Ed Foote

Seattle Chapter PTG
All-Day Seminar
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Kelly Ward wrote a letter to Bill Garlick, recommending Ed. Ed met a fellow in Boston, he contacted the school, which had 300 applicants and took only twenty-two. Bill wrote a personal recommendation and Ed got in without an interview. Bill Garlick introduced Ed to Chris Robinson. Chris didn't worry about throwing stones because all the windows in his house were already broken. Ed has learned that integrity and learning are valuable attributes.

CAREER PLANNING

Career Stability

Plan your career. We must plan our career in toto before we start out.
What do you wish you had known when you started out?

Health

The most important aspect of our business is our health. We take care of our hearing, but it is the muscular skeletal part that we ignore. Our hands were not designed for excessive impact on keys. To justify this career, we must examine our body use. Our tuning posture is atrocious; we become diagonal.

The lower back is where to start. The things we do is heavy and involves leaning over. We are twisting our body when we tune with one arm in the air. Repetitive stress can wear us out.
If our back is over-developed and our front is underdeveloped, we compensate and ultimately suffer. Pay attention to our core.

Flexibility

Flexibility is another issue. Pay attention to stress. Examine shoulder and wrist pain. Flexibility is the way to avoid tendinitis. Ed tunes with a machine, starting with the heaviest strings and moving to the lightest strings. Chronic problems are shoulder, wrist and lower back pain. Flexibility becomes increasingly important as we age. Remain physically active. Balance and flexibility must become a mindful part of us.

In the middle of each tuning, stop. Place the hands together with fingers pointing out and breathe. Then turn the hands down for ten seconds, and finally up and towards your body for ten seconds. Without this break, your body gets tenser through the tuning. With a mindful break, a tuning becomes two thirty-minute tunings; the second half starts fresh, after giving the body and mind a rest.

Pitch Raising

Work ambidextrously. Ed does his pitch raises with his left hand. It is awkward and slower and less accurate, but it builds flexibility, gives the muscles more balance and keeps the body more relaxed. Ed can pitch raise in about fifteen minutes; he moves the pin only once for each string.

If one is too sharp, he'll tune the next a bit flat. It is the average that counts. Even if the machine gives only 3-4 cents accuracy, the tuning still gets more even. He takes his pitch correction figures and indexes the future notes farther to compensate for the change as he goes up. This prevents the pitch raises to stagger; measure and correct ahead for each octave. Don't be shy. Tune Lab, Verituner, and CyberTuner will calculate the pitch raise levels for us. You will develop your ability to hit very close to your target from very far away. The faster you go through a pitch raise, the closer you will get to accuracy. One move of the hammer should be sufficient. Gradually, your turn will get increasingly accurate. Bang the string so you have something to listen to. A golfer gave Ed some advice. Change your pitch by the swing and change your distance by changing your clothes.

The rotator cuff is the most flexible joint in your body and is composed of many small parts. If the joint is not stable, you are going to tear it. Standing while tuning often provides better body posture than sitting. It would become a shame to spend so many years learning the craft and then, when finally good, not to be physically able to do anything. An impact hammer can also help. We must be mindful of our body position while working.

Develop hammer-technique to reduce the physical impact on your wrist and shoulder. First, develop a technique that minimizes the number of times to hit the key. Indecision is the cause of multiple strikes. Don't use your playing fingers to strike the keys: do a karate chop with the side of your hand. Use a pounding tool. Drop your hand on it. It saves your internal muscles. Get your techniques and systems in place to keep your body in working condition.

Formulate Your Business Plan

Tuning is the myth. Very few people can make a living rebuilding if they are not out there tuning and meeting new customers. You want to be in charge of your business, not the other way around.

When routinely maintaining concert pianos for performances, always carry a complete set of Steinway bass strings and a new set of pedals. Think what can go wrong on the stage and be a hero if you can. Salvage junk Steinway pedals, because they will fit everything. You don't have to overtighten the anchor screws; simply make them snug.

Recommendations

Strong recommendations are far more powerful in building your business than any other advertising technique. Referrals are gold.

