the two, string or pin friction, is the greater. Equally crucial is the "string/pin friction differential": this gap between the two dictates how much wire change will occur before both friction barriers are overcome. The greater the friction differential, the less coordination there is between the two and the more excess wire gets moved in the setting of both pin and string. Ultimately, this coordination *is* the feeling of the tuning.

Also, after years of talk about "equalizing the string," Norm Neblett's observation that there can be no such thing in the physical world, is a fresh shot of reality. Not only must we give up hope of equalizing tensions among string segments, but the actual tensions in these segments are unknowable. A National Security Agency frequency counter with laser optics could nail down the pitch of a one-inch section in the front duplex, but would you care to design the laboratory equipment which can measure tension in that stretch of the string jamming itself into a string felt pad? But regardless of how unwilling to be quantified these segment tensions are, any understanding of tuning mechanics would be fatally incomplete without the concept of, if not equalizing these, then distributing them more evenly amongst the string segments. To popularize a friend's favorite phrase, "there's a lot going on in there," much more than can be verified physically.

That leads to the general disclaimer from the manufacturer of these theories, the advice that tuning mechanics should not be pondered and discussed, they should simply be done. By the time you've gained any competence in tuning, it's straight hand-to-ear, with no left brain to adjust knobs and levers. Things have to happen very fast to deal with the tuning system as a pair of springs. Ultimately, with so much of it's reflexes unmeasurable, the tuning system is a black box. The middle of such a mystery is no place for a brain.

My only excuse for the pages to follow is that certain of the more bizarre case pin-string coordination have driven me to analysis (pun intended). This is how I've sorted it out.

Tuning Pin Friction

Setting the pin means making sure you release all torsion (twist) put in while turning the pin. And it's easy because your tuning hammer connects you directly with the transaction. There are two basic ways of handling the hammer. The first has a firm grip which is continuous from the shoulder down through the arm and hammer, and to the tuning pin. In the second, there is a small amount of play between the hammer tip and tuning pin head, and a floppy grip of the hand on the hammer. The play at these two spots is used for delivering the turning force (torque) in short impacts. Actually, in either firm or loose styles, the best turning force is delivered in pulses, as the springiness of both the tuning pin and the string are best overcome in short, quick motions. There are pros and cons to each style. You might prefer a loose grip because it allows no chance of bending the pin. I prefer a firm grip because the direct contact with the tuning pin tells me a lot about the pinblock and the string/pin coordination. (And I don't feel comfortable with less than 50 in/lbs. of pinblock torque). Two years ago, however, I did have a big lesson in proper pinblock grip. I came in on a one-year-old 7'4" grand which had a soft block (tuning pin torques: 30-50 in/lbs) and was getting beaten out of tune at each concert. A powerful concert pianist was set to play on the piano, and when driving the tuning pins only moved torque up to the 60-95 in/lbs. range, rather than the 125 in/lbs. plus range I would have expected from such a new piano, I was worrying. Despite the fact that the unisons survived my test blows that afternoon, I didn't stop breathing until I could check them again after the concert. (The program's finale was the Ravel "La Valse" transcription). The unisons were fine, and I'm now no longer the Marine Corps Drill Seargent about pinblock torque that I used to be.

But there's really no contest because each style is suitable to a different range of pinblock grip. The firm grip is impossible to control at 40 in/lbs., and at 70 in/lbs. is still too rigid to be as effective as a loose grip. However, if you like a loose grip and do a significant amount of hammer manipulation with the floppy wrist and a loose fitting hammer tip, things are going to get increasingly difficult as the torque climbs above 100 in/lbs. and as more force is required to overcome the pinblock's grip on the bottom of the pin. In fact, pinblock grip is like soundboard crown: you need only as much as will get you through the driest winter. My policy up here in New England is that 55 in/lbs. in December or January is acceptable: that amount in July triggers a warning to the owner.

String Friction Barrier

Setting the string, likewise, means leaving a spring with no deformation (in this case, a string separated by bearing points into individual segments and tensions). String friction is as necessary a part of the system as is pin friction (pinblock grip). It is a tollgate through which string cannot pass without mustering a tension differential between sides sufficient to overcome its friction.

Our only way of moving something across a bearing point (outside of a test blow) is by creating a difference of string tension between the two sides, the net force of which will be greater than the friction of that bearing point. In fact, string friction at these bearing points is like a turnstile: you can't go through without coughing up the required tension differential. (Or imagine a hurdle which a runner has to jump high enough to pass). There are many situations in which I would prefer a two-dollar turnstile to a two-bit one. The lower the

string friction, the less of a tension differential is required to allow the string to pass. While that might make the tuning feel easier, your tuning hammer is by no means the only thing creating those differentials. Have you ever noticed that the sweetest pianos to tune are the ones which lose their unisons fastest when the intervals warp. That's because as the weather changes and the soundboard moves, the tuning inside the speaking length is altered. Because the distance from tuning pin to speaking length entrance rest of metal instead of wood, it sleeps through the soundboard's motion. The resulting difference in tensions erases the solidity of the tuning. Concert pianos under stage lights and air-conditioning face a similar threat to the toughness of their unisons. I also suspect that when a pianist starts pouring large amounts of energy into a piano, unpredictable dynamics stresses develop as the rapidly changing activation of piano strings creates a violent turbulence in what was only hours before a very placid field of tension. String friction at moments such as these is like a high castle wall to protect you against the hostile elements outside.

So where does string friction come from? The obvious answer is that anything which pushes a string under tension away from a straight line path, bears on the string, and that causes friction. Some manufacturers (for instance, Mason & Hamlin and the earlier Yamaha) seem to set up their pianos with low string friction, others high. A look at the shape of things on the blueprints could answer alot of questions. Of course, if you squash a grand scale into a case of five feet or less, that doesn't allow much distance for the string to drop a pinblock thickness for the hammer strike height. But like the wire with a kink which sings clean of false beats, it's not the typical runt grand with a steep dive from the string felt pad to the agraffe which has the worst string friction. Poorly laid-out tuning pins which pinch neighboring strings are a real headache as are the obnoxiously tight pressure bars in some of the Steinway and Wurlitzer verticals. Rusting wire and rotting string rests unquestionably play a big part. (The double-whammy here is that during the same half-century that these two are driving string friction up, the pin block is letting pin friction slide in the other direction). Also, when a tuning pin starts to bind on the front edge of its plate hole, not only is the steel-to-iron friction coefficient higher than that between steel and wood, but that friction doesn't drop appreciably when it goes from static to dynamic, once the tuning pin starts to move. Although this last source is patently tuning pin friction and is encountered before the pin-to-pinblock friction, the fact that the level of friction is independent of whether or not the pin is moving makes it behave more like string friction.

The most heinous example of string friction is the wire which ratchets its way across the entrance the speaking length. Snickering almost. It always seem as though the pitch you want sits smack in the middle of the two spots in the neighborhood which the ratchet mechanism will permit. This winter, I was all set to smoke out this gremlin during the restringing of a 1907 Steinway O plagued with "snickers." One wire ran from the right-hand string of D#43 to the left-hand string of E44: the D# side moved smoothly and the E side was impossible to tune. I carefully saved that wire during the tear-down. The string rest pads on each side were equally rutted and rust-burnished. Under a 60X microscope, I could find no difference in the wire's surface, whether at the rest pad, agraffe, or bridge pin points on either side. I was interested to find that wire at the agraffe had a smudging of brass, but once again, equally for both sides. I'm hoping that the Guild can establish a National String Friction Foundation to fund research for a cure for this tragic affliction.

In the final installment next month, we will explore the ways in which tuning pin and string friction combine and coordinate, as well as the ways we can deal with them. Until then, I hope you will be noticing this newly described aspect of tuning, the string's friction, in the pianos on your rounds. ≡

* Definition: Kenzoid n. [Jap fr. proper name. Mr. Utsunomia Kenzo (Yamaha Corp).] 1). A geometric figure composed of two concentric circles and three equilateral chords inside the larger, the intersections of these chords falling on the edge of the inner circle. 2). The concept embodied by this figure, that piano care is divided into four areas (basics, tuning, regulating, and voicing) which interlock and reinforce each other (either positively or negatively). v.t. 1). to perfect a piano's condition according to this concept.

AT LARGE

Fixing It

Norman Neblett, RTT
Los Angeles Chapter

(Though the characters and events depicted in this story are true, the individual names have been changed to protect their anonymity).

I had been working for five years as a technical consultant for a large piano manufacturer. There were five of us throughout the United States, my territory being the Western states. One day the department head, Frank Jones, called me in to his office. It seemed that there was difficulty with two pianos used by a teacher at a small college in Durango, Colorado. Since it was approaching the Christmas recess, he asked if I would be willing to go there at this time? I replied in the affirmative.

It was then that the complications of this service call came out. Frank produced a rather thick file and stated, "I need to give you some background." Several consultants had worked on this case, including the factory representative. The results had been negative. When each technician had been on the plane home, a call would come in to the office saying the work was unsatisfactory. Fuel had been unwittingly added to the fire by the last consultant. He had attended a PTG seminar dealing with difficult situations and people. Carrying his notes with him, he had carelessly left these papers in the music studio. The teacher had read the contents, and assuming that they referred to this situation, angrily called the service department.

Innocently I asked, "What do you think is wrong with these pianos?" The surprising answer was, "I don't give a damn about those pianos. You go over there and fix this customer." So it was off to Durango.

The teacher was a small, fair-skinned brunette with penetrating black eyes. We approached the concert grand. Using an old technique, I asked her to sit down, play the piano, and show me the problem. She stared at me with those eyes and replied, "I do not choose to play for you. Just sit down, play, and you will find out what is wrong."

Complying with apprehension, I did her bidding. The teacher said nothing. Knowing that I had to make a move, I stated that I could hear problems, would work on them, and would await her evaluation. She replied, "I am not coming back. I will evaluate the pianos when I start teaching in two weeks." This answer convinced me that here was a crisis.

The work on the pianos was straightforward. It included some tunings, voicing, pedal work, and minor regulation. But what about the customer?

The answer came to me while lying in the motel bed two nights later. *Someone* would have to evaluate the pianos before I left. Asking for the Dean the next day, I was told that he was at home on vacation. Desperately I asked, "Would you please get him on the phone and ask him to come down here? We have a crisis." Suitably impressed, the secretary called the Dean who agreed to meet with me.

He was a short, burly man, dressed in Western clothes, with a huge black beard. After introductions and small talk, I asked him, "What is wrong with this teacher?" He stared at me for fully five seconds, and then answered, "How did you know?" I did not reply.

The Dean then proceeded to pour forth this story. This teacher was the only woman on the music faculty, and the only piano instructor. She was a high-strung person with a quick temper. One year previous, her husband had separated from her and gone back east to another job. He was returning at this yuletide vacation for a two-week trial reconciliation. If it did not work, he was leaving for good. She had been so edgy and difficult for the past month that all members of the department had avoided her.

