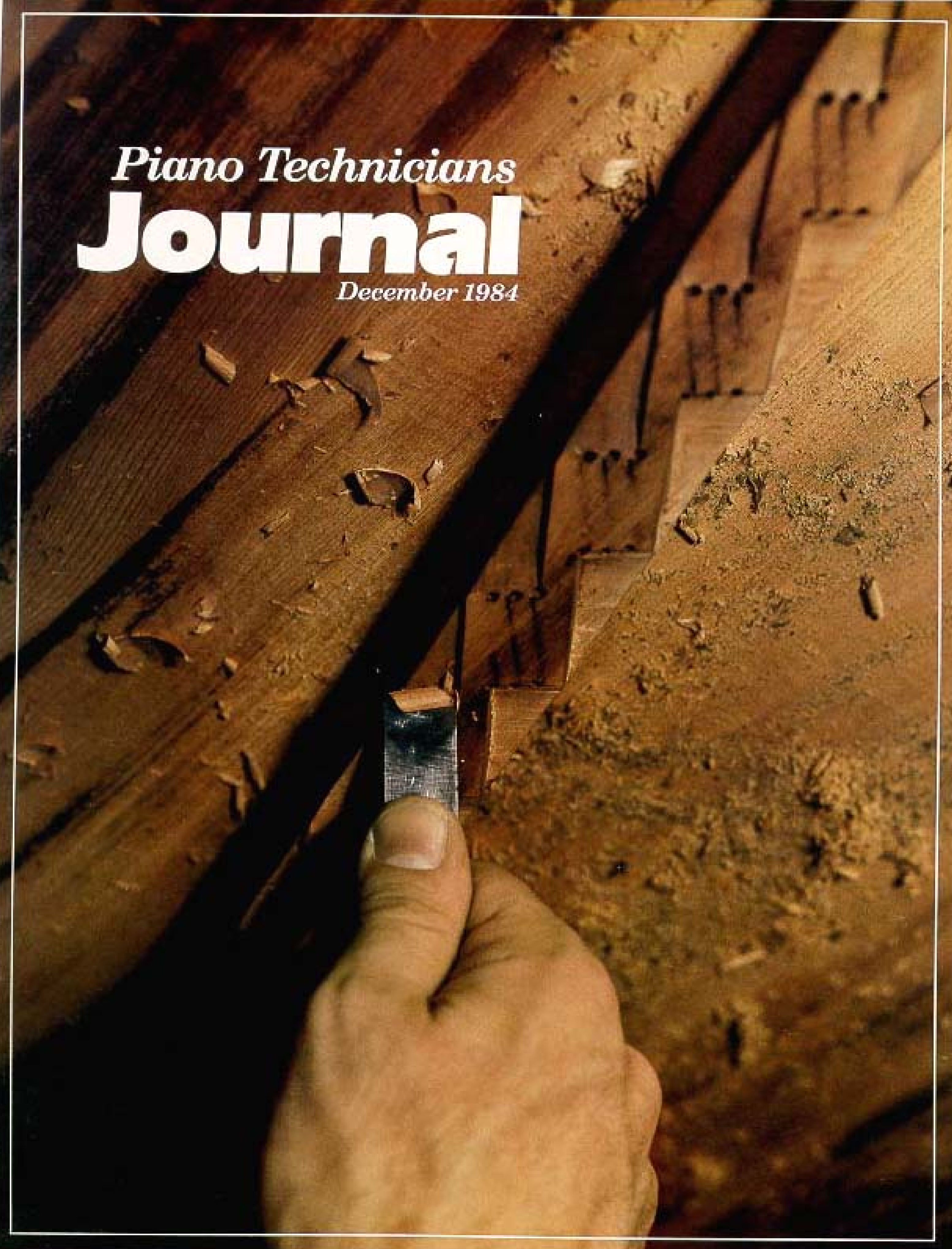

Piano Technicians
Journal
December 1984

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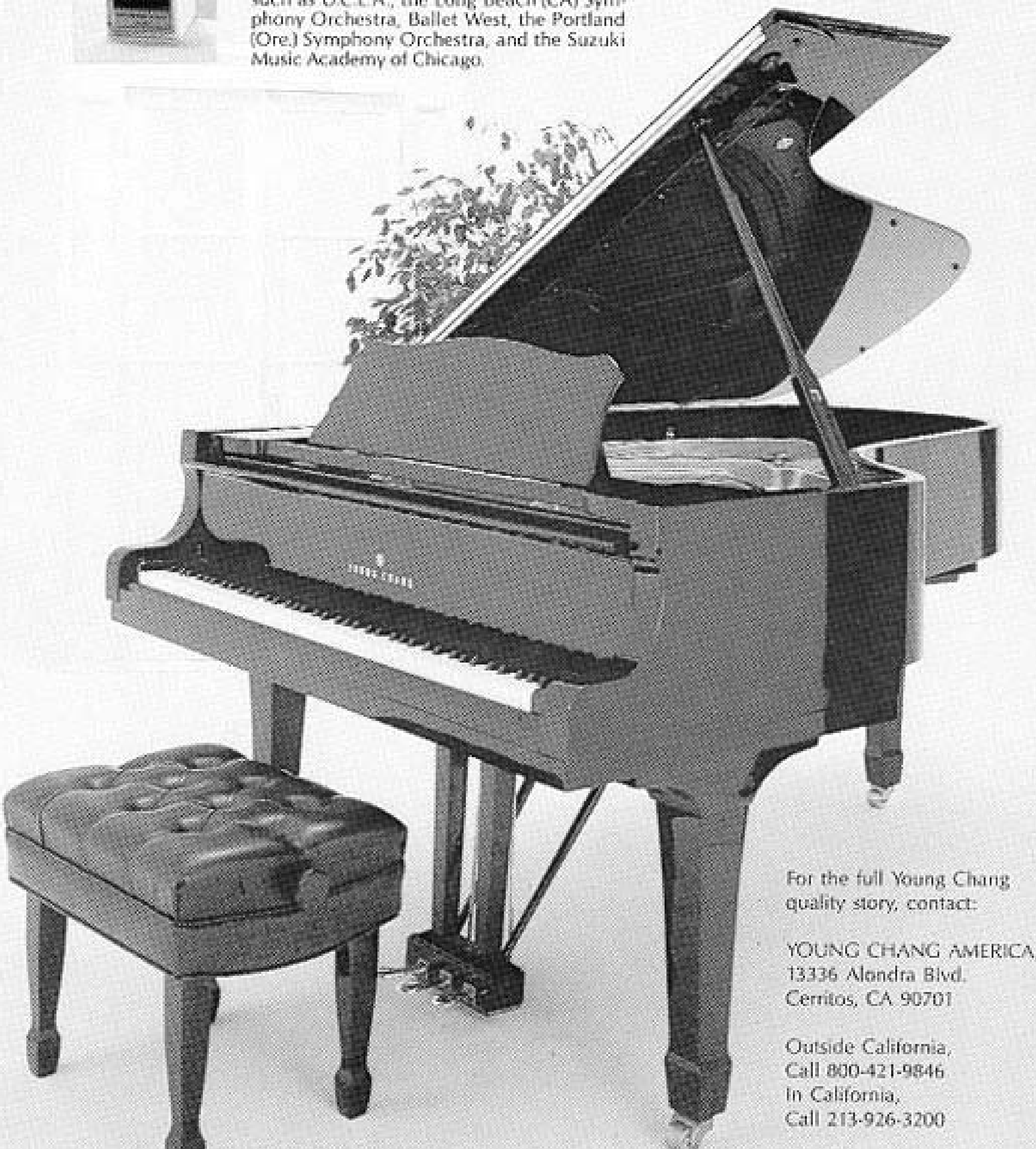

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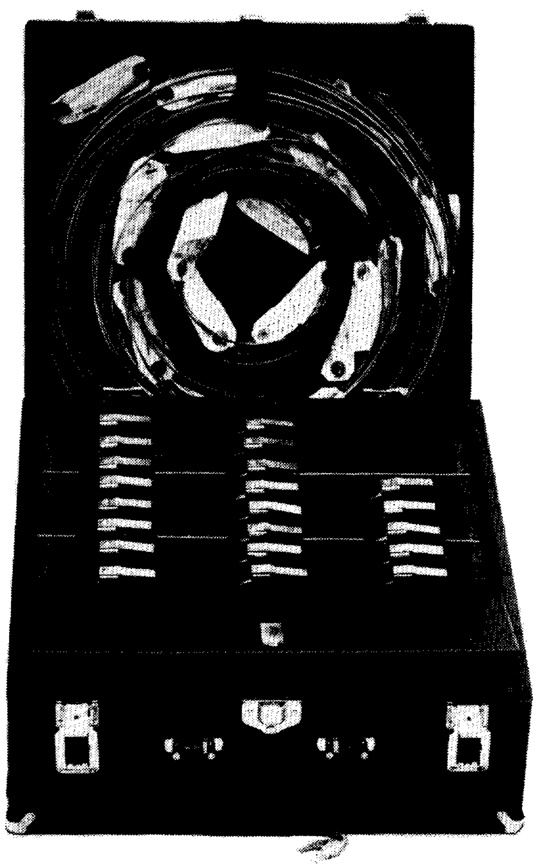

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Piano Technicians Journal
Official Publication of the Piano Technicians Guild, Inc.

December 1984
Volume 27, Number 12

On The Cover:
"Re-notching A Bridge," a study by Randall Woltz of the Orange County, Calif., Chapter. Woltz, a Registered Technician, also is an accomplished photographer, as this month's cover attests.

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The President's Perspective

Charles P. Huether
President

There's Enough Guilt In The World...

December is a month of preparation for celebrations and gift-giving. To each of us, the feast days and celebrations have a different meaning, a different residue of rememberances. In the midst of all the happiness there is a lot of sadness, the so-called "Christmas Syndrome". As if there wasn't enough guilt in the world, there is the added feeling of guilt because one is not enjoying the festivities in the manner they think they are "supposed" to.

We are all creatures of the culture which surrounds us. Even if we resist, we are still affected. I wonder sometimes how many of us feel guilty because we are enjoying our work as much as we do. The usual accounts of "work" describe an occupation which imposes itself upon one's life in a cruel way, keeping one from enjoying more important things. As relief, it is suggested that one engage in a variety of recreation, most of which seems to be very expensive. Is it a coincidence that the recreational activities most promoted are the most expensive ones? When was the last time you heard anyone suggesting a creative walk as a recreational release? Or playing music? If it doesn't require you to spend a lot of money, continuously, for equipment, etc., it can't be of much value.

So much for the commercial world.

Do you sometimes have guilty feelings because you enjoy your work? Do you sometimes wonder why you often consider your work the best recreation you ever experienced? Does the fact that you enjoy your work affect the prices you charge? Do you feel guilty because you manage to make a living and enjoy the process at the same time?

Please, stop the worry. The world is full of reasons to feel guilty. Enjoy what you do. Make each day a celebration. Plan your day and your week with a little bit of foresight to eliminate aggravation as much as possible and do what you do best as only you can do it. Enjoy the work for life is so full of aggravation, why let it intrude on that sacred period of the day, the work time.

A blessed and happy Christmas and Hanukkah to all.

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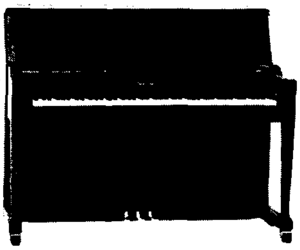

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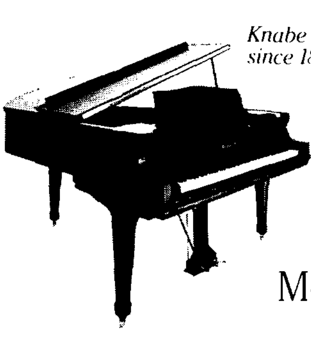

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From The Executive Director

Barbara Parks
Executive Director

Keeping An Eye On The Future

What's ahead? What effect will new technologies have on our businesses? How will consumers, especially those with pianos, behave in the upcoming months? What will the economy do now that the presidential election is behind us?

If we knew the answers to those questions, we would all be rich, or at least we wouldn't be quite so shocked when we open the morning paper. But the best we can do is guess, based on what we know of the present.

We're fortunate in this, because we have a group of people who are looking out for us. You may have noticed in this and several preceding *Journals* a column submitted by Bob Russell and the Guild's Economic Affairs Committee. Pay attention to these guys, because they're our early warning system.

Our Bylaws say that "there shall be a committee for economic affairs to study past, current and future economic trends and advise members accordingly." That's a big task.

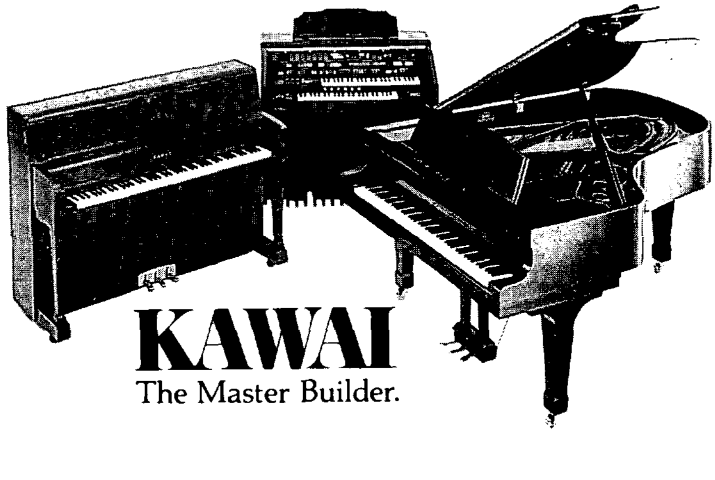
Bob, who's in Cleveland, and his committee, composed of Ray Reuter in French Lick, Ind., and Bob Smit in Kanata, Ont., are responsible for keeping an eye on the economic factors that affect our work and our businesses. They keep an eye and an ear on the behind-the-scenes occurrences in the music industry. They read — a lot. They correspond extensively. And they share their findings with the rest of us.

We want the Guild to be a organization that acts instead of merely reacting, one that makes news instead of just being affected by it. To do that, we have to know what's going on. We have to be one step ahead of the trends. It's people like our Economic Affairs Committee who make it happen.

We're proud of everyone who contributes to the *Journal*, and we hope to have a chance to tell you about more of them in the months to come. We're particularly pleased to bring you these monthly reports from the Economic Affairs Committee.

I also hope you noted the news in recent *Journals* that our convention dates for 1985 have been changed to July 15-19. This was done to give you a chance to spend the Fourth of July holiday with family and friends. Be sure to mark your calendar, because we're looking forward to seeing all of you in Kansas City.

At Kawai, the tuner's hands and ears alone can determine the final "rightness" of a piano in the final tuning process.



Economic Affairs

Bob Russell
Chairman, Economic
Affairs Committee

Comforting Feeling With Workers' Compensation

I believe all states have "workers' compensation." Some programs are state-controlled while others have private companies doing the insuring. For many years I was unaware that "sole proprietors" or "business partners" were eligible to receive this coverage, but since I have discovered this I have a more comfortable feeling about the possibility of being hurt on the job. In the following paragraph I will attempt to give you details concerning this coverage. I will use the laws according to Ohio; however, you can investigate the laws in your individual states.

Workers' compensation is an income-maintenance and health-care insurance program to cover work-related injury, death, and occupational disease. As piano technicians we would be covered driving to jobs, and any job-related injury that might occur. The program provides *full* medical coverage and hospitalization from the time of injury and diagnosis. It also provides some money for living expenses to any worker whose job-related disability lasts longer than seven days. (These checks usually do not equal a person's salary). The maximum weekly benefits for 1983 were $321.00, and the checks are mailed to you every two weeks, usually until you return to work. Generally compensation for the first 12 weeks of disability is 72 percent of your full weekly wage.

- Workers compensation is not considered income for tax purposes.
- Health-care services include medical care and hospital expenses, as well as medicine, dressings, and medical supplies.
- Permanent total disability benefits are paid for the duration of the worker's life.
- There are approximately 230 separate industry classifications, each of which has its own premium rate. My classification is "rebuilding and restoring pianos, including tuning." The rate that I pay is $2.70 per $100.00 of payroll. As an owner, my reportable income is a minimum of $100.00 per week and a maximum income of $500.00 per week. So at $2.70 per $100.00 and a maximum income of $500.00 per week my premium would be $13.50 per week.
- Workers' compensation, which is tax deductible, is entered in your books with all business insurance.

Now you see the advantage of workers compensation. A small premium for the comforting feeling for myself and my family, knowing that if I am hurt on the job, I am covered.

The International Scene

Fred Odenheimer
Chairman, International Relations Committee

Notes From Japan And Europe

It seems that there is a long way to the next convention of the Piano Technicians Guild and the International Association of Piano Builders and Technicians, and yet planning is well on its way and details are starting to take shape. We now have confirmation of attendance from Japan and Australia and,we are certain there will be representation from Korea, Taiwan and England. Everything is pointing towards a successful meeting in Kansas City July 15-19, 1985.