Money

Where does money come from? To make money, you have to take business away from other technicians. When Ed started taking away business from another technician, Ed always charged more, not less, so that the customers could choose the quality of the work over the price. If we make our industry better, we can make incompetency diminish. When it comes to money, don't ever talk about the other technicians. Only say good things about the competition. "I see this amount of work and this is what it will cost." When you are asked to comment on someone

else's work, respond, "I don't sell other people's work. I sell my work. I wouldn't have done it that way; I would do it this way. There are several ways to do this. I believe that how I do it is the most beneficial way." Critique the instrument, show the issues, state prices, but don't comment on other people's work.

When people call from the yellow pages or the internet, you know their only question will be price. These people are cheap-skate price shoppers, so be proud of your prices. Every year the cost of materials is rising. Don't be afraid to raise your price. If you lag on raising your price, you lag further and further behind, and you develop customers who expect those low prices. We invest our time, and our time must pay off. When time is gone, there is no way of getting more of it. We must advance our skills and increase our value to the customers. Players who care about their instruments will be drawn to you if you sincerely care about their instruments. You're on the same side if you're interested in what they are interested in.

If you don't get a comment or a complaint on your price, you are not charging enough. A Rabbi once said that the only thing a Jew cares about is if another person is charging more than they are. Be honest, have faith. If you have faith in yourself and what you are doing, you will develop a strong clientele. Don't have your clientele shape you. However, if nobody is calling you, you may have overpriced yourself too far.

Once you have established where you want to be with your customer base, you need to farm it. Many people don't trust cheap. Raising your price every year does several things. It keeps your income current, plus it scrapes off the dead wood. You don't want to be so busy with the cheap people because then you are not increasing your quality or your clientele. One third of Ed's business came from rebuilding school. Another third came from the wealthy. He priced himself out of the recording studios that required loyalty but involved big egos. The last third was his regular repeat residential clients. Now his retirement income is a bunch of wealthy people who don't care about the cost.

Being selective allows us to do our own scheduling and to cluster appointments geographically. Cutting down on travel time allows more time to be making money. Learn how to handle pets. The fear of losing customers by raising your price will cost you more than all the lost customers over your career; don't be afraid to raise your price. If you are afraid to raise your price, then you probably have other kinds of fears. If every piano in this country were tuned twice a year, then every technician would be tuning 23 pianos a day, seven days a week. Raising a price is an individual thing.

When quoting prices, the first number out of your mouth is the number that the customer will think will be the maximum price, instead of adding on charges to the first price. Customers don't like additional costs. Instead, start with the highest estimate first. Ed quotes prices on a "not more than" basis. "At worst, it would cost this. This piano is so deteriorated, I'm not going to do a partial job on this instrument. The whole thing would cost this much."

Customers hate being told a different price after you have done the work. Finding more wrong and asking for more is the worst thing to do. Forego the whole problem rather than doing partial work. When you give a high estimate for the work and the price comes out lower, the customer is always happy. Get your reputation solidly behind you and be confident about your work and this confidence will transfer into a good income. What you are really selling is yourself, your ability and your confidence in your knowledge and skills. You cannot afford to carry your income from yellow page price seekers. Those customers should go to the new younger technicians who are still learning. The balance is to get the same income for less time.

Your first visit must be a positive experience for the customer. The first time might not be the time to tell them how terrible their piano is. The moment they open their door and let you into their house, they have a reptilian mindset judging every part of you. Be mindful of your words and how your impression comes across. They are determining whether they trust and like you. If their animal doesn't like you, they even wonder. Dogs sniff you out; the owners are sniffing you out as well.

How To Talk to People

Artists

Don't ever argue with an artist. If they tell you they do or don't want something, don't tell them you can't do it. A lot of time pre-performance jitters make the artist hear something that might not be there. Basically, agree with any artist. Assume they are god-like, and whatever they want is what you are interested and willing to do. Artists are often finicky. Gain the allegiance of an artist, and you will receive lots of referrals.

Piano Teachers

Piano teachers are surrounded by people who revere them. Their studio is their realm, and they know exactly what they want in their pianos. Some teachers will refer lots of students and can be amazing sources of referrals. When the powerful teacher tells each student who her tuner is, it is worth giving the teacher a good deal. However, if you feel you are being taken advantage of, you are not charging enough. Risk and gains are proportional. If you want to be risk-free, charge a low price and stay busy; you have work, but your return may be low. There is no binding contract with a teacher.

