PIANO TECHNICIANS

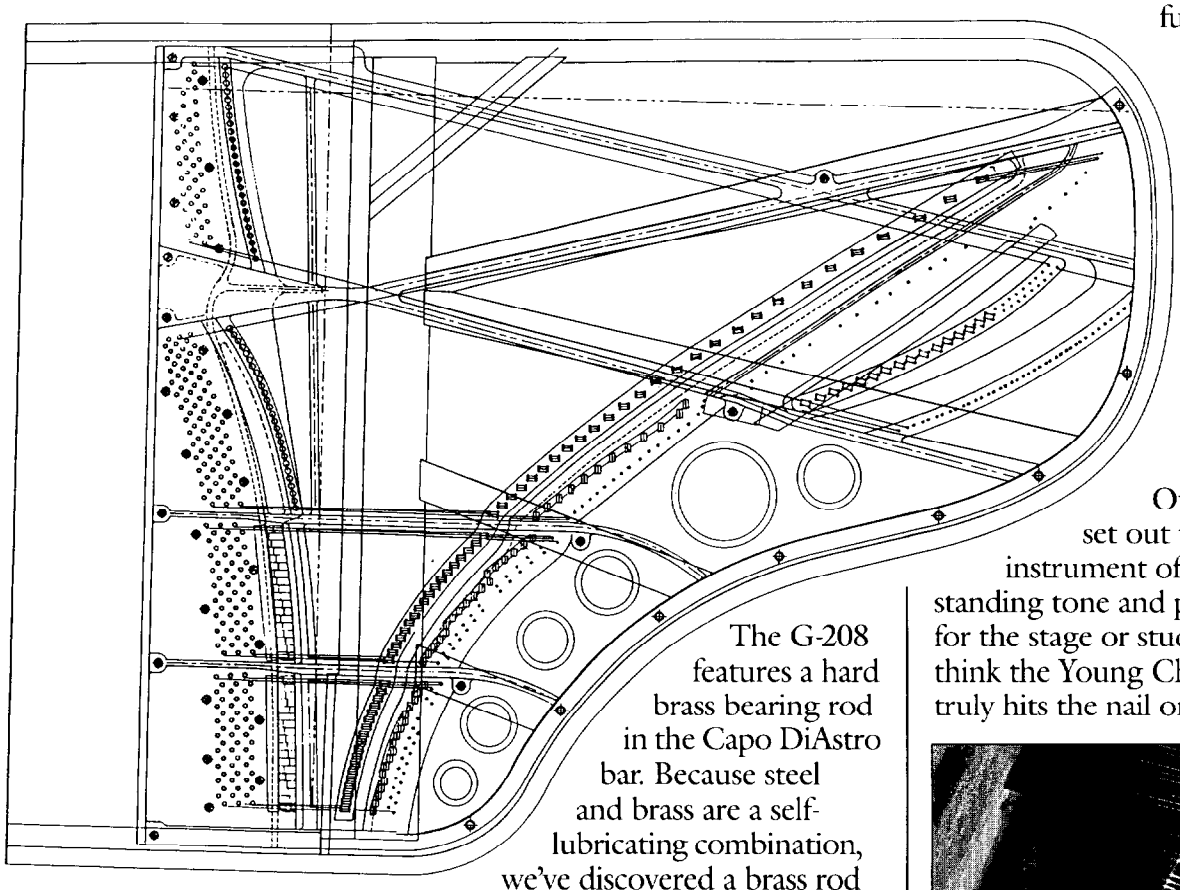
Journal

February 1993

A nuts and bolts guide to the new Young Chang G-208.

Our engineers are obsessed with the little things because they recognize the importance of attention to detail. But lately, they've become equally obsessed with big things, and the result is 6'10" long. Our new G-208 grand is a departure for us and represents the smallest and largest of our latest innovations.

The G-208 is a 6'10" grand piano of an entirely new scale design. It features our new "Asymmetrically Crowned" soundboard which places the highest part of the crown in each rib directly under the bridge providing maximum support under the downbearing pressure of the strings. This new soundboard design exhibits improved power, projection and tuning stability, and offers a longer soundboard lifetime. We're so pleased with this new design, we're now incorporating it into all our grand pianos.

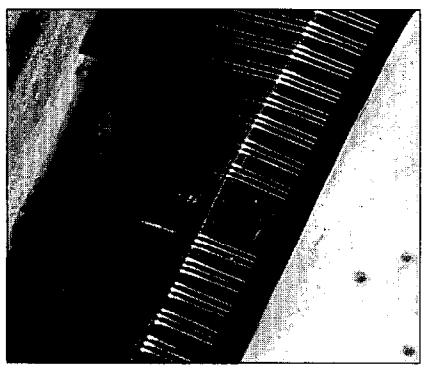


The G-208 features a hard brass bearing rod in the Capo DiAstro bar. Because steel and brass are a self-lubricating combination, we've discovered a brass rod offers better control of strings during tuning. In addition, the brass rod is easily replaced later in the life of the instrument eliminating the need for reshaping of the capo bar.

We also took a close look at our action and developed an all-new action design which improves response without loss of projection or clarity.

Our new double duplex system terminates the strings at the rear of the bridge and near the tuning pins with duplex bars. Both duplex lengths of the strings for each note are then terminated in equal length offering improved sustain, projection and clarity.

Together these innovations create an instrument with a rich, full sound, greatly improved response and a remarkable evenness of tone throughout the entire range of the keyboard. Our engineers set out to design an instrument offering outstanding tone and performance for the stage or studio. And we think the Young Chang G-208 truly hits the nail on the head.



Because strings bear against a replaceable brass rod, tuning control is improved.

For technical information on our new G-208 grand piano, write to us at Young Chang America, Inc., 13336 Alondra Blvd, Cerritos, CA 90701. Or call 310/926-3200, ext. 237.

YOUNG CHANG

The best the world has to offer.

Schaff

NOW HAS AVAILABLE THE ORIGINAL DU PONT SLIPSPRAY LUBRICANT

TFL 50 DRY LUBRICANT

This is a dry lubricant containing the original DuPont Slipspray formula. The spray delivers a high proportion of solids to vehicle, making it quick-drying as well as economical to use. It has a non-hardening base and leaves a light but permanent coating. It is suitable for use on wood, metal, leather and felt; can be applied to action parts (including knuckles), key-frame pins, key-beds, pedal rods or any other application where a dry coating is desired for lubrication and noise reduction.

No. 1418 — 5 oz. Aerosol.
No. 1419 — 10 oz. Aerosol.

TFL 50 WET LUBRICANT

This is a synthetic wet lubricant containing liquid nylon. It is excellent for use on metal to metal, wood to metal, some cloth to metal (damper rod hangers) and leather to metal. It is especially good where grease based lubes will not penetrate.

No. 1420 — 5 oz. Aerosol.
No. 1421 — 10 oz. Aerosol.

THE HOUSE DEDICATED TO SERVICE

Schaff PIANO SUPPLY COMPANY
451 OAKWOOD ROAD,
LAKE ZURICH, IL 60047-1516

24 Hour Hot-Line
Reg. (708) 438-4556
T-Free (800) 747-4266
Fax (708) 438-4615

PIANO TECHNICIANS Journal

JIM HARVEY, RPT
Editor
205 Parker Avenue
Greenwood, SC 29649-2629
(803) 223-2889

LAROY EDWARDS, RPT
THOMAS GORLEY, RPT
Journal On Tape Readers

HOME OFFICE

3930 Washington
Kansas City, MO 64111-2963
(816) 753-7747

LARRY GOLDSMITH
Publisher/Executive Director

JAMI HENRY
Director of Communications

SANDY ESSARY
Subscriptions

MARY KINMAN
Director of Member Services

CATHERINE WILANE
Director of Finance

TERESA VIENS
Administrative Assistant

The Piano Technicians Journal (ISSN 0031 9562) is the official publication of The Piano Technicians Guild, Inc., 3930 Washington, Kansas City, MO 64111-2963. The *Journal* is published monthly. Second class postage paid at Kansas City, MO, US ISSN 0031 9562 foreign and domestic. POSTMASTER: please send address changes to: *Piano Technicians Journal*, 3930 Washington, Kansas City, MO 64111-2963.

Annual subscription price: $85 (US) for one year; $155 (US) for two years; $7.50 (US) per single copy. Piano Technicians Guild members receive the *Piano Technicians Journal* for $45 per year as part of their membership dues.

PIANO TECHNICIANS JOURNAL

Official Publication of the Piano Technicians Guild, Inc.

FEBRUARY 1993 • VOLUME 36 • NUMBER 2

PLUS

ON THE COVER

A method of securing the rear duplex for restringing. See Good Vibrations, page 24, for accompanying explanation.

"For the sensuous, luminous sound, sensitive action and power— for the great artists— there is only Baldwin."

Abbey Simon

"Abbey Simon is a very demanding pianist. I can be confident that a well prepared Baldwin will satisfy his needs. It's full, brilliant tone and firm, distinct touch, enable all his virtuosity to come through."

Richard Ziss
Concert Technician

Baldwin... *Leading the way through research.*

KAWAI
NEWS

Plastics Proven To Be Superior To Wood In A Quality Piano Action...

Obviously, there is resistance to change. However, innovative scientific plastics are available and readily replace less effective conventional materials in the piano action...

..."Scientific tests, i.e., high and low temperature cycle tests, low and high humidity tests, bending strength tests, specific gravity tests, performance comparison tests and over two decades of use in Kawai's Ultra-Responsive™ Action (without a single failure) have proven ABS* materials to be superior to wood in touch, durability and accuracy."

..."Plastic parts have a number of advantages over wooden ones. They can be made more uniform in shape and weight, are indifferent to temperature and humidity changes, and have no glue joints to come apart"

Larry Fine
The Piano Book © 1987
Boston, Massachusetts

Symphony, Concert, University And Other Certified Technicians Praise Superiority Of Plastic Piano Action Parts:

..."I have never seen a Kawai synthetic action part fail...or be affected by temperature change or use."

Steve Smith
Dallas, Texas

..."There is no contest between Kawai's synthetic jack and a wooden jack. The Kawai jack wins hands down."

Edward R. Erwin
Boca Raton, Florida

..."The Carbon Jack is a good idea whose time has come... Makes accurate regulating easy..."

Sean Kelly
Denver, Colorado

..."ABS advantages over wood are numerous. The reliability and consistency in manufacturing is unbelievably good... Kawai is a bold innovator... Precise action performance is a function of Kawai's advanced mechanical engineering and highly developed production methods."

James Alexander
Detroit, Michigan

..."The incorporation of ABS plastic action parts in Kawai pianos make them the instrument of logical choice for universities. I have never had to replace a Kawai jack or flange."

Matthew Dickerson
Indianapolis, Indiana

..."Kawai's use of plastic in the action is a good idea. I never had a problem with the plastic components in a Kawai Action. Slowness and swelling found in wood action components are not evident where Kawai uses plastic."

Paul Monroe
Irvine, California

..."The Kawai Black Jack and plastic flanges are phenomenal, I never had a single problem with them."

Robert McMorrow
Baldwin, New York

..."In the 10 years I have serviced Kawais I have never had a single ABS flange or jack problem... I never had to tighten a single flange screw."

Franco Skilan
North Hollywood, California

..."The Carbon Jack is a good idea. I have never encountered any problems associated with Kawai's ABS parts... or a broken ABS flange..."

Edmond I .Langlois
Modesto, California

..."Kawai's ABS action parts are perhaps one of the revolutionary products of the century... Kawai has the most responsive action in the industry."

Wendell E .Eaton
Silver Springs, Maryland

..."ABS, yes! The old plastic problems experienced by other manufacturers are gone... I have never had a problem with any Kawai synthetic action parts."

Mark Hullibarger
Manhattan Beach, California

..."In my work with over sixty Kawai pianos at Duquesne University I have experienced no failures or problems concerning Carbon Jacks and ABS flanges..."

David J. Barr
Pittsburgh, Pennsylvania

..."As a technician I have been very pleased with the Kawai action, and I work on all makes and sizes of other brands."

Tom Shaw
Charlottesville, Virginia

..."I found Kawai's synthetic jacks and flanges to be trouble-free under extreme demands..."

Ken Lawhorn
Collinsville, Connecticut

..."ABS plastics are quite welcome... Kawai's commitment to quality is manifestly evident... The school of music at USC speaks highly of the Kawai action."

Horace Greeley
Los Angeles, California

*Acrylonitrile, Butadiene, Styrene

Why Don't Others Adopt Plastic Components?

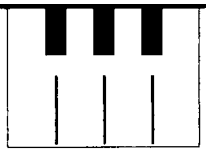
Kawai is the only grand piano manufacturer to adopt the Carbon Jack as an action component. Why don't other manufacturers use plastic, now that it is proven to be a superior material for the action? There are two major reasons.

First, it is absolutely necessary to scientifically analyze action mechanics prior to changing major components such as the jack. Kawai's modern research laboratory, acoustic specialists and design engineers are continually working on action improvement and acquiring effective proprietary properties. This major capital and personnel investment permits Kawai to offer the latest advancements in technology, including the superior Kawai Carbon Jack, ABS flanges and other action components.

The Second reason is that Kawai capitalizes on the economies of scale. Kawai's production capacity makes the high costs associated with the use of plastics economically feasible. Carbon Jack production is a complex procedure. Kawai has the technology, the equipment, and the experience... Kawai is proud of its leading role in the evolution of new processes that successfully blend old world craftsmanship with modern technology.

Some individuals, including piano engineers and technicians, resist changes even when scientific data verifies superiority. The Kawai Carbon Jacks and ABS flanges are superior to wooden jacks and flanges in all aspects, including key touch, quality, durability and precision. The ultimate proof is in the touch.

Your qualified technician will readily attest to the superior performance and durability of the Carbon Jack and the other plastic components in Kawai's Ultra-Responsive™ Action.



President's Message

Advancing Our Profession Through Education

As PTG members, our love of learning unites us: we have come together to understand that fascinating musical instrument, the piano. We understand that the more we know, the better we perform as professionals in the field. And by participating in PTG we are learning more about each other and discovering that, working together towards a common goal, we contribute significantly to our profession and our industry as well as our clients.

This passion for knowledge is evident everywhere in our organization. Chapter meetings are built around technicals, and even the talk over coffee never strays far from piano topics. The PT Journal, the Annual Convention, regional seminars, PTG publications, and manufacturers' training seminars are but a few of the learning opportunities open to us.

We are now in the process of evaluating all our educational programs in PTG. The survey sent to each member last month asked you to contribute directly to this effort. PTG needs to know if we are delivering what you, the members, want. So, your responses to questions on Journal content, client education materials, exam preparation, convention classes, publications and continuing education programs will be closely studied. Decisions made by Council, Board and staff will be better informed by this increased knowledge of what members need.

Our world is uncertain and constantly changing. In PTG, as in life, we try to plan ahead and make wise choices. But we can only plan for probabilities, not certainties. In such a situation, a sense of security can come from education. A broad base of knowledge lends us confidence in confronting the unknown and helps us adapt quickly to the unexpected. We have talked lately about the need for long-range planning and setting goals. We have taken the essential first step by gathering data on the basic question: what do members want from PTG?

In an organization of so many rugged individualists, the process of answering such a simple yet complex question is daunting. Yet, if we fail to confront it, we will expend much time and energy and never reach our potential. If we are not clear on the goal, how can we ever reach it?

Let's take one example. This year Council will be considering a proposal to split the Associate category into two: Apprentices (a pre-RPT group) and Supporting members. As you saw, many of the survey questions were designed to explore impressions of our category structure as well as attitudes towards our exams and member benefits. With this data, we hope to provide Council with every advantage in dealing with this category question. Proper handling of this issue is vital: 40% of our members are Associates and they represent the future of our organization. The programs and structure we put in place for them will greatly affect the look of PTG in the year 2000 and beyond.

Will the data from the survey give us all the answers to the category structure question? No. Ultimately, the answers must come from us—from our discussions, our debates, our minds, our hearts. But the added information gives us an edge. With knowledge comes a fresh perspective and the best chance to address problems effectively.

The same lesson is true in our daily work. Will attending classes or passing the RPT exam guarantee success as a piano technician? No. But it will give you an advantage. By learning more about pianos and your craft, you will be better equipped to handle the new challenges that arise. And one significant benefit of passing our RPT exam is the boost it can give to your professional confidence: knowing you have passed the test is a powerful experience! The flexible and open mind, exercised by learning, can adapt and apply what is already known in new ways.

Whatever else we do in PTG, let us continue to keep education central. Learning more about piano technology will serve our lives, our businesses and our clients. So as we join forces to advance the profession, let us strive to define our mutual goals, so that our united efforts can surpass anything we could achieve singly.

"If you think education is expensive, think of the price of ignorance."
—John Gardner

KNOWLEDGE ON TAP

1993

Come See What's Brewing

in

Milwaukee

CONVENTION & TECHNICAL INSTITUTE

JULY 14 · 18 · 1993

MILWAUKEE WISCONSIN

Institute Update

Milwaukee Spells Knowledge in 1993

Milwaukee is a fascinating city, and our location downtown at the Hyatt Regency Hotel is right in the middle of all the activities. We will be there during Italian festival week which will take place in "Old World". Old World begins right across from the hotel on Third Street where you will find many little unique shops and restaurants.