We have had a number of letters and communications from various countries throughout the world. It seems that everybody enjoyed the Olympic Games. Kazuyuki Ogio (IAPBT secretary) writes: "Returning to Japan (from the Guild convention), I found myself in a hot summer in Tokyo. In fact, it was too hot a summer for me to work. Fortunately the Los Angeles Olympic Games were being held in those hot days, and I stayed home most of the time watching television. The memories of the spectacular opening ceremony and other events are still vivid in my mind."

Well, it was hot here in Los Angeles, too, although it was cooler during the Olympics, especially the first week. But we had the hottest September on record and quite a bit of time was spent watering the garden rather than attending to my correspondence. I publicly apologize to all those who feel that I was negligent in my duty.

As we read in *Das Musikinstrument*, Mr. H.K. Herzog celebrated his 75th birthday this past September third. There are few of our members who would recognize this name. However, as former editor of both *Das Musikinstrument* and *Europiano* magazine, he was instrumental in the success of these publications.

However, he is best known as editor of a good number of musical and technical books on the piano and other instruments published by the house of Erwin Bochinsky over the years, some of which are available in translations from our supply houses.

Personal thanks go to him for the encouragement 10 years ago to work towards the establishment of a world organization of piano builders and technicians that lead to IAPBT in 1979 in Minneapolis. Unfortunately we do not have any member organizations in Europe as yet, but I trust that the future will take care of this.

Mr. Herzog, I and the Piano Technicians Guild wish you many happy returns and I hope, there will be a chance again to meet you in your native Konstanz.

THE TECHNICAL FORUM

Keyframe Bedding, Brass Rail Butt Plate Repairs Screw Sizes And Types, The Multipurpose Tool Contest And Capo Bar Profile

Jack Krefting
Technical Editor

Keyframe Bedding

Q *The last grand piano I regulated was an older Kimball without glide bolts on the balance rail. After unsuccessfully trying to bed the frame, I followed some advice from the manufacturer, who sent me some glide bolts. I drilled holes between the keys at the action breaks and installed them. It worked fine, and I will do the same to all frames without them in the future.*

Key bedding is something I've read everything about but always seems to come hard for me. One pass with a sandpaper strip never seems to be enough. Are all keyframes and beds made to lie flat to flat?...

Kent Gallaway
Ripon, Wisconsin

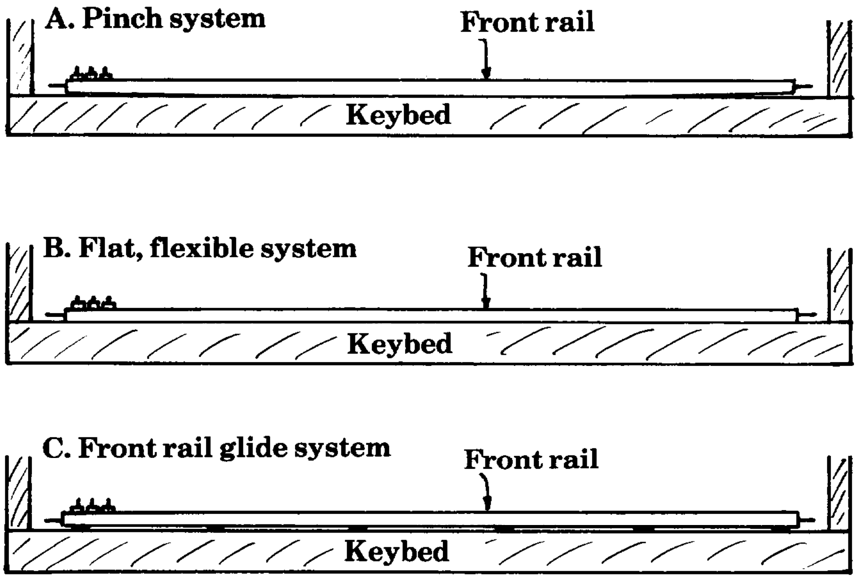


Figure 1

A Some frames are built to be pinched down at the ends, others should lie flat to flat, and still others are made with glides on the front rail as well as the balance rail. There are also grands that do not shift, but we will ignore those in this discussion because they are bedded like a vertical keyframe and typically present no bedding problems at all.

In *Figure 1* we see a front view of three keyframe front rails. The pinch system, used on Steinway and all but the most recent Baldwins, has a slightly crowned front rail which is regulated by adjusting the shape of the crown and the amount of pinch so that the entire front rail is held firmly in contact with the keybed when the pinch is applied at the ends. Below that we see the flat, flexible system such as is used by Bosendorfer, identified by the lack of crown on the front rail underside. This and similar systems will be bedded without pressure at the keyblocks.

The third example, letter *C* of *Figure 1*, shows a front rail with glides, which is arguably easier to bed than the first two examples, but care must be taken not to introduce pinch because that would cause the end glides to act as pivots, raising the middle of the rail above the bed.

In *Figure 2* we see five common cross-sectional configurations of keyframe front rails, the first of which is flat on the underside. The principal advantage of this type of contruction is simplicity and solid support, assuming of course that both the bed and the frame are perfectly flat and that neither changes shape with the weather, which is a lot of assuming. The major disadvantages, other than the above, are that the flat frame has so much surface contact area that it has a lot of frictional resistance to shifting, and that if a knock is present there is a lot of wood to sand away because of the amount of contact. One pass with sandpaper won't begin to solve the problem. In fact, if the frame will not stay bedded, it would be best to modify it either with a glide system or by kerfing it to make it conform to the shape of the keybed. We will pursue this presently.

In *B* of *Figure 2* we see the well-known pinch-type rail, which touches the keybed only at the front half inch. This protrusion measures about 1/8 inch below the bottom of the rail in the middle, and about 1/16 inch at each end after bedding.

The cove cut on the underside of the rail, seen in *C*, works like *B* and is bedded using the same technique, except that even less contact area means even less sanding is required. It also means that bedding mistakes are magnified, so be careful not to inadvertently take off too much material. The next illustration, *Figure 2D*, illustrates the glides that are in the front rail of current model Baldwins. The recommended bedding procedure for this frame is as follows:

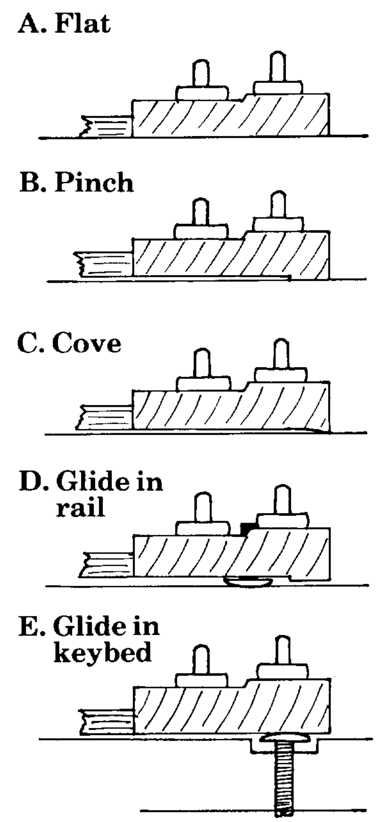
Remove keys and action from keyframe, turn the balance rail glides up as far as they will go, and bed the back rail just as in an older piano. Then, with the action back on but still no keys, place the keyframe in the piano and, with a four-foot straightedge on the front rail, observe where the wood of the front rail comes closest to touching the keybed.

Adjust the proper glide or glides to make the minimum clearance of 0.025 inch and then, being sure to keep the front rail straight and level, adjust the remaining glides so they just touch the bed. The use of six pieces of newspaper is recommended, one under each glide just as we would bed a normal balance rail.

When there is the same amount of resistance to being pulled out in all six pieces of paper, the front rail is bedded. With this system, it is imperative that the frame not be pinched at the ends, as mentioned previously, otherwise it will knock in the middle. When the front rail bedding is done and the keyblocks are installed with just enough downpressure to keep the frame from moving in and out when shifting, bed the balance rail in the same manner.

Another system, similar to the above but with the glides mounted in the keybed rather than the frame, is illustrated in *2E*. This system is found on some older Aeolian products, and works very well, being

Figure 2



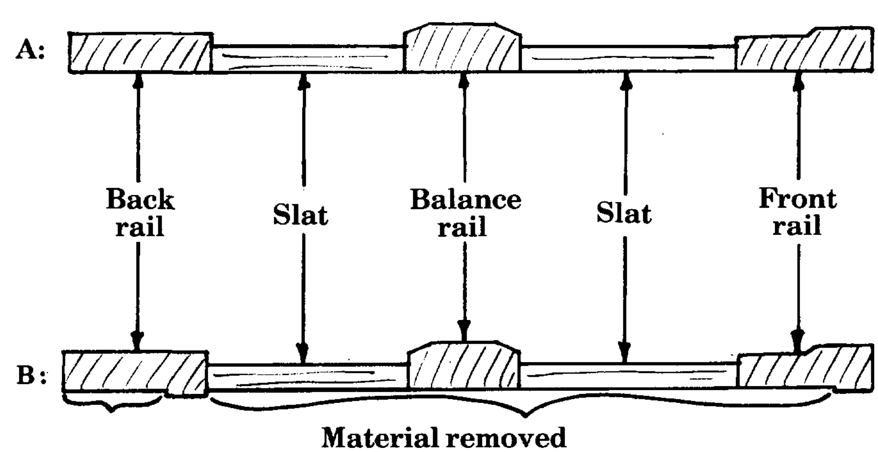


Figure 3

the easiest of all to adjust without removing the keys. The only disadvantage here is that the adjustment screws are accessible from below the keybed, which makes them vulnerable to tampering, both by mischievous children and by the well-meaning but ill-informed practice of piano movers tightening all screws before setting up a piano.

Figure 3 shows a method of making a flat frame without glides into a pinch system frame. The essential modification involves routing away 3/32 inch to 1/8 inch from the bottom of the frame everywhere except the front half inch of the front rail and the front half inch of the back rail. The frame is then drilled for glides at convenient points, preferably where the fore/aft slats cross the balance rail, and when the glides are installed the technician should verify that they will not interfere with the keys.

If the keybed is made of laminated hardwood, the frame can be bedded without further modification. If it is made of solid softwood planks it will be necessary to install hardwood inserts into the keybed as shown in *Figure 4*. The dimensions shown are somewhat arbitrary—certainly if the action position is carefully noted and the action shifts a quarter of an inch or less, these inserts don't have to be two inches in diameter—but the important thing is that each glide is supported on end grain hardwood.

The easiest way to do this, assuming the keybed has not been and will not be removed, is to place the keyframe and action in position, without keys or glide bolts, so that the hammers are at the correct strike point and centered side to side on their unison. Then reach through each drilled hole in the balance rail with a pencil and mark the location of each glide on the keybed. Then, using a right-angle drill attachment such as is used by electricians, make a circular cut with a hole saw about 1/4 inch deep at each glide location. Remove the wood inside the circle with a chisel, glue in the insert, sand the top flush, and lubricate the end grain by rubbing it with a mixture of mutton tallow and French chalk. If this is not available, use soapstone, Teflon spray, beeswax or Chapstick.

If the right-angle drill attachment referred to above is not available, it would presumably be possible to drill all the way through the keybed from below. It should be remembered, though, that it will be difficult to measure the precise location of the holes and that one could encounter interference with the lyre board, or, worse, cut the stabilizing dowels that connect the planks of a climate-compensating keybed.

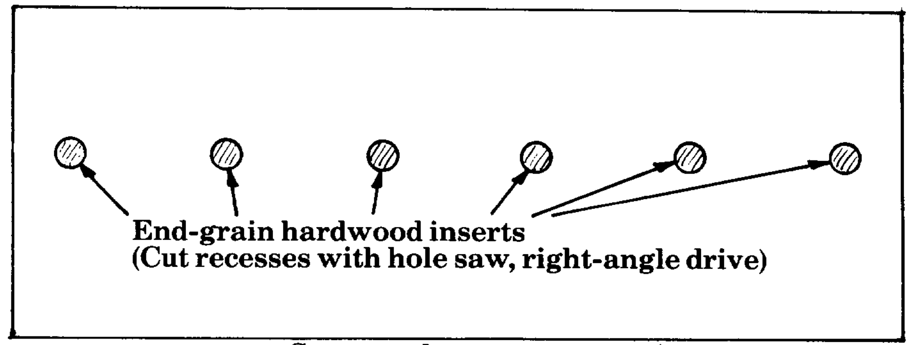


Figure 4

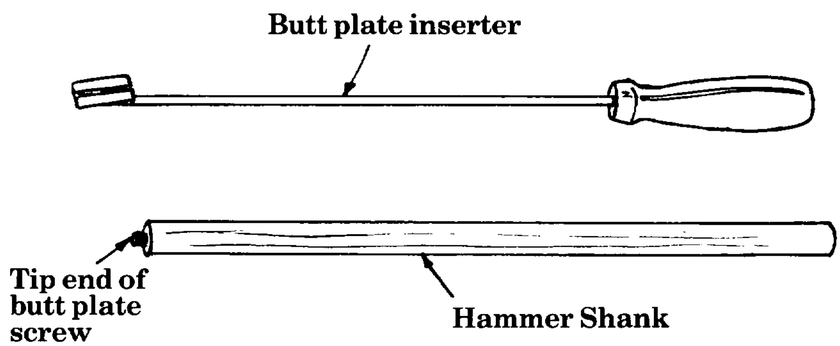


Figure 5

Brass Rail Butt Plate Repairs

Paul Bergan of the Houston Chapter, noting that there are still a number of old brass rail pianos in service and that there are always newer technicians who have not had much experience in that area, sends along the following:

There are two types of metal plates: one has a hole without threads (the old Kimball type) and the more common threaded type. The butt plate may be held in position either with a supply house inserter or with a homemade tool (Figure 5) made from a hammer shank and a machine screw. The latter was given to me by the later Harry Hughes, former Technical Editor of the Journal.

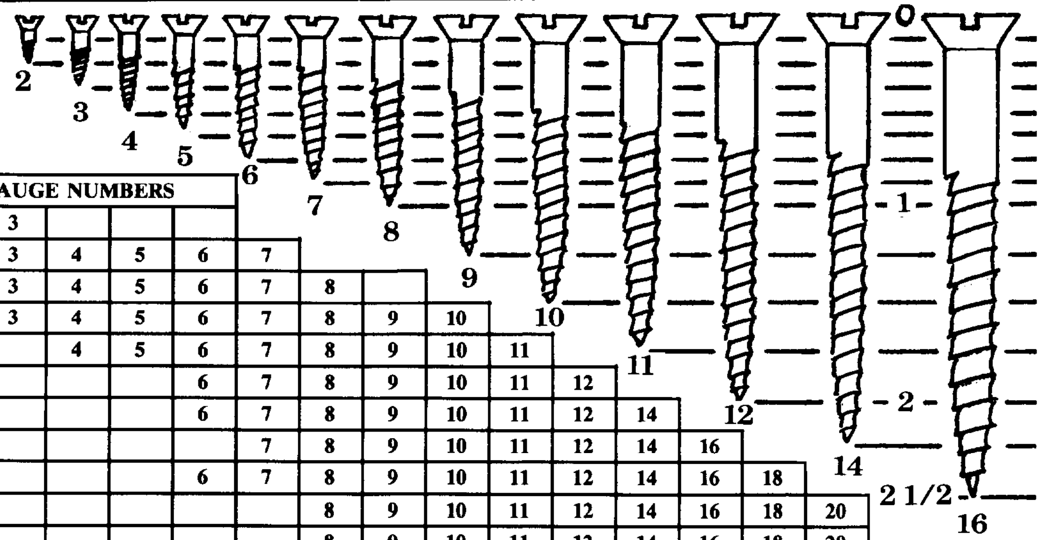
Sometimes a new plate causes trouble. Let's say you have replaced a broken plate and everything is fine, except the shank won't fall all the way back to the hammer rail. I spent several hours on this repair. I figured that it simply could not be that the hammer had been wrongly glued into this brass rail butt because it had worked OK before the brass plate broke. What caused this? Take a look.

Watch the hammer as you loosen the screw. Now it falls all the way back to the hammer rail. This is because the end of the screw extends beyond the plate and interferes with the movement of the hammer. I fixed it by removing the plate and screw, then threaded the screw back into the plate and clamped the plate in a vise. Then I filed off the end of the screw until it was short enough, carefully backed the screw out of the plate so the threads would line up again after being filed, and replaced them in the piano...