Private Customers

Private customers looking for guidance and trust. Most can not tell the difference between a super tuning and an average tuning. The piano is a member of their house, so we must not insult their grandmother's spinet.

Eating Your Work

Eat your work in order to maintain your reputation. Low quality of work will show up years later with your name on it. Accept underpricing as an investment. Overbid to cover big problems, and then charge less, or else make a guess and then eat the work if it takes longer. Do I eat this

work; do I lower or raise the price? Estimate high, and don't worry about the hours. Piano work always takes longer than we think it will take.

Long-Range Goals

Estimates

Easy money comes from estimates. Our expertise is worth something. When we get to a position of trust, we will be asked to evaluate pianos. Our thoughts are worth money; we need to be paid for what we know. People will pay you for your opinion, which is the least physical way to make money. Our time is the only thing we possess of value. Our time on this planet is all we have to make value.

Commissions

Commissions from piano sales are another source of income. However, the customer, not the store, should be our main focus: *your best income comes from keeping the customer's best interest at heart.* Piano stores will pay well for a referral that sells.
For a person who wants to sell a piano, tell the customer "I'll operate as a broker on a 15% basis to sell your piano for you." Stores take 50% to do the same thing.
Tell a long-term student that chronologically, as the student develops and improves, the instrument will need to be improved to match the student's ability. Piano maintenance is like car maintenance. Eventually it will be time to improve the existing piano or to upgrade to a better one.

Inheritance

If you are tuning a piano for an old person, eventually that piano is going to have to go somewhere. When grandma is going to pass the piano on to the granddaughter, this is the point when the piano is ready to be overhauled. Talk to grandma about maintenance.

"That's really nice that you have an extremely fine piano, but you have worn this piano out. Your granddaughter deserves this piano to be in top condition." What they care about is trust. Discuss the condition: it may cost about as much as a small car. It's like a fine car that has been driven for a long time, and it has gotten to the point that it needs to be restored. Be prepared for this conversation; it is based on the trust that you have built.

TOUCH

Developing a Sense of Touch

We have developed a sense of hearing. In the main, we hear about the same as everyone else. The general public can't tell the difference between a tenth and a third and a seventh and a third. Many piano technicians have not developed their sense of touch as well as their sense of hearing.

Where, in the piano, do we most obviously feel our sense of touch? One of the main places is the scrape of the jack moving against the knuckle. This feel tells us the shape of the front edge of the jack, the texture of the knuckle, the strength of the spring, and more. To judge the spring, we can visually see how quickly it rises. However, we can feel how quickly the hammer rises. If you put your finger on a key and quickly slide the finger off the key, the hammer will drop, not rise. The hammer will check. The hammer is the fulcrum and is the stop, so it does not move. The mass of the key is so much greater than the mass of the hammer that the spring can't return. It makes escapement more sensitive.

Use touch when bending the *hammer shank*. While heating a hammer shank, how much pressure do you put on the hammer until it moves? A very light tough will make the move quicker. Hold the hammer lightly, warm the shank, and you can feel it release. We don't know what we are going to get with wood, but we can feel it. Be delicate with the touch, then hold the shank four or five seconds.

Loose hammer heads can be found by feel.

It's not just our fingers. What stops the *trapp* work when you hit the damper pedal? A block of felt. Do you routinely replace that felt, or just leave it? We can feel the difference between a fresh piece of felt and an old hard piece. The resilience of the felt contributes to how the piano feels. The way the pedal stops is like cushioning the harp. A hard stop forces the player to use the pedal tentatively.

Tuning pins may move a millionth of an inch to reach the correct pitch. We can get a stable tuning without moving the pin in the block. Tension and friction are determined by touch. Pounding a note down is not stable. The question is, what does it take to move the pin the least amount? Wiggling the hammer on the pin is touch.

The *eardrum* is touch. When we get older, we cannot hear 6000 cycles, but younger people can. By listening we are feeling with our ears.

Damper Head Cleaner
Ed demonstrated a jig he made for filing off old damper felts with a rasp, by feeling that the two surfaces are level. If your file is over ten years old, it's probably worn out. Always use a file with a forward motion only. Pulling the file backwards will dull the cutters. We can do a lot better work with a sharp file. Old files can be put in a fire, ground down, and made into tools. Put your finger on a file and you can feel the sharp parts versus the dull parts. Use your sense of touch.
Clean the heads with fine steel wool, with the wire inserted into the jig.
Set the wire on the jig to straighten the wires.