I replied, sympathetically, that this was all very interesting, but that someone has to sign these papers approving the pianos before I left. "But I am a clarinetist," he replied, "I don't know anything about pianos." I repeated the statement. Hesitating a moment, he responded, "I will approve them. Give me the papers to sign."

At lunch two years later, I asked Frank if he had ever heard any more concerning that case in Durango. "Have you?" he asked, blanching. *"No!"* I replied. "Neither have I, and I never want to!" he responded.

It has been very comforting to be secure in the knowledge that I had "fixed it." ≡

Efficient Methods Of Felt Replacement

Bill Spurlock, RTT
Sacramento Valley Chapter

Have you ever found that the simplest job can still turn out poorly? I have. In fact, sometimes it seems that there is no job so simple that I cannot mess it up! It is my contention that many piano repair jobs are deceptive: they seem so mundane and straightforward as to not even warrant a closer look. However, if we were to scrutinize our methods and workmanship with a self-critical eye, we might discover that our results fall short of perfection.

It should not be surprising that Murphy's Law strikes even during "simple" jobs, for several reasons. First, piano repair presents us with a tremendous variety of jobs. Piano designs vary endlessly as do available materials, adhesives, and tools. Methods that worked well on one job may not give the same results on the next. Second, playing conditions vary with each instrument. What worked on a seldom-played piano in a comfortable home may not meet the test of the heavily-played instrument in the unheated church. Thirdly, we sometimes take the more basic jobs for granted, failing to stop and inspect our work and not noticing its shortcomings. Thus we may pay close attention to every aspect of the job when replacing a pinblock because that is "advanced" work, but hurry through replacement of the regulating rail punchings when rebuilding the action. The problem here is that a faulty regulating rail can hurt the performance of the piano just as can a faulty pinblock. All elements must be correct to make a quality job, so all are deserving of our best efforts.

Happily, we can give these basics the attention they deserve without adding time to the job. By criticizing each operation with an eye toward efficiency and quality, we can usually find ways of doing jobs faster, more easily, and with improved results. The key here is to question your methods and results, instead of just assuming that the way you first thought of doing a job is the best way.

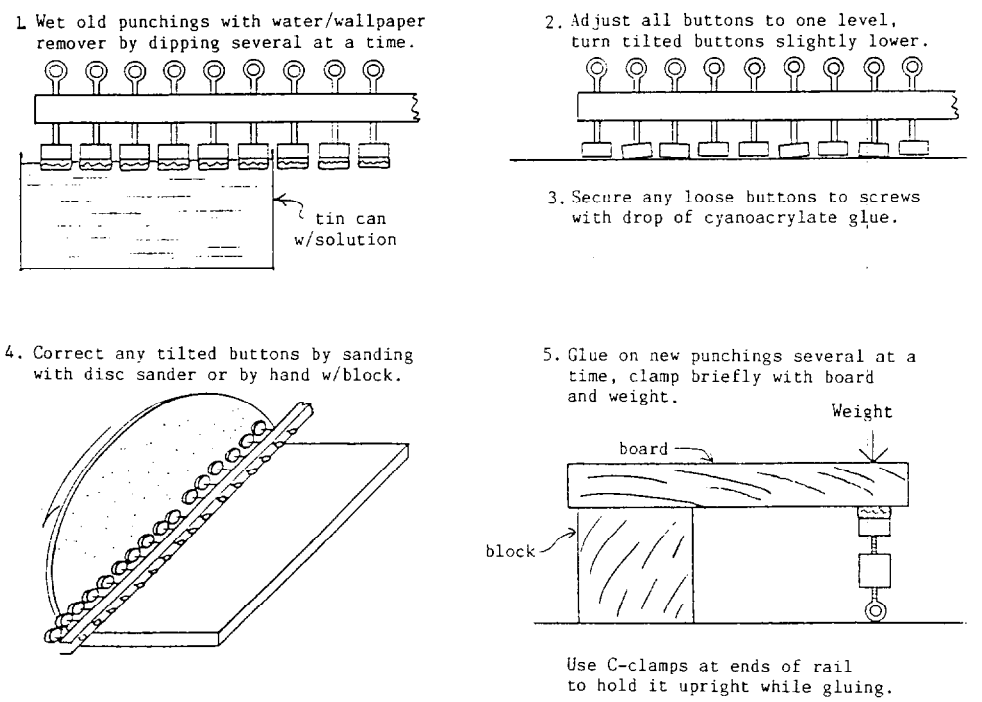
In this article I would like to suggest some methods of action felt replacement that might save time and improve quality in your shop. I will be using three common jobs as examples, examining typical quality problems and presenting solutions to make the work faster and the results better.

Replacing Regulating Rail Punchings

Requirements: The primary requirement for a regulating rail is that it be stable. We ask it to trip the jack at a precise moment, when the hammer is very close to the string. If the cloth punchings are too spongy or if the wood buttons are loose on their screws, let-off will be uneven and hammers can block under playing conditions even if we have adjusted let-off carefully. It is also nice if the buttons are square to the screws and not tilted, so that they adjust predictably. A water-soluble glue must be used, so that punchings can be easily replaced in the future.

Procedure: (see figure 1) Remove the rail from the action and carefully scrape off one of the old punchings to save for a thickness sample. Remove the others by dipping groups of buttons into a can filled to the top with a water/wallpaper remover solution. Submerge only the cloth punchings, not the wood buttons. (For Steinways use same procedures except that rail is part of the action; remove wippens or shield jacks and apply solution with brush). Plan to do other work while the punchings are soaking — there is no use having to work at scraping them off when they

figure 1: replacing regulating rail punchings



will pull off readily after enough soaking. After about 1/2 hour the punchings should come off easily. Allow the wood buttons to dry thoroughly.

Test each button to make sure it is tight on its screw. If any turn or wobble, secure them with a drop of cyanoacrylate glue applied to the base of the screw. Next, look to see whether many buttons are tilted. If so, they will wobble as the screw is turned, causing adjustment to be erratic. Now is an easy time to fix this by sanding the faces of the buttons square to the screws. First, lay the rail on the bench top, buttons down, and adjust the screws until all buttons are even in height, but turn any tilted buttons slightly lower than the others. Next, sand all buttons flat. This can be quickly done by laying the rail on its side on a disc sander table and holding it lightly against the spinning disc as you feed it along. Alternatively, and for Steinway non-removable rails, use an unpadded sanding block and coarse paper and sand by hand, being careful to hold the block level.

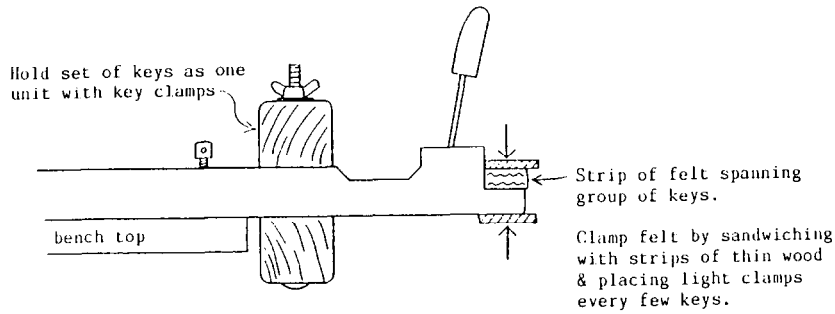
Check your new punchings: they should be firm and not too fuzzy. I find it easiest to punch out my own bulk action cloth using a tube punch from a leather supply house. That way, I can make them whatever diameter and thickness I need for the job at hand.

Prepare your glue. I prefer hot hide glue for the usual reasons: it grabs quickly, does not penetrate the cloth excessively, and is easily removable in the future. Liquid hide glue is not as good because it remains liquid much longer, penetrating and hardening the felt. PVCE is not good because it also penetrates and hardens felt and because it is waterproof when cured. (see February 1990 *Journal*, pg. 22-23 for info on making and using a hide glue pot.) To speed up the work, your glue should have enough working time that you can apply glue to several buttons, set down the brush, and place the punchings before the glue gels. Warm the work area, or extend the glue's gel time by adding urea if necessary.

Place a C-clamp on each end of the rail so it will sit buttons-side up on the bench top, and proceed to glue the punchings on eight or 10 at a time. While hide glue will grab and hold felt fairly well, I feel that most jobs come out best if the felt is clamped. This ensures that it is solidly attached to the wood (You may have run across hammers that blocked during playing, even though depressing the key slowly showed let-off to be correct. This symptom can result when a let-off punching is glued only by its surface fuzz, which compacts under playing force and changes the let-off point). For clamping let-off punchings, a scrap block of wood with weight set on top can be laid over each group of punchings as soon as they are set down (this is another reason to have the buttons all turned to the same height). Only momentary clamping is needed; advance the block to the next group of punchings as they are placed.

After an octave or so, you are at the most important point in the job. That is, stop and inspect your work! Check the punchings you have glued down so far to see if they are all well attached. If in doubt, pull a couple off. If the glue only grabbed the outer fuzz of the punching, you are not using enough glue, it is gelling too soon, or you are not clamping adequately. It is better to make corrections to your method now than to have to re-do the entire job later.

figure 2: replacing key end felts



Replacing Key End Felt

Requirements: The key end felt (damper lift felt) on grand keys has to be of even height from key to key, so that damper lift can be easily regulated. Therefore the key wood should be uniform and the felt must be glued down flat. It also has to be neatly trimmed, both for appearance and to prevent rubbing keys.

Procedure: (see figure 2) This job is easiest to do if the keys are held together in units with key clamps of some sort, or at least strapped together in octaves with masking tape wrapped around them behind the capstans. Carefully cut off one of the original felts and save for a thickness sample. Then apply water/wallpaper-remover solution to the others and let them sit until they come off easily without tearing the key wood. Any glue residue can be easily scraped off while it is still softened.

Allow the keys to dry. Then, with the keys still clamped together in groups, inspect the gluing area. Sometimes the key ends will vary in height, so sanding with coarse paper is needed to bring them all to one level.

Since the width of the keys varies, you will get the neatest job by gluing continuous strips of felt to groups of keys and then cutting the individual keys apart. This method is also faster than cutting individual squares of felt and gluing them on separately. If you are using bulk felt, cut your strips using an Olfa Rotary Cutter.

Make sure that your keys are pressed tightly together at the rear in approximately one-octave groups, and are in an even line. Then quickly apply glue to a group of keys and position the felt. Then clamp, sandwiching the keys with flat scraps of wood to ensure that the felt glues down flat and even in thickness from key to key.

Wait only about 1/2 hour before cutting the keys apart; then the glue will still be slightly soft and will cut easily and neatly. Turn the groups of keys upside down, with the felt resting flat on a soft wood board. Remove the clamps or tape. Tilt each key slightly to one side while slicing down between keys with a sharp knife, and cut the individual keys apart. You now have new key end felts that are exactly even in height, are well attached, and that match the width of each key with no overhang.