One of the unique things to do in Old World is to take the Edelweiss Tour Boat down the Milwaukee River, which also serves meals at certain times. The Water Street Brewery, just a few blocks from the hotel, serves good food and their own beer, brewed on the premises.

The Institute will be offering many new and exciting classes. One of them, taught by Jack Wyatt, RPT from Dallas, Texas, is called "Turbo-Charging the Vertical Action." This class is not intended for the beginner, or for those who are squeamish. He will demonstrate a method of increasing the speed of vertical actions by quick repetition and allow you to repeat notes without allowing the key to reach its normal height.

Another new class will be taught by Vivian Brooks, RPT from Old Lyme, Connecticut. Her class, "Taking Care of Business", will help you decide if you are making any money in your work. She will also give you a jam-packed 1 1/2 hours full of information that will help you "work smarter-not harder".

We also have many of the masters teaching again this year.

Virgil Smith's class, "Advanced Aural Tuning", will let you observe a complete top quality aural tuning at annual convention. He will be using a unique temperament that allows the technician to determine the best speed for each particular piano. This class should be most helpful to aural and visual tuners at every level, also for those preparing to take the tuning exam.

Bill Spurlock, RPT, from Vacaville, California, will show you all of his easily made jigs for repairing worn balance pin holes in keys and repairing poor key mortises prior to rebushing. You will also learn how to make that glass bead blasting booth you have read about in the Journal.

Janet and Kevin Leary are going to put a fine cutting edge on your everyday tools. Bring your chisels for hands-on experience and see all the methods you can use to do a better job.

For entertainment you can visit the Milwaukee Art Museum where they will have Master European Drawings from Polish Collections from the 15th-18th Centuries. This is a major art show made possible by the collapse of the Iron Curtain. You will see works by Rembrandt, Rubens and Durer from ten Polish museums.

For fast food, this month we recommend the hamburger place just across the street on West Kilbourn, they advertise the "Worlds Best Hamburger"; however, Sharla Kistler had a room-delivery hamburger from the Hyatt that she said would be hard to beat.

OK, Gang—we hope this will whet your appetite to be with us in Milwaukee for an exciting convention as we invite you to Come See What's Brewing in Milwaukee, where you will find Knowledge on Tap and the experience of a lifetime

Gary Neie, RPT
Institute Director

Milwaukee's First-Class Attractions Await 1993 Conventioners

By James and Linda Marten
Milwaukee Chapter

For technicians and their families looking for things to do while in Milwaukee for the 1993 Institute, here is a "top ten" list of sites and attractions that are easy to reach from downtown Milwaukee.

Brewery Tours. The Miller Brewing Company, founded in the 1850s, is Wisconsin's largest brewery. Free tours—given daily except Sunday—include a multi-media presentation, views of the brewing and bottling processes, and free samples of Miller products. Another American brewing giant and one of Milwaukee's first breweries, Pabst Brewing Company, is also located in Milwaukee. Visitors, who are welcome—at no admission charge—every day but Sunday during the summer, receive tours of the Brew House and its giant copper vats and the packaging and shipping center. One of the finest of the city's microbreweries, Sprecher Brewing Company, which produces beer based on 17th century German brewing laws, offers tours of its handmade physical plant and samples of its connoisseur-style beer on Saturday afternoons for a nominal fee.

Milwaukee County Zoo. Consistently rated among the finest zoological parks in the world, the County Zoo is the #1 tourist attraction in Wisconsin. Separated only by hidden moats, predators and prey seem to live side by side in natural environments. The 194-acre zoo, open daily, features over 2500 exotic mammals, birds and fish. A Visitor Center provides educational exhibits and the Children's Zoo provides hands-on experiences with farm animals. Recently completed exhibits include a new aviary and a great apes house.

Mitchell Park Horticultural Conservatory...Also known as "The Domes."

Mitchell Park Horticultural Conservatory. Known by locals as "The Domes," these are the only horticultural structures of their kind in the world. Three massive glass domes, each seven stories high, feature tropical, arid and seasonal displays that are open to the public every day throughout the year.

Boerner Botanical Gardens. A part of the Milwaukee County Park system, the 40-acre Boerner Botanical Gardens are internationally recognized for their formal and informal gardens of roses, perennials, wildflowers, annuals, and herbs. Open until sunset in the summer.

Milwaukee Public Museum. Located downtown, the Milwaukee Public Museum is one of the ten largest museums of natural history in America and a turn-of-the-century pioneer in creating natural settings for its exhibits. Visitors can experience a tropical rain forest, the age of the dinosaurs, ancient temples and tombs, the streets of Old Milwaukee, a European village featuring the lifestyles of Wisconsin's 33 ethnic groups, or exhibits from Asia, Africa and North America. Open daily, including Sunday.

Milwaukee Art Museum. Overlooking Lake Michigan at the War Memorial, the Milwaukee Art Museum houses a permanent collection strong in 19th and 20th century European and American art, as well as art works from early Egypt, the modern American Ash Can School and Haiti. Open daily.

Pabst Mansion. Built in 1893 in the Flemish Renaissance style, this magnificent home—on the National Register of historic places—was built for Captain Frederick Pabst, the founder of the Pabst Brewery. Daily guided tours usher visitors through rooms filled with impressive wood, glass and ironwork.

St. Josaphat's Basilica. The first Polish Basilica in North America and only the third basilica built in the United States, this impressive Catholic

Church was constructed at the turn of the century by poor immigrant parishioners and local craftsmen with materials salvaged from the demolished Chicago Federal Building. Tours of this South Side landmark are available.

St. Joan of Arc Chapel. The centerpiece of the Marquette University campus, this medieval French chapel was built in the 15th century near Lyon, France. The French heroine, Joan of Arc, is said to have prayed in the chapel during one of her campaigns. Presented to Marquette in 1965, it was reconstructed on campus and is the site of weekly masses. Free tours are available.

Ethnic Festivals. Each summer, Milwaukeeans celebrate the city's varied ethnic heritages in lakefront festivals. Italian, Irish, German, Mexican, Polish, African-American, and Native American foods, music, entertainment and cultural exhibits draw tens of thousands of people to the Henry W. Maier Festival Park. Festa Italiana, which has been honored by the American Bus Association as one of the top 100 events in North America, will be on tap during the 1993 Institute.

The list of things to do in Milwaukee numbers far more than ten. Nearly fifteen thousand acres of county parks, architectural and historical walking tours and daytime and evening cruises on Lake Michigan also beckon out of town guests. "Rainbow Summer's" free outdoor concerts—ranging from rock to jazz to folk to children's tunes—are presented every noon-hour at the downtown Performing Arts Center, while the Milwaukee Brewers, contenders in the American League's Eastern Division, will be in town for several games during conventioners' stay in Milwaukee. Information for these events and attractions and many more will be available at the Host Chapter Hospitality Site.

J

1993 Convention Offers Private Tutoring

Sign Up Early —Class Periods Available Are Limited

I've always had a fascination with and an appreciation for fine tools. Some of my earliest memories are of my father's shop and having access to his tools. The one rule of the shop was "always put the tools back where you got them" (A rule whose constitutionality was sometimes challenged by a certain unnamed party).

The most valuable tools, as I later came to discover, were not those which could cut or twist, hammer or tighten, but rather the tools of the mind. Tools which allow you to understand a process; to see with your fingers, to see with your mind's eye—tools which are meant to be taken and used and not put back where you got them.

Private tutoring will be offered once again at this year's Technical Institute in Milwaukee. You will be matched with an experienced instructor for an hour-and-a-half to thoroughly examine and explore a topic of your choice. Fill your tool box with these most valuable tools—your clients will thank you, your accountant will thank you and you don't have to put them back there you got them.

Complete the registration form below and mail to:

Fred A. Fornwalt, RPT
1993 Tutoring Coordinator
1333 Logan Boulevard
Altoona, PA 16602

Or call for more information:
814-942-1489

1 1/2 Hours of Instruction:
$65-before June 18, 1993
$70 After June 18, 1993

name _____

address _____

city _____

state, zip _____

phone _____

number of sessions _____

topics _____

_____

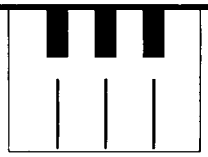
_____

...An investment in your Guild's future

3930 Washington
Kansas City, Missouri 64111-2963
816-753-7747 (phone)
816-531-0070 (fax)

The 3 by 1/4-inch bronze medallions which were cast to commemorate the purchase of PTG's new home in May are still available from Home Office for a donation of $100 or more. Donations received from the sale of these medallions have been earmarked for support of new programs and services for PTG. Among the ideas under consideration is a museum/archive facility to preserve the history of PTG and the purchase of new equipment to provide better information services to our members and the music industry. For each contribution, you will receive a medallion and we'll engrave your name—or the name of someone you designate—on a plaque to be proudly displayed in the new Home Office.

Send your contribution, name, address, phone number and the name you want engraved on the Home Office plaque to PTG Today. Phone and fax orders welcome.
Limited number available.



Technical Forum

An Abridged Treatise on

CPL's, CLP's and Action Centers

Jim Harvey, RPT — Editor

After that title, I need a break. Before getting to this month's primary subject, a look at the outside thermometer makes me think that it may not be too late in the season to mention a favorite tool. If for no other reason, any mention of tools will grab everyone's attention for a moment.

With the possible exception of our colleagues in Southern California and Florida, the rest of us have had the experience of having to work in less than optimal environments during the winter months. We may find ourselves in a church choir room, or a school practice room, when the heat is either turned down, or worse turned off! If this has never happened to you, there is a good probability that it will, since we typically do our work during off-peak hours when the rooms are unoccupied. I've been in some places that seemed more appropriate for hanging meat than for housing a piano.

At first, it may seem funny that you are able to generate "smoke", inside, just by breathing. Later, during repairs or tuning, you discover that you can't feel your toes, and your fingers are getting stiff. Wearing gloves prohibits dexterity during either tuning or repairs. Leaving your jacket or overcoat on means you run the risk of not feeling the effect of the clothing when you go outside. The situation can be so bad as to actually affect your abilities, as well as your work attitude.

Enter the "tool." In reality, it is a ceramic furnace. The name "furnace" is significant, since I would not categorize these units as portable "heaters" by any stretch of the imagination. Should you decide to try one in your work situation, here are a few pointers to help guide your selection.

You can pay practically anything you want for a furnace, from around forty dollars at discount stores, to well over a hundred dollars, depending on brand name and features. Any unit under consideration should be small and cube-shaped, for compact storage in your service vehicle. It should also have the word "ceramic" printed on the case or elsewhere, since some non-ceramic styles are made to look like those that are. A good double-check of this is to heft the unit being considered. It should feel like you're picking up a couple of bricks! A look at the power requirements should indicate something like a million watts. Seriously, most portable heaters operate in the 1000 to 1200 watt range, but the ceramics tend to require a little more wattage in exchange for a lot more efficiency. The ceramics top out at around 1500 watts, which, if I recall, is approaching the maximum wattage permitted a portable appliance for UL approval. It's also pressing the design limits of many 120-volt receptacles, before causing a circuit breaker to trip. For this reason, this might be the appropriate time to mention that you should have an extension cord that is at *least* equal to the power requirements of the unit. Lightweight lamp cords used for your trouble light (so-called "zip cords") should not be used. They may overheat and present a safety hazard.

I don't know how these little black boxes do what they do so well, but am inclined to think it's done by magic. The unit should feature the usual tip-over safety switch, and a thermostat. On regular portable heaters, the thermostat causes the heater and fan to cycle off and on. On the ceramics, the thermostat is continuously variable (instead of low/medium/high) , and constantly monitors the ambient environment and adjusts either the heat intensity and/or fan velocity to the setting you've dialed. Although a handle should be provided, the case should never become too warm to touch, except of course, at the front output grid. The unit should also feature a very quiet fan. Since I don't have an instrument for measuring sones, I'll define a quiet fan as one that, even when running wide open, still permits hearing well enough to tune over the sound of the motor.

In actual use, to protect the tuning, position the furnace on the floor, pointing away from the piano (although in these hostile environments, this practice might be of questionable value). I tend to use mine as a foot-warmer, recalling the backpacking tip which suggests that if the feet are warm (and dry), the rest of the body tends to go along with the program. While I haven't tried this, the furnace would appear to make a reasonably adequate fan (another switch position) for summer use in the same locations mentioned above. Other than the usual precautions regarding portable appliances, such as not having them accompany you (literally) in the bath or shower, I'll add one additional note; if you smell something burning, it will be your shoes.

While there are much more expensive units, I've had good success with mine for the purposes mentioned. It is Model PTC30, made by Arvin Industries of Phoenix, AZ. I realize that heating devices and

Phoenix are a contradiction, but that's the way it is. So, if you've looked at one of these little boxes before and wondered about their practicality or usefulness—go for it. They're great!

To CLP, or not to CLP?

Jim, more and more technicians have discovered the value of "Protek" center-pin lubricant. At the convention in Sacramento, many uses for Protek were mentioned besides center pin treating. But what is this stuff that works so well? Is it really harmless or is it another "plastic elbow" waiting for time to do its damage. It hasn't been around long enough for us to draw any conclusions about it. Is it possible to find out what the ingredients are and whether or not it has been tested against piano materials? Also, is it non-toxic, non-corrosive and non-contaminating?

Ted Simmons
Central Florida Chapter

That's quite a wish-list for such a short letter, Ted; but it is a good question, and also provides a platform for additional discussion. I must confess that I have had both the CLP and the MPL-1 lubricants (both Protek products) on hand for a while, but have not taken the time to investigate the merits of them. Specifically, I've not had a situation that required the use of the qualities they claim to have. However, the pursuit of an appropriate response to this question makes me think I may have missed a couple of opportunities.

Lacking actual experience with Protek, I contacted Joe Vitti, who, along with his associate Al Comparetti, are responsible for developing these products for the piano industry. The word "develop" is significant here, as opposed to "invented." Since both Joe and Al are piano technicians, the Protek products were actually made in collaboration with a lubricants engineer. As I understand it, the engineer was presented with two lists: one itemizing desirable product qualities for piano use; the second list defined the "no-no's"things that should not happen as a *result* of using the product.

Instead of the more customary CPL, an acronym for center pin lubricant, CLP stands for cleaner, lubricant, protectant. According to Joe, the product has had a combination of field testing and in-service use for about 2 1/2 years.

CLP is a member of the space-aged polymer (Teflon) family of lubricants. Although not the same in form or formula, it works by bonding to the contact material, much like some current automotive oil additives that claim to reduce engine wear during initial cold starts. The same formula that is available to us was tested on a bicycle chain. The chain was thoroughly cleaned, had a dose of CLP applied, and the bicycle ridden fifty miles before the rider sensed that

the chain might use another application of the lubricant. In a different, heavier formulation, the bicycle went 300 miles, but I spilled coffee on my notes, and can't read whether the lubricant or the rider quit. Suffice to say, both its tenacity and longevity have been given a fair acid test—at least on bicycles! A more applicable test involved applying the CLP to action centers with 36 grams of resistance, and almost instantly having the resistance drop to (and remain at) 8-9 grams. In another test, Joe applied the CLP to obstinate centers on a wippen, and achieved the desired results. Then, he tossed the wippen on the floor of his shop. It's still there, and in spite of being quite dirty, the centers are still free.

As to what the contents are, Joe would not reveal the formulation. Nor do I blame him, for a couple of reasons. One, it would tend to undermine his enterprise, and the rewards of same. Two, the product is priced to make it accessible to anyone choosing to use it. That leaves us with another reason for wanting to know, and involves Ted's other questions concerning non-this, that and the other. We already know the family of lubricants to which it belongs—the PTFE or Teflon group. While the product cannot be reverse engineered, given enough time and resources, one could perhaps perform laboratory analysis to determine which of the three thousand-plus variations of the formula this one is. Somehow this doesn't seem prudent. That leaves the carrier, used for the same reasons as we use naphtha in traditional center pin lubricants. Overall, toxicity level and inhalation risks for the product are considered low. Obviously, it should not be used as a substitute for your favorite beverage. It would prove very costly, and while you may not die as a result, there would no doubt be some type of dues to pay. I assume this to mean that it would be on a par with swilling a bottle of mineral oil.

The CLP has been accidently-on-purpose applied to lacquer and polyester finishes, hammers, and bass strings with no negative side effects. Due to its ability to molecularly bond to other surfaces, it doesn't creep or leech like silicone is prone to do, especially after the carrier dissipates. Joe does advise against getting the solution in the tuning pin/pinblock area. Even I understood that this would cause tunings to be completed far too fast, due to accelerated tuning pin movement!

I asked about cross-contamination (covered later). Joe said that while it is impossible to check against all other agents, there is a test to determine if the CPL is *not* likely to work: if, on application, the liquid bubbles up on the surface, instead of soaking in, the anticipated results may prove disappointing.

Joe invites any additional questions (or comments) about Protek

products. He may be reached at 516-473-0673. Current suppliers are Pianotek and Schaff.

