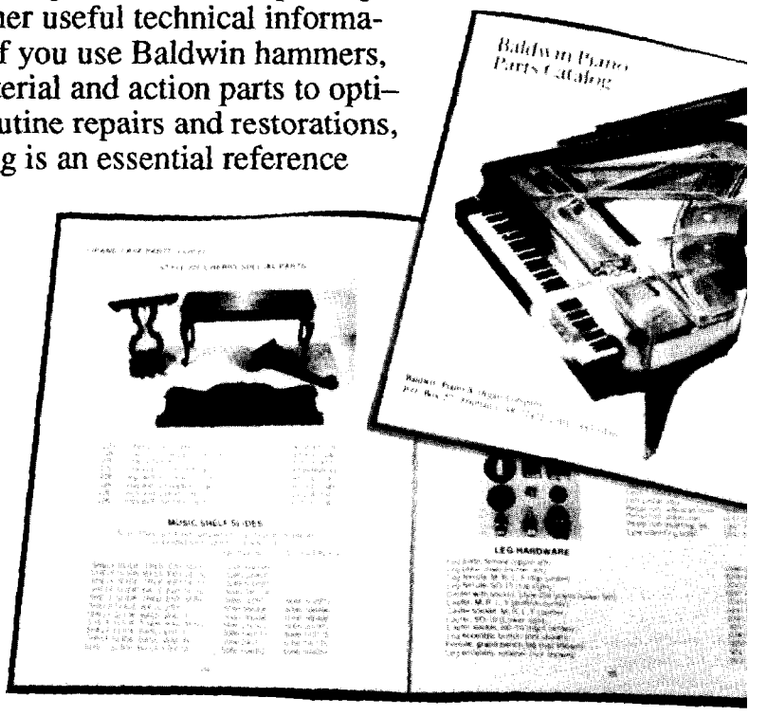
PIANO TECHNICIANS
Journal
OCTOBER 1990

Technical help from Baldwin is just a phone call away . . .

Like this free 36-page parts catalog with sup–plementary price list, for example. It provides a complete listing of all Baldwin piano parts as well as other useful technical informa-tion. Many of you use Baldwin hammers, pinblock material and action parts to opti–mize your routine repairs and restorations, so this catalog is an essential reference tool for you.



I'm Linda Gann, and I'm the person you usuall to when you call Baldwin Tech Service for part five years I've been coordinating parts orders a shipments for Baldwin grand and vertical piano During that time I've become very knowledgeal about Baldwin parts and your technical needs. I enjoy using my expertise to help you make the choice of Baldwin materials for your applicatio

Call me today for your free parts catalog or t order piano parts.

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7:00 a.m. - 3:30 p.m. C

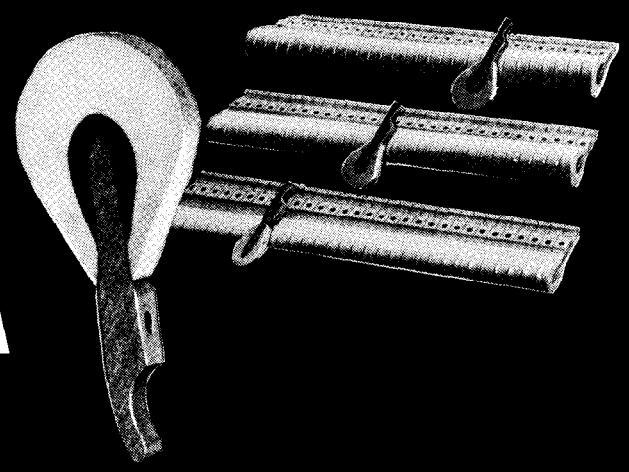
Baldwin

Piano Technical Service Department

Schaff

NOW HAS AVAILABLE...

IMADEGAWA
HAMMERS FROM JAPAN.



Due to the increase in popularity of Japanese-made hammers the last few years, Schaff has engaged with the Imadegawa Company in Japan to be a nationwide distributor. We will maintain a large stocking inventory which together with our years of replacement hammer expertise, will enable us to provide the finest hammer duplication service in the U.S.A.

Who else can offer...

1. A full range of wood moulding sizes and felt weights to accommodate almost any hammer duplication requirement.
2. Both upright and grand type hammers.
3. Either standard bore stock sets or custom made hammers.
4. A long standing history of providing reliable service and selling quality products.

CHARACTERISTICS OF STANDARD BORE STOCK HAMMERS

UPRIGHT HAMMERS—A set consists of 30 bass and 64 treble hammers. All bass section hammers are drilled at an 18° angle. Tenor section has 14 hammers at 12°, 10 hammers at 7° with the balance of tenor and treble at 0°. A 7/32" diameter drill is used for the bore hole. On a special order basis a type "B" set can be ordered with all tenor and treble hammers bored at 0° angle. On a stock basis upright hammers are available in the following striking distances (as measured at the treble end) of 2⅜", 2 7/16" and 2½". Also 12 Lb., 14 Lb., and 16 Lb. weights of felt available. All hammers are made of birch wood moulding, stapled throughout and have the option of being reinforced and unbored.

GRAND HAMMERS—A set consists of 30 bass and 65 treble hammers. All bass section hammers are drilled at a 9° angle. Tenor section has 8 hammers at 9°, 8 hammers at 6°, 10 hammers at 2° and the balance of tenor and treble at 0°. A .204" diameter drill is used for the bore hole. All hammer tails are shaped and tapered at no additional cost. On a stock basis grand hammers are available in the following striking distances (as measured at the treble end) of 1⅞", 2" and 2⅛". Also 12 Lb., 14 Lb., and 16 Lb. weights of felt available. Hammers come stapled throughout and can be provided unbored. Except for Steinway style, all grand hammers are made of birch wood mouldings and have the option of being reinforced.

STEINWAY STYLE—A set consists of either 20 or 26 bass hammers, reinforced with walnut mouldings and bored to Steinway specifications.

CUSTOM BORE HAMMERS

Both upright and grand hammers are duplicated from customer samples and bored to exact specifications. With our extensive inventory, we should be able to match 90% of the samples received for duplication. The samples we cannot match for Imadegawa hammers can be made from our high quality U.S. made hammers. Try Schaff and avoid unnecessary replacement hammer costs and order processing delays that occur in dealing with smaller suppliers.

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PIANO TECHNICIANS
Journal

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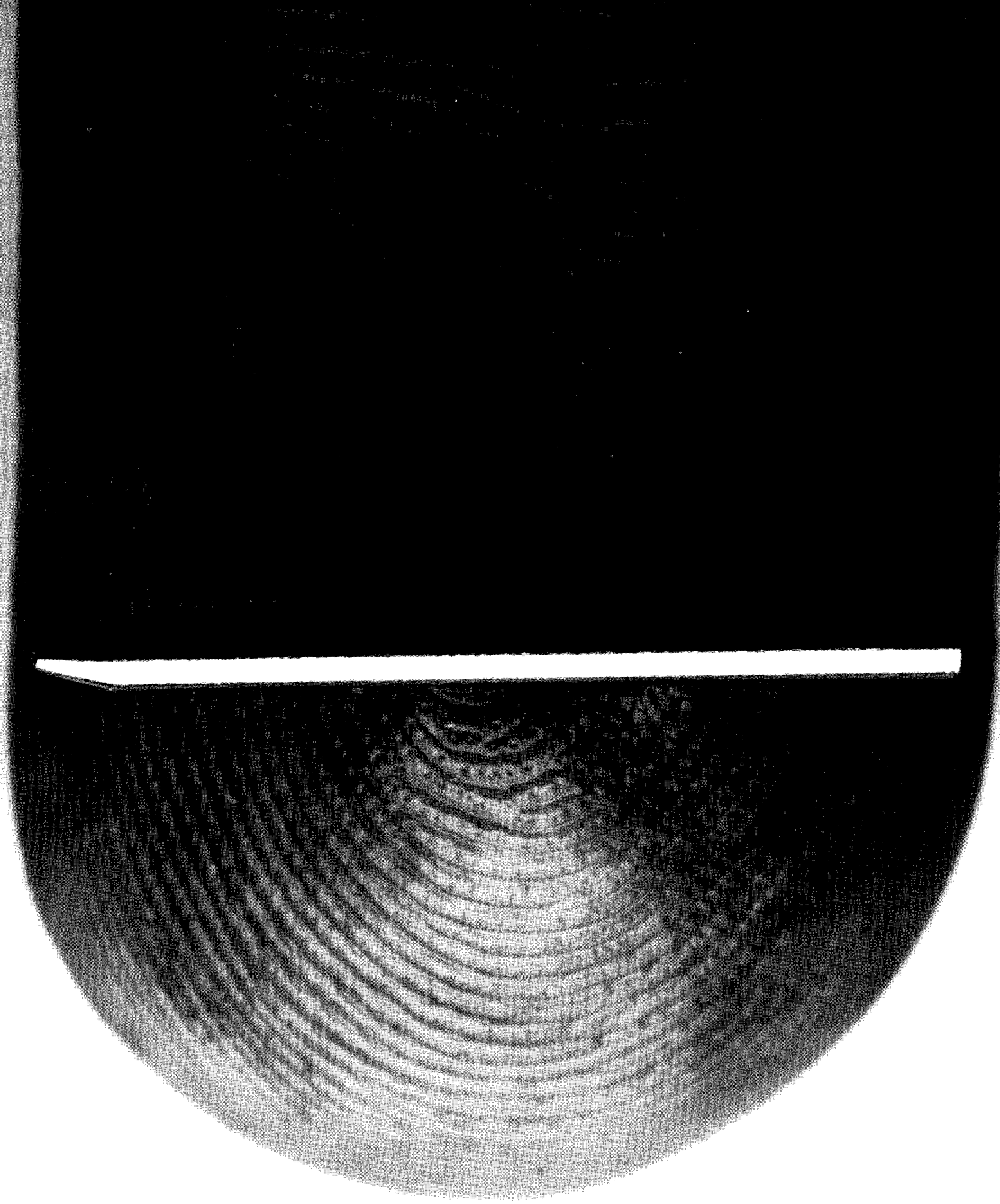

At Young Chang, there's nothing too small to improve.

No one notices a center pin until there is a problem.

Most manufacturers make them out of brass. Eventually they tarnish, and can cause verdigris to form. But it usually happens after the piano has left the sales floor. And often after the warranty has expired.

At Young Chang, we make our center pins of non-oxidizing German silver. They don't tarnish. So they move freely for the life of the piano. Chances are you will rarely need to repin or ream the bushings of a Young Chang action. And chances are our efforts will go completely unnoticed.

You also may not notice we coat many of our action parts with Emralon™ to reduce friction and noise and eliminate graphite penetration in felt and buckskin.

Or that we're using an improved premium English hammer felt that lasts longer and produces a bigger sound. Or that there's now whippen auxilliary springs on our 7' and 9' grands for finer touch adjustments.

Or that we've strengthened our grand keystop rails to prevent damage during moving, and steel-reinforced our grand keyslips to minimize warping due to changes in the weather.

We've also developed a moisture absorbent finish for our black keys and a new satin case finish to bring out more of the natural wood grain highlights.

While these recent improvements have gone largely unnoticed, our 12 year *full* warranty is getting all kinds of attention. It's the kind of promise people understand. And the kind of promise no other manufacturer is prepared to offer.

Little by little, we keep refining our pianos. Because it's the little things that make the difference between a good instrument and an extraordinary one.

For more technical information, please call Alan Vincent at (213) 926-3200. Or write to him at Young Chang Technical Services, 13336 Alondra Blvd., Cerritos, CA 90701 for a free copy of our Service Guide & Technical Specifications Manual.

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PRESIDENT'S MESSAGE

Chapter Participation

Nolan P. Zeringue, RTT
President

A few years ago Don Santy, one of our former Executive Directors, wrote an editorial in which he related the story of the old small-town doctor who was retiring. The town's people decided that they would get together and give him a barrel of wine. Each was to give of his best private stock. Soon the barrel was full and in fanfare presented to the old doctor who was quite happy with it. Later that evening the good doctor retired to his easy chair to have a bit of the generosity of his friends. The first taste... *it had no taste*! It tasted like water. Drawing a second glass; it still tasted like water.

Soon enough the truth finally did come out. Each individual thought that with the size of the gift, his own contribution would not be missed. They had all reckoned that *others* would take care of it.

If this situation occurred in your chapter and then in every chapter, we would not have a Piano Technicians Guild. Your little bit of contribution *does* count more than you can ever imagine. The Piano Technicians Guild *is* all 3700 plus members each doing their little thing for our organization.

We certainly must have a good number of the members giving of their best stock, because PTG has made wonderful progress in the past years. Remember any progress made by PTG is progress for you in your profession since this is our professional organization and any success is shared with all of our membership just for the asking.

Participate on the national level if you can, but most certainly try your best to give of your best stock to your local chapter. Serve on chapter committees, serve as a chapter officer, be a delegate to the Council for a year, serve on your chapter newsletter. There are many ways to participate at the chapter level and I assure you, PTG will be better for you having been there.

The Viennese Classic. A Modern Masterpiece in the Old World Tradition

A true classic isn't just built...it's created. Like the Viennese Classic by Kimball. The creation of this splendid instrument combines the old world artistry of Bösendorfer with the modern ingenuity of Kimball. In the tradition of fine European craftsmanship, the Viennese Classic offers the Bösendorfer scale design and a solid spruce soundboard to provide superior tonal quality and sound amplification. Plus the Herrburger Brooks-Schwander action for the touch demanded by the amateur and professional alike.

The result is a piano that will meet the needs of todays player, in the home, studio or institution.

With over 125 years of manufacturing experience the Viennese Classic is designed for easy professional service. Accessibility in seconds, an action that responds to careful regulation, and hammers that react to voicing techniques, the Viennese Classic takes its place among the Worlds finest pianos.

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The Viennese Classic.
From Kimball.

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From The Home Office

Information

Larry Goldsmith
Executive Director

The materials that come across an editor's desk are, to say the least, diverse. A less diplomatic way to describe some of them would be "downright weird." But they also offer fascinating glimpses into some little-known facets of our society.

One magazine that crossed my desk recently was dedicated to those 900 telephone numbers — you know, the ones where you call in to talk to your favorite New Kid On The Block, or "lonely singles like yourself." Despite the glamorous image the ads project, the magazine is all business. Presumably like the people who run those services.

The article that caught my eye concerned information gathering. You may think that when you hang up from registering a vote to get Pete Rose into the Baseball Hall of Fame, your contact with these people is complete. Not so.

"When a pay-per-call service is in operation, or after it is completed, knowing as much as possible about who is calling, or who has called, allows an [information provider] to...follow up a 900 service with a direct mail or telemarketing campaign targeted at a particularly responsive set of callers...," the article said. It went on to describe several companies providing detailed information on the nation's 83 million households — huge computerized databases that tell marketers almost everything about us. They know not just such common items as our names, addresses and phone numbers, but also things like the cars we drive, the type of neighborhood we live in, the magazines we read, our ethnic background, the things we buy, even our credit histories. Virtually everything we do adds a piece to the marketer's puzzle. It's not big brother — it's scarier than that. This information is in private hands, many private hands, and it's for sale.

Working with large statistical samples, they can also use a seemingly insignificant bit of information to extrapolate conclusions about who we are. It's all a bit frightening. "Tell me someone's zip code, and I can predict what they eat, drink, drive — even think," the developer of one such service said.

I'm sure that both the Hungarian college professor down the street and the auto mechanic who lives next door to him would find that a little arrogant, but maybe the exception proves the rule. Or maybe they're more alike than I know.

But it started me thinking about information, or the lack thereof. We've only just completed our first survey of our membership. Although the data is still being analyzed, early results are promising (see Carl Root's article in this month's *Update*). Still, more information is needed and will be sought in future surveys.

Our uses for the information are different, however. The Guild needs to know who its members are, what they do and how they think. And the Guild, remember, is you. You and every other Guild member have an opportunity to participate in the decision-making process. The information we gather will help you do that intelligently.

So, again, thank you for participating in the survey, and please take the time to digest the results. It is indeed a brave new world — one from which we could not retreat even if we wanted.

Industry News

New Mason & Hamlin Grands Ship

The first Mason & Hamlin grand pianos produced in New England in almost 60 years will be shipped this fall from the Mason & Hamlin Companies' factory north of Boston, MA. The shipment includes Mason & Hamlin's 90,000th piano made.

Blueprints for the new generation of Mason & Hamlin pianos have been carefully preserved in the company's archives. Each piano manufactured by hand at the factory will adhere faithfully to the original designs. Included in the design is the Tension Resonator, a feature known to improve tonal quality and preserve the longevity of the instrument's soundboard. Tension Resonators are unique to Mason & Hamlin pianos.

The Falcone Piano Company acquired Mason & Hamlin last year, along with the Sohmer, Knabe and George E. Steck piano companies. The firm has since changed its name to the Mason & Hamlin Companies, under whose umbrella all lines will be marketed.

The production of Mason & Hamlin grand pianos brings the total monthly output of pianos at the grand piano factory in Haverhill to 35. The factory manufactures the most popular Mason & Hamlin models, including the "A," "A 5.8-foot grand," "BB," and "A 7-foot grand." Three models of Falcone pianos are also produced at the factory, in 6.1-foot, 7.4-foot, and 9-foot sizes.

To commemorate the return to manufacturing and the completion of the 90,000th Mason & Hamlin piano, the company plans to gather descendants of the original artisans who toiled at the factory sixty years ago. They will meet in Haverhill, from all over the United States, to celebrate this momentous occasion. A rare collection of historic artifacts used in piano-making will also be displayed at the reception.

New Video From NPF Promotes Music And The Family

Families that play together, stay together! This is the musical theme of the latest addition to a library of educational videos from the National Piano Foundation. NPF recently completed production of "Make A Home With Music," which tells the story of a real family and how music has become a part of their lives and drawn them closer together.

Rick and Debbie Ragsdale grew up with a love of music and want to make sure their children do, too. Rick, Debbie and her parents explain in their own words what music has meant to them and how it can help children achieve success in other areas as they grow up.

"Make A Home With Music" is available through the offices of NPF. For more information, contact Madeline Crouch, National Piano Foundation, 4020 McEwen, Suite 105, Dallas, TX 75244, (214) 233-9107.

TECHNICAL FORUM

Lubricants

Susan Graham, RTT
Technical Editor

Controlling friction and noise are critical if a piano is to perform properly. To accomplish this, technicians employ lubricants at an almost endless number of contact points. Various lubricants have been discussed in articles on topics such as action centers and trapwork. Several of you have requested that I compile a general reference article on lubricants alone: that is the focus of this month's Forum.

I've tried to write primarily about products I've used over time, or else which come to me recommended by reliable sources. Lack of mention of a particular product may mean that I'm simply not familiar with it — but it may also mean that the product is not suitable for our use. The long-term nature of our work should make us cautious about lubrication. Silicone sprays are a case in point. When these products first came on the market, technicians began using them on friction points ranging from string contacts (capo) to grand keybeds. Initial results were marvelous. Then the instruments developed problems such as loose tuning pins and pronounced squeaks and groans with use of the shift pedal. We realized that silicone creeps: it will wander up a string and down the pin into the block. It can solidify in wood, forming into characteristic spherical molecules: glassy smooth, but inclined to squeal like window glass being washed. The material has proved impossible to remove with solvents and creates problems in gluing and/or refinishing. Take this as an object lesson. We are bombarded with new "space-age" products all the time: don't rely on your local hardware store clerk to give you complete information about them. To be safe, stick with the products other people have used and found satisfactory over time.

I've organized these products into groups: dry films, powders, greases, and liquids. Suppliers are listed wherever possible. (I've tried to be as comprehensive as possible but apologies to anyone inadvertently omitted.) Following the description of products is a list of piano parts and the suggested or appropriate lubricant for each. It should be noted that, in general, any product within a group can be substituted for another (observing the indicated cautions).

As you read and use this information, please remember the first step in treating noise or friction: insure that parts are in good physical condition. Cloth and leather should not be excessively worn or damaged and surfaces must be clean and free of dust, corrosion, improperly applied lubricants, etc. Lubrication will not solve these problems; it may temporarily mask the symptoms but good reconditioning and cleaning are always important.

Dry Films

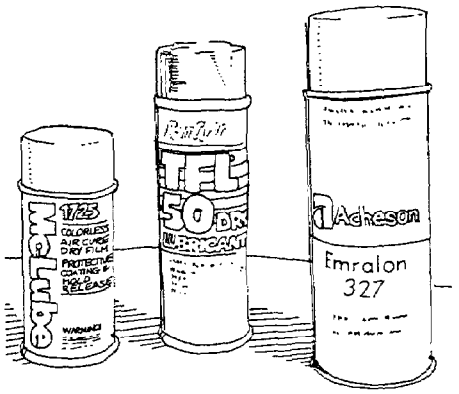
These products come as aerosol sprays or brush-on liquids and utilize a compound such as teflon, molybdenum disulfide or graphite as the lubricating material. They cure to a dry film coating and are useful as a relatively light, non-gummy lubricant on wood surfaces as well as metal and in some cases leather and felt. They are not suitable for action centers. Distinction must be made between those with a vehicle (usually a lacquer) which hardens to a permanent coat, and those which have a vehicle which flashes off cleanly, leaving a lighter coating. This characteristic can be determined by applying the product to a piece of glass. If the dried film can be easily wiped off with a finger, leaving little or no residue, it is the lighter variety and usually can be used on soft materials such as felt and leather. If the film resists wiping clean, then it is likely to be lacquer based: more permanent on wood but may harden and cause noise on the softer materials.

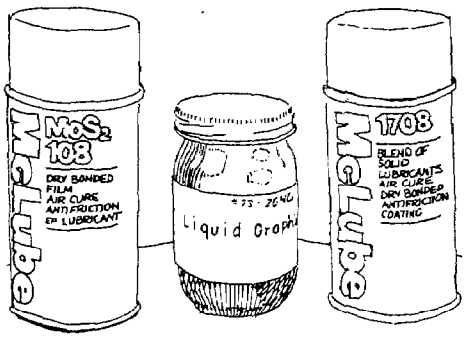
When choosing between a spray or a brush-on liquid, several factors may be considered. Expense is one: in general, sprays are more expensive. Sprays are convenient to use, requiring no applicator, but they can be difficult to limit to a selected surface. They are easy to transport or store in a vehicle, since they are in well-sealed containers. However, use of aerosols releases compounds into the atmosphere which can be unhealthy in the immediate surroundings and definitely are detrimental to the environment. It is also inadvisable to expose aerosols to high heat or airplane travel, since the cans may explode or leak.

Often, the method of application is as important as the product used. For instance, it is never advisable to spray a lubricant in the pinblock area: if strings are lubricated, it should be done with a small brush or felt scrap, being sure to restrict the material to the contact areas and keep it away from the tuning pins. Particular care must be exercised around wound strings. Before spraying anything, give some thought to whether or not surrounding parts will suffer from overspray.

Color is a consideration: we and our customers have aesthetic sensibilities which may be offended by a gray or black product on formerly white wood, yellow buckskin, etc. On the other hand, areas which are traditionally treated with a colored product may be erroneously taken to have been neglected if a colorless lubricant is used (emralon instead of graphite on bridge tops, for instance).

Illustrations by Valerie Winemiller





Clear Or White Sprays And Liquids

TFL 50: The original Dupont Slipspray (teflon) formula, now manufactured by the Remgrit Division of RemChem Corporation. Available as a spray in five and 10-ounce bottles. Information on local distributors can be obtained by contacting Mr. Jordan Jacks, Remgrit, 242 N. James Street Rm. 106, Wilmington, DE 19804 (302) 995-7538. Non-hardening base, dries to white film. Expensive but high proportion of solids to vehicle. Spray application. Dries quickly.