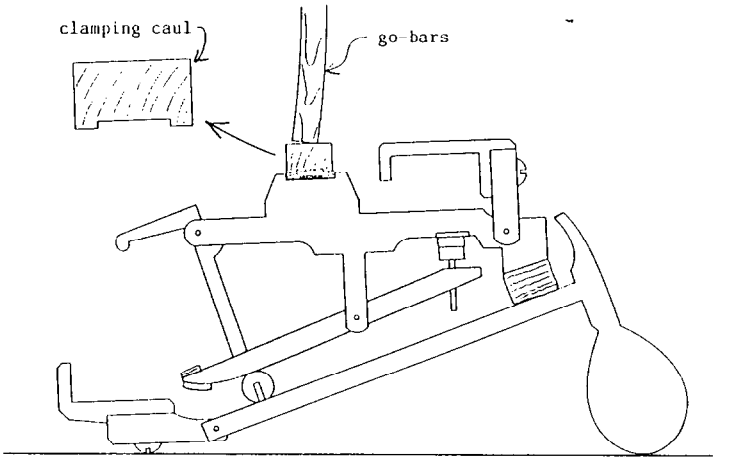
Replacing Wippen Cushion Felts

Requirements: Wippen cushion felts serve two functions: First, they are a bearing surface for the capstans and therefore the curved profile they present to the capstan is important to action geometry. Since they carry a high load,

they must be of a firm, smooth cloth that is stretched tightly and securely glued so that they hold their shape well as they slide on the capstans. Second, wippen cushions reduce the rebound noise cushioning effect, the cushion cloth is usually only glued at the ends, and left unglued in the area of capstan contact. The cushion is often backed by a second, thinner cloth just above the capstan area to provide a rounded shape and further reduce noise. The cushions should of course be neatly trimmed to avoid rubbing on neighboring parts.

figure 3: clamping continuous cloth strip to groups of wippens

With action upside-down on bench, glue continuous cloth strips to 10-15 wippens at a time, cut wippens apart later.



Procedure: If the action has a problem with excessive rebound noise, you might want to modify the original cushion type. Rebound noise usually comes from a combination of hard knuckles, hard hammer rest rail felt, worn wippen cushions, and worn key bushings and key balance holes. Correcting only one or two of these problems seldom cures the problem entirely. However, when replacing the cushions you do have the opportunity to make some improvement; if the original cloth is glued over its entire length, rather than only at the ends, you might as well make that change. You might also wish to add a thin underfelt if there was none originally.

Here again it is easier to work on wippens gang-style. No, I don't mean shooting them full of holes or spraying them with graffiti. Instead, leave them fastened to the action or build a special fixture as shown in figure 4 so you don't have to handle individual parts, and so you can install cloth in long strips and cut the wippens apart later. It is usually easiest to leave them on the action, especially if you have no other reason to remove them.

Again, carefully remove one cushion to save for a thickness sample. The others can be removed by soaking. If still mounted on the action, you can bring a can of water/wallpaper remover solution up under every five or six wippens, saturating the cloth. If you remove the wippens from the rail, set them in stacks four or five high; they can then be easily handled in groups when wetting and removing the cloth. After removing the cloth, any glue residue can be easily scraped off while still soft.

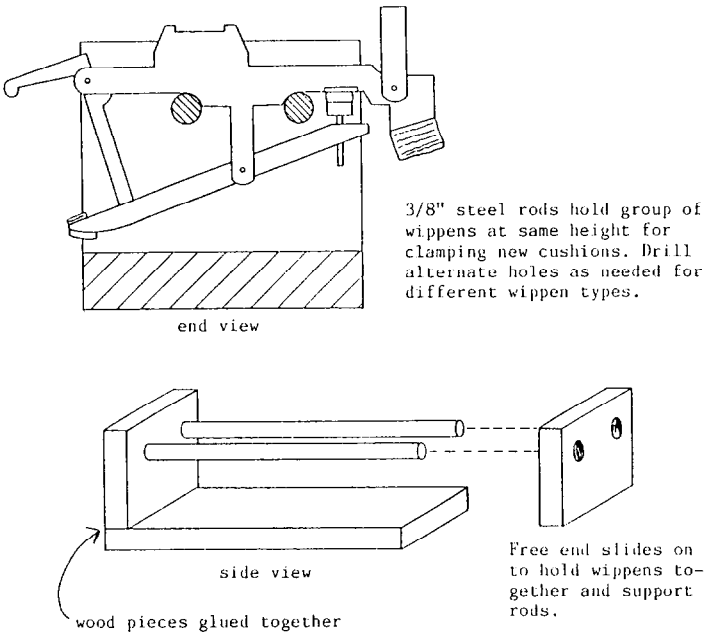
Inspect the wippen cushion on a new, quality wippen. Notice that the cloth is stretched tight and feels firm but springy, sort of like a stiff rubber ball. Since this cushion is subjected to high impact and sliding forces, it needs to be stretched tight and glued securely to hold its shape. Therefore we need to use some method of gluing and clamping that holds the cushion under compression while the glue sets. Our method also has to be reasonably fast to be cost-effective compared to wippen replacement.

I have found the methods shown in figures 3, 4, and 5 to work well in my shop. I show techniques for two types of wippens. Both methods use strips of cloth applied to groups of wippens, which are cut apart later. Both also use shaped wooden cauls to clamp the cloth strips securely.

For wippens with the cushion recessed into a mortise, such as Steinway or Yamaha, cut cloth strips as wide as the mortise length and about 12" long. Tear strips of bushing cloth underfelt of the correct length also. Next, make a wooden caul material for clamping. The caul shown in Figure 3 is easily made using a table-mounted router. Test the shape by fitting pieces of new cloth and underfelt into one wippen and pressing them in place with your caul. You should see the ends of the cloth clamped tightly and the rounded center area compressed and partially flattened. The cauls should be long enough to span 12-15 wippens at once.

Clamping of this type is most easily done with lightweight go-bars (wooden sticks sprung between a ceiling and the workbench). These can be approximately 1/2" square or 3/8" by 3/4" straight grained wood. Soft wood such as pine works very well for this purpose, and can often be found ready-cut in the dumpsters of window and door shops, left over as trimmings from clear pine moldings. You just need moderate pressure, so depending upon their length, the go-bars can be cut thinner if too stiff. Of course, you need a low enough ceiling to prop the go-bars against. If your ceiling is sheet rock, or if you just have bare ceiling joists, fasten a square of plywood to the underside as a flat area to hold the top

figure 4: fixture for holding loose wippens in line for gang-refelting



ends of the go-bars. Once you start using this method of clamping, you will find many cases where it is the only practical way to clamp items in the middle of a workbench.

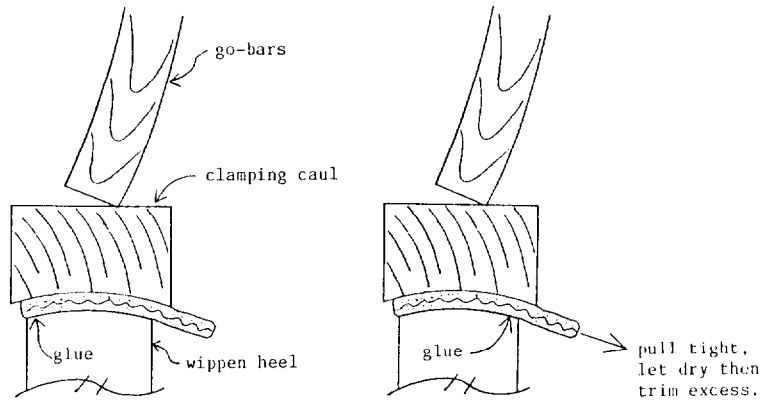
Once your cloth is prepared and your cauls and clamping system are set up, you are ready to begin gluing. Have your cloth strips, cauls, go-bars, and glue pot all at hand. For best results, the glue has to be applied in the correct amount and only to the ends of the mortise, avoiding the area where the capstan will ride. It must also be spread quickly, so the cloth can be clamped down before the glue starts to gel. A five-inch wide putty knife works well here to shield the center of the cushion area while you dab the glue brush along the edges. This allows you to apply the glue very quickly to a specific area without having to be careful. Apply glue to both ends of the mortise on a group of wippens, then quickly lay down the underfelt, cushion cloth, and caul. Press the caul firmly by hand while rocking it slightly to make sure that it is not hung up on the sides of the mortises, then clamp with the go-bars. Caution: When setting go-bars always bow them away from you so that if they break, the pieces will not hit you!

Allow the first group of wippens to set for 20 minutes or so, then inspect your work before going on. Slice them apart with a sharp knife or razor blade and make sure the cloth is well attached. If not, adjust your amount of glue, glue gelling time, shop temperature, etc.

If the wippens are mounted on the action, you can then proceed to glue and clamp several groups at once; having that many go-bars clamping at the same time can get a little hairy. Your ceiling might start to rise, or the action might shift causing them to all spring loose. I usually do three or four groups of 15 wippens at a time, and do other work while those are drying.

If you are using the wippen holding fixture shown in figure 4, allow about 20 minutes clamping time for each group. Then remove them from the fixture to make room for the next glue group, but do not cut them apart until you are sure the glue has grabbed well.

figure 5: alternate method for wippens without mortises



Other types of wippens do not have a mortise for the cloth. Instead, the cloth is stretched over a curved wippen heel as shown in figure 5. I use a slightly different method here: I cut the cloth wider than desired, glue it along one edge only, then glue the second side while pulling on the exposed excess edge to add tension.

For this type of wippen, you need a caul with a cove shape that approximately matches the curve of the wippen cushion. There are two ways of making these: One way is to cove molding stock from a lumber store. Take a wippen along and find a molding that fits reasonably well. You can then saw or plane a flat area on top, if necessary, for the go-bars to rest. Alternatively, if you have a drill press and a rotary planer, you can make your own cove molding to fit. (See the March 1990 *Journal*, pg. 23, for a description and source of this tool). By tilting the drill press table and angling a fence across the table, the planer will cut a cove. The table tilt and fence angle can be varied to change the radius of the cove. See instructions that come with the planer.

Cut your cloth approximately 1/2" wider than necessary, then set up your go-bar clamping system. This type wippen usually does not have an underfelt, but you may wish to add one if rebound noise is a problem. If so, use very thin bushing cloth that will not drastically alter the cushion shape.

Apply glue to one edge of the wippen heel only, using a broad putty knife as a shield as described above. Then lay down the outer cloth only and clamp. Proceed down the action until all wippens have cloth with one edge glued down. Next, lift the free edge of the cloth and insert the underfelt (if used). Again shield the center of the wippen heel with the putty knife and apply glue to the second edge. Now install the caul and go-bars, and grab the exposed excess cloth with pliers and pull snug. Do this every inch or so to stretch the cushion tight. Leave clamped until the glue has grabbed well, but trim the excess cloth and slice the wippens apart before the glue is completely hard. After trimming, you can clip off any stray threads with center pin cutters. For neatness, slip an electric burn-in knife between wippens to iron down excess fuzz on the cut edges.