Paul Bergan, RTT
Port Bolivar, Texas
Houston Chapter

Figure 6

WOOD SCREWS



LENGTH	GAUGE NUMBERS																	
1/4 INCH	0	1	2	3														
3/8 INCH			2	3	4	5	6	7										
1/2 INCH			2	3	4	5	6	7	8									
5/8 INCH				3	4	5	6	7	8	9	10							
3/4 INCH					4	5	6	7	8	9	10	11						
7/8 INCH							6	7	8	9	10	11	12					
1 INCH							6	7	8	9	10	11	12	14				
1 1/4 INCH								7	8	9	10	11	12	14	16			
1 1/2 INCH							6	7	8	9	10	11	12	14	16	18		
1 3/4 INCH									8	9	10	11	12	14	16	18	20	
2 INCH									8	9	10	11	12	14	16	18	20	
2 1/4 INCH										9	10	11	12	14	16	18	20	
2 1/2 INCH													12	14	16	18	20	
2 3/4 INCH														14	16	18	20	
3 INCH															16	18	20	
3 1/2 INCH																18	20	24
4 INCH																18	20	24

When you buy screws, specify (1) length, (2) gauge number, (3) type of head—flat, round or oval (4) material—steel, brass, bronze, etc. (5) finish—bright, steel-blued, cadmium, nickel, or chromium plated

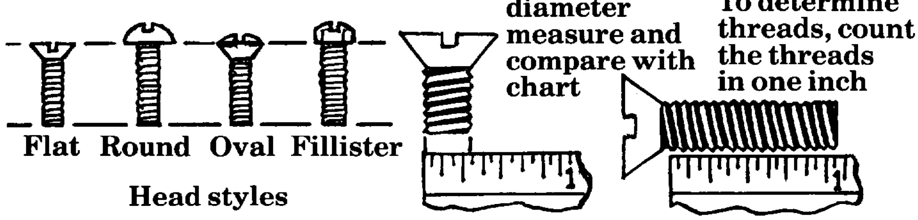


Figure 7

Screw Sizes And Types

Q *In our work we have occasion to use many different sizes and types of screws and holes, and are confused about some of the configurations. Please say a few words about which type to use where, and so on. Also, when measuring the length of a screw, do you always measure from end to end or are some measured under the head?*

A The traditional wood screw thread is tapered, with the outer portion of the thread no larger in diameter than the shank of the screw. This means, of course, that it is necessary to use a clearance hole for the shank and a smaller pilot hole for the threads. Gauge numbers 2 through 16 are shown in *Figure 6*, together with their general (hardware store) availability. We know that pinblock screws are most often 1 1/2 inch x 20, a size that doesn't show up at all here, which just means that you won't find that size at your local hardware store.

Figure 7 shows four of the most common screw heads. Screws and bolts are always measured by their penetration rather than their overall length, and for that measurement it is assumed that the flat and oval head screws will be countersunk so that the rim of the head is flush with the surface. The other two are measured from the underside of the head. Our thanks to *Popular Mechanics* for the layout of these drawings.

Since the oval and Fillister heads are actually variations on the flat and round heads respectively, we are basically only talking about two types. A flathead screw is used where no projection above the surface is wanted, even though that could mean some weakening or even splitting of the work because of the wedging action of the screw head. Where it is important to leave the workpiece full thickness (no countersink) or where it is important not to wedge the head in place, or where projection of the head above the workpiece is immaterial, a round head is used.

Multipurpose Tool Contest

David Patterson of Canada proposes the finger as the ultimate multipurpose tool, which may say something about the way this contest is going. Obviously we are going to have to wrap this up soon, so readers should send their entries right away. In the meantime, in reference to *Figure 8*, here is Patterson's thesis:

Tongue in cheek? No way. The finger is a tool—one that the best efforts of Starrett, Stanley, and Mehaffey could never match. All things considered, skin is an unbelievable product.

The fingertip can lift; pry; spread glue; polish; brush; press; clean flat, concave or convex surfaces plus holes; smooth; pat; mix; apply powders, semi-solids, liquids, pastes and tapes. Gets information where you can't see. Quickly made moist or wet for a myriad of tasks. Safe on any surface. Picks up small or tiny objects using pressure or adhesion. Tests for levelness, approximate temperature, sharpness, texture, smoothness, and dryness. Regu-

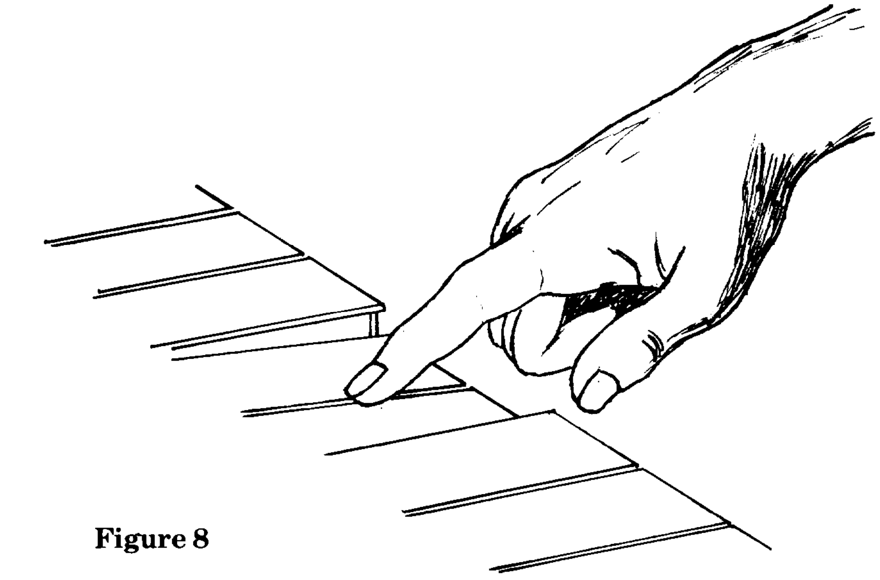


Figure 8

lates vertical and grand backchecks, checks for damper follow-through, pushes on soundboard to locate noises and reveal rib separation. Knuckle gets you in the door and helps bed key frames. Fingernail can pry, scrape, mark, scribe, and pluck strings for tuning or testing tone prolongation. In conjuction with thumb, finger can double (in a pinch) for pliers, tweezers and clamps; turn screws, bolts and nuts; remove lumps from powders; indicate size. Furthermore, fingers clean adhesives and dirt from one another; fingernails are also self-cleaning tools. Last but not least, with your finger you can point out to your customer the advantage of your service.

David Patterson
Mississauga, Ontario

Before some other pundit does so, we'll just point out that the above list barely scratches the surface, which is about as far as we want to go with it.

Capo Bar Profile

A few months ago we published an account of an unusual heat treatment of a capo bar by Matt Grossman. We have had many good comments regarding that piece, technicians being particularly pleased that Grossman could have been both intelligent enough to diagnose the problem and still courageous enough to do the job. One technician, however, has written to express his feeling that another approach might have been preferable. Ed McMorrow of Edmonds, Washington, says:

... Let's assume a 1964 piano goes dead after about 10 years and is rebuilt, and 10 years later it goes dead again. Moving of strings laterally on the capo temporarily improves tone. Obviously, the capo bar is the problem. I've seen this countless times on all makes of pianos, although my findings indicate that it is not a lack of hardness. Rather it is the cross-sectional profile that is the problem. Most capos are too round and the string is somewhat damped by the overly large contact area. Some are flat enough to buzz right from the factory. Usually it takes years for the strings to bend and settle around the capo enough to start an obvious buzz.

I will assume that in Matt Grossman's example the welding of the capo had to be filed to clean it up and that this may have improved its profile. At any rate the new strings would have helped to correct the problem as they would need time to settle into the problem again...

Symptoms... can include: metallic snare-drum-like noise at all dynamic levels; the same sound only at loudest volume; no overt metallic sound but a lack of warm singing tone even at lower volume levels; strings breaking at capo bar contact point too often considering conditions of use. (Ed. note: One would think a rounded bar less likely to cause string breakage, not more... JK)

The desired configuration of the capo d'astro bar includes the following points: one, precise termination of speaking length; two, no interference with the strings' motion on either side of the capo bar even at the very highest amplitudes of vibration; three, soft enough metal both on and under the surface of the string contact point to allow the string to self-machine its own little approximately 1/4-string-diameter indentation (Ed. note: We're going to have to argue that one, too... JK) *and four, narrow enough cross-sectional profile to minimize string contact point to one millimeter with ample clearance on either side of the contact point for free string motion.*

My first illustration represents a typically troublesome capo profile (see Figure 9, upper example). Contact point C is so wide and gently rounded that both string segments A and B will slap or 'ching' against the capo bar. This configuration also is more restraining on the wire and will cause more internal heating or wear on the wire along contact point C. The other illustration (Figure 9, lower example) represents a reshaped capo profile typical of what will solve all the tonal problems listed.

A common repair used to stop the snare sizzle is to insert felt into string segment B. This damps its vibration, kills most of the sizzle, but also kills the tone segment A. Less often more counterbearing is applied to segment B and this stops the sizzle, but results in a higher rate of string fatigue at point C, and still doesn't free up the termination condition at point C to gain a maximum of tonal warmth... I reiterate, the source of the problem is the contour or profile of the capo bar, not the grooves. Hardening the capo bar will only increase string fatigue. Imagine that poor wire bent mercilessly across a surface just as hard as itself and you can see that any deformation of the wire's surface will quickly cause it to break...

Ed McMorrow
Edmonds, Washington

Ed goes on to describe his method of reshaping a capo bar with a Dremel Moto-Tool and a tungsten carbide cutting bit, which may be published later as space and interest may warrant. Of a more pressing nature, meanwhile, is the consideration of the implications of what has been stated above.

My primary argument with McMorrow involves his statement that "it is not a lack of hardness. Rather it is the cross-sectional profile that is the problem". First of all, if the capo bar is not sufficiently hard, the strings will cut grooves into it. These grooves themselves change the profile of the capo bar, at least right where that particular string touches it, just as string cuts in a hammer lengthen the striking surface. If we grind the capo bar to a sharp point, which is my understanding of McMorrow's suggestion, such grooving will only be accelerated because of the small amount of contact surface. In fairness, we should point out that the sharp point in *Figure 9* is our interpretation of the sketch given us, which possibly was exaggerated by Ed for purposes of illustration. At least we hope so, because once that material has been ground away, it's gone.

We are compelled to agree with Ed that some capo bars are too rounded, and if it is possible for any portion of the speaking length to touch the capo we will get sizzling sounds that cannot be voiced out. We think a small radius, smoothly rounded and as hard as possible, such as is shown in *Figure 10*, is ideal. A radius of about 1/16 inch is a good compromise, we feel, between having enough material to support the string and having so much that it can slap the capo.

Manufacturers have wrestled with this problem for over a hundred years, trying to heat-treat the capo portion of the plate without weakening it, or alternately trying to add another material entirely. Some use a metal rod for a bearing surface, the rod being held in place merely by the pressure of the strings. It is our understanding that Yamaha uses such a system in all but its concert grand, which has a traditional heat-treated capo. Interestingly, Baldwin uses the traditional heat-treated capo in all but is seven- and nine-foot grands, which use hardened steel termination pieces instead. Steinway uses the traditional capo in all models.

I think all would concede that there are advantages both ways, which we will outline presently, but no maker grinds the capo to a sharp point as McMorrow advocates, and for this reason alone we would reject that method. We trust that it is clear to all that by publishing this idea we are not advocating it. We feel that there are certainly pianos with the sizzling problem that could benefit from a judicious reshaping of the capo bar, and that simply removing the grooves by shoeshining with emery cloth may not do the job, but we do not suggest grinding off all the radius.

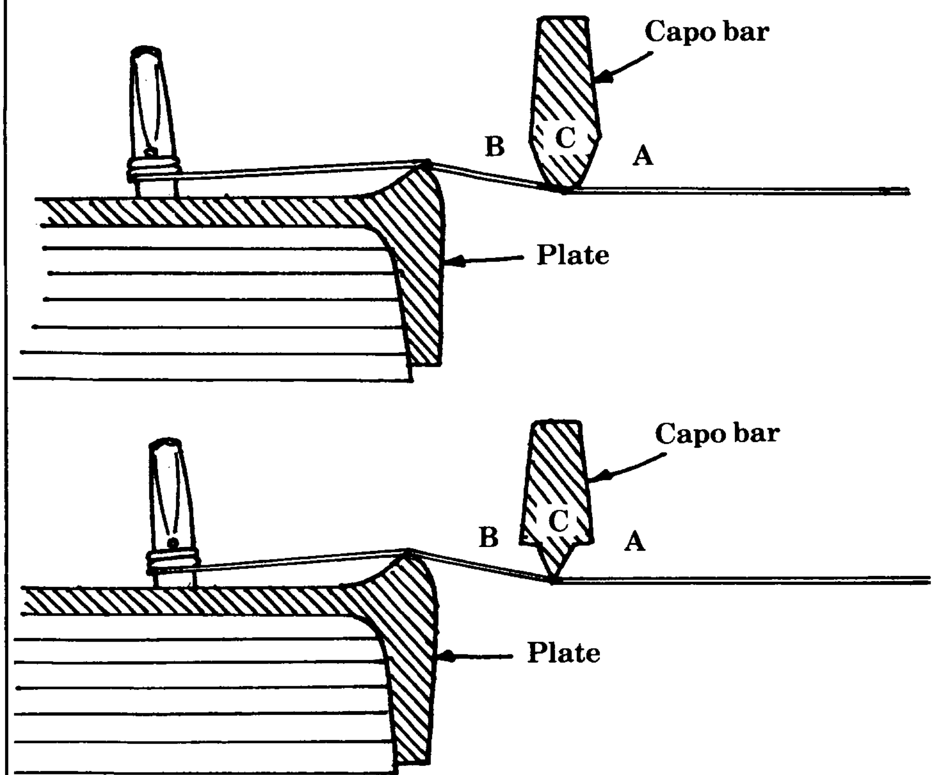


Figure 9

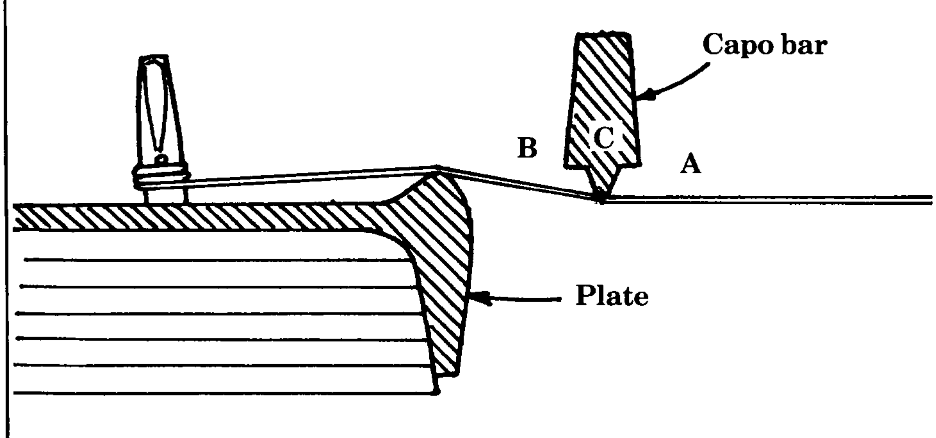


Figure 10

Makers that use a cast-in capo bar must heat-treat that part, otherwise the strings will quickly cut into it. This is especially true of performance pianos which are tuned a lot, because each time the string slides on the bar it is trying to cut into it. Sometimes the heat treatment is more effective, other times less so for some reason, and the unlucky combination of a soft capo in a demanding situation can lead to real problems in this regard. Radical reshaping and hardening can be the only answer, but should be approached with caution and in the knowledge that the draft, or front-side bearing, is being reduced whenever material is removed from the bar. Not incidentally, this also alters the string height in those sections, leading to questions about action geometry, hammer overcentering, and so on.

The biggest advantage of using an insert of some kind is that, no matter what may happen to the bearing surface later, it can always be renewed and it is possible to use a really hard material which will be more resistant to grooving and thus provide a cleaner termination. The biggest problem with an insert is that, unless it is really massive and solidly bolted to the plate, it can absorb string energy and even make noise on its own. It should also be mentioned that hard inserts are not sacrificial, so the strings will show some wear after a few years in a performance situation. If such a piano is tuned every week or so, as it would be in a recording studio or busy concert hall, the top two sections may have to be restrung every ten years or so. If that seems like excessive maintenance, remember that the trade-off is reshaping of the capo bar in similar circumstances with the traditional type of construction.

Another approach which has been tried is to use agraffes all the way to note 88. This worked all right so long as one subscribed to the Broadwood theory of strike point location (1/9 of the speaking length). Modern makers have found that the best strike point is usually heard at 1/8 of the speaking length in the bass, tapering to 1/16 of the length at note 88. Agraffes severely limit this adjustment, because the hammers tend to hit the plate instead of the strings when the action is pulled out far enough to approach the strike point, so from that standpoint the capo bar is infinitely superior.

