PIANO TECHNICIANS
Journal
MAY 1989

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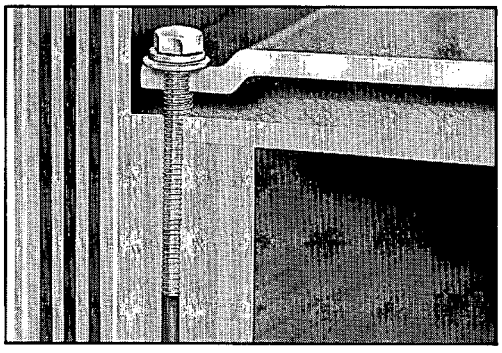

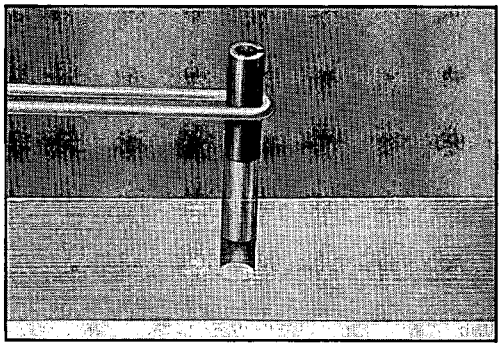

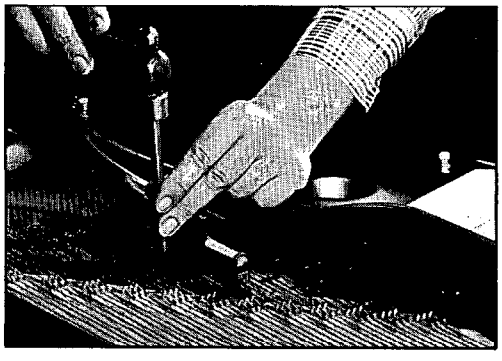

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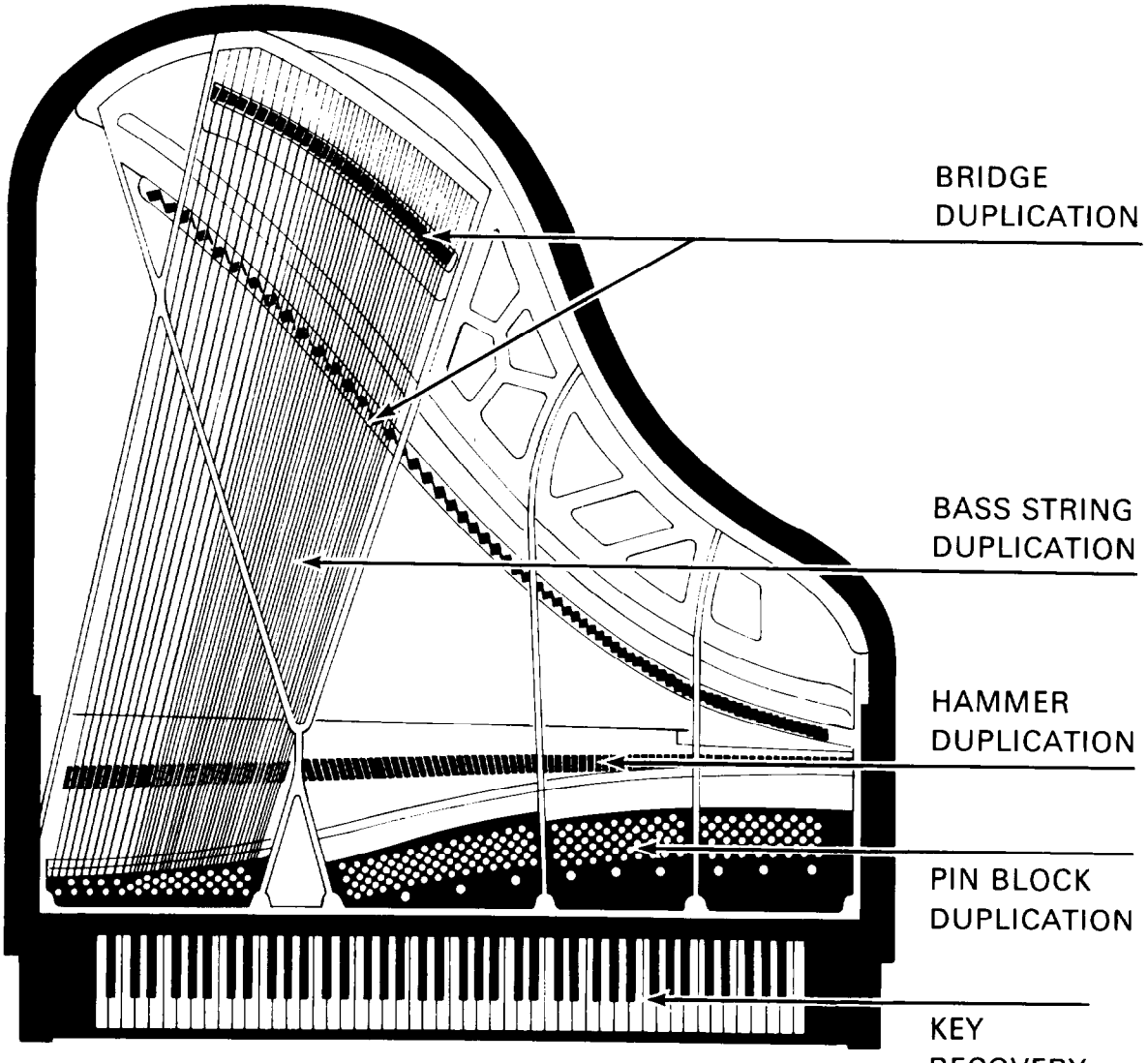

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PIANO TECHNICIANS
Journal

MAY 1989 — VOLUME 32, NUMBER 5 OFFICIAL PUBLICATION OF THE PIANO TECHNICIANS GUILD, INC.

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President's Message

Your Rights And Responsibilities

Ronald L. Berry, RTT
President

This being May, it is time to start thinking about the upcoming Council session in July. Participating in Council is a very important right and responsibility. Policies are set for the whole organization and they must not be taken lightly. Over the years I have seen the general level of knowledge of Council delegates increase. It is critical that delegates know what is going on and not expect to read the agenda book at the Council meeting and make up their minds there.

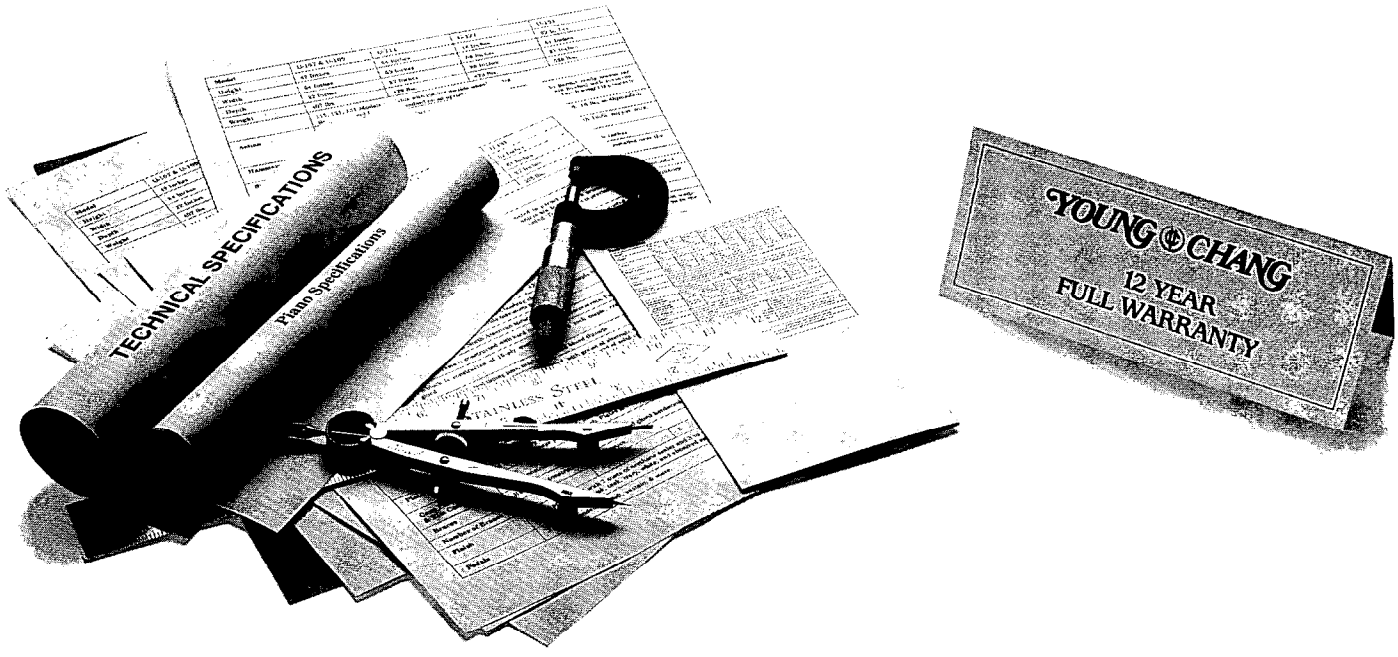
Now is the time for chapters to select delegates for this year. This selection needs to be based on more than who is going to the convention. One chapter I visited had a requirement that the delegate be someone who had served as delegate or alternate previously. This assures a knowledgeable delegate with new people being worked in as alternates. Resist the temptation to send someone new as delegate just so they can have a turn.

Instruct your delegate on how to vote for you. The chapter should discuss the issues that are coming up, particularly the bylaws changes, and vote on them. You may want to instruct your delegate exactly how you want him or her to vote or you may want to leave some room for them to make their own decisions since the issues sometimes change when they get amended on the Council floor. Your discussion and vote will let your delegate know how you feel about the issues so that he can use his or her best judgement and still represent your feelings.

The Bylaws amendments should already have come in a chapter mailing and should appear in this issue of the *Journal* allowing you to have May and June meetings to discuss them. Please read through them so everyone at your meeting will have some concept of what is proposed.

There are certainly more efficient ways to run an organization than our Council, but we prefer it this way. It gives everyone a chance to make the organization his or her own. With this town-meeting goes the responsibility to speak intelligently and to the point. Many chapter members turn off at the mention of "politics," but all this is a necessary part of the organization and affects the way the Guild operates and the directions it will take in the future.

While most manufacturers offer proof of performance in feet and inches, we offer our proof in years.



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For technical information on Young Chang grand and vertical pianos, write to me, Alan Vincent, Director of Technical Services at Young Chang America, 13336 Alondra Blvd., Cerritos, CA 90701. Or call (213) 926-3200.

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From The Home Office

Planning For Portland

In the past few issues, we've been talking about the way the Piano Technicians Guild works and how the Home Office fits into that structure. Organizational structures and dynamics can be very interesting, if you enjoy that sort of thing.

One of our main activities in the Home Office is the convention. That's not to say that we put on the entire convention from this office — far from it — but it does occupy a great deal of our time. In fact, you would be amazed at the number of people and the amount of their time it takes to put one of these things together. It's like putting on a week-long, extra-special house party for a thousand or so close friends, moving it halfway across the country, and throwing in a high-level school, several meetings and a tradeshow for good measure.

'...A week-long extra-special house party for a thousand or so close friends...'

Larry Goldsmith
Executive Director

Here in the Home Office, we coordinate information from literally hundreds of sources, print brochures, programs and agendas, work with the hotel, stuff registration packets and ship 60 to 120 boxes of various materials to the convention site. But that's our job. There are also several dozen people who devote what passes for their spare time to writing letters, making phone calls, and planning various activities to ensure that this thing comes off.

We — and when I say "we," I mean the Institute Director, the Portland Chapter, and a lot of other people in addition to the Home Office staff — have been working on this convention for more than three years. It started with a decision to go to Portland for the convention. Then various hotels were evaluated and a decision was made by the Board to go to the Red Lion Lloyd Center. This year's Institute Director, Ben McKlveen, has been working on the classes and instructors since the last convention he directed, the 1986 gathering in Las Vegas. Likewise, the Portland Chapter, which issued the original invitation, has been fired up about this for at least that long.

Planning an exhibit takes a lot of time. So does preparing an hour-and-a-half- or three-hour class, especially if it's a new presentation, as most of these are. Scheduling tutors and tuning examiners, planning mini-technicals, putting together a schedule of activities for spouses, gathering proposals and information for Council discussion, finding pianos, planning social activities — all these take a lot of time by a lot of people, most of whom go unrecognized and unrewarded for their efforts.

And they do it all for you. They do it so that when you leave Portland, you'll be filled up with knowledge, fellowship, memories of a beautiful city and a good feeling from having built a stronger organization. Your batteries will be recharged and you'll be a better technician and business manager.

How can you stay away?

Follow The Oregon Trail...

Manufacturers' Classes

Ben McKlveen
Institute Director

As I have been reminding you on these pages for the past few months, we will be having our national convention in Portland, Oregon on July 10-14 this summer. We would like you to attend, especially since we are putting together an educational institute designed to have something for everyone. In past articles, I have written about the beauty of the city of Portland and its surroundings; I have mentioned that we have a great hotel in the form of the Red Lion Inn and informed you about some of the features of this year's institute, like the class about the new vertical action designed by Darrell Fandrich and Chris Travelas. I have outlined many of the classes that will be taught by our members who are experts at what they do and I have talked about the expanded tutoring and a full schedule of mini-technicals.

It is my pleasure this month to list the manufacturers who will send teams or representatives to teach classes at this year's institute. In alphabetical order, they are:

Baldwin—who will be sending Del Fandrich, presenting a class in acoustics called "How the Soundboard Really Works." He will give us some insights into recent studies by Baldwin, with some interesting surprises.

Bosendorfer—and Ray Reuter will be bringing a team from Renner. They will show us how Renner hammers are made and how to voice them.

Kawai—will send us Ray Chandler who will present his popular class from last year called "Piano Diagnostics." You can learn to recognize and correct frequently overlooked piano disorders.

Kimball—and their great team headed by Roger Weisensteiner will teach grand regulating in a hands-on session augmented with lecture-demonstrations and slides that will help you to improve your regulating skills.

Seiler Pianos—of West Germany will bring us Mr. Seiler himself to teach a class on "Soundboards, European Style," and talk to us about the engineering of Seiler piano soundboards.

Steinway—will bring us a double-barreled presentation. Gary Green is back by popular demand to repeat his class from last year called "Ivory: The Good, the Bad, and Ugly." If you missed this informative class, here is another opportunity to see it! Franz Mohr and his son will team up with Gary to teach "Grand Regulation, Steinway Style."

Wurlitzer—sends us Richard Elrod who will bring his wagonload of actions and teach you the proper way to regulate the vertical piano.

Yamaha—and their dedicated crew will return with their popular class of several years ago called "Serving Our Grand Customers."

Young Chang—will be represented by Alan Vincent, who will teach a very informative class called "Touch Weight and Lever Mechanics."

Much of the material in these classes is vital to the professional practice of our craft. A surprising amount of this information is a mystery to many run-of-the-mill technicians. For example, recently, I was talking to a piano teacher who is head of the piano studies at a medium-size college outside Cincinnati. The topic was weight. He confided to me that the college technician (who is not a PTG member) confessed total ignorance about anything having to do with touch weight or key weighting. How sad to be so limited when the information is so available through the continuing education provided by our Guild institutes!

If you haven't done so, please make plans to join us in Portland, July 10-14. It could be the best thing that ever happened to your career.

Schedule of Convention Activities

Saturday, July 8
Registration
Pre-Council Delegate Briefing

Sunday, July 9
Registration
Council of Chapter Delegates

Monday, July 10
Registration
Council of Chapter Delegates
Suppliers' Exhibits
Visually Impaired Program
Opening Session

Tuesday, July 11
Registration
Institute Classes
Suppliers' Exhibits
Visually Impaired Program
Portland Chapter Carnival

Wednesday, July 12
Registration
Institute Classes
Suppliers' Exhibits
Visually Impaired Program
Auxiliary City Tour
Seminar for Piano Teachers
Regional Meetings and Awards Programs
Committee Meetings
Steinway Social Hour
Awards Banquet

Thursday, July 13
Institute Classes
Suppliers' Exhibits
Visually Impaired Program
Yamaha Party

Friday, July 14
Institute Classes
Closing Luncheon

Saturday, July 15-Sunday, July 16
Post-convention tour to Posey Soundboard Factory

To Excellence...

Taking The High Road

Taylor Mackinnon
Portland Chapter
Liaison

Last month I mentioned our beautiful Oregon Coast and the Columbia River Gorge. There is a day-long trip you can take to enjoy not only the Cascade Mountains but the Columbia River Gorge as well. Highway 26 out of Portland winds its way up Mt. Hood where you can visit historic Timberline Lodge and get a terrific view of Mt. Jefferson. Beautiful conifer forests with bubbling streams and wild rhododendrons line the highway. West of Timberline, Highway 35 descends north toward the city of Hood River. As you drive down and out of the forest you can see hillsides covered with apple orchards, Mt. Hood resting on the southern banks of the Columbia River, and a picturesque view of Mt. Adams as you look on up into the state of Washington. At Hood River you turn west and travel Interstate 84 down the Gorge toward Portland.

When you get to Multnomah Falls, stop and enjoy this beautiful, delicate waterfall. This waterfall is about the height of the Gateway Arch we all enjoyed last summer in St. Louis, and is the second highest in the U.S. Now, leave the Interstate to travel the parallel alternate route which will take you by more waterfalls. This is a cooler, more shady drive and ultimately brings you to Crown Point, where you have a breathtaking view east up the Gorge which includes Beacon Rock, the second largest monolith in the world and west, down the river toward the sea (more about that next month). There is a small observatory with a museum and a person to answer questions.

If you're interested in more history of this area you can cross the Columbia River at Portland and visit the historic Hudson's Bay outpost at Ft. Vancouver. This wonderful fort displays beaver pelts, Hudson's Bay wool blankets and all the paraphernalia that goes with a frontier fort. There are guided tours of the housing, kitchen, trading post, etc. Vancouver is also the home of The Piano Hospital, which is a training center for the visually impaired established by Emil Fries and currently directed by Ken Serviss. You could stop and have a look around their modern facility.