Earlier I mentioned not having an opportunity to test the product. This is not exactly true. After finding my bottle of CLP, but prior to calling Joe, I was determined to try the product. My collection of green action parts had been deposited in an equally green dumpster prior to leaving California, and in my current small shop, I've been forced to cut back on collectibles. Failing this, I glanced around the bench, and spotted my battery operated travel razor, which ironically was in the shop for reconditioning due to sluggishness. It had started to run progressively slower and slower, and by now was only emitting small grunting sounds. I took it apart and cleaned it. I recalled having seen a bottle of electric razor lube at the local razor lubricant store (my town is growing), but had refused to pay what I felt was a price bordering on extortion. So, using a pipe cleaner, I applied a film of CLP to the foil screen that covers the blades, hit the starter button, and proceeded to shave. Talk about a toxicity test! Results? Let's put it this way. Unless my face falls off, I won't be buying the commercial razor lube. This worked so well, I then applied some to a newer, larger electric razor which, since new, had sounded more like a farm combine than a razor. It now runs not only quieter, but seems to run at least 1/3 faster. Hmmm. I wonder what would happen if used on my straight razor?

In all fairness, John Ford is also marketing a center pin solution called "ZipSlip." Neither John nor Richard were available when I called, and I had to finish this article. At least it has been mentioned, and if Ford's product differs in form or function from what's been documented here, I'll be happy to clarify this in a future issue.

I can understand Ted's apprehension about a new product, *any* new product that could create problems down the road. Although he uses plastic elbows for reference, center pin lubricants alone are not immune from scrutiny. Let's see. There is mineral oil and naphtha. There is silicone (or silicone oil) and naphtha. There is LPS-1. In the past, products for center pins have come and gone, at least in popular usage. I recall from an earlier *Journal*, where the virtues of WD-40 as a center pin lube were being extolled in one article, while the Forum was denouncing its use. Mind you, this was in the same *Journal* issue. Then there is alcohol and water. Ehhh! Wrong. Alcohol and water is a shrinking solution! Yet some technicians seem to have homogenized the intended usage and expected results of these solutions. While the following discussion is not intended to be complete (hence the title of the column), I want to point out a few things about action centers that may be beneficial, starting with the parts themselves.

Action Centers

It is amazing that bushed flanges work so well for so long without any problems, considering the demands of thousands upon thousands of use cycles, and their relatively fragile nature. Center pins are the *fixed* part in our tiny "hinge." This is mentioned as a reminder when dyslexia kicks in during repinning; i.e., those who continue to make the pin tight in the bushing, and loose in the birdseye. Center pins are considered a naturally lubricious material. Combine this factor with the action of the pin, pivoting inside a sleeve of fine wool cloth.

The specifications for flange bushing cloth exceed those for any woolen clothing item we could hope to own, or for that matter, other woven materials in the piano. And yet

the nature of the cloth is another contradiction. Wool is an abrasive, albeit a very mild one in this instance. Notwithstanding manufacturing processes that tend to fix things that aren't broken, wool also contains a natural lubricant—lanolin. This is why technicians used to run a center pin through their hair prior to repinning a part. As surely as modern manufacturing methods often destroy, or diminish this lubricant in the process, those same technicians no longer have any hair. And results would support that scalp grease not only doesn't work as well, the act of performing this ritual leaves strange looking tracks across the top of the head.

The point, at least in theory, is that the combination of this particular metal in a properly bushed flange provides a natural wiping or cleaning action for the pin. As a consequence, with choice materials and proper assembly, centers *should be* maintenance-free for a very long time. So, if this is our ideal, what happens to centers to cause them to need servicing? Actually, a number of things. I'll mention just a few possibilities.

Manufacturing Processes

The manufacturing process was already mentioned in reference to bushing cloth. We cannot stop here because other factors are involved. For instance, some piano makers elect to use plated center pins while "tropicalizing" their products. Tropicalizing is a process used by some manufacturers to help offset the negative effects on pianos when they are exported away from their home turf to new, different (usually humid) environments. The process involves far more than the choice of center pins, but that is all we're discussing right now. The idea of plating the pins is to minimize the onset and growth of vertigris, the green "cooties" that are the by-product of oxidation (not to exclude contamination). You may have seen plated pins where the sheared portions (which removed the plating and exposed the ends of the pin) were coated with a layer of green, but the pin was okay inside the bushing. It could be argued that my earlier point of self-burnishing would explain this, but apparently the plating does help in extreme certain situations. But suppose the plating were inferior originally, or...

Same area, different rationale. I have not researched this, but am of the opinion that the combination of briny, wet air and plated parts set up a chemical reaction similar to electrolysis. While I stand to be corrected on the accuracy of the statement, I have seen the effects on damper spoons and other metal-to-felt contact points, and it just seems strange that each time, the piano was in proximity to a body of salt water. The plating falls off, and in the case of center pins, the plating becomes lodged in the bushing. In other areas, the former plated part oxidizes and becomes pitted, and the resulting abrasive effects cause the accelerated wear and ultimate demise of the felt or cloth. I recall one, totally isolated instance, where a client spilled some salt into the piano. Before you write me about this, I only documented and diagnosed the cause and effects. I don't know what circumstances would cause someone to have salt around a piano. No apparent harm came to the instrument as a result; that is, until it rained and the inside air became moist. (Off-subject: I assume everyone knows that salt has no taste unless it's wet).

Same area, different parts. My last encounter with sluggish centers turned out to have nothing to do with the center pins or the bushings. My idea of diagnostics, at least in the abstract, is to do anything necessary to one key and related parts including setting fire to it if necessary to arrive at the cause of the problem; just don't do it to *more* than one assembly, lest the

reconstruction pattern become lost. While I didn't resort to pyrology in either the abstract or reality to find this problem, I did try *everything else*. I put emphasis on "everything else" for effect because I've heard it used so many times. Had I in fact tried *everything*, the problem should no longer exist! There's a lesson in here somewhere. Let's just say that when the more common reasons for sluggishness were eliminated as possibilities, I resorted to taking one wippen apart, one piece at a time. I finally found the problem to be one of part tolerances. In this instance, there simply was not enough room between the repetition lever and the repetition lever support, and the more the repetition lever was exercised by playing, the slower it moved, up to the point where it finally seized. Incidentally, I did try lubrication as one of my tests. It worked, but I had the feeling that since this was a concert instrument, the performers may want the keys to work for *more* than a few dozen blows. Another valuable lesson: whatever repair is effected at any place on a piano, exercise that part or assembly in a manner that simulates actual playing conditions. Static or minimal dynamic testing may cause callbacks, which doesn't help your cash flow or your reputation.

Usage Patterns

In this area, I'm calling on (or "copping to") the self-burnishing characteristics of action centers. We all encounter pianos of certain vintages whose action centers seem to be working reliably. We also see pianos of similar vintage that won't play. Further investigation reveals that the piano has fallen into a state of disuse, has become nothing more than a piece of furniture, and has recently been rediscovered. How someone could lose a piano, then suddenly "find it" again one day, has always been a mystery to me. A piano is meant to be played, and only coincidentally serve a cosmetic or furniture function. My experiences dictate a preference toward working on a piano suffering from natural wear (use) over one that has simply been occupying space.

Technician Guesswork

There exists a potential of lubricant cross-contamination, an expression I made up just now, which is a variation of "greasin' the grease", which was uttered long ago by John Ford. For example, suppose you encounter a sluggish action. Further suppose that the sluggishness was in the action centers, and that you decide to apply your favorite "slickum" to the offending parts. How do you know you are the first to treat the action? How do you know that you are not exacerbating the situation? In most instances, you can never be sure. Taking the time to properly assess the situation *before* starting to blindly "fix things" may save needless work and embarrassment.

While more a confession than a good analogy, I, too, have tried various experiments on sluggish action centers. Ironically, one of the most successful occurred several years ago. In this case, I had subcontracted to bead-blast an action and install new hammers, shanks and flanges. Additional work was to be done at a later date. While I dislike the installment method of reconditioning, it pays to remain flexible to keep the work flow going (not to mention maintaining and satisfying clients). The wippen centers were literally oozing of vertigris, even after bead-blasting, to the point that they prevented establishing and maintaining even a rough hammer line. Combinations of "something" and naphtha were mentioned earlier. I was out of the something, but had plenty of naphtha. However, instead of using a dropper or syringe to apply the cleaner, I tried something different. I loaded the spray gun with the solvent, adjusted the air pressure to fifty pounds, and "dry-cleaned" all the parts. I can't say that I will do this again, but you should have seen the green fly! I surmise from this experiment that either air pressure or the resulting atomizing as the solvent exited the spray gun caused the naphtha to penetrate the bushing cloth better, providing a deeper cleaning action. Unfortunately, I also shot myself in the foot by doing this. The action is still working, and no mention has been made about the next reconditioning installment.

For additional information on many piano lubricants, refer to the October 1990 *Journal*, or to your cross-reference guide for specific lubricants. Meanwhile, consider that lubricants are desirable, even required, in many areas of a piano work. To use lubrica-

tion as a stop-gap measure is also permissible in certain circumstances. Those circumstances may be a last-minute remedy to get through a concert, or perhaps due to client budget restraints. In these instances, make sure that your client understands what you are doing, and under what conditions. In other words, cover yourself and your reputation, and it wouldn't be a bad idea to do it in writing.

Next, to use lubrication alone instead of parts replacement, proper diagnosis, or quality work, and hiding this under the reconditioning or rebuilding umbrella is not only un-RPT-like (I still prefer Craftsman-like); it's not good business practice. This was echoed by Joe at Protek, submitting that his product was never intended as a substitute for proper workmanship *or*, circumstances dictating, the need for replacement parts.

To conclude for now, I'm sure you'll join me in saying "thanks" to Dan Bowman for his excellent tuning (and related) series. Also, in our continuing efforts to keep you informed, entertained, and educated, welcome to Bill Ballard, who begins his tenure as our contributing tuning editor this month.

J

Between You, Me & the Tuning Pin

Reconciling Sound & Numbers

Bill Ballard, RPT
Contributing Editor
New Hampshire Chapter

To echo a suddenly famous vice-presidential candidate, who am I? Why am I here? The byline above should serve as credentials, and some of you may remember other articles by me in these pages. But here I am, the current holder of a six-month lease on this space, the store-front, if you will. And there's plenty of interesting material in store for you. The important questions like:

- To mute or not to mute?
- What's a good feeling pinblock, and how does tuning hammer technique relate to this?
- Why do you get punished every time you try to skip the rough tuning?
- Is A440 a straight-jacket or should we let a piano's pitch float (within limits)?

...As You MakeYour Way Through The Tuning, How Do You Experience The Sound?...

Items like the slingless psychrometer; yet another take on the old 3rds and 6ths temperament; the heartbreak of inharmonicity, and the cross-eyed fifth (this one rated XXX for its use of math). There's some ear training to develop an acuity for partials, and when you've sharpened up on those, there's the neatest trick of all: trimming an interval by shimming a unison. Many of the ideas I've not heard before, which is not to say they haven't been around. But those ideas which have been taken up before in the *Journal*'s pages certainly bear repeating on at least an annual basis. It's all laid out in roughly the order in which we would pull tuning tools from our kit. And if, of course, along the way I spread around enough confusion and misinformation that our eminent former Tuning Editor pulls himself grumbling out of retirement, we'll all benefit.

But there's no better starting place than with our hearing, or rather what the two halves of our brain do with the piano sound we hear. I'm pleased to be able to carry forward the challenge picked up in the final piece of Dan Bowman's excellent series, that of opening up the intricacies of beat ratios and coincidental partials for a non-analytical mind.

I should caution here that the popular left brain/right brain theory suffers as much from over-simplification as any other notion. Although the intuitive and the logical are two distinct modes of mental process, all of us use healthy amounts of both, whether in tuning or tying our shoes. There's no denying that these two modes are a result of the bi-cameral brain we developed eons ago. But it would be inviting mental disorder to allow this theory to put up a brick wall between these two hemispheres in the brain. And finally, there's an odor of fascism in taking this wide wonderful world of people, segregating it into two categories and making judgments thereon.

But there is a basic division among all of us piano tuners, not between aural and electronic tuners, but between those who "hear the forest rather than the trees" and their opposites. The former tune with their right brains, the latter with the left. For right-brained tuners, harmonizing the piano is simply a matter of shaping sound. The left-brain process is one of breaking piano sound down into the individual and coincidental partials. That's not to say that those oblivious to the framework of coincidental partials are at a disadvantage. However, there's a large body of tuners out there for whom the mathematical approach to tuning has no meaning or use. There is also a wide gap here across which few ideas can be exchanged. Far below this schism, however, there are fundamental facts about how we hear and use sound which unite us all. Tuning is a world of illusion where impurities in octaves and unisons abound. With our broad variety of opinions about what a tuning is, we're like the blindfolded crowd around the elephant. I feel that the left-brain and right-brain tuners among us need a long-overdue introduction to each others' way of tuning.

A Fine Mess, Ollie!

"Oh what a tangled web we weave, when first we practice to..." (let's be perfectly honest about this) ...to tune a piano. As you make your way through the tuning, how do you experience the sound? Are you deep

in a stream of tones, some frozen, some sinuous, and others palpitating, even bleating? Do you regulate beat rates with the same meticulous manner of a watchmaker shaping gears for a given size of timepiece? Our Guild doesn't mind whether you watch beats or hear them. But you might have my peculiar form of audio-visual confusion, in which the sound of these successive intervals forms the image of a jungle gym. Eighty-eight notes are rooted into a sloping ground in such a way that their horizontal cross-ties can be roughly parallel, if not level, and so that the entire ensemble is not deliriously cock-eyed. (Fortunately, as soon as I put away the tuning hammer, these hallucinations vanish, and sound can be sound.)

But hallucinations or not, it's still a world of illusions, from that first day we gave up trying to match twelve pure fifths and seven pure octaves, on forward. We haven't gone very far before we are tuning not octaves, but "octave relationships." Sounds like another New Age concept from Dr. Mel Othello, but in fact, it's the least that a piano's acoustics is technically required to give us.

The unison itself is no sanctuary for the pure. Most false beats I know won't go away, no matter where you tap with your little hammer. And how about bass strings on a bichord note, whose harmonic series don't match. If you're lucky, the discrepancy will be small, say a 12th or 14th partial still wobbling while everyone else stands at attention. It can often be worse however, say, two or three mismatched partials with one of them as low as the 3rd. No matter how you move the tuning of that bichord around, it never ends up with much more grace or poise than one of those automobile dashboard rubber hula dancers. Making up a missing bass string from a universal set is the quickest way to create unmatched harmonic series, but they will just as easily show up in the strings of an original set, whether put on last week or sixty years ago. The most bizarre example of mismatched series, however was on note #64 of a small Sohmer Cupid model grand, maybe fifty years old, with aggraffed bridges. All three strings of the trichord were clean of false beats. Yet when the three-sting unison was pulled in, all but the fundamental were motionless and that beat rate was cleaned up by muting one of the strings.

So we really are in a world of illusion, and very much like the blindfolded group around an elephant all of us arguing our own version of what that big thing is based on our point of view (or rather, touch). A friend in my chapter admits that he doesn't go immediately to the *Journal* articles on tuning when the subject is numbers. I remember at the Guild national convention in 1975 when the subject of inharmonicity was just being opened up by the likes of Dr. Sanderson and Steve Fairchild. I was in a conversation on this with Wendell Eaton, even then long in the piano business, when he declared, "I'm a

wah-wah tuner, I tune it until it stops crying!" Another person with as little use for beat rate and stretch number calculations is Virgil Smith. In tuning an octave he would have us focus on the consonance between the first partials of each note. An impossible way to tune, he has been told by his peers. But he keeps his customers happy by it. What is the current state of the mathematicians' art? Dr. Sanderson will take a sample of three stretch numbers across the keyboard and his spread sheet will crunch out the optimum tuning for that piano. For Steve Fairchild, that's much too small a sample. His optimum tuning is derived from the inharmonicity of all eighty-eight notes. In fact, the gap between those describing the tuning in numbers, and those describing it as sound, is probably as wide now as the division between aural and electronic tuners ever was (that is, before a little education tempered the arguments).

Where We Stand

So, for the purposes of the discussion, all of us in the dark around this beast might as well start back at square one. There are really only two ways to tune a piano, or for that matter any musical instrument: intonation or by acoustics. Intonation, whether an innate gift or developed by rigorous study, lives in the musician's "inner ear." Intonation measures the distance between steps of pitch in sequence. It's how a singer learns to sing intervals, a string player finds finger spacings on the finger board, and how a wind player fine-tunes the raw intonation of his instrument. Someone practicing their intonation may occasionally use acoustic methods to set benchmarks for the intervals. For instance, a violinist, after properly tempering the 4th of two adjacent open strings could then locate the 4th on the lower string by finding a good unison between a proposed 4th on the lower string the upper string's open pitch. But as soon as the notes are played in series, as an instrument capable of only one note at a time must do, the intervals are set by the inner ear's memory. Regardless of how satisfying the product of well-honed intonation is, its standard is subjective, because it is a product of memory. A musician may use his intonation to lay out intervals during a solo performance but as soon as he or she combines with a second instrument, the inner ear's subjective standard must bend and blend.

Acoustics, however, are quite concrete. Either two pitches pulsing in the same airspace are in unison or they produce a beat rate, both with the sum and difference of their frequencies. Because a piano can fill the air with many notes simultaneously (and many harmonic series as well), and because pianos are not meant to be

tuned in real time by their performers, the musical ear's intonation is not of much immediate use in tuning a piano. The pervasive and overriding demands of the acoustical aspect, (that is, how the harmonizing fares in the countless combination of notes occurring on the pianos) are rigid enough that for the most part the inner ear's intonation is simply inappropriate. Of course, at the far corners of the keyboard, your intonation may call for widened octaves, and you can usually deliver this without seriously upsetting the acoustical outcome. But beyond this, there is no exception to the dominion of acoustics.

