Piano Technicians Journal

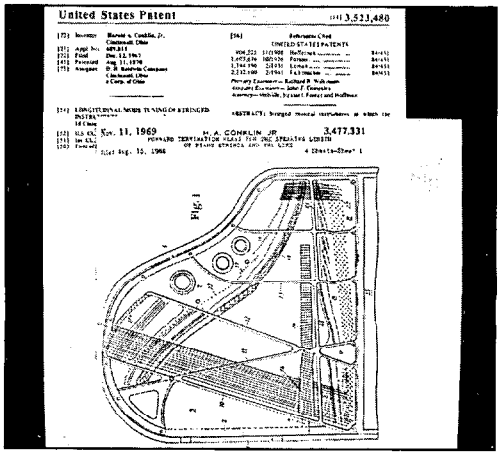
October 1987

The Baldwin Piano...
You can see why it sounds better

Exceptionally rich, clear tone with note-to-note consistency is a characteristic of the bass of a Baldwin piano. Our exclusive SynchroTone™ Strings are one of the main reasons why.

When a string is set in motion, two distinct groups of tone components are produced. The predominant group involves the flexural mode, which has always been the basis for stringed instrument design. The longitudinal mode is less audible but still present in every vibrating string.

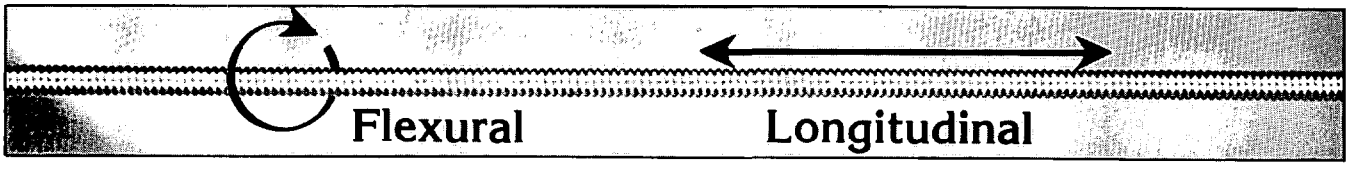
Several years ago, our research staff, seeking a way to improve the traditional string, invented a way to tune the longitudinal mode in addition to the flexural mode of the string. By isolating and "pre-tuning" this mode (usually 4000 to 5200 cents above the fundamental frequency of the flexural mode), Baldwin has devised the SynchroTone String principle — a significant breakthrough in scale design (U.S. Pat. No. 3,523,480).


United States Patent

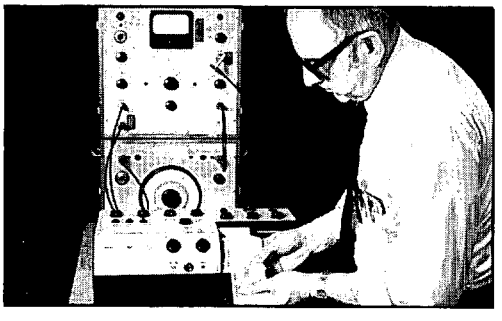
3,523,480

3,477,331

To take full advantage of this SynchroTone principle, we even invented a precision string winding machine, so different from the ordinary winding machines that it, too, is patented (U.S. Pat. No. 4,055,038).



Precision SynchroTone Strings were first introduced in Baldwin grand pianos. Similar SynchroTone Strings are now found in every Baldwin piano built. This is just one more example of how we build incomparable tone quality and consistency into every Baldwin piano... from the concert grand to the smallest vertical.



Fourth in a series of informative ads on piano tone published by Baldwin Piano & Organ Company exclusively for the benefit of piano technicians.

Baldwin® - *Leading the way through research*

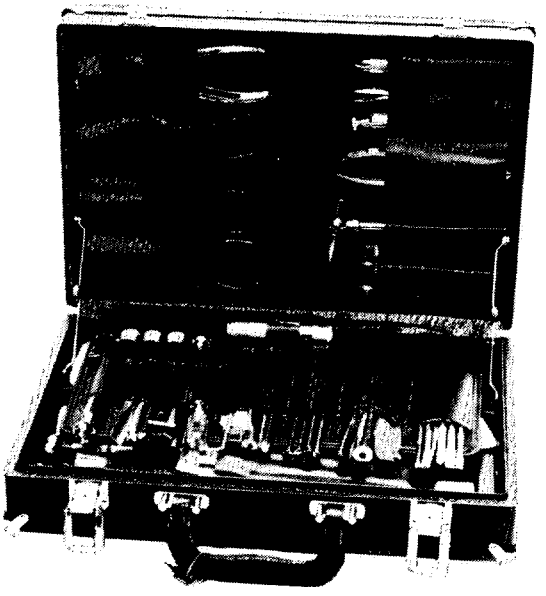
CASES by GENCK

For the professional technician who demands the finest!

• ORGANIZED • COMPACT • LIGHT • DURABLE

Never before has a case been available to store both universal string sets and all of the common sizes of piano wire. A complete restringing case that is professional looking, organized and protects the strings and wire from moisture in the air. There are 24 compartments to hold wire, a top section that stores over 30 universal strings and a large open compartment, with inside dimensions 14"L x 5"W x 4½"D, for restringing tools and supplies. The empty case weighs 6 lbs., measures 16½"L x 15"W x 6½"D and is constructed with 3/8" thick hardwood covered with a black, leather looking high grade vinyl material. The case should last a lifetime. Patent pending. Wire not included.

No. 276 — Genck Universal String and Wire Case Only. Each Net.....$175.00



To our knowledge, this is the only case that has been completely organized and designed specifically for the piano technician. Genck case can hold over 100 different tools and supplies. Pouches are made to accommodate the standard tools of the trade. Case should last a lifetime. Tools not included.

This ultimate professional tool case is made of the highest quality materials. Case weighs 4 lbs. empty, measures 15"L x 10½"W x 4"D and is covered with a black, leather looking high grade vinyl material. Patent pending.

No. 275 — Genck Professional Case Only. Each Net $145.00

These cases created much enthusiasm and received overwhelming approval at the latest national P.T.G. convention. Many orders were placed after seeing the quality and attention to detail that the cases presented. Order now, you will not be disappointed.

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The Piano Technicians Journal **October1987**

Official Publication Of The Piano Technicians Guild, Inc.

Volume 30
Number 10

IN THIS ISSUE...

THE COVER...

A workman in the Roslau factury washes a roll of piano wire. Photo taken by L. Paul Cook during the 1986 Guild European tour.

The Piano Technicians Journal (ISSN 0031 9562) is the official publication of The Piano Technicians Guild, Inc., 9140 Ward Parkway, Kansas City, MO 64114. The Journal is published monthly, with two issues in December. Second class postage paid at Kansas City, MO., US ISSN 0031 9562 foreign and domestic. POSTMASTER: send address changes to: Piano Technicians Journal, 9140 Ward Parkway, Kansas City, MO 64114.

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President's Message

M.B. Hawkins
President

Two Half-Baked Ideas May Make One Good One

While reflecting on events of the past, I focused on July 1973 when our annual convention was in St. Louis. I dug out the *Journals* leading up to that convention. For those who have *Journals* back that far, I heartily suggest taking them out. Spend a little time reviewing where we were compared to where we are in October 1987. I'll guarantee you find the comparison interesting.

There are many things about that period of time that are still very strong in our organization. On the other hand, lots of things have changed. I would daresay most of the changes have been for the better and I'm sure there could be long debates on the things some feel have gone down the tubes. One of the strongest points suggested to me is that we are by no means a static group.

During the next 15 years, there will be additional changes. Many who are young and presently in the business will find themselves in positions of leadership. Those now in positions of formulating foundations for members with less experience should never forget the attitude of giving and sharing. If older members had not been willing to share their knowledge, many of us would still be beginners. To willingly share what you have to offer with those in search of additional know-how is what makes us tick. Forever be on the lookout for someone to share with. If we continue to do this, we will automatically continue to change.

The day one begins to think he or she has the answer, that there is nothing more to learn, look out! That is a large danger sign. Good member participation generally indicates that a healthy exchange of information is going on. When members do not participate, a couple of questions come to mind. Do they think that they have gathered all that is necessary for them to know? Have they withdrawn with what they have gained and now are unwilling to share it with others? These questions stick in my mind as I think about member non-participation. I also wonder how much effort is being made by those of us who have become sensititive to the non-participating member to reach out and establish some type of communication bond? It is definitely a two-way street all the way.

I am aware of pockets of non-participation and I would hope that each of us would take a few moments to turn inward and reevaluate our own motives. Perhaps some things will be uncovered which will develop into an idea which could be helpful to the entire organization. My request is that you don't keep these thoughts to yourself. Please share them with someone — your chapter, region or the organization can never benefit if you keep an idea hidden. On the other hand, if you happen to be the one receiving the idea, do not be too quick to say something negative about the idea or "that can't work" Give it a chance to be discussed. If it is half-baked maybe someone else will have another half-baked idea, too. When fused together they may be a terrific development from one, not keeping it to oneself, and two, not stamping it out when first heard.

Membership and business seem to have some things in common. Maybe this is one of them. Where we are is not only a reflection of the past but a precursor of the future. so when we return to St. Louis in 1988, let's make the best of it and make sure all of our options are open. For some reason, successful people always do more than is expected of them. Let us never become static. ■

Tech Gazette

Yamaha Piano Service October, 1987

Welcome to the first issue of TECH GAZETTE! We hope you'll plan to meet us here in the Journal each month. This is the place where we'll be talking about all kinds of things. Granted, some of the little industry tidbits we'll have to offer may not all be news to you, especially in this Age of Information. But we can almost guarantee that you'll discover plenty of items you'll want to know more about.

And of course, we know we've got no corner on "interesting stuff." If you have questions along the way — either about us or something you see here — or if you happen upon some related topic that you'd like us to know about, please send us your comments. Simply address your remarks to:

Yamaha Music Corp, USA
Piano Service
P.O. Box 6600
Buena Park, CA 90622
Attn: Tech Gazette Staff

So, join us, won't you?

Parts, Etc.

It's no secret to us that we carry a number of parts, tools and related equipment designed to make servicing our pianos easier for you. After all, we've been doing just that for a number of years. But just maybe we've got some things you didn't know we had and perhaps you didn't know you even needed them.

So be watching this column for some of the parts & products we've nearly always had (but maybe only we & a few others have known about), as well as various new goodies as they are developed.

MIDI Corner

Why MIDI? And why are we talking about it here? How is it affecting the acoustic piano business? How is it affecting YOUR business?

Well, Yamaha has introduced two acoustic pianos with considerable MIDI capabilities. Once you gain a general understanding of MIDI and its capabilities, you'll quickly see why we have incorporated it into our acoustic pianos.

From time-to-time, we'll be making use of this spot to let you in on one of the biggest, most significant phenomena ever to change the face of the music industry.

New Products

Someone said that the only constant in this world is change. One of those ongoing changes is the almost constant stream of new products being introduced into the marketplace. And you can well imagine that Yamaha is at the forefront of the development of many of those products. So, when we hear about something new that we think might be of interest to you, we'll use this column to tell you about it.

Personnel Profiles

If you don't pay your credit card bill, you'll likely get a letter in the mail from the bank, complete with a preprinted signature of somebody in the Collections Department. If you're having trouble with some product you've recently bought, and you send a note to the company involved, you'll probably find a response letter in your mailbox before too long that shows the name of someone in the Customer Service Department.

But have you ever noticed that when you call those companies, and ask to talk to the people whose names are at the bottom of their letters, you're often told that they're unavailable at the moment, and "Could I please help you?" Does it ever make you wonder if those people really exist? Well, we in Piano Service DO exist, and we're here to help. In fact, our combined experience in the piano business totals over 120 years!

So, as time and space permit, we'd like to get you acquainted with some of the people at this end of the typewriters and telephones at Yamaha.

Yamaha in the News

As we all know, music is truly a universal language. And if you enjoy a fine musical performance, this section may help to enhance that enjoyment. Many jazz, pop and classical artists perform on Yamaha keyboards, and we'd like you to know the WHO, WHERE and WHEN of some of these music people. Of course, since just about one out of every two keyboard instruments in use in the world today is a Yamaha, we couldn't hope to list all of these events. But we'll try our best to cover as broad a range of the musical spectrum as we can.

We'll also try to keep you informed of other newsworthy items or happenings where we're involved, such as our support for national events, various artistic endeavors, and such.

Calendar of Coming Events

Because it's impossible for us to attend every technical seminar offered, we are also going to use this corner to help keep you informed of the programs and events the YAMAHA Team will be supporting.

YAMAHA

From The Home Office

Larry Goldsmith
Executive Director

Nothing Is Forever

I collect quotations. This is not a compulsion; rather, it's simply a way of keeping pithy comments and observations handy for future use. There are times when our own words and ideas fail us, and it's nice to be able to fall back on someone else's.

In the midst of such wisdom and commentary as William Safire's sage advice to writers, "When [the word] 'whom' is correct, use some other formulation," and the anonymous contribution "Enthusiasm wanes, but dullness is forever," comes the following, also an anonymous quote.

I've always found great comfort in the fact that, while buffalo herds are increasing, the railroads are becoming extinct.

At one time, herds of buffalo literally darkened the plains. They roamed at will, providing food as well as the raw materials for filling other basic needs such as clothing, shelter and warmth for Indian tribes throughout the midwest.

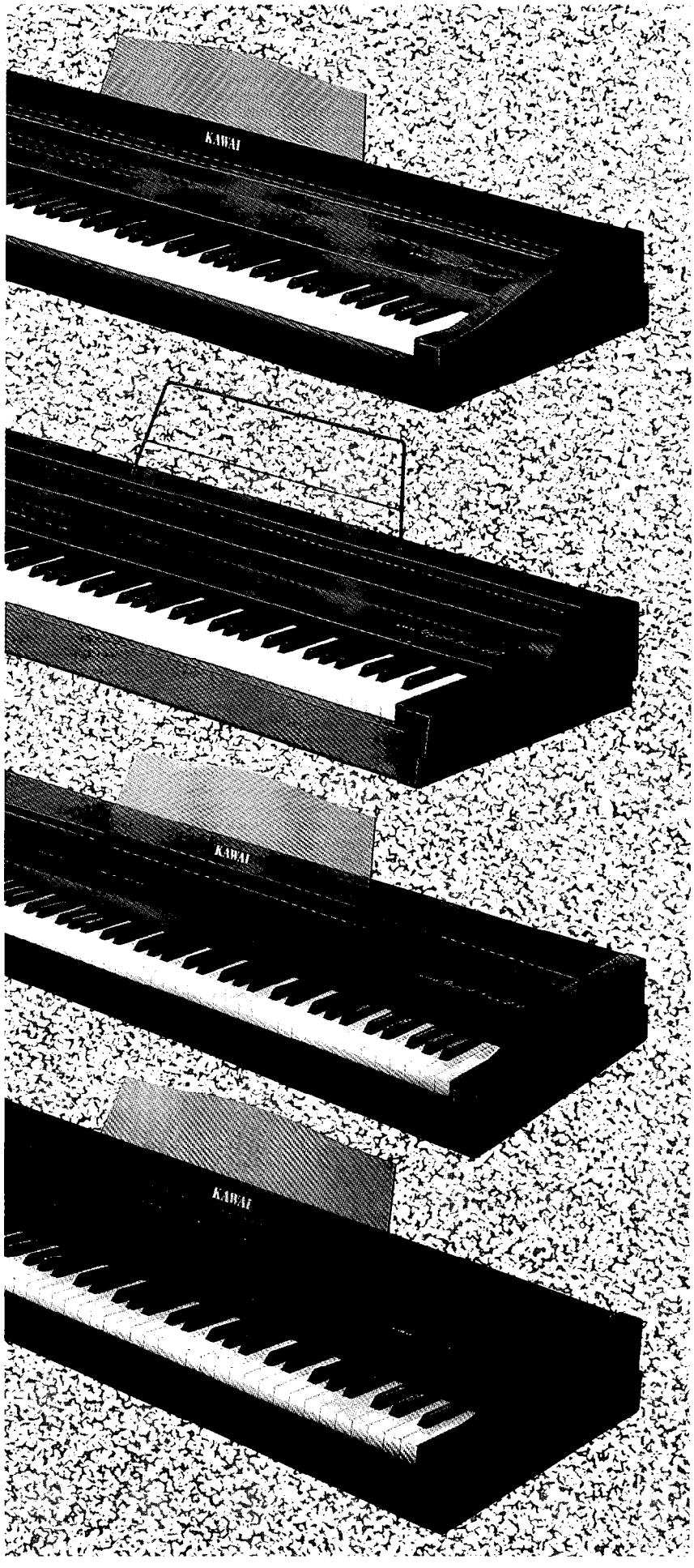
The coming of the railroads changed all that. The buffalo were slaughtered to feed armies of tracklayers, because their numbers often interfered with the smooth operation of the trains by wandering onto the tracks, and simply for sport. Frontiersmen competed to see who could kill the most of these massive animals in a single day. The buffalo faced extinction in a fast-changing and hostile world.

Then came the monopoly-busters, the endless cycle of boom and bust, and, later competition in the form of airplanes and superhighways carrying long-haul trucks and the family car. The day of the railroads came and went. Of course they were never as close to extinction as the buffalo, but their use as a viable form of transportation has declined enormously. Many people today, myself among them, grew up never having ridden a train.

But the buffalo are still alive. Once found only in zoos, they are now making a comeback. There will never again be herds of the size there were in the 19th century — there is no longer much open range for them to roam, for one thing — but they are becoming more plentiful. There are private herds, and they are no longer a curiosity, at least in this part of the country. In fact, the average vacationing American family traveling cross- country can count on finding at least one roadside tourist trap promoting that sought-after delicacy, "buffalo-burgers." They are being bred with common beef cattle to produce a hybrid that embodies the best of both species. The buffalo seems to have adapted to make the best of a changing world.

The messages, I suppose are two: no one, not a huge muscular animal with sharp horns and hooves, or even a several- ton locomotive, ever successfully stood in the way of progress; and second, just because a trend has begun doesn't mean it can't be reversed.