Conclusion

The methods used in the three felt replacement jobs described here can be adapted for many other situations. Although it may seem like extra trouble to set up special procedures the first time for a single job, the benefits will pay off in the future as it becomes habit to build efficiency into all your work.

Next month I'll begin a series of articles on key recovering. This present step-by-step procedures for doing professional quality work using ordinary shop power tools. ≡

GOOD VIBRATIONS

Techniques Of Bridge Notching

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New Mexico Chapter

Many years ago I saw an impressive film of a Steinway worker notching a treble bridge, and as I watched him work I grew discouraged. Wielding a large chisel and leaning over the rim of a grand piano, he confidently attacked that bridge at what seemed to be a most reckless speed, yet his manner was seasoned, sure, even intimidating. I was intimidated. At that time in my career, I wanted very much to do that kind of bridge work; but as I watched that film, straining my eyes to learn something, I began to doubt that I would ever make bridges. To make matters worse an "old-timer" later advised me in near scoffing tones that unless you grew up in the factory carving bridges every day you stood no chance of ever acquiring the "gift." But I did acquire the gift, and I learned something about myself, too.

I can still remember the day I found myself looking down at a blackened bridge top, all laid out and ripe for notching. I had studied everything available on the subject (which wasn't much), and had quizzed several crack practitioners of the art. And, applying no speed or flash, I dug in. To my surprise I ended up with a quite decent job — not as pretty as later bridges, but it was pretty enough — and I breathed easier knowing that the old, split and vile cap was gone, replaced by robust maple. Certainly, practice makes perfect; but I will tell you what I know about bridge notching, and how to ease into the skill.

The first thing to do is rid your mind of speed. Speed is a by-product of mastering rudimentary skills. On the other hand, be suspicious if after having made several bridges it still takes you three days to notch a bridge; an indication of a glitch in the fundamentals. Find the glitch and kill it. When you work, for example, put your tools down in the same place everytime, and pick them up from the same place. And the fewer tools the better.

Second, sharpen your tools. I mean really sharpen them until you can see your lovely self in them. Instruction booklets, etc., on sharpening abound. Check them out. But briefly, and as for me, I use three grades of Japanese water stones. The first grade is coarse at 800 grit; it is used to repair and reshape a bevel, hence it is not used every time I go through my sharpening ritual. The next grade is less coarse at 100 to 200 grit and its purpose is to begin the actual honing, or sharpening work. Final polishing to a mirror finish is accomplished with the "gold polishing stone" with attached hardwood base. During the bridge notching process, when I notice that the razor sharp chisel edge is slightly dulling, I brighten it up on the gold stone or on a leather power strop (it's like a buffing wheel and attaches to a motor). Sharpening stones can blast holes in your budget, but you must have them.

photo 1

The bevel angle of the chisel's cutting edge must be kept consistent throughout the sharpening process. I attach a bevel-setting device (sharpening guide) to the chisel at the appropriate place for the required bevel and leave it in place as the chisel is moved from one stone grit to the next. Remember that all stones, Japanese or Arkansas, will hollow out with use. Minimize by using the entire stone surface rather than creating ruts. From time to time the surfaces will have to be trued. I keep all but the gold stone stored under water in a pail. In use the stones require liberal amounts of water for lubrication; if the stones glaze under the rubbing metal, add more water. When finished, your chisel edges should be fearfully sharp.

Choice Of Tools

My choice of notching tools is thus. A heavy-duty one-inch (or 1 1/4") mortise chisel (photo 2), sometimes called "socket firmer" chisels — you know them in that they don't have beveled edges (except for the chisel edge of course). This chisel is used for bulk removal of waste material, and occasionally for the actual fine carving of the notch. Most of the fine notch carving, however, is done with "straight" chisels which, unlike the usual chisel, have two beveled sides and are ground with two rounded heels, a feature which allows for the rocking and scooping motion necessary to cut a round-bottomed notch rather than a simple sloping bevel. The two I own are Swiss-made and measure at the chisel point 16mm and 25mm wide. Except for a few minor tool additions I do all my bridge notching with these three chisels.

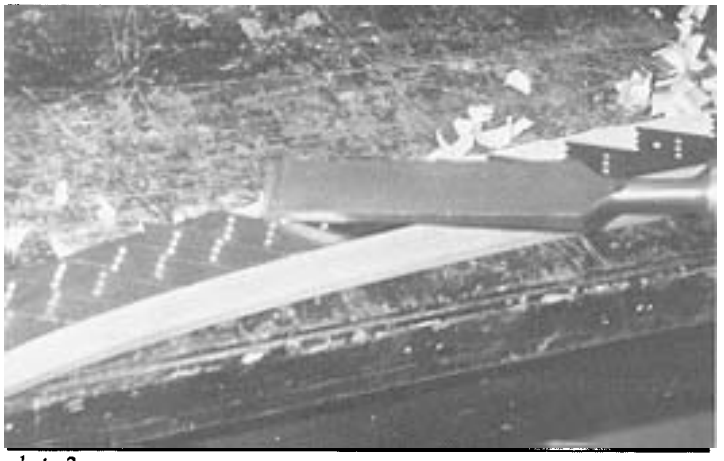

photo 2

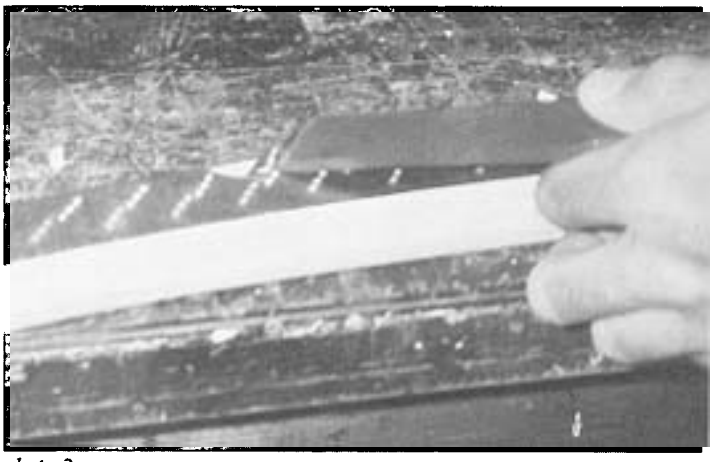

photo 3

Where To Begin?

Assuming that the bridge top hole locations and geometry have been laid out per the last article in this series, notching progresses from right to left. If you are rear-notching, for instance, begin at the treble (or at a break in the scale) and work toward the tenor. Vice-versa for front-notching. Ignoring this convention means removing much more wood for each notching chisel stroke than is necessary. (You'll see what I mean when I get there).

The Technique

Like so much of our work, notching takes place in roughly two phases. Phase one is bulk wood removal; no attempt is made (except perhaps in the high treble) to cut all the way back to the holes with the first chisel stroke. Phase two entails the finer shaping of the notch, as well as making certain that the notch cut is oriented properly with the pin holes.

Let's imagine that we are notching a section of "long" notches such as exist in the tenor or mid tenor. First, and obviously, the sides of the notches — that is the vertical cuts — need to be cut down into the cap. Many bridge makers use a small X-acto saw here. I sometimes do, but mostly I use the slim-bladed 25mm straight chisel with a mallet. Photo 1 shows the chisel and its orientation. Give it a sharp rap. The chisel edge will sink into the maple, cutting across the wood grains. Angle the chisel such that a slope is cut which is deeper at the outside edge of the bridge than at the holes. In other words, this vertical cut should slope toward the outside of the bridge. How deep? At the outside of the bridge the cut should be 1/8" deep at least (more is ok but 1/4" is a bit much, especially if the cap is only 3/16"). At the holes the depth of the vertical cut should be something like 1/32" or more. Generally, it isn't wise to try for total depth of cut all at once: the farther the chisel is sunk into the wood the greater the wedging effect, threatening damage to wood fibers in adjacent areas.

After the vertical cut is made, waste material must be chiseled away. Don't get greedy and try to cut all the waste stuff in one rip-snorting pass. Chisel it out in successive passes. Unless you came into this world with a chisel in your hand, never mind what the films and videos show of sturdy and studious craftsmen popping off notch chips with the ease with which most of us tie our shoes. That will come if you want. Photo 2 shows the mortise chisel at work removing a "layer" of waste. Notice that the chisel point is positioned well ahead of the holes; that is, the tool is being used to remove material by starting *not* at the holes but at the outside of the bridge, and working back towards the holes. Photo 3 shows that the chisel has been moved back toward, although not yet into them, for more waste removal. This technique, especially on long notches, is relatively easy to do, and control of tool movement is assured. Removing waste usually works like this: You tap in your first vertical cut, which is usually not the last for any notch, you calmly remove some waste, you survey what you've done thus far. You say to yourself, "The vertical cut needs to be deeper." — so you make it so, and then remove

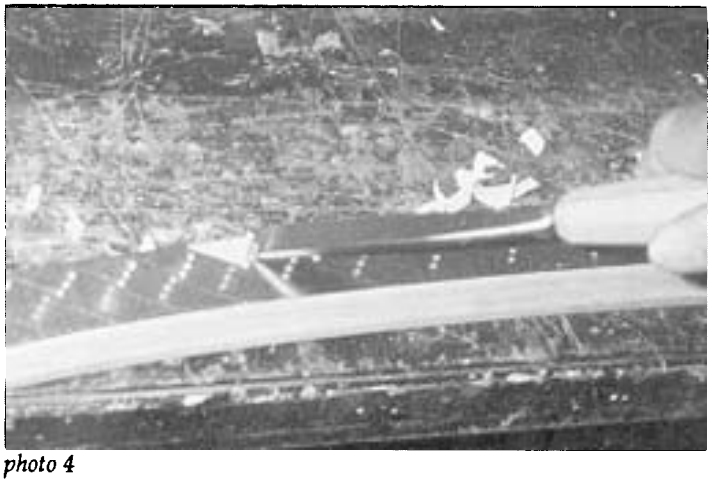

photo 4

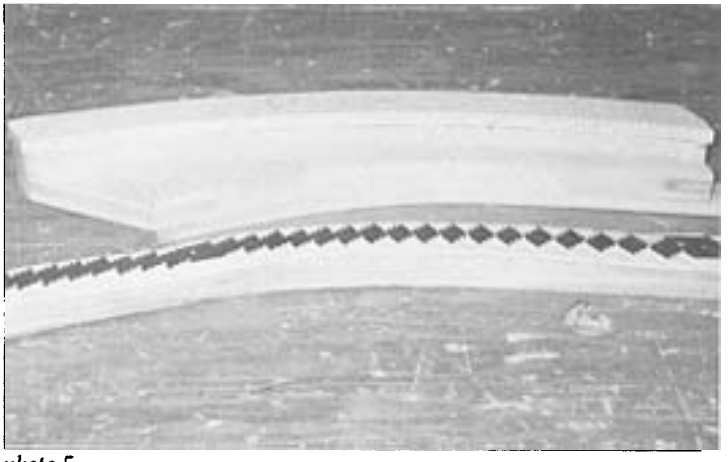

photo 5

more waste until you are back to the holes. Repeat this process until a definite and reasonably clean bevel (with a slightly rounded bottom, perhaps) exists from the holes to the edge of the bridge.