Finally, we must argue with McMorrow's contention that a gently rounded, relatively hard capo surface causes string breakage, because in our experience it just isn't true. Reader comments are invited.

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TAKING THE MYSTERY OUT OF TUNING

Tuning Temperaments And Inharmonicity

Virgil E. Smith, RTT
Chicago Chapter

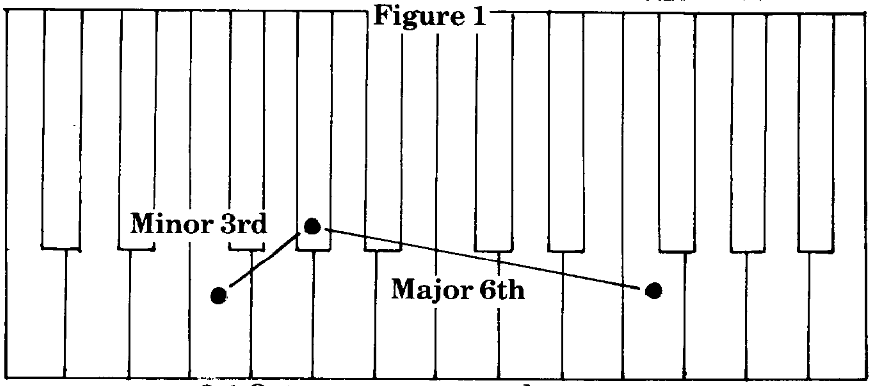
Probably the two most important factors to influence our tuning procedure in recent years have been inharmonicity and the tuning checks. This has been true for some time in aural tuning, but the same can now be said for electronic tuning. The more sophisticated electronic tuning aids are able to measure and adjust inharmonicity, and in the most recent classes in electronic tuning instructors are urging their students to check their tuning aurally.

While considerable research has been done in both of these areas, and both factors play an important part in the tuning process today, there seems to be a general lack of clear understanding regarding the relationship of these two factors to each other.

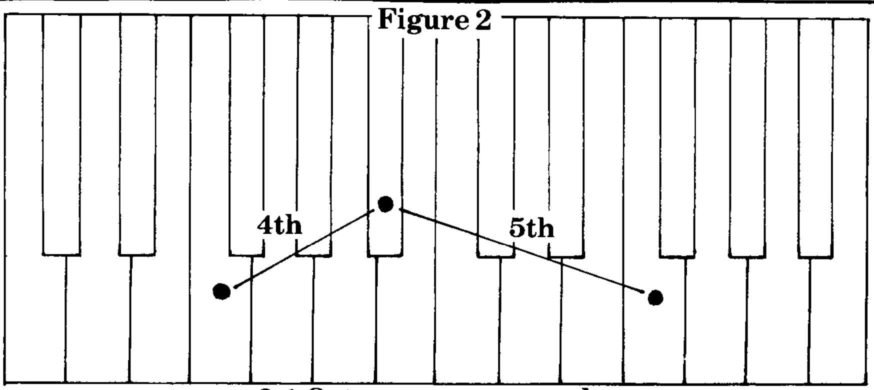
Actually these two principles are incompatible. They contradict each other, and it is impossible to tune a piano carrying out both principles to their logical conclusion. If one tunes so that all the tuning checks work out, there will be no stretch in the octaves to accommodate inharmonicity, and if one tunes stretching the octaves to conform to the inharmonicity, the tuning checks as listed in the textbooks will not work out.

> "How should the tuner deal with this dilemma? Should he tune stretching the octaves in accordance with inharmonicity and ignore the tuning checks, or should he tune so that the tuning checks work out and ignore the inharmonicity?"

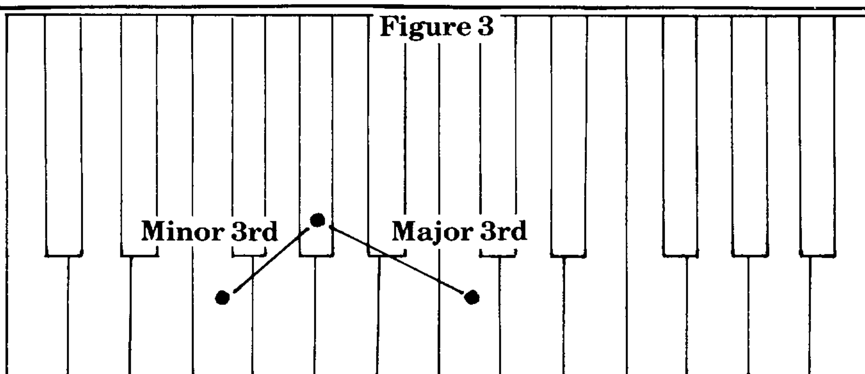
How should the tuner deal with this dilemma? Should he tune stretching the octaves in accordance with inharmonicity and ignore the tuning checks, or should he tune so that the tuning checks work out and ignore the inharmonicity? Neither option is acceptable, and fortunately, neither option is necessary. It is possible to modify the tuning checks in such a way as to allow for inharmonicity. Since the amount of inharmonicity differs from piano to piano it naturally follows that the amount of accommoda-



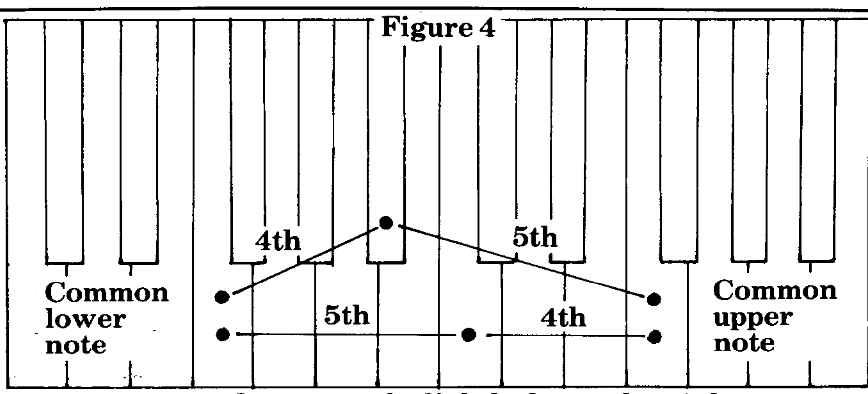
2:1 Octave—same speed
Expanded octave—minor 3rd slower



2:1 Octave—same speed
Expanded octave—4th faster



2:1 Octave—minor 3rd one beat faster
Expanded octave—less than one beat difference



2:1 Octave—4th slightly faster than 5th
Expanded octave—4th faster, 5th slower

tion will differ accordingly, but once the principles of accommodation are understood, the tuning checks can be of great help to both the aural and electronic tuner. Rather than contradict inharmonicity they actually support it, even ensuring that each tuning step is adjusted to accommodate the inharmonicity of that particular instrument. Once the confusion is eliminated in this area, it should be possible for both aural and electronic tuners to use the same checks and to end up with comparable tunings.

Tuning checks have three valuable functions in the tuning process: first, to indicate whether the pitch is sharp or flat and by how much before tuning; second, to confirm that the pitch is correctly tuned; and third, to reveal any slippage of the note that might occur during the rest of the tuning. Tuning checks as listed in most textbooks do not satisfactorily fulfill any of these functions because they are based on a mathematically exact 1:2 octave that does not allow for inharmonicity. For example: if the minor third F3-A♭3 beats the same speed as its inverted major sixth, A♭3-F4, the F3-F4 octave is an exact 1:2 octave with no stretch, an incorrect octave even though the check indicates that it is correctly tuned. A correctly stretched octave will result in a different reading in the accompanying minor third major sixth check.

All frequency tables, all tables of beats between intervals and all tuning checks are computed on the basis of a mathematically exact 1:2 octave in which the upper note of the octave beats exactly twice as fast as the lower note of the octave, and are only valid when that kind of octave exists. Since exact 2:1 octaves are not acceptable because of inharmonicity it naturally follows that the frequency tables and checks in their textbook form do not apply to piano tuning. In fact, the one absolute in this discussion is that when a tuning check matches the textbook pattern exactly, it can be certain that the tuning situation it is measuring is incorrect.

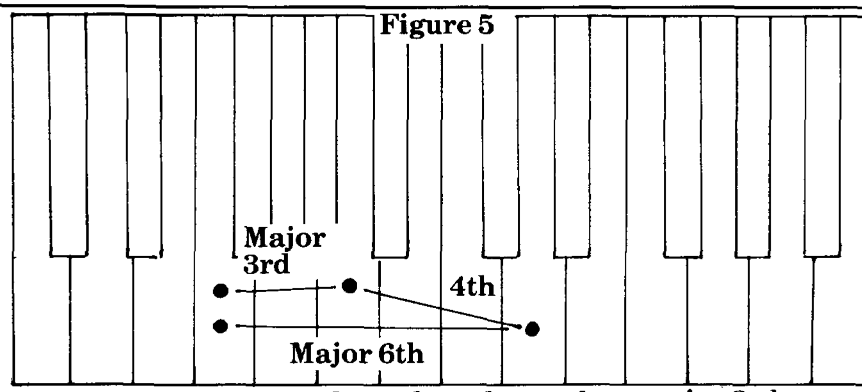
In order for these checks to be meaningful in piano tuning it must be determined how they read when the octave is correctly stretched according to the inharmonicity. Obviously, the results will differ from piano to piano because the amount of inharmonicity differs from piano to piano. In spite of this variable it is possible to establish guide lines for altering or modifying these checks so they are extremely accurate and most helpful in each tuning step.

Whenever an octave is stretched, every interval within that octave also will be stretched, which will alter the beat-speed of that interval accordingly. All expanded intervals, the major third, major sixth, 10th, 17th, and perfect fourth, will beat faster, but the contracted intervals, minor third and perfect fifth, will beat slower because expanding them is really making them less narrow. These alterations must be reckoned with when establishing the beat-speed of these intervals or when using these intervals as checks.

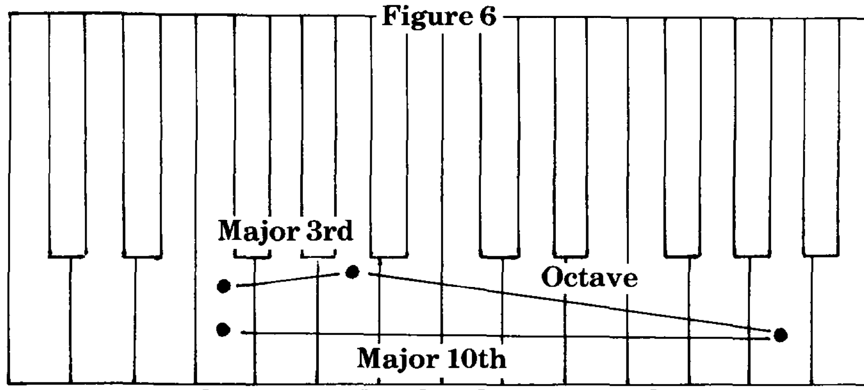
The beat-speed difference is most significant in checks that compare expanded intervals with contracted intervals such as the minor third major sixth octave check. (*Fig. 1*) In an exact 1:2 octave, the minor third will beat the same speed as the major sixth, but as the octave is expanded, the minor third will beat slower and the major sixth faster. Therefore the octave is not correct when the minor third and major sixth beat the same speed, but the octave is correct only when the major sixth is faster than the minor third. Just how much faster depends on the amount of inharmonicity. The check is still valid, it simply must be read differently. If the minor third and major sixth beat the same speed, the octave is not expanded enough. Too much difference can be detected by other checks or a beat in the octave.

My friend Fred Tremper and I proved this on a calculator the other evening during a phone conversation. First we determined the frequency of F3, then the frequency of F4 exactly twice as fast. We then determined the frequency of A♭3, and from that the beat-speed of F-A♭ minor third and A♭-F major sixth, which were the same speed. We then recalculated the frequency of F4 raised just one cent higher. By expanding the octave by just one cent the A♭ sixth beat one-third beat faster than the F minor third.

Another octave check affected by inharmonicity is the lower fourth and upper fifth within the octave.



2:1 Octave—major 6th one beat faster than major 3rd
Expanded octave—6th more than one beat faster than 3rd



2:1 Octave—3rd and 10th same pseed
Expanded octave—10th faster than 3rd

(*Fig. 2*) The fourth F3-B♭3 will beat the same speed as the fifth B♭3-F4 if the octave were an exact 1:2 octave, but the expanded octave will speed up the fourth and slow down the fifth. Therefore, the octave is not correct when the fourth and fifth beat the same, it is only correct when the fourth beats faster than the fifth.

The lower minor third compared with the upper major third for checking the fifth (*Fig. 3*) also involves comparing an expanded interval with a contracted interval. The minor third F-A♭ and the major third A♭-C are compared to evaluate the F-C fifth. Most beat tables list the F3-C4 fifth as beating three beats in five seconds, in some cases almost, but not quite, a pure beatless fifth. Therefore, the F minor third and the A♭ major third will beat closer to the same speed, but never quite the same speed as that would indicate a pure beatless fifth. This check cannot tell the tuner at what point between zero beats and three beats in five seconds is the correct speed for the fifth, but it can with other checks be of great help in determining the best position for the fifth.

One of the most significant interval relationships affected by the stretched octave is the relationship between the fourth and fifth with either a common lower note or a common upper note. (*Fig. 4*) The amount of octave stretch will determine the difference in speed between the fourth and fifth, and the difference in speed between the fourth and fifth will determine the amount of octave stretch. According to the beat tables the fourth will be slightly faster than the fifth in an exact 1:2 octave. Therefore, the difference should be greater according to the amount of octave stretch, but if they beat the same speed the octave is actually diminished. I recently refused to okay a temperament in a super-tuning because the fourths and fifths were the same speed, even though the progression of thirds was excellent. Consistent stretch in the octave above the temperament is achieved by comparing the fourth with the fifth when the common upper note is the top note of the octave being tuned.

In tuning octaves below the temperament the fourth is compared with the fifth when the common lower note is the bottom note of the octave being tuned. The reliability of these checks is dependent on a completely accurate temperament.

Even though the third sixth test used to evaluate the fourth formed by the top notes of the two intervals (*Fig. 5*) involves only expanded intervals, the check is still significantly affected by the stretch resulting from inharmonicity. The faster-beating fourth will cause the sixth to beat more than one beat faster than the third. The primary function of this check is to tell whether the fourth is expanded or contracted. The fourth is expanded when the sixth beats faster than the third, and the amount of expansion is indicated by the difference in beat speed between the third and sixth. The only difference in this check in its original form is that the difference should be more than indicated in the beat tables to allow for inharmonicity. How much more can be determined by other checks.

The most common octave checks are the third-10th and the 10th-17th checks. They are so helpful because they are not dependent on a perfect temperament for their validity. True, a perfect temperament is necessary for even progression of 10ths and 17ths, but not for the single octave check. Whenever the third beats the same speed as the 10th or the 10th beats the same as the 17th the result can only be a mathematically exact 1:2 octave with absolutely no stretch. No matter how slight the stretch the result will be a 10th beating faster than the third or a 17th beating faster than the third or a 17th beating faster than the 10th. Whatever combination of fundamentals and partials is used to achieve the stretched octave the tuning checks will reflect that stretch. Therefore, no octave is correctly tuned if the third and 10th or the 10th and 17th beat the same speed, and it can only be correct if the 10th beats faster than the third or the 17th beats faster than the 10th. Just how much faster the upper intervals of the checks beat depends on the amount of inharmonicity of the instrument being tuned. The difference may be slight but it is noticeable. (*Fig. 6*)

Any other tuning checks may be modified in a similar manner to make them reliable. Anyone can verify the above by checking out the mathematics on a calculator, then see the results in an actual tuning.

Next month we will attempt to show how the modified tuning checks can successfully be used to achieve more accurate tunings.

Failure Of Hammers To Check

**Christopher S. Robinson
Connecticut Chapter**

One problem in the regulation process of grand piano actions which appears to be occupying the discussions of professional piano technicians with increasing frequency is the question of the backchecking function. Technicians seem always to be asking each other why they are not able to get the hammers to catch in the backchecks of some grand pianos when all the other regulation relationships appear to be operating correctly. There happen to be some very good reasons for the described condition, and it will be the purpose of this article to address those reasons.

So that simplicity does not elude us, let's begin with a list of possible causes of the failure of hammers to check, along with the remedy or remedies for each one:

1. Insufficient aftertouch, or excessive aftertouch. If the jack does not properly clear the hammershank knuckle, or moves so far as to bind up the free depression of the repetition lever, backchecking may be impaired. Remedy: adjust aftertouch so that jack is positioned exactly halfway between the knuckle and the repetition window bumper cushion when the key is fully depressed and the action train has been cycled through letoff. (This adjustment is achieved with the capstan).