And don't forget the post-convention tour to Posey Manufacturing Co. and a visit to Mt. St. Helens. We'll leave from the Convention Hotel Saturday morning at 8:00 and get back Sunday afternoon at 5:00. Posey is in Hoquiam on the Washington coast and they manufacture soundboards from Sitka spruce for all piano manufacturers in the U.S. market. John Steinway has called these soundboards the "singing voice of the piano." Posey takes raw Sitka logs, saws them up with the biggest bandsaw I've ever seen, kiln-dries them, and resaws them into vertical-grain lumber which is matched for grain and color. The wood is then edge-glued to form soundboards. They also maunfacture ribs, key beds and other piano parts. This is a wonderful opportunity to see just how it's really done.

Multnomah Falls

We'll stay over night in Chehalis, WA, and on Sunday we'll tour Mt. St. Helens, our very active volcano located about 75 miles northeast of Portland. Although St. Helens was not the largest volcanic explosion we know of when it blew its top in 1980, it was big enough to spread ash clear to South Dakota. It is currently in a dome formation stage.

Don't forget Portland Chapter's Carnival on the

Continued on next page

Portland...

Tuesday night of the Convention. Next month I'll talk about the Oregon Coast and more about the Carnival.

If you're thinking about vacationing in Oregon this summer and want more information, contact:

Oregon State Tourist Information Center
12345 N. Union
Portland, OR 97217
phone (503)285-1631

If camping is your thing, call the Oregon State Park Campsite Information Center at (503)236-7488.

Portland Pins

The Portland Chapter is starting a new tradition at the Annual Convention this July. We will sell enameled lapel pins. Pins (see sketch) will sell for $5, with proceeds going to a scholarship fund at Emil Fries' Piano Hospital. The Piano Hospital is a training center for the visually impaired located in Vancouver, WA, just across the Columbia River from Portland. We're hoping that those who attend the convention will visit the wonderful facilities at the Piano Hospital and visit with the staff and students. We also hope you'll buy our first annual convention commemorative lapel pin (I wonder what Dallas will do next year.)

— Taylor Mackinnon

Grand Pedal Regulation

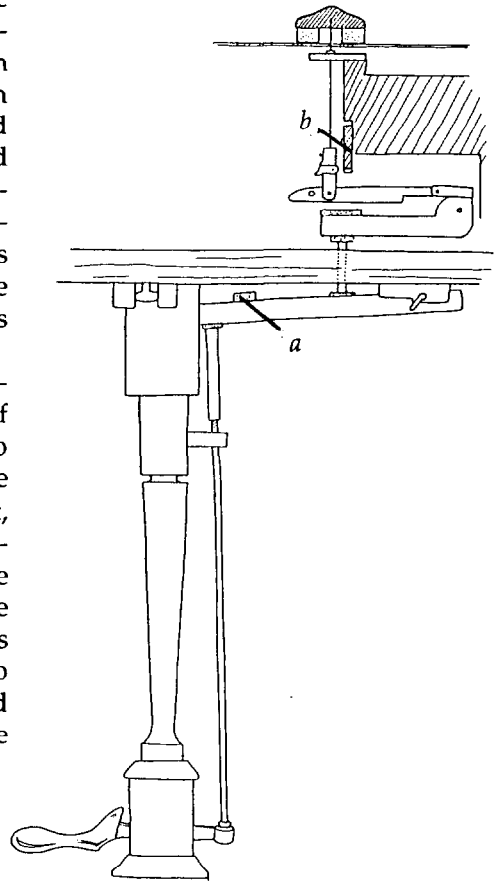
Susan Graham
Technical Editor

Last month we dealt with rebuilding and installing the pedal lyre. Before leaving this subject, it seems appropriate to cover regulation.

The right or damper pedal is regulated by adjusting either the rod length or the thickness of the contact leather (glued to the bottom of the trapwork lever) which should rest directly on the rod. There is lost motion in the system, but it occurs elsewhere. There should be no lost motion between the rod and the pedal, or the rod and the trapwork lever, or between the lever and the pitman, or between the pitman and the tray. Lost motion does occur between the underlevers and the tray: this ensures that the dampers are seated on the wire. The remaining components of the system should be in direct contact with each other, even when at rest (fig. 1). Rod length (or leather thickness) is adjusted to accomplish this. Other regulating adjustments need to be made first, however, and can be done as long as there is at least some lost motion between the tray and the underlevers so the system is not hanging up.

The first step in regulation is to adjust the underlevers to set the timing of the damper lift. Some technicians do this by blocking up the tray to hold the underlevers at the desired lift point, setting the screw to hold the wire, releasing the tray and then shimming the key end felt if necessary to even up the lift with individual notes. This works particularly well on new pianos with no significant wear on the tray or key end felt. In most cases, I prefer to set the underlevers to the key first and adjust the tray lift afterwards by shimming under the tray felt. The underlever is set (by loosening the set screw and raising or lowering it on the wire) so the back of the key will contact the underlever and lift the damper when the hammer is halfway to the string. Some pianists may prefer a slightly earlier lift: contact at one-third of hammer travel. This will result in a heavier feel to the action (the key has less momentum built up before it must lift the additional weight of the damper). Timing to lift at one-half hammer travel may result in a more noticeable bump as the key contacts the lever, however. The important feature is that the lift be uniform from key to key. This is easiest to accomplish if the key end felt is in good condition, so that if the underlevers are in a uniform, straight line and even timing with the keys will result. Determine the correct lift by sample and then use a caul (a block of wood supported table-top fashion on four screws) to set the underlever position. Reinsert the action and check the lift with each key, using a gauge (a piece of wire with three right-angle bends) which fits between the strings and the hammers. If the system is in good condition, continuing with regulation will be simple because the underlevers are also level, forming a straight line with each other. The more wear, the more difficult it is to set evenly.

Figure 1 — Right Pedal Action
Drawings By Valerie Winemiller



When the key lift timing is satisfactory, adjust the pedal timing. The most practical method is usually to set the rod length to raise the tray so the lost motion is correct with the damper—or section of dampers—which lifts earliest. Shim under the tray felt to allow it to pick up the later dampers more quickly. It is possible to burn and brush tray felt to reduce thickness and slow down an early damper (*Please* don't scrape wood off the underlever) but shimming late ones is simpler and reversible. Have a variety of thicknesses of shimming material available—it is more stable to use one piece of thick paper rather than a stack of thinner shims. If the tray itself is warped, setting an even lift can get trickier—in severe cases the tray may need to be planed or replaced.

Uniform pedal lift is important, particularly for skilled pianists: even lift results in an even release, which is at

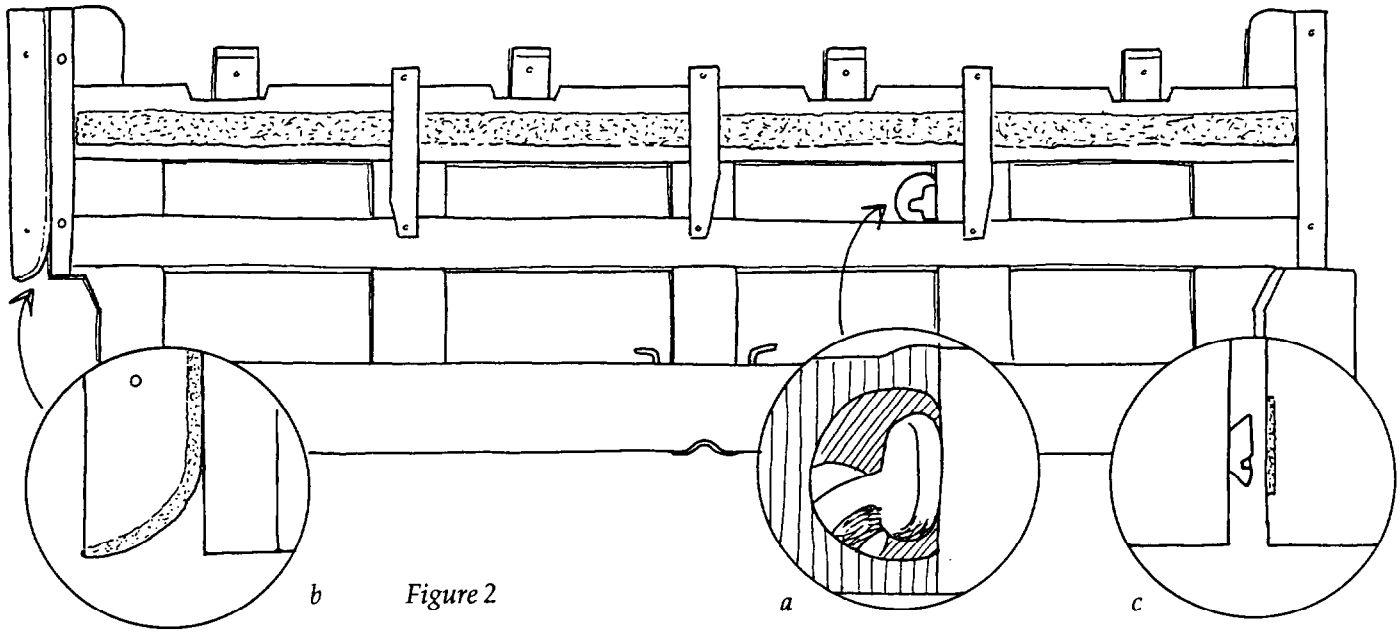


Figure 2

least as important for control of volume and voicing. When you depress the damper pedal, run a chromatic scale from one end of the keyboard to the other, and then very slowly release the pedal; no distinguishable note or notes should ring longer than the others—the sound should be shut off slowly but uniformly throughout the range of the instrument.

Once the lift is even, how much lost motion should there be? About one-third of the pedal travel seems average—enough to insure that when the pedal is at rest, the tray will not stay in contact with the underlevers, causing leakage, and enough to leave some allowance for changes in leather thickness due to climate and the simple tendency of the piano never to react exactly the same way twice.

Adjustable pedal rods are a boon to the technician and are fairly easy to regulate. Be sure that the locking nut usually found under the threaded head on the rod is tightened to hold the regulation, but that in tightening it you do not inadvertently change the position of the main head. If you are dealing with a non-adjustable rod and must take up lost motion, avoid sandwiching new leather on top of old. Usually the rod will have worn a depression in the old leather—if a new piece is glued on over this, the regulation may be correct initially but will quickly change as the new leather conforms to the shape of the old underneath it. It is also difficult to achieve a good glue joint since the old leather usually will have been lubricated (as should the new, with VJ lube where the rod contacts). This increases the chances that the new leather will fall out, or that it will slide between the old leather and the rod, causing noise. Note also the word "leather." A chunk cut off the end of your temperament strip may be better than nothing...but felt will not hold up and a good solid piece of leather is needed for regulation to be stable.

After the lift and lost motion are regulated, a stop of some sort is positioned to limit the movement of the system. The pedal should lift the dampers the same amount as does the key: engage the pedal, run a chromatic scale, and watch for "winking" dampers. If there is movement, then the pedal is not lifting far enough. Either the stop is limiting the lever too soon, or there is so much lost motion that insufficient pedal travel is left to operate the tray. Adjust accordingly. Check that the pedal is not lifting too far by holding down groups of keys and then engaging the pedal, watching to see that the dampers do not lift further.

In older pianos, the stop is usually a block of dense felt between the trapwork lever and the keybed ("a", fig. 1). In newer instruments there may be a screw or other adjustable device which contacts the underlever as it rises. The stop is not usually in the pedal box directly above the pedal, although in systems which have the trapwork levers inside the action cavity instead of underneath the keybed, this may be the only place an effective stop can be placed. It is *not* the function of the upstop rail above the underlevers ("b", fig. 1) to restrict pedal travel. That rail is essentially a safety: it keeps the underlevers from bouncing up too high and rebounding on the ends of the keys. The system should be adjusted so neither the key nor the pedal actually force the underlevers against the upstop rail. The rail should allow very slight play in the damper of a sharp key: depress the key and then attempt to lift the damper by hand. There should be very slight free movement. If the pedal lift/key lift regulation is correct, the upstop can be adjusted by depressing the right pedal fully, letting the upstop rail drop down so it actually rests on the underlevers, and then fudging it upwards very slightly. Often this rail has brads as well as screws. Do not drive these brads in so they are completely flush with the wood, since that makes them extremely difficult to remove when the rail needs to be readjusted.

Adjustment of the shift pedal is also made in the rod length (or the contact leather thickness). There should be no lost motion anywhere in the linkage, meaning that the lever is always in contact with the frame ("a", fig. 2), but it must not hold the action frame up off the end block ("b", fig. 2). Be alert for this if you have trouble repositioning an action to the left. The stop for the shift is usually a screw, either in the arm, the cheekblock or the frame itself, which restricts the travel of the keyframe ("c", fig. 2). There are two basic philosophies of shift adjustment. One is to shift the action far enough for the hammers to

completely miss a string in each unison. The other is to shift it only far enough so the string contacts a different, less compacted section of the striking surface of the hammer. This can be set for the preference of the pianist. After the stop is set, shift the action over as far as it will go and run a chromatic scale to be sure that no hammers are shifting far enough to hit the next unison up: if so, hammer or string spacing may be at fault, or the stop may need to be a little more effective.

It is the act of an optimist to describe sostenuto adjustment: this is a part of the piano which demonstrates beyond dispute the innate perversity of inanimate objects. The adjustments sound so simple but can be so difficult to accomplish, and, even if the system is set up as it should be, it still may not work exactly right. It won't do to let the thing get the upper hand, however. The first requirement is that the tabs on the underlevers be in line, not only up and down but in and out (nearer or farther to the belly rail). Sight down between the strings from above to be sure that they are—if any are too far forward or back, pull or push on the underlever to bend the wire and align the tabs. (Recheck the damper head seating and be sure the height of the underlever has not changed significantly...). The second adjustment is in the static position of the sostenuto blade itself. The angle of the blade at rest is determined by the pedal rod, since lengthening or shortening the rod moves the sostenuto monkey up or down, causing the blade to rotate. There should be no lost motion between the pedal rod, the trapwork lever, or the monkey. The pedal rod adjustment should set the system so that the sostenuto blade, viewed in profile, hangs with the lip at 5 o'clock when at rest (fig. 3). When in this position, the lip should be 1/16" above the tabs and 1/16" away from them. If it is not, the hangers must be moved to adjust the rest position of the blade. This is easier in a sostenuto system with the blade suspended from hangers fastened to the belly rail in the action cavity, so that it remains when the action is removed. Such hangers can be moved up or down, and shimmed to move the blade in or out as need be ("a", fig. 4). Some systems have a screw inserted behind the hanger which is for adjustment. The sostenuto rod must be solidly

Figure 3 — Blade at rest

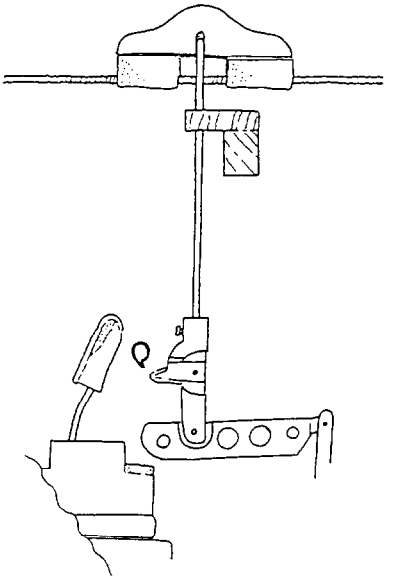


Figure 4 — Rod Mount

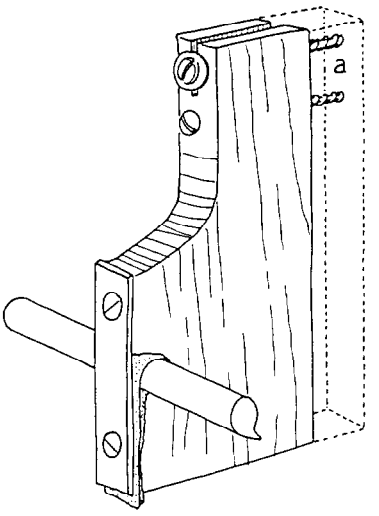
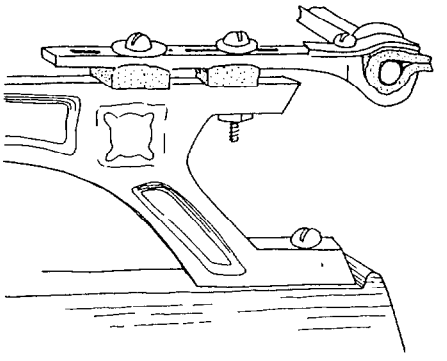


Figure 5 — Steinway Rod Mount



held by the hanger—it will be lined with cloth at the contact point but should not be lubricated.

Some pianos, notably the Steinway, attach the sostenuto blade to the hammer action bracket (fig. 5), making access to the underlevers easier but sostenuto adjustment—ahem—challenging. It is helpful in such systems to use a gauge to register the height of the tabs so the height of the blade can be adjusted while the action is on the bench and it will be the required distance above the tabs when the action is reinserted. The height adjustment is made by bending at the bracket—make sure to bend not just the plate which fastens over the top of the rod, but the actual holder where it supports the rod from underneath. This bend is accomplished by levering against the lower bracket foot with a sturdy screwdriver or similar implement. If you have ever seen Fred Drasche cheerfully manhandle these brackets to demonstrate adjustment, you know some force is required and there is no need to deal too gingerly with it. The forward-and-back adjustment of the blade in this system is made by unscrewing and sliding the holders in the brackets. It may be helpful to remove a few dampers so you can look down between the strings with the action in place and see the rod position.