Two Brains In One

So we have this in common, that we are obliged by the nature of the beast to tune at least the middle five octaves by adjusting beat rates. However, the great divide among tuners is not whether we hear these beat rates as they hang in the air in front of us or whether we watch an electronic box's visual display of them. It's rather, which ear we hear the piano sound through. The left brain/ right brain model is a familiar one by now in popular psychology. The right brain works in intuitive, near-instantaneous leaps and the left brain makes its moves based on the outcome of a series of pedestrian calculations and judgments, mainly of a numerical or logical nature. The computer is fundamentally a left-brain operation, and regardless of the power with which it can process large amounts of data, it can have no hope that an algorithm for the human right brain's intuition will ever be constructed. As you look out over this world of people, left-brain and right-brain personalities are easy to spot, and most centrally in their style of decision-making. The bean-counter and the visionary are certainly working on their favorite side of the brain. They may come to a decision at different speeds, and those decisions on the same matter may be different. What's more, one type doesn't necessarily have a higher batting average than the other.

Over here among us tuners, the right-brain types know immediately when a 5th sounds good. It's like Great Art and dirty pictures: you know it when you see it. The left-brain types wouldn't dare make any conclusion without running that 5th through all the checks they had. When the tuner's right brain is the one interpreting the sound, it is sizing up the sound's overall contour, the shape that is made by the pulsing of beat rates. A 5th is deemed acceptable when its shape is what the right brain is looking for. There are neither words nor formulae to define this. The shape is a composite drawn from the memory of hundreds of thousands, possibly millions of other such intervals, and is further biased by another large memory of how this interval has worked out of other pianos of the same make or size. The whole process is intuitive, nearly instantaneous (or as near so as the memory will allow), and shouldn't be bothered with questions. When the left brain is at work, the sounds of the two notes are refracted into two separate harmonic series, all partial tagged by name and the coincidental partials are spotlighted. These coincidental partials then are regulated to produce coordinates in a mathematically well-balanced structure. The trial and error of a thousand tunings has gone into designing this structure so that eighty-eight notes can be integrated into a harmonious whole. And boy, can this frame-work be frustrated by an uncooperative runt grand!

No Rocket Science Needed

So tell me, why all that nomenclature just for a simple tuning? You might as well ask a seasoned carpenter whether he needs a ruler with aircraft readings, a carbide scribe and a mariner's sextant to build a house. Give him two eye-balls, a good rule of thumb, and a sharp saw, and he's on his way! Yeah, but when you get to a spinet with really gnarly intonation, don't you need the kind of analysis for inharmonicity built into the mathematical structure? Now let's carry the analogy on to the shipwright who can lay out lines tangent and perpendicular to a plane warped by constantly changing curves.

In fact, our right-brained tuner (remember him, the one with the 8th grade level math...) does perfectly well, thank you. Take the example of an octave being laid out with inside 4ths and 5ths. As he (and it is a he—everyone knows that he's are worse at math than she's) walks upwards from the temperament, he really only needs three notes. That's the octave note being tuned, and the two a 4th and 5th down from that. No 10ths, 12ths, 17ths, double or triple octaves need apply. There are no tests beyond a basic satisfying sound: does this threesome of the octave, 4th and 5th sound good, and is it consistent with what he's been getting in the neighborhood and what he thinks the piano can give him?

Is he overlooking the prevailing inharmonicity with this aboriginal scheme? Hardly! Take for an illustration C5 being set to the satisfaction of C4, F4, and G4. These four notes represent four stretch numbers. This sample may fall far short of Steve Fairchild's eighty-eight, but it won't get him into trouble. Granted, these only involve partials 2, 3, and 4 of our four notes. However, bringing in, say, G#3 or G#2 to touch base with the 10th and 17th series is at the least a second opinion on the integration of 2nd and 4th partials. But what the 10th and 17th series might tell him about the progress of his harmony at the 5th and 10th partial levels of G#3 and G#2 is not of much use. The inharmonicity factor is constant over any given note's harmonic series, and testing things at a 5th or 10th level won't reveal any warpage due to a lack of linearity. All he would have accomplished is a goosing of the test interval's beat rate from .5 bps to 5 or 10. And so what if G#3 is a wound string and its stretch number is grossly out of line with those of C4, F4, and G4 used to set C5? So what if G#2 is on the bass bridge? The basic fact is

that harmoniousness is either there or it isn't. When it isn't, you must choose between smoothness in the 3rds (and 10ths) or the 5ths (and 4ths). For me, it's a decision of which will be missed more, and for my money the 4ths and 5ths are the important ones.

And not only is our aboriginal tuner not missing out on anything by sticking to this threesome, he's also well served by it in preparing for the octave above. Remember now that C5 is being adjusted to temper three fundamental intervals: the octave with C4, the 5th with F4, and the 4th with G4. A reasonable F4 5th means that later, when he's setting F5's octave to its threesome, a reasonable 6:3 octave between F5 and F4 (the kid sister of F4-F5's 4:2) will yield a reasonable 4th between F4 and C4. Likewise, a good G5 4th means that when he's setting G5 to G4, the C4-G4 5th won't be out of the ballpark and requiring a lot of twisting of the other two in that threesome.

A Place For Numbers

Clearly, our low-math tuner is in fine shape. He's definitely down at the bank sooner to deposit his day's receipts. The late George Defebaugh used to warn us, "You can test yourself right out of business!" From this it would seem that there is nothing the left brain can claim to offer that the right brain can't easily do. If this is true, why do we need fancy mathematical models? Frankly, some of us poor fools need them to pacify our left brains. But more importantly, these are a badly needed language without which there can be no clear definition of what is going on. A gang of high school motorheads gets their heads turned by a candy apple blue Pontillac Firefeather (or some other passing object of beauty), and "What lines, what a shape" says it all. Amongst them at least. However, that description, transcribed and handed to someone who wasn't there says nothing. On the other hand, you would have a fighting chance of reconstructing the scene given a set of Bezier curves, other polygons, and associated CYMK color values. Likewise, I can't imagine any of the discussion of tuning theory in Guild classes or the *Journal* over these long years, in such language as "Well, you get it to where it sounds right you gotta bend it back from where you'd normally put it." Long tables of theoretical beat rates may be as useless as the composite tunings built into earlier generations of electronic tuning machines. But not until we translate these sounds into coincidental partials, can we understand how harmonizing a piano works. And we certainly can't begin to uncover why some pianos give us such difficulty in harmonizing them, without converting a piano's string scale into numbers and plugging these into some pretty intimidating exponential formulae. Believe me, this is the language we need, and it serves us well.

The Fabulous 3:1 Octave

So how well does this language work? (and if you must know, which side of my skull has the bulge on it?) Try this on for size. I like a little motion in my mid-treble octaves. I tell any customers who may be curious that the difference between "pure" and beating octaves is like Sleeping Beauty, before and after the Good Prince's kiss. (That is, she's equally pretty both ways, but I like her better warm and breathing.)

Now here's an idea for a mildly stretched octave in the mid-treble, the 3:1 Octave (that is, tuning the first partial of the upper note to the third partial of the lower note and testing using a 6th/17th test). This octave falls somewhere between the 4:2 and the 6:3, and I downshift to it when the pure 6:3 octave is too wide for the 4:2 octave.

You can preview the 4:2 and 4:1 octaves which a pure 3:1 octave will produce in the 5th and 6th octaves where I use it, right in the temperament octave. Play a single octave, say

F3 and F4, and add Bb 3 for an inside 4th. With the upper octave F5 tuned a pure 3:1 to Bb3, the beat rates caused by this intermediate "octave's" stretching can be found at the inside 4th. The F5-F3 double octave will beat the same as the F3-Bb3 4th, and the F4-F5 single octave will beat the same as the Bb3-F4 5th. I sample the 4:2 and 2:1 octaves simultaneously, playing F3, Bb3, F4 and F5 together. The best part is that if you want to find out whether the piano's inharmonicity will deliver pleasantly stretched octaves in a consistent series using this pure 3:1 "octave," you can do this by playing the 1-4-8 chord as soon as the temperament is complete and before moving out into those treble regions with octaves and quite likely unisons.

How far up the scale can you use this "octave"? The primary upper limit is how far into the 5th octave you can follow the major 6th beat rate used to set the M17th. But if your hearing allows you to get even to the bottom of the 5th octave (with the M6th of D#4-C5), the 12th above that would be G7. On most pianos, by that time I have downshifted to the 2:1 octave.

The next limit is not one so much of whether you can but whether you want to, and that is how well the octave/inside 4th gauge does when moved up through the 4th octave, a region of frequently bumpy inharmonicity. (It's here that you've probably encountered the Comma of Kohler & Campbell, that discrepancy between the 2:1 and 4:2 relationships in one octave pair.) This too can be previewed in the temperament octave. If in setting your temperament 5ths, you noticed a discrepancy between the 3:2 and 6:4 (that is, if a smooth progression of 3:2 beat rates was only possible with a kinky 6:4 series, that uneven line will be transposed to the 4ths in the octave above the temperament. (This latter anomaly I've dubbed the Comma of Acros.)

Devotees of 3rd/10th/17th beat rate progressions will want to know how the 3-1 octave affects their tuning benchmark. By the time I reach the Ab4-C5 M3rd (the threshold of any effect), I've stopped paying attention to 3rds. The 17th, of course, is a transposition of the 6th series from the 3rd and 4th octaves, which will be provided by reasonable inharmonicity and a good temperament. (Remember that a smooth series of 6ths is the imposition of a smooth series of 4ths on a smooth series of 3rds.) Any deviation which the 10th series may make from the 6th/17th series, again, has been previewed in the temperament octave by that upper 5th (in the example, Bb3-F4). But here as ever, whatever lumps there may be in the inharmonicity have to end up somewhere, either in the octaves or in the 10/17ths.

And finally, how do I manage to play an M12th? One hint: it doesn't involve the sostenuto. But, hey, you'll find out in the installment on interval trimming. See you next month.

J

Good Vibrations

Before You Unstring That Piano— LOOK!

By Nick Gravagne, RPT
Contributing Editor
New Mexico Chapter

The subject of stringing has many times been covered in the *Journal*. Moreover, available books on piano technology usually devote a chapter to this seemingly routine aspect of the rebuilder's art. Still, I think that some of the finer points of careful and attractive stringing are worth a focused look. In general, a nice stringing job includes the following: tight and uniform coils; uniform pin depth; and even string spacing, both in the speaking segments and waste segments of the strings. In addition, after all the strings are installed, they must be pulled to pitch and settled on the various bearing points.

Look Before You Tear It Down

As is always the case when rebuilding, study the existing condition of the piano before you tear into it. As to the original strings, make notes in your shop notebook regarding string spacing in the capo bar sections, spacing in the waste (front duplex) sections, height of coil off the plate surface, number of coils per pin in the various sections, damper guide rail position relative to the string spacing, and anything else that seems noteworthy. Taking such notes does *not* mean that you must copy the existing stringing—it may not be worth copying. This is especially possible if the existing stringing is not the factory job, but a subsequent restringer's job.

String Spacing

The considerations of proper string spacing include left-to-right spacing of each unison-note (non-agraffe sections), spacing of each string in the unison, spacing and adjusting of short string segments both in the front and rear duplex areas. The ideal in note-unison spacing is that each of the three strings should form a straight line running from the bridge pin, under the capo bar, and up to the front duplex bump. Often, especially in the higher treble, the speaking length of the string is not in line with the front duplex segment. That is, it veers left or right (usually left) relative to the speaking segment. This condition can only exist due to the friction and pressure between the string and the capo bar. Were the counter bearing angle much less than 15 degrees in this area, such as in uprights, the speaking length and short duplex length would naturally conform to a line when tension was applied. In the grand piano, and according to some rebuilders, this deviation from a line causes false beats.

The idea is that the speaking length is continually under a force that would cause it to shift laterally along the capo bearing, but the string is anchored due to the pressure and friction. Hence, there exists in the speaking length of such strings an unhappy stress, not unlike the holiday shopper who loves the holiday, but hates the shopping. The string shows its rude displeasure by beating falsely; the shopper, on a bad day, by behaving rudely. Unfortunately, this, seeming to be a hard and fast rule, is not always obvious upon investigation. There are many pianos "mis-strung" as above that sing in pure tones, while others properly strung in straight lines don't. Critical rebuilders are quick to point out that it is only a matter of time before the falseness kicks in on the "badly" strung piano. In any case, since the question of false beats is another subject, suffice it to say that, anytime the restringer can keep the string lines straight, something of an ideal will have been attained.

Should you find, upon tear-down and note-taking, that parts of the treble section wires are not straight, a judgment must be made as to whether the problem is with hammer spacing. If the hammers are flaring to the right, for example, as indicated by the shanks not being positioned over the wippen screws, then the string problem will be solved when the hammer spacing is corrected. But if the hammer spacing looks reasonably accurate in all sections (including the agraffe sections) then you will have to cut a compromise between cheating the hammer spacing right or left and straightening out the new strings. A larger problem may exist here in that the plate is out of position. Corrections of such a problem have been known to go from bad to worse since they involve not only plate positioning but bridge and action positioning as well. There are possibilities here, but a discussion of them will have to wait.

The Capo String Spacing Gauge

Assuming that the original string spacing is fine, a pre-tear down gauge that records the spacing in the capo

sections makes spacing the new strings much easier. **Photo 1** shows the gauge, which is made out of wood, sitting on the original strings. To make, cut the wooden strip a bit long, then disk-sand the ends to fit and conform to the plate struts. It should fit snugly but be easily removable. In the photo can be seen a small plastic triangle sitting on the tensioned strings, and positioned to line up with the *center* string of the unison. A corresponding line is then drawn on the wooden gauge. **Photo 2** shows a similar gauge (different piano) being used to line up the new strings. If the original unison-note spacing is just a bit erratic and uneven, correct it before making the gauges.

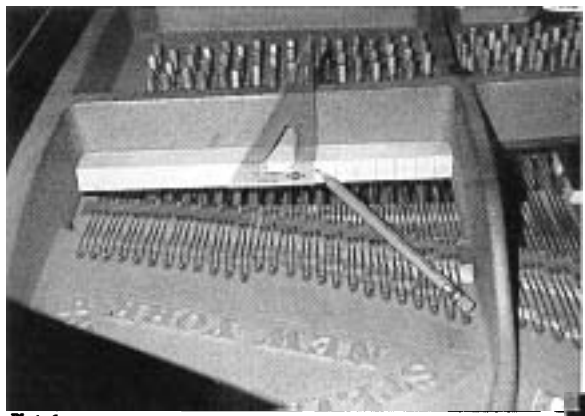


Photo 1

Using The Gauge

When restringing, just eyeball the spacing as you go. In the damper guide rail section, center the strings more or less between the bushed holes; but in the highest treble take your best shot. Do not use the gauge yet. Put enough tension on the strings to hold a tight coil, but don't pull very tight. When all strings are on, and all coils are tight, place the gauge on the strings. Shift the strings on each unison such that the center string lines up with the gauge lines. Tools to use for string shifting include the usual string spacing tool (the blade with three notches), and a small hammer for tapping the tool and strings in the appropriate direction. The tool and hammer can be used from either above the strings or below in the action cavity. Note that this operation is not so much to space all three strings of the unison, but to line up the center string with the gauge lines.

Caution: Pluck strings before shifting so as to isolate any highly tensioned strings. You must lower the tension a bit on these before shifting. Not only does this make shifting easier, but failure to do so could result in "rolling" the tight string over the capo bearing rather than sliding it along the bearing. A rolled string will be then forever twisted longitudinally and could be a source of false beats.

Spacing The Unison Strings

After aligning the strings to the gauge, tension the center string of all unisons so that it is audibly higher in pitch than its two outsiders. Next, with an ordinary screwdriver blade placed upright between the center string and one

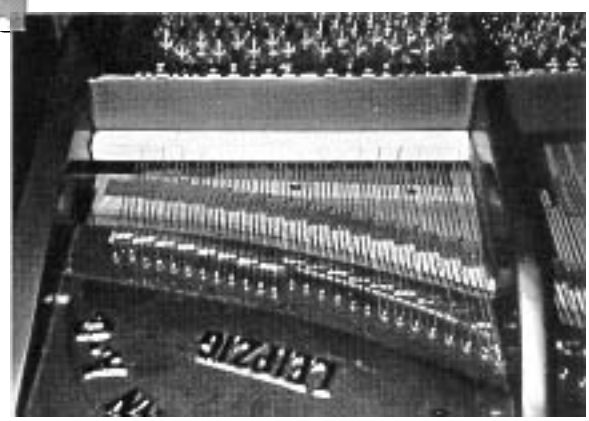


Photo 2

of the outside strings, "wedge" and coax the outside string into position. The higher tensioned center string, due to its greater force against the capo bar, allows this technique to work. But remember that the outsiders must not be too tight or they will roll, or kink in the shifting process. The strings should slide easily and without trouble. Continue to space the two outside strings equidistant from the center strings for all unisons.