McLube 1725: Dry film coating and mold release manufactured by McLube Division of McGee Industries. Available in 16-ounce aerosol, liquid quarts, gallons, five gallons: contact McLube, 9 Crozerville Road, Aston, PA 19014, (800)-2-MCLUBE. Company will accept orders (no minimum) or supply name of local distributor. Also available in 16-ounce aerosol cans or 8-ounce liquid from McCall Piano Service, 1078 E. Third Street, Pomona, California 91766: 714-622-8826. Dries quickly to "colorless" (slightly white). Base hardens.

Emralon: Dries to hard, permanent coating (teflon). Usually available in clear — is used extensively in manufacturing action parts, usually tinted green. Short shelf life. Available from Schaff Piano Supply as a spray. Pacific Piano Supply also carries as a spray (brand name Permalon).

TLR44 Dry Spray (Pacific): Locally produced dry film lubricant/mold release. Dries to clear film, base hardens, they do not recommend for felt or leather.

Slide-All: Manufactured by Elmer's. Available some hardware stores, also American Piano Supply, Tuners Supply, Ford. Dries white, "soft" coating (wipes clean).

Generic And House Brand "Dry Film Lubricants": These are usually a teflon-based product sold by hardware and paint stores and may be considerably cheaper than the above mentioned brands. They can be tested on a piece of glass for suitability for hard or soft materials. In general, these sprays release a greater volume of vehicle in proportion to solids. This may have a hardening effect, particularly on leathers. Economy is also obviated if proportion of solids to vehicle is very low.

Substitution: Products within group are generally interchangeable, observing stated cautions about hardening vs. non-hardening, and color. Effectiveness and permanence of coating may vary. Do not use any spray or liquid containing silicone, waxes or oils except in very specific instances (see "Liquids"). Sprays which leave an oily residue are not "dry-film" and should only be used on non-porous surfaces.

Black Or Gray Sprays And Liquids

DAG 154: Colloid of graphite in alcohol manufactured by by Acheson. Available from Schaff, American and Pacific (may be catalogued as "Liquid Graphite"). Dilute slightly with acetone or isopropyl alcohol, brush onto wood parts, burnish when dry. Forms hard coat — do not use on soft materials. Will creep in laminates — do not use near pinblock. Penetrates, removal difficult, color will remain.

MoS2: Molybdenum disulfide, similar to graphite. Available as MoS2 108 liquid or spray from McLube or McCall (addresses and quantities above). Burnish after application is dry.

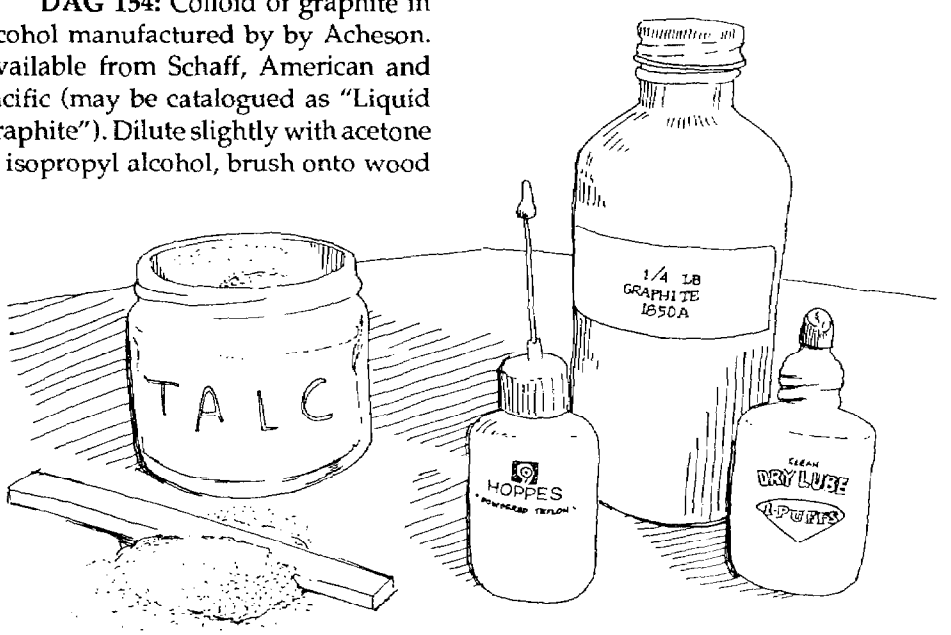
McLube 1708: Combination of colorless dry film and MoS2. More permanent coating than dry film alone, dries gray, company claims "superior performance to either component used independently." Available from McLube in same quantities as 1708 and MoS2 108. Also from McCall Piano in 16-ounce aerosol and 8-ounce liquid. Can be burnished if desired. Hardening properties less pronounced than other McLube products — some companies recommending this product for squeaking key bushings.

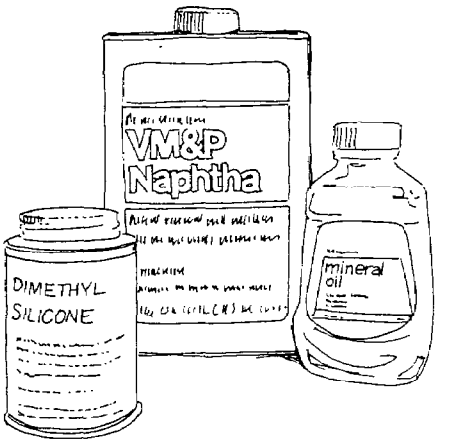
Squeakdouse: Graphite in liquid vehicle. Not a colloidial suspension such as DAG but requires vigorous shaking to distribute graphite in vehicle. Vehicle dries/evaporates, leaving thin film of graphite. Available from Schaff and American.

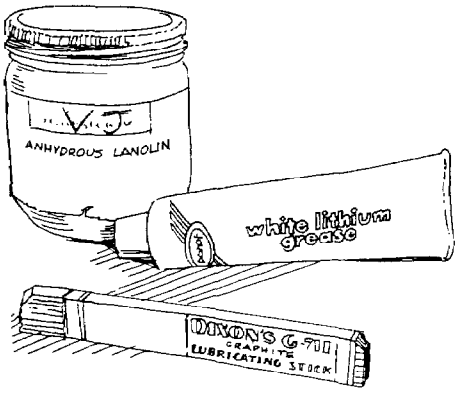
Substitution: Products within category usually can be interchanged: permanence of coating will depend on surface and wear.

Dry Powders

Powders are cheap and quick and easy to apply. They are relatively benign







both environmentally and functionally, although it is advisable to avoid inhaling such products. They are usually either white or gray/black and usually interchangeable (functionally if not aesthetically).

Talc: Mineral which is characterized by a plate-like molecular structure: the molecules slide easily across each other, creating lubricating qualities. White powder. Use of unscented talc is recommended, since the scented talcs (baby and shaving powder) may contain oils. Unscented talc can be obtained from some pharmacists, or from chemical lab suppliers (look in the Yellow Pages). Lab suppliers will carry several grades: buy a fairly fine grade, since coarser talc is abrasive. Sprinkle on, burnish in with fingers.

Soapstone: Essentially, talc in stick or block form. Sticks are available in some hardware stores and from welders' supply. Caution: there are synthetic soapstone sticks on the market which contain who knows what: use the phone to shop until you can find a supplier who guarantees genuine soapstone. Sticks or blocks are convenient to carry in a tool case and quick to use (generally by powdering them with a knife blade). Apply to surface and rub in with fingertips. Remove by brushing/vacuum.

Dry Lube l-Puff's: May be talc, mica (a similar mineral) or some combination of the two. White powder. Comes in small plastic bottles, also convenient for tool case although messy if the top comes off. Available from Pacific Piano (supply permitting) and Schaff; also some hardware stores. American carries Dry-lube "crayons" (hard stick form) as well. Application/removal same as talc/soapstone.

Powdered Teflon: Available from hardware stores. White powder. Expensive. Use same as talc, soapstone. Acts as a "heavy metal" if inhaled or ingested (toxic and stays in system).

Graphite: the grandaddy powder lube of them all. Has plate-like molecular structure similar to talc. Black powder. Can be applied as powder or mixed with alcohol and applied with brush. Should be burnished. American and Schaff carry several grades in a variety of containers — small squeeze cans or bottles may be easiest to use neatly. Cleanup difficult due to persistent color. On white rugs, travels faster than the speed of light.

Molybdenum Disulfide Powder: Brand name "Dry-Slide" from Schaff. Similar to graphite and talc in structure and use. Gray powder.

Substitution: Products are generally interchangeable, with varying effectiveness, adhesion and aesthetic results.

Liquids

This is a category of products, either liquid or spray, which leave an oily residue which provides part or all of the lubricating qualities. They are most often used where some metal contact is involved. Unless specifically stated, do not use them on action centers, parts, or wood-to-wood contacts. Products in this category are usually what can get us in the most trouble; be cautious about use in general, particularly with substitutions. Many of the sprays come equipped with small tubes which fit into the aerosol head, making it possible to spot-apply the product, which can be extremely convenient.

It is important to note that anything which has a petroleum base will cause rubber to deteriorate. Although much of the "rubber" tubing, rod ends, etc. that we use are actually neoprene or else a specialized rubber (such as fuel line) which are not affected, it is wise in case of doubt to avoid petroleum-based products. Dry powders or possibly some silicone products (depending on vehicle) are more appropriate.

WD-40: Petroleum based product created primarily as a water-displacing agent (ever wonder what w-d stands for?). Commonly available in various-sized spray cans. Works well on metal-to-metal contacts as cleaner/rust inhibitor: best lubrication is obtained if WD-40 is followed by use of a product specifically designed as a lubricant. Not advisable for porous materials and *never* in action centers. If used as string contact lube (at agraffe and capo), apply sparingly with small brush — do not spray in pinblock area.

Tri-flow: Oil containing teflon particles in suspension. Commonly available hardware and automotive supply. Use on metal-to-metal where creep is not a concern: some styles pedal supports and trapwork linkages.

TFL-50 Wet: Teflon product from Remgrit. Not as heavy a base as Tri-flow. Available in sprays from company. Petroleum base. Use on metal-to-metal, wood-to-metal, some cloth-to-metal (damper rod hangers) leather-to-metal, metallic, especially where grease-based lubes won't penetrate.

E-Z Free Silicone: Formerly available from Pacific, now most readily found at some hardware, automotive, paint stores. Suggested for key pins, grand damper wires (both applications sparingly with rag, not sprayed) and capo bars (very small amount, brushed on). Silicone creeps, will also interfere with gluing and refinishing — I do not

use it on keypins out of concern for future rebushing, also prefer other products at capo.

Joy's Rust-Solv: Locally-(West Coast) produced rust-dissolving product. Can be ordered by case from Joy Industrial Solvents, 864 Estabrook Street, P.O. Box 752, San Leandro, CA 94577 (415) 357-7588. Similar to Liquid Wrench. Use as cleaner/rust solvent before applying heavier lubricant. Apply, sparingly with small brush, to string/capo and string/agraffe contacts (keep well away from windings on bass strings). Useful in pedal linkage. Product temporarily breaks down corrosion in metal, evaporates after several hours, leaves no residue.

Dimethyl Silicone: Silicone product specifically created for piano work. Developed originally by Wurlitzer for action centers which were binding in spite of good mechanical fit. Available from Wurlitzer Technical Service (Lonnie Young), P.O. Box 1079, Greenwood, MS 38930 (601) 453-2484 or Yamaha Technical Services, P. 0. Box 6600, Buena Park, CA 90622 (800) 521-9477. Must be mixed with VM&P naphtha in glass container (silicone will creep out of seams in plastic or metal). Use in action centers where sluggishness is not due to humidity or corrosion, or after those problems have been treated but sluggishness persists. Research by Wurlitzer indicates that methanol and water action center treatment will work after silicone has been applied but some passage of time is necessary between the two. Helps stabilize wood parts surrounding action centers, eliminating friction due to birds-eye swelling, etc. Suggested by Yamaha for use in grand damper guide rails (one small drop on bushing) and for squeaking key bushings (see caution about glue). Commonly available silicone products are not interchangeable for this material. Any silicone product must be used and stored with great care, since it will permanently contaminate finishing materials, surfaces, etc.

Naphtha And Mineral Oil: Mixed one part oil to eight parts naphtha, traditional as center pin lubricant. Also works best if humidity/corrosion have been treated first. Helps stabilize wood and cloth, lubricates cloth to pin contact. May become gummy, especially if too high proportion oil is used.

Center Pin Lubricants: Several supply houses have pre-mixed center pin lubricants available. Content information is proprietary but most are petroleum based and act as cleaners/lubricants. Ford carries Pro-teck, claimed to permanently cure verdigris-related action problems. Best results obtained if source of problem is determined and eliminated (humidity, corrosion, bad mechanical fit) prior to lubrication. In the ideal world, a good brass pin properly installed in a high-quality cloth bushing in a well-cured and machined wooden part needs no lubrication.

Substitution: Be cautious about interchanging these products, since some are petroleum based or leave a film which may attract dirt or may creep.

Greases

These are the heavy hitters. In most cases they are used only on spring-assisted contacts such as pedal and trapwork linkages. They are generally interchangeable, although any product containing Vaseline (VJ lube) or other petroleum-based products should not be used in contact with rubber, since it will cause deterioration.

VJ Lube: Compound of Vaseline, lanolin and talc; first developed by Los Angeles technician Vic Jackson. Can be homemade or purchased from McCall Piano or Pacific. Heavy, whitish grease. Use only on spring-loaded contact points (trapwork, pedal pins, etc.) metal-to-metal, metal-to-wood, metal-to-cloth, metal-to-leather. Cleaner alternative to grease graphite. Can be applied in very tiny amounts to heads of springs such as Steinway-style grand repetition springs (metal to wood contact).

White Lithium Grease: Hardware store item; Schaff carries similar white grease lube, American has Lubriplate. Use as above; may outlast VJ in areas of repeated friction in metal-to-metal contact.

Lip Balm: (Chapstick, Blistix, etc.) Stick-style lip balm is a reasonable substitute for VJ or white lithium. Small tube is convenient; readily available for emergencies in field. Most brands are petroleum based.

Graphite Stick: Has been carried in the past by suppliers: both Schaff and American currently having difficulty with supply. Stick graphite is in a harder, lighter base than grease graphite; convenient form for applying graphite to ends of keyframes, contact points in pedal linkages, etc. Can be used on wood action parts where appropriate if well burnished following application. Also good for string pattern and bridge pin rubbings. More data on sources forthcoming.

Graphite Grease: Graphite in a heavy petroleum base. Used on areas of heavy wear where color and dirt-attracting qualities are not a problem (pedal and trapwork linkages without rubber contact). ≡

Action redesign is a recurring theme in the articles submitted to the Journal. *In determining whether or not to publish such works, a deciding factor is whether or not the proposed design is actually in existence in a working piano: has an idea progressed beyond a one-note action model prototype to an adequate field test? The Stanwood action covered in this issue is installed and working in a number of instruments. Obviously, it has not been in use for the 60 or so years we expect a piano action to work; unfortunately, there is no substitute for that test of time. However, it is an interesting idea and I hope you find it worth your consideration.*

Guide To Lubricants

	TFL 50 Dry	McLube 1725	Emralon	TLR44	Slide-All	Generic dry film	DAG 154	MoS2 108	McLube 1708	Talc	Soap-stone	Dry-Lube	Teflon (powder)	Graphite
Action parts:														
Jacks	A	A	A	A	A	A	A	A	A	C	C	C	C	B
Repetition levers	A	A	A	A	A	A	A	A	A	C	C	C	C	B
Knuckles	A	X	X	X	A	B	X	X	X	A	A	A	A	X
Spring grooves, with punching	A	B	B	B	A	B	B	B	B	A	A	A	A	pencil
Spring grooves, wood only.	C	C	C	C	C	C	A	A	A	C	C	C	C	pencil
Spring heads	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Action centers	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Keys, keyframe, keybed:														
Key bushings	X	X	X	X	X	X	X	B	B	A	A	A	A	X
Capstans (brass)	A	A	A	A	A	A	C	C	A	C	C	C	C	C
Capstans (wood)	A	A	A	A	A	A	A	A	A	C	C	C	C	A
Keyframe pins	A	A	A	A	A	A	B,C	B,C	A,B	C	C	C	C	X
Keybed	A	A	A	A	A	A	B	B	B	A	A	A	A	B
Keyframe end pins	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Pedals & trapwork:														
Springs (contact to wood)	C	A	A	C	C	C	A	A	A	C	C	C	C	C
Springs (contact to leather, felt)	C	B	B	C	C	C	A	A	A	C	C	C	C	C
Rod tops/leather	C	C	A	C	C	C	A,C	A,C	A,C	A	A	A	A	B
Rod guide bushing	A	B	B	A	A	B	B	B	A	A	A	A	A	B
Rods (at pedal: felt, feather, neoprene bushed)	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Rods at pedal, rubber bushed	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Pedals in wood, usually cloth bushed	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Pedals in metal, may or may not be bushed	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Damper systems:														
Guide rail bushings (usually not lubricated)	X	X	X	X	X	X	X	X	X	B	B	B	B	X
Action lever springs w/punching	A	B	B	A	A	B	B	B	B	A	A	A	A	B
Action lever springs w/o punching	A	A	A	A	A	A	A	A	A	C	C	C	C	C
Tray end pins	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Pitman, sides	C	A	A	C	C	B	A	A	A	C	C	C	C	C
Pitman, top	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Sostenuto hangers (usually not lubricated)	X	X	X	X	X	X	X	X	X	B	B	B	B	X
Miscellaneous:														
String contacts, metal to metal (capo and agraffe)	B,C	B,C	B,C	B,C	B,C	B,C	B,C	B,C	B,C	C	C	C	C	B,C
String contacts, felt	B,C	B,C	B,C	B,C	B,C	B,C	X	X	B,C	C	C	C	C	X
Bridge tops (prior to stringing only)	C	C	A,B	C	C	C	A	A	C	C	C	C	C	A

Key:

A — Recommended.

B — Utilize care in application and usage; read text.

C — Can be used; may be inconvenient or ineffective to apply.

X — Do not use

Guide To Lubricants

	MoS2 (powder)	WD-40	Tri-flow	Squeak-douse	TFL-50 Wet	E-Z Free Silicone	Joy's Rust-solv	Dimethyl Silicone	Naphtha, Mineral oil	Center pin lubes	VJ lube	White lithium grease	Lipbalm	Graphite stick	Graphite grease
Action parts:															
Jacks	B	X	X	X	X	X	X	X	X (wood)	X (wood)	X	X	X	A(burnish)	X
Repetition levers	B	X	X	X	X	X	X	X	X (wood)	X (wood)	X	X	X	A(burnish)	X
Knuckles	B	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spring grooves, with punching	A	X	X	B	B	X	X	X	C	C	X	X	X	B	X
Spring grooves, wood only.	C	X	X	B	X	X	X	X	X	X	X	X	X	B,C	X
Spring heads	C	X	X	C	X	X	X	B	C	C	B	B	B	C	X
Action centers	X	X	X	X	X	X	X	B	A	A	X	X	X	X	X
Keys, keyframe, keybed:															
Key bushings	X	X	X	X	X	X	X	B	X	X	X	X	X	X	X
Capstans (brass)	C	X	X	C	X	X	X	X	X	X	X	X	X	X	X
Capstans (wood)	A	X	X	A	X	X	X	X	X	X	X	X	X	A	X
Keyframe pins	X	X	X	X	X	X	X	X	X	B,C	X	X	X	X	X
Keybed	B	X	X	B	X	X	X	X	X	X	X	X	X	B	X
Keyframe end pins	C	B,C	B,C	A	C	B,C	C	B	C	C	A	A	A	B,C	B
Pedals & trapwork:															
Springs (contact to wood)	C	X	X	A	X	X	X	X	X	X	A	A	A	A	B
Springs (contact to leather, felt)	C	B,C	A	A	A	A	C	B	C	C	A	A	A	A	B
Rod tops/leather	B	C	A	A	A	A	C	B	C	C	A	A	A	A	A,B
Rod guide bushing	B	X	X	A	B	B	C	B	C	C	X	X	X	B	X
Rods (at pedal: felt, leather, neoprene bushed)	C	A	A	C	A	A	C	B	C	C	A	A	A	C	B
Rods at pedal, rubber bushed	A	X	X	B	X	X	X	X	X	X	X	X	B,X	A	X
Pedals in wood, usually cloth bushed	C	B	A	A	A	X	C	B	C	C	A	A	A	C	B
Pedals in metal, may or may not be bushed	C	A	A	C	A	A	A	B	C	C	A	A	A	C	A
Damper systems:															
Guide rail bushings (usually not lubricated)	X	X	X	X	X	X	X	B	X	X	X	X	X	X	X
Action lever springs w/punching	B	X	X	B	B	X	X	B	C	C	B	B	B	A	X
Action lever springs w/o punching	C	X	X	C	X	X	X	X	X	X	B	B	B	A	X
Tray end pins	C	B	A	C	A	B	X	X	C	C	A	A	A	C	B
Pitman, sides	C	X	X	A	X	X	X	X	X	X	X	X	X	A	X
Pitman, top	C	X	X	C	X	X	X	X	X	X	A	A	A	C	B
Sostenuto hangers (usually not lubricated)	X	X	X	X	X	X	B	X	X	X	X	X	X	X	X
Miscellaneous:															
String contacts, metal to metal (capo and agraffe)	B,C	B	B	B	B	X	A	X	B	B	X	X	X	C	X
String contacts, felt	X	B	B	B	B	X	A	X	X	X	X	X	X	C	X
Bridge tops (prior to stringing only)	C	X	X	C	X	X	X	X	X	X	X	X	X	A	X

Key:

A — Recommended.

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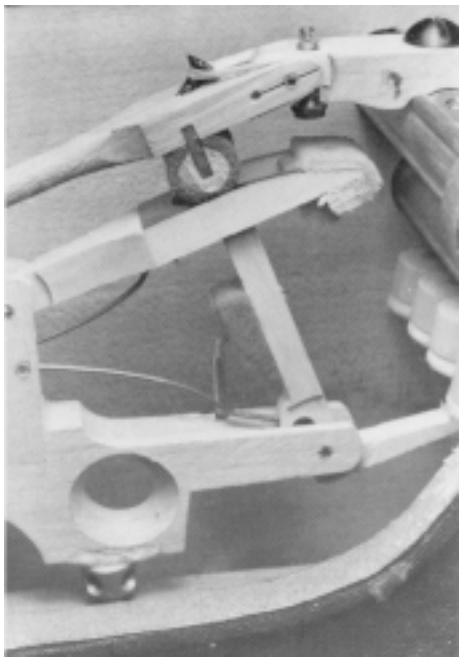
At Large

Stanwood Action; A New Action System For The Grand Piano

Editor's Note: In keeping with a policy of publishing articles on new and innovative ideas, the Journal *presents the following article. The ideas and conclusions it contains are those of the author. Publication of articles of this nature does not imply endorsement but is done to keep the readership informed of developments in piano technology.*

I have developed a system of standard modifications for application to grand piano actions. This system, which I call "Stanwood Action" is designed to optimize action performance characteristics by elimination of unnecessary action weight and through control of friction levels in the action. The result is an action which is extremely uniform, more enjoyable to play, and easier to control. The Stanwood Action system also has a variable touch option which allows the technician to adapt the action to the pianist.

figure 1



This system is now used in 31 pianos and the results have been unanimously positive. The consensus by pianists is that Stanwood Action helps technique and improves artistic expression. The words most often used by pianists to describe the unique characteristics of Stanwood Action are "connected" and "intimate."