As you can see, quotes can come in handy in situations far distant from their original use. And you'll notice that I didn't once have to grapple with the word "whom." ■



TRADITION AND TECHNOLOGY

Kawai's Digital Piano

From Japan's Master Builder of fine acoustic pianos comes the music industry's most complete selection of home digital pianos - The Kawai "P" series digital piano line.

From the quality and affordability of the P135 ($1295.00 suggested retail) through the concert grand sound of the P2000, Kawai's Digital Piano line covers all popular price points.

Kawai's new digital pianos combine sixty years of acoustic piano expertise with very sophisticated digital electronic technology. All of the digital pianos in Kawai's line offer, in addition to fine piano voicing, a full range of traditional musical sounds including electronic piano, harpsichord, vibraphone, and organ voices. Powerful speaker systems and a variety of MIDI functions are integrated into each digital piano. As an added feature, Kawai's digital pianos offer six Renaissance and Baroque temperaments at the touch of a button.

For more information about the music industry's most complete line of home digital pianos, see your local Kawai dealer or write:

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P.O. Box 9045
Compton, California
90224-9045

Kawai Canada Music Ltd.
Unit #1
6400 Shawson Dr.
Mississauga, Ontario
Canada L5T1L8

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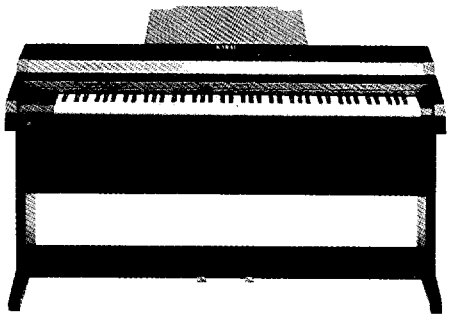
The Master Builder



Economic Affairs

Edgar Jones III, RTT

Do-It-Yourself Supplies

I suppose every piano technician gets an occasional call from someone wanting to purchase supplies to try to fix his or her own piano. I don't know a lot about other Guild members' thoughts on the matter, but I will explain my policy. I do not make any such sales, period!

A qualified technician is a professional who has invested a lot of time, effort and money to acquire the skills to be successful in our field of work. That knowledge and skill then becomes a valuable proprietary asset and the technician earns a livelihood by being renumerated for the use of this knowledge. It has become an income-producing asset in much the same way a house one may invest in to rent for income.

Almost invariably, the propective customer requesting to buy do- it-yourself parts does not have the training to know how to use them, and expects to ask the technician all the necessary questions to gain from him the knowledge to use the parts once they are purchased, and expects the technician to furnish this information free-of-charge.

If a person were to come to town needing a house to live in and inquire at a real estate office, he would be shown various properties for rent. Suppose this person said to the real estate agent, "Oh, I don't want to pay rent. I just want a house to live in. How about just deeding one over to me?" Of course, at the very least, no transaction would take place. The agent would probably chase the propective tenant out of the office. But the do-it-yourselfer has no qualms at all about making the same request of the piano technician, in effect saying to him that not only does he not want to pay the technician for his knowledge, but is asking him to give it away, free-of-charge, as well.

Even if this customer asks no questions and seeks to go home and by trial-and-error make his repairs himself, his motive is still that of trying to get around paying the technician, who has worked hard for his knowledge, for doing his job. I even had one recently to ask me if I would lend him my tools so he could try to tune an old square he had acquired in an estate sale! (I refused, of course!)

The other morning, I was awakened from my bed by a knock at the door. Answering in my robe and slippers, I was greeted at the door by two men who wanted to buy tuning pins! I replied that I do not have supplies for sale for do-it-yourself piano work, that I order supplies like that when there is a job for them, and for no other reason. One then replied, "Don't you have any used ones?" (!!) My answer was "I throw them away. They're no good." (And they aren't. If they aren't rusty or bent when removed, the becket-eyes are burred from shearing off the old strings, and the flats are wallowed somewhat if they were removed with power as we usually do it.) My final statement in reply to these people was the following: "I order supplies for my work, which is professional, and which is the only way that piano work can be successfully accomplished. It is not a suitable area of endeavor for the home handyman, hobbist, do-it-yourselfer, or shade-tree mechanic, because all of this work requires a higher degree of skill and precision than that. The only people who have any business with piano parts are people who are properly trained and qualified to use them correctly." The men left silently, and somewhat crestfallen and rueful, but I don't care, They left.

If our own self-respect and professional status is to be maintained, we must not allow ourselves to be demeaned in this way, and we must not allow the perception to grow in people's minds that any backyard tinkerer can buy parts from us and do the job himself. ■

Economic Affairs

Henry L. Jones, RTT
Chairman, Economic Affairs Committee

Another Approach

We all do occasionally get called upon to sell piano supplies to non-technicians. We all agree with the philosophy of our regular suppliers. They generally limit their sales to those of us in the piano service business and we all appreciate the "trade" discounts that we're offered. Yet, some of us purchase supplies from a certain vendor because we do a significant amount of work requiring their specialty supplies. However, some of them sell to practically anyone.

I advertise in the Yellow Pages that I work on players and I have some supplies for sale. I do sell to the occasional do-it- yourselfers who want to try their skills on old pump players. I sell an occasional set of key covers. I provide #5 wire and zither pins to a couple who make little dulcimer-type gadgets that people hang on their doors — little hammers on flexible shanks bang on "tuned" strings when the door is opened or closed. I sell assorted felts to customers who want to try to repair mice damage, etc. Almost every sale leads to a call from the buyer to "please help us out." And those who have read my earlier articles know that I don't come cheap.

In all fairness to everyone, I must tell you why I'm a little on the liberal side. Some years ago (mid 1960's) I purchased a house in Alexandria, VA, which came complete with a "flower shed." In the rear, behind and under piles of wood, sticks and pots, sat a Hallet Davis player, circa 1917. As you already know, the entire piano was a shambles. An active rabbit nest was in the lower section and many mice and rats had used and reused nests up top. As I removed a part, it was "hosed down" and thoroughly washed in the yard before entry into my workshop. I finally completed a list of needed supplies. Since I was not an active technician at the time, I called every piano technician in the Washington/Baltimore area. The only one who would even talk to me about my needs was a gentleman well known to a lot of you — our dear friend, loyal, talented Guild member, one of the two co-presidents of the Piano Technicians Guild as we know it today, a man very generous with his knowledge and very patient with those of us "still learning," none other than John W. Travis.

He helped me with knowledge and supplies. The old player was revived. I still have it and this summer it survived visits by our grandchildren! Without John, the whole thing would have gone to the trash heap and I probably wouldn't be working on players today, which incidently, I enjoy.

We all have reasons why we do things as we do. None of us want to be told "this is the way to do this or that," but I think it's healthy for us to know how others operate their businesses. We're all interested in how you, the Piano Technicians Guild members, feel about technicians selling supplies to non- technicians. If you have feelings on the subject, one way or the other, or even neutral, drop a note to me, Henry L. Jones, 517 American Ave. Dover, DE, 19901 and we'll publish the results in a later article.

I really feel Edgar and I have a lot in comman and are working toward the same issue. We have only scratched the surface. One of the main purposes of the Economic Affairs Committee and these articles is to let you know a little about how some of us handle important aspects of our businesses so you, the members of the Piano Technicians Guild, can hopefully make appropriate decisions regarding your business practices. What do you think? ■

The International Scene

Fred Odenheimer
International Relations Committee

After The Convention

We left Toronto Sunday the 26th with the Hilbert's in their car, plus Klaus Fenner. Our destination was Bristol, Vermont, where Ed had planned an "International Meeting" with the Vermont group. On the way we caught up with the Japanese Technicians at Niagara Falls. Naturally, pictures were taken from all sides, and we ready for a final good-bye.

We arrived in Bristol Monday afternoon, got settled in our rooms and admired the house, and for me especially Emily's vegetable garden. We saw most of the village in the evening and were ready the next morning for a hike up to the Bristol Bluffs, overlooking from there the whole area past Lake Champlain and to the north into New York State, Adirondacks, and to the north into Canada. It was a perfect day, the view was excellent, but I did not make it down the hill on my own! I needed the Bristol Rescue Squad, of which Ed is a member. Christopher, age 11, Ed's son, brought them up in a hurry. First being carried in a basket, then transferred to a "pick-up" and finally to an ambulance, they brought me to the Middlebury Hospital. After some frantic work there by Dr. Shapiro and his staff, I was taken to the Medical Center Hospital of Vermont in Burlington. There, Dr. Gundel and his staff took over. The operation was successful, and not quite two weeks later, I was out of the hospital and recovering nicely at the home of Ed's mother, surrounded by lawns and woods; a peaceful setting indeed. I 'm not quite ready to tackle the next mountain!

The Vermont Piano Technicians had a successful meeting that evidently lasted until the "wee" hours, although some of the fellows had long distances to cover. Sorry I deserted you on such short notice, but I promise to make up for it in the future.

Voting me into the Guild Hall of Fame is a great honor, but it is my feeling that I did not contribute any more for the organization than many of our members have been doing for years. I want to share the honor with them also.

If you do something that you really enjoy, meeting fellow technicians from not only this country and Canada, but from all over the world. Making lasting friends, is this not a great reward? Passing on knowledge that has been passed on to us freely by our elders, our collegues and yes, our students, is this not our duty?

The IAPBT Convention Saturday, July 25th, was a real success. At the Council Meeting in the morning, some minor changes in the bylaws were made. Australia was voted in as our newest member, also single members Odd Aanstad, Norway, Leonard Duricic, Germany, Lothar Thomma, Switzerland, and Ang Kok Hang, Hong Kong.

A resolution concerning adherence to A-440 as originally accepted by an International body in 1937, was passed by this organization, representing some 7000+ piano technicians and piano builders worldwide.

Officers elected were Seichi Utsunoniya, Japan, President, Bo Yung Lee, Korea, Vice President, Ron Berry, U.S.A., Secretary/Treasurer. Elected to the Board, "Tom" Liu, Taiwan, Ron Harper, Australia, and Charles Huether, U.S.A. The next convention is to be in 1989 will be in Kyoto, Japan and in 1991 will be in Seoul, Korea.

The program on restoration of antique instruments given by Ed Swenson Saturday afternoon, was well attended and well received. It is hoped to be that in the future meetings technical programs will play an increasing part in the program of the convention.■

Letters

To all my friends:

It seems that to be the recipient of any award is a precious thing, but to be presented *the* award is overwhelming. When I heard my name called to accept *the Golden Hammer Award* at the convention in Toronto, my mind went blank and I have not recovered yet!

I have spent a great deal of time looking at this blank page, trying to come up with the words to express my thoughts. I guess I could stare for a much longer time, but I am sure the results would be the same. Words are simply not adequate to express my gratitude. I guess the only thing I can say is "Thanks." Thanks to each of you for your vote of confidence, and a very special thanks to Bill Smith for hand-crafting the most beautiful case any award has ever been in.

With utmost sincerity,
LaRoy Edwards

During the Guild's 30th anniversary celebration in Toronto, the Guild's past presidents were honored for their contributions. Letters of greeting signed by many of those who attended were mailed to the absent former leaders. Here are two responses:

Dear Marshall:

Needless to say, I was deeply impressed by, and humbly grateful for the thoughtful letter in last week's mail. My sincerest thanks to you and to all who took the time to sign and send good wishes.

While Carroll and I were so sorry we could not attend, we were proud to have Liz represent us there. It's been so gratifying to me to see her develop into such an outstanding technician. No matter what problem I encounter these days she has the answer.

Liz, like so many of our fine outstanding young technicians these days, has learned practically everything they know through the Guild. There is no way we can thank all those Institute instructors and Guild officers enough.

The Guild seems to have truly blossomed under your administration. Thanks and keep up the good work.

Sincerely,
F.M. "Kelly" Ward
Past President

Dear Larry:

...I joined one of the originating founders, NAPT, in 1942, and the other one, ASPT, in 1950, and was part of the founding of PTG in Washington, D.C. in 1958, and shared heavily until I left the board in 1975, and finally the nominating committee in 1977. My recent problems have dictated a lack of physical activity on my part that is so very hard for me to get used to, but just could't make Toronto.

When the letter came, I was indeed moved and must say a nostalgic tear or two was shed. I should like to please get a short note in the Journal thanking one and all of those who were so thoughtful and considerate to put together a nice letter of remembrance to me.

A lot of my life's hours, energy, and love and efforts, and no small amount of money, was spent during my time of opportunity to serve PTG, and when I realize that at least a few of my old buddies still remember, I'm gratified, flattered and thankful to them all.

Most sincerely,
George Morgan
Past President

Industry News

Election Of Officers Highlights PMAI/NPF Meeting

Karl Bruhn, senior vice president of Yamaha International Corp., was elected 1987-88 president of the Piano Manufacturers Association International and the National Piano Foundation at the organization's recent annual meeting in Chicago.

Other officers elected for the new fiscal year were Robert Dove, Steinway & Sons, as first vice president; Randall Weales, Kimball International, Inc., second vice president; Lloyd Robbins, Young Chang America, Inc., third vice president; and Richard Harrison, Baldwin Piano and Organ Co., treasurer.

Also presented at the meeting were recaps of the past-year activities of several PMAI/NPF committees.

According to PMAI/NPF Executive Director Don Dillon, distribution of educational brochures increased during 1986-87 by 55 percent to nearly 76,000 copies being mailed to the general public, piano retailers, educators and others. Dillon also reviewed the draft copy of a new quarterly membership newsletter which will be distributed to NPF members, related trade and educational associations and piano dealers.

Lloyd Robbins, chairman of the Public Relations Committee, reported that during the past year a minimum of 28 million publicity impressions were generated by stories encouraging piano playing and education which appeared in a variety of national consumer print and broadcast media outlets. Robbins also reported as chairman of the NPF Ad Hoc Committee on Planning and Communication that several special promotional projects are currently under consideration, including a celebrity spokesperson program, support of national special promotional projects are currently under consideration, including a celebrity spokesperson program, support of national children's television programming, public service announcements and a national competition for school children.

Randall Weales, chairman of the Statistics Committee, told members that a restructuring of the PMAI statistical reporting service had been successfully completed and had greatly enhanced the monthly reporting process.

Other committee chairmen presenting updates on activities included Tom Long, of Baldwin Piano & Organ Co., for the Coordinating Committee; Ed Bezursik, Steinway & Sons, Music Liaison Committee; and Dave Campbell, Sohmer & Co., Trade Show Committee.

Continued on next page

Graham, Baldassin Named To Journal Posts

Susan Graham will take over as Technical Editor of the *Piano Technicians Journal* effective with the December 1987 issue. Graham, a member of the San Francisco Chapter, replaces Jack Krefting of Cincinnati. Rick Baldassin, of the Utah Valley Chapter, becomes the *Journal's* Tuning Editor, continuing his previous responsibility for the *Journal's* tuning articles.

Graham

Baldassin

Krefting, who held the Technical Editor's position for more than nine years, resigned effective with the current issue, citing increasing time pressures caused by his developing rebuilding business.

"My interest in the technology of musical instruments began as a child when I found replacing cork and regluing pads on my clarinet at least as interesting as practicing scales," Graham said.

She entered Antioch College in Ohio as a writing major, but her interest in musical instruments was reawakened by a dulcimer- building class taught by an engineering professor who was also a violin builder. She convinced the college to allow her to substitute piano tuning classes at the Perkins School of Piano Technology and courses in acoustics for the performance portion of a music degree.

Graham graduated from the Perkins School in 1973, joined the Guild as a Craftsman member and finished her BA degree in 1974. While still in Cleveland, she began rebuilding with Chuck Wagner. She moved to Oakland, CA, in 1976 and has been a service technician for Baldwin and Yamaha, as well as maintaining a private tuning clientele and an active grand rebuilding business.

She wrote the *Journal* column "Shoptalk" for five years, receiving a Presidential Citation in 1984 and a Member-of-Note Award in 1986 for that work.

Baldassin received his education from Brigham Young University, where he received a bachelor of music performance degree as well as completing the requirements for an associate of science degree in piano technology. Since the beginning of his piano technology training, he has been an active member of the Guild, attending state, regional and national conventions, as well as serving two terms as president of his chapter. He authored the "On Pitch" series of *Journal* tuning articles from 1983 to 1985.

As the Western Region member of the Examination and Test Standards Committee, he and the other committee members received a 1987 Presidential Citation for their efforts in rewriting the Tuning Examination Manual. He has been a frequent instructor at state, region and national conferences and conventions and became assistant technical editor in 1986.

He has been the concert technician for the Snowbird Piano Festival and was the technician for the finals of the 1986 Gina Bachauer International Piano Competition. He is currently the concert technician for the Utah Symphony Orchestra and the University of Utah.

Industry News . . .

PMAI/NPF members attending the committee were Bezursik, Bruhn, Campbell, Dove, James Graham and Frank Rubury of The Wurlitzer Co., Harrison, Long, John Rajcic of Kawai America Corp., Robbins, Jack Scott of Samick Music Corp., Peter Van Stratum of Charles W. House & Sons, Inc., Weales, Harry Kaprelian, guest, Paul Bjorneberg of Doremus Porter Novelli, and Don and Brenda Dillon, PMAI/NPF.

Russell Resigns From Tadashi

Bob Russell has resigned as technical consultant for Tadashi Piano Corp. All PTG seminars and conferences he has been committed for as of September 1987 will be honored by Bob Russell personally as an independent technician.

Yamaha Purchases Pianocorder

Nippon Gakki Co, Ltd. worldwide manufacturer of Yamaha products, announced the purchase of inventories, patents and copyrights from the Pianocorder Division of Marantz Company, Inc., in Chatsworth, CA. Plans for future distribution of Pianocorder will be announced within the next 30 days.

Correction

An inadvertent omission garbled one paragraph of the August article on NAMM's summer Expo. The paragraph should have read: "Young Chang showed a new studio scale called the U116S featuring a solid spruce soundboard and 15-ply maple pinblock. They are beginning to use lacquer on more and more of their pianos instead of polyester, including the American Walnut and American Oak grands."

THE
TECHNICAL
FORUM

Grand Rebuilding, Aligning Beckets and Readers' Comments

Jack Krefting
Technical Editor

Ever since leaving the employ of Baldwin to reopen my shop a little over two years ago, it has become obvious that there just isn't time to continue editing the *Journal* and run a major rebuilding operation; something had to give. Since the shop provides the bulk of my income, I have regretfully decided that it is time to step down as Tech Ed. Besides, I've been doing this job for nine years as of this issue, and I really feel it is someone else's turn.