How far apart should the three unison strings be? Well, in my experience the string spacing tool positions the three strings too close together. I have two such tools and neither one has a wide enough spacing pattern, which is why I use the above method with the screwdriver. The original spacing can guide you, as can the width of the hammers. New hammers may be narrower than the originals, so factor that in. Correct unison string spacing should be more or less evenly spread out over the striking face of the hammer.

There are obvious advantages to aligning strings according to the wooden gauge. The most notable is that the cumbersome action, which may be in a partial state of rebuilding itself, does not have to be dragged out and shoved into the piano for the purpose of string spacing. Once the strings are spaced they can be chipped immediately to pitch regardless of what may be happening with the action.

Duplex Spacing

While on the subject of string spacing let's consider the front duplex short lengths. These segments run uphill from the underside of the capo bar and cross over the front duplex bars before heading to the tuning pins. What sort of spacing should exist at the front duplex? Again, consider what you found in the original spacing. Beyond that, note that some rebuilders insist that the spacing as set at the underside of the capo bar should also exist at the duplex bar in order to insure the purest tone. I'm not convinced of this, but do consider it, and work towards that end where possible, and where it looks okay. In any event, once the speaking length spacing has been set, the front duplex spacing must follow suit. As mentioned earlier, a straight line (or nearly so) should exist from the bridge pin to the front duplex bump. In practice, this is usually eyeballed, with an occasional test being made by placing a straightedge, or stretching a thread over the top of the capo bar and eyeing down to get a visual fix. Admittedly, these tests are imperfect, but they do tend to uncover the grosser sort of spacing errors. In the next article string spacing will again be discussed.

The Rear Duplex Bars Can Be A Pain

The rear duplex bars can be a pain when it comes time to restring the piano. Since they are not secured to the plate with screws or pins, they have the nasty habit of sliding around until enough strings are on to "nail" them down. So, to avoid this, spot the bar for relocation before unstringing by drilling two holes through the bar and into the plate. Select convenient places for drilling such as between strings. Drilling is easy due to the nature of the metals involved. No need to drill all the way through the plate, but no harm done if this happens. The cover photo shows such a duplex bar, secure and ready for stringing. Note the two 3/32 inch drill bits, one at each end of the bar, standing upright through the pierced bar. The drill bits are easily removed after the strings are installed. This practice accomplishes two things. First, there is no doubt as to where the bar should be when it comes time to restring; and second, the bar is prevented from sliding around during restringing.

Those Pesky M & H Aliquots

If the rear segments have aliquots (Mason & Hamlin), a scratch

mark must be made in the plate finish to locate not only the fore and aft position, but the side-to-side position as well. Before scratching, reposition any aliquots that are not parallel to the rear bridge notch. I once made a gang-aliquot duplex bar by epoxying the aliquots to a thin but rigid plastic base, and then pinning the assembly to the plate. The plastic base was nicely cut— the edges having been sanded and smoothed. The base was then placed over the scratch marks, then drilled and pinned in place (but made removable). Finally, looking through the transparent base, the aliquots were positioned and glued on. With this method the plate can afterwards be refinished without regard to obliterating the scratch marks. But, for obvious reasons, the big reward is realized when it comes time to restring in that the aliquots are ganged together and anchored down. But what about downbearing? Yes, the thin plastic base reduces bearing; this must be factored in. In my project mentioned above, too much bearing was apparent and had to be reduced anyway.

Summary

The time spent in taking pre-tear-down notes, and making wooden spacing gauges, and, finally, in drilling duplex bar location holes is time well invested. The dividends come when you restring the piano. You will thank yourself for having been nice to yourself.

Continued next time.

J

Industry News

HOQUIAM, WA—Fandrich Piano Company, manufacturer of the Model U-122 Fandrich upright piano, has announced that they are doubling their manufacturing space on January 1, 1993.

The new piano building operation is filling a backlog of orders from U.S. and Canadian dealers at the rate of two units a week. The factory expansion is due to plans to increase production in 1993 to meet the growing demand for the instrument.

The piano has enjoyed favorable national publicity concerning its patented action (by Darrell Fandrich and Chris Trivelas) and the innovative back, soundboard and scale design by Delwin D. Fandrich, President, Fandrich Piano Company, Inc.

###

SAN ANSELMO, CA—The premiere issue of *Piano & Keyboard*, the bimonthly successor to *Piano Quarterly* published by the San Anselmo based The String Letter Press, appeared January 1, 1993. The magazine's new name reflects not only an increase in frequency but an expanded editorial mission as well.

While keeping the piano as its main focus, *Piano & Keyboard* will broaden its coverage to include all keyboard instruments, from harpsichord, fortepiano, and organ, to contemporary keyboard instruments such as the digital piano and synthesizer. There will be a comparable focus on the full range of piano styles, including jazz, ragtime, New Orleans, pop, rock, and country piano, in addition to the classical repertory.

Future issues will include feature profiles of and interviews with New Orleans pianist Mac "Dr. John" Rebenneck, solo and ensemble pianists Richard Goode and Peter Serkin, the brilliant young French harpsichordist Christophe Rousset, technical wizard and piano maverick Ivo Pogorelich and rising pop star Tori Amos.

Subsequent issues will offer feature coverage of the new synthesizer Robert Moog has developed for composer John Eaton, critically acclaimed new jazz combo pianist Geri Allen, and the history and music of the keyboard accordion. Repertory-centered articles will provide new perspectives on neglected corners of both traditional and contemporary piano music by composers as diverse as Chopin, Schumann, and Liszt—and Domenico Scarlatti's lesser known contemporary Antonio Soler and present-day, politically oriented Frederic Rzewski.

Piano & Keyboard will provide feature coverage of the latest music, performers, developments, and technologies on the keyboard scene.

All the latest keyboard-related technology will be discussed and reviewed in a new department called "Tech Talk", by Paul Lehrman, a widely respected composer, teacher and acknowledged authority on music technology.

An ongoing department, "The Technician's View", will be written by Larry Fine, RPT. The author of *The Piano Book: Buying or Owning a New or Used Piano*, Fine will bring his expertise to subjects of interest to the piano technician, performer, teacher and owner alike. *Piano & Keyboard* is the newest member of the family of music publications of The String Letter Press, Publishers, Inc., David Lusterman, Publisher.

Book Review

By Stephen H. Brady, RPT
Seattle Chapter

Book available in U. S. and Canada from Steinway and Sons, Steinway Place Long Island, NY 11105

In his introduction to *Five Lectures on the Acoustics of the Piano*, editor Anders Askenfelt acknowledges the complexity of the piano's acoustics: "...a complete understanding of the acoustics of the instrument will probably not be reached until the next century." Fortunately, then, Askenfelt hazards "an advanced guess that pianolike sounds will be used and enjoyed for at least another century. "

Although *Five Lectures* was published in 1990, it apparently has never been readily available at bookstores in this country, and must be ordered from Steinway, as listed above. The book, as its title indicates, is a compilation of five lectures on different aspects of the piano's acoustical nature. These lectures were given at a public seminar sponsored by the Royal Institute of Technology in Stockholm, on May 27, 1988. The seminar was preceded by two days of discussions between lecturers and invited representatives from piano manufacturers, and concluded with a concert played on different historical keyboard instruments.

Askenfelt's introduction to the book is a fine piece which includes a brief history of the piano, marred only by his use of 1709 as the year of the piano's invention by Cristofori, when it has now been established conclusively that Cristofori had invented the piano by no later than 1700.[1] Following this brief history, Askenfelt provides a five-page "survey" of basic piano acoustics in which he does an excellent job of conveying the information in language easily understood even by a lay person. If you've ever heard other piano technicians's throwing around terms like "impedance" or "non-linear stiffness," and wonder what, exactly, they were talking about, this introduction is a very good place to start.

The first of the "five lectures" is by Harold Conklin, former Director of Piano Research at Baldwin. Conklin describes basic piano design factors: the hammers, their weight, size, and hardness; striking point; soundboards, including nice illustrations of several soundboard vibration modes; varnish; the piano case; the cast-iron plate; the strings, including Conklin's work on controlling the frequency of the longitudinal mode of bass strings by a process he patented in 1967, known to us as the "Synchrotone" bass string. Conklin presents a variety of useful and interesting examples, and his material ranges from an examination of the 1720 Cristofori piano now kept at New York's Metropolitan Museum to discussion of certain 20th-century pianos with steel soundboards!

"Five Lectures On the Acoustics of the Piano"

Edited by Anders Askenfelt
Royal Swedish Academy of Music, Stockholm, 1990

Softcover 105 pages with sound recording, $24 plus shipping and handling

In the second lecture, Askenfelt and his colleague, Erik Jansson borrow from computer jargon to describe the piano action as an "interface" between the pianist and the string. This lecture explores action function in a detailed analysis using an elaborate network of microswitches installed on the action parts. With this mechanism, the "timing" of various events in the course of one blow to the key can be analyzed, and different types of blows, from *piano* to *forte*, can be compared via "timing diagrams" produced by the experiments. From these diagrams it is interesting to note that at ***mf***, the key reaches the front-rail punching at the same instant that the hammer reaches the string. At ***p***, the key bottoms out after hammer-string contact, and at ***f***, the key hits the front rail punching *before* the hammer hits the string.

Another point of interest in this lecture is that hammer shanks tend to vibrate at their own resonant frequencies and also vibrate in modes, with a "fundamental" at about 50 Hz and a "second partial" at about 390 Hz. Askenfelt and Jansson feel that these resonances are "in some way connected with the tone generation in the piano." This can be confirmed through observations by piano technicians who find that a "rubber shank" (which vibrates at a lower frequency than its neighbors) can negatively alter the tone of a note. Askenfelt and Jansson also feel that "touch" may affect tone quality through what they call the "thump component" of piano tone, or key impact noise. This idea has already been postulated by other writers, and seems to be valid.[2]

It should be noted that Figure 1 in this article [in the book] erroneously depicts leather coverings over the hammer rest cushion (on a Steinway grand action), the wippen cushion, and where the key contacts the back rail cloth. Donald Hall's investigation of the hammer and the string constitutes the third lecture. Hall examines the relationship between hammer mass and string mass in a typical grand piano, showing that this relationship is not constant from bass to treble. As it turns out, the string mass in the low bass is more than ten times higher than the hammer mass, while in the extreme treble

the hammer mass is about ten times greater than the string mass. Hall also shows that the hammer does not react in a linear fashion when contacting the string under blows of different strengths, i.e., the contact time decreases as the blow gets harder. After presenting his research on the effects of different hammer hardnesses, Hall proposes a system whereby a mechanical striker, a force transducer , and a computer could function as an aid to a technician voicing a piano by evaluating the effective stiffness and non-linearity of each hammer head.

Gabriel Weinreich's treatise on the coupling phenomenon observed in the tuning of unison strings will be familiar to many piano technicians and lay people as well, since he authored a paper on this topic for *Scientific American* several years ago. Weinreich argues that unisons can sound in tune even if they are not perfectly in tune, and that unison "mistuning " occurs even among skilled tuners. His hypothesis is that this apparently random mistuning is in fact not random at all, and that it helps to "cover" for imperfections in the hammers.

The final lecture in the book, "The Strings and the Soundboard," by Klaus Wogram, presents a compelling case for computer-assisted soundboard design. Wogram's thesis is that by modal analysis of soundboard vibrations, expensive prototyping of new soundboard designs can be kept to a minimum. The article gives us an overview of exactly how this type of analysis and modeling is done. Wogram also discusses topics such as the influence of string tension and ribbing on the input impedance of a soundboard, and the effects of impedance matching between string and soundboard upon the decay of the tone.

The most unusual aspect of this book is that it contains a compact-disc recording. The CD includes several musical examples from Conklin's lecture, one example from Askenfelt and Jansson, and none from the other three. The remainder of the recording consists of excerpts from the recital held at the conclusion of the seminar. Six instruments, including a modern replica of an 18th century harpsichord, three 19th-century Swedish pianos, an 1898 Steinway B, and a 1980 Steinway D, are used. The recording is most interesting, and those who teach college piano technology classes or who give lectures in other contexts will surely find it useful.

Since existing works devoted to the acoustics of the piano can be counted on the fingers of one hand, i.e., McFerrin, *The Piano: Its Acoustics*, Briggs, *Pianos, Pianists, and Sonics*, and a section of essays in *Musical Acoustics*, edited by Dr. Earle Kent, this is automatically an important volume. Even though most of the material in *Five Lectures on the Acoustics of the Piano* has appeared previously, most of the papers in it are presented here in a different form, with additional insights, and in language more readily comprehended by non-academics. The book should interest piano technicians of all levels, from those seeking a basic working knowledge of the piano's acoustics to those actually engaged in piano design.

1 See Stephen H. Brady, "The Grand Piano Action: A Multinational Achievement," *Piano Technicians Journal*, June, 1984.

2 See Ramon Alba and Asami Inouye "Piano Tone Color and Touch: A Controversy Compromised," *The Piano Quarterly*, Fall, 1979.

NEW MEMBERS

MEMBERSHIP

DEC • 1992

REGION 1

021 *BOSTON, MA*

ERIC A. BRINKERHOFF
P. O. BOX 951
HULL, MA 02045

122 *CAPITOL AREA, NY*

ERIC W. LEONARD
P. O. BOX 64
DURHAM, NY 12422

151 *PITTSBURGH, PA*

DONALD T. GERRERO
1039 MAIN ST.
WHEELING, WV 26003

REGION 2

201 *WASHINGTON, DC*

ALBERT V. SCHAEFFER
2305 HOLLY SPRING DRIVE
SILVER SPRING, MD 20905

REGION 4

441 *CLEVELAND, OH*

RICHARD K. MESSNER
2117 16TH STREET
CUYAHOGA FALLS, OH 44223

489 *LANSING, MI*

MARK D. ALLEN
4902 PALMER STREET
LANSING, MI 48910

WILLIAM J. SCHNEIDER
233 N. PENNSYLVANIA AVE.
LANSING, MI 48912

600 *WAUKEGAN, IL*

JAMES L. THOMPSON
223 S. MAIN STREET
MT. PROSPECT, IL 60056

REGION 5

631 *ST. LOUIS, MO*

KENNETH M. GERLER
8216 AUDRAIN DRIVE
ST. LOUIS, MO 63121

JOSEPH GERST, JR.
10358 BALTIMORE
ST. ANN, MO 63074

RICHARD J. MURPHY
13918 ST. ROSE ROAD
HIGHLAND, IL 62249

641 *KANSAS CITY, MO*

JOHN J. ZIDEK
7207 WARD PARKWAY
KANSAS CITY, MO 64114

REGION 6

851 *PHOENIX, AZ*

LEE J. STOCKER
4223 N. 31ST PLACE
PHOENIX, AZ 85016

857 *TUCSON, AZ*

EVERETT H. LOWMAN
3980 N. VIA DEL SOL
TUCSON, AZ 85749

901 *LOS ANGELES, CA*

DAVID S. FERRIS
3058 SPRUCE STREET
BAKERSFIELD, CA 93301

921 *SAN DIEGO, CA*

DAN G. LITWIN
2701 ELYSSEE STREET
SAN DIEGO, CA 92123

REGION 7

012 *VANCOUVER ISLAND, BC*

KENNETH B. ACKERMAN
RR 4, FORT STREET, C40
GANGES, BC
V0S 1E0
CANADA

DAVID M. DONOVAN
585 RIDLEY DRIVE
VICTORIA, BC
V9C 1K5
CANADA

RECLASSIFICATIONS

REGION 1

064 *CONNECTICUT*

WILLIAM I. HALSEY
12 MOTT AVENUE
NORWALK, CT 06850

122 *CAPITOL AREA, NY*

FRANCIS M. VETERE
50 BROADWAY
KINGSTON, NY 12401

REGION 2

292 *PALMETTO, SC*

WILLIAM W. MAXIM
231 LYNDHURST ROAD
COLUMBIA, SC 29212

REGION 4

401 *LOUISVILLE, KY*

JOHN W. GOTTSCHALK
1309 ROBERSON DRIVE
MURRAY, KY 42071

1993 EVENTS CALENDAR

FEBRUARY

12-14 **California State Convention**
Sheraton Long Beach • Contact Bruce Stevens
1442 E. 64th St., Long Beach, CA 90805, 310-423-7023

13 **Nebraska One Day Seminar**
University of Nebraska, Omaha • Contact John Minor
4308 Pacific S., Omaha, NE 68105, 402-553-8694

MARCH

12-14 **South Central Regional Seminar**
Fort Smith, Arkansas • Contact Bill Yick
Rt. 3, Box C644, Charleston, AR 72933, 501-965-7945

18-20 **Pacific Northwest Conference**
Seaside, Oregon • Contact Randy Potter
61592 Orion Drive, Bend, OR 97702, 503-382-5411

18-21 **Pennsylvania State Convention**
Holiday Inn-Bucks County, Trevose, Pennsylvania
Contact Patricia Sierota
102 Bridle Path Lane, Feasterville, PA 19053, 215-364-2564

April

15-17 **Mid-South Spring Seminar**
Memphis, Tennessee • Contact William R. Carmichael
901-372-1095

23-25 **Florida State Seminar**
Howard Johnson's-Daytona Beach, Florida
Contact Walter Pearson
1128 State Ave., Holly Hill, FL 31227

24 **Los Angeles Chapter Seminar**
La Canada Presbyterian, La Canada, CA
Contact Jim Karukas
3925 Big Oak Dr. #8, Studio City, CA 91604, 818-506-3077

April-May

30-2 **Central West Regional Seminar**
Collins Plaza Hotel, Cedar Rapids, Iowa
Contact David C. Brown
1719 Bever Ave., SE, Cedar Rapids, IA 52403, 319-365-3742

30-2 **New England/Eastern Canada Seminar**
Merrimack, New Hampshire • Contact Bill Ballard
R.R. 3, Box 875, Putney, VT 05346

May

8 **St. Louis One Day Seminar**
Contact: Bill Trefts, 1453 Colebrook, Webster Groves, MO
63119, 314-962-2143

AUXILIARY EXCHANGE

Dedicated To Auxiliary News and Interests

OK, so you've been cooped up for weeks now and you're getting cabin fever. How about getting some of those PTGA greeting cards out and write a few notes to some friends you haven't thought about since Christmas. Of course, you know what you are going to say to them. You are going to make plans for meeting your buddies in Milwaukee in July. You and your family are going to arrive a week or so early and take in all the sights and sounds of Milwaukee. And please don't forget the fabulous zoo there. You could spend a couple of days there alone. We used to take the boys up on the weekend and just couldn't leave. We'll probably drive by on our tour but won't have time to really investigate the zoo. Besides, it's more fun with your family, especially if there are children or grandchildren.

