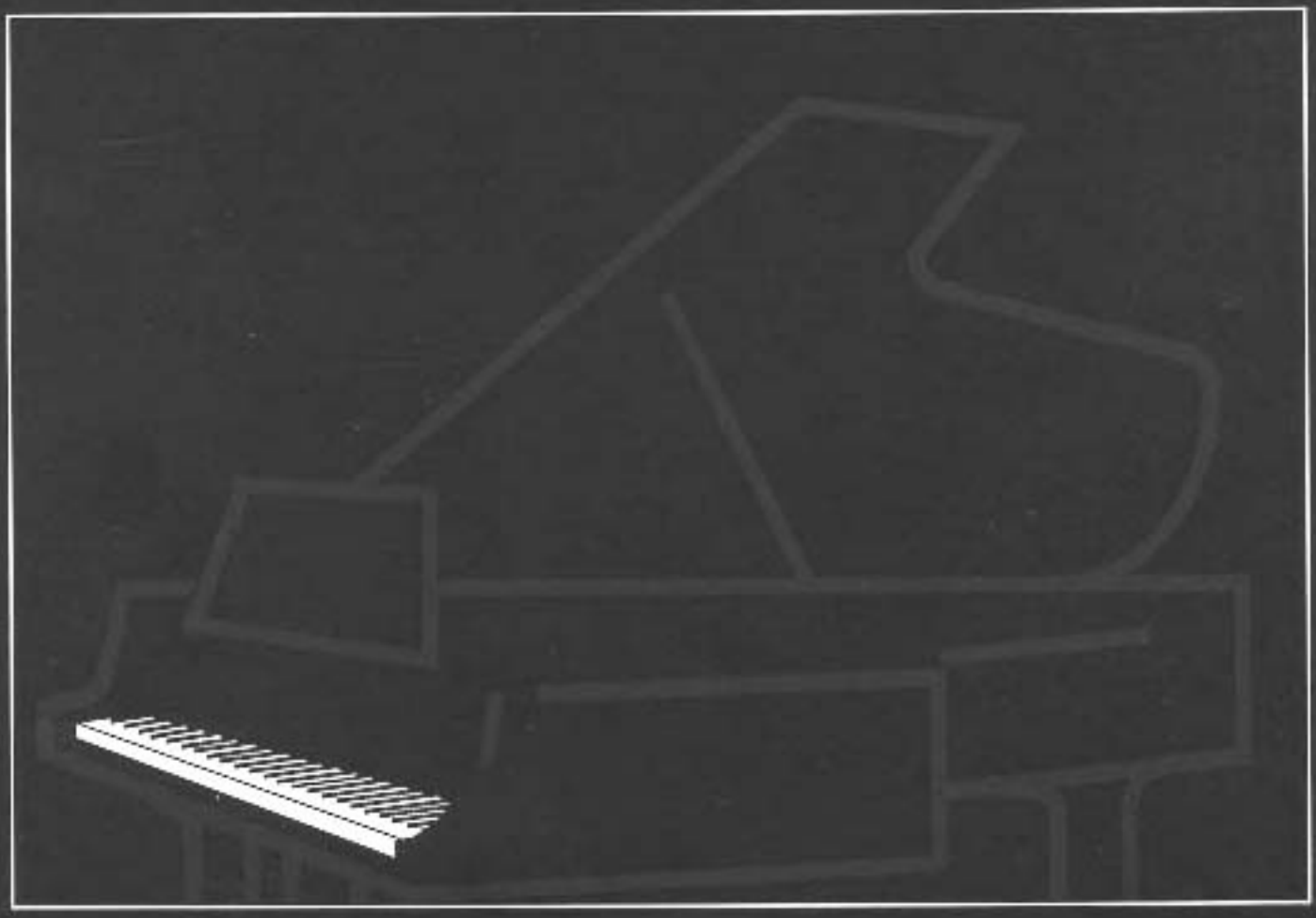
Piano Technicians Journal

August 1989



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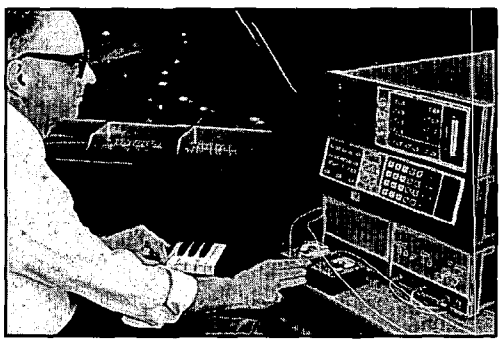

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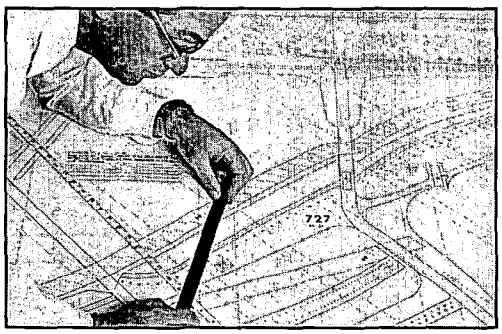
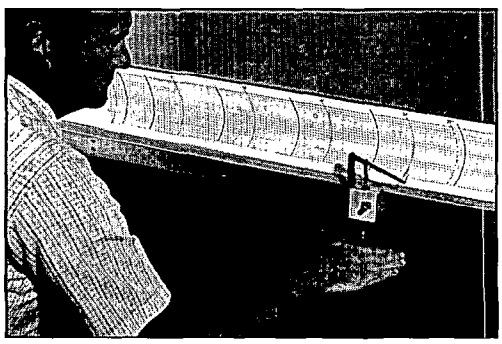


MATERIAL STANDARDS insure continuing quality. For example, stringent standards for weight, dimension, taper, and hardness of hammer felt are established, and each sheet of felt is checked to be sure it meets those standards before it is accepted for production use.



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

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PIANO TECHNICIANS
Journal

AUGUST 1989 — VOLUME 32, NUMBER 8 OFFICIAL PUBLICATION OF THE PIANO TECHNICIANS GUILD, INC.

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President's Message

Trip To Orient Successful

Ronald L. Berry, RTT
President

At the time of this writing we have just returned from our trip to Japan. Julie and I were able to manage only one week away, so we just went to Japan and met up with the rest of the PTG group there. I'll let someone from that group relate the story of Beijing and the other cities they visited. There were about 35-40 Americans and maybe that many Koreans and Taiwanese. The JPTA (Japan Piano Tuners Association) was having its conventions at the same time and there were about 450 Japanese technicians present for that. The excitement of having that many technicians from all over the world was unbelievable. The highlight of the meetings was a symposium in which a member of each Association—PTG, JPTA, KPTA (Korea), and TPTA (Taipei, Taiwan) presented his outlook on the future of the piano industry and the piano service business. There was simultaneous translation available over a wireless headset for Japanese, English, Korean, and Chinese. This gave the audience a chance to ask questions of the speakers.

Charlie Huether represented the PTG well as its spokesman in this symposium. As part of his presentation, the PTG film, *The Unseen Artist* was shown with the translators trying to keep up with the fast paced dialogue. The other associations seemed rather impressed with the film and began to talk about making such films themselves. The symposium pointed out that the problems that happen in our business are basically similar worldwide. The interesting problem for the Oriental manufacturers is that they have been selling pianos at such a rate that the same percentage of households in Japan and Korea have pianos as in the U.S.A. However, in the U.S.A. the pianos are an average of 35 years old, so there is business from people trading in old pianos for new ones. However, in Japan and Korea, most of the pianos are new and it will be quite a while before those people buy another piano. This poses a difficult challenge to those manufacturers. I get the impression that the state of the art of rebuilding pianos is also less developed in the Orient for the same reason.

The tour included factory visits to Kawai and Yamaha (those on the long tour also visited factories in China and Korea). Both factories were amazingly clean and modern with many specialized machines. The Yamaha factory had a large number of robots doing repetitive operations like drilling pinblocks, inserting plate bushings, and driving in tuning pins. The engineering behind these machines was staggering.

All the overseas guests were treated royally by the manufacturers. The closing party in Kyoto at the end of the IAPBT meetings was most memorable. With an opulent buffet opening out to a beautiful Japanese garden, people had a chance to make new friends and renew old friendships. Larry Crab, in his inimitable way, got groups from each country to sing songs typical of their country, which brought everyone closer together.

These experiences brought this trip from being a once-in-a-lifetime trip to a realization that going to these meetings every two years is as much a must as going to the PTG conventions.

At the Portland convention, the PTG Board voted to used the PTG office as the official office for IAPBT. This will be a central mailing point and we will produce two newsletters a year for IAPBT. PTG is committed to the idea of fostering international awareness and will work to facilitate communication between organizations of technicians. You can show your support of IAPBT by sending $15 to receive a "Friends of IAPBT" card and an IAPBT pin. This money helps fund PTG's activities in IAPBT. In the words of Mr. Ojima, President of JPTA, "If there had been an IAPBT 50 years ago, maybe we would not have had World War II."

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From The Home Office

Making The News

We're in the news.

In the last several months, a number of national, regional and local media outlets have published articles about the Guild or its individual members. For example:

- Following an article about the ivory trade in *Smithsonian* magazine, a letter from Guild President Ron Berry was published, outlining our 1988 resolution condemning the harvesting, importation and use of ivory for pianos. Another story on the resolution was published in *Vegetarian Times* magazine. David Mannweiler, a columnist for the *Indianapolis News*, spotted Berry's letter, resulting in an interview and a full column on the subject. In addition to discussing the ivory trade, Mannweiler's column talked about the Guild and described the council's activities in passing the resolution.
- Syndicated columnist and radio commentator Paul Harvey featured a new vertical piano action designed by Darrell Fandrich and Chris Trivelas. Citing the declining numbers of both concert pianists and piano makers, Harvey said, "Part of the problem is the impracticality of providing, moving and maintaining the sensitive instruments." He noted that the piano had been displayed at the Guild's California State Convention. The article was published in newspapers across the country.
- The recent Guild-sponsored tour to the Orient attracted attention because of its timing — the group's plane landed in Beijing on June 3, the night of the massacre in Tiananmen Square, and departed June 6. For example, former Guild President Sid Stone and his Chinese-born wife, Alice, of Hayward, CA, were the subjects of a lengthy story in their local paper, *The Daily Review*. "We were eyewitnesses to history in the making," Stone told reporter Joel Maybury.
- The tour also attracted attention because it included the wedding of Claudia Ellison and Paul Cook. The two were wed by Ed Hilbert as the tour's jet crossed the international date line en route to Asia. United Airlines provided the champagne and the publicity, distributing press releases to wire services and other media outlets across the country. (Look for more articles about the Guild's tour and the International Association of Piano Builders and Technicians Convention in a future issue of the *Journal*.)
- Press releases on the Guild's 1989 convention in Portland, OR, were sent to local, national and trade media and, at this writing, had attracted several inquiries. Press releases designed to be sent by RTTs to their local news media were also to be available at the convention.

'Been in the news lately? We'd like to know more about it.'

Larry Goldsmith
Executive Director

If you've been in the news lately, send along a copy to the Home Office. I can't promise that it will be reprinted or even noted in the *Journal*, but it will help us do a better job of publicizing our activities in the future.

Industry News

Falcone Purchases Sohmer Assets

Bernard G. Greer of Bellvue, WA, has purchased the assets of the Sohmer Piano Co., including the Mason & Hamlin, Knabe, and George Steck scales and trademarks, from Robert MacNeil. Terms of the transaction were not disclosed.

Greer also owns controlling interest in the Falcone Piano Co. of Haverhill, MA. Falcone has gained national recognition recently for its three completely handcrafted grand piano models priced from $26,000 to $52,000.

Lloyd Meyer, former president of Steinway & Sons, sole agent for Renner piano action parts and a principal of the Camilleri Pianoworks Co., assumed management responsibility for Falcone earlier this year and believes Falcone can make an important contribution to the piano industry by bringing Mason & Hamlin back to Boston and restoring it to its original excellence. "It's a world-class piano when properly built," said Meyer, "and they have the skills there to do it...They're using higher quality material, longer processing times, and substantially more labor than other piano companies."

Allan Harrah, Falcone director of manufacturing, will also manage Mason & Hamlin production at the company's factory near Boston. "Our production capacity has gradually increased to the point where we are well positioned to properly bring back the Mason & Hamlin," Harrah said.

"The Mason 50 is currently in production, but several months will be

continued on next page

INTERNATIONAL SCENE

The IAPBT Convention

Charles Huether
Chairman, International Relations Committee

As some of you may know, earlier this year a group of 35 from PTG toured China, Korea and Japan ultimately ending the trip by attending the Sixth Biennial meeting of the International Association of Piano Builders and Technicians, held in Kyoto, Japan and hosted by the Japanese Piano Technicians Association. The details of the tour will be covered by Yat Lam Hong in a separate article. I would like to report on the IAPBT meeting.

At this meeting, new directors were elected and new officers selected for the IAPBT. Elected to represent PTG on the Board are Ronald Berry, who was also elected President of IAPBT, and Edwin A. Hilbert.

A variety of other matters were discussed and decided, including the site for the 1991 meeting, which was reaffirmed as Seoul, Korea. Bo Jung Lee of Korea, Vice President of IAPBT, was designated Chairman for this meeting. It was decided that an effort be made to hold the 1993 meeting in Europe, with the hope of interesting one or more of the European associations in cooperating, helping some or all of their associations to become members of IAPBT.

The program of the Conference was a discussion of the future of piano service. There were four speakers, one from each member organization. I represented the Piano Technicians Guild. The speakers and presentations were very well received. Optimism was the keyword of the presentations.

The Japanese Piano Technicians Association held their own convention at the same time and place, the International Convention Center in Kyoto. We shared their classes and extensive exhibits of pianos, supplies and related items. It was a rewarding experience. We look forward to the next meeting in 1991. Mark your calendar and promise yourself you will attend.

An international meeting such as this is a unique experience. Unlike trade shows where each exhibitor is vying for exposure and hoping to prove his superiority over others in attendance, IAPBT meetings consist of people of like occupations and experience sharing that experience in friendship and support. If you ever wondered what a lonesome business piano service can be, then meet the technicians from all over the world and learn that you are not alone. Your faith in your work and yourself will be renewed.

Industry News...

required before production of the grand models "A" and "BB" can begin, and probably a year before they are available."

The company also plans to continue manufacturing the Sohmer piano.

Shuler Co. Purchased

The O.E. Shuler Co. , which specializes in piano and organ key work and player piano actions, was recently purchased by Philip and Mary DeHaan of Lexington, KY.

The company was founded in 1927 by Mr. Shuler, of Paragon, IN, and purchased by Mr. and Mrs. Norman Green in 1972. The Greens are retiring and sold the business to the DeHaans June 1. Operations will move to 3007 Park Central Ave. #4, Nicholasville, KY 40356, effective August 15. The company's phone number is (606) 885-4330.

Economic Affairs

Cristofori's Pocket Money

Stephen H. Brady
Economic Affairs Committee

Are you better off than you were a year ago? Than 10 years ago? How about 300 years ago? Perhaps, if you're lucky, things may be improving on the short term (or maybe not), but if we look at the life of our most illustrious and most distant literal colleague, Bartolomeo Cristofori, we can appreciate the splendor that once was ours.

During a trip to Italy last September, I was privileged to visit Cristofori's native town of Padua, and to see the church where he was baptized. His home was destroyed several decades ago, so the only evidence of his having lived there is a plaque on the outside wall of his church and a street which has been named after him in an unrelated section of town. Querying business owners on that street, I found that they thought he had been "a politician or a general or something!" One interesting thing I learned on this trip is that Italians do not pronounce his name as we do, "cris-to-FOR-i," but they say instead, "cri-STOF-or-i."