More About That Vertical Cut!

Remember. *Remember*! The most important thing about this cut is that it must extend all the way up to, and actually enter, the left hole (as you stand over the bridge), and be *deep* enough so that, as the mortise chisel is being used for waste removal, wood fibers are *not lifting beyond — that is to the left* — the vertical cut. *The vertical cut defines the left line of the notch side.* If the cut isn't there, or isn't deep enough, the wood fibers being notched out will wander into the next higher unison string landing, and in the worst case will lift the wood at the bridge pin holes. (I once heard a lovely and most religiously devout woman curse quite satisfyingly at such an occurrence. She quickly recovered and made personal amends and apologies, though). It is better if that vertical cut is deeper than it needs to be if splintering, and cursing, upset you. A too-deep cut, within reason, is perfectly alright. In fact, I prefer a hint of that cut line clearly defining the notch sides.

The Final Carving

Carving. Consider the word — it not only implies careful and controlled work, it also suggests shaping wood rather than trimming or straight-cutting wood. The "straight chisels" mentioned earlier are classified as carving tools, not chisels.

It is here where we want to carve a rounded bottom into our beveled notch. Again, don't get greedy and try for one fluid and perfect cut. Swipe it out by degrees. If it helps don't even take in the whole width at first, but rather only half the width, say two pin holes worth or so, and then move over to the left for the next swipe. You will find your way in this: and many factors enter, such as your body size, strength, and personal body mechanics. The key is this: there are something like 130 notches to carve (front and back); if you don't make it easy on yourself, or make it workable and repeatable, no one else will.

As to the carving technique, it amounts to a scooping motion, or a gouging motion. You should practice this on scrap pine at first, then on maple. It is not difficult to get the hang of. Photo 4 shows two-holes-worth of carving being "curled-off." It is not necessary, nor desirable, to carve off a curl all the way out to the edge of the bridge. Set your chisel to cut about midway through the holes and orient the tool so that it is more vertical than level. Push down and forward — the sensation and look of this is like opening a can of paint with a screwdriver. Just curl off enough to define a rounded cut through the holes. That's the critical part: from here on out it's easy. Continue carving that rounded bottom to the notch, and broadening the sweep and length of the cut, with the difference that it isn't necessary to place the chisel edge at the hole diameters anymore; you've already done that. Stay with it until your carving is a clear and rounded slope. Stay alert to the depth of that vertical cut and remake it if necessary.

On very long notches, such as exist in the low tenor (and, it seems, everywhere on seven- and nine-footers) you will have to first establish a bevel as outlined above, carve in the "round," then remove the hump which has formed between the bevel and "round." Use the mortise chisel to cut the hump off, starting at its peak and successively working down until the "round" makes a smooth transition into the bevel.

Cleaning Up The Vertical Sides

If you want to be really fussy, the vertical sides of the notch can be trimmed smooth, and to a slight angle of 90 degrees, with a 3/16" very sharp chisel. To do this the chisel must be pushed along the side cut starting from the outside of the bridge and aiming in towards the hole. Place a toothpick in the hole as a precaution against cutting through the hole. Since the vertical sides tend to get a bit ragged at first (especially if they were made with a saw rather than chisel), this final dressing and smoothing makes for a real neat job. But if this is your first notching job you might be wise to forego this last wild-eyed tedium in order to maintain some necessary perspective.

There are a hundred additional items which could be covered here, but any attempt would fail. You will learn them as you go. They all amount to the same thing — uniformity. Keep a sharp eye peeled for indications of unevenness, especially in the depth of the notches at the outside of the cap. When each notch looks like a clone of its neighbor, the uniformity you seek has become a fact of your work, and your hands and tools are being trained for the next bridge you do. In fact, today's bridge job or tuning is a training ground for tomorrow's bridge job or tuning. (Photo 5 shows the completed treble bridge sitting next to a rough-capped bass bridge.)

Conclusion

At the opening of this article, as well as hinted throughout, certain ideas beyond the purely technical have been suggested. They can be summed up simply enough. I tie my shoes my way. And, although I am grounded in sober respect for our piano brethren around the world, I don't wonder how they tie their shoes, or, beyond gross fundamentals, how they carve bridges. Scoffers live under every rock, surfacing occasionally to tell you what you can do and cannot do. Then another type, those perfect people, real fast-trackers, zoom into your life issuing pronouncements about how things "really" are, and then lay down a molten, smoking track on the way out. But for all the smoke and gas I have learned this: For some reason which I have never cared to analyze, bridge work has taught this to me more forcibly than a thousand well-meaning sages or flashy films ever could. ≡

SOUND BACKGROUND

Mathematical Progress In Earlier 19th Century Acoustics

Jack Greenfield, RTT
Chicago Chapter

Included among the important advances in the science of acoustics during the first half of the 19th century were: determination of the speed of sound in solids and liquids, the introduction of important new mathematical formulas that pertain to musical acoustics and the establishment of principles for the mathematical analysis of musical sounds.

There were still few scientists who specialized in acoustics. Many of the important achievements of the period were accomplished by men who were primarily mathematicians or physicists. French scientists in particular, with a special interest in the application of mathematics to acoustics, were deeply involved in this work, either directly or indirectly.

Motion Of Sound Waves

The earliest experiments to determine the velocity of sound through solid materials and liquids began after the start of the 19th century. Simply speaking, the term *sound* applies only to the auditory sensations produced by longitudinal compressions in the air. The term *sound waves*, however, is customarily applied to the compression waves by which sound is transmitted through solids and liquids.

The movement of a compression wave through a long thin rod can be compared to the passage of force from a hammer driving an iron nail. The impulse of the hammer blow creates a pulse of pressure that is transmitted to drive the tip forward. A general formula for the velocity (v) of a compression wave based on Newton's laws of motion is:

$v = (\text{elastic modulus}/\text{mass density})^{1/2}$

For a long solid rod in which the pulsation moves through the length, the stretch elastic modulus or Young's modulus applies (December 1990 *Journal*). For a large body of water where the pulsation spreads out in all directions, the bulk elastic modulus applies. By definition, the bulk modulus is the reciprocal of the mathematical constant called the compressibility — the fractional change in volume per unit increase in pressure.

Sound Velocity Experiments Of Biot

The first experimental determination of the velocity of sound in a solid was carried out in 1805 by Jean Baptiste Biot (1774-1862) of Paris, a mathematician with an interest in physics and astronomy. Although better known for work in optics, Biot conducted numerous experiments in sound.

Biot had an unusual opportunity to make use of some newly-laid iron water pipes in Paris for his experiments. In his tests, he mounted a bell at one end of a pipe nearly a kilometer long. After the bell was rung, observers at the other end heard two distinctly separate sounds — first, the sound transmitted through the metal of the pipe in less than a second, and then the sound that traveled through the air in the pipe in close to three seconds. In other tests with the pipeline, he verified that the sound of a voice could be clearly understood through the long pipe. He also demonstrated that differences in pitch had no influence on the velocity of musical tones from a flute played at one end of the pipeline and heard at the other end.

In later research, Biot developed a method for demonstrating the movement of the longitudinal vibrations by which sound waves travel through a rod. He reported that pulsations in pressure were visible in a vibrating transparent rod examined in a beam of polarized light by a polariscope.

Speed Of Sound In Water Measured

The first serious tests in which the speed of sound in water was measured took place in 1826 in Lake Geneva, Switzerland. This investigation was conducted by a Swiss physicist, Daniel Colladon (1802-1893) and a mathematician, Charles Sturm (1803-1855). The two men were involved in research to determine the compressibility of water. Obtaining measurements for the velocity of sound through a great distance of water, they obtained data for calculation of compressibility based on the relation between velocity, bulk modulus and compressibility mentioned earlier. The Lake Geneva experiments confirmed their previous laboratory results. Colladon's 1826 report on their work "Memoirs On The Compression Of Liquids And The Speed Of Sound In Water" won the Grand Prize offered by the Academy of Sciences in Paris for a paper on the compressibility of liquids.

Poisson's Mathematical Studies

Simeon Denis Poisson (1781-1840) was a prominent French scientist whose work on wave motion and elasticity were important steps forward in the study of musical acoustics. Poisson was well prepared for a career in science by his education at the Ecole Polytechnique in Paris where he studied with leading contemporary French mathematicians and physicists. During his career as a professor at various institutions, he published almost 400 works. While he was particularly active in the field of electricity and magnetism, his studies in acoustics deserve mention.

His earlier papers relating to acoustical topics were concerned with wave motion. In 1817 he presented a theory on the transmission of sound in tubes which discussed why there was a difference between observed and cal-

culated frequencies of tones from organ pipes. In 1820 he presented a complex mathematical analysis on the three-dimensional movement of compressional waves in liquids, stating principles that apply to the transmission of sound waves.

Poisson's mathematical analysis of the vibrations of a flexible membrane, extended by later physicists, provides an understanding of the production of sounds by a drum. The restoring force that causes the drumhead to vibrate is the tension applied to the drumhead around the rim of the circular frame. Vibrating membranes such as drumheads divide up into vibrating segments on the same principles as the segmented division of vibrating circular plates (October 1990 *Journal*). The nodal lines that form the divisions of the theoretical ideal membrane are in two forms — concentric circles and diameter lines passing through the center. The normal modes of vibration of a drumhead are not harmonic, the upper partials are crowded quite close together. These combinations give a noisy sound of indefinite pitch unless the resonant cavity below the drumhead is properly shaped to change the natural frequencies so as to produce a definite pitch.

Poisson established the constant known as "Poisson's ratio." When a rod or wire is stretched with enough force to become elongated, there is also some contraction in lateral dimensions. Poisson's ratio is the ratio of fractional lateral contraction to the fractional elongation. For steel music wire, the value of Poisson's ration is usually taken as 0.3. As shown by Roberts (October 1980 *Journal*, p.24), although quite small, the fractional decrease in the diameter of the core wire of a bass string may be enough to allow the wrap to loosen. The practice of twisting the string in the direction of the wrap is a precaution to prevent this problem.

Fourier Establishes Mathematical Principles For Analysis Of Musical Tones

The modern understanding of the mathematical structure of musical tones as a composite of simple partial tones is based largely upon mathematical principles established by Jean Baptiste Joseph Fourier (1768-1830). Fourier was born and educated in a small town about 75 miles from Paris. After initial training for priesthood, he changed his studies and completed his education at a local military school. He began his career as a lecturer in mathematics. After a few years of teaching, he entered government service where he remained in various scientific and administrative posts for the rest of his life. During this time he was also able to continue his own scholarly activities which earned for him a reputation as a leading French mathematician and physicist.