The PTG Executive Board has selected Susan Graham as my replacement, an excellent choice indeed. Susan is a full-time technician who can do it all — she is a tuner who does all sorts of field repairs and who also maintains a small rebuilding shop. Best of all, she will be the finest communicator ever to have held this post, in my opinion. If the readership will give Susan even half the support and encouragement that I have received, she will have a pleasant tenure indeed.

Continuing on the work he has begun as assistant technical editor with responsibility for the tuning articles, Rick Baldassin becomes Tuning Editor in this issue.

Next month will be my final issue, so from now on please send all technical material, questions, comments, etc., to Susan Graham, 2967 Madeline Street, Oakland, CA 94602. Tuning material should go to Rick at 2684 W. 220 North, Provo, UT 84601.

"

Some rebuilders actually want the board to belly up as much as possible and will therefore place it in a deliberately humid spot; others, including myself, prefer to keep it relatively flat because it is easier to work on that way.

"

Grand Rebuilding

After a brief interruption, we continue with the scaling of the soundboard. In our July issue, you may recall, we had just removed our board from the go-bar deck but had done no thinning or rib shaping yet.

At this point, practices vary. Some rebuilders actually want the board to belly up as much as possible and will therefore place it in a deliberately humid spot; others, including myself, prefer to keep it relatively flat because it is easier to work on that way. We place the bellied board back into the cooker whenever we aren't actually working on it.

Assuming that no changes will be made — and no changes should be made unless there is a clear and urgent need to do so — we want to duplicate the original board as precisely as possible. Using large calipers, measure the thickness of the original board every inch or two across its surface and make notes of the dimensions. Start planing the board across its entire surface if it is thicker than the old board's thickest part, and then gradually from there as required.

If the rebuilder glues up his own boards, that is, edge-glues the planks rather than buying glued boards, then it makes sense to plane the planks to the maximum thickness of the old board. With this system, the only planing to be done after the bellying is the thinning of the edges. One reader even does the thinning before gluing on the ribs, which sounds backwards but he claims it is effective and easier to control because there is no crown to contend with.

After the excess material has been removed, refine the planing process by marking the areas that are still too thick, planing off the marks, measuring the thickness again, and so on until the desired dimension is reached. Take into account such factors as previous soundboard repair — how much was sanded away to remove that water stain? — and any difference in moisture content between the new and the old board. Quarter-sawn spruce will shrink and grow with humidity changes almost twice as much in thickness as in width.

The top surface, which of course is the side we have been planing, will have to be sanded before finishing, but the rebuilder might prefer to wait until the ribs have been chamfered. In any case the top will have to be sanded before the bridges are installed, which is generally done prior to installing the board into the piano.

Turn the board upside down and mark the ribs for scaling, using the old ribs as a guide. A very sharp, long chisel is best for this, as it can be pushed with both hands for better control. If you have to use a mallet, your chisel isn't sharp enough. Chamfer down to the marks on the sides of the ribs, and then measure the thickness at the edges to be sure the board will fit down flat on the inner rim and not be held up by a too-thick rib end. Ideally, it would be nice if the ribs fit the notches absolutely perfectly in every dimension; but if that isn't possible, we would certainly rather see a slight gap between the bottom of the rib and the bottom of the notch than to see the board forced upward because the rib is too thick. Please understand, we are not recommending clearance; we are merely establishing priorities.

"

Turn the board upside down and mark the ribs for scaling, using the old ribs as a guiide. A very sharp, long chisel is best for this, as it can be pushed with both hands for better control. If you have to use a mallet, your chisel isn't sharp enough.

"

The bottoms of the ribs can be rounded to match the originals now, or after the bridge is installed, depending on individual preference. Next, after the board has been dried out again in the cooker, depending on humidity, of course, refine the fit of the board into the rim. It should fit tightly all around and the ribs must seat into their notches. Be absolutely sure of this, because we are now going to drill the tooling holes through the board and into the rim. Use a brad-point 5/16" drill and a spinet hammershank for a locator pin at each end of the board — the favored spots are near the top of the treble bridge and in the curve where the spine meets the tail. Clamp the board down onto the rim before drilling, and double-check the fit from below with a feeler gauge.

While the board is clamped into place, get the bridge ready to install — more on that later — and place it on the board. Retrieve the "tree" from storage and fit it onto the bridge and into the rim, thus locating the bridge to the board. Mark the board with a scratch awl to indicate the position of each end of each bridge, and then remove the tree, bridge and soundboard from the piano. Locate and drill screw holes through ribs, board and into bridges from below, and assemble maple buttons, screws for the buttons, and round-head screws and washers for the holes drilled through the ribs. Determine and set up any additional clamping fixtures, such as go-bars above and supports below, to be certain of a minimal glue line at the all-important juncture of bridge and board. Apply the glue and install the screws, and then apply additional pressure especially on apron ends or wherever else it is needed. Incidentally, don't use a quick- setting glue for this purpose, because of the time it will take to get all the screws installed. I prefer cold hide, but there are other suitable glues also, such as resorcinol or urea formaldehyde. Epoxy is not suitable because it leaves a thick glue line, and vinyl glues are not recommended because of the creep factor which can result in cold flow of the joint at some later time. Aliphatic resin glues are subject to cold flow also, although not nearly as much as polyvinyl "white" glues, but the aliphatic resin isn't a good choice here anyway because it sets up too quickly.

When the glue has cured, remove the temporary screws through the ribs and drill out those holes to accept maple hammershank dowels. Glue in the dowels, sand the underside of the board, tape off the gluing surface at the edges, and finish the underside with two coats of white shellac and one coat of varnish. Don't use lacquer, as its fill thickness isn't sufficient to maintain tuning stability during sudden humidity changes, such as when the piano is moved from one room to the next. Varnish won't prevent absorption/evaporation either, but it slows it down a lot more.

When the varnish has dried, remove the masking tape from the gluing surface around the edges and scrape off any shellac or varnish that may have gotten under the tape. At this point we could place the board into the rim for a trial fit, except that it probably won't fit anymore. The moisture from the finishing material, plus having kept the board out in the ambient humidity for a day or two, has made it grow enough that it won't fit the rim.

Don't rasp it to fit, as that would defeat the purpose of having fitted it to the rim in the first place. Rather, put the complete soundboard assembly back into the cooker and let it dry until it fits again. When it does, it is ready to be glued into the piano.

Hot animal hide glue is the best glue for this purpose because of its acoustical impedance and lack of cold flow, but the operation must be done very quickly or the glue will begin to chill before the board is clamped all around. You will need three or four people, depending on the size of the piano, and all clamps and cauls must be ready for instant use. Keep the board in the cooker until the last second, and pre-heat the top of the inner rim with heat lamps from above.

Have two people spread the glue quickly with paint brushes about an inch and a half wide, press the board onto its locating dowels and clamp all around quickly. Clean up the squeeze-out underneath with a wet sponge immediately, otherwise the glue flashings will cause a buzzing similar to the sound of a loose board.

After the glue has cured — leave it clamped overnight — you may want to do a final light hand-sanding of the top of the board with 220 garnet or aluminum oxide paper. Decide whether to drill the nosebolt holes before or after finishing the top of the board, and apply the same finish to the top as was previously applied to the underside. If a decal will be used, it should go on the second shellac coat so the varnish will protect it.

Aligning Beckets

Peter Wolford has some thoughts to share on this topic:

Just to prove someone is alive and well in the San Francisco Chapter, I would like to respond to the fine article in the "Chapter Notes" from Dallas by Richard M. Brown, M.D., entitled "Some thoughts about restringing."

There must be a few technicians like me who, reading the treatise on how to have perfect coils with all the beckets alligned, said "if I gotta go through all that math, buy a calculator, and measure so precisely, forget it." So, for this genre of technician, I offer the following practical way of accomplishing the same result.

Make yourself a gauge out of a plastic key blank which will serve two purposes; height to drive the tuning pins and length to cut the wire beyond the tuning pin.

Cut enough single lengths of wire for all the unisons within one gauge — say 16.5. Run the wire from a big fat handspan beyond the tuning pin hole down to the hitch-pin, bend the wire back on itself and cut it off even with the other end. Wire is cheap so allow several inches more than the exact measurement. Better to waste three or four inches than to cut it too short and waste 36 or whatever inches. You now have a small bundle of looped wire.

To install, push the loop under the pressure bar or thread it through the agraffe, fit it on the bridge pins and hook the loop over the hitchpin. Now, pull the slack out of it and observe how neatly it lies alongside the plate bushings. Take the gauge, put the narrow end at the back of the tuning pin hole with the string on top of it, press string and gauge between thumb and forefinger and check the slack — you don't want any — and cut the wire off even with the end of the gauge. Repeat with the other end of the wire.

Pick up your tuning pin, hold perpendicular to the plate, shove wire thru the hole just even with the edge of the pin and crank on about three turns, manipulating the wire with your thumb to keep a tight coil, then pound the pin in to almost the height of the notch of the gauge. Repeat with other end of the wire.

Now, pick up your stringing hook, hold the standing part of the wire up to keep the coil closed and tighten just enough to keep the coil together. Now, pound in the pin to the height of the gauge. It should be fairly obvious that you have to play around with both tuning pins so you don't stress one string more than the other.

As the strings lengthen or shorten, move the gauge forward or backward on the tuning pin hole to compensate for the position of where the wire enters the tuning pin. It doesn't take any imagination to realize that this is also an ideal method for replacing individual strings that have broken.

In which case, inasmuch as the pin is already driven in, it is only necessary to back off one turn or less on it before transferring the new coil from your spare tuning pin to the one in the piano.

It would be advisable to make a second gauge for use on wound strings as they need to be cut a little shorter. You can fine-tune the gauge with a file to get it just the right length for your technique.

Reader Comment

A couple of comments concerning the July issue which I hope might be helpful. I sure agree with Ben's shimming up the balance rail and sometimes shortening the hammer travel but I don't believe that he ever came right out and said that he was putting aftertouch back in the action. Also it should be pointed out that if you should over compensate on this, you could end up with a damperspoon regulating job.

In regard to our friend who had the problem with the Kimball console action removal, a frozen screw is mighty easy to butcher the head of, be it philips or straight. A yanke offset ratchet screwdriver is as handy a tool as you will ever have in your case. Leverage is much better with this little tool for breaking loose frozen screws. Also you will never find a better tool for regulating rocker capstans. Now for replacing that Kimball action. Tighten action securing screws slightly; then if, as in the case mentioned, you find lost motion in the keys which wasn't apparent before action removal, with a wood block atop the action brackets tap down lightly with a hammer and cinch up screws. Thank goodness for Roger action bolts are back again as of about three years ago.

As to brother Travis' comment about lid props where he would prefer to use the wall where possible, I know he wouldn't do that in the case of a spinet type with a bit top. Example, Acrosonic — if you move that piano that far you will most likely change the level of the floor, and you know what you might find when you return the instrument to its original position.

Dumb sales contest: Years ago when I worked in a company shop, we had some salesmen. On our floor were located the used pianos. One day the salesman brought a customer to the old upright. He proceeded to disassemble the case and

show her the brand new keyboard felt. At that very moment, a very large moth flew out, without even batting an eye he said "There might still be a moth or two around, but you can see they still go out to eat." This one came from my good friend Emil Fries several years ago: While servicing a piano for a doctor who was complaining about the price of tuning and his education as a doctor, Emil finally pulled from his tool case the piano atlas and said, "At least you only have two models to work on."

Jack Sprinkle, RTT
Arlington, Virginia

Our thanks to Peter and Jack for their comments. Remember now, all tech material from now on is to be sent to Susan Graham, Tech Ed, 2967 Madeline Street, Oakland, CA 94602.

The Stretch Calculator The Whole Piano, Beat Rate Program And The Equal Beating Theorem

Rick Baldassin
Tuning Editor

Last month in the review of the convention classes, there was presented a graph which showed the tuning system. Since that time, I have received several questions as to how much the treble and bass vary from piano to piano, in instruments which have the same Stretch Number. For those of you who are unfamiliar with the Stretch Calculator tuning system, please go back and review the September issue, which describes the system in detail.

Since it is possible that two very different pianos can have the same Stretch Number, it is very likely that the treble and bass curves will be quite different also. It is also important to note that because two pianos have the same Stretch Number does not mean that they will sound the same in the 3-1/2 octaves that the Stretch Calculator covers.

To show how the treble and bass curves can differ, I chose two different pianos, one large upright, and one console, with the same Stretch Number, and graphed the tuning curves for each. (See Fig. 1)

Notice how the curve "jumps backward" each time the partial changes. The curve represents 6th partials for notes A0 to B2, 4th partials for notes C3 to F4, 2nd partials for notes F♯4 to F5, and 1st partials for notes F♯5 to C8. Notice that one curve begins at -22 cents for note A0, while the other begins at -16 cents. The curve for each is relatively smooth, and the two curves cross at note D2, but wind up with one cent of each other at note B2. Because the two pianos had the same Stretch Number, the curves are identical for notes C3 to F6. From F6 to B6, the curves are nearly the same, but from C7 to C8, the paths depart, one ending at 43 cents, and the other at 36 cents.

It is interesting to note that the piano which had the steeper curve in the bass, also had the steeper curve in the treble. While this is what one might expect, my statistics show that this is not always the case. The curves are dependent on the scale of the piano. (And, I might add, the preferences of the tuner). You might also notice that I have yet to mention which of the curves was the upright and which was the console. I'll leave that up to you to decide. For those of you who just cannot stand the suspense, I will disclose the information next month.

The conclusions which can be drawn from the above are that the Stretch Calculator can accurately predict the tuning curve for the middle of the piano, where the scaling is more uniform, but that the bass and treble curves must be determined on an individual basis, and that the Stretch Number has no direct correlation to the bass and treble curves, which was demonstrated in the above. It has further been my experience that pianos which are the same size, but of different manufacture, with the same Stretch Number, can have differing bass and treble curves. The safest bet is to treat each piano (or at least make and model) individually.

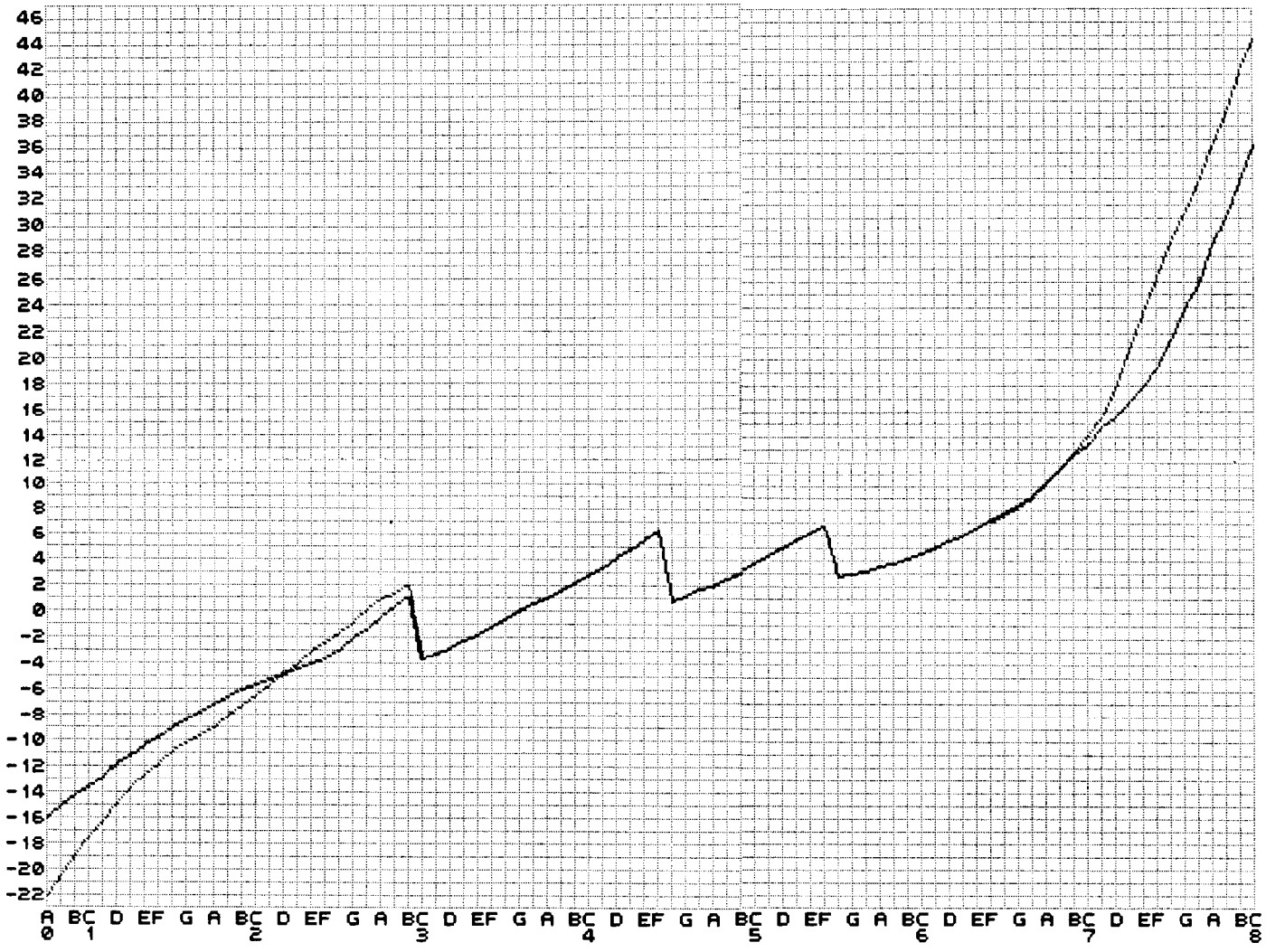


Fig. 1 shows the tuning curves of two different pianos with the same Stretch Number. The cent values represent the 6th partials for notes A0 to B2, 4th partials for notes C3 to F4, 2nd partials for notes F♯4 to F5, and 1st partials for notes F♯5 to C8.