The system combines a special method of key balancing with three weight-reducing modifications and one friction-controlling modification (figure 1):

1. Excess wood weight is removed by drilling and counterboring a hole in the body of the repetition.

2. The standard brass capstan is removed and replaced with a hard anodized aluminum alloy capstan. The new alloy capstan is 1/3 the weight of the conventionally used brass capstan. It has a harder surface, takes a higher polish and has no tendency to oxidize.

3. The conventionally-used jack rest position adjustment system is simplified by removal of the metal screw and the wood button. A piece of butt felt is then attached to the end of the spoon. Adjustment is achieved by bending the spoon with a special tool (figure 2). This method of adjustment has a number of additional advantages which are worth mentioning here:

The new design decreases the weight of the jack by 1/3. The lighter jack will move faster when acted upon by the force of the jack return spring thereby increasing the maximum possible repetition speed of the action.

When the jack snaps back to its rest position it slams into its rest felt cushion. This makes a noise. The lighter jack has less inertia and hits the cushion with less force, thus creating less noise.

As the jack rest felt compacts, it changes dimension and effects the adjustment of the jack rest position. Lowering jack weight lowers the forces that act to compact the rest felt and therefore makes the critical adjustment of the jack rest position more stable over time and use.

Compaction of the jack rest felt over time creates a depression in the felt. The old system, which uses a screw adjustment, requires a rotational change of the position of the jack rest felt. If the compacted felt is not in perfect symmetry with the rotational axis of the adjusting screw, turning the screw will bring uncompacted felt into use. Fine adjustment is lost as the uncompacted felt becomes compacted. The new system maintains the alignment of the felt with its compacting forces, thereby creating a more stable adjustment.

The old screw adjustment method requires engagement of a regulating tool with the screw mounted in the body of the jack. Pressure from the tool effects the actual rest position of the jack, therefore the tool must be disengaged each time the screw is turned in order to confirm the adjustment. This is time-consuming. With the new design, the regulating tool does not touch any part of the jack. Therefore the tool does not have to be disengaged in order to confirm adjustment. This is a great time saver.

The old method requires insertion of the regulating tool through the front of the action between the let-off regulating screws and under the hammer rail. The tool end is small and difficult to engage on its regulating screw and a clear view of the screw end is difficult to achieve because of obstructing parts. With new method, the regulating tool is easily inserted from the top of the action onto its adjusting spoon which is in clear

view (figure 2). This saves time (and cursing under your breath).

4. Friction in the hammer flange bushing is modified so that flange friction can be controlled and adjusted. This is done by modifying the existing flange with specially inserted set screws or through the use of a modified single screw adjust flange.

The combined weight reduction of these modifications adds up to approximately eight grams. This means less lead is needed to counterweight the key in order to achieve proper touchweight. Therefore the total mass thrown into motion by the pianist is significantly reduced. This reduces inertial touch resistance and makes the action easier to play. Reducing inertia makes friction in the key more perceptible. Uniform amounts of frictional resistance are then added to each key by means of the variable friction adjust screw at the hammer flange. This gives the action a unique quality which pianists seem to like.

A unique attribute of the Stanwood Action is the ability to adjust friction levels in the hammer flange to suit the technique of the pianist. Stanwood Action aims to make friction a more dominant force of touch resistance. Making friction adjustable then creates a truly variable touch action. In my experience with this type of action I have generally observed that, when given a choice, pianists with a higher skill level prefer lower friction in the hammer flange. Pianists who find the low friction level hard to handle prefer higher friction levels.

In the Stanwood Action System, the keys are balanced in such a way that upweight and downweight measurements indicate friction levels in the action. The upweight measurement is used as the primary indicator. Once the technician has confirmed that other friction levels are within tolerance (key bushings should not be too tight, etc), frictional resistance is set by placing a test weight (which corresponds to the desired friction level) on the key and setting the hammer flange friction so the key lifts the test weight. In this manner the technician essentially sets friction by setting the upweight.

For instance, to create a resistive-feeling action the technician may place a 20-gram weight on the key and tighten down the hammer flange friction until the key can just lift that weight. If the technician wants the action to feel fast and free, a 28-gram weight might be chosen, requiring the hammer flange friction to be backed off until the key can lift the heavier weight. Different test weights are used for creating different frictional levels in the action. With a little practice, the Stanwood Action technician can change the feeling of the entire action in as little as 10 minutes.

The special key balancing technique used in the Stanwood Action is called the Balance Weight System, which I will describe more completely in a future article. The Balance Weight System is based on the theory that the standard touchweight measurements (upweight and downweight) each have two components, one gravitational and one frictional. Measurement of both upweight and downweight leads to a way of identifying the gravitational and frictional components of touchweight from each other. Specifically, increasing the friction causes the downweight to increase and the upweight to decrease by equal amounts and vice versa, decreasing friction causes downweight to decrease and upweight to increase by equal amounts. The spread between upweight and downweight is a measure of how much friction exists, and will change if friction anywhere in the action is changed. It does not matter where the friction originates — flange center, key bushing, knuckle, capstan, and balance rail frictions all contribute to this spread. In fact, it turns out that the difference between upweight and downweight is caused solely by action friction. Theoretically, if we could eliminate all action friction, there would be no difference between upweight and downweight. The touchweight would then be a single point halfway between the measured upweight and downweight (see figure 1). I call this point the balance weight. *The balance weight is the essential point of reference in key balancing. It is the traditional component of touch.* We cannot measure balance weight directly, because it is impossible to eliminate all action friction. We can, however, use both upweight and downweight to calculate the balance weight as well as the friction.

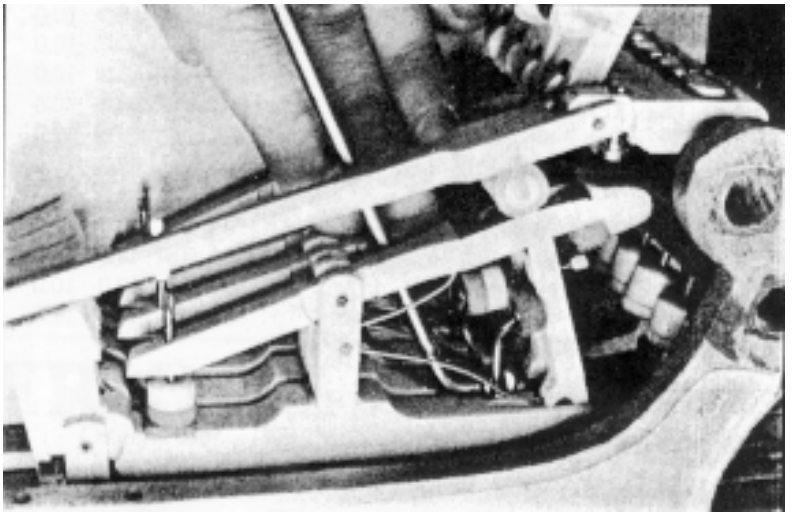
Balance Weight =
Downweight + Upweight ÷ 2

Friction = Downweight - Upweight ÷ 2

For example:

An action with a 50-gram downweight and a 20-gram upweight would have a friction of 15 grams (50 - 20 + 2 = 15) and a balance weight of 35 grams (50 + 20 + 2 = 35). This means when we measure the downweight at 50 grams, it takes 15 grams of weight to overcome the force of friction and 35 grams of weight to overcome the force of gravity. For the upweight it means that friction robbed 15 grams from the 35-gram force of gravity that acts to bring the key back to rest position.

figure 2



The balance weight is equivalent to the force of gravity the pianist feels at the key. But gravity alone is not the whole story of weight in piano actions. There is an additional weight factor — inertia. Inertia is the tendency of matter at rest to remain at rest and for matter in motion to remain in motion. Inertia in piano actions is a function of the total amount and distribution of weight on both sides of the key's fulcrum.

An object with high weight is difficult to start in motion. Compare for instance, kicking a brick (high inertia) to kicking a piece of styrofoam the same size (low inertia). Also the force of inertia varies depending on how fast we start an object's motion (acceleration). For instance, if you start a brick into motion slowly by sliding it along the floor with your foot you will not cause injury to your toe (low inertia). However, if you start the brick more quickly into motion by kicking it, the effect felt at the toe will not be so pleasant (high inertia). For the same reason, a key when played at pianissimo may have a touch resistance on the order of 50 grams but that same key when played at fortissimo will have a touch resistance of hundreds or thousands of grams.

If we are to create uniform touch resistance then we must create uniform inertia. If we think of a piano action as a simple see-saw with weights on either end, inertia is proportional to the sum of the weights on either end which equals the total weight thrown into motion when the key is played. This weight determines how much inertia the key has.

The balance weight is the difference between the weight on either side of the key's fulcrum. Changes in the total weight of the parts on either side of the key's fulcrum affects both the inertia and the balance weight. It is important to keep balance weight consistent because inertia greatly amplifies the force of resistance at the key when played. Any errors or inconsistencies in the balance weight will be amplified. If balance weight is uniform and if the weight of the parts used to build the action are uniform, then inertia will be uniform.

Stanwood Action uses the Balance Weight System to create uniform balance weight values in each key. This makes the gravitational component of touch uniform and optimizes inertial touch uniformity. Since balance weight is unaffected by friction, setting upweight and downweight at uniform levels (by means of the adjustable friction hammer flange) will create uniform friction in each key. In this way the Stanwood Action System brings the highest possible degree of uniformity to the three components of touch resistance — gravity, inertia, and friction.

Before And After Analysis Of A Section Of Notes In A Piano Converted to Stanwood Action

Where:
N = Note number
D = Downweight
U = Upweight
B = Balance weight
F = Calculated friction
(touchweight measurements accurate to the nearest gram)

Before Conversion

N	U	D	B	F
34	34	48	41.0	7.0
35	32	50	41.0	9.0
36	33	47	40.0	7.0
37	35	49	42.0	7.0
38	29	47	38.0	9.0
39	33	47	40.0	7.0
40	35	46	40.5	5.5
41	34	47	40.5	6.5
42	33	42	37.5	4.5
43	34	49	41.5	7.5
44	31	45	38.0	7.0
Avg.	33	47	40.0	7.0

After Balancing With The Balance Weight System

N	U	D	B	F
34	33	47	40.0	7.0
35	31	49	40.0	9.0
36	33	47	40.0	7.0
37	33	47	40.0	7.0
38	31	49	40.0	9.0
39	33	47	40.0	7.0
40	34.5	45.5	40.0	5.5
41	33.5	46.5	40.0	6.5
42	35.5	44.5	40.0	4.5
43	32.5	47.5	40.0	7.5
44	33	47	40.0	7.0
Avg.	33	47	40.0	7.0

(Note that changing the balance does not affect friction.)

After Adjustment Of Friction To A Free Setting

N	U	D	B	F
34	30	50	40.0	10.0
35	30	50	40.0	10.0
36	30	50	40.0	10.0
37	30	50	40.0	10.0
38	30	50	40.0	10.0
39	30	50	40.0	10.0
38	30	50	40.0	10.0
41	30	50	40.0	10.0
42	30	50	40.0	10.0
43	30	50	40.0	10.0
44	30	50	40.0	10.0
Avg.	30	50	40.0	10.0

(Note that changing friction does not affect the balance weight.)

After Adjustment Of Friction To A Firm Setting

N	U	D	B	F
34	20	60	40.0	20.0
35	20	60	40.0	20.0
36	20	60	40.0	20.0
37	20	60	40.0	20.0
38	20	60	40.0	20.0
39	20	60	40.0	20.0
38	20	60	40.0	20.0
41	20	60	40.0	20.0
42	20	60	40.0	20.0
43	20	60	40.0	20.0
44	20	60	40.0	20.0
Avg.	20	60	40.0	20.0

TUNING UP

Interval Tests

Rick Baldassin, RTT
Tuning Editor

This month we have a letter from J. Stephen Hawkes, Associate member of the Eastern Washington Chapter. Stephen writes:

I am very much a student of the craft, not in the business at all. I have read with interest all your articles this last year.

At the Portland Convention, I had my introduction to the various "tests" in tuning, and I think I have a better than foggy idea how they work. But I guess I would like to hear it again, from you — the definitive explanations: What exactly are the M3-M10 and the m3-M10 tests? In checking the A2-A3-A4 octaves, what precise notes are they, and do we expand or contract? I think I am clear on the inside third-outside sixth test, but you may elaborate.

What other common tests should I be aware of and use? Please name the specific notes in relation to the note we are tuning.

And another question of curiosity: Why is the 49th note of the keyboard called A4, when it is in fact the fifth A?

In order to understand any interval test, you must first understand a few underlying principles. First, you must understand that each string not only vibrates in its entire length, but also in two segments of 1/2 length, three segments of 1/3 length, four segments of 1/4 length, and so on. Because of this, not only is the fundamental frequency (f) present, but frequencies of 2f, 3f, 4f, and so on are also present. Musically, this creates what we call the *overtone series.* The pitch corresponding to 2f would be one octave above the fundamental, 3f would be another fifth above that, 4f would be a fourth above that, and up the ladder we go. So each note has its own overtone series.

Second, you must understand that an *interval* consists of two notes, each of which has its own overtone series, and at some point (at least one point, even more for some of the intervals) these two overtone series run into each other, and create what we know as *coincident partials.* These coincident partials cause the beats we listen to when we tune. The numbers of the partials involved for each note comprise what we know as the *interval ratio* for that interval. For example, if the fifth partial of one of the interval notes coincided with the fourth partial of the other interval note, the ratio for this interval would be designated 5:4. In this case, the interval in question would be a Major third.

Finally, you must realize that an *interval test* consists of three notes, each of which has its own overtone series, and at some point, all three series run into each other. If this condition does not exist, then the intervals in question are not truly *interval tests.* This is not to say they may not be useful for purposes of comparison, but a true *interval test* must have three coincident partials.

Knowing the ratios for the intervals involved in the test, we can determine what is being tested for. Stephen first asked what the M3-M10 tested for. The interval ratio for the Major third is 5:4, and the ratio for the Major 10th is 5:2. Since the fives are common to both ratios, the test is for 4:2, which is the ratio for the octave where the fourth partial of the lower note coincides with the second partial of the upper note. If the beat rates of the Major third and Major 10th are equal, then the fourth partial of the lower note is tuned at exactly the same pitch as the second partial of the upper note. The M3-M10 test can also be used in unequal beating fashion. In practice, for the temperament octave (F3 to F4), the Major third will beat slower than the Major 10th. The amount of difference will decrease as you go up the scale, until they become equal (M3=M10) for the F4-F5 octave, and soon above that, the Major third will become faster than the Major 10th, except you cannot hear it any more.

The second test which Stephen inquired about was the m3-M10 (minor third-Major 10th) test. This test is less common, but let us see what the test is for. The ratio for the minor third is 6:5, and the ratio for the Major 10th is 5:2. Since the fives are again common, the test is for 6:2, which is the ratio for the second set of coincident partials for the interval of the 12th, which is an octave and a fifth. (The ratio for the first set of coincident partials for the 12th would be 3:1). The 12th at the 6:2 level is a useful interval in tuning the bass. For example, if the minor third E2-G2 beats at the same rate as the Major 10th G2-B3, then the sixth partial of E2 is tuned to exactly the same pitch as the second partial of B3. The 12th, of course, is an important musical interval in this region of the bass, so this test, while not as common as some of the other octave tests, can be very useful.

The next question which Stephen asked was in regards to the A2-A3-A4 octaves. The precise notes these represent are notes 25, 37, and 49 respectively. As to whether these octaves are expanded or contracted, in reality, each is both. It is sort of a trick question. Let us look at the A3-A4 octave. We are taught that the octaves in the piano are always tuned on the wide side, and this is true if we consider only the 2:1 level partials. If we look at the entire picture, however, we see a mixed bag. If the octave A3-A4 is tuned such that the M3=M10, the 4:2 partials will be in tune (beatless), while at the same time the 2:1 partials will be beating on the wide side, and the 6:3 partials will be beating on the narrow side. So, in truth, the octave is wide, pure, and narrow at the same time, depending on how you look at it. Knowing this, it becomes apparent that there

can be no hard fast rule as to whether the Major third should be slower than, equal to, or faster than the Major 10th. It depends entirely on where you are in the scale. As I stated above, for F3-F4, the M3 should be slower than the M10. For F4-F5, the M3 should equal the M10, and for F5-F6, the M3 will be faster than the M10. When looking at notes A2-A3-A4, the A2-A3 octave is generally wide to pure at the 6:3 level, and the A3-A4 octave is generally wide to pure at the 4:2 level.

The inside third-outside sixth test is not truly an interval test as defined above. First, there are four notes involved, not three, and in this case, the outside sixth and the inside third do not have the same coincident partial, hence this is not an interval test. This is not to say the test has no value from a comparative standpoint. In the theoretical equal temperament, the outside sixth beats at approximately the same speed as the inside third. If the scale of the piano is good, this condition may still exist, in spite of the effects of inharmonicity on the beat speeds of the intervals. This test can certainly point out any glaring errors that may exist, and if the outside sixth can be made to beat at the same speed as the inside third, the piano can be made to produce what George Defebaugh called "beauty-full music." The fact that when all four notes are played at once, only one pulsation is heard, creates the piano's vibrato. These four notes comprise the dominant seventh chord in third inversion (example: F3-G3-B3-D4), which is common to most Western music (as opposed to Eastern music, not specifically Country and Western).

There are many other tests which can be used in tuning. The most common of these would include the M10-M17 (ex: G4-B5, G4-B6) test for the 2:1 octave, the M3-M10 (G4-B4, G4-B5) test (described above) for the 4:2 octave, and the M3-M17 G4-B4, G4-B6) test for the 4:1 double octave. A good relationship should exist between the M3 (5:4) G4-B4, M10 (5:2) G4-B5, and M17 (5:1) G4-B6, in the tuning of the treble, insuring that the relationships of the 4:2 and 2:1 octaves, and the 4:1 double octave are proper when tuning the treble.

The octave tests for tuning the bass would include the m3-M6 (D3-F3, F3-D4) test for the 6:3 octave, the m6-M3 (B1-G2, G2-B2) test for the 8:4 octave, and the M6-m3 (F1-D2, D2-F2) test for the 10:5 octave. Other tests would include the m3-M3 (A1-C2, C2-E2) test for the 6:4 Fifth, the m3-M10 (A1-C2, C2-E3) test (described above) for the 6:2 12th, and the m3-M17 (A1-C2, C2-E4) test for the 6:1 19th. A good relationship should exist between the m3 (6:5) A1-C2, M3 (5:4) C2-E2, M10 (5:2) C2-E3, and M17 (5:1) C2-E4, in the tuning of the bass, insuring that the relationships of the 6:4 fifth, 6:2 12th (octave + fifth), and 6:1 19th (two octaves + fifth) are proper when tuning the bass.

In answer to Stephen's final question, why note 49 is called A4, when it is in fact the fifth A on the keyboard, the best explanation I can offer is that in this system, the octaves are numbered starting with the C's rather than the A's. Hence C1 (note 4) is the first C on the keyboard, and so on, with C4 being middle C. The notes below C1 are considered in the "0" octave, and the bottom note of the piano is designated "A0." The keyboard has not always been designated this way, but this system has been popular for the last 15 years or so, and has been my system of choice for all of the writing I have done.

Our thanks to J. Stephen Hawkes for his letter and questions. I hope the answers will help us to better understand how interval tests work, and why. Our next letter is from Peter Wolford, RTT, of the San Francisco Chapter. Peter writes:

I am glad you found my article on "Tuning Stability" worthy of being published and hereby submit a follow-up which will save a lot of aching fingers if tuners took my original instructions seriously.

For those of you who read my article a few months ago dealing with tuning solid unisons, I advocated a technique of consistent, repeated, firm striking of the key to equalize the tension of each string between all the points of friction along its length, namely: V-bar, Agraffe, capo bar, and bridge pins.

I warned about pounding too hard, especially the karate punch — that of a quick, snapping, straight-fingered jab at the key which accelerates the velocity of the hammer and has been the cause of much string breakage.

After this article appeared in the Journal, *the Santa Clara Chapter invited me to give a demonstration of the techniques talked about in the article, and when I gave the above warning, Joe D'Angelo stood up and asked permission to speak. He told of attending a convention where Kathy Teetsell, of Long Beach, CA, was giving a lecture/demonstration on this very topic, and introduced a less finger-aching technique of striking the key. This technique works very well, and I have been using it ever since. I even forgot myself, and hit a couple of keys on a spinet with the old yellow plastic elbows without breaking them.*

Hold your arm straight out with your middle finger poised over the key you want to tune. Lift your wrist, then strike the key firmly and simultaneously curl your finger towards your palm. No downward arm movement! You are swiping the key with your finger. Yes, this delivers the dreaded, accelerated blow, but it is controlled, and no longer lethal.

Our thanks to Peter for his letter and explaining the technique which Kathy demonstrated. Until next month, please send your questions and comments to:

Rick Baldassin
Tuning Editor
2684 W. 220 North
Provo, UT 84601

More Tuning Class Reviews

Rick Baldassin, RTT
Tuning Editor

The following are reviews of some of the tuning classes held at the Piano Technicians Guild's 33rd Annual Convention and Technical Institute, held July 7-11, 1990, in Dallas, Texas.

Class: Tuning The Old Fashioned Way
Instructor: Maurice Roseburrough, RTT

The purpose of this class was to stimulate interest in the aural perception of piano tuning. The question was posed as to why in this modern age, anyone should be interested in tuning "the old fashioned way." It was stated that when tuners place the tuning hammer on the tuning pin, they become that educated part of the piano that can make a difference.

Mr. Roseburrough stated that he still uses a basic system of fifths and octaves, relative to that published in a booklet entitled "The True Piano Tuner" published by The John Church Co., copyright 1881. This booklet describes in some detail the schemes employed by the majority of tuners at that time. The temperaments were based on C, F, or A.

Some of the elements of basic importance to tuning were said to be the soundboard, strings, tuning pins, hammer action, and the art and skill in setting the tuning pin and string tension simultaneously. It was noted that one without the other is of no value.

The technical goal was to set a standard of pitch relative to A440, purity of unisons, equally tempered scale, stable setting of tuning pins, and natural octave stretch, with allowable tolerances through low and high frequencies for variance in auditory perception.

In tuning, the first step was said to be transferring the pitch source to the piano. This was accomplished by roughly tuning C40 to a C523.2 tuning fork, and comparing the beat rate between C40 and A-flat23, with the beat rate of the C fork and A-flat23. Retune C40 until these beat rates are the same.

The next step was to tune C52 to C40. Compare the beat rate between C52 and A-flat23 (17th), with the beat rate between C40 and A-flat23 (10th). If the beat rate of the 17th equals the beat rate of the 10th, then the Major third from A-flat36 to C40 will beat faster than the 10th from A-flat36 to C52. Tuning C52 sharper will result in the Majorthird beating the same as the tenth. The acceptable tolerance lies between the third-10th and the 10th-17th, preferably favoring the third-10th, but not quite. This is carried beyond the temperament to the area of C64, where the 10th-17th test is used to keep the octave stretching down.

In the area of C76, the 10th-17th test is continued, along with a melodic and/or pitch sense. This involves using an interval of a fifth (C64 to G71) whereby the octave C64 and C76 is heard. This was said to give a constant stretch factor for the top octave, and it was pointed out that the piano would dictate the amount of stretch that best reflects its musical quality.