Once the static position of the blade is set: lip at 5 o'clock, 1/16" above and 1/16" away from the tabs, the blade is set to rotate so it engages the tabs correctly. It should rotate to a 3 o'clock position and stop (fig. 6). A stop block or screw is located between the trapwork lever and the keybed. When it catches the tabs, the lip should extend 1/16" under them. The sostenuto blade must not force the underlevers up against the upstop. Allowing it to do so creates a risk of damaging the underlevers. Check by engaging the damper pedal, engaging the sostenuto pedal, releasing the damper pedal and watching to see that all the dampers remain lifted but do not rise further. If the blade doesn't catch, it may simply need more travel, or the static position may be too low or too far away, or all three. If the blade lifts the dampers farther than the pedal or key, the stop should be adjusted to limit the travel—or the static position of the blade may be too high. The blade should not brush the tabs of any underlevers at rest;

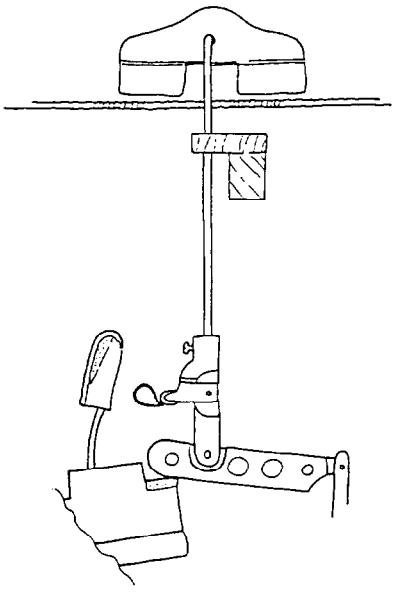
if it does, it may be too low or too close. Although testing with the right pedal as described is the ideal, the fact of the matter is that sometimes the blade will catch a damper when lifted by the key but will let it fall when it has been lifted by the damper pedal. Since the sostenuto is used when the damper has been lifted by the key, it is practical to doublecheck for this before attempting further adjustments in the system (and suspect that your pedal lift may not be precise) The ideal also is that the pedal is slowly released, the dampers should begin to fall randomly. Finally, engage the sostenuto without lifting any dampers and strike each key a sharp blow to check for dampers which hop past the blade and then hang up. If this occurs, the blade may not be swinging far enough, or possibly the upstop rail is too high and allowing too much travel of the underlever. Older sostenuto systems, which employed a fixed tab in the underlever—instead of the hinged, springloaded or flexible neoprene tabs found in modern systems—cannot be adjusted so that the pianist does not feel a bump of contact if the sostenuto is released when keys are still depressed. These systems I find the hardest of all to adjust, trying to minimize that bump but still get reliable catch-and-hold.

With any luck, the first sostenuto you will be called on to service will have the rod fastened into the cavity and not onto the hammer action. These are usually easier to adjust since the whole system remains intact in the piano. It is wise to take advantage of working on such a system to familiarize yourself with basic sostenuto function. Be forwarned that many recent compositions for piano call for extensive sostenuto use and we may get more complaints about an improperly functioning system as a result. Correct adjustment of all three pedals should be included in the regular service of pianos under your care, and will be appreciated even if not consciously noticed by your customers.

Not to neglect vertical pedal regulation, here is a reprint from the Western Michigan chapter newsletter with some tips:

Our jobs would be much easier if we keep the spoon and pedal separate. This is a must. Before starting, check the action for regulation and tighten all flanges, including the damper flanges and the action bracket screws.

Figure 6 — Blade Engaged



When the dampers are properly regulated, they should lift off the strings 3/16" with the pedal fully depressed. There should also be a little lost motion between the damper rail and the back of the damper lever. When bending the wires, always make your first bend at the bottom of the wire and then "fine tune" the wire at the top, keeping all the wires in line with each other as much as possible. Your pedals should always have some play (about 1/4").Regulate the damper wires to the pedal first, then regulate the spoons last.

If during the depression of the sustaining pedal you notice the bass, for example, is coming off first and the treble is late, your problem could be a broken hanger, bent hanger, bent rail or damper rod. If the rail is bent or a hanger is broken, then a whole section will be off together. Bending the hanger arm out will make the dampers move slower while bending the arm in will make them faster.

Dick mentioned before regulating the spoons to be sure the lost at the capstan motion has been regulated first.

Spoons: The dampers should begin to lift after the hammer has traveled half way to the string. When the spoons are bent toward the string, the damper will lift and vice versa.

On spinet pianos you can reach underneath the action under the keybed and bend the spoons by pushing gently on the bottom part of the damper lever. Sometimes when doing this, you may encounter some interference from the bass wires or harp, at which time you may wish for a "jacket hammer" and a "wire cutter" all in one. However, after you scrape up your knuckles a bit, of course, avoiding any expletives along the way, most of the dampers can still be regulated. What few you cannot get at, you can get at by simply tipping the action forward and reaching behind it. If the levers are pushed in too far, you can remove the key, loosen the bridle strap, and gently push down on the wippen to bend the spoon out. Then try again. On older actions be careful not to break the wippen flange.

To regulate the spoons with the action out, regulate the spoon, mark it, and remove the action. Block up the damper lift rod against the action rail with a wedge so it holds the dampers just where they would be when contacting the string. Use the set sample to regulate the others by lifting the wippens by hand.

When you find a hard "zinging" damper, it is suggested to lightly file it with either an emery board or a tooth brush with half of the bristles cut off. In the lower bass, Dick has voiced the damper felt with his voicing needle.

Harry Buyce mentioned that on certain pianos, the felt may be inferior or saturated with excess glue, and the spoon will dig into the felt giving you a sticking key. Nick Pool also said the spoon may be bent too far towards the strings, causing the spoon to scoop the felt, again creating another sticking key problem.

To lubricate pedal grommets, Dick uses teflon "Lub Gel." To lubricate damper springs, he uses a teflon oiler thinning it with naptha to carry it. Mixture is 3/4 teflon to 1/4 naptha. Both of these can be bought at most any Radio Shack store. Dick emphasized once more before closing to keep the wires separate from the spoons in your mind, doing only one step at a time. Then damper regulating will be relatively simple.

Dick Groot, Grand Rapids, MI

The October issue mentioned use of a high-tech moisture meter. Last month we had the low-tech moisture meter courtesy of Nick Gravagne. In this month's *Journal* we have a third option for the build-it-yourself wizards among us. It is a reprint of an article which initially appeared in *Fine Woodworking* and was then revised and included in the Taunton Press publication *Wood and How to Dry It.* (The article is reprinted with the permission of *Fine Woodworking.)* It was brought to my attention by

David Durben, who also sent the following tip for a very interesting method of clamping loose ribs when regluing them to a soundboard.

I came across a soundboard situation that I think you may find interesting. On a studio piano at a local university, there was an incredible separation between the soundboard and ribs. At its greatest length, it involved 6 1/2 inches of one rib. Starting at the bass end, it involved six ribs, starting nearly at the top corner of the board. The incredible part was that it was 3/8 inch away from the third and fourth ribs, and the board was not cracked. That left 1/4 inch between the soundboard and plate, so there was no room for toggles or much of anything else to help draw the board back.

After quite a bit of thinking and brainstorming with my engineer father and brothers, it occurred to me that auto-body people sometimes use a bladder (volleyball, basketball) to pop a dent out of a fender when they can't get at the other side with a hammer.

So, I cut some old bicycle inner tubes to the proper lengths (keeping the valves in place), took them to the local tire store, and had the cut ends vulcanized.

I slid these between the plate and soundboard, wedged the ribs between the backposts (Baldwin's method), and inflated the bladders until soundboard and ribs were rejoined (approximately 351 lbs. psi).

It worked well, except that I would like to have a thin, strong outer skin for the bladders to allow for a higher psi. Those still need a little work.

That's all for now. Keep up the good work! The Technical Forum is by far my favorite monthly reading.

David P. Durben, RTT

Shop-Built Moisture Meter

Rick Liftig, Meriden, CT

Even though I've occasionally had problems with wood warping and cracking or joints coming loose because of moisture-related wood movement, I never could justify spending $100 or so to buy a moisture meter to check my stock before I used it. I've always been interested in electronics, so I decided to build my own meter. My home-built version, shown in the photo on the facing page, cost $30. I've relied on fairly simple electronic procedures, so even if talk about soldering and circuits makes you uncomfortable, you should be able to build the meter.

The moisture content of wood can range from 0% for oven-dried samples to more than 100% for soaking-wet green wood, where the water in the wood weighs more than the wood tissue itself. Traditionally, technologists determined the moisture content by weighing a wood sample, oven-drying it until it was bone-dry, then weighing it again. The weight difference divided by the oven-dry weight, multiplied by 100, gives you the percentage of moisture content. This time-consuming method requires such an extremely accurate scale that it's impractical in most shops.

My meter, and many commerical models, bypasses drying and weighing by taking advantage of the fact that wet wood conducts electricity, while dry wood, a good insulator, resists the flow of electricity. By measuring this electrical resistance (expressed in units called ohms) and comparing your reading with standards developed by the U.S. Forest Products Laboratory and other agencies, you can determine wood's moisture content. The system works fine if the wood moisture content is in the 6% to 30% range, which is fairly common. Depending on the season and locale, most air-dried wood has 12% to 15% moisture content. Properly kiln-dried wood should be 6% to 10%. The electrical resistance in very wet or very dry samples is too erratic to give accurate readings.

Since we are measuring ohms, you might think that any off-the-shelf ohmmeter could measure resistance in wood. Wood is such a good insulator, however, that only a high-

Fig. 1: Building the circuit board

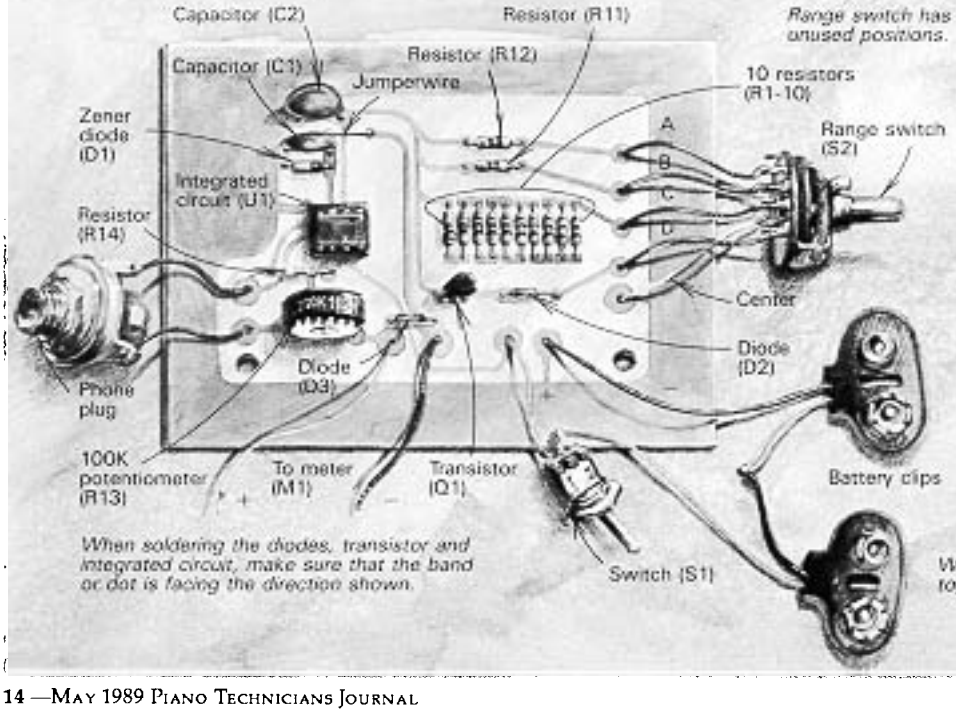
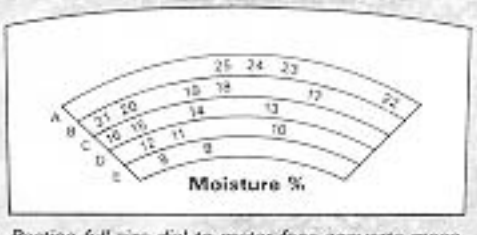


Fig. 2: Customized dial



Pasting full-size dial to meter face converts megaohms directly to moisture percentages for Douglas fir. For other species see conversion table. The five scales correspond to A-1 megohm; B-10 meg.; C-100 meg.; D-1,000 meg.; E-10,000 megohm.

range ohmmeter capable of measuring in megohms (one million ohms) can be used. Early instruments used vacuum tubes and expensive high-voltage circuits, but my unit uses a modern, integrated circuit called an operational amplifier which can be wired to compare the wood's resistances in the meter circuit. The details aren't too important; what's important is that the meter is sensitive enough to measure the moisture in a wood sample. Once I worked the bugs out of the system, I modified my meter dial to show percentage directly, as shown in figure 2, so I wouldn't have to keep checking resistance charts. Just glue figue 2 to your dial face with rubber cement and you're ready to go. I find my readings, based on Douglas fir standards, are accurate enough for most uses, but if you want more accurate readings that account for physical differences of each species, use figure 5. If the species you are testing isn't listed, you can assume its readings would be much the same as one of the listed from the same geographic area and with similar density and structure. The values are probably within 2% of each other. Even within one board, you may find that much of a variation because of wood structure, uneven drying and contamination.

Construction—The simplest way to build the meter is to make a printed-circuit board from the pattern shown, drill holes to accept components, then solder the components on. The completed board, along with its gauge and switches, can be housed in any type of box—I use a cherry case fitted with a 1/4 inch walnut deck. The printed circuit is not as mysterious as it looks—it's just a way of replacing wiring with thin copper lines drawn and etched on a board. All you have to do is buy a printed circuit kit from Radio Shack, or some other supplier, and follow the instructions in the package to the letter.

The probe is a 1 1/4 inch dia. piece of Plexiglas rod drilled to accept the probe leads, which are soldered to the stell points (taken from a cheap drawing compass) epoxied into the rod. I spaced the electrodes about 3/4 inch apart, but the spacing isn't critical. Make the probes long enough to penetrate one-fifth to one-quarter the thickness of the boards you want to test. If you don't want to bother with a probe, drive a pair of nails into the wood and connect them to the meter with alligator clips.

Calibration and use of the meter—The meter must be calibrated before use. Solder four 10-megohm resistors together in a four-unit "daisy chain" series. Touching the ends of the chain to the probe tips, adjust R13 (the 100-K potentiometer) to read 14% moisture content, with the meter set to scale C. Do not touch the probe tips or resistors with your hands as this will change the reading. The meter is now calibrated for all ranges, and should remain accurate as long as the batteries are good.

To use the meter, jam the probe straight into a clear area of the board's face, so that an imaginary line between the points runs parallel to the grain. For the most accurate reading, measure the wood at room temperature. Also, don't insert the probe towards the board. When measuring, switch the meter ranges from lowest to highest (i.e. A to E) and stop at the position that gives a mid-range reading, usually the most accurate and easiest to read. If you can't get a reading, the sample probably has a moisture content of 6% or less. Readings may vary from one part of the board to another due to improper drying, abnormalities in grain structure, dirt and other surface contamination. If you have any doubts about a reading, probe several other areas of the sample.

I've found that having such a useful and inexpensive instrument in the shop is a real plus. If you're contemplating working with wide panels it would be wise to determine the moisture content of the stock before you being work. The time and trouble you'll save is well worth the effort. ≡

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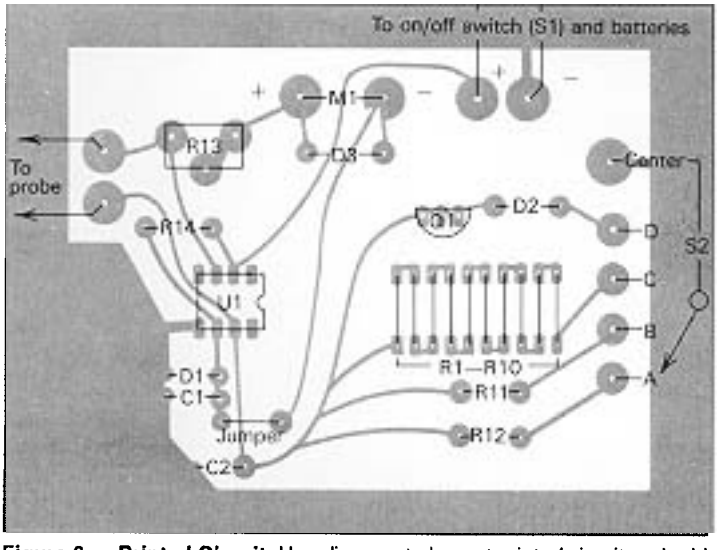

Figure 3 — Printed Circuit. Use diagram to lay out printed circuit and add components. Black lines are circuits printed on underside of board. Underside of board is shown here. Parts are coded and refer to the parts list at right.

Fig. 4: Parts list

Qty.	Radio Shack Part Number	Diagram Code	Description
1	270-1752	M1	0-1 milliamp DC meter
1	276-561	D1	6.2 volt, 1 watt zener diode
1	None	U1	LM308 N Op Amp
1	276-2009	Q1	MPS2222 Transistor
	276-1576		Printed circuit fabrication kit
	276-1577		Direct etching dry transfers
2	276-1620	D2 & D3	1N914 Silicon diode
1	271-220	R13	Printed circuit potentiometer 100K
15	271-1365	R1 - R11	10 Megohm resistors ¼ watt
1	271-1325	R14	2200 ohm resistor ¼ watt
1	271-1356	R12	1 Megohm resistor ¼ watt
1	275-625	S1	On-off switch (SPST)
1	275-1385	S2	One pole 12 position rotary switch
2	270-325		9-volt transistor-battery clips
1	274-252		Phone Plus
1	274-256		Phone jack
1	274-414		Knob for switch
2	272-134	C1 & C2	0.05 UF disk capacitors

Misc: 5 in. section of 1¼-in. diameter Plexiglas rod, 22-gauge wire, solder for electronics.

Parts available from Radio Shack; Jameco Electronics, 1355 Shoreway Road, Belmont, Calif. 94002; or Digi-Key Corp., P.O. Box 677, Thief River Falls, Minn. 56701. Unless you're very familiar with electronics, don't try to substitute electronic components.