However you pronounce it, Cristofori moved to Florence in 1689 at the request of Prince Ferdinand, who had met him in Padua two years earlier. Cristofori found himself in charge of a collection of instruments in the palaces of the Medici family empire. The Medici archives still contain some of Cristofori's actual bills to Prince Ferdinando, his employer. These statements, or drafts on the prince's treasury, include information which proves extremely enlightening to us as we follow in Cristofori's footsteps some 300 years later.

From the Medici court records we learn that Cristofori built new keyboard instruments, but that he sub-contracted the cabinet work to a cabinet maker. He worked with an assistant most of the time, and built probably two or three instruments in an average year. Cristofori's other duties included the adjusting, maintaining, and rebuilding of existing Medici instruments. Although no direct reference is made to tuning, it is probable that Cristofori did some tuning under the heading of adjusting and maintaining. The records also contain numerous references to "moving and setting up" instruments, usually from one palace to another. Cristofori also included a large number of bills for supplies purchased; everything from vulture feathers to music wire shows up in the list.

It appears that Cristofori was paid an average of about 90 scudi per month for his services. Although Jack Greenfield has stated that scudi had the approximate value of dollars, I think this comparison is inaccurate and puts Cristofori's financial status in a dubious light. The figure of $1.00 = 1 scudo was no doubt taken from a table in Will and Ariel Durant's *The Story of Civilization*, vol. VII, which lists the value of one scudo (c. 1700) at $1.16 in 1962 dollars. The values in this table, determined nearly 30 years ago, were based on the premise that a family of ten could live on $50 per week in 1962. As ridiculous as that might have been in 1962, it is even more ludicrous now. I mean, at $90 per month in this day and age, Cristofori's salary would qualify most of us for welfare. The true value of money, whether scudi or dollars, is what that currency will buy. What do things cost?

In examining the prices of goods in Cristofori's time, perhaps the most telling statistic is the cost of housing. From the Medici records, it would appear that the rent on Cristofori's house was only 24 scudi per year, a mere 2% of Cristofori's annual take. For the average 1980's working stiff, housing consumes some 15% to 35% of total income. If we compute the value of scudi by this item alone, we find that a multiplier of around 300 or so is necessary to bring scudi and dollars into equality. In other words, 2 scudi equal about $600.

Giving a completely different picture of the value of scudi, however, is the cost of such items as fish glue, at 12 scudi per 1.5 lbs. Nowadays, a similar quantity of glue might cost only $6.00. Similarly, Cristofori paid 2 scudi for one pound of wax, whereas today we might pay less than $2.00 for the same item. As housing represents the extreme disparity between scudi and dollars, instrument building supplies seem to represent the closest in value that the two ever get.

Most other items on the Medici inventory show that scudi are worth from seven to fifteen times as much as 1989 dollars. For example, two-stop Cristofori harpsichords sold for an average of about 450 scudi. A similar instrument today might sell for around $10,000, or over 20 times as many dollars as scudi. A Cristofori "spineta" went for approximately 750 scudi, or about one-fifteenth of what a spinet harpsichord might cost today in dollars. Provisions, possibly the most important benchmark besides housing, are listed as 12 scudi per month, which we could very conservatively estimate as about one-fifteenth of a 1989 piano technician's provisions budget. We don't really know exactly what items were included in this "provisions" allocation, but assume that food and household supplies might reasonably be included. Neither do we know if Cristofori had a family or lived alone, but for purposes of conservative comparison, we can assume he lived alone.

If we use the conservative multiplier of 15 scudi to one dollar, it appears that Cristofori was paid the equivalent of about $1,400 per month in wages. Now, that seems like small compensation for a technician of Cristofori's genius.

Economic Affairs...

Small, that is, until we factor in the low cost of housing—only 2 scudi per month for Cristofori's house—and the 12 scudi figure for monthly provisions. To make the situation look even better, consider the fact that housing and provisions didn't even come out of Cristofori's salary; these items appeared as separate drafts on the prince's treasury! In fact, there are even claims upon the treasury for repairs to Cristofori's house! Neither did our hero have to buy technician's supplies out of his own pocket; they all appear as separate entries. In short, Cristofori received about $1,400 per month in addition to having all of his basic living and working expenses paid. Given that he was working for the head of state, it is extremely unlikely that he was required to pay taxes back to the prince on the wages he earned. Therefore, the entire $1,000 was probably discretionary income! Without expensive cars, computers, and audio/stereo equipment to spend it on, what did he do with it?

The research on how the average Florentine of that day would have managed his money is far beyond the scope of this article, but it seems clear that Cristofori was fairly well-off. It is possible that a fair portion of his income went towards maintaining his wardrobe, although the fancy duds he is wearing in the only extant portrait we have of him may have been a one-time extravagance. He may have had a large family to support, but there is no evidence to confirm this. If he had children, it seems odd that we have no record of any of them following him into the piano/harspichord trade.

Although the mystery of what Cristofori did with his money may never be solved, it is no mystery where our money goes. With roughly 1/4 going to the federal government, another 1/4 or more going to housing, and the remaining 50% divided among food and other provisions, insurance, supplies, equipment, utilities and phone bills, etc., the only mystery is how there can be any discretionary income left at all! For my own part, working at a state-operated university, I suppose my situation is similar in some ways to Cristofori's. I just wish I could get them to throw in the house and food!

From The Mailbag

Susan Graham
Technical Editor

The entire Forum this month consists of contributions from other writers in the Guild. They present a wide variety of topics and viewpoints and make for very interesting reading and a refreshing change from our usual long-article format.

The first is a response to the leg and lyre article which appeared some months ago. It offers some very helpful refinements; in particular, a suggestion for a lower-profile latch and some comments on construction material and techniques.

I attended your class and recently read your article on grand leg and lyre repair which has inspired me put together a kit for myself (jack-in-a-box?).

This tool is to the grand piano what the folding one-(person)piano tilter is for the upright. Having done the bench and moving pad routine myself, I can well appreciate the invention of such an elegant solution.

If I may add my two cents worth (an expression which should be adjusted for inflation), I offer the following notes concerning the box:

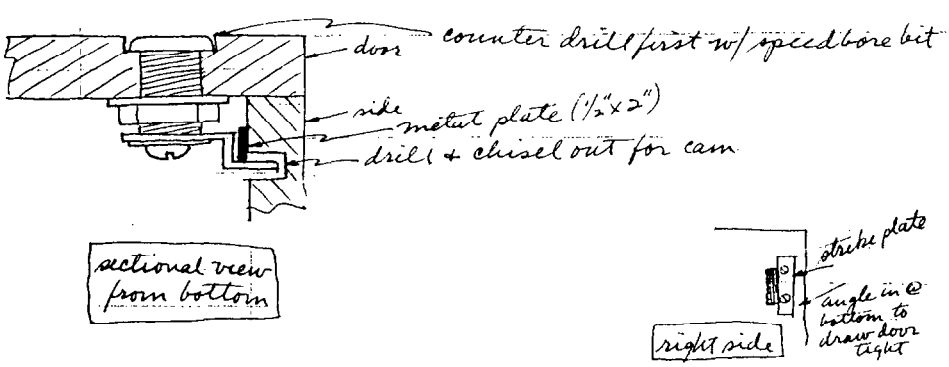
- *hardwood plywood—(I happened to have some shop birch). It has fewer voids, it's less apt to splinter or split apart, and has a better appearance.*
- *assemble with screws only (#10 x 2") predrill (adjustable screw hole driller); can be disassembled for modification; glueing not necessary for strength (a rolled up piece of paper will support a small book); shelf may be fastened same way (two screws through back, one each side).*
- *latch may be a disc tumbler cam lock*

Do a good drawing first and most of your mistakes will be made on paper. If you measure accurately and check table saw settings with a piece of scrap wood, no recutting should be necessary. (It's difficult to impossible to narrow down a board by 1/16," for example, even with a sharp blade).

I realize many people may lack drawing and woodworking skills, so I assume maybe someone will soon offer a new product.

Thanks again for a great idea.

Tom Cole, RTT
Monterey Chapter



The next is a reprint from *The Vancouver Beat*, newsletter of the Vancouver Chapter. It features an idea which was originated by Drew and Jerry Caunter of that chapter and then refinished by Robert Bayley, who also happens to be the newsletter editor. Mr. Bayley points out that the most difficult part of assembling this tool is drilling a hole down the middle of a bridge pin—perhaps someone can come up with a source for a ready-made piece of small tubing of the required dimensions?

For those of us who are working with epoxy to repair bridges, etc., you know how time consuming it is to work the epoxy into the holes in the bridge. My method of accomplishing this has always been to work it in with a paper clip bent into an "L" shape.

When I first looked at a round cylinder with a bridge pin soldered to the end, and saw the other end equipped for an air nozzle, the plumber part of me started thinking. If a person could make a cylinder out of a piece of copper pipe, solder a cap to the end of it, and then drill a hole in the cap to accept a bridge pin (also with a hole drilled in it), and put a fitting on it to control the air, he might have something which will not only get the job done, but do it more efficiently and in less time.

So, I set out with plumbing fittings, which I had lots of, and managed to pick up a few items I thought I would need, and came up with what you see pictured here.

The main idea was to have this device

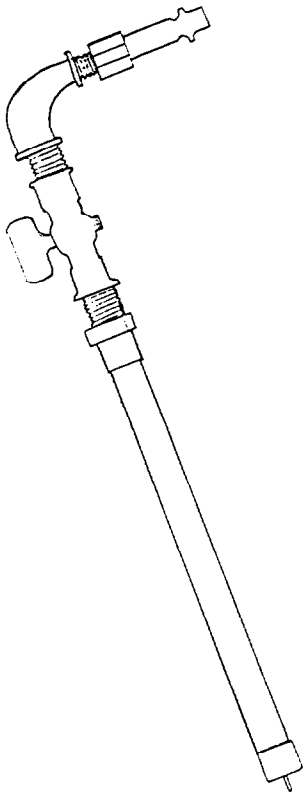
made as two separate parts; the cylinder part to accept the mixed epoxy, and the second part to screw into it which controlled the air.

If anyone wants to make this for themselves, here's a list of what you will need. The most expensive item will be the air cock, and depending if you want to use 1/4" or 3/8" pipe fittings. Altogether, all the parts shouldn't come to more than $12 depending on where you buy them.

1 piece 1/2" copper pipe 5" or 6"
1—1/2"copper cap
1—1/2" copper by 3/8" female pipe thread adapter
2—3/8" x close black nipples
1—3/8" female both ends air cock
1—3/8" x 1/4" black reducing 90 elbow
1—1/4" x close black nipple
1—1/4" female pipe thread air flow fitting

I'm not sure of the correct terminology on that last item, but whatever fitting your air compressor has, this has to be able to adapt to it.

To assemble this, start by soldering the cap to one end of the pipe and the copper threaded adapter for female pipe thread to the other end. After letting the solder cool, take a #7 bridge pin and very carefully drill through it a .042 hole. Then drill a .086 hole in the cap to accept the bridge pin and solder it in place. The end of the bridge pin should not poke through more than the thickness of the cap or else the epoxy will tend to dam up and maybe even clog the hole in the bridge pin.



So far, this is one half of the completed tool. The other part now consists of screwing a nipple into the air cock (both ends) and then attaching the reducing elbow, along with the smaller 1/4" nipple for the air hose fitting. The tool is now complete.

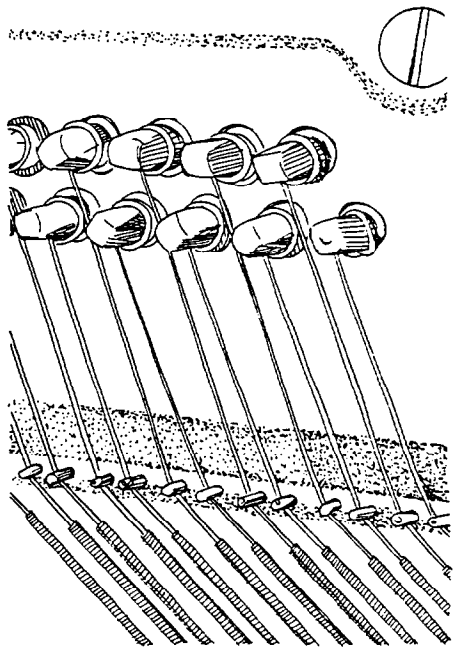
To use this, pour your mixed epoxy into the copper pipe, and then screw on hand tight the remaining part. Set the compressor to 5-10 lbs. and attach the air hose. You now can control the flow of the epoxy from the air cock. It has been my experience in working with bridges that the flow is just right with the diameter hole of .042 in the bridge pin. The bridge pin will almost insert itself into the holes, and I even took a small file and shaped the end of the bridge pin so that it is slightly pointed. In filling all the holes in a bridge, I refilled the chamber twice. The total time to get all of this done is about 20 minutes.

It also works very well with gap filling around a routed out section of pin block. If you need a faster flow, drill a .070 hole in the bridge pin. The uses are endless, and I suppose you could also use glues instead of epoxy. Remember to clean the excess out with a rag and let the two halves stay separate, with the pipe or chamber part standing with the bridge pin pointing up so that any epoxy will run down and you won't get the hole clogged. (Even if it did clog, just drill it out again.)

If this sounds like too much trouble to make, or you don't have a friend who is a plumber, maybe something can be worked out price-wise and you can have one made for you. It only took me 15 minutes to put one together.

The same thing can be made using 1/4" fittings instead of 3/8" but I chose the larger for ease in getting the epoxy into and the cleaning out of the chamber. Also, once the chamber is empty, you can use the air to clean all the excess epoxy off the bridge. The small hole in the bridge pin makes for directing a fine stream of air wherever you want it. It doesn't even hurt to increase the air pressure because you still have pretty good control of it with the air cock.

One other thing to remember: when you shut the air off, the epoxy will continue to flow for awhile. So keep your cup handy that you mixed the epoxy in and just let the stuff dribble back into the cup.



If a job requires a lot of epoxy, the chamber size can be increased to 3/4" copper pipe instead of 1/2," and there are reducing fittings made so that the other parts all stay the same and adapt very nicely.

Good luck if you try it and I know it will save on your back!

Next, we have a query about a problem with tuning pin bushings (see illustration). I have never encountered the problem myself, and the technical representatives of the companies mentioned in the original letter were not familiar with it (although they are now checking into it). Here again, perhaps someone among the readership has encountered the same situation and has a solution to offer.

I have a problem that I have been unable to solve, even by asking for advice from others. It is occurring on several brands of Asian pianos that are seven to nine years old. The problem is the bushings are turning with the tuning pins and since the bushings are not drilled in the center, this makes setting a pin or tuning almost impossible. I have been tuning these pianos ever since they were new and each one was a very easy piano to tune. I have tried to wedge the bushing to the outside by pounding down with a screwdriver, awl, and other devices, of which none work. I have had one suggestion which was to use pin dope. Now, as I have never used the dope, I am afraid to try it because it ruins pin blocks.

The cause of this problem is easier to figure out. It has to be due to green bushings,

which have shrunk through the years. Also, I have only noticed this problem in the winter months, which in Michigan is the driest time of the year.

The way to check to see if the bushings are turning with the pin is to mark the bushing with a lead pencil, or else you can't see it move.

Harry Buyce

It does seem logical to suspect that excessive dryness during the winter months is at least a partial culprit, and that a climate control system to increase ambient humidity is indicated. After all, if the tuning pin bushings are becoming this dry, it stands to reason that the remainder of the piano is doing so as well, with equally damaging effect. No manufacturer's piano can be expected to stand up to climate extremes of this nature. Any other comments?