In the area below the temperament at F33, the Major third-10th test (F33 to A37, F33 to A49) was employed, along with the minor third-Major sixth test (F33 to A-flat36, A-flat36 to F45). The note a fifth above the lower octave note was also checked. It was mentioned that lower note of the octave should be on the flat side of pure. Major thirds were also checked for evenness.

Proceeding lower into the bass, many tests became available, including the minor seventh. At some point, certain intervals do not test with clarity. It was suggested that at this point, changing to an interval which could be heard with clarity is most helpful. Whenever switching to a different interval, always check back a few notes to assure an even progression. One check of interest was the octave-minor seventh from C16 to B-flat38. This beat rate should be the same as the Major sixth from F33 to D42. Because the minor seventh is an expanded interval, if the beat rate of the octave-minor seventh is faster than the Major sixth, then the octave was said to be over stretched.

The above procedures are a sampling of how Mr. Roseburrough demonstrated his tuning "The Old Fashioned Way."

Class: Tips On Tuning
Instructor: John Travis, RTT (Travis Publications)

In this class it was demonstrated that a good "Pattern Scale" could be achieved by following what the instructor called the four series of Major thirds, a system devised by Frank Hale, of Boston, later perfected by Oliver Faust, of the New England Conservatory of Music. Before the actual demonstration, it was pointed out that a thorough inspection of the overall condition of the instrument should be conducted, and a discussion of what tools and equipment would be needed to achieve a good tuning job took place.

Before actually tuning, a thorough inspection of the instrument is in order. This should include: determining the pitch of the piano, checking the action and all of its moving parts, the trapwork, soundboard, bridges, bridge pins and bearing points, the plate, lag bolts, wood screws, and so on. It was suggested that making a record of the above items could prove useful for possible repairs and/or reconditioning or rebuilding jobs.

This was followed by a discussion of what tools and equipment are needed to achieve a good tuning job. It was

OCTOBER **UPDATE** 1990

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

The Average Technician

Carl Root
Economic Affairs
Committee Chair

Everyone likes to be normal but no one likes to be average. The PTG Survey has produced data which tells us that last year, the average respondent ...

- tuned 440 pianos
- of which 46% were annual customers.
- He took 80 minutes to service each piano,
- charged $55 for it,
- and made $21,300 net.

We want to know if these averages, which are derived by taking a median value from the five choices for each question and calculating a weighted average, are typical as well as average.

- 23% serviced 250-500 pianos.
- 20% had 45%-55% annual customers.
- 23% took 75-90 minutes for service.
- 33% charged $50-59
- 27% had $12,000-24,000 net income

To drive home the point that average and typical are quite different, only three respondents out of 1564 actually fell within the average range of all five questions.

The purpose of this article is to demonstrate ways of getting information beyond a simple average for each question. It is often inappropriate to treat rebuilders, tuners, retirees, retailers, and hobbyists as if they had similar interests, priorities, and business practices. We can go back to the raw data and try to visualize a response curve for each question that will suggest ways to sort the data into more homogeneous groups. For example:

I have been an RTT for ___ years. a) 0 (I am an Associate.); b) 1-9 *374*; c) 10-19 *445*; d) 20-29 *161*; e) 30+ *83*

By adding the numbers in "d" and "e," we see that only 244 of the 1063 RTTs have been members for 20 years or more, suggesting that many older members entered this profession later in life.

But why guess? Let's define the group further. We have data on age, so lets see how many members satisfy the condition of both a certain age and 20 or more years of RTT status.

- 40-49 years old — 22
- 50-59 years old — 49
- 60+ years old — 168

Over 70% of those who have been RTTs for 20 years or more are 60 or older. Our assumption is valid.

Using this approach, other questions can be answered even if they do not appear to be

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Code Of Ethics Committee Comments

Francis Hollingsworth
Code Of Ethics
Committee Chair

The Code of Ethics Committee has been asked to develop and solicit questions and answers in ethics situations to appear as a column for education on ethics published in the *Piano Technicians Journal*.

We would encourage you to read the Code of Ethics from time to time so that you may be aware of just what it says. In our day to day work, it can become very easy to say or do something that we later wish we could recall. There is an axiom that says, in effect, that we should do unto others as we would have them do unto us. This seems to do a good job of summarizing our Code of Ethics.

If any of you have a problem or situation with other technicians, dealers, or clients that you would like to have discussed, please write to us. I will contact the other members of the committee with any questions that we receive so that you may have an unbiased and considered opinion. We reserve the right to edit and we'll withhold names upon request.

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

The Soundboard

To The Soundboard:

As Chairman of the Demographic Survey Committee, I have had the opportunity to peruse the raw data gathered from the response to our recent questionnaire. I, of course, have always had my own ideas about the business part of our profession so naturally I am eagerly anticipating the results of our recent poll. I already know from the supplied data that some of my ideas were correct, but many will have to be discarded. I enthusiastically applaud the endeavors of our first committee and congratulate them for breaking new ground by accessing knowledge that was heretofor only available in an informational vacuum. I know that there are many areas of our chosen profession that will benefit from that substantive information that will soon be made available to our membership at large. So, here's to Carl and all of your people, thank you for the work you have done.

Roy A. Hebert, Jr.

To The Soundboard:

I want to thank all the chapters and every person who helped make the contest of business meeting films for the Chapter Management and Achievement committee a success.

A special thanks to all those who entered and did not win a prize — please keep trying. With your loyalty and dedication, I'm sure you will be a winner.

It was generous of you to make these available to this committee for judging.

I'm afraid the length of time I have taken to thank you all is nothing short of disgraceful, but I sincerely want to offer my thanks, and apologies, for this entire committee.

Webb Phillips,
Chapter Management and Achievement Committee Chair

Dates And Deadlines

November 16, 1990
Deadline for committee reports for January Board meeting.

November 17, 1990
RTT Tuning and Technical Exams.
Austin Chapter Test Center. Application deadline: October 17, 1990. Contact: Bill Cory; 711 Landon Lane; Austin, TX 78705 (512) 472-9358

November 24 - 25, 1990
Area Examining Board
Gladsboro College, Gladsboro, NJ
Contact: Hilbert Felton (215) 482-2000

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

January 1, 1991
1991 dues due.

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

January 31, 1991
1991 dues delinquent.

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

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

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

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

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

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

Average...

covered by the material in the survey. Take the following quote from one of the comments on the survey received by the PTG Home Office.

"As a relative newcomer to the field (less than one year), I am finding it very difficult to get customers by any means at all. A question relating to how many years it took to make a living wage would be informative to those of us wondering how long the struggle takes."

If we look at years of experience and average income, we get the following number of responses:

- 1-5 years $12,000 — 174
- 6-11 years 20,000 — 307
- 12-19 years 24,000 — 484
- 20-29 years 25,000 — 228
- 30+ years 22,000 — 231

If we look at net income without considering experience, we get the following number of responses:

- $1-11,000 466
- 12-23,000 426
- 24-35,000 318
- 36-47,000 129
- 48,000+ 90

The five choices offered for the income question require us to choose $12,000, $24,000, $36,000, or $48,000 as a minimum figure that one might strive for as a "living wage." Twelve thousand dollars seems too low and only 14% of all the respondents made $36,000 or more, so let's pick $24,000 as our goal. How many of the 206 technicians with less than six years experience made $24,000 or more? Fourteen. If we

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Who Are We?

The mythical average technician...

- has serviced pianos for 17 years,
- drove 14,000 business miles,
- drove seven hours per week,
- spent four hours per week in the office,
- and 18 hours/week in the field.
- 24% were first-time customers.
- 8% were three or more times per year.

More miscellaneous data:

- 38% of all RTTs and 36% of all Associates spend nine or more hours/week in a shop.
- 35% of all RTTs distribute PTG pamphlets.
- 60% of all members tune entirely by ear.
- 20% of our members work in a rural or small town environment.
- 32% tune at least as many grands as verticals.
- 52% use <MY NAME> PIANO SERVICE as a business name compared to ...
- 27% who use <MY NAME>.
- 47% of those who do both shopwork and field service work find that shop work is much less profitable, but ...
- 66% have done the same or

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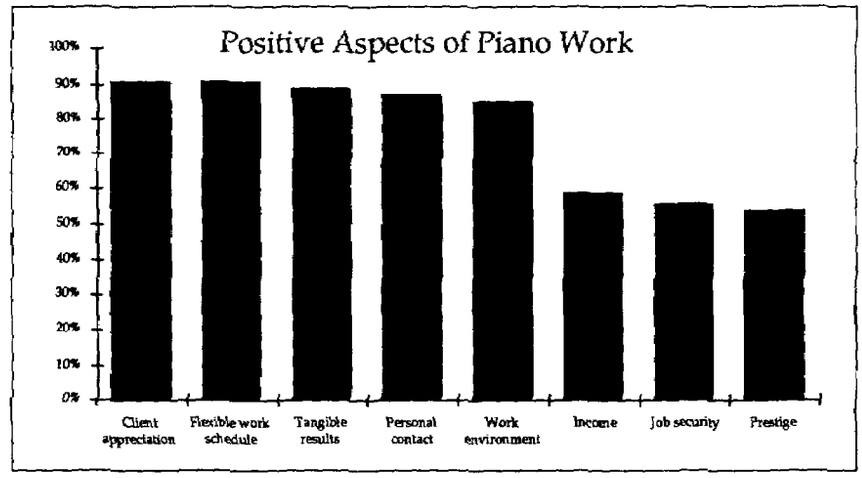


Chart 1 shows the percentages of all respondents who agree or strongly agree on which are the positive aspects of piano work.

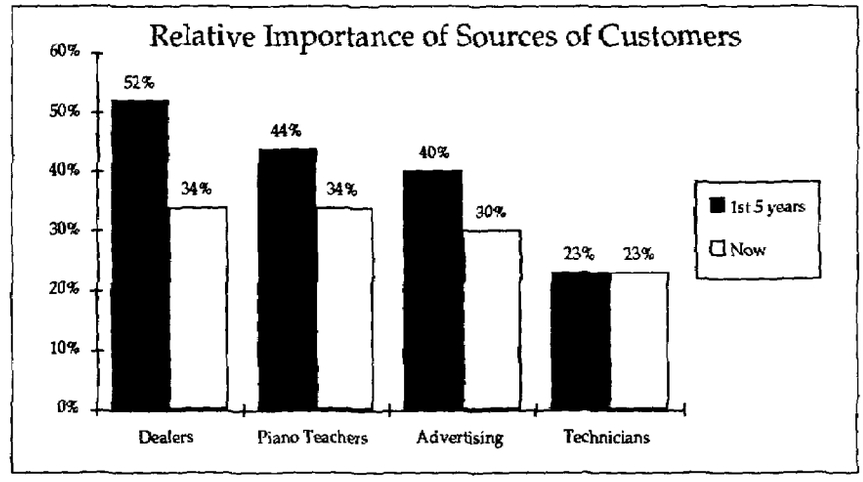


Chart 2 shows the relative importance of sources for customers in the first five years of business and their importance now, according to respondents.

Comeback Of The Piano

Randy Potter
Chapter Program Development Committee Chair

We are seeing an interesting situation in our industry. New piano sales, which reached an all-time high in the mid-1960s and declined during the '70s and into the mid-'80s, are now increasing. While many companies went out of business in the last 20 years, most of those still with us are strong. New companies have been formed. Existing manufacturers have spent millions designing and building new, more accurate, computer-controlled production equipment, resulting in better quality pianos. And, this has been rewarded by the opening of many new stores in the last few years, and the growth and expansion of existing ones.

As the acoustic piano visibly regains much of its former prominence, some are calling it "the comeback of the piano."

One of the healthy, and very welcome, visible evidences of this is the renewed place of the piano in public life — television and advertising.

For example, this last television season had a sitcom (albeit a rather moronic one), "Grand," built around the situations of people whose lives fall in the shadow of a local piano factory. More important, though, are the episodes this last season in major (i.e. top-rated) shows that featured pianos and family life centered around piano playing. Among them were "The Cosby Show" (rated number one most weeks), "The Golden Girls" and "Just the 10 of Us," and "Major Dad" to name a few. Another major showcase for the piano included the recent "Perry Mason Sunday Night Special," where two major scenes were filmed with the Steinway D poster as the backdrop.

As I started writing this article the NBA Championship Series was being played. Nike ran ads, both during the Portland-Phoenix and Chicago-Detroit finals, where David Robinson of the San Antonio Spurs dominates (excuse the pun) half of the ad playing a Steinway D. Nike ran that ad during every game!

While it is interesting that pianos have been used to sell athletic equipment, that is not the only area of consumerism in which the piano has been used as a promotional tool. Ray Charles plays the piano and drinks Diet Pepsi with a big smile on his face. Taco Bell makes their "run for the border" with a cut of a cowboy playing the piano in the middle of the road. McDonald's features Patti Labelle singing and playing the piano in the bed of a pick-up truck in their "drive-thru" ad currently on TV. And IBM's latest shows an engineer scratching his head while looking at his IBM computer — standing next to a grand piano in the factory.

In yet another arena, U.S. Bank, the largest bank in Oregon, is currently running an aggressive advertising campaign to encourage consumers to take out loans. The brochures, three-foot-high posters and television commercials say "when you absolutely, positively have to have it now" and feature these four pictures; a 40-foot motor home, a racy ski boat and trailer, a Porsche, and a grand piano.

Why is the piano used?

The piano is used because it has a high profile and acceptability in today's society. These major companies spend millions of dollars displaying to their most expensive markets items that attract attention and have high consumer identification.

How does this relate to us as piano technicians?

Gallup reported in 1987 that 1,700,000 pianos were sold in the U.S. 140,000 were new, the others used. About eleven used pianos were sold that year for every new one. I have seen many cases where parents who would never have purchased a piano for their children, bought them a keyboard for Christmas a year or two ago. Now they are buying pianos and paying for lessons. Hundreds of thousands of pianos that have sat unused and untuned for years are being sold, bought, tuned, repaired, regulated and rebuilt. This is where you and I, as piano technicians, become involved.

All of this exposure, which is the result of the increased prominence of the place the piano is now playing in the lives of North Americans, translates into an increased need for knowledge and skills on the part of those servicing these instruments — you and I.

And, finally, what does it have to do with Chapter Program Development Committee?

Along with the training we receive through *Journal* articles, and technical institutes and conventions, our local chapters supply the mainstay of technical training in our industry. Our goal in supplying local chapters with fresh ideas, recommendations and resources for technical training is to enhance the expertise of local members, which in turn helps them provide the greatest amount of service to their clients.

The goal of the Chapter Program Development Committee this past year has been to evaluate the audio-video resources (films and video tapes) available through the home office for individual PTG members' and chapters' use. We have prepared a set of recommendations about their usefulness, both by individual technicians and as part of local chapter technical training sessions. That report will form the essence of my next article.

Progress Is Not Made By Contented People

Webb Phillips
CMAC Committee Chair

In looking back on things they were involved in in the past, and were pleased with at the time, people invariably see ways they could have done them better. They didn't see those possibilities at the time, but they can today. This means they have grown. So often, we automatically follow others, not questioning whether the one we are following is qualified to lead. If the game were "Follow The Leader," that might not be so bad, but it tends to be "Follow The Follower."

It's belonging that's important, belonging to the group. That's the subtle trap that gets practically everybody. If we stay in and don't break out of that trap, sooner or later we'll be smothered by it.

How many chapters have you seen formed that never seem to make any progress, and never rise above the stagnant stage? How many chapters have you seen become great with great leaders, and then seem to disappear? They fail to keep in balance the crucial twin functions, education and research — both present and future.

Your chapter has two chapters to consider, its present and its future. How successful we are as chapters will determine the future quality and growth of the entire Guild.

The stages of a chapter's life cycle like living organisms, major corporations, organizations of all kinds large and small, pass through definite *predictable stages of growth and aging.*

The most important thing to recognize is that *we can control* the events that occur in each stage. A chapter can control its own aging process. Your chapter can get into the prime of life and stay there by developing good leadership.

Good things happen to those who know how to manage, to meet deadlines, to build and supervise a team, to get results. That's what makes people take notice. That's what makes your organization successful. It can be summed up as "the ability to make things happen."

That's why we set out to find out what our Guild's top chapters are doing. We are looking for the leaders. We want to find out what techniques are working for them, gain the benefit of their experience and practical insights, and log this information and make it available for all. That is our goal. The method? The monthly CMAC report.

So what is the secret of good chapter management — "Super Stars?" No secrets, really. Just a thorough understanding of what it takes to guide a chapter project from a bright idea to a bottom-line result, the know-how to not only create a plan, but to implement it, monitor progress, correct as necessary, and deliver as promised. A good leader develops the skills to make his or her projects an orderly progression of completed objectives, instead of the all-too-common "helter-skelter" race with disaster.

Nothing in the world stands still. Nothing in the universe stands still. A law of physics says a body in motion tends to remain in motion until acted on by an outside force. A chapter which is growing continues to grow in doing things right (not necessarily in numbers). Conversely, a chapter going backwards or shrinking has a tendency to continue to go backwards or shrink until acted upon by an outside force. So unless your chapter is growing, it is developing the first signs of *death.*

You who are leaders in this organization should realize this same law applies to you as well. Only you can decide what to do about it. You cannot stand still, even if you would like to.

Even though most of our careers have been as technical specialists, as leaders, our future achievements now depend upon how well we can get things done through others. A new, technically oriented leader may need to develop new skills for a serious shift to achieving through influencing others. Genuine management philosophy and practice are absolutely required for long term success.

To grow strong together, we must all share information about our progress, not only in the technical area, but in all areas of organizational leadership and promotion. We need to specialize in the professional development needs of chapter officers.

All Technical Thinking Inhibits Organizational Effectiveness

This committee's crystal-clear goal: to equip you with the tools, knowledge, insights, and skills to develop outstanding chapter and Guild leaders. We are focusing on practical techniques and applications. For projects, we'll try to supply you with step-by-step guidelines.

Whether your chapter is large or small, meets twice a month or twice a year, be your projects straightforward or complex, the same rules apply. Mastering simple, basic leadership skills will make for a super-strong organization from bottom to top.

Thus, your monthly CMAC reports and newsletters are important to this committee. The important reasons are those that are important to you.

One thing to remember is that the report form has an additional benefit of providing the means for you to plan your

continued on page 6

Progress...

activities. It helps you to pinpoint what you need to accomplish.

Because many chapters do not have newsletters, these reports have proven to be a strong link in the chain for all information, quickly and easily, for disbursement to the proper committee or area for follow-up. It is especially designed to make all aware of the areas in which they are not active, and need to upgrade. A monthly report such as this can play a large role in producing the events shaping your future and the future of the Guild. *Better communication means more productivity and fewer problems*; it's just that simple, and extremely important.

CMAC Introduces New Technical Program Evaluation Form

With your help, we will soon be able to provide each region with an accurate, updated book of members capable of making technical presentations, the type of technical and at what level it's presented. Much of this information will come to us on this new CMAC form. It has been made up not to replace the existing form, but for an additional purpose: it will be used to rate technical programs for quality, and also to place the program as appropriate for various levels of audiences.

This information was already requested on the CMAC form, but we feel it will be clearer and given the attention it deserves if moved from the regular CMAC form to a separate sheet.

The new form should be filled out by a knowledgeable person in the chapter. (I may like an opera singer, but I am not qualified to judge the quality of the performance.) Because of the wide range of technical expertise among our members, I feel the most technically qualified person should do the grading, although I realize this will not always be true.

The ultimate goal of this form is to make up a resource book for program chairmen and seminar directors. This book of programs will be available to all those seeking qualified and interesting instructors and speakers at Guild functions of all types. I'm sure everyone could write a book on why we need the various levels of classes and instructors.

Two copies of this and the regular CMAC form will continue to be sent to your chapter president each month. *If they are not discussed at the meeting, your president is holding out on you.* After every meeting one should be mailed to Webb Phillips (address is on the form) and one to your regional Chapter Management and Achievement Committee director. Be sure each gets one *of the two copies of each form.*

Note: When listing non-PTG guests on the regular CMAC monthly report, be sure to include their addresses. This is so they can be added to the mailing lists for seminars.

That leader personality, the president, should delegate this task to someone with stronger secretarial skills if this is what will get the job done.

So whatever and whomever, please help us to help you by seeing that these reports get sent in every time there is a meeting and a technical presentation.

We are all faced with our own unique problems and challenges, but work together on projects of common appeal such as this. I'm sure you will find it beneficial to all.

Next month we will be telling you more about chapter awards — how and why.

Apple Macintosh User Wanted

Wanted: Apple Macintosh user to help with the design of new billing forms, rebuilding contracts, checklists, form letters, etc. Billing forms are now on Aldus Freehand. Contact Carl D. Root, Economic Affairs Committee Chair; 9505 Watts Branch Drive; Rockville, MD 20850 (301) 279-2440.

Directory Corrections

Thomas Jones
new region, chapter, address and phone: **region 1, chapter 041; 6 Gilbert Street, Orono, ME 04473 (207) 990-3107**

Charles Patterson
correct chapter: **chapter 296**

Daniel Lundell
correct address: **HCR 80, Box 7879 McManus, Chugiak, AK 99567**

Aubrey Willis School
new address: **2633 East Indian School Road, Suite 401, Phoenix, AZ 85016 (602) 955-4600**

Membership Status

Northeast Region	838
Northeast RTTs	539
Southeast Region	597
Southeast RTTs	391
South Central Reg.	330
South Central RTTs	214
Central East Region	639
Central East RTTs	403
Central West Region	373
Central West RTTs	254
Western Region	610
Western RTTs	400
Pacific NW Region	347
Pacific NW RTTs	236
Total Membership	3733
Total RTTs	2201

Music Commission Names Blue-Ribbon Panel

Leaders from education, government, business and the arts are participating in a National Commission on Music Education that will conduct a series of public forums this fall on the state of music education in the United States. The series of forums, which began Sept. 18 in Los Angeles, will provide an opportunity to exchange local and national information and to gather public opinion. A videotape by commission member Henry Mancini will highlight the meetings, which will be in Chicago October 18 and Nashville Nov. 14.

Besides Mancini, the Commission includes: Steve Allen; Gregory R. Anrig, Educational Testing Service; cartoonist Tom Batiuk; Leonard Bernstein; Martin Bookspan; Ernest Boyer, Carnegie Foundation; Dave Brubeck; Bruce Christenson, Public Broadcasting System; Erling W. Clausen, American Association of School Administrators; Hon. Bob Clement, U.S. House of Representatives; Jack Coffey, National Association of Music Merchants; Edwin M. Cooperman, American Express; Peter J. Dowd, Texaco, Inc.; Graham Down, Council for Basic Education; Hon Thomas J. Downey, U.S. House of Representatives; J. Martin Emerson, American Federation of Musicians;

Gloria Estefan; Martin C. Fricke, National School Boards Association; Keith Geiger, National Education Association; Karl J. Glenn, Music Educators National Conference; Morton Gould, ASCAP; Hon. Bill Green, U.S. House of Representatives; Michael Green, National Academy of Recording Arts and Sciences; Herbert J. Grover, Council of Chief State School Officers; Emmylou Harris; Hon. Augustus F. Hawkins, U.S. House of Representatives; Whitney Houston; Alan Jabbour, Library of Congress; Hon. James M. Jeffords, U.S. Senate;

Billy Joel; Quincy Jones; William Kaman II, Kaman Music Corp.; John Lammel, National Association of Secondary School Principals; Jack Lemmon; Shari Lewis; Shirley Lincoln, National Association of Elementary School principals; Ann Lynch, National PTA; Barbara Mandrell; Keith Mardak, Hal Leonard Publishing Corp.; Marilyn McCoo; Hon Raymond McGrath, U.S. House of Representatives; Robert Merrill; Dudley Moore; Vito Pasucci, G.Leblanc Corp.; Luciano Pavarotti; Itzhak Perlman; Frances W. Preston, BMI;

Andre Previn; Milton Rhodes, American Council for the Arts; Ralph Rinzler, the Smithsonian Institution; Fred Rogers; Bill Schultz, Fender Musical Instrument Corp.; Gerard Schwarz; Albert Shanker, American Federation of Teachers; Harold Smith, Baldwin Piano and Organ Co.; Peter Suzuki, Yamaha Corp. of America; Frank R. Wilson, M.D., University of California, San Francisco; and James Wolfensohn, John F. Kennedy Center for the Performing Arts.