Fig. 5: Species corrections	Meter Readings (%)										
Species	7	8	9	10	12	14	16	18	20	22	24
Birch	0.9	1.0	0.8	0.7	0.7	1.0	1.0	1.3	1.4	1.6	1.6
Douglas Fir	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mahogany, African	0.7	1.4	1.6	2.0	2.8	3.2	3.6	3.8	3.8	3.8	3.8
Mahogany, Honduras	0.3	0.3	0.3	0.4	0.6	0.5	0.2	0.0	-0.5	-1.0	1.5
Mahogany, Philippine	-1.2	-1.2	-1.5	-1.9	-2.4	-2.8	-3.3	-3.7	-4.5	-5.2	-5.8
Maple, hard	0.7	0.7	0.4	0.1	-0.2	-0.1	-0.2	0.0	0.2	0.5	1.0
Oak, red	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.0
Oak, white	-0.1	-0.2	-0.4	-0.5	-0.5	-0.5	-0.8	-1.1	-1.5	-1.8	-2.0
Pine, ponderosa	0.4	0.6	0.7	1.0	1.4	1.6	1.6	1.4	1.2	1.2	1.6
Pine, white	0.0	0.1	0.2	0.3	0.7	1.1	1.3	1.3	1.2	1.1	0.4
Poplar, yellow	0.1	0.6	0.7	0.7	1.2	1.6	1.6	1.6	1.7	2.0	1.7
Redwood	0.0	0.0	0.0	0.0	-0.2	-0.5	-0.8	-1.0	-1.0	-0.2	0.0
Walnut, black	0.5	0.6	0.4	0.4	0.4	0.5	0.3	0.2	0.0	-0.2	-0.4

Conductivity varies with different species. All species compared with Douglas fir standard. Example: When testing birch and meter reads 10%, look opposite Birch under 10%. Add 0.7% to meter reading for 10.7%. For woods not on chart, use figures for species of similar hardness and grain configurations.

Adapted from *Furniture and Cabinet Making* by John L. Feirer ©1985, Bennett & McKnight, Peoria, Ill.

Conversations Backstage With Garrick Ohlsson

Rick Baldassin
Tuning Editor

Nearly a quarter century ago, pianist Garrick Ohlsson started winning gold medals: first the Busoni Competition in Italy in 1966, then the Montreal Competition in Canada in 1968, and finally and most importantly the Chopin Competition in Poland in 1970. Over the years the promise of such auspicious beginnings was fulfilled and Garrick Ohlsson is now recognized world-wide as a grand master of the piano. He appears regularly both as recitalist and orchestra soloist in all the great concert halls on four continents.

In January, 1989, Garrick Ohlsson performed with the Utah Symphony in Salt Lake City. The following are excerpts from a conversation I had with him backstage before his final performance.

RB: Because you are traveling so much, each place you play you see a different piano. What sort of adjustment is that? Is it a difficult thing to adjust from instrument to instrument, hall to hall?

GO: I would say that sure, it is difficult in a certain way, but a pianist who has played as much as me, in as many different places, must be extraordinarily flexible, and must adjust quickly.

RB: So it is part of the whole concertizing experience.

GO: It is part of what I do normally. If I could spend two weeks in a hall with a piano and a good piano technician, I could get very used to it and it could get used to me, and we could have a lot of fun. But you do have to adjust quicker. I mean, there is no such thing as the perfect situation, or the perfect piano, either.

Some of my colleagues want a piano to sound a certain way or to feel a certain way. Of course, I have my ideas about that, but basically, if you come into a town for a few days, you really can't make a piano over, even if people are willing, which they are usually not, and they shouldn't be, so it is also part of my job to get adjusted as fast as possible—how loud will it play, how soft will it play, how fast or slow, and see what it will do, to take measure of the instrument which you use, because the instrument is a tool, after all, to play music on, and you have to do the best you can, with all the givens. Nevertheless, if the instrument frustrates you, of course it is very difficult. Unquestionably. It certainly is, in a way, difficult to change from instrument to instrument, but on the other hand, pianos are really relatively uniform these days. I'm not talking about quality, but they are intended to be relatively uniform, so they are within a certain range. By now, I've played hundreds and hundreds of pianos, so I know what the range of possibilities would be. When I was a young pianist, it was much more difficult.

RB: You are currently concertizing with over a dozen concerti. How difficult is it to play the piece you are playing, the Barber Concerto, here and in a half a dozen other places in a very short time period?

Garrick Ohlsson

GO: This piece is a very brilliant and very virtuoso piece, so you want a piano that responds with a great deal of brilliance. You want a fairly brightly voiced piano. Some pianists fall into the trap of saying that a piano that has a dull or soft voicing on it is hard, and has a heavy action. See, because you talk about psycho-acoustics and immediately pianists pick up on the general, whole feeling. You could voice the instrument very softly and put the lightest action in the world in it, and the pianist would say it feels heavy because you are trying very hard to make the sound.

RB: It takes a lot of effort to make the same amount of sound.

GO: You can have a relatively heavy action with a very bright voicing, where the touch weight can be heavier, but the pianist won't notice it nearly so quickly. So in that case, with this piece I would need a piano that was relatively bright. But aside from that, it is kind of hard to say because I'm so used to doing it now, it doesn't strike me as difficult. But I think it is probably terribly difficult. I used to have to practice for hours and hours in a hall to sort of get the feel of it. Now I know much faster what it can do and what it can't do. I know what to blame myself for and what to blame the piano for. For example, I see this in master classes all the time. A young pianist you are teaching will say, "I couldn't get this note to repeat." Then I will try it. They will struggle to play it with one hand, and I will play it with two hands, to show that it is not the action. Sometimes the action is failing, but sometimes it's not. Sometimes it is you that is failing, so you have to know

what to blame yourself for, because that is also part of being an experienced artist. I can't ask that piano down there to do something it literally cannot do. A piano cannot drown out an orchestra, for example, unless you amplify it, so therefore, it doesn't matter how hard you play, or how brightly it is voiced. So there are limits to the possible. Of course, mostly we are dealing with much more subtle stuff than that. What you and I do is much more subtle than that. So you have to get to know the range of what it can do and what it can't do. For example, I find that most Steinways are harder to play softly on than most Baldwins or Bosendorfers, because the Renner action, for me, permits a general greater control at a general softer level of dynamics. It's not fatal by any means. For example, there were moments in the "Clair de lune" which I played for an encore last night, and this is a well-regulated piano, but it has a sort of typical "Steinway feel" to it, and there were moments where I didn't dare to play quite as softly as I would have on a good Bosendorfer or good Baldwin, well-regulated, because I wasn't quite sure if it would play. I think on the American Steinway action; it takes just a bit more energy to set the key in motion. It's my theory and lots of technicians have told me it is true. But I am talking about the very, very softest nuances. So therefore, last night, I did not try to ask it to do something I didn't think it could do. Especially where I was playing in front of 2,000 people. I didn't want the note not to speak. So there are things like that. I mean, you have to learn not to force pianos beyond their limits, too, because the power of the piano can be largely an illusion, anyway. The piano can only get so loud at a given moment. Any one note is only capable of so much vibration.

RB: Tell me some of the "Catch phrases" that piano technicans tell you, which really bother you.

GO: The standard one is usually either a mechanical noise in the piano—a noise in the action, some sort of click—or when you use the shift pedal and some noise happens—some characteristic noise of the piano—or perhaps a string, especially in the upper treble with the non-sounding length on the pianist's side, not the back side.

RB: The front duplex...

GO: The front duplex, very often the technican will say, "Well you can't hear that ten feet away from the piano, so don't worry about it. Nobody is going to hear it." For years I tried to buy that, and suffer through it. Now I think it is nonsense, if it can be fixed. Some of these things are unfixable. But I think it is nonsense to be told not to worry and that it can't be heard beyond the first row, because I can hear it, and it will disturb my train of concentration. Concentration is like life itself; it is both very fragile and very tenacious. As you are going along, the fewer things that bother you, the fewer things that intrude upon your consciousness as things to be taken into account, the better musical performance you can give, because the less you have to think about details. And if when I get to the G#, I think, "I know the technican said it doesn't sound that way in the hall." First of all, he may be wrong. That's the artist versus technician stance: "What does he know; I am the musician anyway." Maybe it's "good enough for him." And, on the other hand, it may be perfectly true that what is perceived as a voicing differentiation on stage is sometimes actually not audible in the hall. But if it leads you to feel uncomfortable and to have to compensate for it constantly in your performance, it is a disturbing factor. So in that sense, I think it is much better to be told, "Yes, I understand and I will try to do the best I can," or "Let me work on it and we'll see if we can fix it," or perhaps "I have tried to fix that and I can't seem to do much about it, but I will try some more if you would like." At least then I understand it is the best it can be. It's much better than being told, "Well, don't you worry, because what you are hearing doesn't matter." How far do you carry it, then? I know that the piano sound, as with all instrument sounds, changes as it evolves through a hall. There is no question about that. There is all sorts of endless wisdom and nonsense in our profession. For example, among violinists, one of the standard things they will say about "Strads" is that although they don't sound as big under the ear, they project marvelously in the hall. I have had that experience with many Bechsteins which I didn't think sounded very projective at all, but apparently the tone seems to expand and develop in the air. I mean, it is part of the mysteries of sound. At times, when I have played on Bechsteins, it has made me wonder how I was being heard. And yet it was the standard concert piano of Europe for 50 years, and nobody said they couldn't hear them. So it makes you wonder. On the other hand, to be told, "Don't worry about what you hear up here; it sounds totally different." Well, I do worry about what's up close, because it affects the way I play. And the way I play affects the way that everybody who is listening hears it.

The other one that always annoys me is that some technicians don't want to get into certain voicing work. I must say I am rather sympathetic to them in some cases. Nevertheless, if you say that this G and this F aren't quite even, they will poke at it quite loud and say, "Well it doesn't sound any different to me." I think, "Well, if you play it that way, it's not going to sound much different." But I don't play that way all the time. I guess what I don't like is an attitude of someone who doesn't want to get involved. In other words, it's good enough for Government work, and what are you complaining about?

RB: It was good enough for the last guy, so it ought to be good enough for you?

GO: That is something one hears a lot as a young pianist. Especially from piano firms, who will say, "Well Mr. Serkin played it last week and didn't complain about it," implying "What's wrong with you!" Mr. Serkin may have been on the phone complaining violently about it, but of, course, they are not going to tell you that.

I don't mean to take any artist versus technician stance. I think one of the biggest problems is they don't know how to talk to each other. In music school, they ought to give you just a little technical training, and in technician school, they should give piano technicians some musical training. That is, if piano technicians had some "normal" school to go to for several years like most people.

How many times have you been asked to fix a stuck key, and it is a pencil that has rolled inside the action? Now, I could fix it myself if I had a screwdriver. Some brands of piano, I don't even need that. Very many pianists can't even figure that much out. It's like, "Oh my gosh; something dreadful has happened to the piano. It is broken." Many artists

are incredibly ignorant. It's not that I am an expert on piano mechanics, but I have an idea of what it might be if there is a mechanical failing. I've been around and talked with lots of technicians.

RB: You've caught on to the lingo.

GO: You catch on to the lingo, and if you have seen 500 piano actions open for 500 different concerts, certain things tend to go wrong and certain things don't tend to go wrong. Sometimes the hammer rest rail screws will come loose and it makes a clatter, and you can't identify it. It's a funny noise in the piano, and the technician, being much more of an expert, will come and hear a bunch of funny noises, especially if he knows the piano well, because he knows all of its idiosyncrasies. So, you have to be able to identify those things. That happens rather rarely, whereas if it is a teflon click, that's that. I have learned how to talk to technicians from hanging out with them, and talking about the piano, because I am curious about the piano. Also, I feel that the technician is really my colleague, and hopefully my friend in the whole endeavor and would like to do his best so I can do my best. So I try not to view the technician as an adversary. I suppose you probably run into artists who look upon the technician as the enemy.

RB: Some, yes.

GO: You know I generally like to have a cordial relationship, and I have learned an awful lot in the process. A lot of pianists wouldn't know how to take an action out. A lot of them shouldn't be allowed to. On the other hand, I don't do my own voicing, because I don't have the experience or the knowledge, and even if I did, I wouldn't be doing it often enough to be in practice. So in that sense, it sounds like I am defending the technician above my colleagues. Too many of my colleagues just don't know what is going on, and that's a pity because they don't know how to make intelligent comments.

It is also like the comment of many of my colleagues who will sit down and play a piano for two seconds and say, "Oh, I hate it." Well, you have two options. You can either not play the concert, or not play that piano and get another one in, in that case. Sometimes that's not very practical. Sometimes you learn to love an instrument which you don't like so much at first.

RB: How, then, do you feel the dialogue could be improved between the technician and the artist? Are there certain specific things, ground rules, that might be approached? How do you think this could be improved?

GO: A little bit of knowledge goes a long way in this case. I must say that technicians are often working under terrible time constraints. Especially because the bigger the city, the busier the hall, and the less time the technician has with the piano. And it would be nice if I had nothing to do, if I were so overwell prepared, that all I had to do was sit around and fuss with the piano all day. Often I have to practice a lot, so I don't have a lot of time and energy to worry about things. How could the dialogue be improved? I don't actually know, because I don't know how my colleagues talk to technicians. It helps if the pianist can learn a little bit about the parts of the piano and what they do, how hammers are made and shaped, so they can know the range of possibilities, because sometimes the pianist will talk like, "this doesn't have quite enough chocolate and raspberries." It all sounds like wine talk. And the piano technician is left to guess what this means. It would be a bit nicer if the pianist could address specifically, "This hammer seems too hard," or "could you this or could you that."

RB: Yet from my colleagues, I sense them getting defensive if an artist is so specific and gets into the real technical things, thinking "Why is this person telling me my business?"

GO: If an artist does this and seems like a friendly creature, then you can talk about it.

RB: So, I guess what has to happen then is that the artist, as best he can, needs to express in musical and somewhat technical terms what his needs are, and the technician needs to translate those into somewhat musical and mechanical terms to make it happen.

GO: The problem is that the technician has to decide what the artist might be feeling. And I must say, you are probably luckier in the case of artists who play as much and on as many different pianos as me, because we know the range of possibilities. The most dangerous kind of artist, I imagine, is somebody who gives a couple of concerts a year, and practices on their piano at home all the time. Then they are so totally used to, psychologically, feeling totally at home on their instrument, it's like a new pair of shoes that aren't broken in yet. Very uncomfortable.

RB: How do you see the state of the concert industry?

GO: The biggest problem I see in the concert industry, although it's better than it was 18 years ago when I started, is the fact that people who own pianos, like orchestras and halls, not to mention people at home, tend not to know that they need a lot of care. As a common example, you might have a fund raising, say, with an orchestra, to buy a new piano, (rah rah rah), and they raise the money and they buy a new Steinway. It comes in and of course, the first pianist comes in, fusses and hollers and raises hell, and says it sounds as nice, but, but, but, this and that, and this and that. There are even new pianos out of the factories which might need a new set of hammers, or need all this work. Then you present your estimate to the board of directors and they respond, "We just spent $45,000. And now you tell us we need to spend $5,000 more! What's going on?" Too bad if that happens with a new piano, but even with one that is old, pianos need constant maintenance and constant care. They are like racing cars as opposed to the car you drive every day. A concert grand used by artists at a high level, has great demands placed upon it. As an analogy, you wouldn't want a Corvair to drive in the Indy 500. Well, it has four wheels, doesn't it? It has all the same things as the other cars. It is the same thing with pianos. Concert grands are special instruments, anyway, and those which are used for public performance really are tempermental beasts, and they need a lot of constant care. So I think education is terribly important. It's money well spent, actually. One thing I do know is that it's not that there aren't any good technicians around. It's very often that people won't pay them to do the work. And you know I don't work for free. You shouldn't either. So it is a bit of a problem. Of course, since it is one of the things that almost nobody who is not a pianist or technician can know what we're talking about, it doesn't seem very pressing to most people. "Oh well, so the pianist gripes about the piano. But the concert was a great success anyway, and everybody loved it, and it got a standing

ovation. What's the problem?" It's like the pursuit of quality in all things. Why have anything that's really good or do anything really well?

RB: With the push of the Japanese into the concert market, and with the efforts by the Europeans and the Americans, what do you see as the future of the concert industry?

GO: Right now, if I may philosophize, I think we are in a fairly good time for pianos...concert grands. This is obviously my version of history, which I don't even know very well, but it seems to me that at one time, when America was the country which built the most pianos, and was the leader in the piano industry, back in the 1910's, 20's, and 30's, not only were there wonderful pianos at Steinway, but there were wonderful other makes. There were Baldwins which in those days were very good, and there were Aeoleans, and Mason & Hamlins, and there were Webers, and Chickerings, and all sorts of really fine pianos. And a number of concert artists endorsed and played a whole variety of different pianos. And the same thing happened in Europe, where you had Bosendorfer, Bechstein, Bluthner and Hamburg Steinway. If you saw an Ibach or a Grotrian on a concert stage, it was not considered odd. Then World War II came along, and we know what happened in the United States, which was that many of the piano companies...

RB: Were building boat bottoms...

GO: ...were building boat bottoms and glider wings, because piano factories can do all sorts of wonderful things beside make pianos, because they have the equipment there. In Europe, virtually all piano manufacturers were bombed out, in the German-speaking world and certainly in the French-speaking world, too. I guess by a lucky coincidence, Steinway in Hamburg was left relatively unscathed. Steinway got its monopoly in the States through a combination of wonderful pianos, wonderful service, and the fortunes of a very difficult industry, in which some firms died and lost incentive. So it became virtually a Steinway monopoly as we know after World War II. It seems to me now, especially starting with the 1970s, that there seemed to be a big resurgence, especially by the European makers—the German makers. They were all really small. They got themselves back on their feet and were producing a lot of quality instruments. I see really exciting instruments coming out of Grotrian, out of Bosendorfer, and some wonderful things coming out of Bechstein, Feurich, and Schimmel. You just enjoy them. I always say with pianos, "Viva la difference." I like different pianos. It seems to me that pianos these days sound a lot more alike than they sound different, anyway. Back in the old days, when pianos were barely pianos, you could tell a French piano from a Viennese piano through a closed door. Now on a record we sometimes can't tell whether it's a Steinway or a what. We are not sure.