The final two items are a little longer. One is the kind of thing which I find to be pure pleasure reading—no "useful" technical information, but interesting background and a fascinating look into one of the innovative minds of the piano industry. My thanks to Kent Gallaway for sending this material for the astonishment of us all.

The final item is a very useful and comprehensive guide for troubleshooting noises. As we all know (sometimes to our frustration and sorrow) anything in, on or near a piano is capable of producing just the wrong noise at just the wrong time. While it would be impossible to catalogue all the possible culprits, Brian De Tar has done an outstanding job outlining the likely, the usual and even some of the obscure sources for that noise.

I have just finished rebuilding a piano that I think other technicians would be interested in. The piano is a Julius Bauer 5'8" grand piano circa 1925 that has some features which are noteworthy.

This piano design allows the removal of the plate and the soundboard leaving the rim, keybed and damper action. See pictures and copy of letters patent.

I can see an advantage here that should be noted. The rigidity of a metal plate is well suited for containing a soundboard in its proper shape. The adjustability of the soundboard crown is something I haven't tried yet. In any case, my hat goes off to Mr. Bauer for being nonconventional and innovative.

Kent Gallaway

Specification of Letters Patent
Patented Feb. 15, 1916
Serial No. 846,525.

To all whom it many concern:

Be it known that I, William M. Bauer, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pianos, of which the following is a specification.

My invention relates to certain improvements in piano construction, which are applicable to all types of pianos.

The primary object of my invention is to enable the so-called wooden "back" usually employed in the present construction of pianos to be dispensed with. This feature, which is the bed or bottom of a horizontal piano and the back of an upright piano, and upon which the sounding-board is supported, is formed of massive wooden beams. It not only adds materially to the cost of construction, so that entirely dispensing with it reduces the expense thereof, but being subject to swelling and contracting under the influence of variations in the temperature of the surrounding atmosphere, it tends to disorganize the whole structure of the instrument and detrimentally affect the pitch.

Another object of my improvement is to provide for incasing the wooden pin-block in the metal plate; and a still further object is to provide means for adjusting the contour of the sounding board by increasing when needed, its crown.

For the purposes of illustration and description, my improvements are shown in their application to a grand piano in the accompanying drawings, in which:—

Figure 1 is a broken plan view of the body of a grand piano showing my improvements; Fig. 2 is an enlarged section on line 2, Fig. 1; Fig. 3 is an enlarged section on the irregular line 3-3, Fig. 1 and Fig. 4 is an enlarged section on line 4, Fig. 1.

The wooden case (5) of the instrument may be formed in the usual manner. For a grand piano, this case is composed, as usual, of a plurality of wooden layers cemented flatwise together and bent in a suitable form into the desired configuration. The metal plate (6) is a casting formed with a skeleton center within a comparatively wide metal rim (7) of T-shape in cross-section conforming to the wooden case and fastened to

W. M. BAUER.
PIANO.
APPLICATION FILED JUNE 22, 1914.

1,171,921. Patented Feb. 15, 1916.
3 SHEETS—SHEET 3.

Fig. 3.

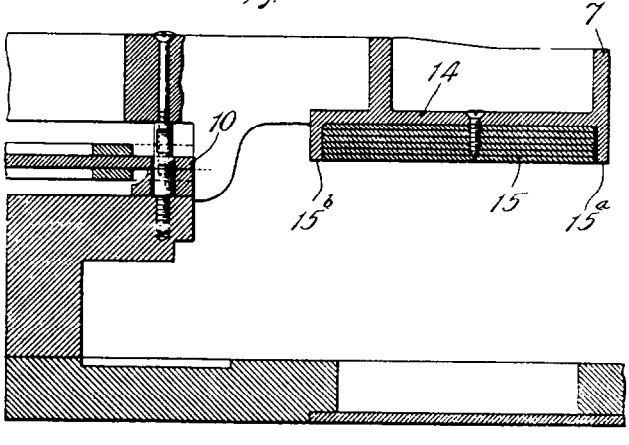
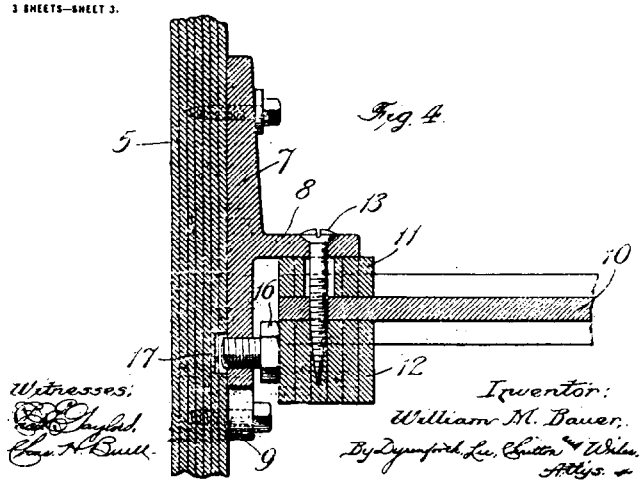


Fig. 4.



the inner face of the latter by upper lag-bolts at intervals and similar lower bolts passing through ears (9) extending from the lower edge of the rim. To the under face of the web-portion or ledge (8) of the rim is secured the sounding board (10), which, in itself, need contain no feature novelty. A strip (11), formed of layers of wood cemented flatwise together, is preferably, but not necessarily provided to extend about the upper face of the sounding board near its edge, to the contour of which it conforms; and a similar but somewhat thicker reinforcing strip (12) is secured, as by cementing, to the opposite face thereof to extend coincidently with the strip (11). Screws (13) are passed through screw-holes formed at intervals in the ledge (8)and through the strips (11) and (12) and the sounding board to secure the latter in place on the rim (7). The screw-holes in the strip (11) should be of the relatively large diameter shown, to permit "crowning" of the sounding board as hereinafter explained. Thus the sounding board, instead of being carried, as is the present common practice, by a massive wooden "back," is carried by the rim (7), which reinforces the frame (5) and enables the back to be entirely omitted, with the advantages hereinbefore mentioned.

The flat perforated metal section (14) usually formed in the forward end of the metal plate for carrying and covering the wooden pin-block (15), is provided with outer and inner depending flanges (15a and 15b) to embrace and thus, with the forward-end section of the rim (7), reinforcingly encase the pin-block.

The crown in a piano sounding-board is liable to become more or less flattened out in time, requiring the board to be re-warped. To enable this to be done readily, as by a tuner in tuning the instrument, and thus save sending the latter away for repairing, I provide set-screws (16) in accessible position at intervals about the sounding board for warping the latter into the required "crowned" condition by turning them more or less slightly. The preferred position of these set-screws is that shown, of working at intervals in threaded holes in the lower part of the rim (7), where recesses (17) are provided to coincide with them in the inner face of the frame (5), and with their hexagonal heads abutting against the outer face of the strip (12), whereby properly turning the set-screws, as by application of a suitable wrench, will compress the strip and produce the desired "crown."

I realize that considerable variation is possible in the details of construction thus specifically shown and described, and I do not intend by illustrating single, specific or preferred embodiments of my invention to be limited thereto; my intention being the appended claims to claim protection upon all the novelty there may be in my invention, as broadly as the state of the art will permit.

What I claim as new and desire to secure by Letters Patent is:—

1. In a piano, in combination with the piano case, a metal rim secured to the inner face of the case and extending about the same and provided with an inwardly extending ledge, a sounding-board provided at each side of its edge portion with a wooden reinforcing portion firmly secured thereto and screws passing through the ledge at intervals and threaded into the reinforced portion of the sounding-board whereby it is secured to the ledge.

2. In a piano, in combination with the piano case, a metal rim secured to the inner face of the case and extending about the same and provided with an inwardly extending ledge, a sounding-board provided at each side of its edge portion with a reinforcing portion being firmly secured to the edge portion of the sounding-board, and screws passing through the ledge at intervals and threaded into the reinforced portion of the sounding-board whereby it is secured to the ledge.

5. In a piano, in combination with a piano case, a metal rim secured to the inner face of the case and extending about the same and provided with an inwardly extending ledge, a sounding-board provided at one side of its edge portion with a wooden reinforcing portion firmly secured thereto, screws passing through the ledge at intervals and threaded into the reinforced portion of the sounding-board whereby the sounding-board is secured to the ledge, and set screws threaded into the rim at intervals with their heads bearing against the wooden reinforced portion.

6. In a piano, in combination with a piano case, a metal rim secured to the inner face of the case and extending about the same, provided with an inwardly extending ledge, a horizontal sounding-board provided at each side of its edge portion with a wooden reinforcing portion firmly secured thereto, screws passing through the ledge at intervals and through openings of greater diameter than the screw formed in the upper reinforcing portion, said screws being threaded into the sounding-board and the lower reinforcing portion, and set screws supported at intervals in said rim to abut their heads against the outer face of the under reinforcing strip.

William Bauer

Troubleshooting Noises

Brian S. De Tar

When troubleshooting noises, it is important to first ascertain where the noise is coming from. The biggest mistake that is made seems to be that we try all the tricks we know first and then get frustrated when the noise still exists. Take the time to attempt (I stress the word "attempt") to determine where the noise is coming from and the circumstances which preclude the noise. It is often possible to pinpoint the location of the noise by doing a little bit of detective work. Determine what causes the noise in the first place and then what conditions either increase or decrease the noise. For example: "Noise is evident when the sostenuto pedal is engaged but not when the damper pedal is engaged before the sostenuto pedal." Once you determine this, take one "fix" at a time, then determine the outcome. If the noise is gone, consider yourself lucky. If the noise is still there but has changed, use this information to dictate which solution you will try next. Occasionally, it is possible to determine the source and, naturally, the repair, by looking for specific *combinations* of symptoms. For example, in a grand, if you hear a knocking sound when you play a note but it disappears when you depress the soft (or shift) pedal, you know that you need to change the position of the action in relation to the damper lever. Try to keep in mind the philosphies: ""Measure twice; cut once" and "Fix it right the first time!"

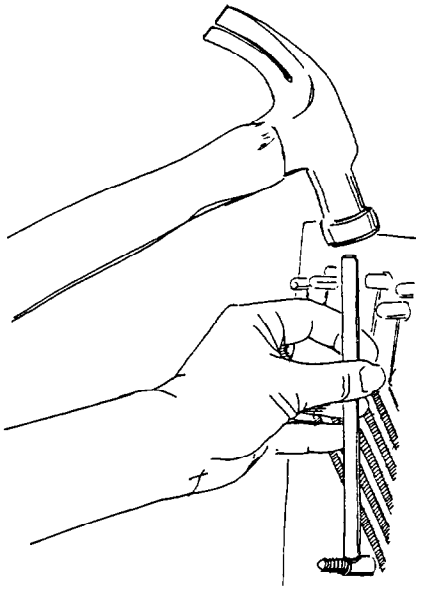
Clicks

Cause	Solution
Hard Dampers.	Replace. In an emergency, you can sometimes needle.
Loose glue joints: hammer, catcher, jack flange or jack tails, key buttons.	Disassemble parts and reglue.
Loose screws: hammer flange, wippen flange, damper, all rail screws (hammer, wippen, damper, damper stop, jack), cheek blocks, case parts, music rack, etc.	Remove action and bottom panel. Tighten all screws (in cluding damper screw!!). There are approximately 390 in the action alone!
Hammer rest rail nuts loose.	Remove action and tighten.
Key pins loose.	Remove pin and either glue-size the hole or plug and redrill.
Teflon	Replace.
Hard or non-existent key bushings.	Replace.
Damper guide rail bushings hard or non-existent.	Replace. In an emergency, you can sometimes needle.
Keyframe un-bedded.	Bed keyframe. After adjusting each glide bolt, check all previous glide bolts to make sure they are not being raised by the bolt being adjusted.
Strings touching screw at capo bar (uprights only).	Using a spacing tool, move spring away from screw.
Over-lacquered hammers.	Replace. It is sometimes possible to "wash" the hammer with acetone and remove enough lacquer to restore the hammer. This is a rare occurrence, though.
De-humidifier heating elements.	Make sure bracket screws and push pins are tight. Line brackets with bushing cloth.
Backchecks loose on wires.	Replace backcheck.
Hard backchecks or hammers catching too high (especially if excessive glue was used).	In the case of hard backchecks, replace them. It is not usually possible to salvage them.
Repetition lever height adjusting screw and felt. Either hard or missing.	Replace felt.
Repetition lever spring; clicks in groove or on wippen near jack. Spring too loose or broken.	Re-bend or replace spring.
Let-off button. Hard, missing, too much glue, or the wood button is loose on the screw.	Replace felt or tighten the button on the screw.
Capstan felt hard or missing or capstan loose in the wood.	Replace the felt. It is sometimes possible to needle the felt, but this should be reserved for "emergency" situations only!
Keystop rail. Loose screws, nuts, or rail is too low. Also, missing felt, too much glue or glue bleed-through.	Tighten screws, nuts; adjust rail to proper height. Replace felt.
Hammer rest rail. Missing felt or too much glue. Also can be a section of cloth that has hide glue on it but did not adhere to the rest rail.	Replace or reglue felt.
Damper stop rail.	Remove action, adjust damper stop rail and tighten screws.
Loose action rails.	Tighten screws or, in the case of Steinway actions, re-solder.
Loose joint in key (at key button or capstan platform.)	Permeate the area with thin "Super glue."
"Over-striking" hammers, or a pinblock that has not been beveled at the flange (exposed or under-side or pinblock).	Replace hammers. Bevel under side of pinblock.
Keyframe guide plate (in cheekblock) improperly adjusted.	Adjust to proper specs.
Damper stoprail screws too loose; felt missing or glue bleed-through.	Tighten screws. Replace felt.
Excessively loose center pins.	Repin flange.
Damper head loose on wire or in collet.	Remove wire, glue size or plug and drill hole. Tighten screw in collet.
Bridle strap wire touching backcheck wire.	Bend bridle strap wire so key does not "wink" when soft pedal is depressed.
Jack spring dislodged from hole; excessive glue.	Clean excess glue from spring and replace spring.
Gap between action bracket bolt and action bracket.	Remove the action. Place a punch behind the threads of the bolt and tap down until it exerts pressure on the action bracket. (See illustration.)
Damper lever felt worn or missing; excessive glue or bleed-through.	Replace felt.

Cause	Solution
Damper rod hooks loose in hanger or felt worn or missing.	Swedge hanger or replace felt.
Jack center pins just touching.	Re-position wippens or file center pin if it is too long.
Hammer shank touching the repetition lever height adjusting screw.	Hammer too low. Raise capstan.
Loose ivory.	Remove and reglue.
Jack adjusting screw. (Worn or missing felt or the screw is sticking through the felt.	Replace felt.