Following the forums, the Commission's findings will be published in a report which will be presented to Congress and the Administration. Copies will be distributed to elected officials, the business community, teachers, parent groups and school administrators.

The year-long campaign will culminate in a national symposium which will examine the impact of music and the other arts on three major challenges facing education today: children at risk, the cultural diversity in our schools, and the needs of the future workforce.

The Commission's campaign, coordinated by NAMM, the National Academy of Recording Arts and Sciences, and the Music Educators National Conference, is the most diverse and broad-ranging coalition in the history of the music industry.

Guild members and chapters are urged to play a part in the campaign by conducting petition drives in their home communities. A petition and cover sheet explaining the music community's position are printed inside the back cover of this *Journal* issue. Please make a copy and collect as many signatures as you can during your daily schedule of appointments. Music does make the difference...for all of us.

Dallas Raffle Winners Announced

The Dallas Chapter would like to thank everyone who supported our Texas Roundup Raffle and the sale of 1990 Convention Pins. We especially would like to thank all the manufacturers who contributed action models for the raffle. Below is a listing of the contributors and the raffle winners.

Grand Prize, Hale Hammer gold-plated tuning fork and hammer — Dean Clark, Bossier City, LA; *Young Chang upright action model* — Bill Clayton, Charlotte, NC; *Young Chang grand action model* — Hans Sander, Shephersville, KY; *Yamaha upright action model* — Alan Hallmark, Richmond, VA; *Yamaha grand action model* — C. Marley, NSW Australia; *Wurlitzer action model* — Richard Gann, Denison, TX; *Walters action model* — Elgin Bagwell, Chatanooga, TN; *Steinway action model* — John Hess, San Antonio, TX; *Seiler grand action model* — Alan Hallmark, Richmond, VA; *Seiler upright action model* — Ernie Preuitt, Independence, MO; *Samick grand action model* — Morris Strouss, Lima, OH; *Samick upright action model* — Paul Hansen, Markham, ON; *Lyon & Healy action model* — Keith McGavern, Shawnee, OK; *Kawai grand action model* — Sperry, El Paso, TX; *Kawai upright action model* — Robin Hufford, Ft. Worth, TX; *Kimball grand action model* — Y.B. Shipp, Van Nuys, CA; *Kimball grand action model* — Aiko Porter, Flagstaff, AZ; *Baldwin grand action* — Gene Wood, Washington, IN.

Survey...

give him 11 years to reach his goal, there are a total of 91 who made $24,000 or more. (To define him, or her, primarily as a field service tuner, which appears to be the goal of the technician asking the question, the figures include the requirement of grossing over $10,000 from that type of work.)

We have two useful statistics: 1. The average income for technicians with between six and 11 years of experience is $20,000. 2. Six percent of the technicians with 11 years experience or less have established a clientele that will net at least $24,000.

We could look at data from those records and compare it to the entire membership or another more precisely defined group to try to find out what it is those 91 members are doing which accounts for their business success. But that's a subject for another article if interest warrants.

Most of you had access to a complete listing of the raw data for each of the 100 questions in the September 1990 *Update*. The data is accessible, albeit difficult to read in a text format. I have received only a few inquiries asking me to look at various subgroups within our membership, and I would appreciate more. Please send your questions to my new address: 9505 Watts Branch Drive, Rockville, MD 20850.

Who Are We? *continued from page 3*

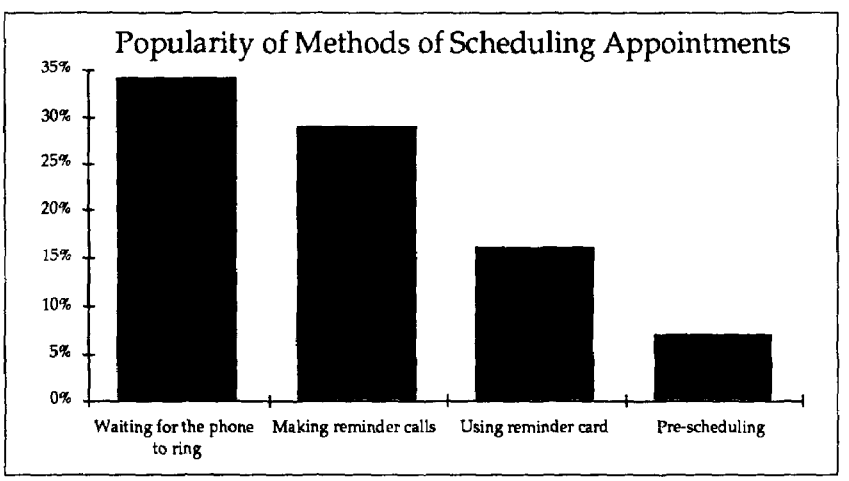


Chart 3 shows the most popular method of scheduling appointments.

more shopwork in the last 3 years compared to prior years.

- 62% of the members have never done piano work in a supervised environment.
- 84% play the piano or other instrument fairly well or very well.
- 43% of the members who responded to this question provide less than 50% of their household income by working with pianos.
- 30% made more than $5,000 from non-tuning field service work and minor shop work.
- 14% grossed $10,000+ from contract rebuilding
- 3% grossed $10,000+ from subcontract rebuilding
- 6% grossed $10,000+ from the sale of rebuilt pianos
- 2% grossed $100,000+ from new piano sales
- 8% made $250+ from commissions
- 10% made $250+ by subcontracting work out
- 21% made $5,000+ from institutional work
- 15% made $5,000= from dealers

Teacher Receives Foundation Award

Shearon Smith Horton of Metairie, LA, has received a $750 advanced-study scholarship from the PTG Foundation.

The scholarship is awarded annually to a nationally certified member of the Music Teachers National Association. The 1990 scholarship is the fourth presented by the Foundation.

PTG's Teacher Relations Committee Chairman, David Rostkoski, reviewed a number of scholarship applications with Harriet Green, MTNA's national certification chairman, during MTNA's annual convention in Little Rock, AR. Horton was selected because of her solid background in music education and plans for her continuing course of study.

Horton, who has taught in both private and institutional settings, recently moved to Metairie to participate in doctoral studies at Louisiana State University with Dr. Jack Guerry.

In a recent letter, she thanked Guild members for their support. "I am enjoying my studies at LSU, and appreciate very much the assistance of both MTNA and the Piano Technicians Guild.

Correction

An article on page 8 of the September *Journal Update* incorrectly asked that comments and suggestions regarding the first membership survey be sent to Roy Hebert, chairman of a committee charged with developing a second survey. Hebert actually asked for readers' comments and suggestions that may be helpful in developing a new questionnaire. The original survey was compiled by Economic Affairs Committee Chairman Carl Root.

recommended that the best quality tuning hammer with extension lever, equipped with at least three heads and three tips, plus a tip wrench, be secured. In addition, a tuning fork at A-440 pitch (or its equivalent depending on your starting point), an Electro-Fork or Sanderson Accu-Tuner is necessary to establish pitch. Felt strip mutes and individual rubber mutes with wires are necessary for tuning the octaves and unisons. Large, medium, and small screwdrivers, along with other assorted regulating tools to fit the combination handle are very helpful. Finally, an assortment of miscellaneous supplies and glues for on-the-spot repairs are essential.

A demonstration of setting the pitch and tuning the temperament followed. The system for setting the temperament was called "The Pattern Scale" and involved the tuning of Major thirds and fifths. The unusual thing about this system was that the temperament was tuned from F♭3 to F♭4, and was referred to as the "Black Key Temperament." It was stated that there are four series of contiguous Major thirds, each of which is known in harmony as an *Augmented Chord*. This chord was said, according to Helmholtz, to be the most dissonant of all chords in music. It was Mr. Travis' belief that if the dissonant intervals were taken care of, the consonant intervals would take care of themselves. He emphasized, however, that it takes both dissonance and consonance to produce harmony. The basic temperament procedure is to tune up a Major third, up a Major third, and down a fifth. Up a third, up a third, and down a fifth. This procedure is continued until all four series' of Major thirds have been completed. By testing interval against interval, ultimately equal temperament is achieved. ≡

At Large

Even More On Tuning Stability

Ernie Juhn, RTT
Long Island-Nassau, NY, Chapter

The following concerns my theory about climate control installation. No doubt, changes in humidity cause the soundboard to contract and expand. Since the board is crowned, and its motion is limited due to the fact that it is "boxed in," a change in humidity manifests itself in changes of the crown. When the soundboard expands, the crown increases, and consequently this adds to the tension of the strings and the pitch will go up. The opposite happens when the soundboard contracts. These changes are most obvious in the tenor section of the piano, which in reality is in the center of the board.

Such changes will occur as fast as within a few minutes of climatic variation. This can be easily demonstrated by drying the soundboard with a hair dryer or applying moisture with a "cold steam" vaporizer. We should do everything in our power to minimize such climatic changes. Naturally, a constant control of room humidity is ideal. Since this is not always possible, controlling the humidity in and around the piano is a practical solution.

The standard package of a climate control unit includes one humidifier and one dehumidifier, along with a humidistat and some other hardware. I believe that for most verticals as well as small grands, this is all that is necessary. Here are some more important points. I am convinced that after installation of a climate control unit, it takes at least two tunings within a few weeks for the piano to stabilize. After that, the most important thing is regular and frequent observation.

Depending on the particular environment, some pianos will need more humidification or dehumidification than others. The most practical way of determining this is to tune the instrument to standard pitch, and observing it during the various seasons. It will then be clear whether the piano needs more humidity or more dryness.

Before installing an extra humidifier or dehumidifier, the possibility of *changing the position of the humidistat* should be considered. The closer the humidistat is to the dehumidifier, the more it will favor the humidifier, and vice versa. There is a pretty good chance that keeping this in mind and changing the position of the humidistat will stabilize the piano.

Should repositioning of the humidistat not do the trick, either install another dehumidifier or humidifier as the case may be. The important thing to remember is that if the piano has a tendency to go sharp, it is an indication that the soundboard expands too much, and more dehumidification is necessary. If, on the other hand, the piano keeps going flat, there is no doubt the piano needs more humidification to keep it stable.

Here is another fact worth mentioning. New soundboards are active, and not only provide good amplification of sound, but are also quite susceptible to climatic variations. Old soundboards, on the other hand, are less active, and react less to environmental changes. This explains quite well why some people feel their "old piano" did not go out of tune as fast as their newly-acquired instrument.

In closing, I believe I should point out that I am in no way connected with the Dampp-Chaser company, and opinions expressed above are based on my own experience.

PRACTICALLY SPEAKING

Grand Hammers Part II; Tail Shaping

Bill Spurlock, RTT
Sacramento Valley Chapter

Last month's article discussed hammer selection, pre-filing, determining proper dimensions and boring. This month I will continue with a look at some simple shop jigs you can use to do your own tail arcing, tapering, and removal of excess weight.

I began last month by stating that hammers have only the *potential* to produce good touch and tone, and to reach that potential they must be properly shaped, installed, and voiced for a given piano. Many of us have seen jobs where good quality hammers failed to reach their potential because they were not shaped properly before installation. Common problems here are poorly-shaped tails resulting in poor checking, and inadequate tail shaping and tapering resulting in much heavier-than-original hammers and consequent "heavy touch."

How can we be sure we are doing a good job when preparing hammers? The answer is simple and is the same for any other piano work: compare your work to the original (assuming a quality piano). For example, when we restring a piano we should be aware that the original coils were neat, level, and tight together. Then, as we work, we will hopefully stop and re-evaluate our procedures if our coils are turning out to look like tangled spaghetti. Likewise, we should also be aware of the elements of good hammer work. If the original hammers on a quality piano were very light in weight with extensively trimmed tails, then the sight of big heavy replacements with crude uneven tails should trigger a "reality check" alert. This does not mean original designs cannot sometimes be improved; however, step one is to know what aspects of the original you are changing, and to have a good reason to do so.

In this article I will be advocating this course of following original design in most respects. While some would argue the virtues of making hammers extremely light and others would advocate adding metal weights to hammers, I feel a major improvement in our work would occur if all technicians simply did good, thorough hammer replacement jobs, including nitpicking the regulation and voicing and delivering a quality job to the customer in a timely manner. The tedium of "ordinary" work may not seem as exciting as more exotic approaches, but it is the ordinary that is seldom done really right, and it is this thorough attention to detail that really makes an outstanding job. Whew! Now to get off my soap box and on with the hammer shaping.

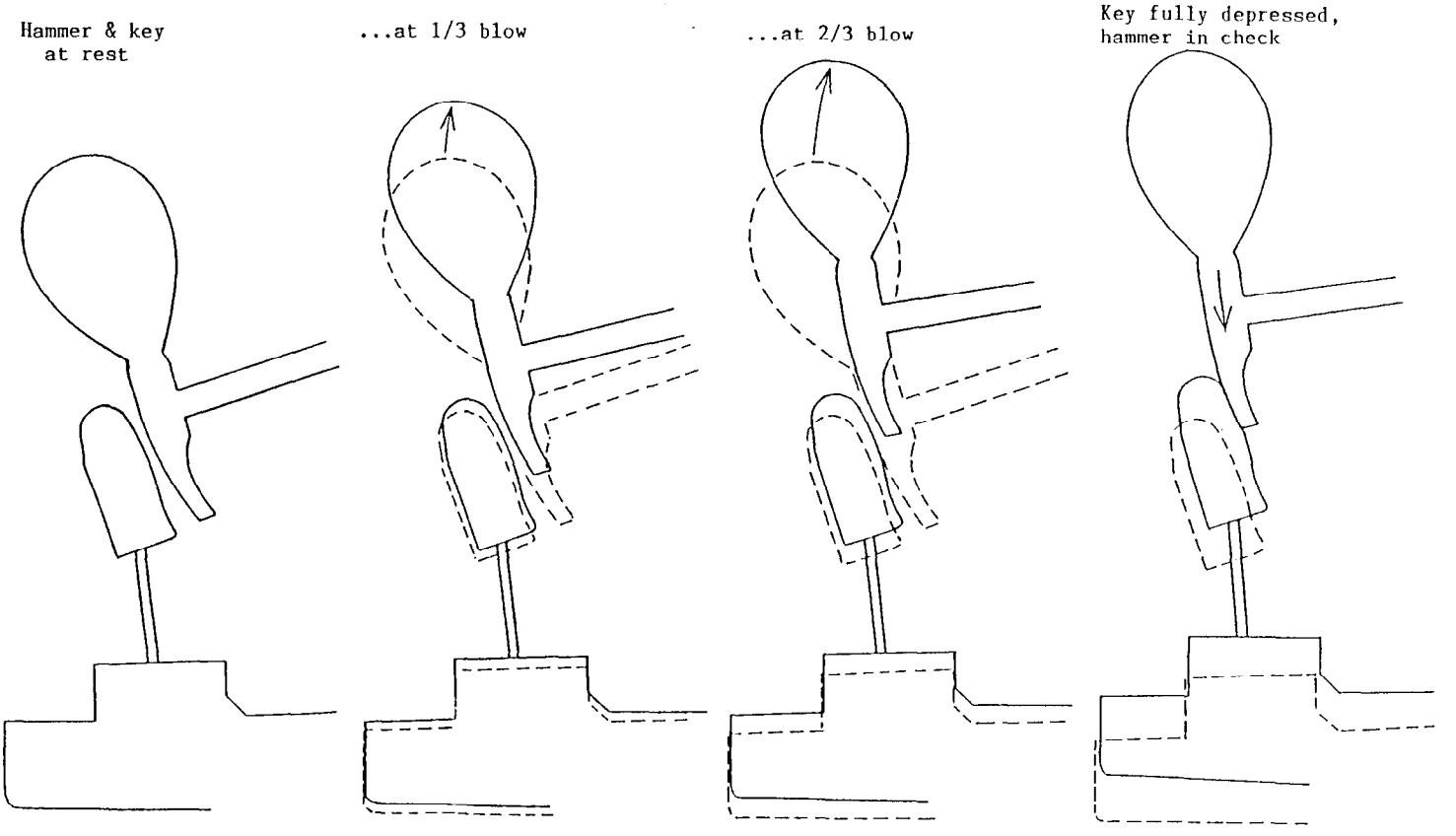
Tail Shape And Checking

After boring the hammers, I would next shape the tails for proper checking. The requirements of good hammer checking are: hammers can be made to check close to the strings (5/8" or less), hammers check approximately the same distance from the strings regardless of playing force, hammers check reliably on a soft blow, and hammer tails do not wear out backchecks prematurely. The main factors affecting checking are: backcheck height and hammer tail length (as discussed last month), hammer tail shape or arc, backcheck angle or bevel, and condition of backcheck leather and hammer tail surface.

Let's look at our first requirement above. For best repetition, we normally adjust the backchecks so the hammers check as high as possible. As we bend the backcheck closer and closer to the hammer tail, a limiting point is reached when the hammer tails drag on the backchecks on the way up. (Test for this by placing finger pressure against the hammer while pressing the key, and watching to make sure the tail clears the backcheck as the hammer rises.) The shape of the hammer tail (assuming proper backcheck height and tail length) determines how high we can set the checking without the tails dragging.

This point is illustrated in figure 1, which shows a hammer tail shaped in a smooth even arc from the shank down to the end of the tail. It is shown in three different stages of lift on its way to the string. Notice that as the hammer rises, it follows a 5 1/4" radius (the distance from the centerpin to the tail). At the same time, the backcheck moves in an arc also, bringing it closer to the path the hammer is following. Therefore, to avoid contact between backcheck and tail, but still allow the backcheck to be set as close as possible, the tail must be arced to a smaller radius than the shank length. If that radius is a combination of the hammer path and the backcheck path, the clearance between the two will remain uniform as the hammer passes on its way up, as shown in the drawings. This radius will be around three inches, and allows you to set minimal passing clearance because the tail has no humps that have to clear. Now, looking at the first picture in figure 1, imagine a hump on the tail just below the shank hole. To avoid interference, the backcheck would have to be bent back, further from the tail, and the hammer could not check as high. Therefore the smooth, even tail curve allows the highest possible checking. At the same time, this tail is as straight as possible for greatest contact area with the backcheck. Incidentally, I made the drawings in figure 1 from tracings of a Yamaha C3 action in various stages of operation; this action can be adjusted to check as close as 3/8"

figure 1: an action with proper tail curve, tail length, backcheck height, and backcheck angle

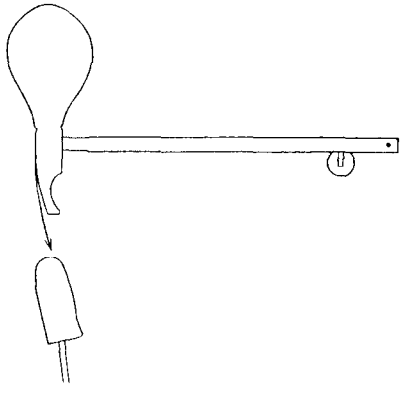


Note that the even tail curve allows the backcheck to be set close to the tail for high checking, without dragging on the tail as the hammer rises. The tail and backcheck pass with uniform clearance. When in check, tail and backcheck have good contact area and wedge tightly together.

from the string.

Our second requirement for good checking is that the hammers check at approximately the same height regardless of playing force. This requires a tail shape that wedges against the backcheck as it is caught. This wedging action provides increasing resistance as the tail drives further down against the backcheck. As shown in figure 2, when the hammer tail is arced to a radius *shorter* than the radius of swing of the hammer (shorter than the shank length) *and* the backcheck bevel is set parallel to the tail curve, the backcheck and tail surfaces are on intersecting paths as the hammer rebounds from the string. Conversely, if the tail was arced to the *same* radius as the shank length, there would be no wedging force at all between tail and backcheck. Instead, the tail would slide easily past on a hard rebound. The other extreme of a sharply-curved tail and severely-angled backcheck will stop the rebounding hammer very well on a hard blow, but does not allow the hammer to slip far enough into check on a soft blow to become caught. Here again, a three-inch radius tail arc provides good wedging action while still being straight enough to allow the tail to slide easily into check on a soft blow.

figure 2: When tail is arced to radius smaller than the shank length, hammer wedges tighter against backcheck as it drops into check.



While we're on the subject, have you ever had trouble making hammers check on a soft blow in the low bass? I have, and after trying all kinds of tail shapes, adjustments, tail checkering, weakening of the repetition springs, etc. I discovered that hammer number one will check just fine when moved up to the top of the bass. This tells me that hammers probably do not rebound as forcefully off the low bass strings as they do from smaller, multiple strings. On most actions, however, I find that the tail shape, tail length and backcheck height recommended here will allow good checking in the low bass on all but the softest of playing.

When tail shape etc. are correct, then wear on backcheck leather is reduced because contact area is large, the rubbing surfaces are smooth curves, and no "checkering" or extreme roughening of the tails is necessary to achieve good checking. On the other hand, if tails etc. are not right, then no amount of tail roughening will really give good results.

Adjusting Tail Length

After boring the hammers, I would next shorten the tails if too long (see last month's discussion of tail length). This shortening can be done using a disc sander with table, by laying each hammer flat on the table and pushing the tail

into the disc. A block of wood pushing against the crown of the hammer can be stopped against another block clamped to the table so each hammer is shortened to the same length. Make sure the table is square to the disc, so the bottom ends of the tails remain square to the hammer sides.

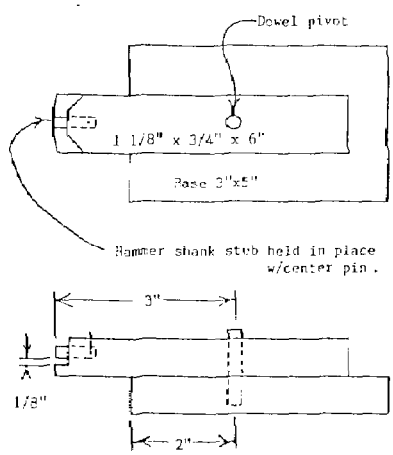
Arcing The Tails

Unshaped replacement hammers may come with moldings that are either partially arced or completely square and unshaped. Since we want the outside surface of the tails to be square to the backchecks (parallel to the action rails), this arcing must be done in relation to the bore hole in the hammer. In other words, regardless of the bore angle of the hammer, the outer surface of the tail should be shaped square to the hammer shank.

Some pianos have been made with all tails squared to the hammer sides, regardless of bore angle, and with the backchecks rotated to match the angled hammers. This causes the hammers and keys to wedge sideways against each other as the hammers check, putting a sideways force on the hammer centers and an opposite, twisting force against the keys. I recommend shaping all tails square to the shanks and turning all backchecks straight when replacing hammers on these pianos.

Arcing of tails is usually done by sanding, either with a flexible sanding disc in an electric drill after the hammers are installed, or with a jig and stationary sander prior to installation. An acceptable job can be done either way. However, I prefer the jig method because it gives me the control necessary to shape each tail exactly alike and to a specific shape. Consistency in touch and tone starts with uniformly shaped action parts, which then allow uniform regulation and touch. Jigs allow us to shape parts uniformly in fast, assembly-line style.