I was told by a colleague in the piano business that at one international competition, the fallboards of two major manufacturers were switched. One was of Japenese manufacture, and the other was a very famous piano. Apparently, the majority of the pianists fell for it, by saying that the piano with Japanese fallboard had a very nice tone, surprisingly nice, but when they sat down to the piano with the more famous fallboard, they said, "Ah, but you hear. Here is the rich noble sound..." So pianists are very susceptible to the label on the piano, too. As I said, pianos these days tend to sound more alike than different. I see tremendously interesting developments coming out of Japan, with the research and development that is going on at Yamaha. I see a lot of quality pianos and improvements, and real trends toward improvements. I have visited the Research and Development Center at Yamaha, and the factory at Hammamatsu, and have seen some really exciting prototypes, and really major changes which are occuring. I don't want to make any predictions, but we are in an age of competition, and I see really good possibilities, and I hope it works out well for everyone. I mean it can't work out commercially well for every piano factory, because there is only a limited amount of market for fine pianos in the world, and if somebody is winning it, somebody is losing it. But this has been from time immemorial. As I said, I believe in "Viva la difference" with pianos. I am known for liking different pianos. I like pianos that sound good. You have to be careful of being lulled by names on fallboards. How many pianists I know will approach a Baldwin, just look, and say, "Yuck, it sounds awful," before they have touched it. First of all, I don't believe that. I know fully well that there are many lovely Baldwins, and I have played some that please me very much. You need to listen to each individual piano. Hopefully it's well cared for. Just to reject a piano out of hand is not good. One really needs to listen very hard. And it's the same when you as an artist find a new piano; you have to listen to it very hard to hear what it has to tell you. Of course, what halls tell you is another thing, too. And a good hall makes any piano sound much, much better. As a matter of fact, I just did a tour in Japan in which I played within two weeks, about ten recitals in ten different halls on three different makes of piano, all of which I would have to say were in good condition. The Japanese have a fanatical attitude, fanatically wonderful attitude towards servicing the piano. Japanese technicians are in the hall usually the whole day you are there, and the importance of servicing the instrument is very well realized. And they are all very well trained, it seems. I must say that with the three different brands of pianos, the halls seemed to make more difference than the pianos themselves. In two cases, I played a really fine Bosendorfer and a really fine Hamburg Steinway in halls which were very dry, and they sounded OK, but on the next night I was on a different piano in a different hall and it was amazing how much more gratifying the music was. Halls color pianos very much, which is one of the dangers when you bring the piano from one hall to the next. It can sound marvelous in one, and can sound not so successful in the next.

RB: Pick out the piano in one location and perform on it in another.

GO: It is very difficult. We have all had the experience of picking out a piano from the Steinway basement which was terribly brilliant, and taking it to a hall where it suddenly sounds non-brilliant. What happened?

RB: You are looking at the number to see if it is the same piano you chose?

GO: Exactly.

RB: Is there a situation you can think of where the piano technician saved the day for you?

GO: Well a couple of them have jumped in and fixed stuck notes at concerts. Out of a certain number of con-

certs, something is going to go wrong. And a couple have luckily been still in the house—"Is there a piano technician in the house?" I always request at all my recitals that the piano technician remain at least until intermission. I would rarely stop a concert in the middle and say, "Oh my gosh, this has happened." Very often I throw unisons out of tune.

There have been technicians, especially when I was younger, who seemed to understand me when I didn't know so much. I remember one in Boston whose name I wish I remembered, who after the first recital I ever played there, helped me when I was terribly unhappy with some voicing things. Except I didn't even know what voicing was in those days. I was just unhappy, and was somehow managing to show him what I meant, and he understood what I meant. I didn't believe such a thing was fixable. That shows you the range of ignorance. I was a well-trained pianist, yet I didn't know what was fixable and what was not.

Yes, there have been technicians who have leapt from the wings to fix things for me. I catalog technicians among my friends.

My sincere thanks to Garrick Ohlsson for his cooperation in giving this interview for the *Journal*. His performances with the Utah Symphony were much like my conversations with him—he had a lot to say, and it was a pleasure listening.

Until next month, please send your questions and comments on tuning-related subjects to:

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The Super-Temperament and Tuning T=(M+C)/12, Part II

Steve Fairchild
Long Island-Christofori Chapter

Last month, formulas were presented to calculate the tuning curve for the temperament which involved the use of inharmonicity constants. When entered into the formula, these constants were used in conjunction with a set of Magnitude Numbers which were presented to calculate the Inharmonicity Magnitude. The Inharmonicity Magnitude (M) plus the Inharmonicity Curve (C) divided by 12 gives the Tuning Curve for that particular note.

The inharmonicity constants can be derived by either mathematical or electronic means. The subject of inharmonicity formulas has been covered in great detail in recent issues of the *Journal*. To derive the constant mathematically for plain wires, we need to measure the speaking length and wire diameter. With either the note number or frequency, the constant can then be calculated. For wound strings, we need to measure the speaking length, core diameter, overall diameter, step diameter (if any), unwrapped lengths at each end, and step lengths (if any) at each end. With the frequency or note number, the constant can then be calculated.

To extract the constants by electronic means, we need to measure the distance between two of the partials and divide this distance by the difference of the squares of the two partials involved. Let us say, for example, that we wanted to extract the inharmonicity constant for note 4:C.1 (key 4, note C, octave 1) by electronic means using partials 3 and 12. We would first measure the distance between the 3rd and 12th partials. With the Accu-Tuner set on G2 (the 3rd partial) we would take a reading. Next, with the tuner set on G4 (the 12th partial), we would take another reading. The difference of these two readings is the distance between these two partials. Next, we divide this distance by the difference of the squares of the 12th and 3rd partials (144-9), or 135. This gives us the inharmonicity constant for this note.

To achieve the most accurate and

Table 1

Note	Steinway B	Wurlitzer Spinet	Yamaha C3	Note	Steinway B	Wurlitzer Spinet	Yamaha C3
25:A.2	.1059956491	.3182331656	.1051976862	49:A.4	.6391604729	.7610656199	.6927595262
26:A#2	.1039446417	.3069405089	.1170365293	50:A#4	.7032832774	.8059813053	.7801881136
27:B.2	.1029427627	.2948261173	.1511693123	51:B.4	.7692441529	.9014750574	.7998112889
28:C.3	.1015096107	.2832535200	.1482974787	52:C.5	.9704659179	.9657183930	.8394396126
29:C#3	.1088056846	.2817277431	.1387288942	53:C#5	.9394875669	.9937634297	.9273474120
30:D.3	.1153419811	.2700955446	.1384114938	54:D.5	.9838251698	1.239422049	.9326408961
31:D#3	.1236081885	.2926664913	.1394094890	55:D#5	1.015108445	1.313980525	1.196940309
32:E.3	.1336438500	.2976312862	.1427887605	56:E.5	1.089601178	1.396849371	1.223114314
33:F.3	.1459397128	.3022241973	.1455566335	57:F.5	1.207760443	1.566450746	1.318359272
34:F#3	.1611158689	.3248537820	.1574094304	58:F#5	1.323065463	1.758283913	1.434627366
35:G.3	.1774044894	.3500993037	.1745060424	59:G.5	1.350863660	2.000873215	1.492185218
36:G#3	.1774549531	.4017330787	.1959213144	60.G#5	1.534074455	2.213229607	1.660297013
37:A.3	.1986084337	.3816428616	.2175351865	61:A.5	1.667788727	2.439197992	1.815579250
38:A#3	.2157890324	.3733157838	.2403846657	62:A#5	1.861317000	2.580624991	2.008502686
39:B.3	.2379738090	.3607048034	.2553964123	63:B.5	2.071542173	2.866939955	2.174993419
40:C.4	.2282338812	.3534950522	.2896562877	64:C.6	2.294974086	3.167767373	2.463624474
41:C#4	.2973991340	.3669820467	.3232072695	65:C#6	2.390002876	3.543307599	2.730075208
42:D.4	.3304484430	.3732139177	.3614326113	66:D.6	2.664797063	4.101851424	2.946234064
43:D#4	.3697688632	.4063546765	.4049788914	67:D#6	2.950879375	4.240346862	3.158796852
44:E.4	.4169889149	.4180586349	.4544651606	68:E.6	3.236930737	4.940119217	3.484309148
45:F.4	.4621439077	.4738793506	.4715364442	69:F.6	3.938205771	5.448719490	3.550852302
46:F#4	.5082262564	.5346232809	.5229094453	70:F#6	4.136481003	5.613081350	3.995874416
47:G.4	.5654837783	.6034982905	.5671057040	71:G.6	4.132425152	6.346618144	4.126292561
48:G#4	.5960499441	.6809280548	.6231623537	72:G#6	4.646852691	7.072894290	5.602970207

consistent results, the selection of which partials to use is important. For bass strings, measure the distance in cents between the 3rd and 12th partials, and divide by 135. For steel wires up to note 43:D#4, measure the distance in cents between the 2nd and 4th partials, and divide by 12. Finally, for steel wires from notes 61:A.5 to 76:C.7, measure the distance in cents between the 1st and 2nd partials, and divide by 3. Having extracted the inharmonicity constants, the tuning curve for the temperament can now be calculated.

Below are listed the inharmonicity constants for three different pianos: an original Steinway B grand, a re-scaled Wurlitzer Spinet, and an original Yamaha C3 grand.

These constants, when entered into the formulas listed last month in Table 2, p. 27, in conjunction with the magnitude numbers listed in Table 1, give the tuning curve for each of the three pianos above. The following curves represent cent deviation at the fundamental for the three octaves of the temperament. The actual cent values used for tuning, and to derive cent widths and beats rates can be calculated from these curves.

These curves, while very difficult, especially for the lower notes, do not give a clear picture as to what each tuning will sound like, individually or in comparison to another. Next month, we will present the beat rates and cent widths for the various temperament intervals, as well as discuss the origins of the Magnitude Numbers. ≣

Table 2

Note	Steinway B	Wurlitzer Spinet	Yamaha C3	Note	Steinway B	Wurlitzer Spinet	Yamaha C3
25:A.2	-3.7	-14.0	-3.9	43:D#4	-0.7	-2.4	-0.8
26:A#2	-3.5	-13.1	-3.7	44:E.4	-0.6	-2.0	-0.6
27:B.2	-3.3	-12.2	-3.6	45:F.4	-0.5	-1.6	-0.5
28:C.3	-3.1	-11.3	-3.4	46:F#4	-0.4	-1.2	-0.4
29:C#3	-2.8	-10.5	-3.2	47:G.4	-0.3	-0.9	-0.3
30:D.3	-2.7	-9.6	-3.0	48:G#4	-0.1	-0.4	-0.1
31:D#3	-2.5	-8.8	-2.9	49:A.4	0.0	0.0	0.0
32:E.3	-2.4	-8.1	-2.7	50:A#4	0.2	0.4	0.2
33:F.3	-2.2	-7.4	-2.5	51:B.4	0.3	0.7	0.4
34:F#3	-2.0	-6.7	-2.3	52:C.5	0.4	1.0	0.6
35:G.3	-1.8	-6.0	-2.1	53:C#5	0.6	1.3	0.8
36:G#3	-1.6	-5.5	-1.9	54:D.5	0.9	1.6	1.1
37:A.3	-1.5	-5.0	-1.7	55:D#5	1.2	1.9	1.4
38:A#3	-1.3	-4.5	-1.6	56:E.5	1.5	2.2	1.8
39:B.3	-1.2	-4.0	-1.4	57:F.5	1.8	2.6	2.1
40:C.4	-1.1	-3.6	-1.2	58:F#5	2.2	3.0	2.5
41:C#4	-0.9	-3.2	-1.1	59:G.5	2.7	3.4	2.9
42:D.4	-0.8	-2.8	-0.9	60:G#5	3.1	3.9	3.4

Plate Lowering: Part Two

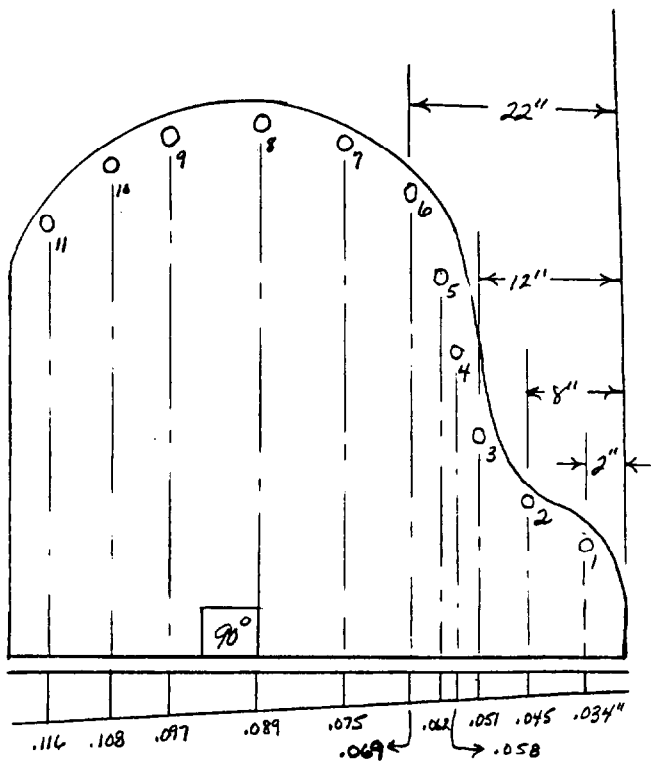
Nick Gravagne
New Mexico Chapter

Continuing from last month's article, "Plate Lowering: Part One," let us assume that a technician decides to lower and cant the plate to its bass side but wishes to retain the dowels for plate supports. Remember, canting the plate/pinblock means the entire plate, front-to-back, is tipped toward the bass side. Retaining the original support system—rather than scrapping in favor of another system—may be the wisest (or only) option available. The condition of the plate lag holes, for example, may be grossly mishapen thereby ruling out the possibility of adopting the Baldwin suspension system. Or, more simply, the rebuilding technician may just not be interested in the Baldwin system for this or any other application. (Although I don't like working with dowels, I consider it much easier to reposition a plate over the original soundboard by altering the dowels than by doing anything else. Installing new dowels for a new soundboard is another matter.)

Our willing and faithful example piano from last month is standing by having scored passing grades for reusable soundboard and workable bridges but flunked the downbearing test. As a result a decision has been made to lower and cant the plate by 1/8 inch at the bass end of the pinblock and by 1/32 inch at the treble end. But again, these specs don't necessarily satisfy every rebuild—a decision, for example, to lower at the bass end and do nothing at the treble end would be appropriate where downbearing looked acceptable in the higher parts of the scale but dwindled to nothing in the lower parts. But whatever amount of lowering and canting is decided upon, a unique problem has now surfaced relative to modifying the dowels.

Since the existing dowels are not going to be removed, two things are apparent: 1. once the pinblock has been dimensioned per the above specs, a trial fit of the plate and pinblock relative to their now lower and canted positions is impossible since the old dowel heights are all wrong; 2. plate canting, as opposed to uniform plate lowering, dictates that the dowels cannot all be trimmed by the same amount. This means that each successive dowel couple, as counting from the treble to bass, needs to be trimmed just a bit more than the preceeding couple. Guessing at this is a waste of time. How do we determine how much to lower each dowel group? It's not difficult, really. It requires very simple measuring and mathematics.

Figure 1



$$T = \frac{dm}{w} + t$$

Let's consider the facts. In our example, we know that the plate will be lowered 1/8 inch in the bass and 1/32 inch in the treble. We also know the width of the pinblock; say it is 54 inches. From these two facts it follows that: 1. every dowel must be lowered by *at least* 1/32 inch and most dowels will need to be trimmed by more than this; 2. the right-to-left slope due to canting imposes a drop of 3/32 inch (1/8-1/32 inch). Considering these facts, a very simple equation can be formed which will tell us how much to trim off each succeeding dowel couple beginning in the treble:

$$T = \frac{dm}{w} + t$$

where T=the amount of dowel trimming, d=drop in the pinblock from treble to bass, m=location of each dowel couple relative to the treble end of the pinblock and perpendicular to it (explained below),

w=width of the pinblock, t=amount the pinblock was lowered in the treble (if any).

Figure 1 shows how to make a quick sketch for your notebook. The tabulated data was computed for each dowel couple using the above formula and was taken from my records of an actual job. The drawing should make clear how the dowel locations are determined by measuring over from the treble edge while, at the same time, maintaining a more-or-less right angle to the front of the piano. Precision is not necessary here. The sloping line just below the soundboard outline is included to help visualize both how the plate is canted and how each dowel couple, as counting from right to left, needs more trimming than the couple before it. The dimensions below the sloping line indicate how much trimming to do at each respective dowel.

Let's take an example computation. Notice the dowel couple which is located 22 inches over from the treble edge.How much should be trimmed off these two dowels? The given factors are:
d=3/32 inch which is 0.094"
m=22 inches
w=width of the block which is 54 inches
t=the 1/32(or 0.031) inch which the block was lowered in the treble

$$T=\frac{0.094 \times 22}{54} + 0.031=0.069"$$

(Math note: remember, you must multiply d times m, then divide the product by w, *then* add the value for t. Also note that if the treble end of the plate/pinblock is *not* being lowered, the value for "t" in our formula is simply omitted).

The answer tells us that the dowel couple in question need to be trimmed by a little better than 1/16 inch. Referring again to the tabulated data, notice that dowel couple #1 in the treble area should be trimmed by about 1/32 inch and couple #11, the last group left, should be trimmed by almost 1/8 inch. This is reasonable and ties in with plate canting specs. All dowel couples in between #1 and #11 exist somewhere in-between these parameters and are simply trimmed according to the formula based on how far over they are from the treble end. Is all this very time-consuming? Not at all. The last time I worked this out—measurements, drawings, and computations—it took a grand total of 20 minutes (thanks to my ordinary Batman calculator).