Squeaks

Cause	Solution
Damper springs.	Remove spring from slot, clean and lubricate slot with graphite from a pencil.
Hammer springs.	Same as above.
Damper Guide Bushings.	Replace the bushing or, in a pinch, clean the hard crust from the bushing and lubricate with graphite from a pencil.
Loose legs or lyre.	Tighten bolts/screws or, in the case of degenerated wood, plug and redrill. Ascertain that the lyre prop rods are tight in their holes.
Pedal rods. Especially those with rubber cups in the pedals.	Determine where the squeak is coming from and clean it thoroughly. Use "Dry-Lube," dry teflon powder or its equivalent to re-lubricate.
Hard key bushings.	Replace the bushing or, in a pinch, clean the hard crust from the bushing and lubricate with "Dry-Lube", dry teflon powder.
Repetition spring rubbing in dirty or unlubricated repetition lever slot.	Clean and lubricate the slot.
Polyester finish; pieces rubbing against each other.	Make sure *all* screws and bolts are tight. If the squeak persists or gets worse, remove the finish by scraping with a sharp cabinet scraper or plane. On small surfaces, use a chisel. It must be *very* sharp! In the case of cheek blocks, (the most common source of polyester squeaks), the finish need only be removed from the side of the cheek blocks. *Do not remove any finish from the side of the case!!*



Groans

Cause	Solution
Jack rubbing against knuckle or butt.	Lubricate knuckle with "Dry-Lube" dry teflon lubricant.
Pedal rods and pedal pivots.	Remove rods and clean. Lubricate with "slipspray" or a similar teflon spray lubricant. Disassemble pedal box pivots, clean and lubricate with "Dry Lube" dry teflon lubricant.
Keybed (when soft pedal is used).	Clean keybed bottom rails (front and back), glide bolts, and the groove in which the shift rod lip fits into. Lubricate with "Dry-Lube" dry teflon lubricant. Clean shift spring and side of keyframe and lubricate with "slipspray" or similar teflon spray lubricant.
Polyester finish; pieces rubbing against each other.	Make sure *all* screws and bolts are tight. If the squeak persists or gets worse, remove the finish by scraping with a sharp cabinet scraper or plane. On small surfaces, use a chisel. It must be *very* sharp! In the case of cheek blocks, (the most common source of polyester squeaks). *The finish need only be removed from the side of the cheek blocks. Do not remove any finish from the side of the case!!*
Loose legs or lyres.	Tighten bolts/screws or, in the case of degenerated wood, plug and redrill. Ascertain that the lyre prop rods are tight in their holes.
Action rails (primarily in uprights when the sustain pedal is engaged).	Tighten action bracket screws.
Hammer rest rail (uprights).	Remove hammer rest rail pivots and lubricate with "Dry-Lube" dry teflon lubricant.

Rattles

Cause	Solution
Hard dampers.	Replace the damper. It is sometimes possible to needle the damper, but this should be reserved for "emergency" situations only!
Damper guide bushings that are either hard or missing.	Replace the bushing.
Loose leads (keys;dampers)	"Swedge" lead with star punch while supporting underside.

Buzzes

Cause	Solution
Cracked soundboard or loose ribs.	Shim soundboard and reglue ribs. Remember; when there is a crack in the soundboard, there is also a loose rib where it bisects the crack.
Picture frames.	Somehow, immobilize the glass in the frame. Don't just move it around until it stops because chances are, as soon as you leave, the buzz will return.
Lamps.	Tighten the loose nut or shade. (And you thought you only serviced pianos!!!)
Bees, doorbell, seat belt and door alarms.	You didn't expect me to go all the way through this without some sort of silliness, did you?!!
Strings; bass string wraps; treble strings where they go through agraffes and bridge pins; and bass and treble stings at the hitch pins. Also check for any screw that may be just touching a string.	Check the notching of the bridge. The string should leave the center of the bridge pin and the bridge at the same time. Tap all strings down on the bridge (grands only) and check the agraffe for burrs or wear. If the agraffes are not worn and there are no burrs, seat the strings using a string hook. Make sure your string hook has been polished very smooth so as not to scratch the string.
De-humidifier heating element	Make sure bracket screws and push pins are tight. Line brackets with bushing cloth.
Locks and lock plates.	The strike plate (on most pianos) is installed *before the finish is put on the piano!!* If you attempt to remove it, you will damage the finish and create more work for yourself. Disassemble the lock from *underneath* the stringer. The source of the buzz is *usually* the spring. In recent years, manufacturers have wrapped this spring with cord. If the spring is not wrapped, use thin bushing cloth and wrap the spring loosely. If the lock cannot be removed from underneath, apply a small amount of glue to a cotton ball and force it in through the top of the lock by depressing the plunger.

Knocks

Cause	Solution
Loose legs or lyre.	Tighten bolts/screws or, in the case of degenerated wood, plug and redrill. Ascertain that the lyre prop rods are tight in their holes.
Keyframe un-bedded.	Bed keyframe. After adjusting each glide bolt, check all previous glide bolts to make sure they are not being raised by the bolt being adjusted.
Sostenuto rod catching tab of one or more dampers.	If there are many dampers that are catching, check the position of the sostenuto rod. Reposition it further away from the sostenuto tabs. In the case of individual tabs catching, check to see that there is no obstruction on the tab itself (glue, primarily). If there is no obstruction, *gently* bend the damper wire away from the keyboard so as to move the tab away from the sostenuto rod.
Key leads. (Loose or expanded to the point of hitting each other).	Remove loose lead and either glue size or plug and redrill the hole. Occasionally, you can expand the lead by using a punch. Be careful to not split the key!!

"Whooshes" and "Scratches"

Cause	Solution
Grand dampers. (This complaint is usually heard) from recording studios.	This is a toughy because it is the nature of the beast due to the natural grain of damper felt. There are, however, some dampers that are worse than others due to coarse or very hard felt that was used. In this instance replacing the dampers with quality felt will significantly help the situation. In the case of a recording studio, *tactfully* try to get the engineer to reposition the upper microphone. A very satisfactory setup (depending on the microphone used) is to have one mike above the piano near the treble area. Place the other mike underneath the center area of the piano. Care must be taken to ensure that the "phase pattern" of the microphones do not interfere with each other. One other trick is to adjust the sustain pedal so there is no lost motion between the damper tray and the dampe levers. (The dampers will be just sitting on the strings). This type of adjusting should be done only on a piano that you see on a regular basis (like every week) as it is *very* sensitive to humidity changes.
Hammers rubbing against a neighboring hammer (or backcheck in the case of a grand).	Properly align hammers to strings. Make sure the sides and tails of the hammers have been properly beveled to ensure passing clearance.
Felt rubbing against a neighbor. (Knuckle, drop screw pad, backchecks, wippen pad, damper lift felt, damper felt, catcher felt or buckskin.)	Trim excess felt to allow clearance.
Glue sliver against glue sliver or wood.	Remove excess glue.
Slivers of wood. (Usually keys but it can be from wippens, butts, catchers, damper levers, jacks, etc.)	Depending on the size of the sliver, either remove it or glue it back in place.

Zings

Cause	Solution
Strings—treble and bass.	Where do we begin? There are so many causes for "zinging" strings that this has to be a sort of "seat of the pants" type of explanation. The solution will depend on the "color" of the zing. The most obvious source of a zing is agraffe noise. This has a metallic sound accompanying the zing. When the zing is more muffled with lower over tones (sort of a "woody" zing) it is caused by hard spots in the hammer. Surprised? So was I when I figured it out!! To eliminate this noise, sparingly needle beneath the crown and high on the shoulders. It won't take much and the area that is responsible is not always the same so go slowly and check often; a few jabs then listen closely to how the zing has changed. What you are feeling (yes, that's right—*feel!*) for are small pockets of felt that are harder than the surrounding areas. They are always at or near the crown. In the case of bass strings, the zing is more of a combination of zing and howl. In this instance, the cause is the same but the needling that is necessary is a bit more liberal in nature. Deeper needling is sometime necessary in the upper shoulder to minimize the howl part of the zing.
Agraffes.	The usual source of agraffe noise is when the agraffe is not completely countersunk or beveled at the hole where the string exits. It is sometimes possible to use a string hook to lift the string enough to eliminate the noise but it is just as often that the solution lies in *lowering* the string a bit. What it really amounts to is taking out or introducing a *slight* bend in the string. This bend should occur on the *non-speaking* side of the string, but, as is usually the case, there are exceptions. It is sometimes necessary to *gently* lift the string on the speaking side of the agraffe. Care should be taken that a kink is not put into the string. This is done by using a "stroking" type of move ment along as much of the string as is practical. Care should be taken when approaching the dampers. String level should also be checked after any strings are lifted. ≣

Before The Concert With Jeffrey Kahane

Rick Baldassin
Tuning Editor

The aura of Jeffrey Kahane's success in both the 1981 Van Cliburn and 1983 Aurthur Rubinstein Competition (first prize) has never been diminished and continues to be reflected in his busy schedule of performances with leading orchestras both here and abroad.

Mr. Kahane made his Carnegie Hall debut in 1983 in a special concert tribute to Aurthur Rubinstein. He was one of three pianists chosen in Lincoln Center to inaugurate a new piano series at Alice Tully Hall in the Spring of 1986 entitled "The Next Generation: Three Stars of Tomorrow."

In April, 1989, Jeffrey Kahane came to Salt Lake City to perform with the Utah Symphony. The following is from a conversation I had with him moments before the concert.

Rick Baldassin: I would like to start off by asking you if there is anything particular that you would like to express to this group of piano technicians?

Jeffrey Kahane: Well, I think that probably I wouldn't say anything that hasn't been said many times before. First of all, I think most of the good technicians I know understand how dependent we are on the quality of the technician's work, and not only that, but his or her attitude towards the work. I have found on occasion that some very fine technicians have made me feel like they were doing me a big favor by doing anything, much less anything significant. Also, I have occasionally, not often, but occasionally run into technicians who take it as a personal affront if you have a criticism of the piano. Most pianists don't feel that way at all. I mean sometimes pianos just have problems. Sometimes you can fix them and sometimes you can't. It depends a lot on the circumstances and the amount of time you have. I am extremely sympathetic to the plight of technicians who have to deal with orchestra managements and universities that don't want to spend the money to keep a piano in shape. I am very aware of the problems that can cause. Very often the people who own the piano don't understand what it takes to keep a piano in tip-top shape. I almost wish I could express my views to these managements. It is very refreshing when you do run into a place that understands 1) that this is a tremendous investment and 2) that we owe it to the artist and the technician to do whatever we can. I have found this problem not only in small places, but in some surprisingly big halls, as well. One of my favorite stories was with an orchestra, which shall remain nameless, but is not an insignificant one. I went down there to play a Prokofiev Concerto, which requires a finely regulated action. The repetition has to be perfect, it has to be fast, and the piano has to project. I started playing some passages that had repetition, and nothing was working. I said to the management person who was in charge of looking after me, "When was the last time this piano was regulated?" And she said to me, "Regulated, what does that mean?" No one on the orchestra staff even knew that a piano needed to be regulated, and it turned out that it had been six years since anyone had worked on the action. These kinds of things are frustrations that I share with technicians. I suppose if there were anything that I would like to express to technicians at large, it would be that most of us are appreciative of the work that you do. There is one thing, going back to what I said about the occasional technician, who seems to take it as a personal criticism if you criticize the piano, or those who seem not to want to bother doing very much work, and that is that most of the pianists I know are very, very happy to try and give as much credit as possible to the technician when the piano works well. But I think the thing that some people forget, is that when the technician isn't helpful, doesn't do a good job, or doesn't want to bother, the artists are usually criticized for it. It is very unusual for anyone to think when someone is having trouble with repeated notes or if the piano doesn't project, or sounds too harsh or too muted, that the piano may be at fault. Nine out of ten times, the criticism will be directed at the pianist. Again, I want to stress that I don't direct this at the majority of technicians that are out there, but it is an experience I have had, and I think that it is always a great frustration when you don't get the kind of support, feedback, and help that is so important. Pianists are the only instrumentalists that have to deal with this. There are those rare and fortunate people among us that are knowledgeable enough and skilled enough that they can make little adjustments if they need to, but I am not one of them, I am sorry to say.

RB: Outline for me then what you would consider to be the ideal situation with the management and technician. You are coming in to play a concert. How would you like to see things handled, ideally?

JK: Very often, because of our traveling schedule, we have very specific time requirements in terms of when we can get to the hall and practice, when we can meet with the technician, and so forth. Very often we don't have any way of adjusting our schedule. We come in the morning, we need to get some rest, something to eat, and very often I have found that not enough thought has been given on the part of the management to arranging things so that the technician can be there when you want to talk with him, either at the end of the time when you are trying the piano out, or the beginning. So I think the ideal thing, and of course, generally speaking, the bigger and better the organization, like here in Utah, the more likely you are to find that these things have been worked out, but the ideal situation for me is when I find that the technician is there when I try the piano out, he or she is willing to be there when I am done practicing, and, I might add, willing to stay on call during the concert, because I can't tell you the number of times, it is really almost shock-

ing the number of times

I have had problems right before a concert, or during a concert. And on rare occasions when a hammer shank has broken, or a string has broken, or a pin has fallen out in the middle of a concert, on rare occasions I have been lucky and the technician has hung around. But more often than not, either because the management is unwilling to pay for the technician to stay on call, or whatever the case may be, you are just stuck. What can you do?

RB: So you feel then if more managements were willing to have technicians stay on call during the performances, that this is something that would help your situation, and make you feel more at ease?

JK: Definitely. Definitely. As every good technician knows, and every good pianist knows, but not too many presentors know, even the best piano, and the best tuned piano will slip a little during the course of an evening's playing, especially in a demanding solo program. One little unison that goes out, when you are listening as carefully as a pianist needs to listen to sound, and trying as hard as you can to make the instrument sound beautiful, one or two little beats in there that you don't want to hear, can be very disconcerting and really distracting. Having someone there who can go on and clean that up is just great. It is strange that we should think of this as a luxury, but we do. Most places just don't provide for this. This is one of the things that means a lot to me. Even to have the technician around right before the concert to give the piano a "last minute, once-over" is tremendously helpful.

RB: From reading your biographical information, I notice you have been involved in several piano competitions. What it is like in a competition situation to choose a piano, and how much do the instruments change over the course of the event, being played so much?

JK: I remember the first really big competition I was in was the Van Cliburn Competition. I had been in some other international competitions prior to that, but this was a big one. They had six pianos, and I had very little experience at that time chosing pianos, and knowing how to choose a piano for a particular hall. I remember staying up late into the night that first night after we tried the pianos, agonizing over...

RB: The one you had chosen?

JK: Yes, and was it a mistake, and was it the right one for me, and for the hall? That is very difficult. I think the more choices you have, in a certain way, the more difficult it is, the more confusing it gets. The Rubinstein Competition in Israel had two very beautiful Hamburg Steinways, and also they had a Yamaha. I didn't have a problem chosing a piano there. One of the amazing things about that competition was that they had a very fine technician who works for the Israel Philharmonic, who was there from morning until night every day of the competition, and he would go out and tune the piano after every contestant, basically every hour, just to make sure that nobody could walk off and say, "Well, I had a couple of unisons, out, and my sound wasn't as good." I thought that this was a real demonstration of how seriously people take it over there. I found this to be true in Europe, as well. I was in a competition in Switzerland. We used different pianos for different stages of the competition, because these different stages were in different places in the city. Every instrument was just absolutely superb, and superbly maintained. I think European orchestras and presentors in general, perhaps have more of a sense of how important this is, or maybe they just have more of a budget. I found this to be true in the competitions, as well.

RB: What different types of pianos do you find in the concert halls of Europe, as compared to the United States?

JK: The standard piano in European concert halls is the German Steinway, although they are starting to show up more here. I played one a couple of weeks ago in San Francisco, and one in Colorado recently, and here and there you do run into them here in this country. It is a very different sound and different feeling from an American Steinway. I am not even sure I could put it into words.

RB: It is to me as though they are two different makes of piano. They could just as well be two makes of piano, they are so different.

JK: They really are. I used to have, I will confess, a strong preference to the German Steinway, but now I find that if either of them is really good, they are as good as pianos get.

RB: So, mostly you find the German Steinway in European halls. Are there any other makes that are used regularly?

JK: Now that I think of it, if I think back over the last few years, I don't think I have played anything other than a German Steinway, There are places that have Bechsteins and Bosendorfers, especially in Austria, you find Bosendorfers a lot.