Our three-inch radius tail curve can be easily made using the jig shown in figure 3 and a stationary belt disc or sander. The sandpaper should be new and coarse, preferably 60-grit. When using a disc sander, the table should be lowered below center if possible, so the hammer tail will be right on a horizontal with the disc center. That way the sanding scratches will be straight across the



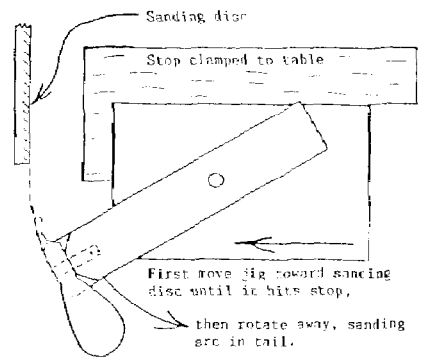


figure 3: hammer tail arcing jig

hammer tails, rather than angled. Note that the short piece of shank is pinned, rather than glued, into the jig. This is so you can replace or knurl it as necessary so the hammers fit on freely but without wobbling. Clamp a stop to the sander table to limit the amount of material removed. By trial and error, adjust this stop until both bass and treble sample hammers have as large a sanded area as possible without excessive thinning at the bottom ends of the tails. Depending upon tail length and the existing inside shape of the tails, you might use a slightly different radius than the three-inch shown; just drill a hole on either side of the one shown for two alternative radii. Often the entire length of tail from felt to bottom tip can be sanded in one continuous arc.

Assuming accurate boring, a good fit of the hammers on the jig stub, and care that each hammer is pushed all the way on before sanding, your tails should all come out very uniform. The coarse new sandpaper will leave the tails with a good textured surface; together with the right hammer tail curve for maximum contact area, no further roughening or checking of the hammer tails will be needed to ensure reliable checking.

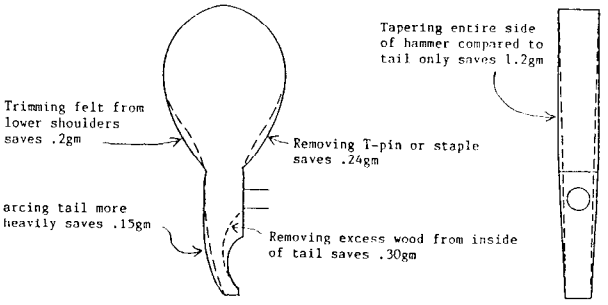
Removing Excess Wood From Insides Of Tails

As I mentioned in last month's article, many quality older pianos had very lightweight hammers originally. In most cases the sides of these hammers were tapered along their entire length rather than only in the tail area, and the tails were arced heavily, leaving them fairly thin. In addition, many had moldings made of a very lightweight species of mahogany. The result is that modern replacements, even those from the original manufacturer, are often heavier than the originals were when new and thus cause a heavier-than-desired touchweight. Felt density is a big factor in hammer weight; dense harder hammers will often be heavier than soft hammers, even if shaped smaller.

One approach to this touchweight problem is to add more lead to the keys. This will reduce the downweight of the action; however it also adds inertia, or resistance to movement, to the mechanism. As an example, imagine two teeter-totters. The first has a 20-pound child on one end and a 30-pound child on the other. The second teeter-totter has a 400-pound Sumo wrestler on one end and a 410-pound Sumo wrestler on the other. Both teeter-totters have a "touchweight" of 10 pounds; however if you imagine walking up behind each and pumping them up and down, it is apparent that you can oscillate the children much faster and easier than you can the wrestlers. Likewise, a piano key with minimal lead and a light hammer will play and repeat more easily than one with lots of lead and a very heavy hammer.

It seems better, therefore, to avoid touchweight problems by matching the weight of replacement hammers as closely as possible to that of the originals. Of course, the exact original weight of the replacements is unknown because they will now be worn smaller. However, back when we fitted some sample hammers to prove out our bore distances etc. we (hopefully) made touchweight measurements and so should be aware of whether our replacements will give acceptable upweight and

figure 4: the effect of various shaping operations on touchweight



In this typical example, 2.09gm were removed from a standard supplier-shaped hammer. This would reduce the action downweight by approximately 12gm.

downweight values, or how much extra weight will have to be removed from them to make a good match for the originals. (These measurements would have to be made on sample notes that had action parts in good condition, friction points correct, etc. See Alan Vincent's recent series on touchweight.) Figure 4 shows the effect of various shaping operations on hammer weight.

In order to match the weight of original hammers on older pianos, it is often necessary to do much more extensive hammer shaping than we might be used to seeing on current new instruments. Besides purchasing replacements with mahogany moldings, doing generous tail arcing, and tapering the entire sides of the hammers, a significant amount of weight can usually be removed from the insides of the tails. To do this, I use the top part of the tail arcing jig, with the hammer installed inside-out on the shank stub. This jig is used as a holder to feed the hammer into a one-inch sanding drum which is mounted in a drill press, as shown in figure 5. A guide block clamped to the drill press table aligns the jig to the sanding drum. Adjust the guide block such that when the sanded arc reaches the shank hole, there is still a little unsanded flat left at the bottom of the tail, as shown. This retains the original factory edge at the lower end of the molding for use later on to align the tails when hanging.

Note that since the hammers are mounted on the arcing jig during this operation, the angle-bored hammers are tilted the same way as they were when their outside surface was arced. This means the shape you sand into the inside of the tails will be square in cross section (and stronger) rather than thin on one side and thick on the other.

Additional weight can be removed at this time by laying each hammer flat on the table and sanding away some of the felt from the lower shoulders using the same one-inch sanding drum. An extra 1/4 gram can be saved by pulling and discarding the T-pin type staples if present.

figure 5: removing excess wood from inside of tails

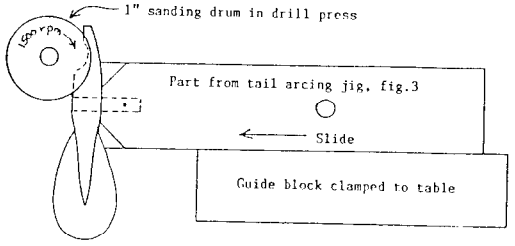
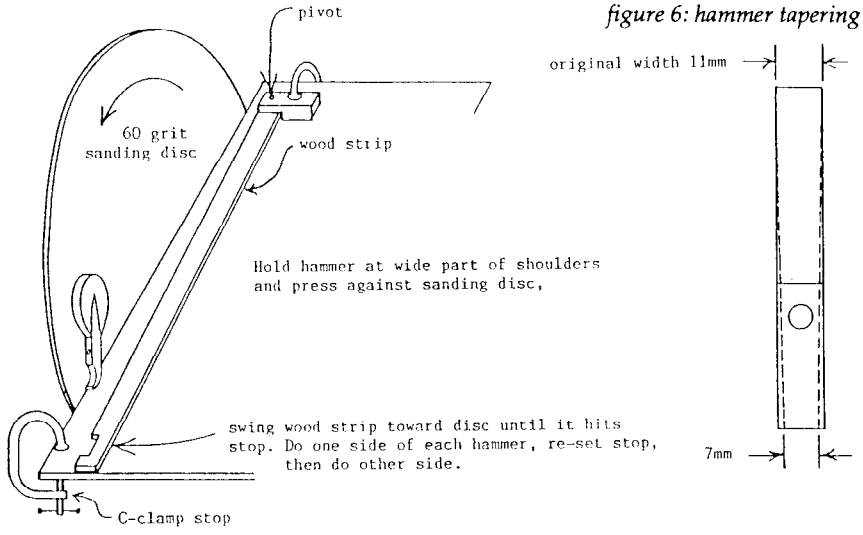


figure 6: hammer tapering jig



Tapering The Sides

I taper the hammer sides last, because it is convenient to have the sides parallel for all previous steps. If weight and clearance are not a problem, the tails only can be tapered, from the bottom of the felt on down. This can be done with a hand plane and shooting board (board with a "V-shaped" recess to hold the hammer while planing), or by inserting each hammer between an angled fence and a sanding disc.

In most cases weight *is* a problem, and as already mentioned, most quality older pianos had hammers tapered along their entire length. I use a disc sander for this job, as shown in figure 6. (A stationary belt sander could be used as well.) Here each hammer is held at the wide part of the shoulders and pressed lightly against the spinning disc while the other hand swings the wooden stick over against the hammer tail, forcing it against the disc. The stick is stopped by a C-clamp, limiting the sanding to a pre-set amount. In this operation, one side of each hammer is tapered, then the stop is reset and the other side of each is done. The broad shoulder area of the hammer sands quite slowly compared to the slender tail, so the hammer comes out tapered even though both top and bottom are being pushed against the disc.

To adjust the stop, first measure the width of the hammers and decide how narrow you want them to be at the bottom of the tails. Typically, a hammer will start out 11mm wide, and we may want to taper them down to seven millimeters at the bottom. Therefore we will remove two millimeters from each side of the tail. We will first set the stop to sand each hammer down to nine millimeters at its bottom end, then reset it to seven millimeters for the other side. This procedure makes each hammer symmetrical, with an even taper on each side.

To prevent glazing the sides of the hammers from overheating the felt, new sharp 60-grit paper should be used, and the sander should be set to a low speed. A vacuum hose placed just below the table or compressed air directed at the disc will reduce staining of the hammer sides by the colored underfelt. Any staining that does occur can be blown off

with compressed air later. *Caution:* When using a belt or disc sander, always set the table as close as possible to the disc (or belt). Never leave a gap which could trap a finger!

Conclusion

For those accustomed to buying replacement hammers and just "slapping them on," some of the shaping procedures I've outlined here may appear radical or unusual. However, the object of these procedures is simply to match the weight and shape of original hammers and therefore actually represents a conservative approach. Hammers have a major effect upon touch and tone, but are often supplied in a very raw state. The many steps necessary to match them to the piano represent thoroughness; anything less is just incomplete work.

Next month I'll conclude with a look at preparing and traveling shanks, determining the proper strike line, hanging hammers and final trimming. ≡

GOOD VIBRATIONS

Removing The Old Bridge Top With Power Tools

Nick Gravagne, RTT
New Mexico Chapter

The last article in this series on bridge recapping discussed the removal of old bridge tops by chiseling, or hand planing, or both. Working with non-powered hand tools, like everything else we do, has it upside and its downside. On the upside, hand tools are quiet, less messy (raise less airborne dust, etc.), and are usually more controllable for fine, close work than are their Tazmanian-devil-type powered counterparts. But chisels, handplanes, and, to a lesser extent, scrapers require considerable skill to sharpen, adjust and operate effectively. And for a given amount of work, hand tools are more fatiguing to use than power tools.

As to bridge top removal using hand planes, an annoying hindrance sure to thwart the inexperienced (indeed, even the veteran) woodworker is what I call the "lazy plane." The cutting edge of this sluggardly tool would sooner ride on top of the hard wood rather than cut through it. For tool and worker alike, planing maple is considerably more difficult than planing spruce. Planes seem to know this and so devise cunning schemes to shirk their duties when talk of maple floats around the shop. In order to convert a lazy plane into a working plane the woodworker must re-establish a "bite" somewhere, usually at the beginning of the cut. On bridge tops a fresh bite can often be had — in fact, can only be had — by planing into the wood from anywhere along the edges. The small rabbet plane mentioned in an earlier article is very effective when planing in from the bridge edges.

A different sort of character hanging around the tool chest is the "union plane." This by-the-book tool will go on strike in a moment's notice if anything in the adjustment or mechanism isn't up to regulations or, worse, if the blade is dull. Working with hand tools and hardwoods (especially maple) is simply impossible unless the cutting blades are honed to a mirror finish and are supersharp. Non-powered hand tools possess a kind of intelligence and personality; most are prima donnas and require pampering and proper handling. Indulge them, take command of them, and they can do wonderful things for you — things that no other tools can do.

Power Tools

Compared to sensitive hand tools, power tools are loud, thick-necked brutes — the defensive linebackers of the woodworker's shop. They can chew up good wood as quickly and ruthlessly as unwanted wood, blind in their duty save to feed a voracious appetite for wood fibers. Still, they are hard-working and loyal, and they are not dilettantes. The one power tool essential to bridge top removal is the full-size router, or its smaller brother, the laminate trimmer (small router). Power planes can also gobble up a bridge top quite neatly and, moreover, they serve beautifully well later on in the project for reducing a new too-tall cap to the required dimension; something a router can't do.

Routing

It should be obvious that routing off bridge tops requires that the slick base of the tool be somehow supported on something other than the work being cut off. Photo 1 shows a router equipped with two hardwood runners which have rounded sled-like bottoms to minimize friction. The runners measure about 1 1/2 inch tall by 1/2 or 5/8 inch wide. The plastic base plate (which is held on with three screws for this tool) was removed and clearance holes drilled through it at appropriate places for runner attachment. After the runners are screwed to the base plate the assembly is secured back to the router.

As can be seen in the photo, the router in operation straddles the bridge, allowing the 3/4-inch straight cutting bit to be lowered or raised as necessary. Carbide bits, as always, work better than the ordinary variety. Since the height of a bridge relative to the soundboard surface is not uniform along the length of the bridge, the router cut should be started at a high place. Measurements taken, for example, from a Steinway M showed the bridge height to vary by .300", the lowest place being (typically) in the high treble, and the highest reading being in the tenor area.

In order to decrease the amount of wood removal, to say nothing of reducing the overall work involved, it is sometimes advisable to cut in a two-step (or even three-step) surface on which to glue the new caps. Photo 1 shows a two-step cut. The lower level exists in the high treble. Locate the step under a plate bar, and don't try to rout a straight line across the bridge top. Rather, make the cross-bridge straight cut *first* using a small saw, and then begin routing. As you near the saw kerf, run the router up close to it, but stop just short of actually reaching it. When the routing is completed, use a chisel to remove the small amount of wood still standing at the saw kerf.

Remember, a router with runners will always leave the body of the bridge, i.e. that which is left intact, at uniform height above the surface of the soundboard. If step cuts are made, each step will be of uniform height above the soundboard. But planing, either with hand or power tools, will not necessarily leave the bridge body at uniform height above the soundboard, unless

you go to pains to make it so. It is not imperative that the routed or planed surface be any particular height at all; what matters is that the surface be reasonably flat and true.

The usual router precautions are in order here. It is best to insert the bit all the way into the collet, and make sure the depth adjustment is securely locked or the working bit will be wandering up and down. Don't hog too much material in one pass or the tool will be laboring, the bit and wood will be burning, and you'll be wishing you were doing something else. Wear eye, ear, and lung protection and be prepared to clean up a blanket of chips.

Since the runners ride on the soundboard, the condition of the board's surface needs to be considered. Cracks in the board which cause different surface levels to exist will create problems of operation both in movement of the tool and uniformity of cut. On a cracked soundboard, it is perhaps best to repair (but not finish) the soundboard before the bridge top is routed off.

Unfortunately, the large six-inch-base router is not able to remove material in the highest treble due to case obstruction. In addition, one of the runners will not have a surface on which to ride as the bridge is too close to the belly rail edge of the soundboard. Laminate trimmers come in handy here since their smaller three-inch bases allow the tool to cut all the way to the end of the high treble on most pianos. Runners, however, will not work on them. When using laminate trimmers, contour shelves (which follow the serpentine contour of the bridge length) need to be built up along either side of the bridge, the purpose of this is to support the router base. Make the shelves out of pine and stick them to the soundboard with double-stick tape, (the real stuff — don't make a loop out of ordinary tape). The height of the shelves should stand below the top of the old bridge by a dimension which represents the amount of bridge cap that is to be removed. But don't forget that the bit must extend down below the base by something like 1/16", so make allowances. Don't worry if the original bridge top length is sloping up toward the bass end of the piano while your pine shelves are of uniform thickness. What matters is cutting a flat and true surface on which to glue the new cap. Of course, sloped shelves which match the slope of the bridge top can be made without too much difficulty. In my own work I use the large router on runners as far as it will go, and finish off the highest treble area with hand tools. Although I have made shelves for router support, I try to avoid going to the trouble.

Non-cantilevered bass bridges as found on large grands can be routed as explained above, but another set of taller runners needs to be available. Cantilevered bass bridges which have non-sloping aprons can be routed using one tall runner which rides on the soundboard, and a shorter runner which rides on the apron top. Work out the heights of this Mutt-and-Jeff pair of runners so that the base of the router is parallel to the bridge top. Sloping aprons present a peculiar problem and, in my view, obviate the use of routers. Use a power plane or hand planes here. In fact, I routinely use the hand and power plane on bass bridges where I can get away with it.

Power Planes

Power planes were invented in heaven by a saint who lived his life on earth circa 1875 working as a piano bellyman. These tools have halos atop them. They are as their name implies: planes which power a spinning cutter. But, in essence, they are used much as is any hand plane, with the exception that the cutting force comes from the revolving blades and not from the craftsman's effort in pushing the tool forward. The worker's job is to steady the tool and simply guide it along its course. The power plane usually comes equipped with a dust/chip bag and a variable depth-of-cutter control knob. It is an excellent tool for bridge top removal as well as for planing down to dimension the new cap. As with routers and other hand tools, though, it is relatively bulky and cannot cut all the way to the ends of certain bridges due to case obstruction.

Photo 2 shows a Black and Decker power plane (10-inch long sole) in action. Notice how wide the tool is compared to a hand plane, and how far out the dust bag extends. Use of the tool requires that extra care be taken to prevent tipping. Like routers, power planes are mindless piranhas and, once they smell wood, attack for all they're worth. Take shallow cuts at first, gradually increasing the depth of cut as seems safe and workable. Also, take safety and health precautions.

Whether using a router or power plane, it is advisable to reduce the old bridge top by something like a quarter of an inch at least. The new cap (or caps) to be glued on are usually milled a bit taller than necessary, with an allowance for final reduction to the target dimension. (We'll deal with this in future articles.)

Final Surfacing

Once the surface of the old bridge has been removed it should be moderately scraped with a cabinet scraper blade after which hardwood shoe pegs are driven into the pin holes. Take care when scraping not to round the cross-sectional corners. In fact, inspect the bridge for rounded corners and correct by scraping off the "hump." You shouldn't find much rounding, though. Shoe pegs are available from American Piano Supply in lots of 250. They are inexpensive, so order a couple thousand at a time if you plan to do bridge recapping. Drive the pegs into the holes and trim off the waste length with a chisel followed by scraping in both directions. Photo 3 shows the scraper blade in position; the shoe pegs have been installed and trimmed. Finish with a light sanding.

Is it necessary to glue in the pegs? Not in my experience. The pegs are a tight fit and, anyway, glue from the new cap installation will wick down, and be pressed down, to some extent, thereby unitizing and integrating all components. In addition, you will be surprised, if you have laid out your paper pattern correctly, how often in the pin drilling operation the bit will drill out the shoe pegs after it has gone through the new cap. But if you are uncomfortable with dry pegs you will have to glue in every peg.

Photo 4 shows a bridge project underway. Notice several things. The old removed cap, which appears in the background as a flock of penguins sunning themselves, was able to be removed by chiseling only. Untrimmed shoe pegs exist in the center of the photo while trimmed pegs can be seen to the left, under the chisel. Notice the joint where new cap will meet old cap; it is located under a plate bar and was cut straight down *before* attempts were made to

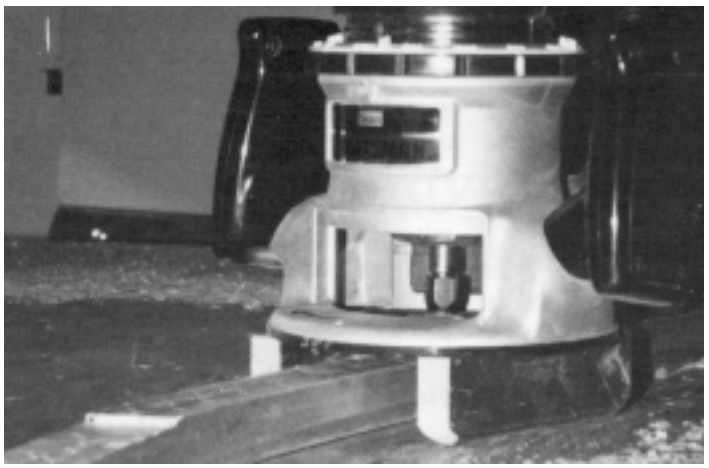


photo 1

photo 2

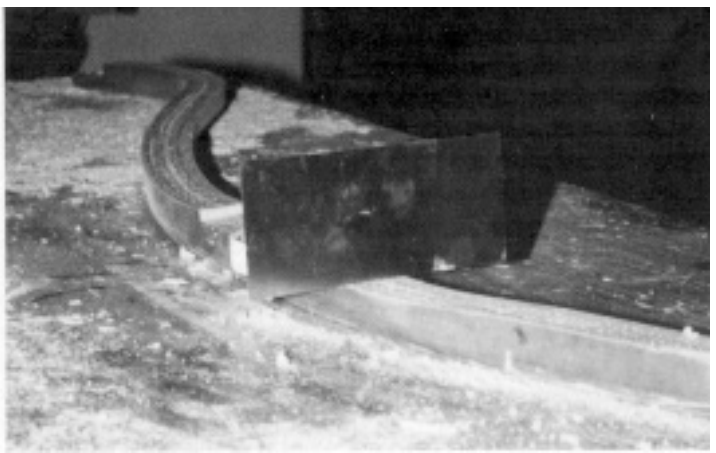


photo 3

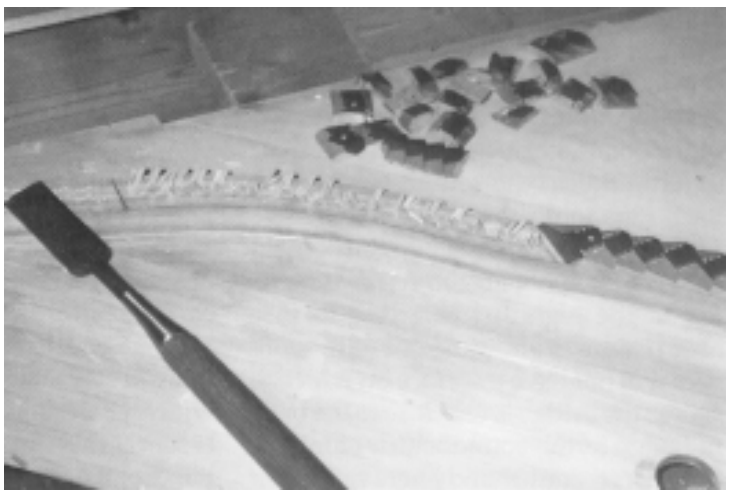


photo 4

remove the old cap. Finally, notice the first unison to the right of the joint cut: a 1/8" hole can be seen in the center of the unison patch, the purpose of which is to locate the paper pattern which contains the pin locations and spacing. (Refer to past articles if that confuses you).

Which Way To Go?

At that place where piano technology and woodworking meet there are personalities at work in the craftsman and yes, in the tools, both of which determine how a given job will go. Typically for the bridge top removal an arsenal of tools and techniques will be brought to bear as no one tool or technique can accomplish the entire job. My approach is to try the simplest thing first; if that doesn't work (or work very well), I have a go at the next simplest thing, etc. Although I believe a router is *the* essential tool for this work, it is the *last* tool I bring into the fray, after I have exhausted all other avenues. The router represents my ace in the hole — but I leave it in the hole until I absolutely must dig it out. Two recent jobs might give you the sense of what I mean.