Considering the foregoing discussion, a few clues are uncovered as to what to consider in the initial stages of the problem-solving process. Although it seems as though these thoughts should be placed at the beginning of this article, they actually have more impact here.

First Considerations

It should be very obvious that before any decision is made to lower and cant the plate the height of the existing dowels must be checked first—is there even enough dowel sticking up to work with? In our example, there must be a dowel height of at least 1/8 inch in the area of bass perimeter. In some pianos the dowels are very shallow to begin with, thereby limiting, or excluding, the possibilities of plate lowering.

Even more basic than this is learning not to be too hasty in pulling the plate out before ascertaining if the down-bearing condition is as bad as (or as good as) it appears. When the strings are off check for bearing in your favorite way and make notes. Now tighten the plate lags, loosen the nosebolt cap nuts and turn the nosebolts down until a space can be seen between the underside of the plate and shoulder of the nosebolt. Use a mirror and flashlight (and begin thinking up-side-down). Now that the biasing effect of the nosebolts is eliminated, check for bearing again. You might be delightfully surprised to find that the bearing test has improved considerably (indicating that the nosebolts were flexing the plate up) or that the bearing condition has worsened (indicating that the nosebolts were flexing the plate down).

The Trimming Process

Of course, it is one thing to know that a dowel needs to be trimmed by, say, 0.089 inch and another to actually trim the dowel by this (or any desired) amount. All sorts of trimming techniques have been concocted by technicians and most have attractive and unattractive features to them depending on the skills, tooling, and preference of the technician. The following is a very workable method and has the advantages of ease of application, accuracy, speed, and, with reasonable care, avoiding damage or marring to the top of the soundboard or the case.

In order to apply this technique, a simple dowel trimming jig will have to be made and a Forstner type wood bit along with an extension will be needed. (You probably know that this type of wood bit has a circular knife edge at its perimeter and shaving cutters along its diameter. It is the shaving cutter that makes this bit useful as a trimmer). The extension, which is essential in both acting as a guide in the jig as well as in locating the electric drill tool above the rim for clearance, is not commercially available. Drill bit extenders which are available are only suitable for 1/4 inch shanks but the larger headed Forstner bits have shanks which are bigger in diameter than this. Mine, for example, has a 7/8 inch cutting head and a 5/16 inch (plus) shank. What to do about this will be explained later—first let's look at the process. Refer to Figure 2 for illustrations of the jig, bit, extension and set-up.

To use, position the jig and bit apparatus so that the guide hole is over a dowel. Note that because the bit has a large circular cutting head, precise central positioning of the bit over the dowel is necessary. The brad point of the bit, however, must make contact somewhere on the dowel, even if off center. The jig is secured to the case with a clamp (snug pressure only). Punch the bit down so that the brad point buries in the dowel. Locate the depth guide above the top of the jig according to the trimming dimension required for that dowel. Use feeler gauges to set the dimension and lock the depth gauge in place. The space existing between the top of the jig and the underside of the depth gauge is the amount the dowel top will be trimmed. With the drill tool attached to the extension, lift the brad point out of the dowel; pull the trigger and get the bit up to full speed before lowering to trim the dowel. Continue from dowel to dowel in this manner but don't forget to reposition the depth gauge per the necessary amount of trimming. Depending on the

dowel spacing and contour of the rim, you may need a second locator arm to accommodate at certain dowels or for different pianos. These jigs are also wonderfully useful for setting dowels in a new soundboard. They are fast and easy to make and become part of your (ever-expanding) shop repertoire of esoteric piano paraphernalia.

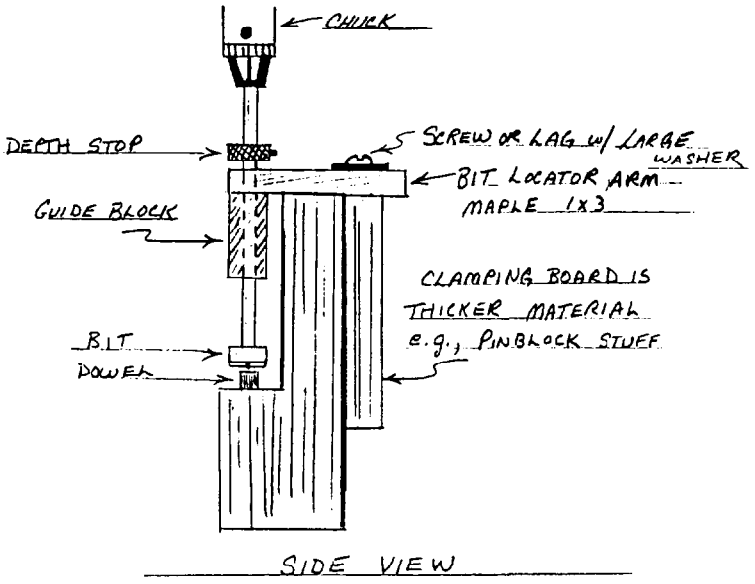
How much shop time does it take to make the calculations and drawings and actually trim the dowels? All of an hour and a half to two hours if you're used to the process; your first time will take longer. This is a very small investment in time for an adjustment which will have such a critical impact on the future performance and life of the piano. Incidentally, the best tool for canting the pinblock is by far an electric hand plane. With such a tool it is a simple matter to remove material from the underside of the block. The tool is started at the bass end and moved toward the treble end.

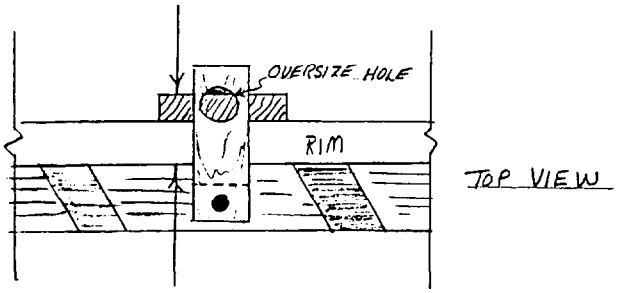
The Bit Extension

Unless you can find a way to extend your bit, the services of a machinist are required. (If you think about it, you may have a machinist in your customer files. I do, and he is always a help in such matters). Making a drill bit extension is a very straightforward job for a machinist and should cost you their minimum charge (or even much less) plus material. The extension itself will be made from ordinary drill rod stock, and, depending on the preference or advice of the machinist, a decision will be made as to whether to turn down part of the shank to 1/4 inch (which allows the use of an ordinary, commercially available bit extender), or to bore out the drill rod stock such that the bit can be inserted into it and locked in place with set screws. But whatever is chosen, keep the diameter of the extension to a maximum of 3/8 inch or it won't fit most high-speed drill chucks. I prefer a removal extension as it doesn't render the bit useless in ordinary service such as in a drill press. The depth gauge can be made from Nylon (or something similar) which is also common stock in machine shops.

If you would like to make this jig and try out the process before you seek the services of a machinist, try this: lay

Figure 2





Clamp to rim at arrows. Note that the bit locator arm has an oversize hole to allow for locating bit/extension over top of dowel. A slot would be better but is more difficult to make, especially in maple. In clamping the jig at curves, use shims (and your ingenuity). Attach a piece of protective cloth to the surface of the clamping board that touches the outside of the case.

The two joints that must be carefully made are the clamping board-to-locator arm and the guide block-to-locator block (which is a glue joint). Make as clean and true to 90 degrees as possible.

The guide block is about 3 inches deep but doesn't have to be as wide as the locator arm; in fact, it works better if it's not. To drill the guide hole, secure the block in a drill press vise and drill through. Then glue block to the locator arm, let dry, and finish hole through the locator arm.

To use the jig, first make sure that the arm screw or lag is tight and that the bit is in the arm hole but the drill is not chucked on. Position the jig more or less over the dowel and clamp to rim. Loosen the arm screw and locate the bit over a dowel; lock the arm. Tap the brad point down into the dowel, adjust the depth stop to the trimming dimension. Chuck on the drill, lift brad point out of the dowel, pull trigger to get bit up to speed and slowly lower drill and trim dowel.

It is sometimes possible to trim two dowels from one jig position depending on how the arm can be moved. Don't forget that in plate canting, each dowel couple is trimmed by a different amount.

your hands on a smaller 3/8 inch Forstner type bit that has a 1/4 inch shank. Using this bit will allow you to attach a commercially available bit extension. These are usually 12 inches long by 5/16 inch diameter. The smaller cutting head will not trim the entire dowel top but will, instead, bore a hole into it leaving a circular lip in place. Remove this lip with chisels and sandpaper; it's not as neat but it does work and will give you the idea of how the jig set-up operates.

Other Considerations

It is often the case that, because dowels don't sit directly under the plate bosses (as they should), the top of the dowel will be stepped, i.e., it will have two top surfaces rather than one. When such is the condition, trim off the top step until a common surface is had with the lower step. It is from this point that the dowel is further trimmed per the above process.

The experienced rebuilder knows that, upon loosening the lag screws, the plate invariably relaxes and actually lifts off the dowels at many places, especially at the tail near the lower end of the bass and treble bridges. To see how much the plate has lifted off the dowels, again, use the flashlight and small mirror accessed through any opening in the plate that will give a clear line of vision. (Tip: slip a piece of white paper or posterboard down between the side of the case and the plate. This makes for a light background upon which the dowels and plate boss outlines can be more clearly seen in the mirror.) Remember, the nosebolts should be down and out of the way but the pinblock screws should be in. Small spaces existing here and there are inconsequential. Look for something radical, such as an oddball looking couple of dowels which are noticeably different than adjacent sets. That is, for no apparent reason, there exists a relatively large space at a particular set of dowels, or one dowel of a set is too low. Make a note of it and remember to trim it down no farther than its more obedient brother. Some dowels will remain entirely hidden from view. Wire gauges (as used for checking the gap in engine spark plugs) can be inserted through the lag holes and a gap test made. But if the dowels are too far from the hole these wire gauges won't reach. There is some estimated guesswork here—but that is always the case when working with dowels. Generally, in most pianos the dowels just need to be trimmed and there is little, if any, concern with unusual conditions.

Other Suspension Systems

Some pianos were designed with plates sitting on wood screws or lag screws. If this is the case, simply turn these down by the same amount that the dowels would have been trimmed.

For those pianos with a continuous wooden plate support piece (yuck), make the calculations at every lag screw hole and set up the jig in the same manner as described above. Drill reference depth holes into the support piece on either side of the hole. What remains now is to remove all wood that stands above the bottoms of these reference holes. It is sometimes more convenient to break the glue joint and remove the entire support piece and plane it no lower than the holes. Glue back in when finished using go-bars or a clamp and press-block arrangement.

Another possibility is to chisel out a relief between the support areas (which exist at every lag hole). That is, after the reference holes have been made, use sharp chisels and work in a neat little shelf, the top of which will be the bottom of the depth holes. When this is done at each lag hole the effect will be that the support piece has been notched. The wood exists between these new shelves (and is standing higher than the shelves) is trimmed down below the shelves. The net effect is that when the plate is installed it will touch at the new, individual support rests but not touch (or touch very little) anywhere else.

Next time we will discuss installing a plate over a new soundboard. See you then. ≡

How The Science Of Musical Sound Began

Jack Greenfield
Chicago Chapter

Breaking the chronological sequence of the past "Sound Background" articles, this is the first in a new series on the history of the scientific study of the sound of keyboard stringed instruments. Investigation of piano sound became an important phase of musical acoustics and was closely tied to the advancements in the design of the instrument during the nineteenth century.

The First Acoustic Scientist

Although earlier civilizations in China, the Near East and elsewhere practiced music as an art form thousands of years earlier, the first systematic investigation of musical sound took place in the ancient Greece. This work was originated by Pythagoras, a brilliant scholar of mathematics and astronomy. Born in Samos, an eastern Greek island, he spent most of his early and middle life wandering from country to country in the Mediterranean region studying and gathering mathematical wisdom. Late in life he settled in Croton on the southeast shore of Italian peninsula where he established a colony with a school in which he carried on his research and taught his philosophy to his followers who became known as Pythagoreans. He combined a mastery of mathematics with number mysticism and esoteric religious beliefs. His followers continued in these directions for generations after his death.

The purpose of Pythagoras' research in music was to show the relation between musical sounds and numbers. During his era, lyres were the most widely used musical instruments in Greece. There were two types—the *kithara*, a heavy horseshoe shaped instrument and the *lyra*, a smaller, lighter instrument. Each had eight strings of equal length which were plucked with long plectra. The strings, of varying thickness, were attached to tuning rings in the crossbar. The adjustment of string tension for tuning was made by rotating the tuning rings.

The eight-note scales in which the instruments were tuned were formed of two four-note groups known as "tetrachords" in the music of ancient Greece. One of the most used patterns consisted of two diatonic tetrachords with the step spacing (1/2-1-1) with one step between giving a scale corresponding to (E-F-G). This was a simple intonation for performing musicians to tune aurally with the intervals of the octave, fifth, and fourth tuned to give the most pleasing or consonant pairs of tones. The Greek words for these intervals were:
octave=*diapason*, fifth=*diapente*, fourth=*diatessaron*.

The word "octave" now in use originated later as Latin for "eighth."

Pythagoras is given credit for his methods as well as his acoustical discoveries. In his research he used a monochord with a moveable bridge, establishing the system of identifying pitch in terms of string length and intervals as numerical ratios, a practice continued for many centuries. It is believed that he considered the smaller the numbers of the ratio, the more pleasing the consonance, limiting his studies to the octave, fifth and fourth. These he identified with string length ratios of 2:1, 3:2, and 4:3, while demonstrating the inverse proportionality of string length and pitch.

The diatonic scale based on the series of consonant fourths and fifths became known as the Pythagorean diatonic scale, although not necessarily originated by Pythagoras. The earliest documentary record of a Pythagorean scale is found on a fragment of a writing by Philolaus, a Greek mathematician who lived about a century later than Pythagoras. Philolaus was one of the first Pythagoreans to put into writing the philosophy previously transmitted in speech. There is no evidence that Pythagoras ever considered a 12-note chromatic scale. Aristoxenos, active during the second half of the fourth century B.C., with a greater knowledge of music than most other Greek philosophers, proposed division of the octave into 12 semi-tones and even further into quarter-tones but Greek music continued with eight-note octaves in various intonations.

Pythagorean Legends

By the time biographies of Pythagoras were written in later centuries of the Greek and Roman eras, many errors and inaccuracies had arisen through verbal transmission. Legends were created based on misunderstanding or imagination. Several of these concern his acoustical studies. One of the fictitious events recorded was the story that Pythagoras discovered harmonious ratios by chance observation of consonant sounds produced by hammers in a metal-working shop. He was then supposed to have found the pairs of hammers produced tones pitched in intervals of octaves, fifths, and fourths corresponding to the ratios of their weights. He was also supposed to have experimented with "musical glasses" striking various partially filled glasses to produce musical tones. Although it was quite evident to him from the process of tuning lyres that pitch and string tension were related, it is doubtful that he conducted tension experiments with weights sus-

pended from a string over the end of a monochord.

Ancient Greek Theories On Sound Production

During the fourth century B.C. Greek philosophers moved away from the early Pythagorean ideas of music derived through the action of mystical number forces and began to speculate on natural physical actions as the cause of sound production and transmission. Existing fragments of ancient Greek writings show a growing awareness of the concepts of motion and frequency. One of the earliest statements relating pitch with frequency was written by Archytas, "a rapid motion responding with a shrill sound...and a slow motion answering with a deep tone...clearly swift motion produces a high-pitched sound, slow motion a low-pitched sound."

He had the mistaken notion, however, that the speed of sound varies with the pitch. Other Greek philosophers held similar views until Theophrastis (372-288 B.C.), successor to Aristotle as head of his school in Athens, showed the fallacy of such thinking. He reasoned that when pairs of strings are struck simultaneously, both tones are heard together showing that both sounds had traveled at the same speed.

De Audibilidius, a work by Aristotle or other writer of Aristotelian school, shows advancement toward the concept of sound waves arising from the voice or musical strings traveling through the air toward the hearer:

"All sounds arise from...air...being moved by contraction, expansion and compression...owing to the striking of breath and by musical strings,...the air is at once driven forcibly on, thrusting forward, so that the sound travels...as far as the disturbance of the air manages to reach."

The third century B.C. philosopher Chrysippus stated the now familiar analogy between the movement of sound waves and the expanding circles of ripples on a pool of water:

"Hearing occurs when the air between that which sounds and that which hears is struck, thus undulating spherically and falling upon the ears, as water in a reservoir undulates in circles from a stone thrown into it."

These concepts of waves and motion were passed on by later Greek philosophers although some belief in influence by mystic numerological forces persisted.

Acoustics Study During The Roman Era

The works of Vitruvius, Ptolemy and Boethius written during the Roman era had significant influence on developments in their fields later in Europe during the Middle Ages and the Renaissance. Marcus Vitruvius Pollio, usually referred to by his middle name, first served as an engineer in the Roman army before he became famous as an architect in Rome. He acquired a wide range of technical knowledge in following his profession. During the years 20-14 B.C., he wrote his great treatise *De Architectura Libri X* ("The Ten Books of Architecture") for the instruction of others, a reference on architecture, engineering and related technical subjects. His instructions on theater acoustics based on experience and observations in design and construction show an understanding of principles still considered valid.

He believed architects should have a knowledge of music and included a chapter on "Harmonics," a summary of Greek music. He gave an example in the "tuning" of military catapults and ballistic machines to check for equal tension in the twisted ropes on both sides of the lever-arm that threw the projectiles. The strings were struck to produce musical tones — "if they are not in unison they will prevent the course of the projectiles from being straight."

Vitruvius described a primitive system of amplification said to have been used in some theaters in Greece and Italy. This consisted of a series of large shallow bronze vessels graduated in size to give different tones over a range of two octaves when struck. The vessels, arranged in aisles between banks of seats, were supported in an upright position facing the stage. It was intended that "the voice uttered from the stage...spreading and striking against the cavities of the different vessels...will be increased in clearness of sound and will awake a harmonious note in unison with itself."