Fourier's most important study is the mathematical theory he developed in connection with his work on the propagation of heat in solids — for example, the flow of heat through a metal rod, one end of which is held in a flame. In 1807, his essay on this subject was awarded the Grand Prize of the French Academy. He continued to develop his initial ideas and in 1822 published his celebrated "Theorie analytique de la chaleur."

Fourier's book was important not only for his observations on heat transfer but even more so for the new broad mathematical principle as "Fourier's Theorem" for analysis and interpretation of data such as he had obtained in his experiments. According to this theorem, any continuous motion, no matter how complex, is a composite of a series of simple motions with the following qualifications: (a) "Simple harmonic motions" are considered as oscillations whose displacement with time can be represented by sine curves. (b) The frequencies of the oscillations are in the ratio 1:2:3:4: etc. (c) The simple harmonic motions are in suitable phase and amplitudes. The procedure for resolving the complex motion into simple components is known as "Fourier analysis." An equation which shows the complex motion as a series of simple motions is known as a "Fourier series." Curves derived by graphic representation of the equations, for complex motions or for simple components are known as *wave forms*.

Although Fourier did not discuss the application of his theorem to acoustics phenomena, it did support the theory presented by Daniel Bernoulli almost a century earlier (June 1990 *Journal*, p. 34) that indicated that complex string oscillations could be represented by an equation for an infinite series of sine curves. Bernoulli's mathematical proof was considered inadequate by contemporaries who disagreed with him. Fourier's proof of his theorem in his original essay met the approval that won for him the award he received.

Ohm Establishes Fourier Analysis Of Musical Tones

The application of Fourier's theorems to musical tones was developed by the German physicist Georg Simon Ohm (1789-1854). Ohm is better known for his "Ohm's law" which gives the relation between electrical current, potential difference and resistance. Ohm was educated at the University of Erlangen where he received a Ph.D. He held various minor teaching posts until 1833 when he was appointed Professor of Physics at the Polytechnic Institute, Nurenberg. During the following years he began to receive wide recognition, especially in Great Britain, for his outstanding scientific work. In 1849 he was appointed to the highly prestigious post of Professor of Physics at Munich.

In addition to teaching, Ohm began his original research during the 1820s. While investigating the relation between heat and electricity, he became familiar with the analytical theory of heat flow Fourier had published in 1822. When Ohm published his own great book on electricity in 1827, some of his conclusions were based on principles he had found in Fourier's book.

Ohm's interest in acoustics developed later when he became aware of the possibility of applying Fourier's Theorem to the analysis of musical tones. In 1843, he published a paper on this work in which he presented his theory of audition "On The Definition Of A Tone ...", that was published in a German scientific journal. Following are important principles of Ohm's theory, often referred to as Ohm's Law of Acoustics:

1. All musical tones are the results of the action of simple harmonic vibrations that may be represented in the form $a \sin 2\pi mt$, or $a \cos 2\pi mt$ where a is amplitude, m is frequency and t is the elapsed time of the vibration. (Note: *sin* and *cos* formulas give equivalent curves opposite in phase.)

2. The tone quality or timbre of actual musical sounds depends upon the combination of a larger or smaller number of particular simple tone com-

ponents of commensurable frequencies.

3. Tone quality of timbre also depends upon the distribution of energy or relative strength of partials. The effect of variations in phase is negligible.

4. The human ear is capable of analyzing complex tones or detecting the presence of simple tones corresponding to the series represented by Fourier's Theorem.

Subsequent research has provided more convincing demonstrations of Ohm's conclusions than was possible for him in his experiments in which he used violin tones. Later in the 19th century, more effective laboratory methods of sound analysis were developed based on resonance. Partials in complex tones could be identified by the pitch of the sympathetic vibrations they generated — for example, such as the tones resonating from a piano with its dampers raised.

Modern determinations of the components of a complex musical tone can be carried out with electronic test equipment that displays results on screens similar to a small television screen. One type of equipment converts the input signal into sound wave forms similar to those obtained by constructing a graph of a Fourier equation. The sound spectrum analyzer, another type, displays a *frequency spectrum* that shows frequency and relative strength as vertical bars in a bar graph.

In recent years, investigators have found that variations in the phase of the components of a complex tone may be detected by the ear under some conditions. The modern view is that phase variations are more significant than stated by Ohm's Law of Acoustics. ■

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INDEX OF DISPLAY ADVERTISING

Coming Events

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 8-10, 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 16, 1991	**Bluegrass Tuning Seminar (one-day)** Transylvania University, Lexington, KY Contact: Ben Griffith; 101 Crestwood Drive; Frankfort, KY 40601 (502) 875-2297
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 20, 1991	**Los Angeles Chapter Annual Seminar** La Cañada Presbyterian Church, La Cañada, CA Contact: Jon Longworth; 6926 Bellingham Avenue; N. Hollywood, CA 91605 (818) 982-2431
April 25-28, 1991	**New England/Eastern Canada Regional Seminar** Sonesta Hotel, Portland, ME Contact: Joseph Bacica; P.O. Box 104; South Windham, ME 04083 (207) 892-0031
May 23-26, 1991	**Mexico City Seminar** Ollin Yolisli Cultural Center, Mexico City, Mexico Contact: Danny L. Boone; 9707 Timberview; Waco, TX (817) 772-0546
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

Valentine's Day is for love and kisses — no one can argue with that! I, however, would like to see a much broader use of this happy day of affection, romance and super goodwill, which would include a time of love pats and friendly hugs that say "thank you" for good deeds done. We really do need more than one Thanksgiving day per year, and I feel zeroing in on Valentine's Day for a pre-spring bout of gratitude is not only fair, but in order.

Love pats and affectionate hugs are well-deserved by our PTGA Board for each and every member. Phyllis Tremper, our "veep," has sent out thank-yous and membership cards to new and renewing members while in the midst of a new furnace transplant and, better yet, the arrival of a new granddaughter — which makes Phyllis a new Grandmama! Imagine working for us with all that excitement going on! Barbara Fandrich, our treasurer, after a not-so-long-ago move to Oregon, had to make another temporary transfer to Indiana on business, hoping to return to Oregon in January. Barb, with the help of Phyllis, has carried on our financial and membership business in great style. More love and kisses deserved, right? Our two secretary ladies, Ivagene Dege and Marge Moonan, are backing us with support and covering their own particular duties on our behalf, while Agnes Huether, immediate past president, carries on spreading goodwill and cheer as our roving ambassador wherever her travels take her.

There are many other devoted individuals who deserve a Valentine's Day "smooch," at the very least, for their new and continued support of the PTGA Scholarship Fund, including much appreciated support from various PTG chapters. We love you all!

A hug to our "cookbook lady," Nita Kadwell, and another to Auxiliary Exchange Editor, Julie Berry. More hugs to Bylaws Committee Chair Ginger Bryant who also "works out" as the Scholarship Fund Chair. I'd like to send a rosebud to Beva Jean Wisenbaker who sent photos of the Rose Test Gardens, the Pittock Mansion, and the Japanese Gardens in Portland for our memory books, to Sue Speir for editing our newsletter, and to Ginny Russell for preserving our past and for storing all those bulky albums.

If there are any more "historic" photos out there, please send them to the proper departments or to any board member; we do appreciate them. Please send any news of Auxiliary chapter activities to Julie Berry for the Auxiliary Exchange, or on to Sue Speir for the newsletter. We do need to hear from you!

There are high winds whipping around our drafty, old farmhouse and if I've omitted sending any loving gestures to deserving people, please forgive me, for my feet and brain are becoming very chilled, and thought processes have really slowed down. I'll catch you on a warmer day and Happy St. Valentine's Day to everyone!

Arlene M. Paetow

Same And Different

In several circles "same" and "different" are big topics of discussion. It's a discussion which often goes beyond the preschool concept of matching pictures that are the same. At the school where I teach we talk about the "cultural diversity" percentage, and we are concerned because right now we don't have very much cultural diversity at our school; we are all too much alike. We learn more by being around people who are different from ourselves. We can compare and contrast and question why we do things the way we do.

The Piano Technicians Guild Auxiliary gives us a chance to explore the concepts of same and different. We find our sameness in that we are all connected in an indirect way to the piano service industry. Our differences are what make us such a fascinating group. We come from all parts of the USA and Canada, and beyond. Some live on farms or in rural communities, while others have apartments in the city. Many have children; some have grandchildren. Many are musicians; most appreciate the role of music in a person's life.

When you enter one of the PTGA function rooms at a convention you may sense the differences before you see the sameness. For me, the amazing thing to observe is the growth and learning that takes place as we begin to grow when we are together. We broaden our horizons and change our perspectives as we join in activities together. Most of us come to these PTGA convention events by ourselves. We usually attend the convention with a spouse and then are left to fend for ourselves while the spouse attends technical classes.

We may end up sitting beside strangers when the bus tour pulls out in the morning. We may pull up a chair to participate in a craft project and feel awkward at first. However, more often than not, by the time the bus tour returns to the hotel or the craft project is finished we feel more comfortable because we have found a sense of sameness with others in the group.

It's easy to feel you belong when you are with people who live in your neighborhood, attend the same church you do; have children in school with your children, and the like. The challenge lies in being comfortable with people who do things differently than your ways. PTGA gives us a chance to explore differences. Interestingly enough, such exploration often leads us to the conclusion that we are all a lot more alike than we are different. Isn't this a great organization!

Julie Berry

Start planning now !
for PTG's
34thAnnual Convention at the
Adam's Mark in Philadelphia,
July 13-17, 1991

The Tuner's Life

The following poem was written by Fred O. Rice, Sr. Fred is an RTT in the Indianapolis Chapter and read this poem at the chapter's holiday party in December. The poem is called "The Tuner's Life."

These lines may not live on thru years
As Norman Rockwell's print,
But they will be my part tonight,
In this my little stint.

The "Tuner's Life" as I have lived
For almost thirty years
I offer now as best I can,
To you my cherished peers.

Some years ago I made a choice,
Discussed it with my wife,
I said "One thing I'd like to do,
That's try a Tuner's Life."

I sent for books and hammer, too,
C-fork, and long felt strip,
I've got it all...so here I go,
My life's a brand new trip.

By lesson three I said "I've learned
My fourths and fifths...I think,"
Now looking back, the truth is this,
My tuning...it did stink.

A Legion Post in Terre Haute,
The first I tuned for pay,
To think of that poor tuning job,
I shudder yet today.

To justify such shoddy work,
I offer this defense,
My charge was only *eight small bucks,*
And, I didn't have much sense.

This life's been fun, and now I know,
There's more to learn than thirds,
Yet pleasure that's derived from it,
Is hard to put in words.

Some things I like, I'll try to share,
In these few words of rhyme,
I can't tell all...it's far too much,
Don't really have the time.