A bridge top removal on the Steinway M mentioned earlier went very quickly. I began by looking for a crack in the cap-to-body joint. Having found one in the tenor area I drove a thin, sharp chisel into it and a large piece of the cap began to peel off. Chiseling and peeling worked for a while, but up in the higher sections the cap was resolute. I kept chiseling but the peeling was only slight so I found myself chopping through the cap with the aid of a mallet, but taking care to avoid gouging the body. I decided to stay with the chisel for bulk wood removal, to get down as close to the body as I could. When satisfied, I got out some hand planes and tried various sizes; the little rabbet plane worked best, so it was used to more or less level things out and to bring me right to the surface of the vertical laminations of the body. The final surfacing was accomplished with my sacred power plane. The job took about an hour and a half — and my screaming router sat wonderfully idle through the whole business. But its time would come.

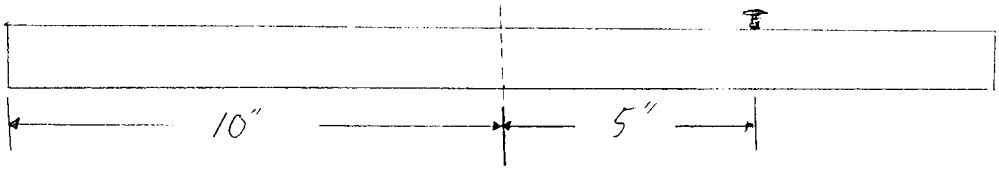
The final job frustrated all my simplest efforts. In the end it required the use of the large router on runners for most of the long bridge, followed by chisels and a small rabbet plane to cut and level the highest several unisons. The bass bridge was power-planed down after which all bridges were scraped and trued. Still, working at an unhurried pace, and allowing for a joke or two with my assistant — equipping with eye, ear and nose protection seems to encourage a certain airiness — the bridge top removal took the better part of a morning. I can think of many worse ways to have spent it. ≣

At Large

More On Leverage

Alan Vincent, RTT
Los Angeles Chapter
Young Chang America

In the last article, we discussed the basic principles of leverage and how these apply to the grand action. This month we will look further into leverage and the 5:1 leverage ratio within the grand action.



Most technicians are aware that, with a properly regulated action, an average key travel of .375" can result in a vertical hammer movement of 1.875". This is a 5:1 mechanical advantage as one unit of key movement results in five times that amount of hammer movement (.375 x 5 = 1.875). The 5:1 ratio is also a statement of the overall leverage values of the action. Leverage ratios can be used to determine both vertical movement of the action parts and weight, but at this point, we will only be discussing the amounts of vertical movement of the action parts achieved through leverage. Any consideration of weight must include friction as an added variable. Weight, friction and the 5:1 ratio will be discussed later.

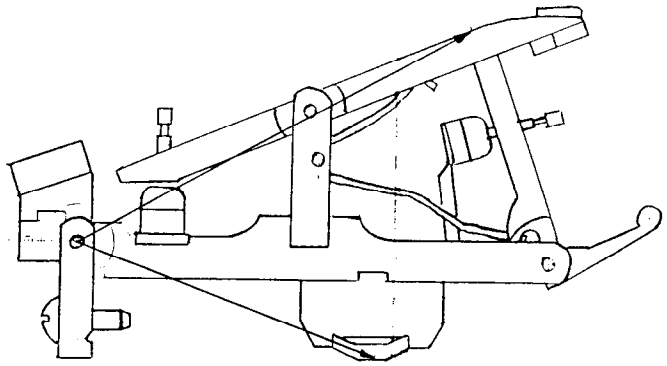
The 5:1 ratio represents the beginning and the end of the leverage train in the action but there are several different parts between the playing end of the key and the hammer. To further illustrate the 5:1 ratio of the grand action, we can trace an initial input through the leverage train of the action and out to the hammer. The amount of movement at the hammer can then be calculated from a given key movement and the overall ratio of the action determined.

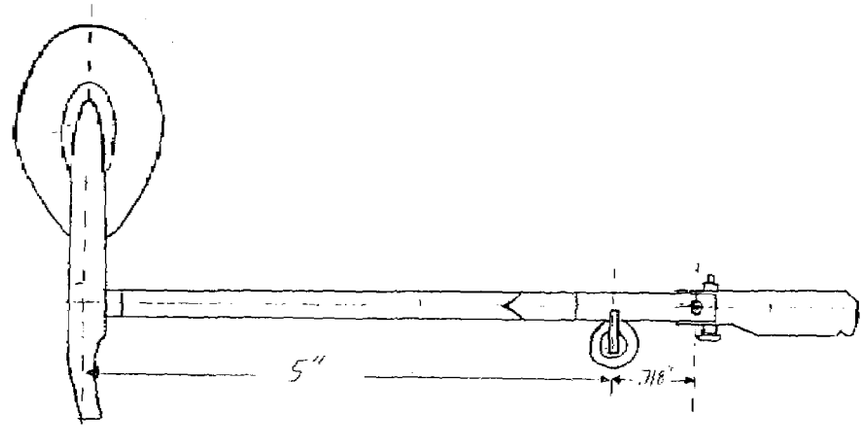
In our article last month we discussed the leverage ratio of the average grand piano key. That is a 2:1 ratio: and the vertical lift at the capstan is half of the movement of the front of the key (see drawing one). Using .400" as a key dip (or total key travel) and .050" as aftertouch we arrive at .350" as the amount of movement of the key needed to take the hammer to the point of let-off. After multiplying this by .5 (the output lever length, five inches, divided by the input lever length, 10", equals the leverage ratio of .5), the vertical lift at the capstan would be .175" with a movement of .350" at the front of the key.

In order to analyze the leverage within the wippen, it is necessary to determine which of the wippen levers are involved in the lift of the hammer to the string. Upon inspection of a wippen, many different physical levers can be seen. The wippen body, repetition lever and jack are all visible levers. However, the lever arms of the wippen which lift the hammer to the string are more like imaginary lines. Drawing a line from the wippen flange center to the point of contact between the capstan and the wippen heel will produce the lower wippen lever arm. A line from the flange center to the jack/knuckle contact point will produce the upper wippen arm (see drawing two). The two lever arms of the wippen produce a V-shaped lever with the pivot located at the vertex (the wippen flange center). The two arms are usually arranged to form an angle approximating 45 degrees with the upper lever arm being the longer of the two and the angle between the two lever arms remaining fixed during the wippen travel. (As mentioned before, this is only true to the point where the end of the repetition lever contacts the drop screw. At this point, the upper wippen lever arm is divided at the repetition lever center introducing two new lever arms; one from the wippen flange center to the repetition flange center and the other from the repetition center to the knuckle center line. This results in a new leverage configuration within the wippen and a different, overall leverage ratio within the action which is approximately 1:1. This leverage ratio would be in effect from the time the hammer reaches the drop position through the completion of the key travel.)

The average length of the upper wippen lever arm is about 3.75" and the lower 2.5". This gives us a leverage ratio within the wippen of 1.5:1 (3.75", the output lever length, divided by 2.5", the input lever length, gives us 1.5). The lifting force is being transferred from the key to the wippen via the capstan screw. Therefore the input is now at the wippen heel and into the lower wippen lever arm with the output being into the knuckle.

When the wippen ratio of 1.5 is multiplied by the input at the capstan of .175", then the output of the wippen into the knuckle is found to be .262". Again,





this is the total amount of vertical lift achieved by the wippen at the wippen/knuckle contact point. This now leaves us with one remaining lever in the grand action, the hammer shank.

To determine the leverage ratio within the hammer shank, again two measurements are considered. The first is the distance from the shank flange center to the centerline of the hammer molding. In modern grand pianos, this dimension varies from five inches to 5 1/8". For this example, the measurement of five inches will be used.

The second leverage arm is the distance from the shank center to the jack/knuckle contact (see drawing three). This dimension usually is slightly less than 3/4" and 23/32" (.718") will be used here. When five inches is divided by .718", the answer is 6.9638". This can be rounded off to a ratio of 7:1 for the leverage ratio of the grand shank. When the shank ratio is multiplied by the input at the knuckle, .262", 1.825" is given as the total, calculated vertical movement of the hammer.

If we subtract .0625" (1/16") for let-off from our original hammer blow of 1.875", we arrive at 1.813" as our total vertical hammer movement before the jack tender contacts the let-off button. This is .012" from our leverage calculation of 1.825" as the total hammer movement. When 1.825 is divided by .350 (our original input at the key) the overall ratio of the grand action, using the above numbers, is found to be 5.2:1.

The 5:1 ratio of the grand action tells us that one gram of weight added to the hammer will result in an increase of downweight, measured at the playing end of the key, of at least five grams plus friction. If the weight of the hammer is increased, the friction within the action leverage train will also increase. If the weight of the hammer is reduced, the action friction will also diminish.

As mentioned, the distance from the shank center to the centerline of the hammer molding is from five inches to 5 1/8". If this dimension were longer, the effective weight of the hammer would be increased (as felt at the end of the key) and many lead weights would be required to counterbalance the weight of the hammer if a downweight was desired that was acceptable to current standards. This would result in increased inertia within the key and a low upweight. (The added weight of the front key lever caused by the additional key leads and the added friction caused by the increased leverage within the hammer shank would slow the return of the key and action part assembly to the at-rest position.) The described key would probably be perceived as "sluggish" by the pianist. If this same distance was diminished past five inches, the hammer blow would be shorted considerably resulting in a much shorter key travel available before the hammer contacted the string. The relationships and dimensions of the grand action have evolved to their present state through experimentation and criticism from pianists. All modern grand pianos display dimensional relationships within the action which are common from one make to the next.

Next month, we will continue with the effects of the action spread on touchweight, the three-point alignment test (balance rail, capstan to wippen contact and wippen flange) and more on the effect of hammer weight.

Sound Background

Chladni's Vibration Patterns

Jack Greenfield, RTT
Chicago Chapter

Chladni's Acoustical Studies

During the final decades of the 18th century and continuing through the early years of the 19th, the leading scholar in the study of sound and musical acoustics was Ernst Florenz Friedrich Chladni (1756-1827). While his eminent predecessors, Daniel Bernoulli and Leonhard Euler, devoted as much or more time to other branches of physics and mathematics, Chladni was the first scientist since Joseph Saveur who specialized in the study of sound. He is best known for his studies of the vibrations of solid elastic plates although he also was the first one who investigated longitudinal and torsional vibrations of rods and strings and he conducted experiments to measure the speed of sound in solids and gases. He made practical use of his theoretical knowledge in designing several musical instruments including a "piano" in which musical tones were generated by the application of friction to metal bars.

Chladni Biographical Summary

Chladni was born in Wittenberg, Saxony, where earlier members of his family had settled after moving from Hungary. At the insistence of his father, a jurist, Chladni was educated in law also, graduating from the University of Leipzig in 1781. He did not continue in law however. After his father died a few years later, Chladni turned to science which interested him more. A serious amateur musician, Chladni concentrated his efforts on the study of sound and musical acoustics.

Chladni worked independently conducting his studies and research at his home in Wittenberg. He acquired the knowledge and understood the acoustics theory of his 18th-century predecessors. Unlike them, however, he relied more on experimentation than mathematics to reach his conclusions.

It did not take him long to gain recognition as a leading scientist. In 1787 he published his first work, *Entdeckungen uber die Theorie des Klanges* describing the results of his first project, a study of the vibrations of solid plates and other sounding bodies. The subject that attracted the greatest interest was an experimental procedure he had developed for visual demonstration of the patterns of vibration of oscillating surfaces. He had found that after spreading a thin layer of sand on a thin plate, when he drew a violin bow over the edge of the plate, causing it to vibrate, the grains of sand collected in straight lines or curves to form regular geometric patterns. He concluded that these were nodal lines where there was no motion, marking the boundaries between vibrating segments of the surface. He found that by varying the points of support and the bowing location, he could produce different patterns and tones of different pitch. Other physicists quickly accepted the Chladni sand technique as a valuable aid for their research on sound. To meet the demands for more information on his work, Chladni began to deliver personal presentations at meetings of interested groups. He continued throughout his entire career, alternating between periods at home doing research, writing or working on his musical instruments, and periods in which he traveled extensively to present lecture-demonstrations on his latest work.

Around 1790, Chladni began to include in his demonstrations a performance on an experimental musical instrument he had designed. The instrument he named the *Euphon* ("euphone" in English) consisted of an assembly of upright tuned glass cylinders about the size of a pen, attached to metal rods. When the cylinders were rubbed by the player's wet fingers, their vibrations were transmitted to the metal rods which responded by the production of musical tones.

In 1794 he published a book of importance, not concerned with musical acoustics. He had collected meteorites and in his book he offered the theory that they were debris that dropped out of the sky from an exploded planet. His theory was not generally accepted until further scientific studies in the early 1800s confirmed that the source of meteorites was in space away from the earth.

Through the 1790s, Chladni continued to improve the design of his euphone while also making progress in acoustical research. In 1799, he introduced a successor to the euphone, the *Klavizylinder* ("clavicylinder" in English). In this instrument, tones were produced by tuned C-shaped metal bars pressed against a wet glass cylinder kept in rotation by a treadle.

Chladni published a more comprehensive acoustics text *Die Akustic* in 1802. It included observations made since the publication of his first work in 1787 as well as complete historical material.

French scientists with a special interest in research on surface vibrations invited Chladni to present a lecture-demonstration in 1808 at the *Academie des Sciences*, Paris. In addition to the distinguished scientists that were there, the audience included Napoleon himself. Chladni's presentation was so impressive that he was asked to prepare a French translation of *Die Akustic*. As payment in advance for his work, he received an honorarium of 6000 francs from Napoleon. Napoleon also gave the *Academie* a grant of 3000 francs to be offered as a prize for a satisfactory mathematical explanation and a general formula for vibration of plates. Although

her explanation and formula were not entirely correct, the prize was awarded to Mlle. Sophie Germaine. Chladni's French translation, *Traite d'acoustique* was published in 1809. A second German edition of Chladni's acoustics text was published in 1809.

He continued work on his musical instrument designs also. By 1814, his clavicylinder had evolved into the form of a square piano. He reviewed his work on musical instruments and practical musical acoustics in a book published in 1821. Chladni played real pianos also. In the late 1820s, shortly before his death, he reported in the *Allgemeine musicalishe Zeitung* on the differences between the English pianos with louder sound and the Viennese pianos with lighter actions he had noted in instruments he played.

Chladni's Vibrating Plate Experiments

In his initial experiments, Chladni used thin glass or copper circular plates from three to six inches in diameter or rectangular plates with three-to six-inch sides. He used other shapes also in later work — ellipses, semi-circles, triangles and six-sided polygons. He supported the plates usually at internal points he conjectured to be stationary points at intersections of nodal lines although sometimes he selected stationary points on an edge. Drawing the violin bow across one edge of the sand-covered plate caused it to vibrate and produce a sound. Grains of sand thrown away from the rapidly oscillating segments of the surface, gathered on stationary areas along the nodal lines. Chladni found he could produce separate partial tones by selecting points of support and touching the plate with his finger tips along the nodal line intersections corresponding to that particular partial, while bowing at a point on the edge midway between the nodal lines. He observed that touching the plate in the middle of a vibrating segment would damp the vibration. Satisfactory results could not be obtained by striking the plate instead of bowing. Striking or dropping a plate produced a sound of indistinct pitch containing many inharmonic partials. No single partial could be isolated from this indistinct sound by the sand pattern technique.

Chladni obtained a great variety of different plate vibration patterns which he showed in his writings. Each pattern corresponded to a specific partial tone. When two plates similar in shape and material but different in thickness showed the same nodal pattern, frequencies varied as the thickness of the plates. With two circular plates which differed only in diameters, the frequencies varied inversely as the square of their diameters. The fundamental mode had the simplest pattern with two nodal lines forming an X or a cross or in some other placement dividing the surface into four vibrating segments. The surface of each segment vibrated in the direction or phase opposite to the direction of the adjacent segments on the other side of the dividing line. For the upper partials with greater numbers of segment divisions, the Chladni patterns are more complex with curved as well as straight lines forming circles, stars and even more intricate geometric figures. Chladni believed that the progression in the number of divisions of the plate corresponding to the mode was analogous to the complex motion of a string vibrating simultaneously in a harmonic series of modes.

Chladni reported his observations but offered no theory that would relate the various forms of modal patterns to particular frequencies. Scientists who studied plate vibrations later after Chladni, were no more successful in speculating a plausible explanation for the great variety of patterns, soon given the names "Chladni patterns" or "Chladni figures." Theoretical formulas were developed, however, for the frequency of vibration of circular plates, calculated with the figures for thickness, radius, density, several constants and a variable factor which depends on the manner in which the plate is supported: at the center or around its perimeter — resting freely, hinged, or clamped in place.

Savart Uses Chladni Technique For Study Of Violins

One of the later scientists who took a great interest in Chladni's work was the French physicist, Felix Savart (1791-1841). Savart repeated and extended Chladni's experiments with vibrating plates and initiated the use of the Chladni technique in acoustical tests of wood plates used in construction of musical instruments. Savart was particularly concerned with violins and bowed string instruments. The bellies or front plates are usually made of two joined pieces of straight grain quartercut spruce while the backs are generally made of two joined pieces or a single piece of curly maple. Because of the variations in the makeup of the fiber in wood, for good tonal quality the specific thickness of the plates must be determined by "tuning" each piece of wood individually. As the piece of wood is shaped and thinned down, skillful violin makers can judge whether or not the plates are right by listening to the pitch and quality of the *tap tones* obtained by tapping the plate at various points while it is held between the thumb and forefinger. Around 1830, Savart began to investigate use of the Chladni technique for guidance in forming violin plates. He was extremely fortunate to obtain the cooperation of Jean-Baptiste Vuillame (1798-1875), the eminent French violin maker and dealer, an expert in building excellent copies of fine old instruments. Vuillame made available to Savart the disassembled top and back plates of about a dozen Antonio Stradivari and Guiseppi Guarnieri violins which Savart used to determine their Chladni patterns and frequencies for normal modes of vibration. In a report on his studies, he stated that for the violins with the best tone, the principal pitch of the sound from the front plate varied between C#3-D3 for the front plate and D3-D#3 for the back plate with a difference of one or two semitones between the two plates. Similar studies of violin acoustics by later investigators have confirmed the important influence on musical quality by the interval between the principal plate tones.

Modern Analysis Of Plate Vibration

Modifications of the Chladni technique in recent research on violins, have made its results more significant. Besides determining the frequencies of the natural modes of vibration of wooden plates more accurately, specialists in such studies have identified the characteristics of vibration patterns that indicate the degree of elasticity desirable for good acoustical quality. In one new procedure, plates are caused to vibrate by resonant response to the pure tones of an adjustable sound generator. The plate rests horizontally above a loud speaker which receives the sound signal. Instead of sand, the plate is covered

with a layer of fine sawdust or aluminum dust.

In an alternate method, the plate is put into vibration by a very light transducer attached to the center of the plate. The pitch of the sound of the vibrating plate changes as the frequency of the driving signal is scanned across the frequency range. Although the signal strength remains the same, variations in the loudness of the sound, measured by a sound level meter, indicate resonant frequencies at peaks of intensity.

The resonant response characteristics of complete instruments can be evaluated by a similar but even simpler test. The violin is bowed with even force, manually or mechanically, while sound level meter readings are taken at semitone intervals. A *loudness curve* obtained by plotting loudness vs. pitch provides a record of the evenness of resonant response of the instrument.

The most sophisticated method of observing the vibration modes of plates is by *holographic interferometry.* This is a photographic/optical procedure using light from a laser beam to illuminate the vibrating surface. The patterns on the holographic photographs provide much more detail on the vibrational modes of the surface.

There appears to have been much less investigation of the vibration patterns of piano soundboards than of bowed string instrument plates. The assembly and forming of pieces of spruce for piano soundboards has not required the extreme precision of shaping violin plates. While piano soundboards vibrate in a complex series of modal patterns also, the frequency response of each mode is fairly broad, overlapping to give fairly uniform response characteristics across the keyboard. Further research with plate vibration analysis techniques however, could be helpful in developing new designs for piano soundboards of alternate materials to match the performance of spruce.

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Coming Events

Sept. 15, 1990	**Rhode Island One Day Seminar** Narragansett Christian Brothers Center Contact: Kirk Russell; 37 Liberty Street; Wakefield, RI 02879 (401) 783-1966
Sept. 28-30, 1990	***Florida State Seminar*** Hilton Hotel, Pensacola, FL Contact: Danny Lyons; 1224 E. Cervantes Street; Pensacola, FL 32501 (904) 438-8969
Oct. 4-7, 1990	**Ohio State Conference** Days Hotel, North Randall (Cleveland, OH) Contact: Bob Russell, 1414 Lander Road, Mayfield Heights, OH 44124 (216) 449-5212
Oct. 15, 1990	**Washington D.C. One Day Seminar** Smithsonian Institute Contact: Colette Collier; 12113 Somersworth Drive; Silver Spring, MD 20902 (301) 649-7330
Oct. 18-21, 1990	**New York State Conference** Holiday Inn, Binghamton, NY Contact: Donald R. McKechnie; 1660 Slaterville Road; Ithaca, NY 14850 (607) 277-7112
Oct. 19-21, 1990	**Wisconsin Days** Yahara Center, Madison, WI Contact: Norman Sheppard; 5715 Cedar Place, Madison, WI 53705 (608) 233-3844
Oct. 27, 1990	**Kansas City One Day Seminar** Meyer Music, 1512 Highway 40, Blue Springs, MO Contact: Lucy Urlacher; 4215 Terrace; Kansas City, MO 64111 (816) 561-2465
Nov. 1-4, 1990	**Texas State Association** El Paso Airport Hilton, El Paso Contact: Guy Nichols; 901 S. Main; Las Cruces, NM 88005 (505) 524-1465
Nov. 9-10, 1990	**North Carolina State Seminar** Brownstone Hotel, Raleigh, NC Contact: Tom Karl; 20 Mayo Street, Apt. F-6; Raleigh, NC 27603 (919) 832-3149
Jan. 4-5, 1991	**Arizona State Seminar** Tempe, AZ Contact: Gary Miles; 3722 W. Port Royale Lane; Phoenix, AZ 85023 (602) 942-2588
Feb. 22-24, 1991	**California State Convention** Radisson Hotel, Sacramento, CA Contact: Patrick C. Poulson; 15474 Airport Road; Nevada City, CA 95959 (916) 265-6739
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

I have just returned from the summer picnic of the Capitol Area Chapter, NY, held on the spacious grounds of the Rand Reeve's Shop, better known as *The Piano Place*, in Ballston Spa, NY. Even though upon reading this everyone will be thinking of hobgoblins, witches and ghosts — for Halloween is fast approaching — we were an outdoor group, a fine assortment of PTG members, spouses, guests, youngsters and two PTGA members (*Sue Snyder*, wife of *Stephen (Skosh) Snyder*, immediate past president of the C.A. Chapter, and I) enjoying the fellowship, good talk, good food — homemade ice cream and strawberries, ah! — and some chapter business thrown in.

My husband, *Bill*, a charter member of the Capitol Area Chapter, served as delegate at the Council meeting of the annual convention in Dallas. He gave a presentation to the PTG members attending of the material covered and voted upon by the delegates at the Council meeting. He was also pleased to be able to deliver a second-place Chapter Management Award for the Intermediate Chapter Category which had been awarded to the Capitol Chapter and which he had been asked to carry from Dallas to his chapter.