RB: How do you feel about the appearance of so many different pianos on concert stages here in the United States?

JK: I think it is a healthy thing. I will have to say that I am bothered by the pressure on pianists to align themselves with one or another piano company, because I find that one can find great pianos among almost all the major makes. Some perhaps more frequently than others, but it is a real shame when a pianist gets someplace and there are two pianos, or three for example, one of which may be the piano that this person is endorsing, but which, in this particular case, is far inferior to the others. I have had experiences like this in the past. I just think it is unfortunate that the companies feel that they have to enforce that kind of thing. I think in a way, the competition is very healthy. When a company feels that everybody is going to play their piano no matter what, there may be a tendency to rest on their laurels a little bit, let things slide, and not keep the quality up. I think some of the companies which are not so well-known for making quality pianos are trying very hard to produce quality, and I think that is good for everybody. I think it is a good thing. I wish that we could just be free to play whatever piano we liked...

RB: Whichever was the best for that recital?

JK: Exactly! That is a real important point. The idea that one piano is going to work for everything doesn't hold true very often. I have on rare occasions found a truly, truly great piano. I can count on my two hands, in ten years of concertizing, the truly great instruments that I felt I could sit down and play a Mozart Concerto, and turn around and play the Rachmaninoff 3rd. But most instruments are not like that. That doesn't necessarily mean that they are not good, just for some reason, they don't have that kind of flexibility. Our friend Larry Sinz suggested to me that the Falcone Company was considering having an additional action available with their piano, so that you could have a piano with a Mozart action and a Rachmaninoff action, or a Mozart set of hammers and a Rachmaninoff set of hammers. I think there something to that.

RB: How influenced would you say pianists are by names on fallboards?

JK: Very. Very. I can tell you that I myself have been very suspicious of certain pianos. I think that it is very hard for us to overcome prejudices which are laid upon us from the time we are small. For example, I think of Yamaha, which is a piano that people don't think of as a real fine concert instrument. I have recently played some Yamaha pianos, just in the past few months, which were really outstanding. And I can testify to the fact that a number of my colleagues, who most of the time play Steinway, or one of the better-known concert instruments, have had similar experiences. And of course, a piano like the Falcone has astonished a lot of people. No one had even heard of it. There are, of course, other examples of this. I think that a great Steinway is as great as any piano in the world, but I don't think it is right to assume that just because a piano doesn't say "Steinway" on the fallboard, means that it can't be a really great piano.

RB: On this concert, you are playing two very different pieces. How difficult is it to play two very different pieces on the same program?

JK: It is very difficult. It is a very hard thing to switch gears from something as drastically different as Mozart is from Bernstein. Even to go from Mozart to Brahms is a challenge. To go from Mozart to Bernstein, is just a completely different world of sound, technique, and everything. Actually, I have enjoyed the fact that for the Mozart Concerto I am playing sort of the rounder and softer of two instruments, and then being able to switch to the more gutsy, powerful instrument for the Bernstein. It is kind of a nice thing. It is not often in an orchestral situation that one plays two works on a program. It is fairly rare. Of course, in a recital, that is always a frustration. I almost always find, wherever I go, that when I play a recital program, if I want to have a fairly varied program, the piano is going to work better for some things than for others. As I said, there are those rare exceptions. Unfortunately, in a recital, you normally...

RB: You can't switch?

JK: You can't switch.

RB: Which present more problems for you as a performer, technical problems or sound problems, or do you differentiate between the two?

JK: I have found that voicing problems are generally much easier to solve, at least in a short amount of time, and generally speaking, because of the way our schedules work, there is usually not much time for the technician to do something major, if something major needs to be done. I have found many more intractable technical problems with repetition, sluggishness, or whatever the case may be, than I have with voicing problems. Of course, there are always those instruments that just either don't have enough sound, or are too explosive and you can't control when you try to play soft, but that kind of thing you can sort of accustom yourself to. You can't accustom yourself to...

RB: Notes that won't repeat?

JK: Notes that won't repeat, and that kind of thing.

RB: For the Mozart Two Piano Concerto that you are playing, is it unusual to have the pianos positioned where they are? In this case, the other pianist is conducting, as well, so his piano is facing the orchestra, and you are seated facing the audience. It seems very unusual to me. Is it done very often this way, and is it unusual to play this way? The lids are off both pianos, and it seems a very unlikely arrangement.

JK: As far as having both lids off, any time you do a double concerto like this, you would almost have to take both lids off, which you wouldn't have to do, necessarily, if you were just playing a two piano recital. I have never played this piece before with the other pianist conducting, so it almost necessitates this kind of unusual arrangement. The only thing that is really strange for me is looking out at the audience. All of a sudden, I have great sympathy for singers, and now I really understand what they go through when they get up before the audience.

RB: Because they have so much eye contact?

JK: Exactly.

RB: Is the eye contact more distracting?

JK: It is in a way, but once you start playing, you are focused in on that.

RB: Would this type of set-up arrangement be considered more characteristic of the period? Quite often in this time period, the keyboardist did conduct the orchestra.

JK: I don't think they would have done it this way. First of all, I don't think the lids were removed from the forte-pianos, and the instruments were so much smaller, and didn't take up so much room. The orchestras were often led both by the concert master and the pianist. I am not sure how they would have done it, but I imagine it probably would have been done with the more traditional, interlocking arrangement, with the pianos parallel to the edge of the platform, but again, I don't really know. I have never seen a forte-piano with the lid removed, though.

RB: How many programs do you have to keep in your repertoire at a time, and how much time do you have to spend practicing while you are on the road? Is this something that is hard for you?

JK: Probably the single hardest thing about my life, and I think I speak for a lot of my colleagues, is practicing on the road. First of all, being on the road is tiring. When you get to a place, you may be hungry, you may be tired, you may be late. If it is difficult to find a place to practice, if the piano is lousy that you have to practice on, all of these things are a problem. What people don't realize is that we are very often practicing not for the concerts that we are doing tonight or this week, but for next week and the week after. I play generally anywhere between eight and twelve different concertos in a season, usually two recital programs, and a fair amount of chamber music. That is a lot of music, maybe 15 to 20 hours of music that one is responsible for in the course of a season. If you multiply each hour of music by the number of hours necessary to practice it to keep it in shape, and/or prepare it, you can see the problem of finding hundreds of hours of practice time over a period of several months, during which many hours are spent on the road, doing sort of fundamental things one has to do to survive. It is a real problem. The situation here in Utah has been a very nice one. The hotel is right next to the hall, and all I had to do was walk out the door and into the hall and practice, at more or less any time. That is very unusual, and that is a big frustration for most pianists. There are those rare, fortunate ones who either can afford to rent a piano for their hotel room, or the company provides them with one. That kind of thing is really nice when you can do it, but it is pretty unusual.

RB: In conclusion, tell me an interesting story, or experience involving the piano technician.

JK: I have a great story. A couple of years ago, I played a recital in the deep

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South Korea's history is a story of extraordinary individuals. Their vision of independence and prosperity has fueled its emergence as one of the most respected industrial powers in the world today. Often, the enormity of their collective accomplishments obscured the achievements of these proud, determined individuals — the men and women working together to create a new South Korea. This, too, is the story of Young Chang.

▲ Chairman Jai-Sup Kim

THREE BROTHERS WITH A SINGULAR VISION

In 1956, the Kim brothers, Jai-Young, Jai-Chang and Jai-Sup, began building pianos in Seoul, South Korea. Although all three had specialized in areas related to piano manufacturing, each brother's educational background was different. Jai-Young majored in finance, Jai-Chang in music, and Jai-Sup in engineering. Incorporating as Young Chang Akki Company Ltd. in 1962, theirs became the first musical instrument manufacturing company in South Korea. In 1967, the Kim brothers entered into a partnership with the Yamaha Corporation of Japan, receiving technical assistance to help them acquire the production skills necessary to create instruments capable of competing with those made in Japan as well as the United States and Europe. A testament to the brothers' exceptionally diverse yet thorough educations, Young Chang began exporting world-class instruments in 1971, just fifteen years after assembling their first piano.

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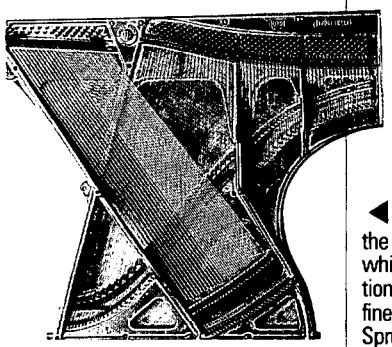
The Kim brothers determined from the beginning that superior quality materials were essential to the company's success. In order to ensure the ultimate in quality control, Young Chang elected to build the *entire* piano, from the solid Sitka spruce soundboards and the stylish cabinetry to the tuning pins and screws. Today, Young Chang uses only the finest materials and is one of the most vertically-integrated manufacturers of pianos in the world.

RETURNING TO A PROUD TRADITION OF INDEPENDENCE

The Kim brothers completed their second factory in Incheon in 1976, greatly expanding production and enabling them to aggressively pursue the world market.

In January of 1977, they opened their own foundry for the production of piano plates. Today, the

▶ Young Chang Pianos are shipped to more than 45 countries throughout the world, including the U.S.A., Canada, France, W. Germany, Italy, Spain, England, Sweden, Japan, Australia and Israel.



◀ The heart and soul of the piano is the soundboard which amplifies string vibrations. That's why we use only the finest quality solid Alaskan Sitka Spruce for our soundboards.

▼ Young Chang has revolutionized plate-making through a unique vacuum mold process which enables us to create extraordinarily stable iron plates.

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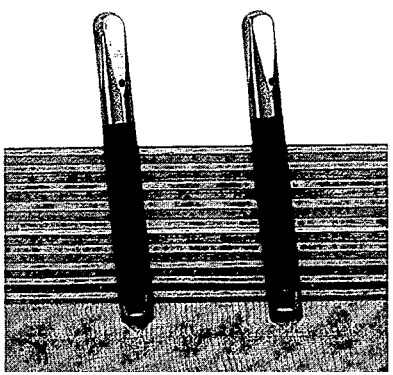


company possesses one of the world's few vacuum press foundries which produces plates of unparalleled strength and stability. Young Chang further expanded their state-of-the-art manufacturing capabilities in the late 1980's by adding 633,000 square feet of floor space.

▲ Young Chang became the first foreign musical instrument manufacturer to be awarded Japan's prestigious JIS (Japanese Industrial Standards) mark for consumer product quality assurance.

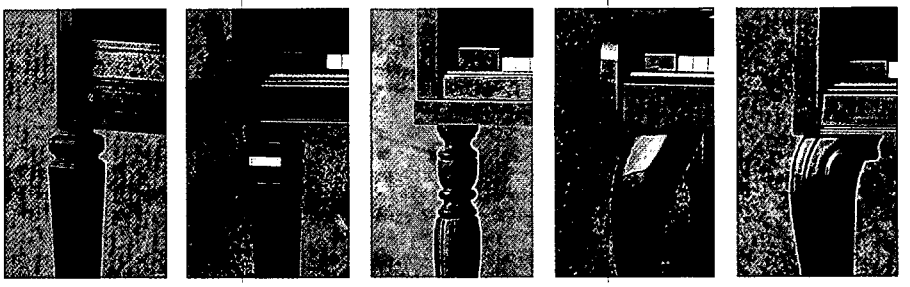
Young Chang pianos found early acceptance in the European market and won numerous medals for excellence in Germany, Switzerland, Spain and The Netherlands, including the International Trophy for Technology at the Frankfurt Music Fair. In May, 1979, Young Chang America was established, with Young Chang Canada following in 1984. Through these subsidiary companies, Young Chang has been able to create instruments designed especially for the American and Canadian piano buyer, with styles and

finishes suited to North American tastes.

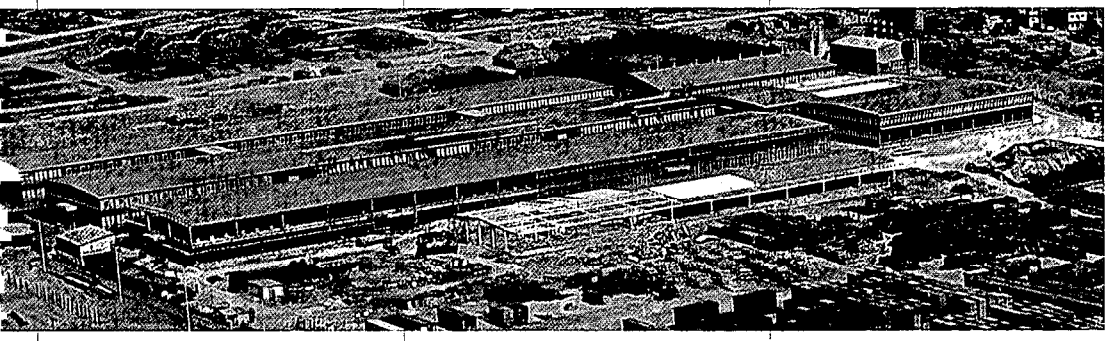
In 1987, just thirty-one years after assembling their first piano, Young Chang received the Japanese Industrial Standard Award for their upright and grand pianos. The first Korean piano to receive the JIS designation, Young Chang pianos are recognized for maintaining the superior standards of construction and performance that have made Japanese pianos so accepted throughout the world. With this guarantee of quality craftsmanship and design, the Kim Brothers' pianos are now recognized as among the finest instruments in the world.

ACHIEVING A BALANCE OF OLD AND NEW

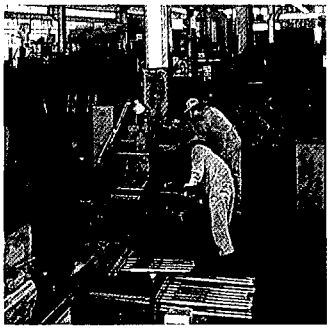
As part of their continuing work in research and development, Young Chang entered into a



▲ Available in a wide variety of styles, wood grains, colors and finishes, there's a Young Chang piano to complement the decor of virtually any home, studio, school or stage.



▲ After decades of intensive effort, Young Chang has grown to become one of the largest and most respected manufacturers of fine keyboard instruments in the world. Our factories are situated on 2,721,000 square feet of land with over 1,391,000 square feet of floor space. Annual production capacity is over 135,000 pianos.