The Whole Piano

The publication of the article by Jerry Anderson in the August issue, along with the reprinting of the Sanderson Data for a well tuned piano in the midrange, has created interest for data concerning the entire piano. At my request, Dr. Sanderson provided me with data for all 88 notes of a well tuned piano. The data included the inharmonicity constant for each note, as well as the cent readings for the 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, and 16th partials, the interval widths in cents for the octaves, fifths, fourths, Major Thirds, minor thirds, Tenths, Seventeenths, Double Octaves, Triple Octaves, and Quadruple Octaves, and beat rates for same. My deepest appreciation to Dr. Sanderson for this information as I was not at all looking forward to gathering it myself. From the data, I have created several graphs. Figure 2 shows the cent deviation for partials one through six, and eight. The tuning curve is also shown by way of highlighting the curves of the partials actually used to do the tuning (i.e. 6th from A0 to B2, 4th from C3 to F4, 2nd from F♯4 to F5, and 1st from F♯5 to C8).

This data alone is very interesting, but the graphs of the interval widths shed even further light. Fig. 3 shows the interval width in cents for the 2:1, 4:2, 6:3, and 8:4 octaves. Note that in general, the octave widths decrease for all types moving from bass to treble. From Fig. 2 we can also see that the octave type decreases as we move from bass to treble.

Note that while the 2:1 Octave for C7-C8 has been maintained at +1 cent, the same octave at the 4:2 level is -25 cents. The same octave at the 6:3 level would be nearly -70 cents. Fortunately for us, the 4:2 and 6:3 levels cannot be heard due to the tonal spectra in this area of the piano.

Fig. 4 shows the interval widths in cents for the Major 3rd, 10th,

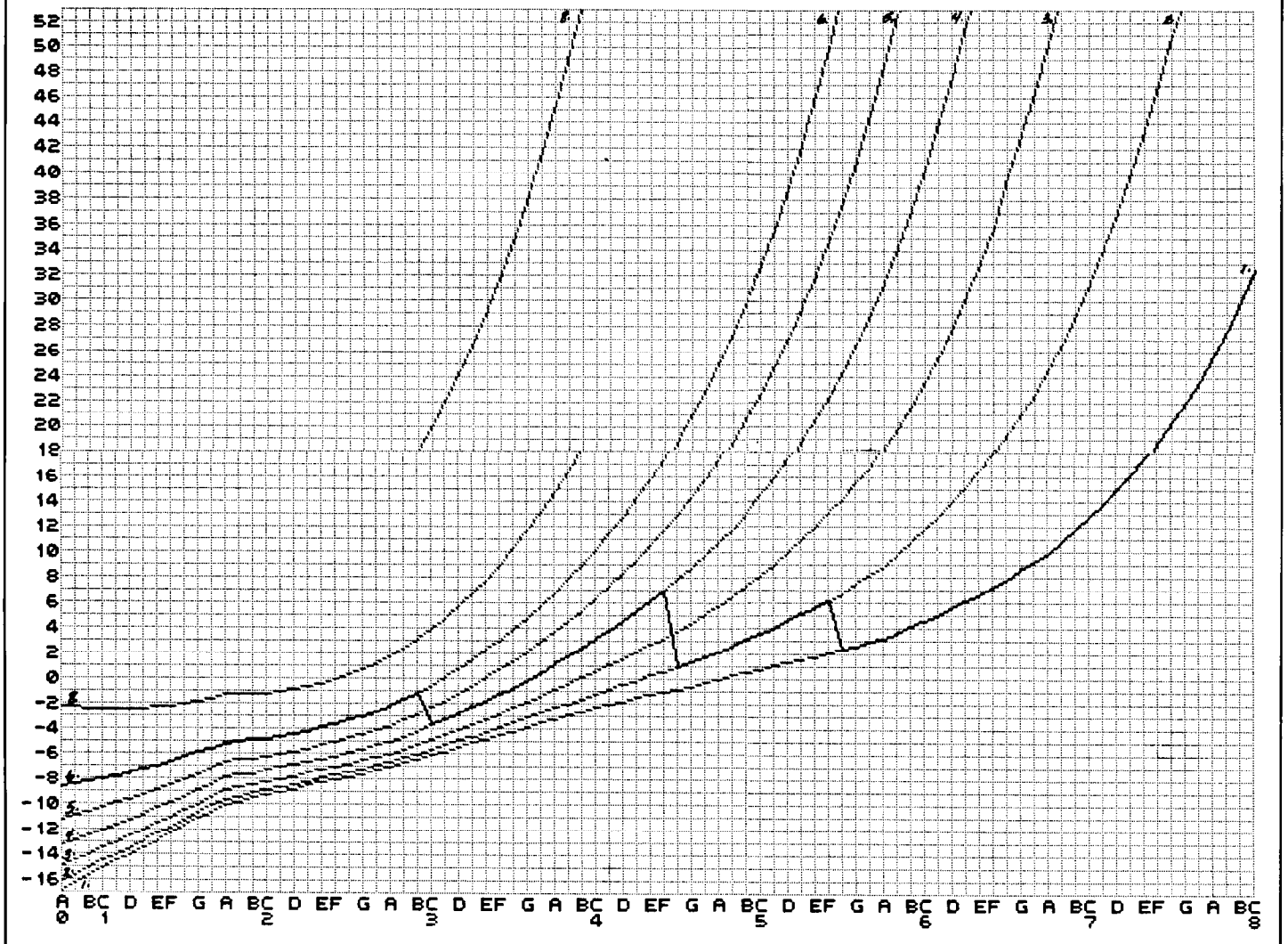


Fig. 2 shows the cent deviation of partials 1, 2, 3, 4, 5, 6, and 8, for all 88 notes. The tuning curve is shown by highlighting the curves for the partials actually used to do the tuning.

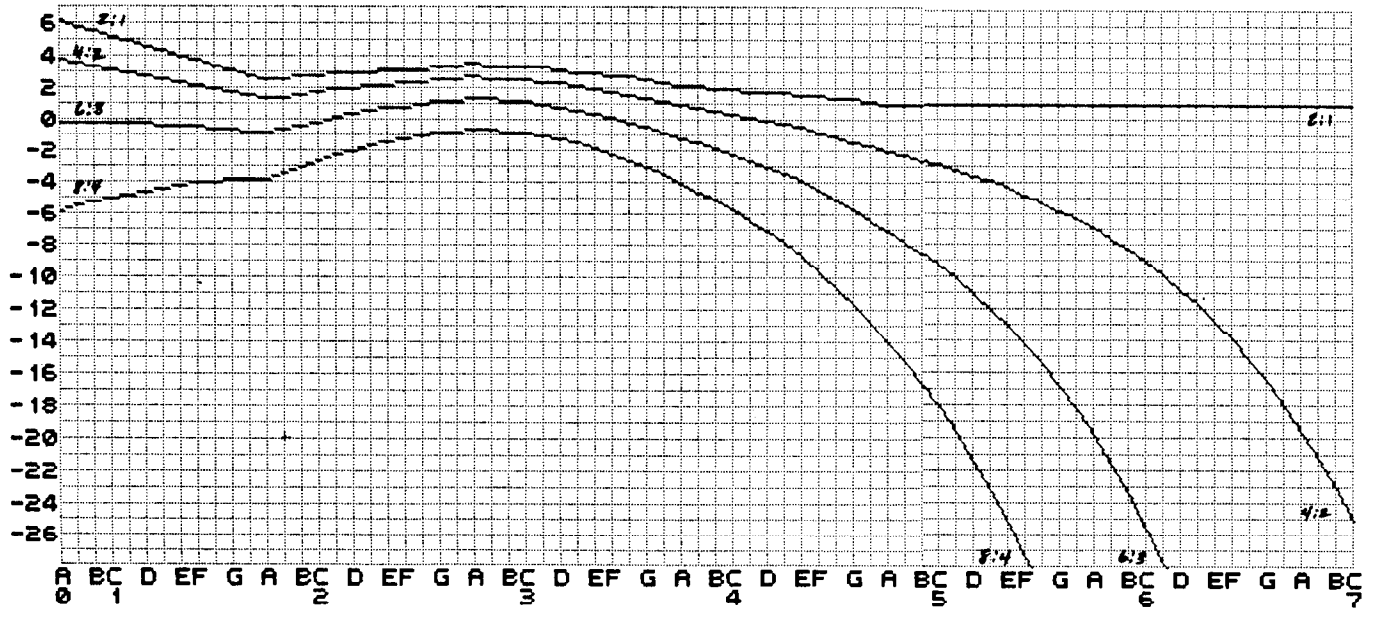


Fig. 3 shows the interval width in cents for the 2:1, 4:2, 6:3, and 8:4 octaves.

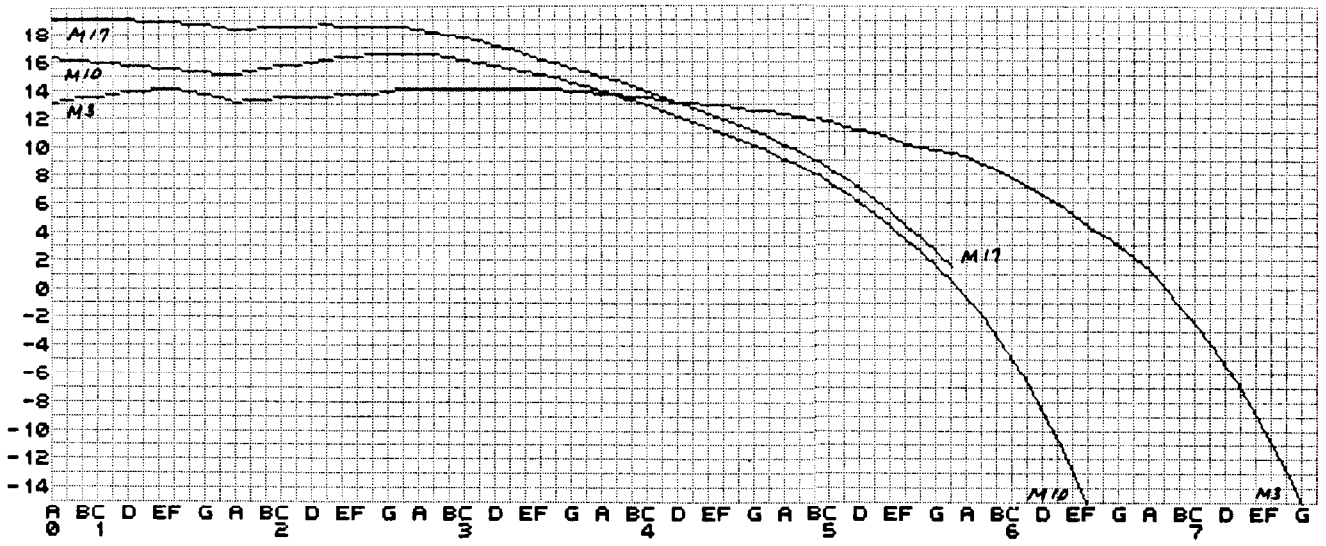


Fig. 4 shows the interval width in cents for the Major 3rds, 10ths, and 17ths.

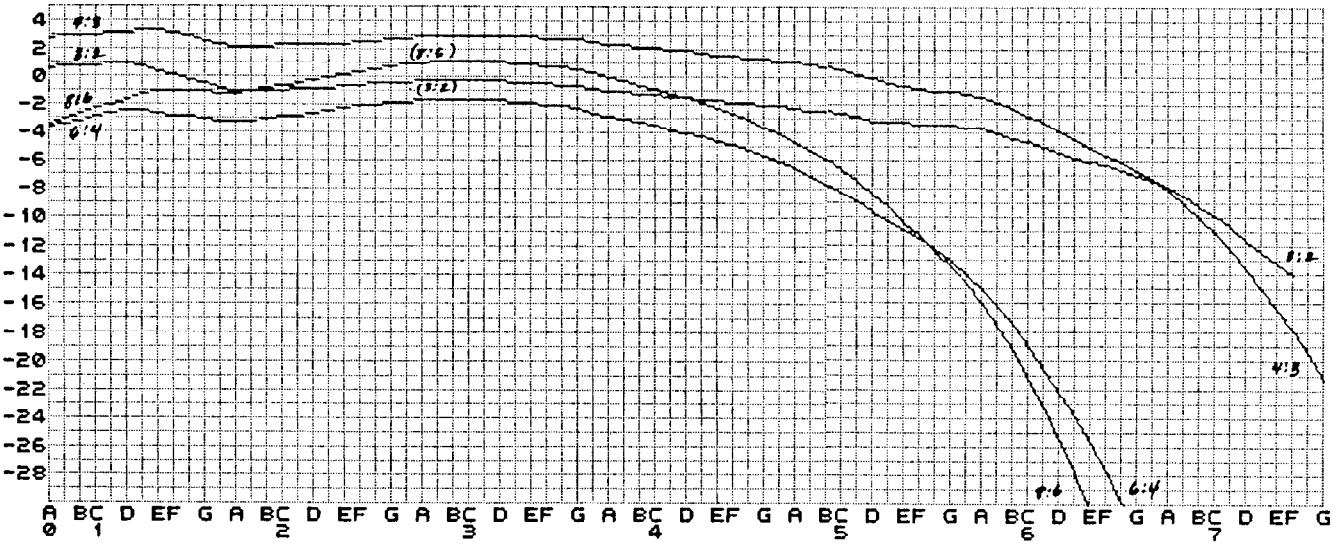


Fig. 5 shows the interval width in cents for the Fifth at 3:2 and 6:4, and the Fourth at 4:3 and 8:6.

and 17th. Even though the 10ths and 17ths start out wider than the 3rds, they cross at around C4. All continue to decrease in width, and the 3rd and 10th go increasingly negative, the 10th reaching -15 cents at F6, and the 3rd at G7. Fortunately for us, again, the tonal spectra prevents us from hearing this. Note also that the 10th and 17th track each other at 1 cent apart from A4 to G♯5. This is because 2:1 + 1 cent octaves were tuned from A4 to the top of the piano.

The Major 3rds, 10ths, and 17ths decrease in width moving from bass to treble, becoming severely inverted at the top of the piano.

Figure 5 shows the interval width in cents for the Fifth at 3:2 and 6:4, and the Fourth at 4:3 and 8:6. Notice that the 3:2 Fifth is actually expanded in the low bass, and does not become as narrow as in equal temperament until around C4, where it begins to become increasingly more narrow, reaching -14 cents by the top of the piano. The 4:3 Fourth is more expanded than in equal temperament until C4, where it too becomes narrow, reaching -21 cents at the top of the piano.

We generally think in terms of tuning the fifths more pure as we tune into the treble. The statistics show otherwise. We cannot hear them in any case.

Our sincere thanks to Dr. Sanderson for the data which permitted these interesting observations. Next month we will look at the beat rates from the same statistics.

Beat Rate Program

A while back, I received a letter from Kerry Nicholson, of Lumberton, North Carolina. Kerry writes:

I have been enjoying your article for some time now. Keep up the good work. I have written a pro-

gram for the TI-59 which calculates beat rates. I am enclosing a copy. I don't know how much good it will do you, but if you think anyone would be interested, I would welcome you to use it in your column. It sort of goes back to the beginning. I think by now that a lot of chapters have access to a TI-59; and may have as much fun with this as I have. I wrote this primarily because I wantaed to learn to program. Here is the program:

Here are the instructions for use:

1. *Do not repartition memory.*
2. *Insert magnetic card, side 1.*
3. *Enter note number.*
4. *To find the note frequency, press A.*
5. *To find a beat rate, press E for M3rds, A' for Fourths, B' for Fifths, C' for Sixths, or D' for minor 3rds.*

When finding a Fourth or Fifth, you will see the BPS (Beats per Second) flash on the display momentarily, then the BPFS (Beats per Five Seconds)will remain displayed. All other intervals will be displayed only in BPS. Label the card in this way:

Beat rate program				
4ths	5ths	6ths	m3rds	
Freq				3rds

Our next submission comes from Michael J. Wathen, of the Cincinnati Chapter. It deals with the use of equal beating intervals as the proof of Just intervals. I am sure you will find it interesting.

Equal Beating Theorem: A Proof For Just Intervals

The necessity of aurally verifying the tuning of just intervals in the piano requires the use of tests or proofs. The Equal Beating Theroem provides the basis for developing any and all valid test(s) for the tuning of fourths, fifths, and octaves in the piano. In following we present the theorem and show its inexpendable use for treating inharmonicity.

A just interval is one in which the ratio of the frequencies of the fundamentals can be expressed in natural numbers and have their coincident partials at the same frequency. Natural numbers are defined as N = [1,2,3,...].

The simplest just interval ratio is that of a unison having a ratio of 1/1. The ratio of a semitone or half step in equal temperament is which is not a just interval because the does not belong to the set of natural numbers. The ratio of an octave is 2/1 which is a just interval in which the upper note is expressed by the number two and the lower note is expressed by the number one. The ratio 2/1 not only indicates the frequencies but it also indicates the location of the coincident partial of the interval. In this case the second partial of the bottom note is matched to the first partial of the top note. The ratio 4/2 is also a ratio of an octave but of different type indicating that the fourth partial of the bottom note is matched to the second partial of the top note and that the ratio of the fundamental frequencies is 4/2.