In a section on water machines, Vitruvius gave details of the *hydraulos* or water organ invented by Ctesibius, an engineer of Alexandria during the last half of the third century B.C. The organ pipes operated on air the same as later instruments but received the air from a reservoir partly filled with water and containing an internal arrangement to stabilize the air discharge pressure by the weight of the water.

Ptolemy Summarizes Greek Music Theory And Acoustics

Claudius Ptolemy, born shortly before the end of the first century A.D. spent most of his life as an astronomer, geographer and mathematician in Alexandria. He had a strong interest in music science also which he studied in research on the acoustics of intervals and scales. He carried on his investigations with a 15-string "monochord" with movable bridges for tuning in two-octave scale patterns. He studied the scales of earlier Greek theorists as well as his own and scales used in contemporary instrumental practice. He presented the results of his work in his three-volume treatise, *Harmonika* ("Harmonics"). In it, he provided a comprehensive critical review of the earlier studies of Greek music and acoustics together with his observations and the theories he believed in. He had done his research with full two-octave scales while Pythagoras had studied only intervals with the monochord. Some Greek philosophers had based their work merely on mathematical calculations.

Ptolemy concluded that the most pleasing concords were produced by string length ratios of small whole numbers, later known as "just" ratios. He believed that ratios in the form x+1:x, he defined as "superparticular ratios", were most desirable. His syntonic diatonic scale which became known as the "just diatonic scale" includes intervals with string length ratios of 2:1, 3:2, 4:3, 5:4, 6:5, 9:8, 10:9 and 16:15. Ptolemy's treatise is a very important reference not only for its account of his own original work but also because it is the only source of information on earlier Greek scholars whose writings have been lost.

Boethius Preserves Greek Music Theory

Early in the sixth century A.D., as the Roman era neared its end, Anicius Manlius Severinus Boethius, a learned

Roman aristocrat and high ranking government official, wrote a series of works on Greek and Roman philosophy and liberal arts, including translations, commentaries and his own philosophical speculations. These received little attention during the early Middle Ages after the fall of Rome when theology dominated most activity in Europe and classical learning faded away. After a revival of interest in liberal arts during the tenth century, Boethius's *De Institutione musica* which had survived although ignored, now became the primary source for information on music theory. Although Boethius had added little that was new in musical thought, what he wrote was significant because it served as the base for future development of music and acoustics science in Europe. He restated the principles of Greek scales, monochord divisions and the relations between concordant intervals and simple numerical ratios and discussed the reasons why it was desirable to identify musical sounds mathematically. He repeated the wave theory of sound production and transmission and the analogy of water waves in a pool stated by earlier writers.

Monochord String Length Ratios
The Just Diatonic Scale

Note	C	D	E	F	G	A	B	C
String Length Ratios								
1. Note to fundamental	1	9/8	5/4	4/3	3/2	5/3*	15/8	2/1
2. Between Notes		9/8	10/9	16/15	9/8	10/9	9/8	16/15

*Ratio of Inversion is 6/5

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Tax Topics

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Federal Income Tax rules are always changing. No matter what new and simplified tax plan comes out, there always seems to be more and more complicated rules and regulations. In this article, I will go over some of the changes that have been made since the Tax Reform Act of 1986 came out. I will then pick some topics of general interest to cover in detail. Afterwards, I will quickly summarize the highlights of the "Taxpayers Bill of Rights," and then give you a list of reference material I use to get all this tax information. First of all we will review the "Tax Formula," to give you a basis of understanding of what deductions go where on your return. This article is not meant to be all encompassing. That would be an impossible task. If an area has not been covered that you would be interested in knowing more about, please let us know and I will try to cover it in a future article.

Tax Formula

There is a basic tax formula to compute taxable income. The formula is as follows:

Figure 1: Tax Formula	
Income	$xxx,xxx
Less: Exclusions	(xx,xxx)
Gross Income	xx,xxx
Less deductions for AGI	(xx,xxx)
Adjusted Gross Income (AGI)	$xx,xxx
Less: The greater of	
1. Total itemized deductions, or	
2. Standard deduction	(x,xxx)
Less: Personal and dependency exemptions	(x,xxx)
Total Income	$xx,xxx

Income includes all income you receive from whatever means, either taxable or nontaxable. Income, however, does not include return of capital or receipt of borrowed funds.

Exclusions are whatever Congress chooses to exclude from the income tax base. Some examples of the many exclusions are as follows: accident insurance proceeds, child support payments, death benefits up to $5,000, worker's compensation benefits, (to a limited extent), welfare payments, compensatory damages, gifts (some restrictions apply), scholarship grants (to a limited extent), military allowances, etc.

Gross Income is "all income from whatever source derived, including but not limited to the following items: compensation for services, including fees, commissions, fringe benefits, and similar items; gross income derived from business; gains derived from dealings in property; interest; rents; royalties; dividends; alimony and separate maintenance agreements; annuities; income from life insurance and endowment contracts; pensions; income from discharge of indebtedness; distributive share of partnership gross income; income in respect to a decedent; and, income from an interest in an estate or trust."[1]

The list of gross income gives you a feel for what is included. Even though this list was taken directly from the IRS Code, it is not neatly cut and dry. Because of the wishes of Congress and the executive branch of our government some of the items listed above may have certain conditional exceptions. For more information on items the IRS specifically includes in gross income, refer to Section 71 and Part II immediately preceeding (IRS Code). For items specifically excluded by the IRS from gross income, refer to Section 101 and Part III immediately preceeding (IRS Code).

Deductions for adjusted gross income include ordinary and necessary trade and business expenses not incurred as an employee, certain reimbursed business expenses reimbursed by the employer, alimony paid, certain IRA payments, deductions that result from losses of the sale or exchange of property by the taxpayer, deductions attributable to property held for the production of rents and royalties, etc. These deductions are very important to us small business owners. Why? Because any amount remaining as AGI is the number used to determine Self Employment tax and many of your deductions on 1040A.

Itemized deductions are allowable deductions such as charitable contributions, property taxes, mortgage interest, etc. These deductions are found on form 1040-A. If you do not have many itemized deductions you can choose to use the standard deduction instead. The standard deduction for 1988 is as follows:

Single	$3,000
Married Filing Jointly	5,000
Surviving Spouse	5,000
Head of Household	4,400
Married Filing Separately	2,500

The standard deduction and the tax rate structures will be adjusted for inflation in 1989. The inflation adjustment for 1989 will be the percentage increase in the CPI in 1988 over the CPI for 1987.

Personal and dependency exemptions are allowed for the taxpayer, the taxpayer's spouse, and for each dependent of the taxpayer (check dependency rules for your specific situation). The personal exemption will be indexed as of 1990. (Exemptions are phased out if you reach

higher income levels).

Taxable income is what is left over after applying these deductions. Your taxable income will determine your actual tax. If any credits are pertinent to your situation, they are subtracted from your tax due.

Understanding the flow of deductions will allow you to do quick "runs" on your revenue and expenses each quarter so you can be sure to make adequate estimated payments, and also plan better as far as expenses are concerned.

New Changes To The Tax Code

There have been some changes made to the 1986 Tax Reform Act. Out of all the changes, the following may be applicable to piano technicians:

Phone Expense: No business expense deduction is allowed for the base cost of a phone which is also used for personal purposes.

Automobile Mileage Rate Expense: If you claim an expense deduction for business use of your car using the mileage rate method, as of 1988 the rate has changed. The standard mileage rate has been increased from 22 1/2 cents per mile to 24 cents per mile for the first 15,000 miles, and remains 11 cents per mile above 15,000 miles.

Self-Employment Tax: Self-employment tax is levied on your Adjusted Gross Income (referred to simply as AGI). This tax is our Social Security burden. The tax is structured so that the employer pays 7.51% which is deducted from his/her paycheck. The self-employed person (who is in essence the employer and employee) has been paying in 1986-87 12.3%. This amount is not the total burden of 15.02% as in the employer/employee relationship, but is slowly going to reach that level, and surpass it in 1990. As the tax law presently reads, the rate paid out will be 13.02% in 1989, and 15.30% in 1990 and later. The good news is that after 1989, self-employeds can deduct 50% of the amount of self-employment taxes paid for the year. I feel that this deduction is long overdue and would put us on a level playing field with larger businesses.

At this point in time the tax is based on self-employment earnings cap of $45,000 giving you a total maximum payout at 13.02% of $5,859. In 1990 total maximum payout will be $6,885 on $45,000 at 15.3%. As you can see, being able to deduct half this amount will definitely decrease your tax burden. Through my reading I have no indication of where in the tax formula this deduction would fall. Logically, I think it should fall under "Deductions for AGI," which would make the deduction a business expense deducted before the self-employment tax is charged against our income. With deficits ever increasing, the IRS and Congress may not look at placement of this expense as I do, so watch for more information, and write your Congressman if their plans don't look to be in our self interest.

Tax Areas Of Interest To All

The following are some topics that are of universal interest to piano technicians. Hopefully I can clarify some things you may have had questions about.

Business Expenses in general: Business expenses are deductible if they are "ordinary" and "necessary" expenses directly connected with the taxpayer's trade, business or profession and are "reasonable" in amount. The IRS may question, for example, advertising expenses if they think the amount you deducted is excessive in comparison to other businesses of your size and income level. If you can show an equitable increase in income from such expenses, or that in order to compete with other technicians in your area these are "ordinary" and "necessary" expenses, they will allow the expense. The key words are "ordinary," "necessary" and "reasonable." If the expenses may seem out of line, be able to prove that your decisions have merit or they will be disallowed.

Depreciation—Section 179: Business equipment that you would normally be required to depreciate may be expensed up to a total yearly amount of $10,000. See Part I, Section A of your depreciation schedule which is Form 4562. There are some exceptions, so read your instructions for that form.

Penalties: Penalties for late payment of state, federal or city tax is not deductible. Interest, however, for late payment of federal taxes is deductible as interest expense. Personal interest expense is slowly being eliminated, so check the amount allowed for the applicable year.

Business Use of Your Home: In order to be able to deduct a portion of your home as business use you must show that the specific area is used "exclusively and regularly" as either the principal place for trade or business, or a place where you meet with clients, patients, or customers. Although "exclusive use" does not mean a separate room, it can be a portion of a room. You cannot, however, walk through the business use portion of a room to get to a personal use section of your home. This would negate "exclusive use," so check your traffic patterns. The IRS can visit your place of business in an audit and disallow the business portion of the room if it includes a walkway to another room used for personal purposes. Allocate the room or rooms between business and personal use and deduct the appropriate percentage. Even if all the IRS requirements are met, the allowable home office expenses cannot exceed the business gross income less all other business expenses attributable to the business activity. In other words, you can't deduct more than you made in a year. You can carry forward to a more profitable year any excess deduction you could not use (subject to the same limitations). Ask your accountant for more details if this pertains to you.

Meals and Entertainment Expenses: In order for a meal to be deductible the meal must: 1. "directly relate to the active conduct of a trade or business, or 2. be associated with the active conduct of a trade or business, for items that directly preceed or follow a substantial and bona fide business discussion."[2]

What this means is that meals paid for as a goodwill gesture, even if shared with your clients, are not deductible. A bona fide business discussion must immediately preceed, follow or ensue during the meal. You must also have adequate documentation.

As you should know by now, meals and entertainment expenses are limited in deductibility to 80% of allowable expenses. This applies to any food or beverage expense, any expense that constitutes entertainment, amusement or recreation, cover charges, parking fees at an entertainment location, and room rental fees for a meal or cocktails. There is a limitation, however. You must first determine if the expense is an allowable amount. If it is a "lavish" expenditure, the amount that is considered excessive is disallowed before applying the 80% rule.

Meals provided as an integral part of a qualified banquet meeting were fully deductible. Beginning the 1989 tax year, the 80% rule applies.

What's "lavish?" The IRS Code does not list a specific amount. This is where you'll have to depend on your accountant who may have prior experience with the IRS disallowing certain amounts his/her other clients tried to deduct. The only example I have is from West's Federal Taxation text for 1989. They give an example where $40 of a meal expense (one person) totaling $100 was considered excessive, so the 80% rule was applied to a $60 meal instead of a $100 meal. I'm sure each circumstance is a little different and would be looked at individually. Just remember to use common sense, and have proper substantiation for your expense claims.

Transportation Expenses of Combined Business and Personal Trips: Many of us combine our business convention trips with some personal time sightseeing. What is deductible regarding transportation expenses?

Transportation expenses are deductible only if the trip is primarily for business. If it's primarily for pleasure, no transportation deduction is allowed—not even a percentage of the cost. If, however, the trip is primarily for business, once you reach your destination any expenses that are attributable to the business are deductible.

In order to have deductible travel expenses you must spend more days conducting business than sightseeing. "Days devoted to travel are considered as business days. Weekends, legal holidays, and intervening days are considered business days, provided that both preceeding and succeeding days were business days."[3] Let's look at an example:

Example #1:

If you traveled to a convention on a Friday, it is considered a business travel day (assuming that the trip is primarily for business purposes). Since you have a booth at the convention to display your wares and will be doing set-up on Monday, that is also a business day. Being that the weekend—Saturday and Sunday are adjacent to two business days—Friday and Monday, the weekend is also considered business. The convention lasts through Friday which adds another four days of business. Unless you can show business activity on the following Monday, the weekend cannot be attributable to business, leaving your trip with eight business days. In order to deduct transportation expenses, you can only sightsee for seven days. Keep in mind that the rules differ a bit for travel outside the U.S., and for luxury water travel.

If a family member accompanies a taxpayer on a business trip, the additional amount spent for their travel is not deductible unless their presence has a bona fide business purpose. Performance of "incidental services" is not sufficient as a "business purpose" to qualify for an expense deduction.

Automobile Depreciation Expense: You must retain a log of your auto's mileage and keep track of the amount used for business and the amount of personal usage. If you are not using the mileage rate method and are depreciating your vehicle, business usage must be greater than 50%, otherwise you must use straight line depreciation. Straight line depreciation is 20% per year for five years. Under what is called the "half-year convention," all property placed in service during the tax year is treated as if it were placed in service at the midpoint of the year, no matter when it was actually purchased. This means that using the straight-line method of depreciation, the half year convention applies and the percentage allowed is as follows:

Year one — 10%
Year two — 20%
Year three — 20%
Year four — 20%
Year five — 20%
Year six — 10%

If business usage of your auto is over 50%, you can use MACRS (Modified Accelerated Cost Recovery System, 200%DB). The percentages are accelerated in the beginning years to give you a larger depreciation deduction. The half-year convention still applies, so your depreciation percentage would be as follows:

Year one — 20%
Year two — 32%
Year three — 19.2%
Year four — 11.52%
Year five — 11.52%
Year six — 5.76%

Since Congress wanted to limit writing off "lavish" business vehicles, they instituted a cap for allowable auto depreciation:

Year one — $2560
Year two — $4100
Year three — $2450

Year four and all other remaining years — $1475

Under certain circumstances the mid-quarter convention may apply. Namely, "if the combined bases of the personal property placed in service during the last three months of the tax year exceed 40% of the combined bases of all the personal property placed in service throughout the tax year. As long as the combined bases of the property put in service during the last quarter of the tax year doesn't exceed 66% of the property already placed in service during the tax year, the mid-quarter convention won't be triggered."[4]

Other types of property falling in this five year classification besides autos are computer, typewriters, copiers, heavy general purpose trucks, and light-duty trucks.

Taxpayers' Bill Of Rights

Last year the "Taxpayers' Bill of Rights" was passed by Congress. The law phases in throughout 1989. Some of the highlights of that bill are as follows:

1. The bill requires a 30-day grace period before the IRS can seize property (increased from 10 days).

2. Prohibits the IRS from using a quota system for evaluating each auditor's performance.

3. Reimburses your legal fees for adminstrative proceedings when you prove that an IRS action is not "substantially justified."

4. At the start of any action the IRS must provide a written statement explaining your rights concerning audits, appeals, and collections.

Tax Reference Material

At this point you are probably wondering where all this information comes from. I am not an accountant; I work on pianos as you do. Over the years I have had some dubious experiences getting wrong or limited information from accountants and the IRS. My only alternative was to slowly accumulate informational texts for my own use to double check the information I was getting. Over time I felt more secure and began han-

dling our business and personal tax planning and filing. I have also taken a tax course at a local private college as part of a business degree program and plan to take refresher courses every two to three years. Tax is an exhaustive topic, but you don't have to know everything all at once. Begin by slowly obtaining more and more knowledge. It will definitely help you in planning not only your business, but also your personal transactions.

We will now discuss tax reference material. In order to have an understanding of the tax you should have reference material on hand in your office. Reference material as accessible as your dictionary will cut down the simple questions you'll have to ask your accountant, and help direct you to more complex issues in understanding of your tax situation.

Many of you may not use an accountant for your tax filing. If you don't, I'm sure you buy reference texts from time to time. Besides the publications provided by the IRS which are extremely helpful, you should choose at least one substantial text to start with for reference when you have questions.

The following list of reading material may at first look exhaustively ridiculous to you, but it really isn't. I use every bit of it cross referencing and double checking each topic I have questions about. Another alternative to book material is a tax program. If this route is your bag, don't buy the "cheapie program;" ask your accountant what he/she uses. I have attempted using tax programs. A top-quality program is just not cost effective for me. It may figure out the "bottom line," but it isn't much good for conceptual planning. Also, these programs must be upgraded every year, which can get considerably more expensive than a book for $19.50.

As far as my reference material is concerned, I have basically six categories of informational materials:

1. The most primary is a *Tax Handbook.* By primary I mean that this is the first book you should buy; it is by no means "mickey mouse," and is by no means a book you'll be reading in total—it's a reference book. Tax handbooks are published on a yearly basis by large publishing houses such as Commerce Clearing House or Prentice Hall. They provide you with yearly revisions to the tax code, plus they give you a volume of information on tax issues in an easily understandable style. An example of this type of reference book is Prentice Hall's "Federal Tax Handbook—1989," Title Code:31316-3 for ordering. Prentice Hall's ordering phone number is 1-800-872-6386. The volume is not the 186-page pocket paperback version, but is 804 pages of solid information. The cost is $19.50. I would suggest buying a text of this sort every year.