Now, while you're at it, take out the PTGA cookbook and make one of those recipes you thought would be good on a cold winter's day. Bake something so the kitchen stays warm and smells good when the family comes home. You'll be glad you did, and think of all the "ohs" and "ahs" you'll get. That will make your day.

Oh yes. I have more good news for you to further entice you to come to Milwaukee. I have a great big "yes" from an instructor for our class in sign language. I'm very excited about learning sign and all of you who have asked me about it, be sure to be there. It should be a very interesting two hours.

I'd like to get a handle on how many of you will be in Milwaukee. When you send in your membership and scholarship fund check, let us know your plans. Also, we need to know how many of you will be taking the tour. Make your plans early and plan to enjoy your institute and family vacation in July, spent in the wonderful rolling hills of Southern Wisconsin. Don't forget to stock up on all that wonderful cheese that they are so well known for! There ought to be a taste tempting recipe in the PTGA cookbook to use it. And, don't forget to write your friends on the greeting cards that you are going to buy at convention and tell them all about the wonderful time you had in Milwaukee and that you'll meet them the following year in Kansas City!

See now, that wasn't so bad and you have dinner ready and you made your day and the winter is almost over. You're dreaming about lying on the beach by Lake Michigan with friends. See you there!!

By the way, the morning I wrote this, December 1, 1992, it had snowed all night and the county closed the schools so that I couldn't teach that day. I walked our dog that morning in the snow and took pictures of it. Golly, isn't nature beautiful when it wants to be? So, I came inside and decided to write to you instead. So you see, you've made my day. You be good now.

Phyllis K. Tremper,
President

From The Auxiliary Editor...

February and early March usually mark the first sightings of the changing of the seasons in the Puget Sound Region. We have been known to get some of our heaviest snows in February, but usually the pussywillows are bursting and buds are swelling in preparation for spring. A large percentage of the tulips and daffodils and related bulb crops of the country are grown right here in the Pacific Northwest—perhaps some of those tulip bulbs in a pot that you buy at your local grocery got their start here in our corner of the world.

My mother, who was a native of the Northwestern corner of Minnesota, always found the mid to late winter season here to be gray, dreary and generally depressing. In order to chase away the gloom she would get out brochures and plan our vacation for the eventual coming of summer. Her other favorite winter doldrums activity was to go through every cookbook and recipe she found and to compile some wonderful "clipping cookbooks" complete with editorial comments. Boy did we ever eat well! And, those cookbooks are one of my favorite keepsakes.

Reading Phyllis Tremper's column for this month reminded me of Mom and her "advanced planning".

Along those lines, if any of you readers know of some great travel tips, please pass them along so everyone can put them to good use. This month's Auxiliary Exchange continues the biographical sketches of our officers, featuring Pearl Kreitz, our Recording Secretary. Also, Donna Moberg has written a nice article about the diversities of Milwaukee so in keeping with our theme of vacation planning, I decided to go ahead and run it.

Take heart, winter is nearly over and it's nearly time to start all that spring yard work! Grab a cup of coffee and spend an afternoon going over maps of the midwest and plan to attend the convention in Milwaukee!

—JR

Meet the Board: Pearl Kreitz—Recording Secretary

I was born and raised in the Reading, Pennsylvania area and attended the local schools. Upon graduation from high school, I attended Reading Business Institute, a private business school, for two years, and, upon graduation, was asked to remain at the school where I taught shorthand and typing for eight years, taking summer courses at Temple University and the University of Pennsylvania.

After the birth of my only son, Robert, I stayed home to be a full-time mother, until he went to school. I then was employed as a secretary in the international division of a large metals manufacturing company, overseeing all order entry and shipments of our metals all over the world. I was in this position for twenty-three and one-half years until my retirement in 1986.

Since then, I have become involved in my husband, Dick Kreitz's, tuning business, in the secretarial capacity—taking phone calls and doing billing, correspondence, etc. Since I have worked outside the home for so many years, I never became involved with his tuning work until now.

We have two granddaughters—12 and 14-years-old and they are the joy of my life.

My hobbies, in addition to spending time with my grandchildren, include travelling, reading, gardening and attending plays and concerts.

Milwaukee—Has Lots of Charm

You've heard of it—beer brewing capital of the U.S., some of the nation's best German restaurants, hometown of the Bucks, the Brewers, LaVerne and Shirley and Happy Days.

Did you also know that Milwaukee is an Old World City with lots of small town charm? Whether it's politics, industry, architecture, religion, the arts or neighborhood life, the history of Milwaukee is, to a large extent, the history of its ethnic groups. Now much more diversified, it's been cause for great celebration. The many and varied festivals take place year round, but Milwaukee's lakefront is the site of summer-long fun which kicks off with Summerfest, an eleven day music extravaganza with over 500 musical groups, comedy acts, sports and great food.

A weekend series of ethnic fests run from the second week in July to early September.

Another important attraction is the Great Circus Parade. Horse-drawn vintage Circus wagons, wild animals and exotic costumes make it an extraordinary event.

Rainbow Summer is a music series that can be enjoyed weekdays during the noon hour throughout the summer. Music ranges from blues and salsa to big band and jazz.

Much of the city's redevelopment has been aimed at the historic city center especially along the Milwaukee River. Well known for its county park system, the city is now linking its historic commercial area with parks and riverwalks. Harbor tours and dinner cruises are a great way to get another perspective on city scapes.

For shopping pleasures, the Grand Avenue Mall is an enclosed, multi-level marketplace connected by glass skywalks. East Town and Old World Third Street are other historic shopping areas.

Most of the above sites are within a five to ten minute walk from the Hyatt Regency Hotel.

Outlying attractions that may be of interest are the Milwaukee County Zoo and the Mitchell Park Horticultural Conservatory . No trip to Milwaukee would be complete without a visit to a brewery.

Whatever your plans, you're sure to find that Milwaukee's one of the friendliest cities you've ever been in. The "City of Gemutlichkeit" where people are made to feel right at home.

CLASSIFIEDS

Classified Advertising rates are 35 cents per word with a $7.50 minimum. Full payment must accompany each insertion request. Closing date for placing ads is six weeks prior to the month of publication.

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

Send check or money order (U.S. funds, please) made payable to Piano Technicians Journal, 3930 Washington, Kansas City, MO 64111-2963.

FOR SALE

HANDCRAFTED SOUNDBOARDS BY NICK GRAVAGNE. Ready to install crowned boards or semi-complete. Your choice. Ordering and installation instructions $15.00. 20 Pine Ridge; Sandia Park, NM 87047 (505) 281-1504

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

KORG MT1200 TUNER. $275 (list $360) Hears A0-C8. Plays C2-B5. Shows pitch, note, octave. Can program calibration, temperament. KORG AT12 TUNER. $155 (list $225). SONG OF THE SEA. 47 West Street; Bar Harbor, ME 04609 (207) 288-5653. Brochures

SANDERSON ACCU-TUNERS. New and used. Bob Conrad, 1-800-776-4342

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

SANDERSON ACCU-TUNERS from Authorized distributor. Tuning lever note switch for Accu-Tuner: $35/coiled cord, $30/straight cord. Consignment sale of used Accu-Tuners and Sight-O-Tuners or new Accu-Tuner customers. Call for details. Rick Baldassin (801) 292-4441, (801) 374-2887

PIANOS FOR SALE — Spinets, consoles, studios, grands. One or a carload. Excellent brand names. As is or rebuilt. Lowest possible prices. Owen Piano Wholesalers; 2152 W. Washington Boulevard, Los Angeles, CA 90018. Telephones (213) 732-0103, (818) 883-9643

WONDERWAND: Try the Tuning Lever you read and hear about. Enjoy Less Stress; Better and Faster Tunings: $50.00 p.p. Charles P. Huether, RPT, 34 Jacklin Court, Clifton, NJ 07012

FROM THE PIANO TECHNICIANS GUILD: The Piano Action Handbook; The Calculating Technician; and a variety of other publications, brochures, business aids and merchandise. Order by mail or phone. PTG, 3930 Washington, Kansas City, MO 64111-2963, (816) 753-7747

RELIABLE ACCU-TUNER NOTESWITCH! One year guarantee! Includes coiled cable, thumb switch and attaching hardware. Left-handed switches available! $40.00 Dean Reyburn, RPT, Reyburn Piano Service; 2695 Indian Lakes Road, Cedar Springs, MI 49319, 616-696-0500

THE MOST ECONOMICAL precision key bushing cauls on the market. All sizes in stock all the time, custom sizes usually within one week at no extra charge. Phone orders welcome. Immediate shipping. Spurlock Specialty Tools, 3574 Cantelow Rd., Vacaville, CA 95688. Phone/FAX (707) 452-8564

ACCU-TUNER FOR SALE-FAC tuning and 20 page memory. Used only three months. $900. Call Ben Griffith 502-875-2297

PIANO STRING DESIGN program for IBM and compatable computers. Change wire dimensions and immediately see the effects on inharmonicity, tension, and breaking point. Improve tone, tunability of pinaos that you restring. Menu driven, user-friendly interface. Produces printout for stringmaker. $150.00. Mark Dierauf, 439 Clinton St., Concord, NH 03301, (603)225-4652

ENCORE PIANO HAMMERS: Consistant, strong round bass; clean, clear tenor and treble without a lot of bite normally associated with European and Oriental pianos. More like the Mason and Hamlins, Chickering and some Steinways made in the early part of this century. Lightweight—easily voiced—no chemical hardener or impregnation—pre-filed—finest quality workmanship. Mahogany and walnut moldings. "T" rivet tensioner-underfelt—15 lb or 17 lb. Encore Hammers are made to the strictest specifications of Wally Brooks by the Abel Hammer Company of Germany. Write or call: Brooks, Ltd., 376 Shore Road, Old Lyme, CT 06371, (203) 434-0287 or 800-326-2440

GRAND PIANO STRING covers. Are you ready for an item that can keep the piano clean, prevent corrosion, improve tuning stability, make your clients happy and make you money besides? Custom made, it rests above the strings, covering soundboard, tuning pins and plate for complete protection inside the piano. Made from finest quality woven wool, available in black, brown and white. Personalized name applique also available. No inventory or investment required. For free brochure and samples call: Edwards Pianos (408) 426-1295, 145 S. River Street, Santa Cruz, CA 95060

MORE PIANO JOURNALS. Fifty-seven (57) dating from 1972-1977. Excellent condition. $3.00 each (5% discount for the lot) plus shipping. Contact Keith McGavern, RPT, Oklahoma Chapter at 1-800-359-4211

KEEP YOUR JOURNALS OFF THE FLOOR! Use our Mag-Protectors! Jordan's Organizers will help you keep valuable information in our Journals readily at hand; all those papers from technical classes in our Notesbook. Also unusual tools, T-shirts, gift items and more. Write, call for free brochure. Ruth Ann Jordan, RPT, 4 East Granville Dr., Silver Spring, MD 20901 (301) 587-7757

A. ISAAC HAMMERS - New US Distributor. Made with very resilient felt that gives you the reserve of resilience needed to promote soundboard sustain and balanced tonal spectrum, without hours of difficult voicing. Good stock on hand. Boring and shaping service available. 48 hr. turn around. Technical support. Prices and info—Dale Erwin, 209-577-8397, 606 Auburn, Modesto, CA 95350

PIANO HAMMERS AND ACTION PARTS for the rebuilder. Highest quality Nu-Tone (Knight), Imadegawa, Encore (Abel), and Tokiwa. Large inventory, quality boring and snapping. Fast service. Honest, knowledgeable technical support. Try the new Nu-Tone hammers on mahogany moldings. Excellent! Prehanging on new shanks available. Wally Brooks, Brooks, Ltd., 376 Shore Road, Old Lyme, CT 06371, (203) 434-0287; 1-800-326-2440

PIANO SCALING SOFTWARE for IBM & compatible computers. Plot inharmonicity, tension, break %, loudness/sustain, hammer contact, and more. 18 graph types, string winding data sheets, detailed users manual and money back guarantee. $80.00. Write or call: Tremaine Parsons, Box 241, Georgetown, CA 95634, 916-333-9299

RARE CLASSIFIED INDEX to Published Piano Technology by Merle Mason. Out-of-print edition. Lists all articles, subjects, authors in technical journals for the years 1946-1978. $115.00 plus shipping. Contact Keith McGavern, RPT, Oklahoma Chapter at 1-800-359-4211

SUCCESSFUL PIANO TUNING business for sale on Long Island's affluent North Shore. Established 12 years. Outstanding reputation. Good repeat customer base. Unlimited potential for growth. 516-928-8123

SAMICK 7'4" GRAND. Two years old, black. Smoke damaged, but structurally sound. Will need restringing, hammers and case sanding and rebuffing. Contact Les Conover for more information: 4805 Central Ave., NE, Albuquerque, NM 87108, 505-255-0658 or 265-0162 evenings. Submit bids to Joan Eich, USAA Property and Casualty Insurance, 1855 Telstar Drive, Colorado Springs, CO 80920-1098

MICRO-FINE TEFLON POWDER - the best lubricant for grand knuckles. Half the price of the commercially packaged product, and longer lasting. Reduces knuckle friction better than any other lubricant, greatly helps accuracy and speed when making touchweight measurements. Stops all but the most stubborn knuckle squeaks. 3/4 oz. =$3.75, 2.5 oz. = $10.75. For free catalog of all current products call or write Spurlock Specialty Tools, 3574 Cantelow Rd., Vacaville, CA 95688, Phone/Fax 707-452-8564

PROTECT YOUR INVESTMENT-and your customers' with custom wool string covers for grands. Wool absorbs moisture and keeps strings, tuning pins, plates, soundboard looking new. Action Piano, 714-364-1073

BEST LID PROP EVER. Works on any vertical, adjusts to any angle, can't slip out and it's pretty. Money back guarantee. $11.95 postage paid. Clair Davies, 848 Arrowhead Drive, Lexington, KY 40503, 606-223-2263

1852 J.G. IRMLER 6'1" Rosewood-Viennese action. Original finish, ivories, nameplate, etc. Beautifully restored and rebuilt and a fully functional piano. For details write Ed Pettengill, 3639 Saddlemire Rd., Binghamton, NY 13903

"PIANO"—A zine for lovers of the instrument. One dollar a taste from First Person, 871 "H" Street, #2, Port Townsend, WA 98368

HELP WANTED

PIANO TUNER-TECHNICIAN position available in Savannah, GA area. Full-time, benefits. Call 912-352-9241

LITERATURE

THE GUIDE, a source of information; procedural, technical and hourly. Fits a shirt pocket. $10.00 postage paid. Newton J. Hunt, Piano Tuner-Technician, 74 Tunison Road, New Brunswick, NJ 08901. (908) 545-9084

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

TO PLACE YOUR CLASSIFIED AD in the May issue of the Journal, call 816-753-7747 by March 19, 1993. An inexpensive and effective way to deliver your message!