Here is where the problem arises that separates from the theoretical model. A 42 octave in a

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000  76 LBL     041  32 INV     081  75  -     121  94 +/-     161  95  =     201  13  C
001  11  A      042  45 Y^x     082  53  (     122  66 PAU     162  91 R/S     202  53  (
002  42 STO     043  01  1      083  53  (     123  65  x     163  76 LBL     203  53  (
003  01  01     044  02  2      084  43 RCL     124  05  5     164  18 C'      204  43 RCL
004  76 LBL     045  54  )      085  03  03     125  95  =     165  11  A      205  00  00
005  12  B      046  45 Y^x     086  65  x     126  91 R/S     166  43 RCL     206  65  x
006  53  (      047  53  (      087  04  4     127  16 A'      167  01  01     207  06  6
007  02  2      048  43 RCL     088  54  )     128  76 LBL     168  85  +     208  54  )
008  22 INV     049  02  02     089  54  )     129  17 B'      169  09  9     209  54  )
009  45 Y^x     050  75  -      090  95  =     130  11  A      170  54  )     210  75  -
010  01  1      051  01  1      091  58 FIX     131  43 RCL     171  13  C     211  53  (
011  02  2      052  54  )      092  01  01     132  01  01     172  53  (     212  53  (
012  54  )      053  65  x      093  94 +/-     133  85  +     173  53  (     213  43 RCL
013  45 Y^x     054  53  (      094  91 R/S     134  07  7     174  43 RCL     214  03  03
014  53  (      055  02  2      095  15  E     135  54  )     175  02  02     215  65  x
015  43 RCL     056  07  7      096  76 LBL     136  13  C     176  65  x     216  05  5
016  01  01     057  93  .      097  15 A'      137  53  (     177  03  3     217  54  )
017  75  -      058  05  5      098  11  A      138  53  (     178  54  )     218  54  )
018  01  1      059  54  )      099  43 RCL     139  43 RCL     179  54  )     219  95  =
019  54  )      060  95  =      100  01  01     140  00  00     180  75  -     220  58 FIX
020  65  x      061  42 STO     101  85  +     141  65  x     181  53  (     221  01  01
021  53  (      062  03  03     102  05  5     142  03  3     182  53  (     222  94 +/-
022  02  2      063  92 RTN     103  54  )     143  54  )     183  43 RCL     223  91 R/S
023  07  7      064  76 LBL     104  13  C     144  54  )     184  00  00     224  19 D'
024  93  .      065  15  E     105  53  (     145  75  -     185  65  x     225  76 LBL
025  05  5      066  11  A     106  43 RCL     146  53  (     186  05  5     226  10 E'
026  54  )      067  43 RCL     107  00  00     147  53  (     187  54  )     227  11  A
027  58 FIX     068  01  01     108  65  x     148  43 RCL     188  54  )     228  91 R/S
028  03  03     069  85  +      109  04  4     149  03  03     189  95  =     229  13  C
029  95  =      070  04  4      110  54  )     150  65  x     190  58 FIX     230  53  (
030  42 STO     071  54  )      111  75  -     151  02  2     191  01  01     231  53  (
031  00  00     072  13  C      112  53  (     152  54  )     192  91 R/S     232  43 RCL
032  92 RTN     073  53  (      113  43 RCL     153  54  )     193  76 LBL     233  00  00
033  76 LBL     074  53  (      114  03  03     154  95  =     194  19 D'      234  65  x
034  13  C      075  43 RCL     115  65  x     155  58 FIX     195  11  A      235  08  8
035  42 STO     076  00  00     116  03  3     156  01  01     196  43 RCL     236  54  )
036  02  02     077  65  x      117  54  )     157  94 +/-     197  01  01     237  75  -
037  76 LBL     078  05  5      118  95  =     158  66 PAU     198  85  +     238  53  (
038  14  D      079  54  )      119  58 FIX     159  65  x     199  03  3     239  43 RCL
039  53  (      080  54  )      120  01  01     160  05  5     200  54  )     240  00  00
040  02  2
```

piano cannot have its fundamental frequencies in an exact 4/2 ratio. A deviation from our theoretical model occurs due to the inharmonicity factor. We must change our previous definition of a just interval in order for it to be a useful vernacular for piano technicians. We need only use it in the sense which indicates the status of the coincident partials since we have no real need of concerning ourselves with the frequency of the fundamentals in actual tuning practice.

In the piano, due to the inharmonicity factor we will often find just intervals of a particular type such as the 42 which will be virtually exclusive of all other octave types. For example, C3C4 tuned just as a 42 octave can exclude the other octave types such as the 63 or 84 from being just. Beats at these levels of coincident partials will be an aural indication of this fact. We will fall short of providing our position emphatically without the use of an additional note that has as one of its partials the coincident partial of the note being proved.

Our additional note can be adjusted; set up or down to facilitate its use as a reference note by producing beats from two to eight per second. If the beat rate is too slow, we cannot be sure of its movement and we are no better off than we were just listening for the absence of beats in the just intervals.

Equal Beating Theorem

An Interval having a set of coincidental partials tuned at the same frequency will have two intervals formed from one additional note which will beat equally in comparison. The two intervals will have the same coincidental partials as the interval being proved.

Proof

1. Choose any interval: example: C3-A3

2. Determine the coincidental partials:

	partials						
interval	C3	C3	C4	C5	(E5)	G5	A♯5
	A3	A3	A4	(E5)	A5	C♯6	E6

coincidental partial: E5

3. Find one additional note that forms an interval using the same coincidental partial: additional note which has E5 as one of its partials: E3

4. Compare the beat rates of the two intervals formed from the additional note.
Original interval: C3A3
Additional note: E3
Two intervals formed from the additional note: C3-E3, E3-A3.
C3-E3 will beat at an equal rate as E3-A3 when the interval C3-A3 is tuned just.

It is common practice to apply this same principle we find in the equal beating theorem to set the pitch of the piano to a standard such as the tuning fork. Our goal is to match the first partial of A4 to the first partial of the fork and in effect tune a 1-1 unison. We need an additional note that has as one of its partials A4. The chart below indicates five of the possibilities.

Partial #	Note	Partials			
1	A4				
2	A3	A4			
3	D3	D4	A4		
4	A2	A3	E4	A4	
5	F2	F3	C4	F4	A4

Since we need some point of reference other than the note we are tuning, then the first possibility we naturally exclude. The second choice is of some help but only if it is far enough away to produce a countable number of beats. Using A4 is also in the true sense of the word handy, in that we need only one hand to play the additional note simultaneously with the note being tuned, with the other hand free to manipulate the note being tuned. One pitfall in the use of our second choice, is the presence of the octave doubling of the partials i.e. A3-A4 have another set of coincident partials at the A5 level. Particular care must be taken not to confuse the two sets of partials. It is for this reason that our most common additional note is F2.

Here is a step by step method that can serve as a example of how to solve the problem of which test to use. We choose our interval, in this case F2-F3. We begin by making a chart showing the partials of each note. *(Figure 1, bottom of page).*

We show pairs of coincident partials with connecting circles. We determine the octave type and its coincident partial. The first circled frequency of the bottom note is under the column headed by the partial number two. This frequency is found in the upper note under the column for partial number one. Thus:

Interval	Type	Coincidental Partial
F3F2	2-1 Octave	F3
	4-2	F4
	6-3	C5
	8-4	F5
	10-5	A5
	12-6	C6
	14-7	D♯6

If we wish to verify 105 octave type, our coincidental partial would be A5. Using the Equal Beating Theorem our next step is to list the notes that have A5 as one of its partials.

As its first	A5					
second	A4	A5				
third	D4	D5	A5			
4	A3	A4	E5	A5		
5	F3	F4	C5	F5	A5	
6	D3	D4	A4	D5	F♯5	A5
7	B2	B3	F♯4	B4	F♯5	F♯5;A5

Figure 1

Partial #	1	2	3	4	5	6	7	8	10	12	14
	(F3)	(F4)	(C5)	(F5)	(A5)	(C6)	(D♯6)	F6	A6	C7	D#7
Octave	F2	(F3)	C4	(F4)	A4	(C5)	D♯	(F5)	(A5)	(C6)	(D♯6)

We can use any of these notes as our additional or reference note. Albert Sanderson suggests that the most convenient way to classify the tests is to use the numbers of the octave type plus the partial number of the additional notes, for example 10-6-5. Where ten refers to the tenth partial of the bottom note, five to the fifth partial of the top note and six to the sixth partial of the additional note which in this case is between the note represented by 10 and the one represented by the number five. This note would be D3 which is a minor third below the top note.

Octave type 10-5
10-6-5
major sixth 10-6
minor third 6-5

We can add any number to the 10 and 5 to come up with a different test, e.g. 10-7-5. Referring to the chart again we find that B2 is the note that has as its 7th partial A5. Therefore, we may say that if F2-F3 is a just 10-5 octave, then F2-B2 will beat at the same rate as B2-F3.

There is a theory in acoustics which is called format theory which is an attempt to understand how we perceive and discriminate between sound qualities. Earlier it was Helmholtz who stated that vowel sounds in human speech were discerned by a rather rapid unconscious process in which the listener perceives the relative strengths of partials. Formant theory suggests that lacking other markers of sound such as attack and decay, we identify sounds by perceiving areas of frequency accentuation called formants. These areas are accentuated in general within and are a specific characteristic to the instruments producing the sound regardless of the fundamental pitch. In the case of a vowel sound like "e" it would have a certain resonance or formant region regardless of the fundamental pitch.

When choosing which interval type to tune or favor, compromise the interval types that have coincidental partials in the fifth octave of the piano. This is no hard fast rule, but rather something that is believed to be by the author the method that would produce the most desirable outcome. Unfortunately, I have no published studies to reference my opinion to. What I do have is the practical experience of tuning and being aware of these principles and it is from this that I conclude that the formant regions in the piano can be found in octave five, part of octave two, a range in octave seven, and in smaller pianos such as spinets and consoles the range from F4-B4. That the focus of pitch in the piano is in octave five is quite evident from the fact that when we examine current practice of setting temperament, we find the majority of temperaments are set in the third octave but use partials in octave five. We listen for rising thirds, fourths, fifths, sixths, tenths, all in octave five. Any partials above octave five are too short lived in pitch duration to be useful.

In determining how are F2-F3 octave might be tuned, we use the octave five rule and determine which of our types fall within the scope of the fifth octave. Three types will need to considered, the 6-3, 8-4, and the 10-5. Since the 6-3 is barely within the range of the fifth octave, we need not give it too much weight other than determining that it is greater than just. Octave types will progress just as all intervals will in the piano. A particular type of octave will progress gradually from narrow to just to wide as we move down in the bass. Generally, in the range of the piano in which we are examining, it is safe to assume that the 6-3 will be greater than just. We use the equal beating test to verify this. For example we might find in our 6-5 test that the 6-5 interval is beating more slowly than the 5-3 interval, thus proving that the 6-3 interval is just. Assuming that our 5-3 interval is wide, then we are able to say that the 6-3 interval is greater than just.

Next we must determine the status of the 8-4 and the 10-5 octave for our interval F2-F3 using the aforementioned procedure. If we wish to look at the 8-4 interval we might choose the 8-5-4 test. If we wish to look at the 10-5 interval we might try the 10-7-5 or the 10-5-4 test. Of course, all this seems fine in theory but can we actually use these tests? It is often the case that the 8th partial in the bass cannot be heard due to the striking position of the hammer effectively blocking the sounds of this partial. If this is true, then we would need to compromise only between the 10-5 and the 6-3 interval types. Otherwise we would want our interval to be just or greater than just at the 8-4 level and less than just at the 10-5 level. If we were to listen to the 12-6, we would most likely find it quite narrow. We tune chromatically down in the bass eventually moving closer and closer, finally achieving a just 10-5 octave type and an increasingly less narrow 12-6.

The inharmonicity factor tends to rise rather abruptly in smaller pianos especially when we reach the single wound strings. The fourth octave partials that are found in octave one do not decrease in amplitude in smaller pianos, thus forcing us to make compromises along the partials in octave five. In larger pianos such as seven- and nine-foots, the lowest notes can be obtained by tuning just 14-7 octaves which is a matter of preference. Octave types beyond 14-7 are of little use since partials above 14 tend to crowd closer and closer together, e.g. 15 and 16 are so close together that it is nearly impossible to discern from which partial pairings beats come. The Equal Beating Theorem provides us with any and all tests for just or near just intervals in the piano.

Our thanks again to Dr. Sanderson for his piano tuning data, to Kerry Nicholson for his beat rate program, and to Michael Wathen for his submission. Please send tuning related material to me:

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TEMPERAMENT TESTS

An Encyclopedia Of Tests For Equal Temperament, Part 4

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In the three preceding installments of this series 50 aural temperament tests were presented in some detail, with explanations of how they work and how they are interrelated. This month's article is in the nature of an appendix, to show how the tests can be incorporated and used in an actual tuning sequence.

A well-tuned piano implies not a set of 88 independent pitches, but a complex network of tuned intervals. Each note is linked in both directions with more than a dozen other notes by thirds, fourths, fifths, sixths, octaves, tenths, and so forth. It is these intervals, not the notes, that are tuned. To construct this network expeditiously, the first few notes of the temperament sequence should generate as many tuned (and testable) intervals as possible. While many different note sequences for constructing an equal temperament exist, one that permits many tests early in the sequence is preferable. Contiguous thirds and the "both ways

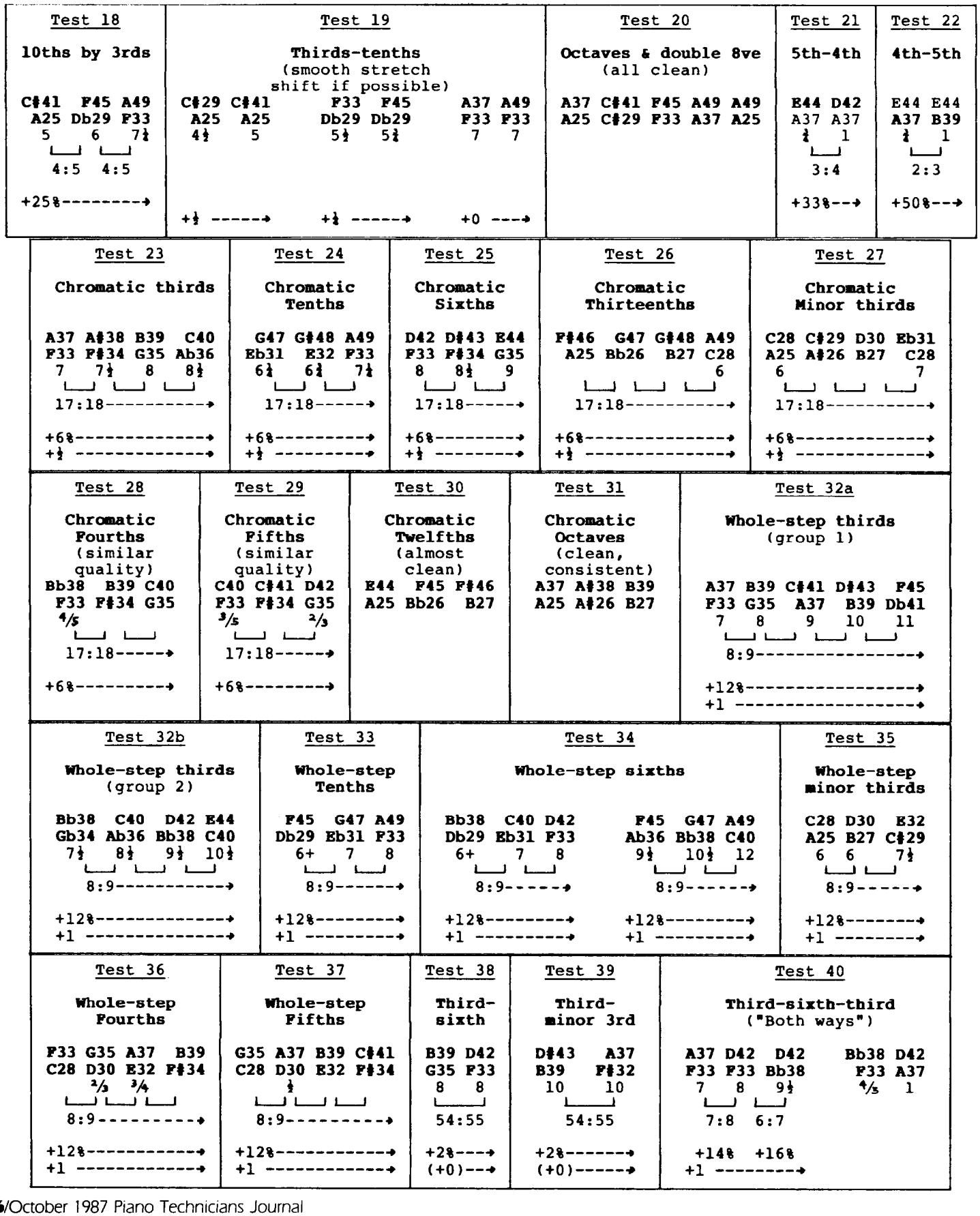
KEY	Test 0	Test 1	Test 2	Test 3	Test 4	Test 5
Test:	Fork-17th	Octaves and double 8ve	Third-tenth	Third-tenth-seventeenth	Third-tenth-sixth	Minor third-sixth (6-3
Comments:	(exactly the same)	(stretched yet clean)	(4-2 octave; 10th not slower)	(tenth intermediate)	(tenth intermediate)	octave; 6th not slower)
Upper note:	fork **A49**	**A49 A37 A49**	**A25 A37 A37 A49**	**A25 A37 A49**	**E32 E44 A37**	C28 **A37**
Lower note:	F21 F21	**A37 A25 A25**	F21 F21 F33 F33	F21 F21 F21	**C28 C28 C28**	**A25** C28
Beats/sec.:	(4) (4)	(0) (0) (0)	3½ 4 7 7 (7½)	3½ 4 4½	5 5+ 6	6- 6
Beat ratio:	1:1					
Increase by %:	+0%----→					
in b./s.:	+0 ----→			(+½)------→		

Test 6	Test 7	Test 8	Test 9	Test 10	Test 11	Test 12	Test 13
3rd-m3rd-6th (minor 3rd intermediate)	**4th-5th** (5th not faster)	**5th-4th**	**3rd-6th** (tests 4th)	**6th-3rd** (tests 4th)	**Combination of tests 9 & 10** (tests 4th)	**3rd-m3rd** (tests 5th)	**10th-6th** (tests 5th)
C♯29 C28 A37	D42 **A49**	**E44 A49**	**A37 D42**	**F♯46 F♯46**	**A37 D42** F♯46 F♯46	**E32** C28	**E44 A37**
A25 A25 C28	**A37** D42	**A37** E44	F33 F33	**A37 D42**	F33 F33 **A37 D42**	C28 **A25**	C28 C28
4½ 6- 6	1 1	½ 1½	7 8	10 11½	7 8 10 11½	5 6-	5+ 6
		1:2	7:8	6:7	7:8 6:7	7:8	7:8
			+14%--→	+16%----→	+14%----------→	+14%--→	+14%--→
			+1 ----→	+1 -----→	+1 ----------→	+1 ----→	+1 ----→

Test 14	Test 15	Test 16	Test 17
Contiguous thirds	**Contiguous minor thirds**	**Contiguous fourths** (2 series link notes from Test 14)	**Fifths**
C♯29 F33 A37 C♯41 F45 A49	**C28 E♭31 F♯34 A37**	**D30 G35 C40 F45 F♯34 B39 E44 A49**	**D42 A49**
A25 D♭29 **F33** **A37** D♭41 **F45**	**A25** C28 D♯31 **F♯34**	**A25 D30 G35 C40** C♯29 **F♯34 B39 E44**	**G35** D42
4½ 5½ 7 9 11 14	6 7 8½ 10	½ 9/10 3/5 1½	2/3 1
4:5 4:5 4:5 4:5 4:5	5:6 5:6 5:6	3:4 3:4 3:4 3:4 3:4 3:4	2:3