I like the *folks* I get to meet,
A most congenial lot,
They offer Cokes and coffee, too,
When the weather's cold or hot.

I like my *time,* it's all my own,
My schedule I can make,
Vacation time when ere I want,
And days off I can take.

Sometimes it's true, the hours are long,
But only if I choose,
To make more cash, or compensate
So business I won't lose.

I like the *income* over-all, tho,
I'll never wealthy be,
For I can't tune enough each week,
To make me rich you see.

I like those *funny little things,*
That people always say,
Like "Fifteen years since last 'twas tuned,
Is it very bad today?"

Or, "Does this sweeper bother you?
Don't mind the stereo,"
And "I'll just watch a TV show,
For you won't care I know."

A Steinway or a Melodigrand,
No other job around,
Can offer such variety,
Or diversity be found.

Now as the year draws to a close,
I like to reminisce,
Those times of fun and happiness,
Might even call them bliss.

And as we face year '91
That's quickly drawing near,
I wish you "Happy Holidays,"
And a pros-per-ous New Year.

P.S. For those aspiring as I did,
A "TUNER'S LIFE" to live,
A few small words I pass along,
And this advice I give.

Be honest always with yourself,
And honest with all men,
Then give your best in all you do,
New clients you will win.

Did you know

•••

that each year the Piano Technicians Guild Auxiliary gives scholarships to talented young pianists? Your donations to the PTGA Scholarship Fund make this tradition possible.

Do you have something to contribute to this column? Most of us have experiences or ideas that would be interesting to share with other folks in the Auxiliary. Don't hestitate. Jot your thoughts on paper and send them to Julie Berry, Editor; 6520 Parker Lane; Indianapolis, IN 46220-2259.

Sheer Entertainment

Piano technician Anita T. Sullivan had an interesting article in the October 1990 issue of *Music Inc.* magazine. In the article entitled "Piano Tuner Is Teacher To Children," Ms. Sullivan told how the tuner's visit can be sheer entertainment for children and even a fine substitute for Nintendo!

In another article (*Newsweek,* December 3, 1990) playwright/author Rita McDonald Bleiman wrote about the importance of convincing young people of the value of attending concerts *and* about the importance of the rest of us being willing to put up with an occasional outburst from a young listener. She says it is the price we pay for an audience.

Auxiliary Exchange Editor
Julie Berry (Ron)
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Indianapolis, IN 46220-2259
(317) 255-8213

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Tech Gazette

Yamaha Piano Service February, 1991

Survey Reveals High Marks for Disklavier™ Piano Seminars

With the Disklavier™ piano playing a growing role in the business of many piano technicians, we thought you might be interested in the results of a random survey among participants in recent Disklavier™ piano training seminars.

The 5 day seminars, held in-house at Yamaha corporate headquarters in Buena Park, CA, prepare piano technicians in all aspects of diagnosing and servicing the instruments. Despite the necessary concentration on the electronic nature of the Disklavier™ piano, seminar participants who responded to our survey reported that a lack of previous experience in electronics was no handicap to mastering Disklavier™ piano service.

Prior to attending the seminars, many technicians reported that they wouldn't have tackled servicing a Disklavier,™ even though the pianos are becoming fixtures in homes, schools, hotels and clubs in their areas. Many credit the training seminars with opening up a new segment of opportunity in their respective businesses. Some participants even report plans to promote their new qualifications in Yellow Page ads and other media as a means of broadening their customer base.

In reference to the actual seminars, specific comments included:

"...excellent in all respects—content, presentation, and availability of instruments to work on..."
—Ken Burget, staff technician

"Great hands-on training...disassemble and reassemble instructions were easy to understand."
—Jack Reeves, staff technician

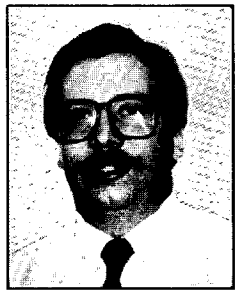
"It's a lot of information to take in, but everyone was very helpful."
—Mark Adams, independent technician

"The general attitude of the Disklavier™ training gave me a sense of quality service and support."
—Brian DeTar, independent technician

"I'm almost 65 years old, but Yamaha 'slam-dunked' me into modern technology...and I'm glad! The seminar was a very pleasurable and rewarding experience."
—Robert L. Ousley, independent technician

Special thanks to all participants who took time to respond to our survey—and also to Dean Garten, LaRoy Edwards and Bill Brandom for their work in organizing and teaching such a successful series of seminars.

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



Personnel Profile

PHIL GLENN

Music has long been an important part of Phil Glenn's life. Phil, who was named a Technical Services Representative for Yamaha Piano Services in October of 1990, grew up playing percussion and guitar, and spent two years working in the woodshop at the Rickenbacker Guitar factory in Santa Ana, CA. He entered a piano technician apprenticeship at Fullerton Music in California in 1974, then accompanied an English pop band on their 1979 U.S. tour as a piano technician.

Prior to beginning part-time work in the Yamaha piano parts department, Phil was in private business for 15 years as an independent tuner/technician for several southern California stores. Married, with four children, Phil has already proven himself to be a valuable addition to Yamaha Piano Services.

Yamaha will participate in

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The PTG Survey: Discounts And Surcharges

Carl D. Root, RTT, Chairman
Economic Affairs Committee

An RTT I know has a rather dramatic way of describing his feelings about discounts to his customers. He wipes his brow dramatically and exclaims, "You want me to discount this!?"

I agree that your labor is all you have to offer someone and should not be discounted. It is not like stock off the shelf because you have a limited amount of time and energy to offer. End of discussion? No discounts? You can offer discounts, because the amount of time you spend servicing customers is not fixed. This would be obvious if your fees were based only on hands-on work, but sometimes technicians forget how much non-technical time is spent on each customer, either specifically or prorated. The variability of both technical and business time and overhead suggests that we could fine-tune our fees so they more accurately reflect our personal investment in each customer.

Is it common practice to give discounts? Only half of one percent of the respondents to the PTG survey said they never give discounts for any of the five conditions listed. They are: working for stores, several pianos in one location, teachers, pianos serviced three or more times per year, and long-time customers. At the other end of the scale, 38% of the members who responded always give a discount for one or more of those conditions.

If we offer a discount for two pianos in the same location, what happens if one needs to be tuned to the other? Is there a surcharge or a discount? If the pianos belong to a teacher, will that affect the policy? This is a good example of why it is reasonable to consider occasional exceptions to a policy. If we broaden our focus and ask if there are any conditions under which a technician will "always" or "usually" give a discount, the number doubles to 70%. The following percentages apply to the respondents who answered "always" and "always or usually."

	always	*always or usually*
Stores	22%	45%
Several pianos, one location	18%	46%
Serviced 3+ times per year	9%	24%
Teachers	9%	23%
Long-time customers	2%	8%

Notice that it is apparently not common practice for technicians to offer discounts for any particular conditions as a matter of policy. The only exception is *stores*, since this list includes technicians for whom referrals from stores were not an important part of the business. If we eliminate those technicians, we find that 97% work at a discount. One of the reasons a third of us virtually never work for stores is precisely because most of them insist that we work for less than our normal rates.

My first piano service job was a full-time salaried position tuning floor stock and doing dealer prep. The store owner planned on having me out in the field tuning full-time within six to 12 months. At the time, it was hard for me to accept that I would be bringing in twice as much in gross receipts as I expected to earn as a salary. That's a heck of a discount! Can it be justified? A salary is a guarantee that carries some risk to the employer because lean months can be anticipated where the work coming in may not cover your salary. Much of the work may be follow-up service or warranty work which is an out-of-pocket

Continued on next page

New Orleans Chapter Honors Jess Cunningham

With about 21 people present on Dec. 9, 1990, the New Orleans Chapter of PTG paid tribute to Jess Cunningham, their founder, past president of PTG, and one of the greatest supporters of students of piano technology in South Louisiana. This tribute to Jess was long overdue, and I think it came in a timely fashion. Jess has not been in very good health for the last two years or so.

The New Orleans chapter has had some very strong supporters in the past and for the most part have gone without a pat on the back. Well this has changed now, because through the efforts of some members of the chapter, the award which Jess received on December ninth is to be an annual award which will be given to someone who has given outstanding service to the chapter. In this way the chapter will honor its own each year, and will also honor Jess's hard work for PTG each year.

Continued on next page

Past President Kelly Ward, left, and current President Nolan Zeringue, center, were among those honoring another former President, Jess Cunningham.

Survey...

expense for the employer.

I moved on to another store where the arrangements were quite different, but discounts, or their equivalent, were still in order. I was now responsible for driving to the service department several times a week where I picked up the invoices of customers who had called in to have their pianos tuned. I was expected to schedule appointments, take care of the pianos, collect payment and send a check back to the service department for their cut — about 30% as I recall. They did not give me a guaranteed number of tunings per week, but my net income, as anticipated, turned out to be higher than at the other store. I now had more free time to service my small clientele or follow other pursuits.

If a store or school is able to provide you with a substantial portion of your workload for a reasonable period of time, that is worth something, although we do not usually think of it as a discount. I can not see reducing my fees for anyone, professional or otherwise, unless there is a predictable and measurable benefit. That benefit can be a substantial increase in income as described above. However, it is more commonly applied where there is a savings in the time and or cost of providing service to an individual client.

The only discount I offer as a matter of policy is when there are two or more pianos in one location. Most technicians spend between a half hour and an hour on the phone and on the road prorated for each customer. The customer pays for the time and expenses incurred as part of the tuning fee. If a customer has two pianos, why should they have to pay a double portion of your overhead? It does not take any more office or travel time to service that customer. Sometimes a customer will ask if they can get a discount because they have a neighbor whose piano can be tuned on the same trip. The rule does not apply in my business because I will still want to spend time in the office talking to the other client directly. Travel time will not be increased significantly, but if you schedule people in the same area on the same day, there will be no comparative advantage. It turns out that some "neighbors" actually live far apart and may not have such flexible schedules or commitment to service in the future to will allow for same-day service. Discounts should be repeatable if possible to avoid confusion and misunderstanding.

I know an RTT who has piano owners in outlying areas who schedule his whole day for him in each town he visits. He tunes that person's piano for free, which seems like an awful deep discount. He does recognize the value of scheduling time and contacts, but won't he feel locked in to a policy that he may want to change when he eventually fills his schedule and doesn't want to a pay a premium for servicing customers on a regular basis?

The same problem exists when you charge $10 less than everyone else as a new practitioner in the field. What happens later when you add it back onto your fee once you have joined the ranks of the fully qualified? It can be done, but I don't recommend putting yourself in that position to start with.

I used to give discounts for pianos serviced three or more times per year. I finally occurred to me that I was spending more time rather than less on most of them. Pianos get frequent service because their owners have high standards or because the instruments are subjected to severe humidity changes and/or heavy use. I service pianos at a large nursing home that has about a dozen pianos, most of which are tuned several times per year. Not only does this provide a fair amount of work per year, I can service them with no notice and they live five minutes away. The combination of location, ease of scheduling, and multiple tunings per year make it a desirable account. I give them a discount and wish I had three more just like them.