SERVICES

SIGHT-O-TUNER SERVICE: Repairs, calibration & modifications. Fast, reliable service. Richard J. Weinberger; 18818 Grandview Drive; Sun City West, AZ 85375. (602) 584-4116

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

KEY RECOVERING/REBUSHING — 52 whites with .075 tops with fronts - $70.00; 36 sharps - $35.00. 88 keys rebushed front and center - $88.00. Pre-paid or on open account - your choice. Three working days turn-around time. Money-back guarantee. Send UPS or US mail. Seven years experience. Kreger Piano Service, RT. 1, Box 693-T, Ottertail, MN 56571. (218) 367-2169

ADD ADDITIONAL $'s to your income. Rebuild player pianos for your clients. Send us the player parts. You restore the piano and we will return the mechanism in restored condition. We guarantee our work. For more details, call or write: Jim Brady, 2725 East 56th Street, Indianapolis, IN 46220, 317-259-4307

SENECA PIANO KEY. Quality key services at competitive prices. Sharps replaced, key bushing and the finest key recovering at any price. Write or call for price list and information on quick return of your key work. Seneca Piano Key, Ted Oberhaus, 4593 E. Seneca Road, Trumansburg, NY 14886, (607) 387-3095

ACCORDIONS. Straps, cases, parts, accessories. Professional tuning/repair service. Satisfaction guaranteed. Mid-America Accordions, 303 Highland Drive, Richmond, IN 47374 (317) 966-2711

ORCHESTRION brass pipes refinished. Call for prices. 410-798-6536

PIANO HARDWARE REFINISHED. Lacquer finish or nickel plate finish. Craftsmanship and finishes are guaranteed to factory specifications. Delivery 2-4 weeks. Brass on Ivory, 302 Linden Avenue, Edgewater, MD 21037. (410) 798-6536

OSLUND PIANO KEY Machine, rebuilt. Missing parts replaced. We buy used machines that need repair. New blades for sale. Charles A. Wilson, 1841 Kit Carson, Dyersburg, TN, 38024 901-285-2516

RENT A SANDERSON ACCU-TUNER: FAC, MIDI and 60-page memory, available for short-term rental. Perfect for replacement while your SAT is in the shop. $50/week; signed contract or credit card deposit before shipping. Visa/MC. Lawrence Becker, RPT. 800-722-1811

.050 - $60.00; .060 - $70.00; .075 with fronts - $85.00. New gloss sharps - $40.00. Keys rebushed: felt - $75.00; leather - $95.00. Other services available. Call or write for price list. Return freight paid with pre-paid order of $50.00. Walker Piano Service, Route 4, Box 364, Fulton, KY, 502-838-6889 (Formerly Charles A. Wilson Piano Key Service, Dyersburg, TN)

KEY RECOVERING. Quality workmanship at competitive prices. Gerald Johnston, RPT, 41 Goodale Street, Haverhill, MA 01830, 508-372-2250

TRAINING

THE TOLL-FREE phone number for the piano technology program at Shenandoah University in Winchester, VA is 1-800-432-2266. Please see display ad on page 8

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

NILES BRYANT OFFERS TWO HOME STUDY COURSES: Electronic Organ Servicing: Newly revised. Covers all makes and models — digital, analogue, LCT's, synthesizers, etc. Piano Technology: Tuning, regulating, repairing. Our 87th year! Free booklet; Write or call NILES BRYANT SCHOOL, Dept. G, Box 19700; Sacramento, CA 95819 — (916) 454-4748 (24 hrs.)

LEARN AURAL SKILLS on your Macintosh computer. Use any of 9 pre-programmed temperaments or create your own. If you are having trouble hearing beats, this program can isolate the beats for you. Score yourself with the PTG exam. Historical temperaments also available. Call for free demo. Mark Anderson, RPT: 510-524-0390 (California)

VIDEOS

PIANO TECHNOLOGY EDUCATIONAL materials. Vertical Piano Regulation by Doug Neal, $115; Plate & Pinblock Installation by Cliff Geers (2 reel set), $148; Wood Repairs by Cliff Geers, $68. Add $5 per order for shipping and handling. Questions? Call 712-277-2187. Mail orders to PTEM, 3133 Summit, Sioux City, IA 51104

WANTED

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

PIANOS! PIANOS! PIANOS! !!!Free phone appraisal!!! Buying all types of usable pianos. Cash or bank check on pick up. Won't hesitate on price. Call us first for fast professional service. "Steinway, Mason-Hamlin command specialty prices." Jay-Mart Wholesale, P.O. Box 21148, Cleveland, OH 44121. Call Irv Jacoby collect (216) 382-7600

DISPLAY AD INDEX

Promote Proper Piano Care With PTG Business Aids

Brochures

The six-page, stapled brochures are 2-color, printed on glossy-coated paper, and measure 9" by 3 3/4". Formats are consistent among all brochures. The three brochures intended for customers feature a description of PTG and RPT's on the final inside page.

"Why Should I Be A Member of the Piano Technicians Guild?"
This brochure answers typical questions from potential members of PTG. It describes membership categories, RPT exams, benefits of membership and includes our Mission Statement. A form is included to request a membership application for further information. Chapter officers as well as individual technicians should have these. *There is no charge for this brochure.*

"How Should I Take Care Of My Piano?"
Written with the average piano owner in mind, this brochure covers such topics as problems and tuning needs. Basic rules of piano care are spelled out, along with advice to seek professional piano care from an RPT member of the Guild. This is an excellent brochure for individual clients and for bulk displays in piano stores and music studios.
$35/100, $150/500

"How Often Should My Piano Be Serviced?"
This brochure begins with a brief description of factors affecting maintenance frequency (climate swings, placement in the home, quality of manufacture), then presents quotes from ten piano manufacturers outlining their specific service recommendations. This is an essential tool when answering the perennial question, "How often should my piano be tuned". The manufacturer quotes lend credibility to your advice.
$35/100, $150/500

"The Special Care and Maintenance of the Teaching Piano"
Proper maintenance is especially important to piano teachers who must provide their students with a responsive action and a musical tone at correct pitch. This brochure describes tuning needs, regulation and voicing as well as their relation to the student's ability to perform. An excellent business builder with teachers, it includes such topics as "What should my regular maintenance program consist of?", "How should I go about selecting a piano?" and "How do I find a qualified person to service my teaching piano?"
$35/100, $150/500

Client Newsletter

"The PTG Soundboard"
Used to keep in touch with clients and provide them with interesting information, the newsletter projects a positive image of piano playing and conveys your commitment to your customers. The first issue of "The PTG Soundboard" contains articles on the recent trend of adults starting to take piano lessons, the benefits of piano playing to child development, and how to find a qualified technician, along with photos, a quiz and trivia. Printed on textured paper with attractive typefaces and design, 2 color. 4 pages. 8 1/2 x 11.
$28/100, $115/500

Technical Bulletins

The Technical Bulletins are written for the customer who is considering a particular maintenance option. They provide detailed information on specific topics in a question-and-answer format. The attractive, single-page documents are printed on heavy ivory card stock in 2 colors, punched for a three ring binder. 8 1/2 x 11.

Bulletin #1: Pitch Raising
This bulletin emphasizes the importance of keeping a piano tuned to A-440 for best sound and proper ear training. It explains how climate and neglect affect pitch and why the technician must perform a pitch raise before doing a fine tuning.

Bulletin #2: Regulation
Topics covered are "What is regulation and how does it affect my piano's performance?", "How often is regulation needed?", "What are the signs that my piano needs regulation?" and the difference between regulation and tuning and information on reconditioning and rebuilding. Space is included for your comments. This bulletin features a detailed diagram of a grand and vertical action.

Bulletin #3: Climate Control
Topics include, "How does humidity level affect my piano's tuning?", "What is relative humidity ?", "What can be done to minimize humidity problems?" and "How will humidity control benefit my piano?" A chart is provided for recording relative humidity levels and pitch data. Together with an accurate hygrometer, this bulletin helps you in diagnosing climate-caused stability problems and recommending solutions. Clients receive educational material on the effects of climate as well as documentation of their specific problem.

Bulletin #4: Voicing
This edition describes voicing, explains the difference between tuning and voicing, what is good tone, how the technician voices a piano and also explains to the customer indications that their piano may need voicing.

Bulletin #5: Finish Care
This bulletin discusses common-sense finish care tips, as well as information on various types of products and piano finishes. It also includes a section on cleaning keys.

All technical bulletins are $20/100 and $90/500

These brochures, technical bulletins and client newsletter educate the public about a wide range of piano services and the benefits of proper maintenance. They promote PTG as a source of qualified technicians, and their professional appearance projects quality onto your business. All products provide a space for your business stamp or label.

Place your order by phone by calling 816-753-7747 or use the convenient order form to the right to place your order by mail or fax.

a fax order from...

Name

Address

City, State, Zip

Daytime Phone

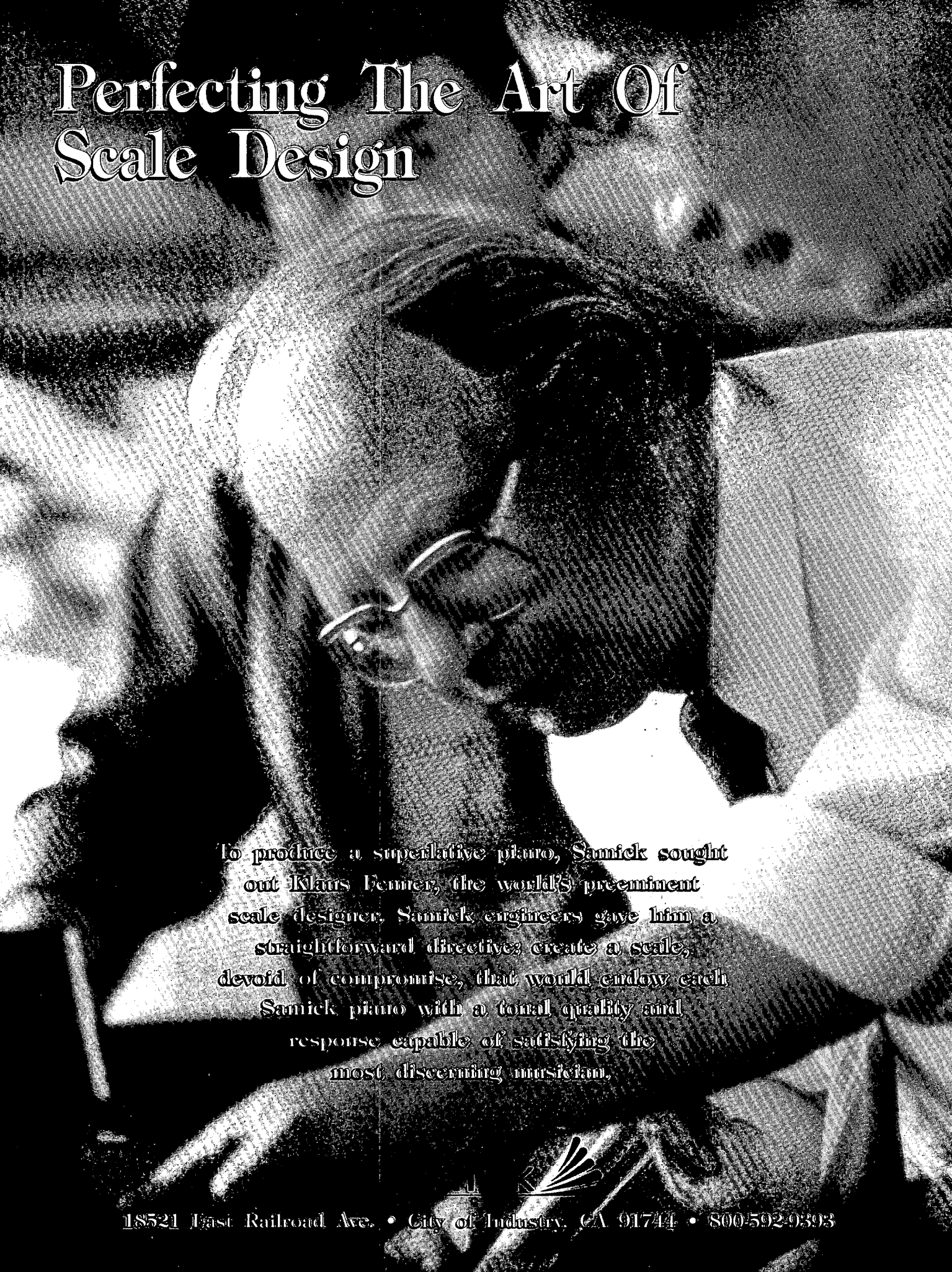
RPT Guild Member # ☐ Visa ☐ MasterCard # Expiration Date

Please send the following marketing tools

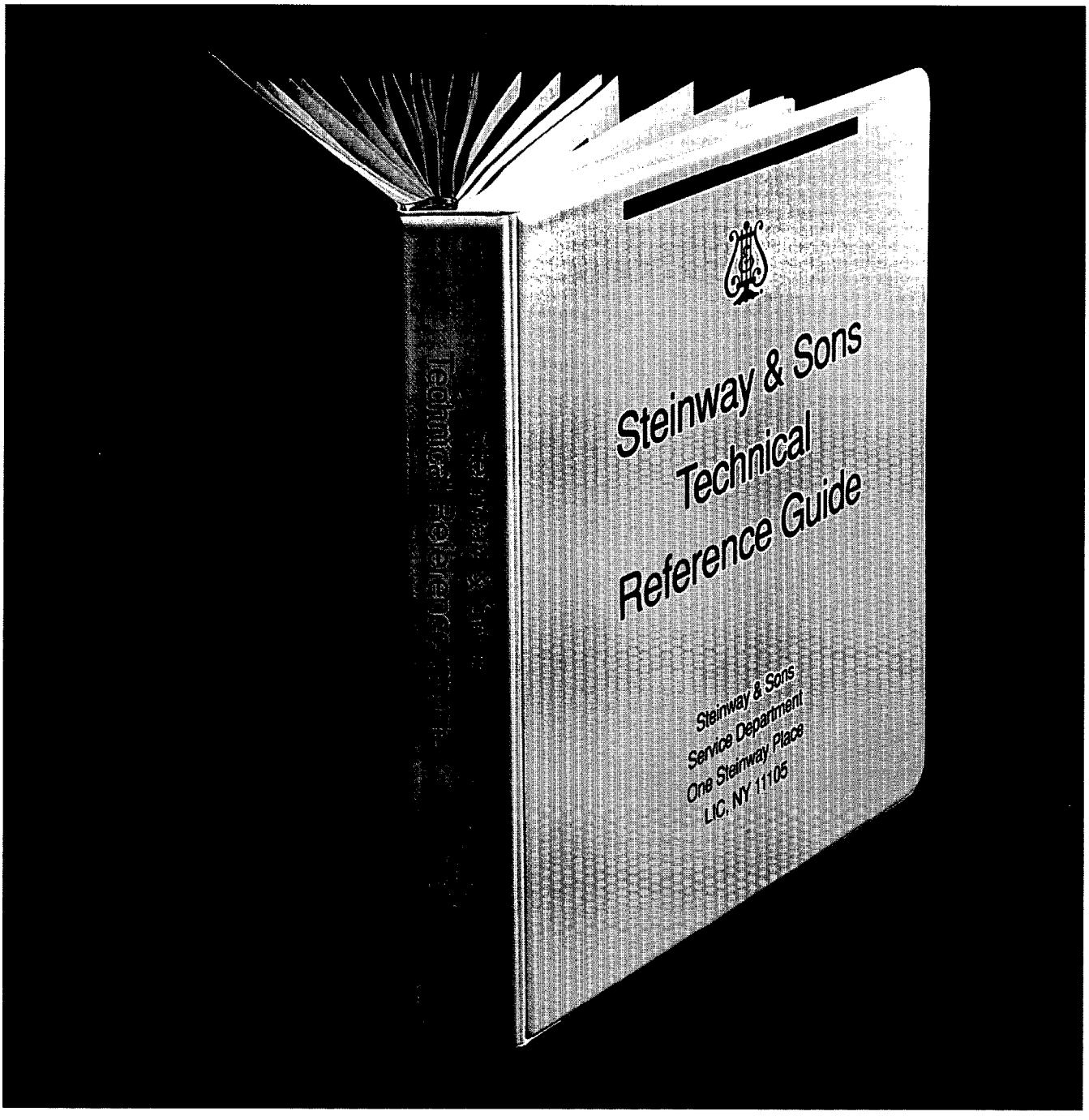
Item Description	Quantity	Price per unit	Total
☐ "Why Should I Be A Member of the Piano Technicians Guild?"			
☐ "How Should I Take Care of My Piano?"			
☐ "How Often Should My Piano Be Serviced?"			
☐ "The Special Care and Maintenance of the Teaching Piano"			
☐ The PTG Soundboard			
☐ Bulletin #1: Pitch Raising			
☐ Bulletin #2: Regulation			
☐ Bulletin #3: Climate Control			
☐ Bulletin #4: Voicing			
☐ Bulletin #5: Finish Care			
Subtotal of cost of items			
Add $2.00 per hundred for shipping and handling			
Total cost of order			

Once you have completed this form, fax it to 816-531-0070, 24-hours-a-day, 7-days-a-week

If faxing this order form is not convenient for you, simply complete the form and mail it to:
The Piano Technicians Guild Home Office
3930 Washington
Kansas City, Missouri 64111-2963


Perfecting The Art Of
Scale Design
To produce a superlative piano, Samick sought
out Klaus Fenner, the world's preeminent
scale designer. Samick engineers gave him a
straightforward directive: create a scale,
devoid of compromise, that would endow each
Samick piano with a tonal quality and
response capable of satisfying the
most discerning musician.
18521 East Railroad Ave. • City of Industry, CA 91744 • 800-592-9393

S T E I N W A Y



Introducing The New Steinway & Sons Technical Reference Guide.

The new Steinway & Sons Technical Reference Guide is a comprehensive resource for the piano technician who services the Steinway piano. Inside you'll find our Technical Service Manual, Parts Catalog and Price List, along with details about our On-site Concert Service, Restoration Center, and Steinway Technical Educational Programs (S.T.E.P.). You'll also discover historical information and a complete list of Steinway patents. In addition, each copy of the Steinway & Sons Technical Reference Guide will be individually registered so we can send you free updates in the future. The Steinway & Sons Technical Reference Guide is now available at $20.00. To order, please call Glorie Lefrak, Steinway & Sons Parts Department, 1-800-361-1853.