+25%----------→	+20%----------→	+33%----------→	+50%--→

from the middle" pattern (examples of which are shown in tests 14 and 40 respectively) are therefore among the best ways of starting a temperament. The straight "fourths and fifths" pattern is less efficient because several important intervals and tests do not become available until late in the sequence.

Even more important than the choice of an efficient, economical tuning sequence, however, is the constructive exploitation of all the intervals which are generated by



each new note in the sequence. The tuner needs to remain continually aware of all these intervals and how to test each of them, either with untuned test intervals, or by comparison with intervals tuned previously.

Figure 1 assembles the tests in their entirety for reference; Figure 2 shows a sample temperament in chart form which meets the above requirements. The particular sequence, which combines a two-octave foundation of contiguous thirds with a series of "both ways from the middle" patterns, is the one I use currently. It is presented here as an example of how tests are made an integral part of the tuning procedure, not as an endorsement of a specific temperamnet sequence.

In Figure 2 the intervals, together with their relevant tests, are given for each note. How many tests need to be used depends on the inharmonicity and tonal clarity of the piano; normally I use about half of the ones listed, but if difficulties arise other tests can always be drawn upon. If you follow the chart step-by-step, perhaps playing the intervals on a tuned piano, the principles of using tuned intervals and available tests to best advantage will become readily apparent.

The tuning sequence itself consists of three stages. In Stage 1, the octave and double octave are tuned down from A49 to A25, checked with third-tenth, minor third-sixth and third-tenth- seventeenth tests, and are then filled in with a series of contiguous thirds. Usually it is easier to tune the lower thirds first, since the beat rates are slower in the tenor. The C♯ and F octaves are checked and used as a guide for correcting any errors in the contiguous thirds. The completed series of thirds is checked with progression of tenths (Test 18).

Stage 2 is an F-to-F temperament based on thirds, sixths and fourths. The notes to be tuned can be divided into groups of three, each group forming a descending series of contiguous thirds: D-B♭-Gb, D♯-B-G, and E-C-A♭. I often place the notes initially by fourths and fifths and then use the tuned chromatic thirds and sixths as checks, but it is just as easy to do the converse. The first few fourths and fifths should be checked with Tests 9, 11, or 13; these tests are often easier to hear if one plays the test note once and then plays the other two notes alternately while holding the test note. Before group 3 is tuned, the notes of group 1 and 2 should be adjusted so that the progression of the thirds by whole steps (Test 32) is perfectly even; this should improve other intervals simultaneously. Contiguous fourths (Test 16) are particularly useful for setting E44 and C40 in group 3.

Stage 3 extends the temperament outwards to A25 and A49. If the F-to-F section has been done carefully, the remaining few notes usually fall into place easily. Whole-step sixths (Test 34) are especially helpful for placing G47, E♭31 and B27. If there are problems with chromatic thirds and sixths, slight adjustments in the F-to-F section usually improve the entire temperament. The most important final checks are the progressions of chromatic thirds, sixths and tenths; on a good, stable piano these should not be omitted, and the progressions should be as smooth as possible.

Tests are thus most effective when use as an integral part of the tuning procedure. In this way the frustration, not to mention the time, expended in going back over to correct the temperament is minimized if not eliminated. With an even, well- checked temperament, the rest of the piano becomes easier to tune, and ultimately more enjoyable to play and hear.

Test 41

Third-sixth-third

A37	D42	C♯41	D42
F33	F33	A37	A37
7	8	9	1

7:8 10:11

+14¢ +10¢
+1 ——————→

Test 42

Third-minor third-third

C♯41	A37	F45
A37	F♯34	Db41
9	10	11

7:8 10:11

+14¢ +10¢
+1 ——————→

Test 43

Third-third-sixth

A37	Bb38	D42
F33	Gb34	F33
7	7½	8

17:18 13:14

+6¢ +8¢
+½ ——————→

Test 44

Sixth-sixth-third

D42	D♯43	C♯41
F33	F♯34	A37
8	8½	9

17:18 24:25

+6¢ +4¢
+½ ——————→

Test 45

Thirds-tenths
(similar stretch if possible)

C♯29	C♯41	D30	D42	D♯31	D♯43
A25	A25	Bb26	Bb26	B27	B27

Test 46

Minor thirds - sixths
(similar stretch if possible)

C28	C40	C♯29	C♯41	D30	D42
A25	A25	A♯26	A♯26	B27	B27

Test 47

Thirds-sixths
(consistent fourths)

C♯29	F♯34	D30	G35	D♯31	G♯36
A25	A25	Bb26	Bb26	B27	B27

7:8 7:8 7:8

+14¢——→ +14¢——→ +14¢——→
+1 ——→ +1 ——→ +1 ——→

Test 48

Tenths-sixths
(consistent fifths)

C♯41	F♯34	D42	G35	D♯43	G♯36
A25	A25	Bb26	Bb26	B27	B27

7:8 7:8 7:8

+14¢——→ +14¢——→ +14¢——→
+1 ——→ +1 ——→ +1 ——→

Seventh chord tests:	**Test 49**			**Test 50**		
	Seventh chords in third inversion (clear vibrato)			**Seventh chords in second inversion** (clear vibrato)		
Comments:						
Notes (played together):	**D42**	**Eb43**	**E44**	**D42**	**D♯43**	**E44**
	B39	**C40**	**C♯41**	**Bb38**	**B39**	**C40**
	G35	**Ab36**	**A37**	**Ab36**	**A37**	**Bb38**
	F33	**Gb34**	**G35**	**F33**	**F♯34**	**G35**

Figure 2: Sample Temperament Sequence

Notes tuned:	Intervals tuned:	Tests available:
Stage 1: Contiguous thirds over two octaves		
A49	17th test F21-A49	Test 0
A37	Octave A37-A49	Tests 2,7
A25	Octave A25-A37	Tests 5,2
	Double 8ve A25-A49	Tests 1,3
C♯29, F33, C#41, and F45		
	Thirds A25-C♯29-F33-A37-C♯41-F45-A49	Test 14
	Octaves C29-C341 and F33-F45	Tests 19,20
	Tenths A25-C♯41, D♭29-F45, and F33-A49	Test 18
Stage 2: F33 to F45 temperament based on "both ways from the middle" method (thirds and sixths)		
Group 1:		
D42	Sixth F33-D42	Test 41
	Fourth A37-D42	Tests 11, 7
	Fifth D42-A49	Tests 13, 7
B♭38	Fourth F33-B♭38	Tests 11, 7
	Third B♭38-D42	Tests 40, 23
	Fifth B♭38-F45	Tests 13, 7
F♯34	Fourth C♯29-F♯34	Tests 11, 7
	Minor 3rd F♯ 34-A37	Test 42
	Third F♯34-A♯38	Tests 43, 14
	Fifth F♯34-C♯41	Tests 13, 7
Group 2:		
D♯43	Sixth F♯34-D♯43	Tests 44, 25
	Fourth A♯38-D♯43	Tests 11, 16
B39	Fourth F♯34-B39	Tests 11, 28
	Third B39-D♯43	Tests 32a, 39, 40, 23
G35	Third G35-B39	Tests 32a, 38, 23, 14
	Fifth G35-D42	Tests 13, 29
Group 3:		
E44	Sixth G35-E44	Tests 34, 38
	Fifth A37-E44	Tests 8, 13, 22
	Fourths C♯29-F♯34-E44-A49	Tests 16, 11
C40	Fifth F33-C40	Tests 8, 13
	Fourths G35-C40-F45	Tests 16, 11
	Third C40-E44	Tests 40, 23
A♭36	Minor 3rd F33-A♭37	Test 39
	Third A♭36-C40	Tests 23, 32b, 38, 40
	Fourth A♭36-D♭41	Tests 8, 21, 11
	Fifth A♭36-E♭43	Tests 21,22, 13
	Sixth A♭36-F45	Tests 38, 25
Check entire F33-A45 section		Tests 32a, 32b, 23, 25, 28, 29, etc.
Stage 3: Completion		
D♯31 and B27		
Thirds		Test 32
Sixths		Test 34
Fourths and fifths		Test 21
E32, D30, C28, and B♭26		
Thirds		Test 23
Sixths		Test 25
Minor thirds		Test 27
Fourths & fifths		Test 21
F♯46 and G♯48		
Sixths		Test 25
Tenths		Test 24
Fourths & fifths		Test 22
Final Check		Tests 23, 24, 25, 30, 31, 45-50, etc.

AT
LARGE

The Effectiveness of A Humidity Control System Within A Piano

Robert W. Mair
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Dampp-Chaser Electronics Corp.

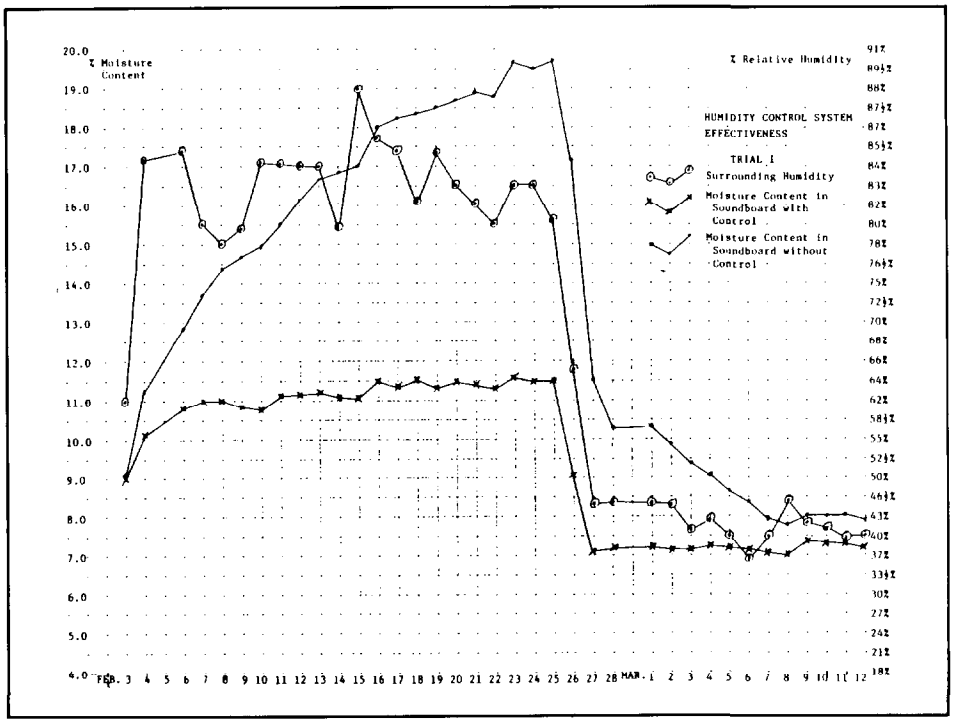
Those associated with the piano industry have recognized that changes in climactic conditions, i.e., temperature and humidity, have considerable effect on piano pitch, performance and longevity. Simply stated, the piano soundboard and other critical wood parts grow with increases in humidity and contract with decreases in humidity. The strings tighten and relax as the expansion and contraction process takes place.

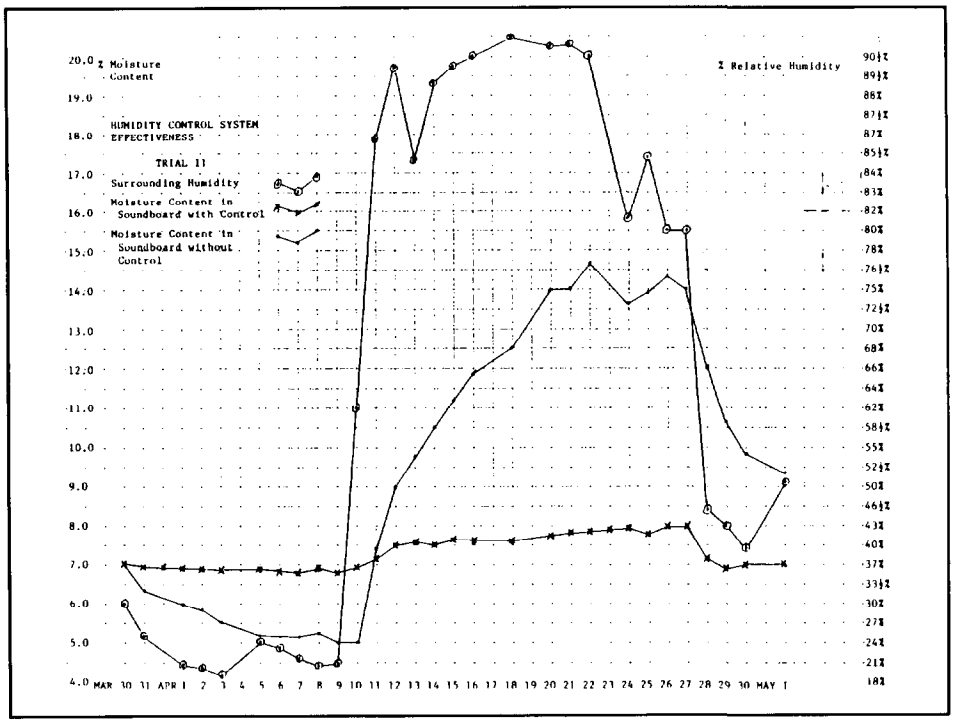
Over the years, efforts have been made to artificially control the humidity within which a piano must operate. These have ranged from light bulbs to chemicals, and finally resistance heaters. However, just reducing the humidity level can produce the harmful effects of excess dryness during the winter season. Therefore the more effective approach has been to develop a system that stabilizes the humidity, i.e. prevents excesses in either dampness or dryness. Such a system contains both a dehumidifier and a humdifier, along with a humidistat that turns each on or off at the desired level of humidity. These systems have been available for a number of years and are used extensively by many technicians. However, this response has been based almost entirely on the experience of the technicians observing the effect of such a system on the piano and its performance.

There has been little scientific evidence provided to document how this result is achieved. This article describes the results of two tests made that begin to provide such scientific documentation.

> "The trials were initiated . . . to provide data to measure the effectiveness of a humidity control system on a piano soundboard during periods of high and low humidity and during changes from high to low and back."

The trials were initiated as stated, to provide data to measure the effectiveness of a humidity control system on a piano soundboard during periods of high and low humidity, and during changes from high to low and back. The area in which the ambient humidity could be controlled for this purpose was a room which had been essentially sealed to contain the specific humidity levels used to test other product components. It had been used for some years for this purpose and it, the humidity generating equipment, dryers and instrumentation proved to be reliable. Two identical cases reasonably similar dimensionally (50 inches long by 30 inches high by 12 inches deep) to the cavity of a large vertical piano were built. These had a cutout in the front that was replaced with plexiglass so that the contents as well as whatever action was taking place could be seen. A section of a piano soundboard was installed in each case with one end bolted to, but shimmed away from, the back of the case. Probes from a Delhorst

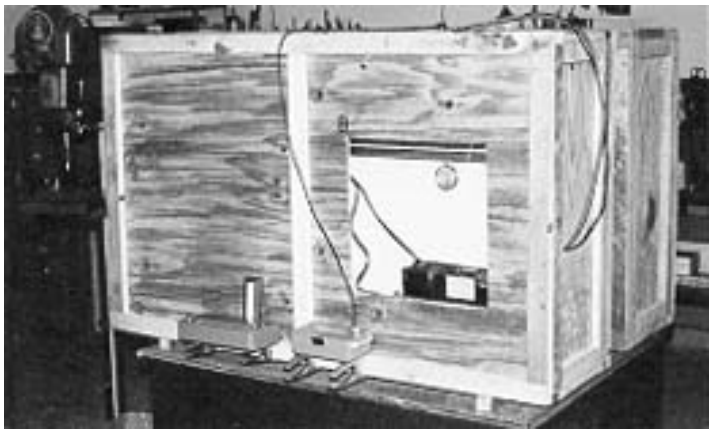


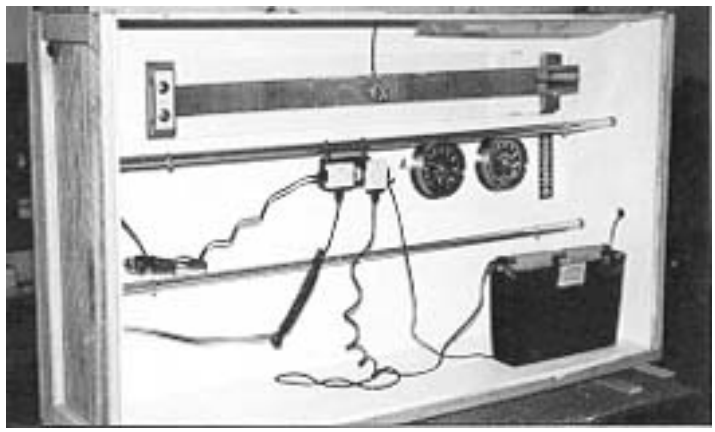


Moisture Detector were inserted into the center of each soundboard. Two nylon band hygrometers and a room thermometer were added to each case. A humidity control system, in the form described above, was installed in one of the test cases. The second case, used as a control, was identical except that it had no humidity control system. Figures one and two show the case with the assembled humidity control equipment.

Trial I was begun on Feb. 3, 1987. The objective was to compare the moisture content of the portion of the soundboard in the case with the humidity control system to that in the case without humidity control while the humidity of the surrounding area was raised to a high level. The graph entitled Trial I describes these results. The ambient humidity levels employed in Trial I and Trial II were not designed to represent the climactic conditions of any particular area of the country or any specific season of the year. The high levels probably approach those one might find in some areas during the summer. The low levels, however, probably don't go as low as those found in some northern homes during the heating season.

With the test room running a humidity level of 84/85 percent, both cases showed an increase in moisture content. The one without humidity control eventually went to 19.7 percent. For the temperature and humidity in the room, this was equilibrium.* The soundboard was giving off as much water as it was absorbing. The soundboard in the case with humidity control went to 11.5 percent moisture content. It was evi-





dent that the power level of the dehumidifier at 25 watts was not sufficient to produce a lower level. The important point here is that the non- humidity-controlled case went to a moisture content 70 percent above the case with the humidity control. These comments are relative to the first 22 days of the trial, during which the ambient humidity was raised to a high level.

When the humdity was dropped to normal, as noted from the graph, the moisture content of both soundboards dropped. In the case of the humidity-controlled unit, it dropped immediately to 7.0/7.3 percent and held at this level the next 13 days. Both the humidifier and the dehumidifier were observed to be operating alternately during this period. The moisture content of the soundboard in the non-humidity-controlled case took 10 days to reach equilibrium at eight percent. That it was eight percent was solely the results of the room running pretty much at 40 percent relative humidity during this period.

If the room had been a higher relative humidity, the moisture content in this board would have been higher.

Trial II was run with some refinements and the addition of a period with humidity lower than normal. The major refinement was the addition of more dehumidification power in the form of another 25-watt dehumidifier unit.

This test was begun on March 30th and, as noted from the graph entitled Trial II, the room humidity was immediately dropped to 20 percent. The moisture content of the soundboard in the case without humidity control dropped over a period of six days to five percent. The soundboard in the other case started at seven percent moisture content and dropped to 6.8 percent over the same period.

In the high humidity part of Trial II, the ambient relative humidity was raised to 89.5 percent. The experiment provided pretty much the same results as Trial I except that with the power of two 25-watt units, the moisture content of the soundboard in the humidity-controlled case increased from the beginning level of seven percent to only eight percent over the 18-day period April 10 to April 27. The soundboard in the case without active humidity control increased to 14 percent over this same period. The writer believes that it would have gone to equilibrium (19 percent) as in Trial I, had sufficient time in the test room been available.

The results described above were developed without thought to fine-tuning the location of the various system components to provide the ultimate feedback to the humidistat. Future experiments will cover this aspect as well as testing of grand piano configurations and will be reported later.

As for now, however, these efforts provided test data that shows the humidity control system produces an environment that yields a reasonably even moisture content (6.8 to eight percent) in piano soundboards. This contrasts with variations from five to 19 percent moisture content in the soundboards of pianos not so equipped.■

** The soundboard sections used for Trials I and II were not the same. The Trial I specimen was furnished by Don Valley of Valley Piano, Spartanburg, S.C., and that used for Trial II was supplied by Webb Phillips of Allied Guild, Hatboro, PA. It is believed that the Trial I section was of a species that permitted a higher equilibrium moisture content than the humidity moisture content relationship of the scales on the graph would indicate.*

The First Pianos In Great Britain

Jack Greenfield
Chicago Chapter

Outstanding Harpsichords Built Before Pianos

While the German and Viennese piano building crafts of the late 18th century had much in common, the development of the instrument and the establishment of an industry for its manufacture followed an entirely different independent path in Great Britian. The German instrument makers migrated and helped start piano making in Great Britain in the 1760s were mainly from Saxony. These were craftsmen trained in the methods of Gottfried Silbermann who had kept alive and carried forward the original principles of the jack action of Cristofori. Jack actions with various modifications became firmly established in England and were referred to as English actions. English builders showed no interest in bumping actions although they were widely accepted in Germany after Stein's introduction of an escapement design in the 1770s and then later in Vienna with further improvements.

In spite of a late start, by the end of the 18th century, English builders were competing with German and Viennese builders for leadership in design and production. One of England's major advantages was its flourishing harpsichord business during the middle of the century. Harpsichord design reached its most advanced stages in England then. England had been the last of the major European countries to achieve eminence in harpsichord building, largely through the outstanding work of Burkat Shudi and Jacob Kirkman.