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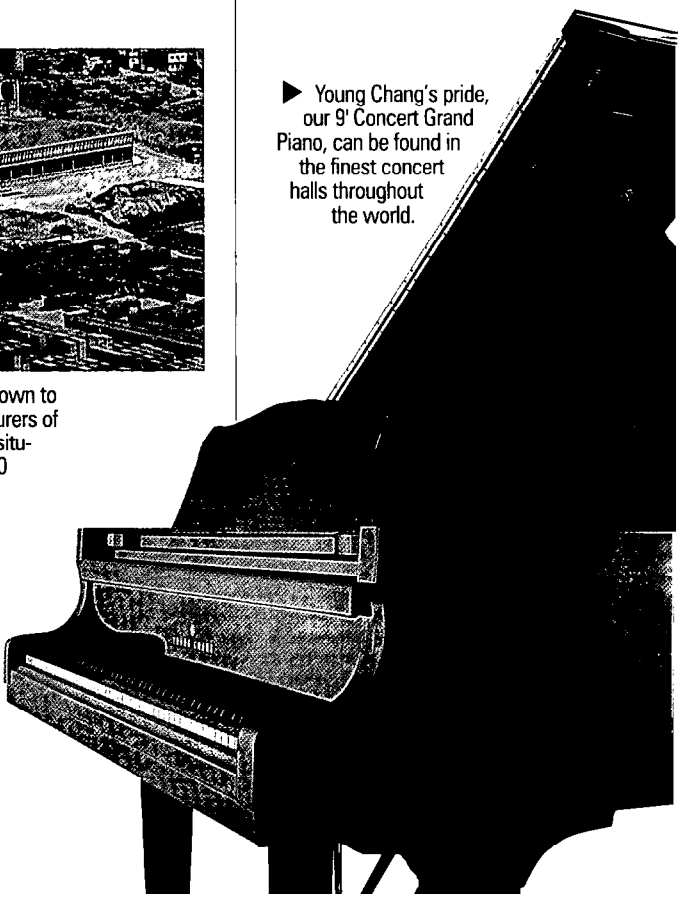
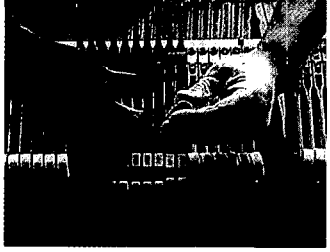


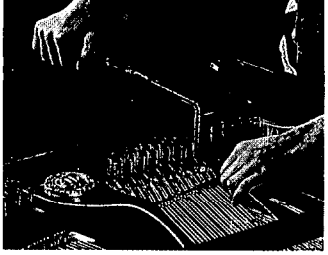
▶ Young Chang's pride, our 9' Concert Grand Piano, can be found in the finest concert halls throughout the world.



technical assistance agreement with the 200-year-old West German piano maker, Ibach, in 1988. This association maintains the balance of tradition and innovation which endures as a legacy to the Kim brothers' vision.

INVESTING IN OUR PEOPLE

Today, Young Chang is a community of nearly 6,000 individuals. Convinced the company will prosper only if our members prosper and grow as individuals, employees study every aspect of piano manufacturing from design to woodworking through special classes offered by the company. As our employees find a home and a future with Young Chang, these long-term values and commitments translate to high levels of care and attention to detail in the assembly of each instrument.



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Piano buyers throughout the world find that Young Chang offers outstanding performance and extraordinary quality at prices that make them an exceptional value. And, Young Chang is the only manufacturer to offer a twelve-year *full* warranty which serves as a promise that every Young Chang piano will give outstanding performance year after year.

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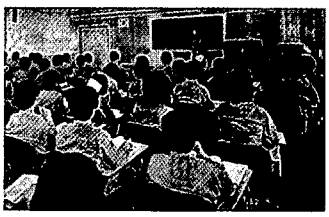
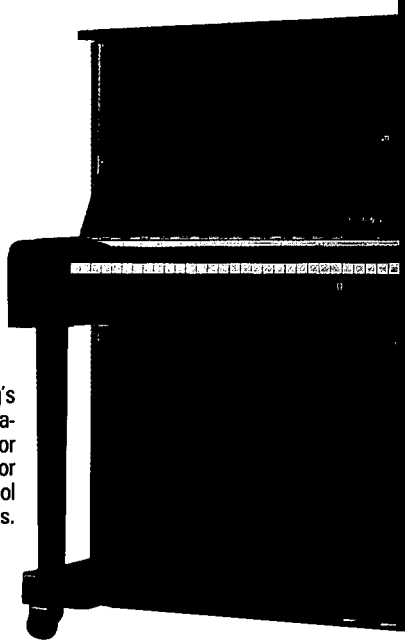


◀ Our skilled and dedicated workforce of almost 6,000 craftspeople is an indispensable element of Young Chang's success. The work force undergoes constant training to guarantee its proficiency.

▲ Young Chang's actions consist of over 6,000 pieces, assembled with expertise to an accuracy within 0.01 millimeter. This is our upright assembly line employing the highest state-of-the-art technologies and the most stringent quality inspection procedures.



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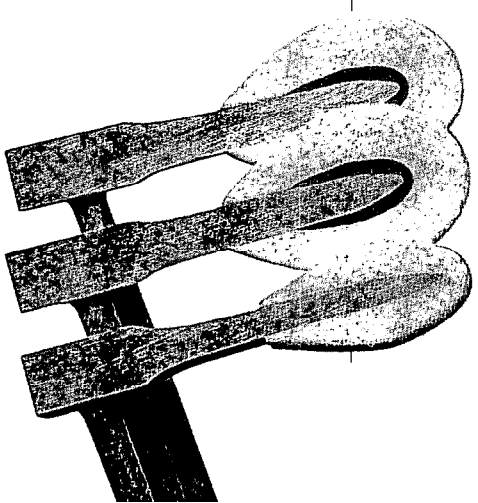

◀ Only the finest premium grade felt from the Royal George Feltworks in England is used for Young Chang hammers.

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south. It was a town on the Gulf Coast. I got to the hall, which was a huge high school auditorium, it must have been 2800 seats. No balcony, just this enormous wide expanse of seats. I walked out and sat down to try the piano. I was playing Bach and Schumann in the first half, the second half of the program was all Liszt. The piano was so dead that you could have sat on it and it wouldn't have played above a mezzo-forte. No sound. The technician showed up after I had been practicing for a while, and I asked him if there was anything he could do. He said that he would do his best to brighten it up for me. I practiced for a while, then went back to the hotel to rest, as I had the afternoon off. Later, I walked out to play the recital, sat down, and about one minute into the Bach Partita, I smelled what seemed like an overwhelming odor of nail polish. I couldn't figure out what was going on. By the end of the first piece, this was getting so overpowering, I was almost feeling ill and dizzy from it. I walked off stage and could not figure out what was going on, because it seemed like it was coming from the piano. There was a stage hand there, an old fellow who must have been the high school janitor, and I said to him, "I know this is going to sound really crazy, but I can't tell if I am halucinating or not. Would you mind going out there and smelling that piano?" He replied, "I would, but I got terrible hayfever and I can't smell a thing." By the end of the first half, I was really in trouble. Fortunately, this fellow from community concerts was sitting in about the third row, and he decided he was going to come back stage. I realized by this time that the technician had lacquered the hammers, but I couldn't believe it because I had never heard of anyone lacquering the hammers on the day of a concert. I have seen it done the day before. Normally, aren't you supposed to give it enough time to dry?

RB: Yes, it takes a while to dry.

JK: Apparently, he had done it about noon, and taken a hair dryer and dried it, which I guess you could do.

RB: Sometimes you have to do what you have to do.

JK: Well I had never had this experience before. The fellow from community concerts said that the smell was so overpowering that he could smell it sitting out in the audience. That was definitely the wildest experience I ever had, getting high from smelling the piano.

RB: Jeff, thanks a lot. I am sure the *Journal* readers will appreciate what you have said.

JK: It was a pleasure. Thank you so much for all of your help. It is really great to have these wonderful pianos to perform on.

This month we have another letter from Dennis Gorgas, of Seattle, Washington. You may recall that Dennis' letter a while back on the subject of inharmonicity sparked the discussion which appeared in the *Journal*, in which much new information on the subject came to light. This month Dennis writes:

The equations which we use to determine string tension, % break, inharmonicity, etc., all use fundamental frequency values taken from the equal tempered scale. In a piano, A49 (tuned to 440 hz) is the only note whose fundamental frequency is equal to its counterpart in equal temperament. Piano fundamental frequencies below A49 are higher than equal temperament fundamentals, whereas those above A49 are higher than equal temperament fundamentals. Were we to use the actual piano fundamental frequencies in our calculations, the result would be a lower value for tension and a higher value for inharmonicity for all notes below A49. The reverse would be true for all notes above A49.

My question is: do the fundamental frequencies in a tuned piano deviate from equal temperament frequencies to such an extent as to substantially alter our calculations for string values?

Many thanks for responding to my questions. Your answers have enabled me to build on a solid foundation.

Sincerely,
Dennis Gorgas

I know that having the notes tuned to the actual tuning curve rather than the theoretical frequencies does alter the results as Dennis has mentioned.

There is a very simple way to facilitate calculation at the "actual" frequencies rather than the "theoretical" frequencies. If you use the forms of the equations which require a note number rather than a frequency, you may simply add two or three decimal places to the note number to simulate the note tuned so many cents sharp or flat. The first decimal place represents the tens of cents, the second decimal place represents cents, and the third decimal place represents tenths of a cent.

For example, let us say that note 88 is actually tuned 37.5 cents sharp according to our curve. Rather than enter 88 as the note number in the formula, we would enter 88.375. This format will work for all notes above A-49. For notes below A-49, which are tuned lower than the theoretical frequencies, we have to look at things from a slightly different angle. Note 48 could also be considered note 47 at 100 cents sharp. Looking at it this way, note 48 at 1 cent flat would be note 47 at 99 cents sharp, and we would enter 47.99 for this note. If the very bottom note was 18.7 cents flat according to our curve, we would enter 0.813 for our note number, rather than 1.

Since changing the note numbers in this way is so easy, if you are concerned about the differences that the actual tuning frequencies would make, I would suggest you use the format explained above.

Our thanks to Dennis for his letter. Until next month, please send your questions and comments to:

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

At Large

Efficient Tuning, Part III

Charles P. Huether
New Jersey Chapter

This piano we have been talking about and this piano which we have been "mastering" has a will of its own. It reacts to everything we do, not always as we might like or expect. But that is part of the fascination of the work.

When we consider the materials involved, the many people who in one way or another have imposed their will on those materials, the fact that we see this instrument for the first time in a strange setting, totally ignorant of its past history or of its unique characteristics, we are to be complimented on how well we are able to achieve good results.

The piano is full of strange parts which move in strange ways—like the bridges. Do they rock? Do they roll? Do they rock and roll? Your answer may depend on your notion of what each of those words means.

How does the soundboard move? How much, how often and under what circumstances? Can an open window create problems in stability even over a short period of time? Where do those twenty tons of tension go? What are they doing and where are they doing it?

Frankly, I do not have answers to those questions, but I have a strong feeling that every tuner who achieves respectable results has a way of compensating for these and many other factors even though he may not know what he is doing. Part of the art of tuning is developing subconscious reactions to the multiple and mysterious movements of the piano which occur while we are tuning it. These movements occur in different ways and at different times. One of the causes of these varying times of movement is the system one uses in tuning. I am convinced that should I change my order of tuning for another I will have difficulty in getting satisfactory results for some time. What is occurring is my adapting to the subtle changes happening inside the instrument, changes happening as we go from string to string, happening in a different way or producing different reactions as we work in different sequences.

As a string is tuned, the change in its tension produces a reaction in other strings which are not being touched. The most obvious example of this is how the pitch drops when one completes the first pass of a pitch raise. There is almost universal agreement that one starts the first pass with the pitch set about 25% to 30% higher than the anticipated end result. If this happens for a large pitch adjustment, it must also happen for a small one.

But such variations of pitch are not universally the same amount nor are they always in the same directions. Some areas will go sharp while others go flat.

How does the total string tension distribute itself over the plate and the case? Is it reasonable to assume that when a piano is in tune the stress is equally distributed? That the structure of the instrument is then static? This is hardly the case. It is more likely that the out of tune instrument is in a more equally stressed condition. One might say that the process of going out of tune is a process, at least in part, of stress equalizing itself throughout the instrument.

It would be interesting if someone would run some tests as to how pitch of strings change during the process of tuning. We know that most of the pitch drop occurs when unisons and adjacent strings are adjusted. Are other strings changing? Are the strings we have not touched yet still at the pitch they were when we first started tuning? If the strings we tune change (pitch drop) how about the ones we have yet to adjust?

On a practical note, in actually reconciling a string, it is a good idea to tune within a set time frame and a set degree of volume. By this I mean, do not listen overly long to the comparison of strings. We know that the actual pitch is changing as the sound sustains. We can see this on any visual frequency measuring device. Also, the amount of deviation varies from string to string. So if we listen to the comparison of two strings we must match them at a particular moment in the duration of the sound, for the longer we listen, the less likely it is that there is a constant we can compare.

We also know that the strength of the blow can modify the frequency. For this reason we should strike each interval we are comparing with the same intensity.

We should listen and make our judgement in a consistent period of time starting directly after the initial distorted impact sound and stopping as soon as there is a noticeable decay. Beginners often have difficulties because they listen overly long to the interval, getting more and more confused all the time.

Use a repetitious striking of intervals, a set time frame, possibly no more than two or three seconds and a reasonably sharp blow. The repeated blow will also help to set the strings. Make a judgement and move on. Remember that every time you test a note, you are testing not only the note just tuned, but the one you are comparing it with. When one test is good but another is not, check the test note; it could have shifted.

I prefer to tune with minimal stripping—only in the temperament area. From there on, unisons are tuned as each note is set. It is my feeling that this can produce better stability, mainly because the entire unison is repeatedly settled as the note is struck over and over again as part of a test pattern as one progresses away from the temperament.

There are two main and obvious areas where the peculiarity of pitch imbalance is most obvious to me. One is in the tenor area where we usually set our temperament. Have you noticed how the lower end of this section always seems to drift sharp while the upper end drifts flat? The other area is up in the top octave where a series of notes always seems to grow sharp when everything else has gone flat. I have gotten into the habit of reaching behind the soundboard

and feeling for the top rib. It usually is directly below the area where the notes go sharp.

These and other irregularities in tension and pitch stability are factors which intrude on the tuner's attempts to achieve a finely tuned instrument. Which factors are causing which problems are questions which one does not have the time to answer. One must cultivate an instinct to achieve good results in spite of not knowing what all of the problems or difficulties are.

One reasonable attack is to size up the instrument right from the start. If one has mastered the art of manipulating one's tools efficiently, you can handle going over the instrument twice in a reasonable length of time. Don't reserve your "double tuning" only for pitch raises unless you feel like many excellent tuners who say that two beats or more is a pitch raise. Size up the instrument from the beginning and decide that it will need to be gone over twice. Not tuned twice, for no matter how many times one goes over the piano before being willing to get up and say it is "tuned," it has been tuned only once. The piano is tuned when you accept payment for the job, not before.

Going back to the start up, decide in advance what your approach will be. All spinets require going over twice, in my opinion. I see the instrument, fix my mutes and away we go as if it were a first pass on a pitch raise. Don't waste time agonizing over refined settings because they won't be refined by the time you are finished. That's guaranteed. The second time you go over the instrument is the time to take care. You hope you will find it very close and subtle adjustments can be made with the reasonable expectation that they will stay that way. After a bit of practice, it will be just that way.

The same rationale applies to other instruments, and once you accept the fact that such a procedure is reasonable, it becomes easier and easier. By making up your mind in the beginning that you will be going over the piano twice, you have a better mental attitude about the work involved. Trying to do it all in one pass and finding it not working out as hoped causes upset and confusion. You hate to go over it again even though you know it should be done. You don't really have the time to do a second pass in a refined way because you wasted too much time trying to make the first pass stand up. If you make up your mind to go over it twice before you start, the whole job will be easier.

Tuning a piano is not a process of setting strings to pitches which match a theoretical frequency pattern. Tuning a piano is a process of setting strings to pitches which relate in a practical way so that they achieve a recognized goal—that is, a tuning which can be transposed into all keys without dramatic differences in color. In other words, an equal temperament.

Piano tunings are not like little children who, we used to be told, should be seen and not heard. Piano tunings are never seen and always heard. ≡

Good Vibrations

New Soundboard, Old Bridge, Part I

Nick Gravagne
New Mexico Chapter

Here in the Southwest, where relentless spring winds exacerbate an already dry environment, pianos can come apart at the seams. Although new pianos starting out here in the Badlands stand a good chance of survival, old instruments born and bred in wetter climes and subsequently transplanted will experience "ambient shock" unless pains are taken to cushion the blow. Soundboards and bridges, if housed where no attempt is made to humidify the air, will bang and pop in small but audible explosions as they lose the battle to desiccation. Sometimes these bellies can be repaired; but often they need to be replaced.