2. Repetition spring too strong. Remedy: regulate spring.

3. Tails not roughed. Remedy: roughen tails with checkering file.

4. Backchecks excessively worn or "glazed". Remedy: file checks with 100 grit abrasive, or recover.

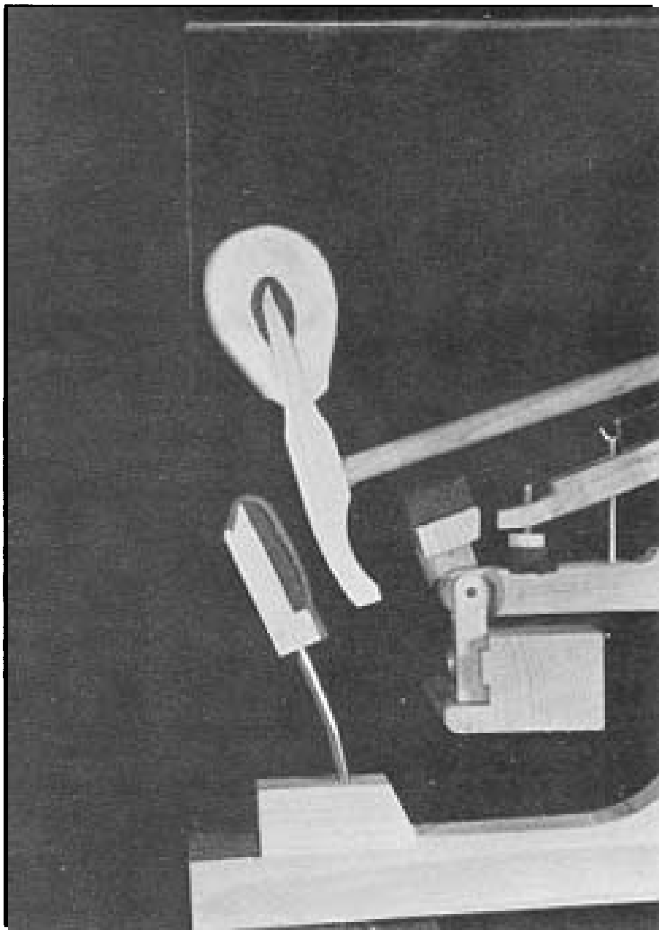
5. Improper angle of backcheck head. Remedy: the proper angle for grand piano backchecks is 85 degrees to the hammershank when the hammershank is in its rest position. Since this may be the first time you ever heard this, please take a look at *Picture 2.* While you can see that the hammer molding forms what is very close to a 90-degree angle with the hammershank, *the backcheck is clearly positioned at an angle which is 5 degrees more acute than the hammer molding.*

> "Technicians seem always to be asking each other why they are not able to get the hammers to catch in the backchecks of some grand pianos when all the other regulation relationships appear to be operating correctly."

6. Improper curvature of the hammer molding tail. Remedy: the correct curvature for piano hammer tails is a radius of no more than 4 1/2 inches nor less than 3 1/2 inches. The orientation of that curve will be such that the implied tangent of the radius is *perfectly parallel* to the backcheck when the key is fully depressed and the hammer is in its full aftertouch, but not checked position. Please look at *Picture 3* for an illustration of that stage in the operational cycle of the grand piano action. If your eye can follow the line implied by the hammertail, you will see that it is quite nicely matched with the line established by the backcheck itself.

7. Backchecks too low. Remedy: raise them to correct height.

8. Hammertails too short (or too long). Remedy: if the hammertails



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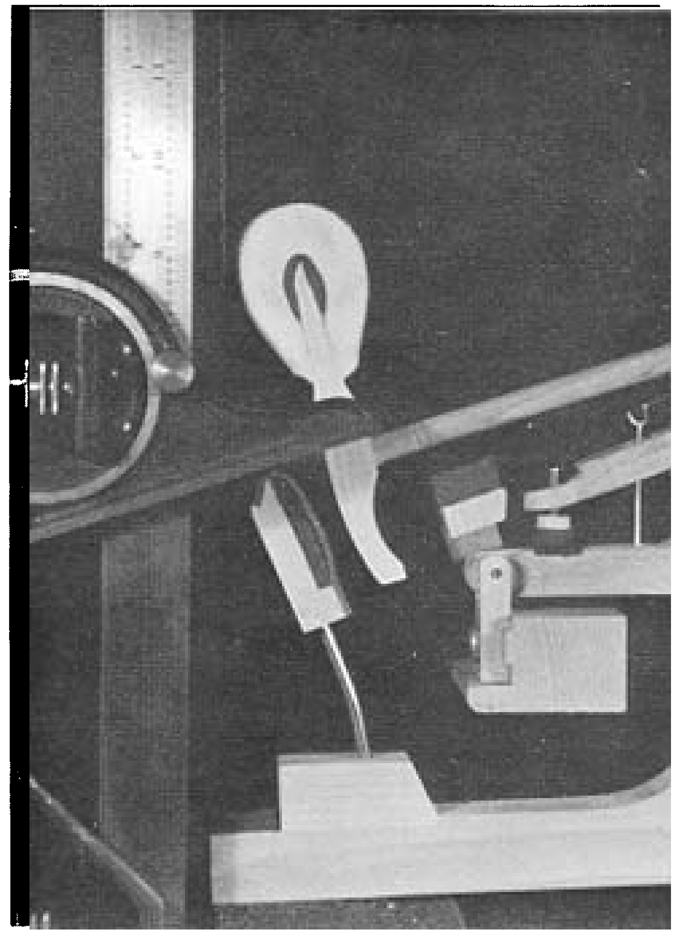

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are too short, replace the set of hammers. If they are too long, simply cut or grind (sand) them to proper length.

It would be helpful here to expand a little on the answers to items 7 and 8. A great deal is mentioned in technical classes and written articles about the technique of drilling (boring) hammers and establishing correct bore length (the distance from the hammershank hole—center—to the apex, crown or striking point of the hammer), but this writer cannot recall anything which has laid equally important emphasis on correct *tail bore length.* To be fair to piano hammer manufacturers, they have always used a system which includes a specification of *hammer overall length.* Obviously, if both the bore length and overall length of the hammer is specified, what is left over will be the distance from the hammershank hole—center—to the bottom edge of the tail. *This is the tail bore length!* This specification is crucial for the ability to properly regulate the backchecking function in the grand piano action.

"All right," the reader will ask, "how do I go about determining what length to make the tails when I am ordering or drilling my own hammers?"

The easy way out would be to use a tail bore or hammer tail length of no less than 7/8 inch, nor more than 1 1/8 inch, with a usual average hammer tail bore of 1 inch. If this is not sufficient for the more critical technician, he or she might follow another procedure. Please keep in mind here that we are dealing with a virtual Rubik's Cube of interlocking trigonometric functions, so that *the assumptions we are making are carved in quicksand, not in granite!!!*

"Please keep in mind here that we are dealing with a virtual Rubik's Cube of interlocking trigonometric functions, so that the assumptions we are making are carved in quicksand, not in granite!"

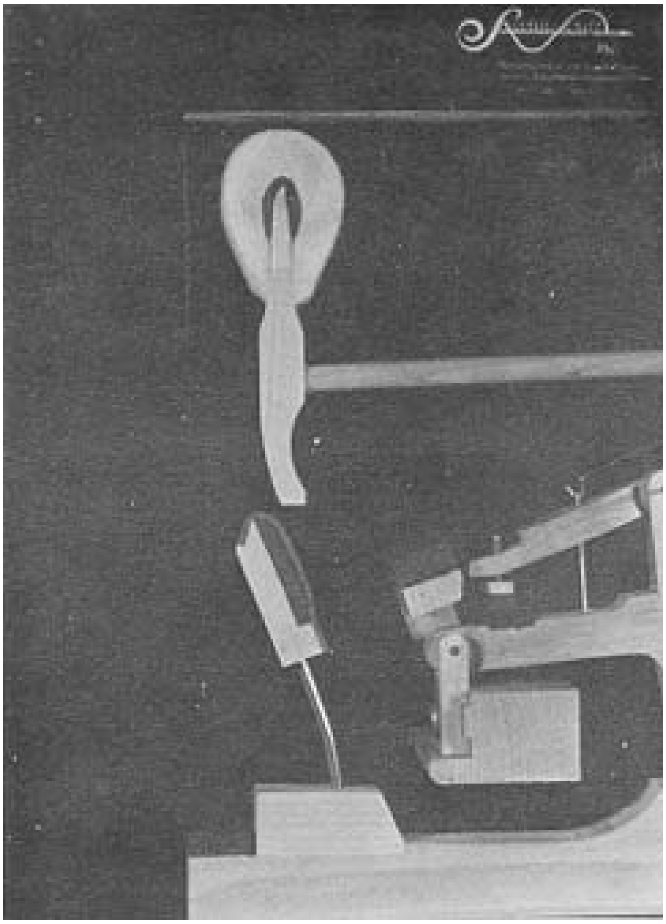
Assumption #1: The piano is in perfect regulation with proper touch (key dip), and aftertouch.

Assumption #2: The head bore (hammer bore distance) is correct.

Assumption #3: The action "spread" (internal geometry) is correct.

Look at *Picture 1*: the hammer is at rest, the key is fully released; and all action relationships are correct. In *picture 2*, you will see a bevel protractor which *shows clearly that the plane established by the top of the hammer shank is directly in line with, and in contact with, the top of the backcheck.* Remember problem number 7 above? This is how to establish proper backcheck height. If you need to raise them, please refer to the *Journal*, Volume 27, Number 9, September 1984, page 19, figure 9.

In *Picture 3*, the hammer is in its full aftertouch position, with the key



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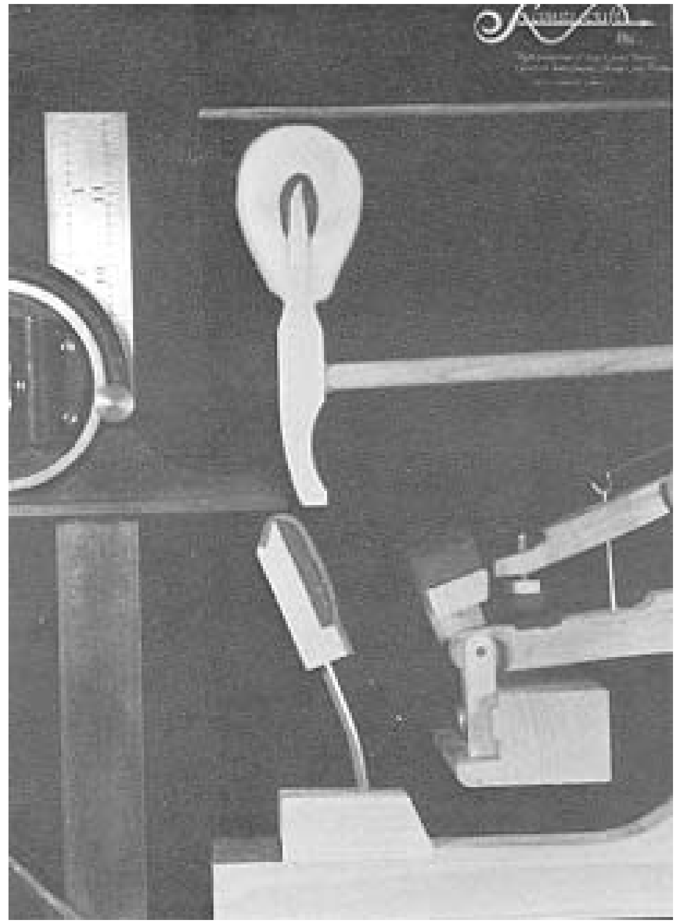

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fully depressed. The hammer is resting just below the string in its so-called "drop" position, but it is not caught by the backcheck. Look at *Picture 4*: as the bevel protractor clearly indicates, the bottom of the hammer tail is on level and in a direct horizontal plane with the top of the backcheck! The tail bore, or length of the hammer tail from the center of the hammershank hole to the bottom of the hammer tail is the distance from the center of the hammershank to the top of the backcheck when the piano action key is fully depressed with the action train in full aftertouch position.

One continuing caution: please start with the simplest remedy first! Please do not get into major alterations if the basic steps have not been thoroughly tried and abandoned. Also, if you find that one of the earlier steps corrects the condition, do not concern yourself with a measurement infraction which is not actually producing a mechanical malfunction. Caution is the better part of valor!

Transition To Equal Temperament: Final Stage

Jack Greenfield
Chicago Chapter

Early 19th-Century Instruments And Tuning

It appears certain now that the competition between equal and unequal temperaments continued on into the 19th century with equal temperament finally emerging as the prevailing system of keyboard tuning around the middle of the century.

The debates among those active in music must have been as heated as in politics, judging from the historical accounts. During the early decades, influential musicians had views on both sides of the controversy. Complications were added by disagreement over the merits of the English grand action introduced by Broadwood, compared with the Viennese action developed by Stein. By mid-century this, too, was settled by the appearance of the superior Erard-Herz grand action accepted by most of the industry.

Harpsichord manufacture ended soon after 1800. The latest existing harpsichord by Kirckman, then Europe's leading builder is dated 1800. After this, there remained a few shops that restored instruments and occasionally built new ones in Paris. The last of the plucked string instruments from Italy were some virginals built in the 19th century.

It is surprising that clavichords remained popular much longer, almost to the middle of the 19th century. This is noted in a recent paper by Bernard Brauchli "The Clavichord in Christian Friedrich Gottlieb Thon's Keyboard Manual" (*Journal of The American Musical Instrument Society*, Volume IX, 1983, page 68). Thon's 142-page manual *Ueber Klavierinstrumente* was published in 1817. A second edition was printed in 1825 and a final revised edition in 1843. New material in the last edition gave service instructions for fortepianos. Brauchli lists 18 builders as other evidence of the continued use of clavichords through the first half of the century.

"The latest existing harpsichord by Kirckman, then Europe's leading builder is dated 1800. After this, there remained a few shops that restored instruments and occasionally built new ones in Paris. The last of the plucked string instruments from Italy were some virginals built in the 19th century."

The chapter on tuning in Thon's manual provides information on practices of the time. Thon stated that the most-used systems for keyboards were temperaments of Kirnberger and Marpurg. Since Kirnberger's was set with the aid of a monochord, Thon preferred Marpurg's, which needed no tuning aid. However, he recommended that inexperienced tuners would find it easier to tune in a cycle of equal tempered fifths starting with either F or C. His instructions were to tune beatless fifths first and then reduce them slightly, proceeding by trial and error until the intonation was judged satisfactory.

In another chapter on maintenance of the instrument, Thon refers to the use of several different pitches in musical performance but advises that it is best for clavichords to be kept consistently on the same pitch. In instructions for replacing broken strings, Thon gives directions for making hitch pin loops and for winding the other end of the string on the tuning pin with 16 to 18 coils for treble strings and 10 to 12 coils for bass strings. The tuning pins had no holes and the coils were wound over the end of the string bent down parallel along the side of the pin.

Early Piano Concerts

Although uncritical listeners might have found the tuning of the early pianos in the home by music teachers, musicians or the owner of the instrument acceptable, the growing interest in the piano as a solo instrument for concert performance created a need for skilled tuning technicians. The first pianoforte solo ever played at a concert in England was a performance on a Zumpe square piano by Johann Christian Bach on June 2, 1768. Three months later, September 8, 1768, a keyboard player known as Mademoiselle Lechantre, previously an organist, played the first piano solo in France at a concert in Paris.

Other pianists followed and audiences continued to grow. By the 1780's public concerts featuring piano solos were a popular form of entertainment in London, Paris, and Vienna. The French Revolution, which began in 1789, diverted the touring German and Italian concert artists from Paris to London and during the decade 1790-1800, an enormous number of concerts took place in England. Napoleon's assumption of power in 1799 quieted the social unrest in France and the musical activities of Paris soon returned to the high pace of the past.

At first pianists played only their own compositions. In addition to written music, the program included a section in which the pianist improvised. Beethoven was said at times to have performed his improvisations better than his published pieces. After 1800, pianists began to play music composed by others. Some composers relatively unknown today, such as Hummel, Herz, Kalkbrenner and Moscheles were popular contemporary concert pianists. Interest in the masters, Beethoven, Mozart and Haydn came later. Few performances of Bach's music were given on the piano in the early decades of the 19th century.

Beginning with the early concerts, it was customary to present programs which included the featured pianist and another instrumental soloist or vocalist supported by an orchestra, sometimes with as few as four musicians. The first solo performance of a complete program by a pianist alone was a concert by Franz Liszt in Rome in 1839.