This was presented to *Rand Reeves*, vice president of Capitol Area Chapter of the PTG in the absence of president *Nancy Buswell*. There was surprise and much appreciation expressed by members attending the picnic, and the plaque will be displayed in a place for all to see.

I was introduced as the newly installed president of the PTG Auxiliary and roundly applauded. You can tell these members were an appreciative group. I did remember one of the serious purposes of our Guild Auxiliary and was eager to tell them of the fine results of our scholarship program and the young men who were the current recipients of our Scholarship Awards. There were several piano teachers present, to whom I showed the 1990 Auxiliary Schedule from the 33rd Annual Convention and Technical Institute at Dallas, and they read this as well as the biographies of the recent winners with interest.

Remember, spouses, a little fun and relaxation go a long way to display our efforts in a good light and to let PTG chapter members know we are always in there supporting them and furthering music and the use of the piano in a way that should contribute to their careers as tuners, technicians, and rebuilders.

Arlene M. Paetow

For Our Friends Who Weren't With Us

Since the convention in July, some of the highlights have filtered back to those of you who weren't able to be with us. This month we present the definitive summary of events, and who better to tell it the way it was than the omniscient, omnipresent *Ginny Russell*:

Welcome to the 33rd Annual PTG Auxiliary convention at the Dallas Hyatt Regency Hotel at Reunion, July 7-11, 1990.

What a beautiful hotel — magnificent location, mirrored building that glistens in the sunlight, large atrium with skylights, restaurants and lounge in the middle of the atrium, most congenial help, and, of course, wonderful friends! Socially it was perfect! All of the technical classes were located together and easy to find. Our Auxiliary room was right in the middle of activity and roomy enough for everyone. Our president, *Agnes Huether*, had a lovely suite as usual. Before I continue let me say all the food functions were delicious and most appetizing. Before the formal opening, the Dallas ladies were available to answer questions and give advice. *Sue Speir* was especially eager to help everyone find their way.

PTG's opening ceremony went off with a bang as usual. Our Auxiliary officers were introduced, and following this grand event we were feted to a Baldwin reception. Good food, good friends, and a good time!

The Auxiliary Opening Assembly began with "A Welcome to Dallas" by *Sue Speir*. A warm welcome from a warm person. Following this sincere welcome we were pleased to hear about the history of Dallas presented by *Rose-Mary Rumbley* from Festivities, Inc. You really missed this one! *Rose-Mary* presented history like no one else ever has — so entertaining, so humorous, and even with a Texas accent! The audience laughed from beginning to end, and we learned there is more to Dallas than J.R.! (Did you know that Dr. Pepper, Mary Kay, and Frito-Lay were founded in Dallas? Should have been there.)

Following this most entertaining presentation we were treated to danish and coffee. During this time *Ruby Discon* hustled membership while *Phyllis Tremper* and *Sue Speir* hustled cookbooks. It was a good time to greet friends, meet new friends, and enjoy our Auxiliary.

In the corner of our hospitality room the members-at-large met to select delegates for the upcoming council meeting. With the danish gone, coffee over and delegates selected we were ready to begin our council meeting. (A summary of the Council's business appeared in the August issue.)

Perhaps one of the highlights of this program came following lunch when we were treated to a program by *Barbara Boone* on the harp. I'm sure you all agree with me that the harp is one of the prettiest, most relaxing instruments in an orchestra. *Barbara*, who is a most professional harpist, told of the history of the harp using the overhead projector to show the evolution of the harp, displayed how a harp is played, how it is made, breaking up each section with selections most befitting the harp. The lilting strains of many favorite songs really made this presentation something special. As I listened to all this knowledge it occurred to me that in all my musical training the two instruments we never learned too much about structurally were the piano and the harp. The harp was

never included in any methods course on instruments. What a shame.

To complete our musical afternoon we were entertained by our two scholarship winners from Texas, accompanied by tea and dessert. *James Lent* from Houston and *Eric Thompson* from San Antonio were the recipients of the PTG Auxiliary Scholarships and were very pleased to entertain us with piano selections for our enjoyment. Both boys expressed their thanks for the scholarship and their pleasure to perform for us this afternoon. Their selections were performed to perfection and were chosen *with very good taste.*

No convention would be complete without a tour of the host city. Dallas was no exception. We really crammed many sights in a short time. Our tour included Thanksgiving Square, Kennedy Memorial, Reunion Arena, Old City Park, Dallas Market Center, Morton Meyerson Symphony Hall, and other sights. Of course it was impossible to stop and visit every sight, but it was a most complete tour of Dallas. Our final destination was Northport Mall and lunch. Upon leaving the bus, people scattered in every direction to shop, souvenir hunt, eat, and do whatever. Three famous Auxiliary members took the time to dine at Neiman-Marcus, something they can't do at home. Just the finishing touch to a most sophisticated day... (The food was good!)

At the appointed time we all gathered at the Dallas Repertory Theater *nearby to enjoy the presentation of "I* Love New York In June" by *Linda Farabee*, accompanied by *Ann Strain* on piano. Following this delightful revue of Broadway tunes we were treated to tea with petite sandwiches and pastries. What an enlightening afternoon. The bus ride to the hotel found the happy tourists humming those famous melodies while enjoying the scenery.

As always the PTG Banquet was great. *Peter Nero*, who needs no introduction, did an outstanding job of displaying his talents for all to enjoy. Steinway furnished desserts that were most delicious following the banquet.

"A Technician's Wife Looks At The Piano Industry And Its Future" by *Eleanor Ford* opened our program on Tuesday. *Eleanor* is no stranger to us, and her knowledge and wonderful storytelling is always great. Eleanor took us back in time to the New York City piano factories: to the depression that killed the factories, through the rebuilding of the industry and the creation of the spinet, plus many interesting, amusing stories in between. Following an amusing class we finally decided that "Pianos will be around for a while, let's not give up!"

A most delightful prelude to our installation was entertainment by *Randy Potter* and his accordion in the hall. It was *Ron* and *Julie Berry's* anniversary, so, of course, *Randy* played the Anniversary Waltz while *Ron* and *Julie* danced. As always, our Installation Luncheon is the highlight of our week together. As we entered the room we found that *Ruby Discon* had made pink and coral silk flower corsages for everyone. Following our lunch President *Agnes Huether* presented *Ruth Pollard*, our first president, with yellow roses. *Ron Berry*, Guild President, gave a short message telling the Auxiliary just how much it means to the Guild to have their support.

Jeanine Geiger was our installation officer. The installation theme was "Let The Auxiliary Put Their Brand On You." The ceremony was complete with a cowboy music background and cowboy motif.

The board presented Past President *Agnes Huether* with a beautiful leather travel bag thanking her for her hard work of two years and her continuing international relations work. *Ruby Discon* presented *Agnes Huether* with red silk roses as president.

How many spouses were there? Well, I believe there were 112 spouses enjoying our wonderful program in Dallas. Were you there? If not, be sure you don't miss Philadelphia in 1991. I'll be looking for you!

Ginny Russell

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3	Mary Lyons
4	Betty Defebaugh
6	Cordelia Grijalva
13	Ruth Juhn
13	Virginia Seller
14	Deanna Zeringue
17	Mabel Hiatt
18	Doris Zimmerman
20	Joann Biegler
21	Arlene Boyd
21	Grace Mehaffey
24	Helen Hollingsworth
26	Willie Mae McDonald
28	Jane Baker

October Birthdays

5	Charmaine Haas
9	Sandy Caldwell
9	Barbara Fandrich
12	Barbara Zeiner
13	Wintress Gentry
17	Norma Reimer
19	Patsy Escobar
19	June McGee
19	Delia Skull
24	Malinda Dobrins
24	Barbara Yepson
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RESTORATION OF CARVED WORK, turnings, inlays, and marquetry, including repair of existing work and reproduction of missing pieces. **Edwin Teale; 19125 S.W. Kinnaman Road; Aloha, OR 97007 (503)642-4287**

WHY SETTLE FOR LESS THAN THE BEST? We have the finest tools: SOLID BRASS ACCUCAULS, BUSHMASTER, KEY BUSHING IRON; we have the fastest, most accurate, and easiest to learn method: THE ACCUBUSH SYSTEM; and now we have the best deal for ordering. Call toll free: 1-800-388-BUSH(2874). Join the experts who agree: THE ACCUBUSH SYSTEM is the BEST system for rebushing keys! (Many have already changed over; if you haven't you are losing time and money). MASTERCARD & VISA accepted. **KEY BUSHING SUPPLY; 84A Main Street; Kingston, NH 03848. For information only, call (603)642-3633.**

AUBREY WILLIS SCHOOL — Our home study course in piano tuning, repair and regulating has been used by hundreds to learn the basics. Accredited member National Home Study Council. No cost information. **Aubrey Willis School; 2633 East Indian School Road, Suite 401; Phoenix, AZ 85016 (602) 955-4600**

THE GUIDE $10. The Piano Technicians Guide. A job-time study and work guide. Revised and printed to fit a pocket. **Newton J. Hunt, Piano Tuner-Technician; 74 Tunison Road; New Brunswick, NJ 08901. (201) 932-6686**

PLAYER STACKS REBUILT FOR YOU. Ship it to me and I will do the work. Installation instructions provided. **(501) 642-7100**

"LET'S TUNE UP" Hardback 1st Edition only $17.50 per copy. Paperback 2nd Edition *still available* per copy $17.50 *No immediate plans* for another printing. Make checks payable to ***John W. Travis; 8012 Carroll Avenue; Takoma Park, MD 20912.***

ACCU-TUNER TOOL CASES. "Newly redesigned." 4 sizes ($120, $150, $180, $200). For Accu-Tuner and tools. **Bob Conrad, (800) 776-4342.**

CUSTOM PIANO COVERS MADE TO YOUR SPECIFICATIONS. Perfect for any storage or moving situation. All work guaranteed. Also available, many gift items. Send for brochure and samples. **JM FABRICations; 902 185th Street Court; East Spanaway, WA 98387 (206) 847-6009**

NOW HIGH DENSITY POLYETHYLENE key bushing cauls for two-caul method featured in August '88 *Journal*. Precision machined, tough, & glue proof, in quantities of 45, 90, or 180, 25¢ ea. Available for key pin sizes .087", .125", .131", .133", .137", .146", & .163". Also key clamps, felt knives, gram weight sets & soundboard cleaners. For brochure, call or write **Bill Spurlock; 3574 Cantelow Road; Vacaville, CA 95688. (707) 448-4792**

PREFER TO REBUSH both sides of mortise at once? Now manufacturing conventional double-shouldered bushing cauls of high density polyethylene, 25¢ each. **Bill Spurlock.**

THE RANDY POTTER SCHOOL OF PIANO TECHNOLOGY — Home Study programs for beginning students, associate members studying to upgrade to Registered Tuner-Technician, and RTTs wanting to continue their education. Tuning, repairing, regulating, voicing, apprentice training, business practices. Top instructors and materials. Call or write for information: **RANDY POTTER; RTT; 61592 ORION DRIVE; BEND, OR 97702. (503) 382-5411** See our ad on page 3.

PLATING-PIANO HARDWARE. Stripping, buffing, and NICKEL plating, with hinges up to 60" lengths $125-$225/set, depending on quantity of parts included. Enclose packing list indicating number of screws with description and quantity of items. REFERENCES AVAILABLE. COD delivery in 2-3 weeks. A.R.O.M. throughout the U.S.A.! We will serve you with quality & reliability. **CRAFTECH ELECTROPLATING; #46R Endicott Street; Norwood, MA 02062. (617) 769-0071 days, (617) 469-9143 evenings.**

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"COMPONENT DOWNBEARING GAUGES (bubble type) give readings in degrees (string angle) and thousandths of an inch (dimension). Available at supply houses. **Box 3247; Ashland, OR 97520."**

CAREER TRAINING IN BAND INSTRUMENT REPAIR OR PIANO TUNING AND REPAIR. Western Iowa Tech Community College can develop skills from tuning to rebuilding pianos, or overhauling and repairing brass and woodwind instruments. Specially-designed facilities include individual work stations and up-to-date equipment. In-state tuition $325.00 per term; out-of-state tuition $650.00 per term. Most students qualify for in-state tuition by the second term. Employers: contact our placement office about availability of graduates. For more information or a free loan video, contact: **Admissions Office; P.O. Box 265; Sioux City, IA 51102-0265 or call (712) 274-6400 collect.**

FOR SALE — "A Guide To Restringing" Paperbacks $16.50 plus $1.50 for postage and handling. Hardbacks $21.50 plus $2.00 for postage and handling. Order today. Sorry, no COD's. Make check or money order payable to: **JOHN TRAVIS; 8012 Carroll Avenue; Takoma Park, MD 20912.**

NILES BRYANT SCHOOL — Since 1898 Piano tuning, regulating and repairing learned easily at home through time tested method proven over 90 years of continuous service. ELECTRONIC ORGAN SERVICING also covered. World's only home study course covers all makes and models and contains over 100 pages of schematics. **Write or call: NILES BRYANT SCHOOL; Dept. G; P.O. Box 19700; Sacramento, CA 95819. (916) 454-4748 (24 hrs.)**

STATE OF THE ART KEY COVERING — 52 piano keys recovered .075 with fronts — $85.00 Premium work — includes tops and fronts resurfaced, clean and renew wood and backcheck, coverings, polish capstans. New sharps, $45.00. Return freight paid with prepaid order. Fast service. *"Try us, you'll like us."* **Mr. C. Brunkow; 4991 104th Way North; St. Petersburg, FL 33708 (813) 397-1699.**

PIANO KEYS RECOVERED — 52 whites with .075 tops with fronts=$65.00; 36 sharps — $35.00. Pre-paid or on open account — your choice. Average three working days turn-around time. Money-back guarantee. Send UPS or Parcel Post. We return UPS. Five years experience. **Kreger Piano Service; Rt. 1, Box 693-T; Ottertail, MN 56571 (218) 367-2169.**

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

SANDERSON ACCU-TUNERS from Authorized Distributor. The most accurate and advanced tuning aid available. Tuning lever note switch for Accu-Tuner $25. Consignment sale of used Accu-Tuners and Sight-O-Tuners or new Accu-Tuner customers. Call for details. **Rick Baldassin; 2684 W. 220 North; Provo, UT 84601. (801) 374-2887**

VICTOR A. BENVENUTO VIDEO TAPES, PIANO TUNING AURAL/ELECTRONIC — $175. The most accurate approach to fine tuning. KEY MAKING, $124.75. GRAND REBUILDING (two tapes), $225.75. Preparation, pinblock replacement, damper installation, restringing. GRAND REGULATING, $175.75. SOUNDBOARD REPLACEMENT, $94.75. Ship old board — new board comes to you ready for installation. Please specify VHS or Beta. All prices include shipping. **THE PIANO SHOPPE; INC.; 6825 GERMANTOWN AVENUE; PHILADELPHIA, PA 19119 (215) 438-7038**

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BUMPER STICKER. "Have You Played Your Piano Today?" Two-color with piano on quality vinyl. Send $4.00 each to: TPT; **P.O. Box 906-A; Johnston, IA 50131.**

Wanted

WANTED: STEINWAY AND MASON HAMLIN GRANDS. All sizes and cabinet styles. **Ask for Karen Bean at (415) 676-3355. Piano Finders; P.O. Box 23814; Pleasant Hill, CA 94523.**

UP TO $1000.00 FINDER'S FEE will be paid for successful purchase of a Mason and Hamlin Ex-Player. I have mechanism to install. ***Please call collect* (317) 259-4307 or evenings (317) 849-1469. Jim Brady; 4609 Cranbrook Drive; Indianapolis, IN 46250.**

WANTED: Copy of Don Hardin's book circa 1983 on accurate electronic tuning. Will pay fair price. **J. Meehan; Route 5, Box 319, Gardiner, ME 04345 (207) 582-1540**

KEYBOARD SERVICES TECHNICIAN: Ball State University has an opening for an individual to perform technical duties related to keyboard maintenance in the School of Music. Three years technical study related to piano/keyboard maintenance technology plus one to three years keyboard maintenance experience or related required. Review of applications to begin immediately and continue until position is filled. Send letter of application, resume and copy of college transcripts to: **Human Resources Department; Ball State University; Muncie, IN 47306** An Equal Opportunity/Affirmative Action Employer

WANTED!! DEAD OR ALIVE: "Steinway Uprights." Call collect, **Ben Knauer (818) 343-7744.**

WANTED — large numbers of pianos. Will pay cash and remove immediately. No large uprights except Steinways, please. **(716) 774-0044 Grand Island, NY**

WANTED: 7-foot to 9-foot American grand needing work. **(713) 363-0488 John Pels**

TUNER/TECHNICIAN: Experienced. To work in piano shop. Full-time, excellent benefits. Salary commensurate with experience. **Pickle Piano; 104 West Lake Street; Bloomingdale, IL 60108 (708) 894-2992**

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

Music Makes The Difference

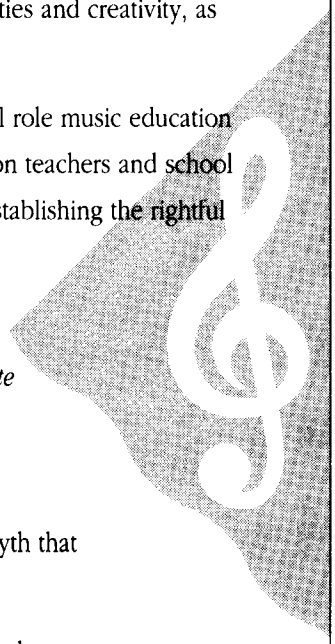
A DECLARATION OF CONCERN ABOUT MUSIC EDUCATION

*D*uring the 1980s, educational reform made it onto the front pages of American newspapers for the first time in decades. Politicians, policy makers, and business figures have been quick to trace much of the nation's *"competitiveness gap"* to the schoolhouse door. They have voiced ringing alarms over the slippage in math and science scores. But when the discussion has turned to making sure our children learn to understand and participate in music and the other arts, there has been silence. We believe such near-sighted concern short-changes our children because it leaves them only half-educated. Since the beginnings of civilization, music has been universally recognized as crucial to quality education, for two reasons.

First, every civilization recognizes that both formal and informal music education prepares children for what life ultimately requires. Music education fosters creativity, teaches effective communication, provides basic tools for a critical assessment of the world around us, and encourages the abiding values of self-discipline and commitment.

Second, music and the other arts have been recognized as unique to human capabilities and creativity, as a means to self-discovery and self-expression, and as a fundamental part of civilization itself.

We, whose lives are marked indelibly by a love for music, and, who understand the essential role music education can play in developing the whole human being, call on the parents of our school children, on teachers and school officials, on local and state boards of education, and on the American people to join us in establishing the rightful place of music in the schools.



OUR CREDO IS SIMPLE

Just as there can be no music without learning, no education is complete without music. Music makes the difference.

TO THAT END

*W*e call on all who care about education to destroy, once and for all, the myth that education in music and the other arts is mere "curricular icing";

*W*e call on all who cherish the arts to insist that instruction in music and the other arts be reestablished as basic to education, not only by virtue of their intrinsic worth, but also because they are fundamental to what it means to be an educated person;

*W*e call on parents, educators, and citizens who know and understand the value of music in our common life to bring the message about the value of music education to decision makers at all levels and to encourage them to establish music as a priority, so our children can continue to learn and make music and;

*W*e call on those whose livelihoods depend on music–as manufacturers, technicians, retailers, educators and performers, composers and others–to lend their support to the cause of music education in our schools.

❧

In witness to our commitment to these goals, we have signed our names to the accompanying petition.

The National Commission on Music Education, 1902 Association Drive, Reston, Virginia 22091-1597 1990-1991

P E T I T I O N S H E E T

MUSIC MAKES THE DIFFERENCE

THE NATIONAL COMMISSION ON MUSIC EDUCATION

Just as there can be no music without learning, no education is complete without music. Music makes the difference.

YES! I want to make music education a driving force in America's schools. If our children are to succeed in the workforce and world of the future, they must be provided with a well-rounded educational curriculum incorporating music and the other arts.

NAME ADDRESS

IMPORTANT: We can accept signatures from adults of legal voting age only. Please be sure to sign your name to verify the authenticity of the signatures.

This petition sheet voucher authenticity verified by NAME:

ADDRESS:

CITY: STATE: ZIP: DATE:

Please return to: The National Commission on Music Education
1902 Association Drive
Reston, Virginia 22091-1597

Tech Gazette

Yamaha Piano Service October, 1990

New Products

DISKLAVIER™ PIANO LINE EXPANDS WITH MX80 CONSOLE MODELS

The Yamaha Keyboard Division recently unveiled its new console version of the Disklavier reproducing piano. The MX80 unites the continental styling of the MIE piano with the popular Disklavier reproducing system already available in a professional upright and several models of Yamaha grand pianos.

According to Carter Schuld, Digital Acoustic Piano Marketing Manager, "The MX80 will broaden the Disklavier market, and rounds out the Yamaha Disklavier piano line."

Performance reproduction on the Disklavier piano is superb—recreating the player's subtlest musical expression as it was originally played. Performance information is stored on a 3.5" disk rather than on traditional paper rolls or magnetic tape. Advanced optical sensors accurately interpret keyboard expression in the Record function. The Playback function replays the music precisely as the performer recorded it using a sophisticated solenoid system to translate each nuance of the performance to the keys.

The MX80 Disklavier piano features a MIDI function which transmits performance data to outboard synthesizers, sequencers, or other MIDI keyboards, permitting the home pianist to tap into the vast potential of MIDI.

The MX80 Disklavier piano is available in Polished Ebony and American Walnut finishes. All selections in the PianoSoft™ library of performance software can be used with the MX80 Disklavier.

Yamaha in the News

DAVID BENOIT USES DISKLAVIER™ PIANO IN NEW ALBUM

Top contemporary jazz artist David Benoit has just completed his next album, a highly-anticipated work due for release this summer.

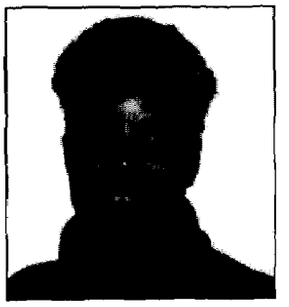
The album was mastered in Los Angeles using a Disklavier reproducing piano.

"The Disklavier gave us incredible flexibility in the studio," according to Benoit.

A number of top artists and studios are now beginning to use the Yamaha Disklavier system for recording, and it could well become "a must" piece of equipment for the recording studio of the 90's.

Mr. Benoit is also currently on national tour with a Yamaha MIDI Grand Piano.

Personnel Profiles



BALINDA KNOWLES

Balinda Knowles, Piano Parts Administrator, will soon be celebrating her ten year anniversary with YAMAHA! Balinda joined Yamaha in 1981 as an order desk clerk in the Keyboard Division. Balinda's continued performance in the Keyboard Division led to a promotion as Software Administrative Coordinator in 1987.

A member of Yamaha Piano Service since early 1990, Balinda's knowledge and experience make her a valuable addition to our staff. As Piano Parts Administrator, Balinda assists our customers (including many of you) in resolving billing discrepancies and mis-shipments, and provides information regarding shipment feedback. Tracking and processing returned items are also a part of Balinda's daily duties.

A California native, Balinda is a graduate of California State, Fullerton with a teaching degree in Physical Education. Balinda and her 14 year old daughter, Jackie, reside in Fullerton, California.

Yamaha will participate in

DISKLAVIER™ SERVICE SEMINARS
October 8-12
November 5-9
December 3-7

LITTLE RED SCHOOLHOUSE
September 17-21

PTG SEMINARS
October 17-20 New York State
November 2-4 Texas State

YAMAHA