Usually a seriously cracked and flattened soundboard is accompanied by a cracked, irreparable bridge—but once in a while the bridge is actually quite good, needing only minor structural and cosmetic attention. When such is the case, we replace the soundboard with the original, cleaned-up bridge attached. To do this requires a little different approach to setting the plate, and possibly to building the new soundboard, since the bridge height is not variable through planing. It also demands of the soundboard maker a brief but thorough evaluation of the entire pre-tear-down condition of the instrument's belly in the event that some unusual aspects of the original manufacture might be discovered. Sometimes the information gathered from this evaluation will cause the soundboard maker to modify the bellying process so as to customize and integrate the many features of soundboard installation.

The June '89 issue of the *Journal* for this series explained one method of setting a plate. The hypothetical piano in the article was equipped with a new soundboard, new bridge caps, and new plate support dowels. It was explained in the article that since new bridge caps were present, the plate was simply installed to its original height location thereby allowing for the downbearing angle to be set by planing down the bridge. With such an approach, the bridge was said to be the variable factor which must take its cue from the directing position of the plate. But what happens when the bridge height is already finished and set? Such would be the case if the original bridge was being installed on a new soundboard. Reinstalling the plate to its original height location may work out fine—but it may not.

When the bridge dimensions are set, i.e., not variable through planing, the tables are turned: rather than the plate being the primary reference it is now the bridge. I am currently rebuilding a 1909 Bechstein where this is the case. The soundboard is flat and sunken and riddled with cracks—some so wide you can drop a nickle through. The bridge, on the other hand, is surprisingly sound. The problem, then, is to set the plate over a new soundboard which has the original bridge attached and still come up with some semblance of uniform downbearing and proper down action mechanics. How is this done?

For starters, we must understand that the complete bridge means one of three things: the original with notching and pinning intact; the original with the pins pulled out allowing for minor planing, renotching and repinning; or a new bridge duplicating the old one as, say, a supplier might offer. In any of these cases, the original bridge height is the controlling factor and the plate must be set accordingly.

The Basic Considerations

The first, unalterable dimension to consider is the distance from the keybed to the strings. Assuming the piano hasn't been tampered with, this measurement should be trustworthy. After the strings are removed make this measurement to the underside of a suitable test string. Make two measurements; one at the lowest bass and one at the highest treble. When it comes time to set the front of the plate to the original string height use the same diameter test string and secure it in place to the hitch pin and to a dowel, or some other device, at the tuning pin area.

Something else to remember is that the perimeter of the plate should not make contact with the soundboard at the rim area. It can be close, though. Make a wire gauge from a tuning mute handle by bending a 90 degree angle into it about 3/8 inch from the pointed end. When the plate is being checked for soundboard clearance the gauge can be placed into a lag hole to find if the short bend segment is moving freely in the space which should exist. The diameter of a mute handle is about 0.080 inch. I prefer at least that much dowel protruding through the soundboard, but I have set them closer. Actually, only a few of the many dowels will be close (if at all).

The rear string rests present another factor to consider. They are in a sense adjustable up or down depending on what thickness you choose or how the cloth might be built up with posterboard, thin hardwood, or thin plywood (you'll find it in a good hobby store along with may other useful goodies). Rear duplex bars can also be raised if necessary by placing underneath thin pieces of material cut out to the shape of the bars. I have had excellent success with very thin hardwood plywood (on the order of 1/64 to 1/32 inch) which is easier to cut, shape and clean. The idea is to use a hard substance for a shim, not cloth or spongy material.

Notice that the above considerations are anticipating having to build up the

rear string rest in the event that *more than enough* bearing is present. This is how it should be. But this doesn't mean *way* too much more—just more. It is possible to make something work when there is a bit too much bearing; the reverse cannot always be said. A new soundboard should have plenty of crown and, coupled with the old bridge, should yield more than adequate bearing even if the plate is reinstalled to its original height. For the most part, a new soundboard crowned to something like a 60 foot radius will raise the original bridge high enough that all those poor test-bearing readings will become quite positive. Still, a closer and more controlled estimation of how much crown should be in the new soundboard is advisable. But what should we look for?

There are three factors that need to be checked and noted to complete this simple investigation: 1) the downbearing readings obtained from the string tests, as either dimensions or angles, depending on your preference; 2) the clearance which exists between the top of the bridge (including pins if appropriate) and the underside of the plate bars; 3) the amount of crown which actually exists in the old board. Numbers one and two need to be accomplished before the piano is torn down while number three is measured after the plate has been removed. Let's consider these in more detail.

It should be obvious if the downbearing readings as obtained by string tests are poor. Experienced technicians don't really have to think too much about it; they know when the bearing is too shallow at a particular place in the scale even if the reading is positive. Still, it doesn't hurt to check these judgements now and then against some math: multiply the rear string length (includes the bridge top segment) by .026 or by .017. The answers will give the required space which should exist between the test string and the top of the rear rest for a 1.5 degree angle and for a 1 degree angle respectively. Most pianos needing new soundboards have minimal to negative bearing, though.

In some instruments the space existing between the bridge and the underside of the plate bars is large—something like 1/2 inch, give or take, depending on where the bar crosses the bridge. Given a flat soundboard, this would be expected. With such adequate clearance, there is no danger of bridge pins (or the bridge top) contacting these plate bars later on when the new soundboard is in. Although this isn't necessarily serious, it's nice to avoid it. Other instruments, however, do not have generous clearances. In fact, when small clearances are found (1/8 inch or so) in addition to a flat soundboard, it is almost certain that a normally crowned, new soundboard will raise the bridge to a place where there is considerable interference with the plate. This, of course, assumes the plate is reinstalled back to its original position, which, if possible, is generally a good idea.

A more precise assessment of this condition can be had by referring to the crown deflection graph as appeared in the October '88 *Journal* in this series. The sequence works this way: measure the clearances in those places where there is some doubt. Make a chalk mark on the bridge as a reference. When the plate is out, measure the amount of the crown in the board at, or near, the chalked bridge. (Also see the October '88 *Journal* for how to measure crown deflection). Let's say, for instance, that we are wondering if there will be enough clearance at a place on the bridge which is relative to a cross-grain soundboard width of 36 inches.

Further, let's say that the clearance found before tear-down was 3/16 inch (0.188) and that the crown deflection in the old board is 1/16 inch (0.063). The graph tells us that, theoretically, a fully crowned soundboard should deflect upward by .225 inch for a 36 inch span. The difference between the theoretical graph number and the measured crown in the old board should be *less than* the clearance in question. In this example .225-.063=.162 which is less than the .188 clearance as initially found so there should be no interference when the new board is in. But it will be close, and, allowing for some variation from the theoretical crown, or panel thickness grading, there may be some slight contact. The gap, whatever it is, will noticeably and measurably widen when the piano is strung. Of course, if the plate bar passes over a piece of the bridge where there are no bridge pins, it would be possible to slightly notch the bridge top to allow for clearance; but under normal circumstances, this shouldn't be necessary.

The Typical Evaluation

Let's take a case in point. The 1909 Bechstein grand arrived in the shop needing a new soundboard and restringing. The original bridges were fine, needing only minor attention, and the pinblock was sound enough for oversize pinning to 3/0 (fortunately). The downbearing readings before unstringing were flat to negative, and, after unstringing, the test-string bearing showed minimal to slightly positive in the tenor, flat through the midrange, and positive in the high treble. The bass bearing looked decent. Then every other lag screw was tightened (they didn't turn much) and the nosebolts were turned down until they cleared the underside of the plate (as seen in little mirrors). The plate followed the nosebolts down. As a result the bearing became minimally positive everywhere, and good positive in some places. What was disturbing me was a small clearance of 1/8 inch between the bridge top and the second treble plate bar (as counting from the top). The relative cross-grain soundboard span was 25 inches which meant that a new soundboard would deflect upward by .100 inch or more in that are, thereby closing the gap almost completely. I was assuming that the old soundboard was flat. I was about to find out.

The plate was pulled and the soundboard crown was measured for deflection. The first check was made at the place in question. The board was worse than flat—it was slightly sunken. This meant that the 1/8 inch clearance that I thought I had to work with was even less. Other crown measurements revealed 1/16 inch at places while other areas were flat to negative, which was interesting since the bearing test was, after nosebolt lowering, positive everywhere (if not like new). Since the pinblock was not being removed, the plate had to go back to its original height location all around. This being true, it was clear to me that the bridge top would contact the plate bar as well as create a too-high downbearing condition if a normal, fully crowned soundboard was installed. Maybe it wouldn't matter—but maybe it would. What to do?

Soundboard Making As A Function Of The Evaluation

Given a flat to negative soundboard with positive bearing everywhere it was obvious that the new soundboard would not need to be crowned to a 60 foot radius. (In fact, it also seems clear that the original board, for whatever reason, must have had a shallow crown). A flatter than usual replacement board should

work just fine giving a comfortable amount of downbearing to work with but still allowing clearance at the one plate bar. The mechanics of soundboard building would now have to be carefully considered. The thickness grading of the spruce panel in the area of the "trouble spot" was .315 inch tapering down to .300 inch just a few unisons toward the high treble. I decided to thin the board to .300 inch in that general area in order to buy a bit more clearance. In addition, the ribs would be crowned less than usual and the soundboard would be dried to 5.5% EMC rather than 4.5%. It so happens that the ribs on this instrument are large in cross section averaging one square inch for eight of the thirteen ribs. All else being the same, ribs with large cross sections bend less with ambient expansion of the spruce panel than do smaller dimensioned ribs. This would also help in keeping the crown flatter. Lastly, there is a dumb bar in the upper bass corner which serves to shorten five ribs which otherwise would have been quite long. As it turns out, the longest rib is about 38 inches long; without the dumb bar it would be 10 inches longer. This fact would also account in maintaining a reasonable crown. Now all this isn't to suggest that soundboard makers enjoy a wide range of crowning possibilities—they don't. But there is, at least, a small range.

Does this seem like a lot of hard reasoning? Actually, like so many cognitive processes, it probably took all of 60 seconds once I had the necessary information. Piano tuning is like that; the many decisions tend to be automatic after a while.

Fortunately, most old pianos are worn out and deteriorated in typical ways. And not only is there usually plenty of bridge-to-plate bar clearance, but a normally crowned 60 foot radiused replacement soundboard generally restores all (and more) of the missing downbearing found with the old board. Still, as shown with Bechstein, modifications are sometimes necessary and it certainly pays to measure and check things before disassembly. In rare instances, the pre-tear-down evaluation would suggest that a higher than normal crown is warranted. But whatever deviation from a normally crowned replacement board is called for, the idea is to set in the "new board/original bridge" in such a way the required plate height will turn out to be very close to where it was initially, needing only slight alterations to achieve good downbearing and action mechanics.

New Soundboard: Variables Shouldn't Vary Too Much

Although every aspect of soundboard making must be carefully carried out, there are two variables which, when the original bridge is being used, significantly impact the condition of the downbearing: 1) the amount of crown built into the new soundboard and, 2) whether or not the original thickness grading pattern is accurately planed into the spruce panel, especially right under the bridges.

Given that soundboards are made of spruce, dried to about 5% EMC, made with radiused ribs (much of the time), the amount of crown introduced should be fairly consistent from one soundboard to the next. That is, if one board comes out with a high 45 foot radius crown while another yields a low 90 foot crown, something is wrong with the uniformity of the processing. One of the factors which cause for acceptably varying crowns is the differing dimensions of many makes of soundboards. The Bechstein board mentioned earlier has a thin panel with large cross-sectional ribs while a Mason and Hamlin board is quite a bit thicker but has smaller cross-sectioned ribs. In addition, there are long soundboards, short boards, some with many ribs or few ribs, and there are varying angles of ribs-to-panel grain, etc. Still, all things considered, the crowns should be more or less predictable and of reasonably consistent curvature.

A critical facet of soundboard making has to do with thickness grading. Whether it is done prior to or after crowning, the spruce panel must be thinned according to that of the original board if the old bridge is going to be reused. Thickness grading is a painstaking process, anyway, (although enjoyable), but even more finicky under the conditions we are discussing since the old bridge, if placed on a panel which is thinner than the original, may lack for downbearing even if there is plenty of crown. Of all the aspects of soundboard making, planing the proper shape into the spruce panel is the most time consuming and meticulous, but is a critical factor in determining the singing ability of the completed instrument.

Considering what has been said, it should be evident that significantly altering the thickness grading for whatever reason will rule out the possibility of reusing the old bridge. An example of this would be replacing an old Steinway board with a "diaphramatic" one. If the original bridge height is retained, there will be minimal or zero or negative downbearing in the higher and lower parts of the scale.

If at this point we can assume that a reasonable evaluation of the original belly conditions has been made, and that a suitable soundboard has been installed with the original bridge attached, it is time to install the plate and finally establish downbearing. And that is where we will pick up next time as this discussion continues. ≡

At Large

The Bird

Norman H. Neblett
Los Angeles Chapter

It was the year 1955. When the call came in, the inevitable question was asked: "How much do you charge?"

I answered, "Seven fifty," which was my going rate at the time.

"We have a small grand. When can you come out?" I happily made the appointment because my business was still developing. It was my sixth year tuning pianos.

The neighborhood was upper middle class, just south of the wealthy community of Beverly Hills, California. A girl of about 10 years answered the bell, calling, "Mommy, the piano tuner is here."

"Please tell him to come in," the mother replied.

The piano was at the end of the living room facing large draped sliding glass doors. I sat down to try a few notes to hear the tuning condition. Running my hands over the keyboard, I was suddenly surprised by a fluttering noise in my left ear and felt something land on my shoulder. Twisting my head, I observed a small yellow canary sitting on my left shoulder. The little girl looked at me and said, "That's my birdie."

"How nice," I replied.

Moving my body caused the bird to fly off my shoulder and land on the valance of the curtains. Looking up produced an astonishing view. There were bird droppings all over the curtains. The view into the piano was worse. Bird seed surrounded the tuning pins, lightly covered the soundboard and had dropped into the action. Even some of the wippens were sticking. There was no alternative but to pull the action, get the vacuum cleaner, and go at it. This was a chance to make an extra dollar, so there was no hesitation on my part.

Moving the bench about ten feet back to provide a table, I proceeded to remove screws, key slip, fall board, and key blocks. The action was difficult to extract because of the birdseed grinding on the key bed. Extra care was taken to prevent breaking a hammer off the shank. I was beginning to sweat! Finally, the action was eased out. With arms extended, I picked it up and slowly stepped back toward the bench. My left shoe contacted an object on the carpet causing my ankle to slightly rotate. It felt like stepping on a package of cream cheese.

Instantly, there was a horrible scream from the little girl followed by uncontrolled sobs. The mother came running. Moving to one side, I looked down to observe little more than a yellow blob blended in with the thick fibers of the carpet. I had killed the damned canary!

I shoved the action into the piano, put in the case parts, ran up the screws, grabbed my tools and fled out the front door, never to return.

SOUND BACKGROUND

Renaissance Music Science: Mersenne's Discoveries

Jack Greenfield
Chicago Chapter

Changes In Music During The Middle Ages

During the Middle Ages, understanding of the physics of music advanced very little beyond the principles of Greek music theory reviewed in the writings of Boethius in the sixth century A.D. Changes in music practice, however, did take place. The diatonic keyboard of the early organ in Pythagorean intonation was gradually extended with one-by-one addition of raised notes for accidentals to reach the present configuration of five raised notes by the start of the fourteenth century. By the middle of the fifteenth century, harpsichords had become more common while church organs had evolved into large magnificent instruments. Musical composition had advanced also and found the tonal capabilities of Pythagorian intonation of medieval music inadequate.