2. I always like to have a *college tax text* on hand. If there is anything I'm not quite clear about, a secondary reference is always useful. It gives you definitions of terminology, examples and problems as a typical text would. Every year or two I buy one. The most recent aquisition is "West's Federal Taxation—Individual Income Taxes—1989 Annual Edition." This can be purchased for $44.75. You can update this text every three or four years, or whenever Congress passes substantial changes to the tax code.

3. *The Internal Revenue Code.* This is a two volume text that is the actual tax code book. Tax texts always refer to the section number of the Code, and it's always nice when you have a question you can go directly to the Code to check for any exceptions or pertinent references. Each volume is approximately 5600 tissue-thin pages. The cost is $29.50, and can be ordered from Commerce Clearing House or Prentice Hall. The Prentice Hall Title Code for ordering is 47076-5. Request the most recent revision. I recently purchased the version as of June 23, 1988. I have bought three of these sets over the past 12 years. Again, replace them whenever substantial changes are made to the Tax Code.

4. *Income Tax Regulations.* This is a four volume set which is the official Treasury Department interpretation of the Internal Revenue Code. This text also includes proposed regulations so you can see what may be up for change in the near future. This set is priced at $47.00, Title Code 30852-8 from Prentice Hall. I update this set whenever I update the IRS Code.

5. *Internal Revenue Bulletin.* This is a weekly publication averaging about 35 pages long. It is put out by the Commissioner of the Internal Revenue for announcing official rulings, procedures, publishing Treasury decisions, etc. It gives you weekly information on changes. This can be purchased directly from the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20401 for a yearly subscription rate of $88. This publication is not really necessary. Only those who are really serious about tax, and want up-to-the-minute information on both proposed and actual changes need spend the money.

6. Last but not least are the *free IRS publications.* You can order from the IRS countless free publications that will guide you in rules, filing requirements, etc. by simply picking up the phone and calling your local IRS office. Some examples are: Pub. #910—*Guide to Free Tax Services;* Pub. #535—*Business Expenses;* Pub. #551—*Basis of Assets;* Pub. #534—*Depreciation;* Pub. #334—*Tax Guide for Small Business.* The list goes on and on.

I hope this article was of some service to you. ≡

Footnotes

[1]Internal Revenue Code, Volume 1, as of June 23, 1988; Commerce Clearing House, Inc.; Copyright 1988; Section 61(a).

[2] Prentice Hall, 1989 Federal Tax Handbook; Prentice Hall Information Services; Copyright 1989; page 255.

[3] 1989 Annual Edition, West's Federal Taxation: Individual Income Tax; West Publishing Co.; Copyright 1988; page 10-18.

[4] Prentice Hall, 1989 Federal Tax Handbook; Prentice Hall Information Services; Copyright 1988; page 319.

Reference Material

Publications mentioned within the article.

Editor's Note: Tax-related information in this article is published for general information only. For specific advice about your own situation, you should research available sources yourself, or consult a specialist in this area.

Coming Events

MAY 13, 1989
LAKE CHARLES 1-DAY SEMINAR
University United Methodist Church
Larry Eddy
2426 Weil Drive
Sulphur, LA 70663
(318) 625-7027

MAY 19-20, 1989
UTAH INTERMOUNTAIN SEMINAR
Holiday Inn-Airport
Gary Dunn
6287 W. 3705 S.,
West Valley, UT 84120
(801)967-5215

MAY 25-JUNE 4, 1989
PTG ORIENT TOUR
JUNE 10-13, 1989
IAPBT CONFERENCE
Charlie Huether
34 Jacklin Court
Clifton, NJ 07012-1018
(201)473-1341

MAY 26-28, 1989
MEXICO CITY SEMINAR
(SPONSORED BY REGION 3)
Danny Boone
9707 Timberview
Waco, TX 76710
(817)772-0546

JULY 10-14, 1989
32ND ANNUAL PTG CONVENTION
Red Lion Lloyd Center, Portland, OR
Home Office
4510 Belleview, Suite 100
Kansas City, MO 64111
(816)753-7747

SEPT. 23-24, 1989
MILWAUKEE CHAPTER DAYS
Howard Johnson — 611 W. Wisc. Ave.
Rudolph Moroder
3916 N. Frederick Ave.
Shorewood, WI 53211
(414)332-8474

SEPT. 23, 1989
RHODE ISLAND STATE 1-DAY SEMINAR
Providence, RI
Robert Case
24 Sunnyfield Dr.
Westport, MA 02790-4825
(508) 636-4691

OCT. 6-8, 1989
OHIO STATE CONFERENCE
Holday Inn North — Dayton
Francis Hollingsworth
2271 E. Spring Valley Paintersville Rd.
Xenia, OH 45385
(513) 372-1981

OCT. 13-15, 1989
TEXAS STATE ASSOCIATION
Lubbock, TX
Bob Johnson
3224 92nd
Lubbock, TX 79423
(806) 792-9712

OCT. 20-22, 1989
NEW YORK STATE CONFERENCE
Queensbury Hotel, Glens Falls, NY
Robert Reeves
R.D. #1; Galway Rd.
Ballston Spa, NY 12020
(518) 885-5472

OCT. 27-29. 1989
NORTH CAROLINA STATE CONFERENCE
Hyatt Winston-Salem
John Foy
195 Fayetteville St.
Winston-Salem, NC 27107
(919) 773-1754

New Members In March 1989

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	1989	*1988*
Northeast	796	800
N.E. RTTs	540	552
Southeast	576	565
S.E. RTTs	391	382
South Central	311	313
S.C. RTTs	213	229
Central East	610	614
C.E. RTTs	405	414
Central West	393	415
C.W. RTTs	280	312
Western	884	868
W. RTTs	616	631
Total Members	3570	3625
Total RTTs	2445	2520

The Auxiliary Exchange

Nature Manifests Might

In the early spring of 1980, she rumbled to life. After lying dormant for years and years, she stretched and groaned and sent the geologists scrambling. Mt. St. Helens, located in southwestern Washington State was once again a living and very active volcano.

People who lived anywhere in the Pacific Northwest that spring can tell you just what they were doing on Sunday, May 18, 1980, which was the day the mountain finally blew her top. The plume of ash and gasses was visible over a wide area. We could see it clearly from our house which is just 75 miles away as the crow flies.

The mountain spewed her cloud of ash high into the atmosphere where the winds caught it and scientists tracked the residual cloud clear around the globe. The lower level cloud "snowed" inches of ash over a pie-shaped area which reached into the state of Montana.

In an easy day trip from Portland, one can go up to the National Volcanic Monument area at the mountain and witness first-hand the destruction that occurred on May 18th. There is a road that takes one up to an overlook called "Windy Ridge" where one can look down on the formerly pristine Spirit Lake and right up into the mouth of the crater.

It is an extremely humbling experience to stand on that ridge and witness just what power nature has. However, the first thing that naturalists who work in the area prefer to talk about is the recovery that is taking place. Plants are sprouting up, the footprints of small animals that are returning can be seen, and the temperature is dropping in Spirit Lake. The wonders of nature abound.

If you can engineer an extra day into your visit to Portland this summer, it is very much worth the time invested to drive up to the monument area and witness the damage and more importantly, the rebuilding process, first hand. It is truly awe-inspiring.

Jennifer M. Reiter

President's Message

The "countdown" for our annual Convention in Portland begins about now—when most all of you have decided and made formal plans to travel to the great Northwest. From the beginning of this year there have been articles by various individuals endeavoring to whet your appetite about this city. There is something for everyone. The technicians who wish to increase their skills, enhance their professional development and greet old as well as new friends will have little strain making their decisions. It may be more of an effort for their spouses to resolve to make the trip if they are concerned about meeting with new people and wondering if they will really feel at ease and comfortable with new associates. Our Auxiliary will do its very best to meet with the new members as well as the seasoned colleagues. Concerns about readying children for school or clothing, books and tuition for the college-bound offspring will fade as the technician and spouse absorb, enjoy and luxuriate in all the history, atmosphere, and food in the Northwest this year.

If one can manage to remain an extra day after the convention, a day trip to Mt. St. Helens can be organized with some local couples serving as "tour guides." Portland's neighbors just across the river in the State of Washington are planning many exciting activities for their centennial celebration. Clubs, college alumni, and Community groups are organizing a variety of events such as a Wagon Train (7 trains total), horse-back riding groups, cook-outs, etc. to express pride, good citizenship and individual achievement.

The year 1889 was an extraordinary one with many plusses and few minuses. That was the year the State of Washington was admitted to the Union along with Montana and North and South Dakota. It was the year that Charlie Chaplin was born as well as Adolf Hitler. Benjamin Harrison was inaugurated as the 23rd President of the U.S. and the Austrian Crown Prince Rudolf committed suicide at his hunting lodge in Mayerling. Gilbert & Sullivan wrote *The Gondoliers* that year and Mark Twain wrote *A Connecticut Yankee in King Arthur's Court*. George Kaufman the dramatist was born that year and the poet Robert Browning died. At Olympia, London, the London County Council formed the Barnum and Bailey Circus! At another Olympia in Washington, all the centennial celebrants will converge at a massive rally and festival. Oregon admitted to statehood 30 years earlier in 1859 is doing its utmost to help Washington celebrate its centennial year! — *Agnes Huether*

From Our Mailbag:

Sandy Essary, Adminstrative Assistant of the Piano Technicians Foundation, has informed us that a contribution has been made by the Erie Chapter of the Piano Technicians Guild to the Piano Technicians Guild Auxiliary Scholarship Fund in memory of Mary Ann Manna, wife of Tony Manna. This tribute of love and esteem will be used for a most worthwhile cause.

Jewel Sprinkle of Arlington, Virginia wrote to express her regrets that she will not be attending the Pennsylvania Institute this year. Generally a "regular" at this event, she and Jack will have to pass on it this year as they did attend the California State Conference in Fresno last February and that trip did cut into their scheduled work time.

Dorothea Odenheimer of Van Nuys, California wrote to tell us of her attendance at the Fresno State Conference with her husband, Fred. Unfortunately, their weekend was affected when Fred had a slight stroke on Saturday morning of that weekend and had to be admitted to the hospital on Monday. He is home now and making good progress each day. We wish Fred all the best and Doro reported that all the Auxiliary activities were most enjoyable.

Marge Moonan sent St. Patrick's Day greetings but stated, too, that she doubted she and her husband would be

able to attend the PA State Convention. Their youngest, 14-year-old Brian, is quite ill and they feel their absence from home would be ill-advised. Despite her concerns, Marge was able to write an Irish toast for us: "May you have warm words on a cold evening, a full moon on a dark night, and the road downhill all the way to the door." We really liked that one. Here's another for all you pussy-cat lovers: "Tis for its own sake that the cat purrs!"

Larry Goldsmith, Executive Director, wrote to advise that the Central Illinois Chapter has made a generous contribution to the Piano Technicians Guild Auxiliary Scholarship Fund in the memory of David Pitsch's wife, Lynn Susan Mumaw Pitsch. This memorial tribute will live on through the work of the Auxiliary Scholarship Fund.

Another report from **Dorothea Odenheimer!** Although there is no Auxiliary Chapter in Fresno, the women they met were gracious, cordial and provided a pleasant time. There was an ample supply of coffee, tea and cookies in the eighth floor Hospitality Room and a good number of attendees. They were served luncheon in the Beethoven Room, which is generally a night club. As Doro reported, Ludvig Von Beethoven would turn over in his grave if he heard the loud music that is played there! At lunch each woman was given a goody bag containing a piano-shaped black pot holder and a quantity of nuts, raisins, and candies to tide them over till the next meal! From the enclosed raffle tickets, Dorothea won a small earthen ware cooker with a wrought iron stand and our **Pauline Miller** won a wallet. An auction of fashions followed and among the buyers were **Blanche Evans** and **Fern Morton** who wore their new gowns to the banquet that evening! Thanks, Dorothea, for your report.

Nominating Committee Reports

The Nominating Committee, under the Chairmanship of Pauline Miller, has completed its assignment and the following slate of officers has been submitted and recommended for your consideration in the 1989-1990 election of officers to the Piano Technicians Guild Auxiliary: Agnes Huether, President; Arlene Paetow, Vice-President; Christine Monroe, Recording Secretary; Judy White, Corresponding Secretary; Barbara Fandrich, Treasurer.

As has been the custom, nominations from the floor will be accepted. PTGA holds elections by secret ballot even if there is only one nominee for a position.

Editor

Kudzu

Piano technicians remind me of kudzu—you know; the green, ivy-like plant that spreads all over like mad, covering everything in its path. For a long time, I thought it was just my own, personal live-in technician who exhibited these kudzu-like tendencies, but I have found out over the years that many piano people share this prolific phenomenon.

First there is the tendency to spread pianos all over the house—Little ones, big ones, short ones, long ones. Great conversation pieces everywhere, but what can you really do with that many pianos that do not play? (Admire the wood? Display quilts? Show off photos?)

By the way, have you ever had a garage to call your own? I used to have a friend whose garage I would visit from time to time just to admire the big, empty spaces, the tidy little peg-board on the wall, and garden tools right out in the open where you could find them. Our garage looked like that once...right before we moved in. Now, of course, it's crammed to the gills with the tons of piano stuff that gradually creeps like kudzu into the house.

Tools, gadgets, parts, pieces. They all have a home somewhere, I'm sure, as I pile them up here and there, afraid to put them somewhere that my Del might never look when he is searching for them some day. Little brass things, felt things, wood things, just popping up everywhere, in every room, as if connected by some unseen root system spreading throughout the house. In fact, because our last few houses have contained enough space for an office-study, we now have to contend with drafting, computer and paper kudzu invading from within! How to cope with 18 huge, curling blueprints piled on the living room floor when a six and eight-year-old are coming to visit? Answer: quickly put them on the bed in the guest room. (Either the kids or the papers, take your choice!)

In fact, every now and then when company comes over and it's not an understanding piano person, I find I have to root out and clean up all the kudzu, which, of course, produces consternation and quite a chilly atmosphere for a while. Then gradually, quietly, without ever quite seeing anything move, the house fills up again with this little gadget and that little knob—until suddenly, it feels like my own, warm wonderful greenhouse once again.

Barbara Fandrich

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"LET'S TUNE UP" $20.00 per copy. Last few hardbacks will soon be gone. No immediate plans for another printing. Paperbacks still available at $17.50. Make checks payable to **John W. Travis, 8012 Carroll Avenue, Takoma,MD 20912.**

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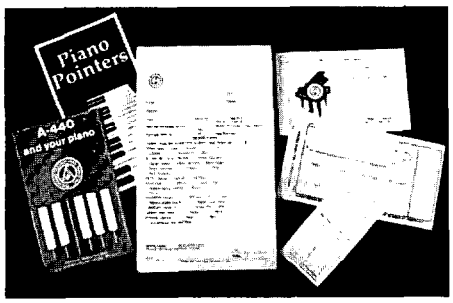

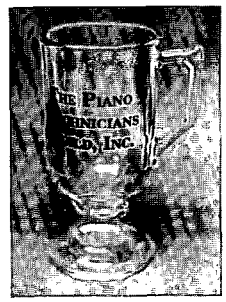
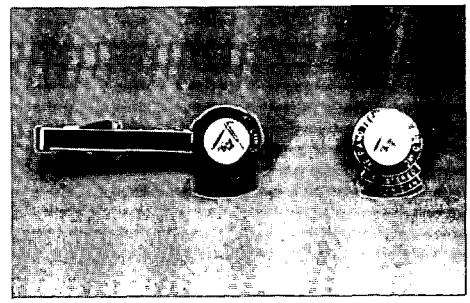

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Tech Gazette

Yamaha Piano Service May, 1989

Yamaha in the News

Yamaha Music Manufacturing, located in Thomaston, Georgia, is a factory designed and constructed from the ground up. YMM was first an assembly plant for Yamaha Electones®, Keyboards and sound reinforcement equipment. Next, "Knock Down" kits made by our factories in Japan arrived for final piano assembly in Thomaston.

Recently the new building construction, machinery and manpower have been added to enable YMM to make Yamaha pianos from "back frame to final finish." Some exclusive Yamaha components like tuning pins and the Yamaha action will still be supplied directly from factories in Japan for installation in these pianos.

YMM currently produces the following Yamaha models:

- the M 300's,
- the M 400's,
- the P 22's
- the M1E's

MIDI Corner

Within recent years digital information has made it possible to create on a computer any subject matter, which was once possible to do only on "paper with the use of pen or pencil."

Not only can subject matters easily be created, they can easily be edited before completion. Once the information is correct it can be transmitted to another computer within the same office or by satellite, to a terminal anywhere in the world.

In a very similar manner, the standard called MIDI was developed to enable all digital music instruments to send or receive digital signals.

So why should you be concerned? Because MIDI just might be on the next piano you service. A good percentage of the musicians you work with use MIDI daily, and you need to keep up your knowledge of the MIDI as a professional.

Chances are you will be more involved with MIDI as time goes by.

New Products

One might think that a piano manufacturer would be content to rest on the laurels of the past successes. However, Yamaha has offered many new products in the last year and they include:

- the new 7' 6" C7F grand
- the new "4 in 1" piano, the Disklavier (see the March issue of Tech Gazette)
- the new M1E European console pianos

Parts, Etc.

Under the direction of Mark Wisner, the treasure house called "The Yamaha Parts Department" has been deluged with requests for Yamaha parts.

If your recent order has been delayed, we assure you that we are doing everything we can to "catch up." We have received more orders recently than at any other period on record. Some of the popular items being shipped are:

- Yamaha grand hammer assembly sets (pre-glued to set of shanks and flanges)
- "Aftertouch" training video. (We also offer several other training videos)
- Touch adjuster weights that clip on to hammershanks of grands or the hammer catcher dowels of uprights.

Yamaha will participate in:

May 4-7:	New England Regional Seminar Cromwell, CT
June 17-20:	Summer NAMM Chicago, IL
July 10-14:	32nd Annual PTG Convention Portland, OR

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