Hummel Urges Adoption Of Equal Temperament

Although the Hungarian pianist Johann Nepomuk Hummel (1778-1837) is not highly rated as a composer today, he exerted considerable influence on piano technique and performance through his instruction books which were taken as gospel until the middle of the century. Hummel started his career as a child prodigy. After two years of study with Mozart, when Hummel reached the age of nine, he gave concerts on a tour of northern Europe. He then settled in London for at least a year where he studied with Clementi and Haydn. Next, he returned to Vienna and studied theory with some of the most prominent instructors in the subject. In 1804, he was appointed musical director for the Esterhazy family, a post previously held by Haydn. He left occasionally for short, highly successful concert tours but finally settled down to conducting and teaching. From 1811 on, he followed a career as music director in positions in Vienna, Stuttgart, and Weimar.

The instruction book on piano playing Hummel published in Germany in 1828 is valued more now than his piano music. The 1829 English translation had the title, *A Complete Theoretical and Practical Course of Instruction in Playing the Piano Forte.* In this book he discussed the problems of tuning contemporary pianos. In order to withstand the heavier pounding of pianists following the style of Beethoven, some manufacturers in the 1820s had begun to build instruments reinforced by metal parts and with trichords of heavier strings instead of the bichords of thinner strings in the older instruments. Hummel believed the additional burden the new piano designs placed on piano tuners, especially novices, justified abandoning unequal temperaments and adopting equal temperament as the uniform standard practice.

Influence Of Broadwood And Hipkins On Tuning

An account of the influence of the firm of John Broadwood and Sons and Alfred James Hipkins (1826-1903) in bringing about the final acceptance of equal tempermant as standard in the 1840's is given by Alexander J. Ellis in the appendix of the 1885 English translation of Helmholtz's *On The Sensations of Tone.* In the 1840's, Broadwood, the world leader, had an annual output of about 2300 instruments. Collard, the next largest in England manufactured about 1500 per year. French production was about one-third of England's. Vienna's largest piano maker had an output of only 200 but there were over 100 shops in this city.

According to Ellis, James Broadwood, oldest son of the founder and head of the firm from 1812-1834, had written a magazine article in favor of equal temperament in 1811. The older Broadwood tuners that Ellis questioned who had some knowledge of earlier practices reported that in spite of James Broadwood's articles his tuners still continued to use a modified meantone temperament with G# at the end of the tuning cycle raised to reduce the dissonance of the final "wolf" interval in the regular meantone temperament. This is a temperament Mersenne discussed in the 1630's. Regardless of the accuracy of the reports on earlier Broadwood tuning, the most significant point is that equal temperament became the standard trade practice on its establishment at Broadwoods in 1846 under the supervision of Alfred James Hipkins.

Hipkins was one of the most extraordinary piano tuners in the history of the industry. Like other members of his family, he showed a talent for art when young. His father did not want him to become an artist, however. Instead, at the age of 14, Hipkins began training as an apprentice in the Broadwood factory. He also took up the study of piano playing and by 1844 was competent enough to qualify as an assistant organist in a London church.

Hipkins remained with Broadwood for 58 years, achieving internationally renowned status as an authority on tuning, pitch and the history of musical instruments. He was involved in considerable research on the acoustics of struck strings, collaborating with Alexander Ellis in some work. Ellis was a mathematician interested in the scientific aspects of music. The appendix in the English translation of Helmholtz's book contains a summary of Ellis' writings on scales, pitch and temperament.

Hipkins' skill as a tuner was evident early in his career. He was only 22 years old in 1846 when Broadwood followed his recommendations to standardize on equal temperament. Hipkins was chosen to tune for the Chopin concerts in London in 1848. Hipkins was also responsible for pursuading the principal English piano builders to adopt a uniform pitch. Pitch had been creeping up and around the middle of the century pianos were being tuned with A = 445 to 455 Hz. The high pitch appears to have been favored by the Philharmonic Society of London. The lower pitch adopted later in the century, A = 435 Hz, was known as French *diapason normal.*

Except for the tuning of organs, where older temperaments lingered, a complete changeover to equal temperament in musical activities took place rapidly. After centuries of prominence as a topic of music theory, the study of temperaments began to diminish and many segments in the history of the development of temperaments were forgotten. Helmholtz's *On the Sensations of Tone*, an important reference on acoustics and music theory since its first edition in 1862, devotes little attention to the irregular temperaments although presenting a thorough discussion of Greek scales, church modes and exotic tuning of the Near East. Helmholtz believed that while tempering of intervals detracted from musical quality, equal temperament was the most practical compromise for a 12-note octave to cope with the problems of intonation.

He thought it better to develop musical instruments with more pitch divisions per octave to permit just or pure intonation. He objected to the irregular temperaments of Rameau and Marpurg (page 321, third edition) because he believed a variety of different-sized thirds and other intervals would be disturbing to the listener. Helmholtz came to the conclusion modern scholars believe erroneous, that Johann Sebastian Bach used equal temperament for the clavier. This was based on two points: Marpurg's report of Kirnberg's assertion that Bach instructed him to tune all major thirds sharp—Helmholtz assumed this to be equally sharp—and the recommendation of C.P.E. Bach in his 1753 instruction book for the clavier that the instrument always be tuned in equal temperament. In the appendix to later English editions, Ellis mentioned contemporary differences of opinion on whether J.S. Bach used equal temperament. In addition Ellis gave information on meantone temperament but ignored the irregular temperaments that came into use between meantone and equal temperament. Hipkins, Albert Schweitzer, and others who wrote on his music until recently, also believed J.S. Bach tuned in equal temperament.

In Ellis' research, he used the tonometer—a series of very accurate tuning forks graduated in fractions of a semitone for pitch measurements. He found that even Broadwood's best tuners made occasional errors of as much as four or five cents in setting the temperament. To help them achieve better accuracy, he gave figures for beat rates of the fourths and fifths in the F3F4 octave and a procedure for timing the beat rates with a small pendulum, a procedure he originated.

ON PITCH

Ninth In A Series Of Articles Dealing With The Integration And Equation of Aural And Electronic Tuning Techniques

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Utah Valley Chapter

In June, our discussion presented cent width and beats per second charts for seven C to C octaves tuned on a nine-foot concert grand piano. The beats per second charts were analyzed to see which partial matching (2:1, 4:2, etc.) minimized beating in neighboring pairs of partials with the greatest amplitudes as discussed the previous month, to eliminate from our consideration any beats which were insignificant due to lack of amplitude. In general, it was shown that by matching one of the pairs with large amplitude, beating could also be minimized in the other pairs with large amplitudes. In some cases, tuning between two matchings (4:2 and 2:1 in the treble, for instance) produced the best results.

All of this supports the idea that there are two primary reasons different types of octaves are tuned in particular areas of the piano. First, different partials are louder than others in different areas of the piano, and second, varying the level of partial matching causes varying degrees of out-of-tuneness (beating) in neighboring pairs of partials. As mentioned, the job of the piano technician is to tune so as to eliminate beating in the loudest pair or pairs of partials, and at the same time minimize beating in the neighboring pairs, thus allowing the piano to sound as good as possible.

This month we will discuss executing compromises between types of octaves and double octaves. As mentioned previously, compromises between types of octaves occur in areas of transition between types of octaves, and/or satisfy the demands of the double octave as well as the single octaves.

Several of the early articles of this series presented interval tests and electronic setting instructions for several types of octaves and double octaves. The interval tests were equal beating tests, and it was noted that when the test intervals beat equally, a pure octave of a type corresponding to the test intervals was tuned.

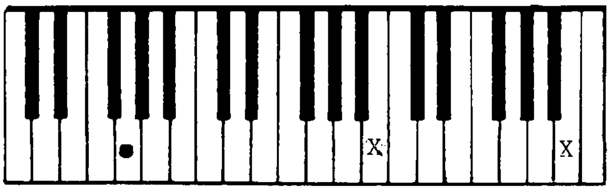
> "...the job of the piano technician is to tune so as to eliminate beating in the loudest pair(s) of partials, and at the same time minimize beating in the neighboring pairs, thus allowing the piano to sound as good as possible."

Knowing the interval tests for the different types of octaves and how to manipulate them to tune pure octaves at a given level prepares us to use the same tests to tune expanded (plus) or contracted (minus) octaves at the same level by simply making the test intervals unequal beating. Of course, this unequal beating cannot be random. It is necessary to know how to manipulate these tests to achieve the desired results.

Let us begin with the 2:1 octave. As mentioned previously, the 2:1 octave tests are the M10 - M17 and P5 - P12. If we want to tune a pure 2:1 octave we tune such that the M10 beats at the same speed as the M17, and the P5 beats at the same speed as the P12. Electronically, with the tuner set on the upper note of the octave, when the lower note is played and the display stopped, the upper note stops the display as well.

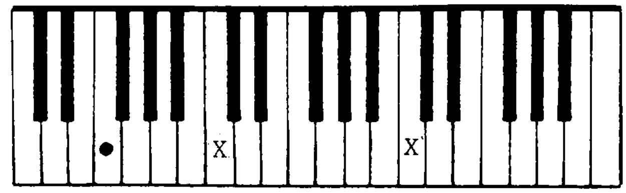
2:1 Octave (Treble)

M10 - M17



Test the octave by playing a M10 below the lower note and a M17 below the upper note. To tune a pure 2:1 octave, the M10 = M17. To tune this octave expanded (2:1+), the M10 < M17.

P5 - P12



Test the octave by playing a P5 below the lower note and a P12 below the upper note. To tune a pure 2:1 octave, the P5 = P12. To tune this octave expanded (2:1+), the P5 > P12.

2:1 Octave—Electronic Setting Instructions
On The Upper Note

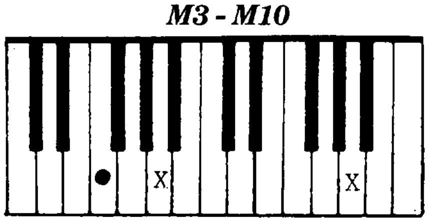
To tune a 2:1 octave pure, set the tuner to the note and octave settings corresponding to the upper note. Play the lower note, and stop the pattern. When the upper note is played, the pattern will stop as well. To tune the octave expanded (2:1+), the pattern will rotate "sharp" when the upper note is played.

If we want to tune an expanded 2:1 octave (2:1+), which is the case through most of the treble, we tune the octave such that the M10 beats slower than the M17, and the P5 beats faster than the P12. How much faster or slower is a whole other subject which cannot be treated fully at this time. Electronically, with the tuning device set on the upper note of the octave, when the lower note is played, the display rotates "sharp." Since the 2:1 octave is never tuned narrow or contracted, there is no practical reason to cover manipulating the tests to accomplish this.

The interval tests for the 4:2 octave are the M3 - M10 and P4 -P5. To tune a pure 4:2 octave, tune such that the M3 beats at the same speed as the M10, and the P4 beats at the same speed as the P5. Electronically, with the tuner set an octave above the upper note of the octave, when the reference octave note is played and the display stopped, the other octave note stops the display as well.

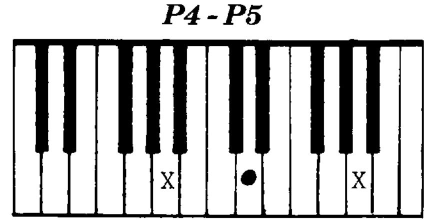
4:2 Octave (Midrange)

M3 - M10



Test the octave by playing a M3 below the lower note and a M10 below the upper note. To tune a pure 4:2 octave, the M3 = M10. To tune this octave contracted (4:2-), the M3 > M10. To tune this octave expanded (4:2+), the M3 < M10.

P4 - P5



Test the octave by playing a P4 above the lower note and a P5 below the upper note. To tune a pure 4:2 octave, the P4 = P5. To tune this octave contracted (4:2-), the P4 < P5. To tune this octave expanded (4:2+), the P4 > P5.

4:2 Octave—Electronic Setting Instructions
Octave Above The Upper Note

To tune the 4:2 octave pure, set the tuner an octave above the upper note. Play the reference note and stop the pattern. When the other octave note is played, the pattern will stop as well. To tune the octave contracted (4:2-), when the lower note is the reference and stops the pattern, the pattern rotates "flat" when the upper note is played. When the upper note is the reference and stops the pattern, the pattern rotates "sharp" when the lower note is played.

To tune the octave expanded (4:2+), when the lower note is the reference and stops the pattern, the pattern rotates "sharp" when the upper note is played. When the upper note is the reference and stops the pattern, the pattern rotates "flat" when the lower note is played.

To tune a contracted 4:2 octave (4:2-), tune such that the M3 beats *faster* than the M10 and the P4 beats *slower* than the P5. Electronically, with the tuner set an octave above the upper octave note, when the lower note is the reference and stops the display, the display rotates "flat" when the upper note is played. When the upper note is the reference and stops the display, the display rotates "sharp" when the lower note is played.

To tune an expanded 4:2 octave (4:2+), tune such that the M3 beats *slower* than the M10, and the P4 beats *faster* than the P5. Electronically, with the tuner set an octave above the upper octave note, when the lower note is the reference and stops the display, the display rotates "sharp" when the upper note is played. When the upper note is the reference note and stops the display, the display rotates "flat" when the lower note is played.

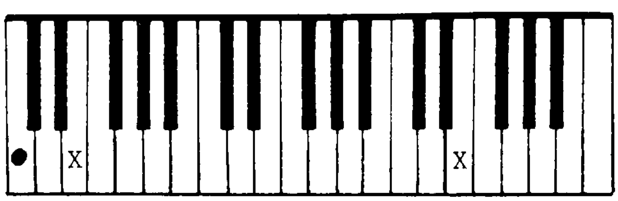
To tell if the octave is tuned somewhere between 4:2 and 2:1, the octave must be tuned such that the M3 > M10 and the P4 < P5 (4:2-). At the same time, the M10 < M17, and the P5 > P12 (2:1+). Since wide at 4:2 means wider at 2:1, it is important to test for both the 4:2 and 2:1 when trying to tune somewhere between the two. If only the 2:1 tests were used, the octave might wind up wide at 4:2 as well as 2:1. If only the 4:2 tests were used, the octave could wind up narrow at 2:1.

This is how transition between the 4:2 and 2:1 areas of the piano is executed. At some point, the ear detects that when the octave is tuned 4:2, too much beating occurs. The upper note is then flattened slightly, and a narrow 4:2 (wide 2:1) octave is tuned. After a few notes, the point is reached where the 2:1 octave sounds best.

When tuning the treble, it is important to consider the double octave as well as the single octaves which make up the double octave. The tests for the 4:1 double octave are the M3 - M17 and the P4 - P12. To tune a pure 4:1 double octave, tune such that the M3 beats at the same speed as the M17, and the P4 beats at the same speed as the P12. Electronically, with the tuner set on the upper double octave note, when the lower double octave note is played and the display stopped, the display stops when the upper note is played as well.

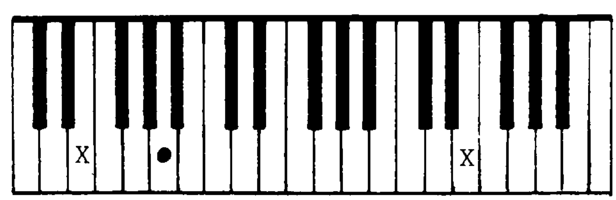
4:1 Double Octave (Midrange, Treble)

M3 - M17



Test the double octave by playing a M3 below the lower note and a M17 below the upper note. To tune a pure 4:1 double octave, the M3 = M17. To tune this double octave contracted (4:1-), the M3 > M17. To tune this double octave expanded (4:1+), the M3 < M17.

P4 - P12



Test the double octave by playing a P4 above the lower note and a P12 below the upper note. To tune a pure 4:1 double octave, the P4 = P12. To tune this double octave contracted (4:1-), the P4 < P12. To tune this double octave expanded (4:1+), the P4 > P12.

4:1 Double Octave—Electronic Setting Instructions
On The Upper Note

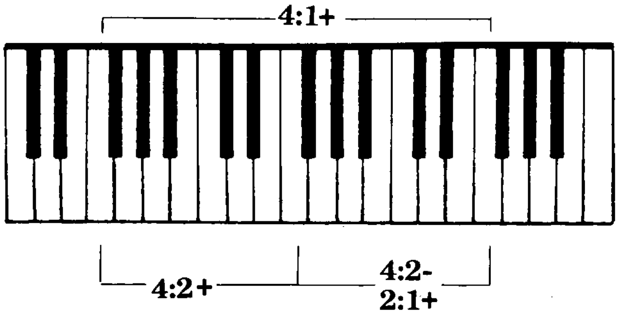
To tune a 4:1 double octave, set the tuner on the upper double octave note, play the lower note, and stop the pattern. If the double octave is pure, the pattern will stop when the upper note is played. If the double octave is contracted (4:1-), the pattern will rotate "flat" when the upper note is played. If the double octave is expanded (4:1+), the pattern will rotate "sharp" when the upper note is played.

If we want to tune the double octave narrow, which is to some degree necessary in a good percentage of pianos for the last half dozen or so notes, the M3 must beat *faster* than the M17, and the P4 must beat *slower* than the P12. Electronically, with the tuner set on the upper double octave note, the lower double octave note played, and the display stopped, when the upper note is played, the display rotates "flat".