I do not give discounts to teachers. A lot of my work comes from teachers' referrals, but I get even more from my other customers as a group. Some teachers have wonderful pianos, some have instruments that have been used and abused. Some tune them faithfully on a regular schedule, some can't seem to manage even once a year. For every teacher who has dozens of students and showers me with referrals, there are several who have only a few students who I never hear from. If all teachers provided more referrals than other clients, I would be happy to establish a discount policy that would reflect their consistent and predictable contribution to the growth of my business. I recently tuned a piano for a teacher who said that the last technician gave her a discount, and that she had given my name to many of her students. I checked my computer and found that her name was not listed by anyone as a referral. She tunes her piano once a year.

I try to give special service to special teachers in a form that reflects their contributions to my business and piano service requirements. They get priority for scheduling, extra work on a low budget public performance piano, etc.

I expected that the few technicians who give discounts to long-time customers would be older members who were semi-retired and had lower living expenses. I have noticed a tendency for some to refrain from increasing fees to keep up with the actual cost of living that is more typical for the rest of us. Imagine my surprise when I found that the average age of this small group of discounters is 45, compared to 47 for

Continued on next page

Cunningham...

Feelings and thoughts about Jess were shared with those in attendance by Kelly Ward, past president of PTG, Gary Neie, Bob Discon, John Wright, Marilyn Wright, Al Pulley, and Dan Skelley. Letters of congratulations read to Jess were received from the PTG Home Office, Wendell and Audrey Eaton, and Marshall Hawkins. Dan Skelley, on behalf of the New Orleans Chapter, presented Jess with the first annual Jess Cunningham Award. Jess spoke a few words of appreciation for the honor bestowed on him.

After the chapter presentation, it was my honor to be able to present Jess with his PTG Presidential Medallion which he had never received since it was not possible to be in attendance at any PTG International Conventions since these medallions have been presented.

It was an emotional and fun-filled evening with plenty of good food and great camaraderie. I believe that this event was a charge of renewed spirit to the chapter as it is something which we have never done before, and this type of event can only be positive for the chapter.

Nolan P. Zeringue, RTT
President

Have You Studied Your Chapter Management Manual?

Webb Phillips, Chair
Chapter Management And Achievement Committee

...Especially the section covering the basic tools and techniques necessary for good management productivity (which is under "welcome new president")

Is everything set for your next meeting? Have you done all your homework? Is your "to-do" list up to date, and are you following it? *Remember — Motivation is like a fire: Unless you continue to add fuel, it goes out.*

All the work of this committee is designed to help *you* as chapter officers develop solid planning techniques and control procedures. Those who think they have anything to contribute to this, please contact me. Any chapter officers who think they need help in this area, please call or write.

Don't Procrastinate! Do It Now!

If procrastination is a problem, perhaps we can even help in that area.

Odette Pollard, founder of Time Management Systems, says there are two kinds of people in this world — those who procrastinate and those who live or work with procrastinators. Have we left anyone out?

My understanding is that procrastination is the avoidance of starting or seeing to conclusion a task defined as important. When procrastination affects leadership it fits in the same glove as tardiness; both clearly display lack of concern and disrespect for all. *You* as a chapter officer are in a leadership position where everything is quickly noticed. These two rascals effect every decision by all persons and committees where you are influential; your entire following is deprived.

Your most scarce resources are time and energy. Your time is precious, and your energy is limited. The way you invest the two will determine your degree of success in any venture you undertake. A third resource is the time and energy of other people. If you are a time waster, they will follow your example. If you are a procrastinator, think of how your lack of action affects everyone around you. A good example is starting a meeting late. If the starting time is 7:00, the gavel should fall at 7:00 sharp, not 7:03 or 7:30. Starting late is a sign of disrespect to those who have arrived on time. It is an insult to their intelligence. To me, stealing time is much worse than stealing money. Time is an intangible. Money can be replaced — time can't. By setting a starting time and not starting at that time, you have declared yourself undependable and have raised questions about your leadership capabilities. Worse, you have stolen a part of someone else's life which can't be replaced. Rather than waiting for you they could have done other things, among which could have been

Continued on next page

Survey...

the whole survey. You may recall that the average tuning fee of older members was not substantially different from the average member, either. Another theory up in smoke.

The flip side of the discount is the surcharge. They don't seem to get as much attention, but the same kind of analysis will help to determine whether or not an extra charge is warranted. In a previous example, we noted that when two pianos are in the same location, they may be sitting side by side and must be tuned together. Does it take enough extra tuning time to warrant an extra charge? How much "extra work" are you willing to do on a piano before you add to your fee?

Some technicians single out specific brands and models because they are physically demanding and will always require extra effort. Tight pins and strings that don't render easily are good candidates for this. If you tune squares, you no doubt charge an extra amount which will be put into a fund to pay your chiropractor.

Pitch raises are the source of much debate. Some technicians charge by the cent — 25 cents flat costs so much, 50 cents flat costs so much more, etc... Some technicians say it takes longer to explain the extra charge than to do the work. I find that it takes two minutes to explain and 15-20 minutes of hard work to yank a piano up to pitch. I charge for that time, but not in the form of a surcharge, as explained in an article in the October 1989 *Journal*, titled "The First Time Call."

Concert work presents an interesting combination of discount and surcharge possibilities. Significant portion of income per year and referrals generated from enhanced image suggest a possible discount. So does reduced time required to service the piano if you are allowed to tune it often enough. The skill required, extra driving time due to odd hours and short notice, parking and access hassles, and general stress all suggest a surcharge. Figure out how much office, travel, and service time it takes to service the account compared to your other clients, and factor in other benefits and drawbacks.

Perhaps the most common surcharge is for travel time to outlying areas. Even if you can schedule a full day once you get there, it's either a very long day, or one tuning less than your average. Some technicians charge by the mile, others charge the same for everyone within a zone. I have found that I can't give prompt service or keep enough people active to provide a full day's work for sparsely populated outlying areas. I used to service the entire metropolitan Washington, D.C. area. Now I service the northwestern suburbs only. If you specialize (in Steinways, or players, or whatever), high travel overhead is a cost you must either accept in the form of reduced net hourly income or pass on to the customer.

I sometimes charge extra for billing. This may seem uncalled for, except that payment at the time the service is rendered is the standard practice in our profession as in most home services. Institutions require a bill, but there are other considerations, some mentioned above, which are offsetting benefits. I have a few wealthy clients who insist that I send a bill to their office where their accountant will pay it. The problem is that, more often than not, it takes three bills and two phone calls before they are motivated to mail a check. You can accept their inefficient, inconsiderate system of payment, throw the rascals out, or charge them for the extra service their account requires. I prefer the last approach.

Analyzing your discount and surcharge policies is a good way to assure yourself that you are consistently being paid what you think you are worth, while giving the customer the best value for their money. It's just another form of fine tuning.

Focus On Ethics

Say What You Mean, But Don't Say Mean Things

The phone rings. Mrs. Jones is finally going to replace that fossilized piano. Your heart leaps, and then she says: "I'm looking at (fill in store name). Should I buy here?" It just so happens that this particular store is notorious for bad service, poorly rebuilt pianos, and questionable ethical practices. What do you tell her? How can you give the "best service possible under the existing circumstances," while avoiding a lawsuit for defamation of character or slander?

One response would be to say what you are thinking and be damned about saying any dealer who might try to sue. Truth is an absolute defense, isn't it? But this is one case where you might be making a grave error. Have you ever asked for advice from someone who gives it to you all in negative terms? We tend to forget that people are listening to the way we say things as much as to the content. Do you like to be around people who are all negative?

People tend to look for positive advice. The old saying: "if you can't think of something positive to say, say nothing", has a lot of wisdom to offer. You can always say: "I have looked at several pianos at that store, and have not been able to recommend one yet." You are at least telling the client that you have made the effort to find something good for sale there. You are keeping open the possibility that the hours the person has spent looking there might not be wasted. You can offer to visit that dealer again, and discuss the fee for the service. They will probably be anxious to hear any other suggestions you might have, and feel good about calling you.

If you say: "That place is a disaster! All of their stuff is junk!" you are not likely to get the conversation on a positive track. Worse, you could be called upon to prove that statement. Even if it were proven true, that dealer could make a case that you were trying to destroy his business, thereby restraining his right to trade. And you could be found responsible for damages.

Colette Collier
Washington D.C., Chapter

Another thought might be that you could recommend a dealer and a line of pianos that you are comfortable with and avoid a confrontation with the dealer that, for whatever reasons, is not performing the best service to the customer. Thank you, Colette, for your contributions to this column.

Francis Hollingsworth, Chair
Code of Ethics Committee
2271 E. Spring Valley
Paintersville Rd.
Xenia, OH 45385

Chapter...

completing a job, otherwise left unfinished just to be with you at the agreed upon time. *Stealing other people's time is unforgivable.*

Lack of good planning reduces the efficiency of the entire organization. Logical reasoning can be easily affected, as well as your credibility. Many times all the forces of frustration accelerate to a boiling point, or your followers throw in the towel — and nothing is accomplished.

When you get your work done on time, your immediate subordinates have the resources to get their work done on time, too. Work will be more accurate because they are not racing to beat the clock. People depending on people will be able to stick to their schedules, and so on down the line. This is the kind of effect we all like to see. *It produces a chain reaction.*

Our acceptance of a person's inability to cope with punctuality is like the acceptance of America's debt. We slowly become desensitized, until we accept as commonplace what should amaze or frighten us.

Make the gavel fall at the precise time. Be a worthy leader.

If you are interested in being among the best, refer to your chapter management manual and study all three chapter business and technical meeting films.

In Respectful Memory...

Floyd Swinney

Floyd Swinney, 79, a former president and charter member of the East Texas Chapter, died October 22, 1990 after a lengthy illness.

Mr. Swinney tuned and serviced pianos in the entire East Texas area for 32 years. He also sold used pianos and operated a rebuilding shop, until his retirement in 1979. Mr. Swinney was well known by piano owners and often requested by the finest pianists in the area.

Mr. Swinney helped to promote the Piano Technicians Guild, hoping to make it a part of every piano owners' vocabulary.

Surviving are his wife, Marvelle Swinney, four sons, and nine grandchildren. His youngest son, Steve, is an RTT in the Dallas Chapter.

Dates & Deadlines

March 1, 1991: *Deadline for committee reports, delegates' names, for inclusion in 1991 Council Agenda Book.*

March 4, 1991: *Members delinquent in 1991 dues to be dropped from roster.*

March 16, 1991: *RTT Tuning Exam.* Detroit Chapter. Contact: Hugh Gulledge (313) 669-4325.

March 23, 1991: *RTT Technical Exam.* Detroit Chapter. Contact: Steve Hornbeck (313) 627-6128.

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

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

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

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