S T E I N W A Y & S O N S

One Steinway Place, Long Island City, New York 11105

Tech Gazette

Yamaha Piano Service February, 1993

TECHNICIAN VS. MANUFACTURER (?)

- by Lloyd Whitcomb

Last month, we began a discussion of the technician in the field and the elements involved in dealing with a piano maker. Please join us now as we continue that discussion.

WHEN YOU NEED TO CALL US

If you see a problem that you think may be warranty related, call the selling dealer, if possible. Most manufacturers have certain requirements of their dealers when it comes to after-sale service. If you decide to call us directly, there are a few things you can do to help us do a better job, both for you and your customer.

First, be prepared by having the model and serial numbers; the customer's name, address and telephone number; and if possible, the dealer and date of sale. Not long ago, a technician called to request a bass string. When I asked him which string, he wasn't quite certain, asking if they weren't all the same. And when I questioned him as to what model the piano was, he replied, "Well, uh, I think it's brown."

Unless it's absolutely unavoidable, try not to call from a customer's home. This is not to be secretive or underhanded. I don't mind if my doctor consults with a colleague about my condition, but to sit there and listen to his half of the phone conversation might be a bit frightening. You can tell your customer that you need to buy a tool at the local hardware store, or that you're going to get a bite of lunch, or whatever your creativity will allow. Then, dial our number. Otherwise, our ability to talk freely may be limited.

Never call from the home to complain about quality. Of course, we're always willing to do what we can to improve our pianos. That's not the point. But again, if you happen to be overheard by a nail-biting owner, the lasting effects can be devastating.

WHO PAYS?

If there is a question as to who should pay for the repair, call either the dealer or the manufacturer, and preferably the dealer first.

In any case, don't put yourself (or your customer) in the middle. You could lose in more ways than one. I recently received a letter from a consumer saying that a key had broken in her piano. The technician glued it back together, and assured her that we would reimburse her for the repair. He then charged her $300.00, which she paid. She enclosed a copy of the paid receipt, demanding full reimbursement. Well, she wasn't too happy when I told her what I would allow for that, and I can't help wondering if the technician ended up having to buy new tires for his car...

There was another time when a technician, without first checking with us, accidentally misdiagnosed a simple problem. His next move was to launch into a fairly involved and expensive repair, only to fix something that wasn't wrong. The piano did play a little better (maybe), but the original problem remained unsolved. And I probably didn't make any points in his book when I denied his claim for payment. A simple telephone call would have averted a lot of hard feelings.

YEAH, TEAM!

Technicians, dealers and manufacturers all depend heavily upon each other. This industry would eventually crumble if one part of the triangle ceased to exist. So, to one extent or another, whether directly or indirectly, piano makers pay a considerable portion of your salary. And it's equally true that our success in the marketplace is largely a result of your assistance and input. Because of that, we're committed to supporting you, and your efforts, in any way we can.

By the same token, you can help us do a better job, and in some very specific ways:

Before initiating a repair, call and ask us about it. We may have information and/or materials that will lead to a more effective, efficient repair.

Try not to play the role of "heroic campaigner" when you contact us on behalf of a customer. Remember that a "team spirit" approach is always better than a combative stance. Although we do our best to treat every situation with the utmost courtesy and professionalism, the fact remains that we're still human. So, if you start from a place of hard-nosed aggression, everyone could lose before it's all over.

Also, there are nearly always certain elements and circumstances between the dealer and the customer, surrounding the sale of the piano, that you may not be aware of.

FINALLY

I think it was Lily Tomlin who said, "Remember, we're all in this alone." Well, that just isn't true in this business. You work with us, and we work with you. And, we're just a toll-free call away when you need advice, assistance or information.

YAMAHA WILL PARTICIPATE IN

LITTLE RED SCHOOLHOUSE:
#115 March 22 - 26

DISKLAVIER™ SERVICE SEMINARS:
#32 February 1 - 5
#33 February 22 - 26
#34 March 8 - 12

PTG SEMINARS:
February 12 - 14, California State
March 12 - 14, South Central Regional
March 18 - 20, Pacific Northwest Regional
March 18 - 20, Pennsylvania State
April 23 - 25, Florida State

PARTS & SERVICE: (800) 854-1569 FAX: (714) 527-5782

PIANO TECHNICIANS Journal UPDATE
FOR MEMBERS OF THE PIANO TECHNICIANS GUILD, INC.

PTG 1993 Dues Are Now Delinquent

Unpaid PTG dues for the coming year are now delinquent. The billing for RPT and Associate members, which was mailed November first, included $126 for Guild dues, a $12 special assessment for marketing activities, and, for those in the 99 chapters that requested the Home Office dues collection service, chapter dues. A delinquent statement will be mailed February first

The final deadline for payment of 1993 dues will be March 2. After that date, those whose dues are unpaid will be officially dropped from the membership roster.

Members who may be unable to pay all or part of 1993 dues because of hardship or other special circumstances must make special arrangements with their regional vice president (see listings on page 2 of this month's *Journal*) prior to the March 2 deadline. No dues payments can be made after that date.

Membership cards have been mailed to those members whose 1993 dues have been paid. Because Council allowed a year to use up existing materials, 1993 RPT cards will carry the designation "Registered Tuner-Technician." This will allow us to realize the significant cost savings from ordering a two-year supply of cards. 1994 cards will carry the "Registered Piano Technician" designation, and both RPT and Associate cards will carry the new PTG logo in 1994, in accordance with any usage guidelines approved by Council this summer.

It's Time To Elect Delegates

Although PTG's 36th annual Council meeting won't be until July, chapters have only two short months to select their delegates to the annual meeting. The names of elected delegates and alternates should be sent to the Home Office by March 1, 1993. Only names received by that date will be printed in the Council agenda book, and those not pre-recorded will be required to present proper credentials at delegate check-in. Credentials required will be in the form of a letter verifying their election from the chapter president.

Agenda books will be mailed to delegates — or to the chapter president if no delegate is listed — in April, and delegates should make these books available for review and discussion by chapter members .

Examiner Names Needed

All chapters are asked to submit the names of their examiners for publication in the April 1993 PTG membership directory. Please check page 14 of the April 1992 *Journal* directory for individuals and area exam boards currently on file and send any changes or new information to the Home Office no later than Feb. 19, 1993.

At Your SERVICE

Colette Collier, RPT
Chapter Services Committee Chair

In recent years, with the stabilization of the PTG Tuning Exam, many chapters have found it helpful to offer training or practice sessions to their Associate members to help them prepare. An interesting twist was recently turned in by the Golden Gate Chapter. They called it "Piano Tuning 101: Preparing for the PTG Tuning Exam."

Six months before, in April 1992, a letter was sent out to Associate members in northern California, informing them of the plans for the seminar. A postage paid addressed card was enclosed for easy reply. In August, the seminar brochure was mailed, with a registration form and a survey for Associates to fill out. The survey asked for reasons why the person did not want to come, or was not interested in taking the test—valuable information to have. A reminder letter was mailed in September.

The chapter was blessed with having a member who possessed a large home, two grand pianos, and a generous disposition. The session was led by two CTE's: Jim Coleman, Sr. from the Phoenix Chapter, and Sid Stone, from the Golden Gate Chapter. There were fifteen attendees, representing 4 or 5 chapters. Each of the instructors took four of the eight sections of the exams for this "ears on" and "hands on" session.

continued page U3

1993 Milwaukee PTG Convention Exam Application

Deadline: June 30, 1993

Mail to: Jack Stebbins, 46 Eames Avenue, Amherst, MA 01002-1868

—PTG Members Only—

Name: _____

Member Number: _____ Phone: _____

Address: _____

City, State, Zip _____

Application for:

_____ **Written Exam Only** $ _____
(If you check here, you may not apply for other exams at this time)—No Fee

_____ **Complete Tuning Exam—$60** $ _____

_____ **Complete Technical Exam—$60** $ _____

Partial Exam(s)—partial exams available only if repeating a section for the first time within one year of previous attempt:

_____ **Part 2 Tuning Exam—$30** $ _____

_____ **Number of Technical Exam sections @ $20 each** $ _____

_____ **Total Fee enclosed** $ _____
(Note: no fee required for tuning exam for RPTs enclosing a Consent-To-Serve form)

_____ **I have passed Written Exam taken 7/89 or later**
Required for Tuning and Technical Exams

_____ **I will bring Reclassification Form**
Required for Tuning and Technical Exams

_____
Signature *Date*

Insurance Update

Health

• For information about optional major medical, disability, and prescription drug insurance programs offered through PTG, contact Acorn Underwriters, Inc., 4200 Somerset Drive, Suite 100, Prairie Village, KS 66208-5267, or call 1-800-255-6029 or (913) 383-3883. Inquiries can be faxed to (913) 383-9632.

Business

• Nowogroski Insurance Associates, which offers PTG members business liability and tool and bailee coverage, has moved. The new address is 10740 Meridian Ave. North, Suite 210, Seattle, WA 98133. The telephone number is 206-363-1110, and the fax number is 206-363-2044.

In Memory...

Daniel J. Goodwin
January 1, 1912
November 23, 1992

Daniel J. Goodwin passed away November 23, 1992, in Covina, California at the age of 80. He was born January 11, 1912. in Chicago, was raised in Arizona, and had been a Covina area resident for the past 52 years.

Mr. Goodwin was a piano tuner for many years and was a member of the Piano Technicians Guild and the American Legion.

He is survived by his loving wife, Lucille of Covina, daughter, Elaine Marsh of Montana; brothers Richard and Nelson Goodwin, both of Desert Hot Springs and sisters, Clydia Dahl of Covina and Sara Benner of San Luis Rey, California.

Services were held at the Custer Christiansen Mortuary Chapel in Covina. A Mass was celebrated at St. Louise de Marillac Catholic Church.

Membership Status

Northeast Region	865
Northeast RPT's	527
Southeast Region	656
Southeast RPT's	388
South Central Region	325
South Central RPT's	204
Central East Region	641
Central East RPT's	392
Central West Region	395
Central West RPT's	246
Western Region	646
Western RPT's	380
Pacific NW Region	398
Pacific NW RPT's	233
Total Membership	3926
Total RPT's	2370

...At Your Service Continued

The chapter is now planning a session for next fall on preparing for the technical exam. Lots of chapters are doing unique and creative projects to help Associate members study and practice for the RPT exams. It seems to me that this was once done by individual members in their own shops. As our situations have changed, the need has become more apparent that some alternate means are needed. If your chapter is doing something along these lines, I'd like to hear about it—and pass it on to the rest of the country via this column.

The following article has been floating around the country, finding it way into several chapter newsletters. I got this from the Indy-440 Newsletter, Jon Light, editor.

An Anglican Bishop who returned to England after a stint in St. Louis is yearning to "tickle the ivories" of his Steinway, but he can't. The U.S. Customs Service won't release his piano. The Bishop revealed in a newspaper interview that customs officers had seized the piano because shipping it out of the country would violate ivory traffic laws enacted to protect the African elephant.

"They insist upon knowing where the elephant that provided my piano keys had been shot," explained the Right Reverend Michael Marshall. "After pleading the absurdity of this kind of retrospective scrupulosity, [don't you wish you could talk like that?—C] I was told *you shouldn't have bought a piano with ivory keys.*" Marshall purchased the piano from the Steinway store in Hamburg, Germany in 1984.—Music Trades Magazine.

Indy Editor's Note: The same thing happened when we tried to send rock star Bob Seeger's 7'4" Bosendorfer back to Vienna to have the soundboard replaced after a fire sprinkler went off. It was purchased in 1976!!

Just before this article appeared, I got a phone call asking what it would cost to recover the keys of an upright piano. You guessed it—the owners had recently returned from abroad, and the customs people refused to let the piano in until the ivory was stripped from the keys!!

Attention RPTs!

New Technical Bulletin Available

Finish Care

A fifth technical bulletin, "Finish Care," is now available. The bulletin discusses common-sense finish care tips, as well as information on various types of products and piano finishes. It also includes a section on cleaning keys.

The new publication joins previous works on "Pitch Raising," "Regulation," "Voicing" and "Humidity Control." These products are available to Registered Piano Technicians from the Home Office for $20 per 100, or $90 for 500, plus shipping.

All brochures and technical bulletins can be ordered from the PTG Home Office either by phone or by using the convenient FAX order form on page 39 of this Journal.

Work has also proceeded on other new projects, including a draft of the guidelines for usage of PTG's new logo.

"Mitzi"—The Dog From Hell...

The following is a true life experience that I had just this past holiday season. I thought maybe some of you could relate to it. A friend at work referred the business to me...

Jon Light
Indiana

I should have known better! The second I stepped through the door and met Mitzi, I should have *known* better, especially when the owners said, "Don't worry, she'll stop barking once she gets used to you, and *she doesn't bite.*"...I really should have known better!

I got one of those "Isn't there any way you can get it tuned before Christmas?" calls. You all know the kind I mean. They wait until the last second and then ask you to "fit them in." Fit them in where? Midnight?

Like most of you, I made the time somehow, and when I showed up...there was the dog from hell. She was a miniature dachshund who took an acute dislike to me when she first heard my car drive up the lane. From the moment I stepped in the house I could barely hear humans saying "Thank you for coming," because of the constant barking, snapping and foaming at the mouth. Don't worry though, "she doesn't bite."

I walked as best I could to the piano, (which was a wreck), with Mitzi directly under my feet yipping at the top of her little weiner shaped lungs. Not only was the piano 50 cents flat, it was also coated on the inside with soot from a recent fire, and had many, many, many little mouse sprinkles. The rust on the strings and pins looked like some kind of dull brown frost.

"Oh, we just had a bad fire in the kitchen three weeks ago and everything in the family room here got smoke damage." "Mitzi will you please shut up!" they

said. "Clean the soot from the inside as best you can, and don't pay any attention to Mitzi...she doesn't bite." I should have known better! I *should* have.

As I opened the lid of the piano and started wiping soot, Mitzi stayed beneath my feet there in front of the pedals. My every attempt to look at her or speak soothingly to her was greeted by another vicious round of barking and lunging, so I quit looking at her and let her go about doing whatever it was she was doing down at my feet.

Finally, I noticed she was quiet so I looked around and saw her curled up on my good sport coat that I had carefully laid on the couch. At least she was quiet, and I would rather get the coat cleaned at that point that to listen to her. Then, it happened.

As I reached down to move the bench out of my way, Mitzi came off of the couch like an Oscar Meyer missle and bit me on the index finger. Wham!!

I was shocked. After all, Mitzi doesn't bite. I should have known better! Then, before I could recover, the dog from hell lunged and bit again. Just as I was going to kill her with a naphtha soaked rag, the owner came into the room because he had heard a change in the timbre of her bark. It was because she had my fingers in her throat.

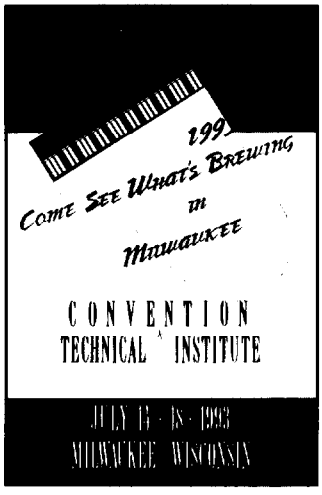
"Please get your dog out of the room and shut the door," I said. "She did bite me...twice!" The embarrassed owner complied and took Mitzi, who now looked for all the world like a shaking hunk of bologna tucked under his arm, out of the room. "See," he said sheepishly, "She knows she's been a bad girl."

The door closed and I must confess that I took great delight at the sound of Mitzi getting swatted lightly with a plastic fly swatter.

There! I thought. She's gone from my life for good and can't possibly bother me any further." I should have known better!—The dog from hell plans ahead!

I returned to the piano and having cleaned the upper portion, I proceeded to remove the bottom door and clean out the lower portion. As I plopped down on the carpet, I was instantly surprised to feel a disturbing wetness come soaking through the seat of my pants. Now I knew what Mitzi had been dong around my feet earlier when I had stopped watching her. I should have known better! I *should* have!

1993 Convention Registration Brochure Mailed



Don't get left behind! Watch for the latest brochure announcing 1993 Institute Classes and Instructors, the schedule of events, housing accommodations and how to register for Milwaukee.

The early bird not only gets the worm, he or she will get a better choice of lodging and the benefit of the discounted cost for convention registration.

Invest in your future goals by making your convention plans today.

DATES & DEADLINES

February 1, 1993
1993-94 Officer nominations due to Nominating Committee Chair

Proposed Bylaw changes due to Nominating Committee Chair

March 1, 1993
Deadline for 1993 Council Delegate forms due.

March 2, 1993
Members delinquent in 1993 dues to be dropped.

March 21-22, 1993
Tuning & Tech Exams—Portland Chapter following PNW Conference Contact: Dave Peake, 503-761-4800

March 26, 1993
Request agenda items for Board meeting

April 1, 1993
Disbursement of collected chapter dues

Deadline for Nominating Committee report to Home Office

April 2, 1993
Council agenda finalized, agenda books to printer

April 9, 1993
Good Friday—Home Office closed

Begin assigning booth space to exhibitors for 1993 convention

Deadline for budget distribution to members

April 19, 1993
Council agenda books mail (with Delegate handbook)

April 30, 1993
Deadline for receipt of Board agenda items—Draft of Board agenda to president for approval