To tune an expanded double octave, which is the case through the midrange of the piano, the M3 must beat *slower* than the M17 and the P4 must beat *faster* than the P12. Electronically, with the tuner again set on the upper note of the double octave, when the lower double octave note (assumed as reference) is played and the display stopped, the display rotates "sharp" when the upper note is played.

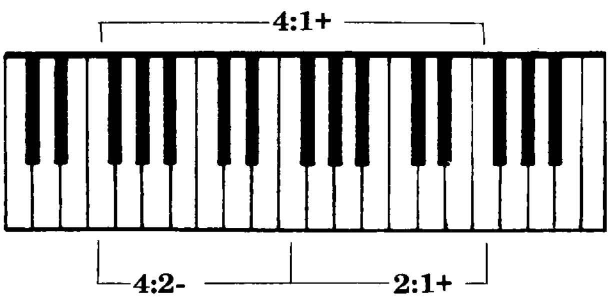
In the midrange and lower treble, the double octaves are generally on the wide side. As we move up the scale, stretching the single octaves as much as is comfortable, the double octave eventually becomes pure, and as we reach the top, the double octave must sometimes be narrow, having stretched the single octaves to their limits.

Midrange



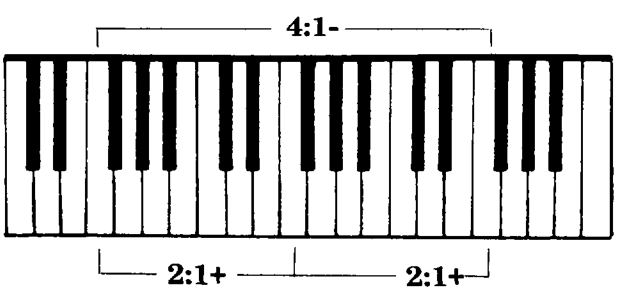
The above example illustrates a compromise between 4:2, 2:1, and 4:1 in the midrange of the piano. The lower octave is 4:2 to 4:2+, the upper octave is 2:1+ (4:2-) to 4:2, and the double octave is 4:1+.

Treble



The above example illustrates a compromise between 4:2, 2:1, and 4:1 in the treble of the piano. The lower octave is 4:2 to 4:2-, the upper octave is 2:1+, and the double octave is 4:1+ to 4:1.

High Treble



The above example illustrates a compromise between 2:1 and 4:1 in the high treble of the piano. The lower octave is 2:1+, the upper octave is 2:1+, and the double octave is 4:1 to 4:1-.

2:1	M10 = M17, P5 = P12
2:1+	M10 < M17, P5 > P12
4:2-	M3 > M10, P4 < P5
4:2	M3 = M10, P4 = P5
4:2+	M3 < M10, P4 > P5
4:1-	M3 > M17, P4 < P12
4:1	M3 = M17, P4 = P12
4:1+	M3 < M17, P4 > P12

In the midrange, compromises between 4:2, 2:1, and 4:1 might be as follows. M3 is less than or equal to M10 and P4 is greater than or equal to P5 (4:2 to 4:2+) for the lower octave. M10 < M17 and P5 > P12 (2:1+) and at the same time M3 is greater than or equal to M10 and P4 is less than or equal to P5 (4:2 to 4:2-) for the upper octave. M3 < M17 and P4 > P12 for the double octave. To accomplish this electronically, with the tuner set on the upper double octave note, when the lower double octave note is played, the display rotates "flat" or stops. When the middle octave note is played, the display stops. Finally, when the upper double octave note is played, the display rotates "sharp".

A little higher in the scale, we might find the following: M3 is greater than or equal to M10 and P4 is less than or equal to P5 (4:2 to 4:2-) and at the same time M10 < M17 and P5 > P12 (2:1+) for the lower octave; M10 < M17 and P5 > P12 (2:1+) for the upper octave; and M3 is less than or equal to M17 and P4 is greater than or equal to P12 (4:1+ to 4:1) for the double octave. To accomplish this electronically, with the tuner set on the upper double octave note, when the lower double octave note is played, the display stops. When the middle octave note is played, the display stops or rotates slightly "flat". Finally, when the upper double octave note is played, the display stops or rotates slightly "sharp".

As we move up to the top, we may have to settle for the following: M10 < M17 and P5 > P12 (2:1+) for the lower octave; M10 < M17 and P5 > P12 (2:1+) for the upper octave; and M3 is greater than or equal to M17 and P4 is less than or equal to P12 (4:1 to 4:1-) for the double octave. To accomplish this electronically, with the tuner set on the upper note of the double octave, when the lower double octave is played, the display stops. When the middle octave note is played, the display rotates slightly "flat". Finally, when the upper double octave note is played, the display stops or rotates slightly "flat".

With training and a lot of practice, the question of how much slower or faster becomes more easily answered. To set specifications or limitations as to how many or maximum beats per second or cents expanded or contracted seems inappropriate here, since the matter is quite subjective, and there are widely varying views on how much and where to stretch the octaves in piano tuning.

Here is a chart summarizing the interval tests for the various types of octaves and double octaves discussed this month. Next month we will discuss compromises between types of octaves in the bass.

The Case Of The Percussive Piano

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Seattle Chapter

Before you ask what's wrong with a piano being percussive (after all, the piano is considered to be both a percussion instrument and a stringed instrument), let me address that issue.

True, many people do treat the piano as a percussion instrument, and some composers, notably Stravinsky and Bartok, have tried to emphasize this part of its nature. But most classically-trained pianists approach the matter from a different angle. Indeed, much of the piano's historical development has been spurred by the desire of musicians and composers to disguise the percussive aspect of the piano to the point that a good pianist can make a good piano seem to sing.

While the percussive element will always be there (and be valuable when the pianist wants a percussive sound), most pianists object to a piano which cannot be made to sound non-percussive at the performer's whim. By way of definition, a "percussive" piano tone is one which has a relatively strong attack, but which either decays extremely rapidly or drops rapidly to a volume level which is so low as to be insignificant in comparison to the level of the attack.

Such was the case with a piano owned by one of the piano professors at this university. After I had tuned the piano, she asked me if I could do something about the percussive tone and the "clunky" feel of the action. After checking the hammers and action I decided to try a little light surface needling or "sugar-coating" of the hammers, knowing that the percussiveness problem is often the result of an overly-hard striking surface. On this piano, an old Steinway A, the problem persisted after this treatment, so I began looking elsewhere.

After a careful examination, the only thing I could find that might be called abnormal was that the front-rail cloth punchings were extremely hard to the touch. This puzzled me, since the piano had supposedly been rebuilt shortly before it was moved to Seattle. I concluded that the "rebuilder" had opted to dry-clean the original punchings and re-use them rather than bear the overwhelming expense of a new set of soft, springy ones. Since I was out of ideas on the percussiveness problem, I decided to replace the front-rail punchings, since I was reasonably sure that would solve the "clunky action" problem.

> "While the percussive element will always be there (and be valuable when the pianist wants a percussive sound), most pianists object to a piano which cannot be made to sound non-percussive at the performer's whim."

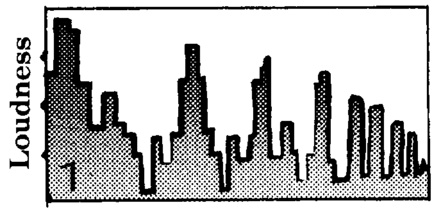
After replacing the punchings and doing some minor regulation, I found that not only was the action no longer "clunky", but the percussive tone was completely gone. Mentally, I filed that bit of information for future reference, without really understanding why it worked. Some time later, I used the same procedure on a seven-foot Baldwin here at the university to overcome a similar problem. The difference in tone was undeniable. Again, the method worked, but I didn't understand exactly why or how.

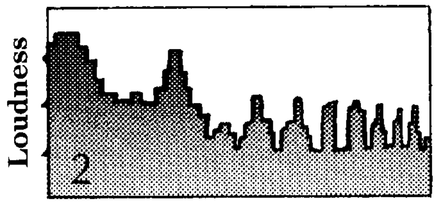
Then, in the Fall, 1979 issue of *The Piano Quarterly,* I found the answer. In an article entitled "Piano Tone Color and Touch: A Controversy Compromised", two researchers named Ramon Alba and Asami Inouye abstracted the results of their research into the great historical controversy between pianists and scientists regarding the effect of "touch" on tone color. Traditionally, pianists have held that by depressing a key with different types of touch, they can evoke different kinds of tone color while keeping the volume level the same. Scientists, on the other hand, have countered that such control is impossible because the hammer is released from the power train before it hits the string. The classic statement representing this point of view goes like this: "It does not matter whether a key is depressed by the finger of Artur Rubinstein or by the tip of his umbrella...for any given level of loudness there can be only one tone-quality."

With Alba and Inouye, however, we see scientists coming down on the side of the artist. The most startling thing about their article is a pair of photographs showing the Fast Fourier spectral analyses of the same note on the same piano, played at the same volume level, but with the pianist using a different touch each time. The two pictures are different! The first spectrum, labeled "non-percussive, mezzo-piano," looks something like *Figure 1*:

The "peaks" in this graph represent the partial components of the tone, with the fundamental at the far left. The second spectrum, using the same note at the same volume level, is labelled "percussive, mezzo-piano" and looks like *Figure 2*:

The loudness levels of the funda-





mental and upper partials are virtually the same here as in the first spectrum, hence the perceived volume is identical. The real difference between the two tones is the filling in of the "valleys" between partials. The researchers describe this filling in as a "controllable noise" element in the tone, and they explain it this way: "...techniques of controlling wrist-arm motion as a shock absorber...determine, independently of the loudness of the tone, how much 'noise' is created due to the impact of the key upon the keybed."

How does this noise element become a part of the piano's tone? Very simply, the key impact noise travels from the keybed into the case or rim, and from the rim into the soundboard. In other words, the case of the piano becomes the bridge for this element of the tone.

So, returning to the problem of hard punchings, it follows that if the front-rail punchings are hard, the "controllable noise" element becomes nearly impossible to control, because it is a much harder, louder type of noise than we get from soft, resilient punchings. Therefore, the tone sounds percussive at all levels, and this percussiveness can't be remedied by hammer needling without ruining the hammers.

This concept extends beyond front-rail punchings, however. To a lesser degree, almost any of the felt or cloth parts in the action can add unwanted noise to the tonal output if they are too hard or worn out. Particularly, the key bushings and regulating button felts fall into this category, and I'm sure we're all aware how a loose hammer flange bushing can add unwanted noise to the piano tone. This "random", or uncontrollable, noise element is anathema to a pianist who is concerned with fine tonal shadings, and before any serious voicing can be done the random noise element must be reduced to a minimum.

It's The Little Things That Count!

Losing Points

Gerald F. Foye
San Diego Chapter

For some of us, dealing with the customer is the most difficult part of our work. Unfortunately, dealing with individual customers is just as critical as the actual work performed and losing points also may be a loss of dollars.

Question the pianist as to possible trouble spots in their specific piano. This will avoid the situation where you have completed the tuning, have packed your tools, collected the money and the customer says, "By the way, did you correct the squeak in the key cover?"

Another problem is terminology and interpretation. When customers rattle off about having the piano voiced, regulated, etc., don't jump in by assuming they know what they are talking about. Discreetly question customers as to the specifics and, generally, you will end up with quite a different picture as to what they really want.

Unfortunately, the best intentions don't always work. It's strange that no matter how much time you spend explaining why that newly replaced bass string will need several future tunings, you discover at a later date that the customer called another tuner since your replaced string didn't hold pitch.

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N.B. IF YOU DO NOT RECEIVE YOUR REGISTRATION LETTER BY 15 JANUARY, CONTACT
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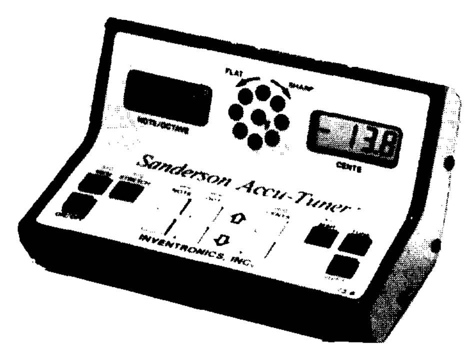

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Thrive In '85

Getting The Organizational Spirit

M.B. Hawkins
Vice President

As we move deeper into the holiday season, it is rather easy to find ourselves into the new year without any plans developed as to where we are going or what we want to accomplish.

Along these lines, let's spend a few moments discussing how an improved organizational spirit can help us *Thrive In '85*...as an individual and as an organization.

A couple of months back we talked about reviewing our bylaws and regulations. The thought in mind was that having done so, each of us would certainly find himself or herself more knowledgable about our Guild and its operation. Armed with more information of this sort, along with improved technical know-how, one would surely move about with more pride. More pride in oneself, it seems, would naturally support a better feeling about our organization.

Wouldn't it be nice if all of our membership operated in this fashion? We can, you know. It is up to each of us to do his or her part. We could be sure that the beginning of 1985 would find the Home Office busy processing applications—applications of those we had shared our knowledge with and who had ultimately decided to join us in The Piano Technicians Guild. Decided to join us on that unending journey in search of improved methodology and refinement of technique, combined with a genuine desire to help others move in that direction also.

How can this help us *Thrive in '85*?

When we look at the general cycle of management, we see that it involves three major functions. We perform these functions concurrently and repeatedly to a greater or lesser degree all of the time. They are planning, execution, and review. We should now be very much involved in the review phase and the planning phase.

Planning involves asking the questions, deciding in advance what, why, where, when, who and how it should be done. In this planning stage there are some major steps we need to deal with.

First, we need to commit ourselves. This is to know clearly the purposes of our individual business and the purposes of our organization as well.

Second, we need to formulate policies. Remember, to set policy is to anticipate the question by working out the answer in advance. It is a rule that we can follow as we work to fulfill our purposes. The same goes for organizations. Good policies tend to maximize the use of energy and time for making progress toward fulfillment of the set purposes.

Third, we need to take inventory. This goes hand in hand with review. Even as this is read, we should already have been reviewing the status of our work by pulling together all the data required to give us a clear picture of where we are now.

Fourth, we need to formulate objectives and set goals. This should also include performance standards, which are methods by which performance can be evaluated. This is one part of planning that definitely should not be overlooked.

So, looking toward 1985, let's build and nourish a healthy attitude.

Let's include in our plans provisions for Kansas City in July. Share your plans with chapter members—and others. Tell them why you want to be there personally. Let it be known that we are not only having an annual institute and convention but also will be hosting all the prominent piano people from around the world with the IAPBT meeting going on at the same time. Let your planning reflect how you intend to finance your part of this happening. Yes, it is going to be a happening!

Let's go for it—be a part of the 1,000-plus present in Kansas City in July of '85. It's in the works, so hook on with your plans and we will all *Thrive in '85*.