The disadvantages of Pythagorian tuning were especially critical for keyboard instruments with notes at fixed pitch. The earliest written accounts of other keyboard tuning are given in the writings of the music scholars Bartolomeus Ramis de Pareja (1482) and Franchinus Gafurius (1496). Gafurius originated the use of the term "tempered" for alteration of a just interval, a practice he did not approve. Ramis gave a method based on monochord division. More practical aural methods were offered by Arnold Schlick for the organ (1511) and Pietro Aron for the harpsichord (1523). Neither method is precise but each allows wide variations depending on the judgement of the tuner.

Zarlino's Influence

As the use of tempered tuning spread during the sixteenth century, temperament became a greatly discussed topic among music theorists. Seeking classical authority for their theories, they studied surviving works of ancient Greek philosophers. Besides reviving old Greek tunings, theorists proposed new systems, some based on actual tuning practice, others on mathematical principles. The most prominent authority on music theory during the high Renaissance was Gioseffo Zarlino (1517-1590), certainly the most important writer on music since Boethius. Educated by the Franciscans, he became a Franciscan monk involved in a variety of ecclesiastical and musical activities. In 1565 he was appointed to a highly prestigious post, *maestro di capella* of St. Marks, Venice. His principal work, the *Istituzioni armonichi*, published in 1558 and reprinted in 1562 and 1573, was widely read and highly respected by theorists, musicians, teachers, and others concerned with music. He was the first to discuss harmony in terms of the triad instead of intervals and major and minor modes instead of medieval church modes. He wrote extensively on tuning including meantone and equal temperament. He was responsible for moving the start of the characteristic diatonic scale to C. Previously Boethius's scales started on A; Ptolemy started on E.

While Zarlino rejected music of the Middle Ages, he attached importance to the writings of the classical Greek philosophers. Here he discovered ancient doctrines of music theory that conformed to his thinking. Impressed by Ptolemy's writings on tuning, Zarlino advocated the revival of Ptolemy's syntonic diatonic tuning. This pattern, which came to be known as the just diatonic scale, contains the more harmonious ratios of 5:4 major thirds and 6:5 minor thirds instead of the 81:64 and 32:27 Pythagorian ratios. The C, F, and G major triads composed entirely of just intervals are the most consonant arrangement possible. Zarlino believed singers sang in just diatonic intonation naturally when not accompanied by instruments.

Zarlino's Consonance Theory

According to Pythagorian principles, only intervals formed by string length ratios consisting of numbers from 1 to 4 were considered perfect consonances; the others were classified dissonances. In the late Middle Ages, as use of thirds and sixths increased, they were reclassified as imperfect consonances. Seeking an explanation for the acceptance of thirds and sixths, Zarlino declared that the upper limit of numbers in string length ratios for consonant intervals was 6 instead of the Pythagorian limit of 4, thereby adding 5:4, 5:3 and 6:5 as consonances to 2:1, 3:2 and 4:3 intervals in the just diatonic scale.

Zarlino's wisdom in music theory was in sharp contrast to his belief in metaphysical action by specific numbers on the production of musical sounds. This was similar to the present notions of "lucky" and "unlucky" numbers. Pythagoreans considered the numbers 1 to 4 as "sonorous". Zarlino added numbers 5 and 6 to the "sonorous" group that produced consonances. The terms "senario" or "senarius" were numero-logical terms applied to the group of the first six numbers or other groups of six.

Vibrating String Laws Replace 'Sonorous' Number Theory

The first skeptic who challenged Zarlino's numerological acoustics was Giovanni Batista Benedetti (1530-1590), a philosopher, musician, and mathematician who was a member of a prominent Venetian family. In a letter written

about 1563 to Cipriano da Rore who served as choirmaster at St. Marks before Zarlino's appointment in 1565, Benedetti gave his views, the first on record offering physical instead of metaphysical causes for consonance and dissonance. He stated that consonance depended on coincidence of sound waves while dissonance resulted from sound waves breaking in on one another. In addition, he was the first to relate frequency of sound waves to string length and pitch, stating that the frequencies of two strings under equal tension vary inversely as the string lengths.

Benedetti is better known for other work in physics and mathematics. His ideas on musical sound were not published until they appeared in 1585 in the book on his work *Diversarum soeculationum mathematicum*. Zarlino received more vigorous opposition, ironically, from his former student, Vincenzio Galilei. Galilei, a member of a patrician Florentine family, had been an accomplished lutenist as a young man before he studied with Zarlino in Venice in 1561-1562. He married and settled in Pisa in 1562. Later, he moved to Florence in the early 1570s. It was there he began his study of Greek music theory and carried on his own investigations of tuning and consonance. This work led to conclusions that contradicted principles he had been taught by Zarlino. He expressed his doubts first in a 1578 letter to his former teacher. Three years later, he published an account of his studies in his work *Dialogo della musica antica e della moderna*.

Galilei rejected the prevailing doctrine of "sonorous" numbers and the "natural" order of just intervals. He considered all intervals "natural" and maintained that there was an infinite number of consonances. He observed that intonation in music practice was based on aural perception and not number theory and he believed that intervals were tempered in vocal music. Zarlino defended his principles of consonance in his *Sopplementi musicali*, published in reply in 1588 at Venice.

During the following year Galilei made his rebuttal in an essay, *Discorso*, giving convincing experimental data demonstrating the mathematical relation between string length and tension and exposing the falsity of the "sonorous" number theory. Until he had presented the results of his tests, it was generally assumed that tension ratios equal to the inverse of string length ratios produced the same intervals of pitch. Music books contained drawings of pairs of unequal weights suspended from equal lengths of wire compared with equal weights suspended on unequal lengths of wires, with figures for the tension ratio as the inverse of the length ratio. No one had ever measured such a comparison before. Galilei's tests showed the true tension-length relationship, that the equivalent interval pitch ratio for tension was the inverse of the square of the length ratio. For example, while string lengths in the ratio 4:3 produce a perfect fourth, the ratio for weights on equal string lengths giving the same interval is 9:16, consisting of numbers greater than Zarlino's consonance limit of six.

Early Recognition Of Physical Causes Of Musical Sounds

After Vincenzio Galilei's death in 1591, his famous son, Galileo, continued his father's work in acoustics but gave more attention to other physics research. Galileo waited until 1638 before publishing his studies on acoustics. In the meanwhile, several other mathematicians and physicists, including Beeckman (1618), Descartes (1618), and Kepler (1619) expressed their views on the physical causes of musical sounds. Marin Mersenne (1588-1648) who started to write on music in the 1620's, shares credit with Galileo for establishing the study of acoustics as a major branch of physics. Mersenne wrote more extensively, however, and made many new and original experimental and theoretical contributions.

Mersenne was a Franciscan friar whose education included mathematics and physics as well as theology. He spent most of his adult life at a monastery in Paris. He had a wide range of scientific interests but in the late 1620's he began to specialize in music while also continuing some work in optics. His opinion that music could be analyzed and explained on a rational physical basis led him to important discoveries in acoustics.

His first writings were minor treatises and commentaries on classical texts. These were followed by several major works published in 1636 including his encyclopaedic *Harmonie universelle*. Later publications were mainly reprints, revisions and accounts of repeated experiments. Mersenne wrote in both Latin and French.

Mersenne's Data Not Accurate But Significant

The most serious fault in Mersenne's work is the inaccuracy of his data. Primarily concerned with his descriptions of physical phenomena, methods, and demonstration of basic principles, he attached secondary importance to precision of measurements. Differences of 10% or more in his data for repeated experiments is not at all unusual. To some extent such variations were not due to his experimental technique alone, but to the equipment and conditions he had to work with. He had no standard pitch reference and had to depend on monochords, organs, or other musical instruments. He had no reliable watch or clock for timing in seconds. Mechanical clocks of his era operated by weights and pendulum did not keep time at a uniform rate and varied as the weights descended. Clocks were periodically corrected by reference to a sundial. In earlier tests, Mersenne used his pulse for timing. He made a study of the pendulum later, to find lengths and weights that would provide suitable periods for timing with accuracy.

Mersenne's Determination Of Pitch Frequency

Mersenne was the first investigator who obtained figures for pitch frequency and who determined the effect of the variable factors on frequency by direct experiments with vibrating strings. He accomplished this by tests with long lengths of rope and music wire which were made to vibrate at a rate slow enough to count visually. Tests were made with fine hemp cord 138 feet long and brass music wire 90 feet long. Through variations in vibrating length, tensions, cross section and density, Mersenne observed the following mathematical relationships known as Mersenne's Law: The fundamental frequency of a vibrating string is:

1. Inversely proportional to the length,
2. Directly proportional to the square root of the tension
3. a. Inversely proportional to the diameter or square root of the cross section of wires of the same material,

   b. Inversely proportional to the square root of the mass (or weight) per unit length of all wires.

From these relationships and the

measurable data, he could calculate frequencies too fast to count. By tuning shorter lengths of wire to specific organ notes or other pitch reference, he then obtained their frequencies by calculation.

Mersenne's Discovery Of Partial Structure

Mersenne also detected the presence of overtones in the sounds of vibrating strings. He wrote that he could hear at least five different sounds that followed in the pitch ratios 1:2:3:4:5, the fundamental, the octave above, the twelfth, the fifteenth and the major seventeenth. He associated the presence of these partial tones with pleasing harmonious sound and attributed them to the simultaneous vibration of the strings at different frequencies, a phenomena he thought paradoxical and could not explain.

One of his observations may have been the first account of octave "stretching." He found that when he quadrupled the weight of a string under tension he had to raise the tension by an additional factor of 1/16 of the larger weight to bring the pitch a full octave above the pitch at lower tension. While Mersenne's measurements may have been inaccurate, this type of correction would be necessary to compensate for the higher inharmonicity of the string under lower tension.

Besides his derivation of the rules of vibrating strings and discovery of partial structure, Mersenne's studies on the speed of sound, resonance and echo, vibrating columns of air, and theory of tuning and temperament became the foundation of later music science.

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THE AUXILIARY EXCHANGE

President's Message

A few years ago while attending a class at the New York Museum of Natural History, our lecturer-archaeologist recounted his initial encounter with the Ibo Tribe of Nigeria, Africa. From the imposing halls of Harvard he travelled to a primitive wilderness area outside of Lagos, Nigeria where he was the "house guest" of the tribal Chief. It was most important that he make the right impression on his first meeting.

In the chief's thatched-roof compound he hunkered down on the dirt floor with the other tribal VIPs, accepted and drank from the communal bowl that was passed around the circle and without any grimace, made his many mental observations. The notebook comes later.

The archaelogist was accepted by those gathered and he had no wish to alienate any of them. He told us that he observed, accepted and followed through on all the tribal customs and "etiquette." He did not laugh at, protest or correct what was important to these people. As a scientist and a professional, he told us it was his responsibility to note and report for research. Parenthetically, we were told that the missionary has a far more difficult role.

The medical missionary with utmost tact must introduce his medications whether they be oral tablets or injections of immunization with much dignity and reserve so as not to offend the rank and prestige of the native medicine man. To inform the natives about proper health and hygiene it is well for the medical missionary to involve the support of their medicine man, neither denouncing him or upholding his practices.

The religious missionary as well has a most challenging role. With delicate diplomacy, and a newly learned dialect, he strives to instruct the natives about one God who loves all, who is not capricious or vindictive in contrast, perhaps, to their polytheistic religion. This is truly a huge challenge. In sum, according to our professor, his role was a comparitively easy one because he "mingled with the native" to learn and observe. It was not his function to correct or change.

This past May members of our Piano Technicians Guild, their spouses and friends visited Asia to greet, listen, learn and observe the achievements of fellow technicians in China, Korea and Japan. Relations were cordial, gracious and productive. The handshake and smile conveyed acceptance and accord as the group of thirty-five toured factories in China, Korea and Japan. Music and its competent production, via the piano instrument was the common denominator. The group accepted explanations of some procedures which were explained through interpreters as well as the statistics that were provided. The group respected the wishes of their hosts as far as not taking pictures where restrictions were made. The group accepted the hospitality of our hosts at banquets, luncheons and cocktail parties. Like the archaeologist, the group knew they were guests in these countries and did their best not to damage that relationship but rather to enhance good fellowship.

Despite language, cultural and social differences, the group was united through music. A Chinese tenor was heard singing Gounod's Ave Maria and he seemed to have no difficulty pronouncing the Latin. A young Chinese girl in the pracitce room of a Conservatory was playing Bach Inventions. At a commune in the People's Republic of China kindergarten children sang "Frere Jacques" in mandarin as lustily as youngsters in La Belle, France. At a special concert in China the group attended a performance of Beethoven's 9th Symphony and heard a chorus of one hundred voices singing "Ode to Joy" in Chinese.

All of the technicians and their families and friends felt a high degree of good fortune that they are involved in a profession whose roots and connections are spread world-wide creating immediately recognized areas of mutual interest. They did not need to, nor would they presume to correct, advise or contrast their way of servicing pianos or building the instruments. Like the archaeologist, they were guests in the Orient.

We are sure it touched the hearts of all when they heard the composition of Henry Bishop, "Home Sweet Home" played on a mouth-organ by a Japanese technician at the conclusion of the convention of the International Association of Piano Builders and Technicians. There was not a dry eye in the house.

Agnes Huether, President

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Oct. 1-3, 1989	**Florida State Conference & Seminar** Clarendon Plaza, 600 North Atlantic Ave., Daytona Beach, FL 32018 Contact: Walter Pearson, 1128 State Ave., Holly Hill, FL 32017-2728 (904)255-4804.
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Oct. 27-29, 1989	**North Carolina State Conference** Hyatt Winston-Salem Contact: John Foy, 195 Fayetteville St., Winston-Salem, NC 27107 (919)773-1754.
July 7-11, 1990	**33rd Annual PTG Convention & Technical Institute** Hyatt Regency Dallas at Reunion Contact:Piano Technicians Guild, Inc., 4510 Belleview, Suite 100, Kansas City, MO 64111 (816)753-7747.

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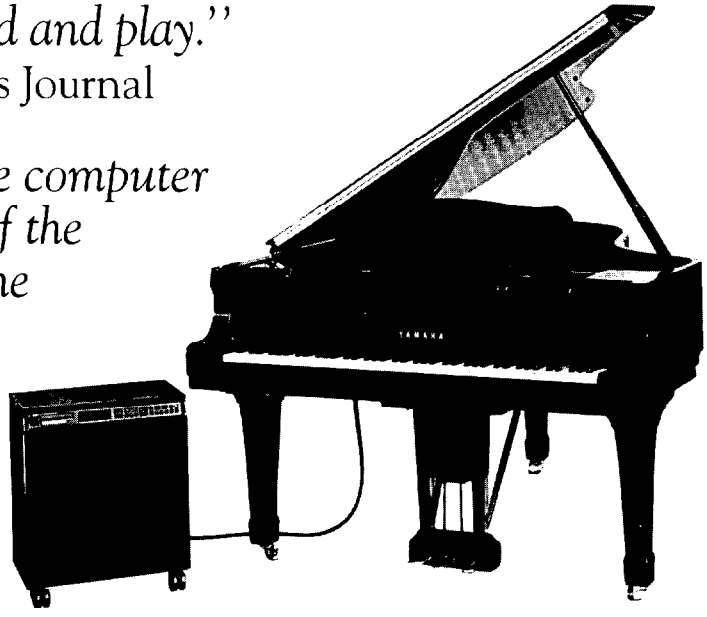

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