The spectacular rise of keyboard instrument building in England began at the start of the 18th century. At that time there were probably no more than a dozen builders of keyboard instruments in London, a city with a population of about 600,000. The Hitchock family were well-known as builders of fine spinets. The best harpsichord builders of Europe were then considered to be the Blanchet family of France. With the termination of the famous Ruckers-Couchet business and for various other reasons, Flemish keyboard instrument making had declined rapidly after leadership through most of the preceeding century.

Around 1700, Herman Tabel, a Flemish builder, moved to London and some time later he established a shop there. It is known that he was trained in Antwerp but whether or not he studied with the last of the Couchets is uncertain. The authenticity of the one harpsichord with his signature still in existence has been questioned. Very little is known about Tabel. The main reason for interest in his work is that he trained Shudi who worked for him during the 1720s and Kirkman who worked for him during the 1730s. Existing examples of Shudi and Kirkman harpsichords have a close resemblance to the single harpsichord with Tabel's name. Both men went on to success in their own businesses and between them dominated harpsichord making in Great Britain. Shudi's firm remained on top and became the leader in piano manufacturing under the direction of his later partner and successor, John Broadwood.

Shudi, or Tschudi as spelled by his parents in Switzerland, was born in 1702 into an upper-class family. He was taught cabinet

making by an uncle and at the age of 16 he emigrated to London. After earlier employment elsewhere, he went to work for Tabel during the early 1720s. By 1729, he had gotten married and had left Tabel to start his own business. He offered instrument tuning and repair service in addition to selling instruments that he built.

Shudi was fortunate to meet and form a friendship with George Frideric Handel who made London his home after becoming a British citizen in 1727. Handel, as director of the Royal Academie of Music helped Shudi meet members of the nobility. His business expanded rapidly and by the 1740s, he had become quite wealthly. One of Shudi's most prominent clients was Frederick, Prince of Wales, who purchased a two-manual harpsichord in 1740. Shudi then continued to provide regular tuning service. A copy of a page of an account in *Broadwood By Appointment* by David Wainwright (Quiller Press, London 1982) shows that from December 11, 1750, to March 12, 1751, Shudi tuned for the Prince at intervals of from three to seven days. There were seven instruments at different locations. The usual fees for tuning were five shillings for harpsichords and two shillings and six pence for spinets. Also listed in the account record showed Shudi had tuned a harpsichord for the Earl of Bristol seven times in one year.

Shudi encountered no serious competition during the early years of his business. This changed after the death of his former employer, Tabel, in 1738. Kirkman, 28 years old, an Alsatian immigrant who had started to work for Tabel in the early 1730s, now married his widow and took over his shop. Kirkman also developed into a fine builder and smart businessman and it did not take him long to match the success of Shudi. By mid-century, both makers were producing most of the harpsichords sold in England. John Hitchcock and a number of minor makers built mainly spinets. Shudi and Kirkman built louder and longer instruments, often as much as nine feet long, with overall workmanship better than in most instruments built anywhere else. Continental harpsichords were rarely made over seven feet long.

"The usual fees for tuning were five shillings for harpsichords and two shillings and six pences for spinets."

Although Kirkman acquired an appointment as "Harpsichord Maker to the King" (George II) and passed Shudi in total sales, Shudi maintained his own following among the nobility and he continued to prosper. Shudi's production rate during the years 1750-1769 has been estimated as 15 annually. Shudi made nothing but the finest instruments that he could. Kirkman was more commercial.

The Start Of John Broadwood's Career

John Broadwood, who became Shudi's partner, son-in-law and successor, started to work for Shudi in September, 1761. Broadwood was born in 1732 in a small town near Edinburgh. His father, who earned a good living as the village carpenter, taught him the crafts of carpentry and cabinet-making. Because of the limited opportunities in the village, Broadwood departed for London. He had a letter of introduction from an influential wealthly landowner that enabled him to join the prospering Shudi workshop as an apprentice. He proved to be a talented craftsman and within a few years, he was trusted with some of the most important projects in the shop.

Introduction Of The Piano Into England

Broadwood's career as an instrument maker began about the same time as piano building was being started in England. Information on earlier pianos in England is vague. In an article written in 1805 for *Rees's Encyclopedia,* Burney stated that while in Italy in 1711, an English monk, Father Wood, was supposed to have built a piano, evidently a copy of an early Cristofori design. Later, during the 1750s Samuel Crisp, gentleman and author, was supposed to have bought this instrument in Rome and taken it back to England. There, at least one builder tried unsuccessfully to build a similar instrument. Although Burney is a generally reliable authority, there are no records or other evidence to support this story. An account of a later piano appears more authentic. In 1775, Rev. William Mason wrote his friend Thomas Gray, the Cambridge professor and poet, that he had bought a square pianoforte in Hamburg. It is presumed that he brought the piano back to England. He showed so much enthusiasm after his return, that some writers believed he had designed the instrument himself.

Around 1760, German instrument makers from Saxony emigrated to London to avoid the conflict of the Seven Years war (1756- 1763). A Dutch builder, Americus Backers, also settled in London around this time. References do not make it clear whether or not Backers had also left employment in Saxony. According to a recent article "The Early Piano in Britian Reconsidered" by Warwick Henry Cole in *Early Music* (November, 1986), no more than a half dozen instrument makers left Germany to come to work in London during the 1760s. There are no records to confirm that a group of 12 arrived together as stated in many references. Among the men who came, some trained as apprentices in the Silbermann shop in Freiburg.

After he arrived in 1760, one of the immigrants, Johannes Zumpe, found employment with Shudi. It is likely that Broadwood first learned about pianos while he and Zumpe were co-workers for Shudi. Later in 1761, Zumpe left to establish his own shop. He may have made a few harpsichords but he found a greater demand for the small square pianos he built. Nothing is known of his previous work in Germany, but he must have had expe-

rience with pianos there since he began making them soon after opening his London shop. This is shown by a report (1851) of the Belgian musicologist F.J. Fetis that he had begun his piano studies on a Zumpe square, dated 1762.

Description of Zumpe's Square Piano

The oldest known existing square piano is dated 1766 in the collection of Victoria and Albert Museum, London. Other Zumpe pianos are one dated 1767, at the Metropolitan Museum, New York and one at the Smithsonian Institution, Washington, D.C., dated 1770 with the same Zumpe and Buntebart, his partner from 1768 to 1778. Published descriptions of these well-known pianos and an account of restoration by Robert Hayward, a Chicago piano technician, on a privately-owned Zumpe piano dated 1768 (*Journal,* March 1960, page 5) show that the Zumpe pianos resemble large contemporary German clavichords. The scaling and diagonal bichord stringing from tuning pins on the right to hitch pins on the left at the back, appear the same. As in the clavichords, bass strings in the lowest octave are brass-wound followed by an octave of plain brass strings. The remainder are plain iron strings. Wound strings were not used in harpsichords because of the possibility of damage to the windings. The 1776 piano, evidently an experimental model designed for meantone tuning with five sharps and five flats, has seventeen notes to the octave. The sharp keys are split to provide the five extra keys necessary. Other details are:

Case: rectangular, about 52″ by 19″
Keyboards: F1 or G1 to F6; keys guided by balance rail pins and guide pins at back ends
Hammers: small half-round wood hammer heads about 3/8″ across, covered by buckskin; shanks are flat thin narrow strips of cedar hinged to the hammer rail by strips of buckskin or parchment.

Zumpe's action is a simple design for propelling the hammers and raising the dampers. The jack is a piece of stiff wire about an inch and a quarter high placed directly into the top of the keylever behind the balance rail pin. The jack presses up against the underside of the leather-covered hammer shank butt. The highest reach of the jack leaves enough space for the hammer to rebound. There is no escapement or backcheck to prevent hammer bounce. The back end of the keylever also lifts a thin wooden or wire damper rod between the strings to elevate the overhead damper arm hinged to the back of the case and retained with a whalebone spring. Two hand-operated brass knobs on the left of the keyboard operate the divided bass and treble damper lift rails. Hayward observed that the only regulation possible was adjustment of hammer blow by bending the jack wires, changing key height at the balance rail in the usual manner and altering key dip by varying the thickness of the strips of felt running along the front of the keyframe under the keys. ■

AT
LARGE

Prevention And Treatment Of Musculoskeletal 'Aches And Pains' For Piano Tuners

Kathryn M. Vance, B.Sc., L.P.T.

The human body is a miracle of engineering, but it is subject to a certain amount of breakdown. We all have experienced aches and pains, but piano tuners are more subject to some specific problems due to the nature of their work. As a physical therapist specializing in the treatment of chronic pain, I have observed my father (Guild Registered Tuner-Technician member John D. Vance, of Port Charlotte, FL) while tuning and analyzed the specific physical stress this involves. I will offer a brief description of the relevant physiology and tips for prevention and treatment.

Relevant Physiology

The body is designed for movement. However, movement of joints creates friction which can then lead to system breakdown. Therefore our bodies are supplied with several types of lubrication. Bones are surfaced with a smooth teflon-like cartilage where they articulate. Further lubrication is provided by an oily substance called *synovial fluid,* secreted by a sac which surrounds the joint.

The power to move the joint is provided by the muscles. For example, the *biceps muscle* attaches to the forearm and *humerus bones* and where it contracts it pulls those bones together – thus bending the elbow. In some joints, the attachments of the muscle to the bone (ligaments and tendons) lie under the bones where they also are subject to frictional wear and tear. So, lubrication is provided via bursas-sacs filled with slippery fluid which cushion the areas prone to friction.

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> . . . the shoulder is a very complicated joint which requires multiple bursas for friction reduction. Thus, it is easy to see that piano tuning can place a great deal of stress on a joint which is already easily prone to breakdown.
>
> "

These lubrication systems work well, but are not designed to hold up under endless repetitive stress. During piano tuning the tuner's arm must lift and place the tuning hammer on 233 tuning pins — which is a very repetitive stress for the shoulder (and this assumes each tuning pin sets immediately!)

Unfortunately, the shoulder is a very complicated joint which requires multiple bursas for friction reduction. Thus, it is easy to see that piano tuning can place a great deal of stress on a joint which is already easily prone to breakdown.

Another even more important mechanism of musculoskeletal irritation is poor postural positioning. Try bending a finger backwards and holding it there for an hour. It will be very stiff and painful (so I don't recommend actually trying this). When we sit without back support (as on a piano stool or bench) we tend to slump, therefore placing prolonged abnormal postural stresses on the neck and back.

Prevention

Despite the occupational hazards I described, there is much that can be done to prevent chronic neck, shoulder or back pain. Having worked with many patients with chronic pain, I strongly urge you to take prevention seriously as treatment can be arduous and expensive.

First, make sure you maintain good strength and range of motion in your neck, shoulder and back muscles and joints. A brief daily exercise program can improve the muscle strength and suppleness which cannot be gained from ordinary daily activities.

Secondly, be scrupulous in your postural positioning during a tuning. Make sure your feet are flat on the floor and you are seated high enough to reach the tuning pins with the tuning hammer without straining. You may need a cushion or a box to sit on if the piano stool or bench is not adjustable or carry an adjustable stool. Keep your back as straight as possible.

You will not be able to maintain perfect posture throughout the tuning. But if you spend the majority of your time well- aligned, you will be doing your body a favor.

Try to avoid any static position (i.e., sitting with your arm up on the tuning hammer) for longer than 15 minutes. Take 10 seconds to break, stand and stretch. If you've been slumping, arch your back several times. Stretch your arm behind you if it has been up in the air. Move your neck around, shake out your arms and legs. Basically, *reverse* the position you have been in, then move around to get circulation going. This may seem like an unnecessary routine. But consider — taking six 10-second breaks adds only a *minute* to your job and I am certain you will feel more refreshed when you finish than if you take no breaks. This will mean you are working more efficiently and may actually decrease your total working time.

> "Take care of your body so you can take care of our pianos."

Treatment

Despite the best prevention, you may still develop a sore back, neck or shoulder. *Don't ignore it.* If it persists it *can* become a chronic problem.

If you are experiencing new and acute pain, apply ice to the area. A simple home ice pack can be made by adding one part rubbing alcohol to two parts water as fluid to a ziplock bag with ice chips. These packs are reusable as the alcohol will act as an anti-freeze and keep the bag slushy while it is stored in the freezer. *Always* use a towel between your skin and the bag to prevent *freezer burn.* Leave the ice on long enough only to numb the area and reduce the pain and inflammation (about 15 minutes). After the pain is reduced, perform the range of motion exercises for the area and then rest it, applying more ice if necessary. Determine exactly which motions are painful and *avoid* them by finding other ways to accomplish your task. You want to give the joint a chance to cool down since the process of inflammation interferes with its lubrication system.

Forcing a joint to move under friction can create an incurable disease we've all heard of — arthritis. If the condition does not improve after several days of rest, ice and gentle range of motion exercises, see your doctor. If you are not certain it is a muscular problem, see your doctor *immediately* as some conditions can mimic joint pain (e.g. stomach ulcers and heart conditions can both refer pain to the shoulder).

If you have a chronic ache such as back pain or neck pain (chronic pain is defined as a pain which lasts longer than six months) don't just accept it as a "bad back." So often these conditions are treatable. Heat followed by gentle range of motion exercises followed by ice can often make a big difference. If this is not successful, see your doctor and ask to be referred to a good physical therapist, preferably one who specializes in the treatment of pain. We have many techniques which just might help.

I hope you have found these tips helpful. I can't emphasize enough the importance of prevention, and early treatment when problems arise. Take care of your body so you can take care of our pianos.

Exercise

Do each exercise 10 times, once or twice a day. Perform exercises slowly and smoothly and do not force the motion into a painful range. Breathe while exercising — do *not* hold your breath. *Note: * indicates an exercise which is strenuous and should be avoided if you have a medical problem such as a heart condition. When in doubt, consult your physician.*