New Members

Registered Technician

Dallas Chapter
Pankey, Ted W.
2711 Fairmont St.
Dallas, TX 75201

Reed, Daniel S.
711 Melrose
Richardson, TX 75080

Kansas City, Mo., Chapter
Littau, Chuck G.
2630 S. Arlington
Independence, MO 64052

Reading-Lancaster Chapter
Woodworth, Stephen M.
PO Box 98, Rt. 300 & 42
Kenton, DE 19955

Woodworth, Philip F.
1437 S. Garnet Mine Road
Boothwyn, PA 19061

Apprentice

Golden Gate Chapter
Roach, Anthony
300 Evergreen
So. San Francisco, CA 94080

Miss.-Gulf Coast Chapter
Broome, Sharl D.
Rt. 9, Box 169
Hattiesburg, PA 39401

Northern Virginia Chapter
Olson, Paul L.
918 Elden St.
Herndon, VA 22070

Richmond Chapter
Taylor, Barry D.
2265 Lake Surrey Drive
Richmond, VA 23235

Utah Valley Chapter
Tripp, Booth A.
1103 South 550 East
Springville, UT 84663

Associate

Chicago Chapter
Collins, M.J.
c/o The Beautiful Sound, Inc.
333 North Michigan Ave.
Chicago, IL 60601

Golden Gate Chapter
Jiang, Tian
101 Westgate Drive
San Francisco, CA 94127

Long Island-Nassau Chapter
Orlando, O. Vincent
41 Peach Grove Drive
West Hempstead, NY 11552

Romeo, J. Stephen
505 LaGuardia Place
New York, NY 10012

Palm Beach Chapter
Repka, G.L.
2840 Okeechobee Blvd.
W. Palm Beach, FL 33409

Student
Central North Carolina Chapter
Duncan, C. Renee
140 W. Lakefield Drive
Greensboro, NC 27406

Peterson, John W.
306 Chapel Hills Road
Boone, NC 28607

Central Washington
Anderson, Steve A.
Rt. 4, Box 1
Moses Lake, WA 98837

Detroit-Windsor Chapter
Grattan, Stephen G.
2223 Griswold
Port Huron, MI 48060

Member Recruitment Points
June 1, 1984—November 1, 1984

	Pts.	Mbrs.		Pts.	Mbrs.
Ackman, W. Harold,	1	1	Kreitz, Richard C.	1	1
Anderson, Robert A.	4	1	Krentzel, Jim L.	1	1
Bessette, Roland	5	1	Leary, Kevin M.	5	1
Betts, David C.	4	1	Leonard, Grant G.	1	1
Bittinger, Richard E.	3	1	Lillico, John E.	2	2
Blees, Willem	5	2	Lovgren, Christine	25	6
Bridges, Nate	2	2	Macchia, Frank S.	5	1
Bryant, Ken L.	5	1	Manna, Tony	1	1
Bullock, Wilbur W. Jr.	4	1	Matley, Wayne O	6	2
Burow, Burtis L.	4	1	McKay, C. Guy	1	1
Burton, James H.	1	1	McNeil, Thomas	1	1
Burton, Robert H.	4	5	McVey, James I.	5	1
Callahan, James J.	4	1	Mehaffey, Francis	3	3
Cannon, James D.	5	1	Melton, Eddie J.	1	1
Churchill, Kenneth R.	1	1	Metz, J.A.	4	1
Coffey, Barbara L.	10	2	Morrow, Hope E.	1	1
Coffey, Bruce F.	2	2	Mrykalo, Vincent E.	4	1
Coleman, James W. Sr.	5	1	Nelson, Clifford G.	1	1
Conrad, Robert	5	1	Ousley, Robert L.	5	1
Cox, Merrill W.	1	1	Pagano, Joseph L.	4	1
Delpit, John A.	4	1	Palm, Stanley S.	1	1
Doss, Harry W.	4	1	Pearson, Walter T.	5	1
Duncan, David R.	2	2	Phillips, Webb J.	10	2
Fandrich, Delwin D.	1	1	Pierce, James C.	4	1
Foss, Mark E.	5	1	Pierson, James B.	1	1
Fox, John D.	5	1	Pike, Gene A.	5	1
Geiger, James B.	1	1	Prentice, Randy A.	1	1
Godfriaux, Stan R.	1	1	Riedel, Paul W.	4	1
Graham, Susan E.	4	1	Roe, Donald E.	1	1
Groot, Gerald W.	1	1	Rosenfeld, James I.	5	4
Grossman, Matt	1	1	Schmitt, Jake E.	5	1
Grossman, Michael S.	8	2	Schoppert, Robert L.	5	1
Hansen,Charles	1	1	Sierota, Walt	1	1
Harmon, Clayton C.	1	1	Sloan, Kenneth A.	4	1
Harris, Dale L.	1	1	Sloffer, Phillip C.	5	1
Hazzard, Nancy M.	4	1	Speir, Leon J.	5	1
Heismann, Barry	1	1	Stone, Sidney O.	5	2
Heneberry, Alan J.	4	1	Stout, Clarence P.	1	1
Hess, James N.	5	1	Towne, Christine S.	5	1
Hess, Marty A.	5	1	Tremper, Fred W.	1	1
Hines, David M.	5	1	Vogellehner, Karl	1	1
Hitt, Henry L. Jr.	4	1	West, Ivan	4	1
Holder, Leopold,	5	1	West, Richard E.	1	1
Houston, James P., Jr.	9	2	Wilkinson, Asa	4	1
Howell, W. Dean	1	1	Winters, Kenneth E.	5	1
Jackson, Stephen S.	1	1	Wisenbaker, Martin G.	1	1
Johns, Barney J.	1	1	Wurz, Douglas K.	5	1
Jorgenson, Les O.	1	1	Yonley, Fred T. Jr.	9	2
Keast, Lawrence J.	1	1	Zeringue, Nolan P.	1	1

Snitchler, Charles A.
45373 Utica Green West
Utica, MI 48087

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Holt, MI 48842

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Ft. Walton Beach, FL 32548

Waitt, Harold
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Lake Park, GA 31636

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Campbell, Patrick A.
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Stivers, Mark V.
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Sacramento, CA 95818

Twin Cities Chapter
Nolan, David R.
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Minneapolis, MN 55408

Utah Valley Chapter
Larson, R. Henry
1753 N. 1975 W.
St. George, UT 84770

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Singapore

Hafner, John J.
PO Box 3, Hu Chih
Nantou County
Taiwan, 555, R.O.C.

Panganiban, Roy V.
184 Dr. Alejos St., La Loma
Quezon City, Philippines

Scott, Linda L.
Fray Angelico 50, Apt. 1
03910 Mexico City, D.F. Mexico

Reclassifications

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Columbus Chapter
McNamara, Russell J.
Schmoll, John

Long Island-Suffolk Chapter
Izzo, Vincent

New Orleans Chapter
Magnuson, Frank E.

Orange County Chapter
Thompson, Rex M.

Reading-Lancaster Chapter
Martyska, Barbara

Utah Valley Chapter
Garrard, Paul G.

The Auxiliary Exchange

President's Message

"Peace on Earth." While our spouses run around like busy bees with frayed nerves caused by dozens of people whose pianos "went out of tune just before Christmas," we need to be extra helpful and especially kind. When you read this, my first message to you as your Auxiliary president, we will be at this time of the year once more.

As I ponder over what to say to you, I wonder if you are aware that our Auxiliary page deadlines are almost two months before printing. Many of you did not know until the November *Journal* that I had been catapaulted into this high and prestigious office. I had been looking forward to the possibility of being your president next July. I need you to help me make this transition as smooth as possible. Our executive board has been wonderful and I know you will be, too.

We have some nice surprises ahead for the convention in Kansas City. The hotel is large and beautiful. It has a health club, a swimming pool, a revolving restaurant and much more!

Our Auxiliary committees also have some surprises for us. An organization without change is dead. Our Auxiliary is very much alive! Read the *Journal* and the newsletter carefully for clues to the future of our organization.

And — if you are reading this and you are not a member, do contact our treasurer and join with us in a really exciting experience!

Have a happy holiday season!

Louise Strong
Auxiliary President

Meet Your Officers: Helena L. Thomas, Recording Secretary

Helena Thomas is the wife of Dean G. Thomas, CERVP, and the mother of one son, Brian. She is employed as a legal secretary to the Lawrence County, Pa., public defender.

Helena graduated Magna Cum Laude from Salem College, in Salem, W. Va., in 1975, with a bachelor of music degree in vocal performance with applied minors in flute and piano. She also received the 1975 music department outstanding student award. Helena served as the first president of a women's music fraternity chartered at Salem College and participated in community plays and musicals.

Helena was employed in 1976 as cathedral organist and choirmaster for the primary grades of a local Scranton, Pa. church, and taught music in the parish school.

She decided it was time for a change from a music career and in 1983 began a business in cosmetics and other related fields.

Her interests in the piano business include contact with customers, and scheduling, but she has remedial skills in shop work and tuning. She admits to being better at cooking and expresses a devotion to her aloe vera garden, which thrives on neglect. To avoid being labeled as a fanatic, she takes Sundays off from her 5:30 a.m. aerobic workout.

Helena is a charter member of the Ohio Chapter of the Auxiliary. She served as its first secretary and is now serving as secretary/treasurer.

Helena Thomas

Guild British Isles Tour — May 10 to 29

Dorothea Odenheimer's thoughtfully detailed account of their exciting trip to the British Piano Tuners Association convention filled me with envy. I wish space allowed me to print it in its entirety, but it would consume most of several issues so I will recount some of the highlights and attempt to convey the love and emotion that filled Dorothea's pages.

She and Fred arrived in London on May 8th to spend some time with **President Ralph Long** and his wife, **Jean** at their 16th-century home in Ware, a small town near London. They learned Windsor Castle was open and their visit was made more impressive since the Queen had just finished a residence there. They found the many rooms indescribable, and filled with paintings by such artists as Holbein, Durer, Rubens, Rembrandt and Van Dyke.

On May 11th they joined the tour members and boarded their "Coach" and headed southwest to experience the beautiful, green English countryside. Salisbury, their first stop, set the tone with its fine old buildings, timbered inns, and narrow streets. In the distance, they could see the spire of the 13th-century gothic cathedral immortalized in paintings by Constable. Hearing the ringing of the heavy old bells, how could one doubt the beauty of life with this mingling of past and present? In startling contrast, their next stop was Stonehenge, where the huge rock formations make one feel small and insignificant.

Enroute to Hereford they visited the Bentley factory and wondered about the dark green color of the felt used. They were told it was specially treated to be shipped to the tropics. In Hereford they visited the Royal National College for the Blind, where they were entertained in the Music Museum where the pianos all had been restored by blind students.

It is now May 16th, six days into the tour and they are continuing north through the quaint old town of Shrewsbury, through Ostwestry and on to Llangollen, Wales. On the street the group met the mayor's wife who was doing her daily shopping. She chatted with them and said her one dream was to someday visit California.

From Wales they went to Southport, near Liverpool, for the convention. The next day they went to Liverpool to attend an International Flower show along the banks of the Mersey River (*ED: The home of my favorite International Dixieland Band, The Merseysippi Jazz Band*).

After the convention, the group headed north to Scotland with stops along the way at such places as Kendall, an ancient, stonebuilt market town with cobblestone streets, historic ruins and a magnificent countryside; through Windermere, made famous by Beatrix Potter and "Peter Rabbit"; Ambleside, where Wordsworth lived and wrote; Gretna Green, to where, years ago, eloping couples fled to be married by the local smithy. On entering Scotland they noticed a swift and startling change in both the architecture and the landscape. They visited Ayr, the home of Robert Burns, and stolled along the Atlantic Ocean savouring the feeling and culture of this country.

Moving across Scotland to Edinborough they visited Holyrod House, the Queen's residence in Scotland; St. Giles Cathedral; and the small Chapel Of The Order Of The Thistle — an order bestowed by the Queen upon only the most outstanding citizens.

They re-entered England at Melrose and went on down to York to the famous Minster with its huge towers and priceless stained glass windows. They viewed the town from atop the ancient Roman wall that rings it. They continued on to Nottingham, noted for its fine lace. (*To this Editor it conjurs up an image of Robin Hood, Maid Marion and Friar Tuck*). The next day they visited the Herrburger Brooks action factory in Long Eaton.

The next stop was Coventry, still in partial ruin from the devastating bombing raid of World War II. That evening they went to Stratford-on-Avon for a performance of "The Merchant of Venice." They were fortunate to have gotten their tickets six months earlier since performances are sold out well in advance. The next morning they visited Anne Hathaway's Cottage and Shakespeare's House nearby.

A visit to the Crown Foundry was scheduled, but it was closed so they went on to Cambridge to enjoy a beautiful concert in the Prince Albert Chapel at the University.

On their way back to London their driver, Reg, took them over to Dover for one last look from that historic spot. While the group returned home the next day, Fred and Dorothea stayed on a few more days to see more of London. They took in a few plays, visited the Tower of London and saw the Crown Jewels, and visited the Victoria and Albert Museum to see their large collection of musical instruments. They also saw some huge four-poster beds that had been manufactured in the small town of Ware, the home of Ralph and Jean Long where they had started their trip three days before.

Dues Due

As treasurer, I must remind you it's time to pay Auxiliary dues for another year. Every member should have received a notice by now for 1985. Send your check for $5.00 ($8.00) new member, to **Kathryn Snyder**, *79 Furnace St., Robesonia, PA 19551. Make certain your name, address and zip code are correct.*

Tidings And Tid-Bits

Congratulations to **Norma Lamb**, for the timely Olympic Theme for the L.A. Chapter installation ceremonies... Goes to prove, all of PTGA are winners! Received a most charming letter from **Marion Damon** of Milwaukee, WI, our newest Honorary Life Member. What a "niche" she has found for herself as a volunteer, reading to pre-school children and helping in a day care center! Such joy and love she gives and I know she receives the same in return. Marion was editor of the then "Auxiliary News" from 1966-1970. Her only regret was so few sent in items... Nothing has changed, Marion!... The spouses who attended the Ohio State Seminar in October, had quite a day when aided by expert Columbus resident **Marilyn Ritchie**, they toured a German Village and French Market all in one day... and never left Ohio! They then saw 4,000 participants run the Columbus Marathon to celebrate... what else but ... Columbus Day!

Oops!

Last month we had President **Louise** married to the wrong Strong. My typist must have been recalling some of the early council meetings when he typed **Doug** rather than **Don**. My apologies to all.

'Tis The Season

Christmas is a time of tradition. It's a time to take a moment and consider our many blessings and to give thanks. It's a season to sit back and savor. In the words of the revered poet, John Greenleaf Whittier:

"For somehow, not only at Christmas but all the long year through — The joy that you give to others is the joy that comes back to you"

I wish you much Joy and Happiness this Holiday Season.

Ginger Bryant

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Immediate Past President
6520 Parker Lane
Indianapolis, IN 46220

Editor, Auxiliary Exchange
GINGER (Mrs. Jim) BRYANT
1012 Dunburton Circle
Sacramento, CA 95825

Coming Events

Date	Event	Site	Contact
Jan. 4-5, 1985	Arizona State Seminar	Arizona State University, Tempe	Wirt Harvey 5901 Calle Del Norte Phoenix, AZ 85018 (602)945-8515
Feb. 1-3, 1985	NAMM Winter Market	Anaheim Convention Center, Anaheim, CA	NAMM 5140 Avenida Encinas Carlsbad, Calif. 92008 (619) 438-8001
Feb. 15-17, 1985	California State Convention	Saint Claire Hilton, San Jose, Calif.	Robert W. Brown 2853 Butte St. Santa Clara, CA 95051 (408) 984-0625
March 8, 9, 1985	North Central Louisiana Seminar	Holiday Inn, Alexandria, LA	F.M. Kelly Ward 5731 Jackson St. Ext. Alexandria, LA 71301 (318) 443-2235 (Home) (318) 443-6365 (Work)
March 28-30, 1985	Pacific North-west Conference	Ridpath Hotel Spokane, WA	Scott Colwes 1315 Coeur D'Alene Ave. Coeur D'Alene, ID 83814 (208) 667-3393
March 28-31, 1985	Pennsylvania State Conference	Philadelphia	Walter Sierota 5201 Whitaker Ave. Philadelphia, PA 19124 (215) 533-3231
April 12-14, 1985	Michigan State Conference	Hilton Inn Lansing, Mich.	Dale Heikkinen 1914 Wayne Ann Arbor, MI 48104 (313)662-0915
April 19-21, 1985	Northern Illinois Piano Technicians Seminar	Northern Illinois University, DeKalb, IL	Jack Greenfield 259 Riverside Drive Northfield, IL 60093 (312) 446-9193
April 26-28, 1985	Central West Regional Seminar	Minneapolis, MN	Jonathan C. Nye 1515 Almond Ave. St. Paul, MN 55108 (612) 646-1622
April 27, 1985	Los Angeles Chapter Annual Seminar	El Camino College, Torrance, CA	Lindasue Darling 828 Dickson St. Marina Del Rey, CA 90292 (213) 822-9690

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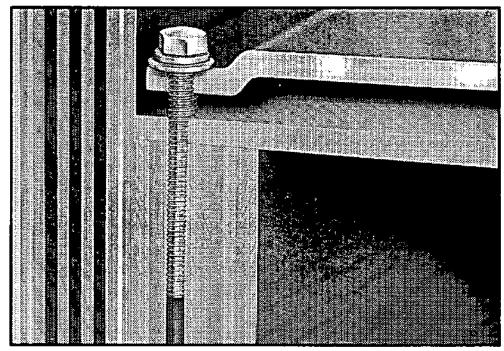

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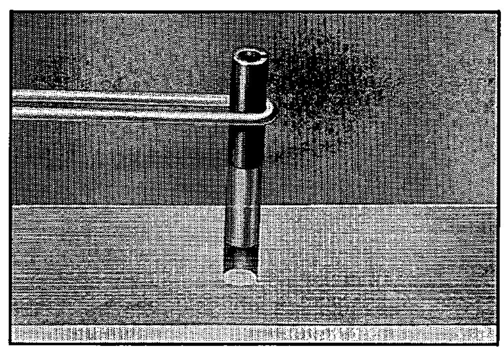

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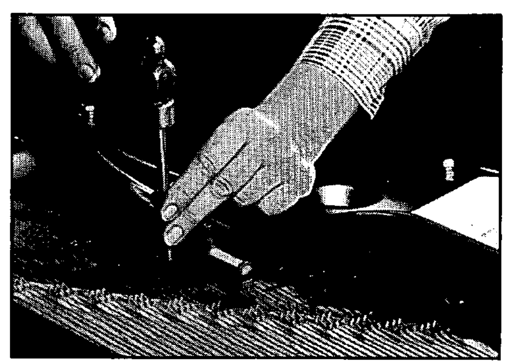

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