Neck

1. Turn head fully to each side
2. Tip head sideways (ear toward shoulder) each side
3. Bring chin to chest, tip head backwards
4. Pull head back, hold for three, relax
5. Raise shoulders up, pull back (military position), hold for three, relax

Shoulder

1. Raise arms (in front of you) all the way over your head.
2. Raise arms (to your side) all the way over your head
3. Hold arm straight out to side. Bend elbow and rotate arm by swinging hand in the direction of floor to ceiling.

Back

Sit slumped. Pull up so that lower back arches. Hold for three. Relax
2. On hands and knees, curve and arch back.
3. On hands and knees, raise right arm and left leg, hold for three. Reverse to opposite sides. ■

Calendar Of Coming Events

Date	Event
Oct. 2-4, 1987	**Florida State Assembly of the Piano Technicians Guild** Orlando, FL David G. Taylor; 1909 Mae St.; Orlando, FL 32806; (305) 898-9266
Oct. 9-11, 1987	**Ohio State Conference** Greater Cincinnati area Jack Krefting; P.O. Box 16066; Ludlow, KY 41016; (606) 261-1643
Oct. 16-18, 1987	**Texas State Seminar** Holiday Inn, Wichita Falls, TX David L. Hale; 135 Pembroke Lane; Wichita Falls, TX 76301; (817) 322-2082
Nov. 6-8, 1987	**North Carolina Conference** Black Mountain, NC Jeff Owens; P.O. Box 903; Shelby, NC 28150; (704) 482-7119
Nov. 21, 1987	**Baltimore Annual One-Day Seminar** Baltimore, MD Christie Cornetta; 10 Drawbridge Court; Baltimore, MD 21228 (301) 788-3694
Jan. 8-9, 1988	**Arizona State Conference** Aztec Inn, Tucson Arizona Mark Peele; 2204 E. 6th St.; Tucson, AZ 85719 (602) 362-4528
Feb. 12-14, 1988	**California State Conference** Torrance Marriott, Torrance, CA Anthony Pascone; 895 N. Calle Circulo; Camarillo, CA 93010; (805) 482-3513
Mar. 11-13, 1988	**South Central Regional Spring Seminar** Fayetteville, AR Denele Campbell; 541 W. Meadow; Fayetteville, AR 72701; (501) 443-2457
Mar. 18-20, 1988	**Central West Regional Seminar** Wichita, KS Marty Hess; 4031 N. Harding; Wichita, KS 67220; (316) 744-0564
July 18-22, 1988	**31st Annual Piano Technician Guild Convention & Institute** Adams Mark Hotel, St. Louis, MO Home Office: 9140 Ward Parkway, Kansas City, MO 64114, (816) 444-3500.

Auxiliary To Present Performance Scholarships

Piano Technicians Guild Auxiliary scholarships in the amounts of $400 and $200 will be presented to winners in the senior and junior keyboard divisions of the Missouri Music Teachers Association piano competition.

The scholarships, the first to be awarded by the Auxiliary's scholarship fund, will be presented by Diane Hennessy at the MMTA's awards banquet Nov. 14 at the University of Missouri in Columbia. Winners will also be invited to perform for the Auxiliary at next summer's Piano Technicians Guild convention in St. Louis.

The Personal Touch

Ron Berry
Vice President

Is there someone you know who is not a member of PTG but who should be? Do you know well-qualified technicians who, for one reason or another, have not joined? Often all they are waiting for is to be asked to join.

You, as a member, are aware of what PTG can do for you and the pleasure you get by giving to PTG. We are a very personal organization and the personal touch can be the difference between encouraging someone to join or his remaining a non-member.

One common reason given for not joining is "I'm not an organization-type person." Often these people are viewing PTG as some sort of union waiting to take their money and tell them what to do. There are very few organizations like PTG so this misunderstanding is not surprising, but taking some time to explain what PTG is really like can often clear it up.

Another reason for not joining is "I'm doing fine, I have all the business I need and my customers are all happy." While this is no doubt true, PTG can give the technician more efficient ways to do his work and therefore make more money. Nearly all seminars and conventions have factory representatives who bring factory techniques for many of the jobs we do. Finding more efficient ways to do your work and finding out about pitfalls without having to go through them will help your business greatly.

Another reason for not joining is "It's too expensive with exam fee and dues." Compared to other professional associations our costs are low. The *Journal* is a benefit that is unobtainable anywhere else. Because of PTG's high volunteer commitment, costs are truly kept to a minimum. Conventions and seminars would cost three to four times as much if we paid instructors and those who organize the seminars for their time. Exams offer the best personalized evaluation of a technician's work that is available. In fact, many schools of piano technology use PTG exams to evaluate their students. Consider what a college education costs these days and you'll realize the bargain offered in PTG exams. Because a piano technician's business can be started on a shoestring with a minimum investment in tools and advertising, technicians tend not to treat themselves professionally. If you were to begin another type of business, you might get a small business loan of $250,000 or more just to get started and spend the first three or four years just barely surviving and recovering startup costs. Bear in mind that many companies consider it an important part of their budget to pay for their employees to belong to and participate in professional associations related to their business. Yet we find technicians who are hesitant to participate themselves when they are the whole business.

Anyone who has been involved with PTG for very long can extol the virtues of the organization. Let's share this enthusiasm with someone else who is not a member, for their sake. ■

Reclassifications during August

REGION 3

Dallas, #752

Donald A. Bennett
3272 Lockmoor
Dallas, TX 75220

REGION 5

Nebraska, #683

Michael J. Osterberg
705 West 22nd Street
Kearney, NE 68847

New members during August

REGION 1

Western Massachusetts, #010

Susan Akmentin
33 Chandler Avenue
Longmeadow, MA 01106

Southeast Massachusetts, #024

Ann Dietlin
5 Cheryl Lane
Carver, MA 02330

Newfoundland, #040

William C. Hutchings
32 East Valley Road
Corner Brook, NF
CANADA A2H 3L3

Maritime Provinces, #050

John M. Ross
R. R. #2
Windsor, NS
CANADA B0N 2T0

Connecticut, #064

Paul Monachino
256 Winthrop Road
Deep River, CT 06417

New Jersey, #078

Daniel R. Sciscente
P. O. Box 81
Buckberg Road
Tomkins Cove, NY 10986

New York City, #101

Jeff S. Alterman
156 Vallard Avenue
Hastings-on-Hudson, NY
10986

REGION 2

Hampton Roads, #233

Mark E. Jaeger
712 Sedgefield Drive
Newport News, VA 23605

Palmetto-Florence, #292

Jack D. Perkins
Box 98, Route 3
Marion, SC 29571

Nashville, #372

Emily E. Roberts
P. O. Box 307
Pleasant Hill, TN 38578

REGION 3

Dallas, #752

Donald A. Bennett
3272 Lockmoor
Dallas, TX 75220

REGION 4

Louisville, #401

Jennifer R. Parks
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The Auxiliary Exchange

President's Message

Our present society seems to expend a great deal more effort in the placing of blame than in the simple solving of problems. Periodicals are crammed with articles telling us we eat all of the wrong foods; have the wrong kinds of sex lives, and have, in all likelihood, suffered an abused childhood. If one wasn't physically abused, then the *must* have been mentally abused. One either dwells on sex too much, or they repress natural desires. We consume too much cholesterol; develop potassium deficiencies; don't get enough amino acids, etc. It all makes me want to cancel my subscriptions and reread the stories of my youth that dealt with the simple concepts such as "early to bed/ early to rise/ makes a man healthy, wealthy and wise."

I therefore found it refreshing a while back to come upon an article entitled: "You are what you think, say and do." Now *that* is something I can relate to!

At the recent "Revitalization of PTGA" meeting in Toronto, ably moderated by Julie Berry, the refreshing thought above was brought home to me. I was delighted with the packed room, and further encouraged by the readiness of those in attendance to participate in the discussion. It was exciting to find that you *do* have your opinions and *do* have solutions to offer. Through these pages, both as editor and as your president, I have begged for input from you members for more than three years, but have received very little and that from the same few people over and over. At this meeting, however, many rose to offer praise and criticism; suggestions and plans; and thoughts and conclusions. It was most productive and evolved into a good old-fashioned rap session. It could well become an annual event at our conventions. While we may not be able to fulfill every suggestion, all will be given serious consideration and every effort will be made to try to implement them.

By the time this reaches you, I will have traveled to St. Louis for the convention planning meeting Sept. 18. While the program will be in the initial stages of development, it is not too late to get your input since nothing will be "in concrete" for a few more months. Since the newly constructed Adams Mark Hotel, the convention site, is right on the Mississippi River in view of the Arch and all attendant attractions, I am leaning toward more free time next year. To get to the most desirable attraction in St. Louis, you need only cross the street!

If you favor this, let me know *now* — *not* in St. Louis in July! I want to do what *you* want. Clairvoyance, however, is something with which I was not blessed.

Ginger Bryant

For all you members who are skilled at needlework, we have a special item of interest. Our Beva Jean Wisenbaker of Houston crocheted an American Legion emblem for her father, who is an active member of the Legion in Horatio, AR. Her beautifully finished work merited a picture and writeup in the *Old Time Crochet* magazine (page 26 of Summer 1982 issue). In her letter to the publisher, Beva Jean explained the process she used to achieve the finished piece.

"I only got as far as completing the bottom border before the work inspired me to design the Piano Technicians Guild emblem for my husband, who is a piano tuner/ technician. I set aside work on the American Legion Emblem to work on the emblem for my husband. I learned two things in the process. I learned that my gauge was off, so that the emblem came out oval instead of round. I also learned to do filet crochet in color. I applied both of these learned items when I went back to the American Legion Emblem. I had originally been using a double crochet stitch, since your magazine had stated that patterns written before 1929 often had outdated directions for stitches. I started over again, using a treble crochet stitch since my stitch had been too short on the other emblem. I also decided to see if I could change the pattern from all white to having only the background in white and the emblem itself in color."

We are pleased to note that there are in our membership individuals who are "handy" with the needle *and* yarn.

Editor

Convention News

This year's Auxiliary program in Toronto offered a variety of activities and events that gave the Auxiliary family many interesting things to do and plenty of time to visit and relax. Toronto is a friendly city, and Auxiliary members enjoyed its hospitality in the two scheduled tours our program offered. The first tour was of Parkwood Estates, a huge expanse of manicured gardens, sculptures, reflecting pools and magnificent 50-room mansion which is kept by the local historical society. After sur-

veying the opulent surroundings, guests were treated to a "high tea" in an outdoor arborium. The second tour was a shopper's delight, taking participants to Toronto's popular Harborfront area, a huge complex of scores of specialty stores and boutiques. (There even was a store dedicated to pig paraphernalia.) A boat tour of the harbor and islands was an exciting part of this package.

Those who declined the tours gathered in the Auxiliary room where Bert Sierota taught a needlepoint craft class. Ruby Discon offered a class in silk flower arranging and provided beautiful centerpieces for the Auxiliary luncheon. (Some very happy luncheoners carried these off afterward.) Other classes offered were professional in nature, including a new tax class taught by Randy Potter and a refinishing class taught by Andre Bolduc, both PTG instructors.

At our opening assembly, 23 states were represented and, of course, Canada. However, California had the largest delegation in attendance. A slide presentation of historical Toronto was given by local historian and author, Mike Filey.

Council business included adding a new Honorary Life Member to the roles. Bert Sierota was nominated for this status by the Reading/Lancaster Chapter and was approved by standing ovation. Our new scholarship will be awarded for the first time in St. Louis through a piano competition sponsored by the Missouri State Teachers Association. We will award $400 to the senior division winner and $200 to the junior division winner. Recipients will be invited to perform at an Auxiliary function at next year's convention. A dues increase was approved by Council. Annual Auxiliary dues will be $10 (new member fee also $10) beginning in January of 1988.

The installation luncheon included a program by local pianist Linda Bradford, who provided a beautifully played medley of popular tunes, old and new. Beva Jean Wisenbaker installed the newly elected national board in a well-researched presentation relating the officers' duties to the parts of a maple tree. Many of our past presidents attended this year's convention: Ruth Pollard, Esther Stegeman, Jewell Sprinkle, Luellyn Preuitt, Ginny Russell, Helen Pearson and Julie Berry.

Julie Berry chaired an open forum concerning the revitalization of the Auxiliary. The lively exchange that ensued revealed the need for open discussions at future conventions. Time will be allocated in St. Louis to allow participants to discuss their ideas, concerns and suggestions in regard to the Auxiliary and its programs.

On our last day, we were treated to a very special presentation by Isaac Sadigursky (PTG instructor). He spoke on the "Life of a piano tuner in the Soviet Union," and concluded with a surprise performance on his accordian of regional folk music. Participants in this class left with a new appreciation of the freedoms and provisions of our own country.

Some of the projects the new board will be working on include a new cookbook (scheduled for release in 1989), an executive board handbook, and sale of a "convention T-shirt." You'll be hearing more about these projects soon.

Should you have some views you would like to express, you will find a receptive ear in our board and these committees and appointees: Nominating Committee — Celia Bittinger, Deanna Zeringue, Beva Jean Wisenbaker; Bylaws — Bert Sierota; T-Shirts — Deanna Zeringue; Restructuring — Julie Berry; Cookbook — Nita Kadwell; and Scholarship — Ginger Bryant.

Helena Thomas

New Members

We extend a warm welcome to the following new members:

Shirlee Bailey (Benjamin)
1605 N. Willard
Altus, OK 73521

Susan Lee Birch (James)
56 Nashville Rd.
Bethel, CT 06801

Carol Bussell (Robert)
224 West Bant Road
Indianapolis, IN 46217

Nancy Carnicom (Ronald)
2685 Ridge Road
Norwalk, OH 44857

Pat Chamberlain (Millard)
6989 Convent Street
Creghan, NY 13327

Liz Cowan (Ken)
Belgrave, Ont., Canada

Anne Diehl (Edwin)
1213 Tilghman Street
Allentown, PA 18102

Frances Goodwin (Garland)
46 Marrow Street
Hampton, VA 23669

We hope you make many friends and enjoy your association with the Piano Technicians Guild and Auxiliary. It's a great group.

Kathryn Snyder
Treasurer, PTGA

Exchange Editor:
Agnes Huether
34 Jacklin Court
Clifton, NJ 07012

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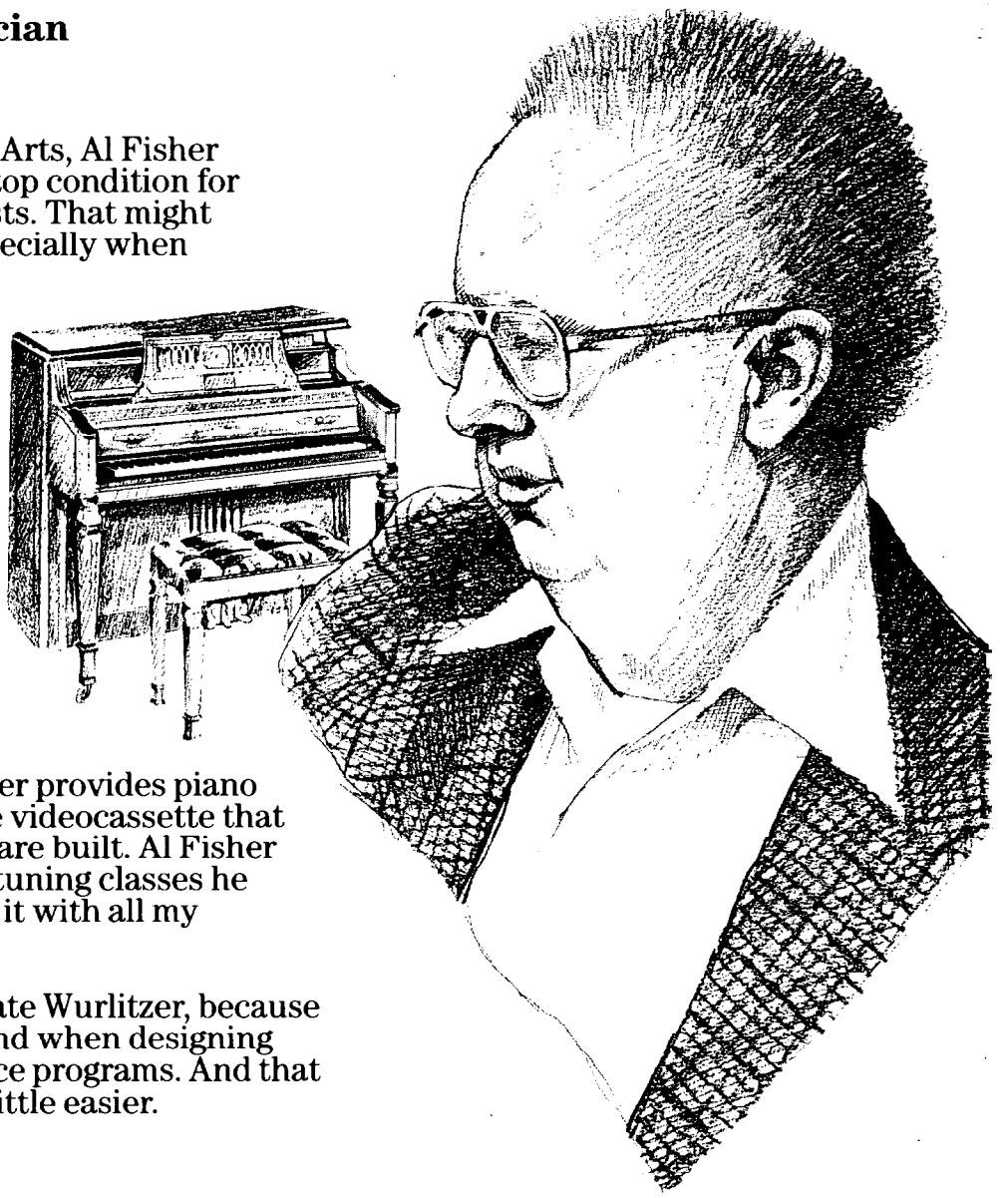

At Interlochen Center for the Arts, Al Fisher makes sure the pianos are in top condition for students and performing artists. That might look like a formidable job, especially when you consider that most of the pianos used during the famous National Music Camp are in lakeside buildings where temperature and humidity change constantly. But Al Fisher will tell you that it's "easier than you might think" with Wurlitzer pianos... because Wurlitzer actions are manufactured with uncommon precision.

Naturally, he appreciates that. But he also appreciates the extra service that Wurlitzer provides piano technicians. For example, the videocassette that shows how Wurlizter pianos are built. Al Fisher uses it regularly in the piano tuning classes he teaches at Interlochen. "I use it with all my students. It's well done."

People like Al Fisher appreciate Wurlitzer, because we keep the technician in mind when designing pianos and establishing service programs. And that makes the technician's job a little easier.

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