Keys
Close your eyes and feel the keys. Ivory feels different from plastic. Microscopically, ivory has a tooth. Plastic is so perfectly smooth, that once it is covered with finger oil, you are no longer

touching plastic. When playing a long time on plastic keys, the feel changes. Even polished ivory will cut through the oil and you can feel the ivory.

Do we *ease keys* by sight or feel? What if we combine the two?

- Is your finger is so sensitive that you can move your finger along the top of the key and make the back-check move? If, by dragging your finger across the top of the key, the back-check moves, then you have some movement in the balance rail. At the top you might feel, but at the bottom of the key you may not.
- Dropping the key and watching it bounce is another technique.
- The balance hole reamer tool is 4mm. To ease the hole, with the key flat on the bench, insert the balance hole reamer from the top and twist it. You can feel it. Blow the shavings out.

Key Frame Bedding

You should be able to tell if the keyframe is bedded by touch. Lay your hand on the middle keys, play some notes and feel if the keyframe moves. To adjust, turn the bass screw until it touches; turn the next bass screw until it goes too high, then lower it until it touches; move on up the same way. More pressure in the treble than the bass makes it tighter in the bass, which is good. Key-frames will change their bedding with the weather. If one of the feet is off, since the feet don't always touch evenly, if you tighten one, there is stress between the bed and the keyframe. When the key-bed raises, it changes the position of the stack as well. Remove the keys, put the stack on, and adjust the glides. Bed the key-bed in the piano.
Under the foot of the stack you can always find where there is a gap, which can be shimmed with punchings.

Level the keys in the piano. Set the end hammers to the blow distance with a string. Set key dip. Weight the keys with the stack. It doesn't have to be totally screwed down. Level by sight first. Often ivory keys are scalloped; do not level to the worn dip – level to the edges. Feel across the keys with the fingers and you can tell instantly how level they are.

Reaming balance holes.

You can make your own reaming tool by swedging a balance pin with a hammer. Put a cloth punching on the pin to use as a visual stop. Hold the end of the pin with a vice grips and insert the tool into the hole. Since the pin is now tapered, push it in incrementally to the desired width. The tighter the hole, the less the key will bounce off the balance rail pin. When you achieve the size, then turn the pin sideways to widen the front and back of the hole. The key should hold fairly firmly on the bottom of the key. You will not slow a key down by having more pressure. With fast repetition, you want a firm junction. Start tighter.

Another way to enlarge the hole is to bump or the back of the key slightly with a tool.

If the holes become too big, size the holes with hot hide glue, diluted 20:1. Put it on the key and rock it, about ¼" on the balance pin, once the glue is hard. Turn the keys upside down and use a little artist's brush; Ed might do eight at a time. Be careful not to get glue inside by the bushing.

Baubbling
Hit the key with your knuckle. This takes the damping out of the system. When a hard object hits the key, there is a shock wave that sends the hammer off the jack before the jack escapes. You have a resilience in your action. Tests with microsensors in the action find that the key hits the button before the hammer moves. By powering the hammer with the compliant, no matter how much harder you hit it, you are already on the pad.
How does this integrate with key punchings and bushings? The bushings are damper agents, since the key moves in all directions.

For finding all determinations by touch, find the limits.

Pinning
The fastest way to find the sluggish pins is to *swing the set*. Ed made a jig to enable watching this. Fasten the jig on each end of the stack and put it on the bench. Tilt the entire stack over and swing all the hammers at once. It becomes easy to see which pins are slower. Pinning must be fast; we can't afford to spend an entire afternoon re-pinning. Turn the stack sideways and observe how everything swings. Mark the bad ones with chalk. Flop the stack back down, and re-pin. *This jig is also helpful for checking travel.*

When you have a hammer line with anything that needs to be re-pinned, we were taught to use a micrometer. We do not want to measure pins. What we need to do is to determine what size of pin was in there before. Find a half-size pin larger than anything in the line. Go through and punch out all the pins, then insert the new pins, then clip. Do all 88 of each step at a time. Use brass jaw pliers and clip only one end of the pin. To do the entire set, number them all. Use an electric screw driver. Determine with your sense of touch which are the worst.

With one pin size and one reamer, you will have consistent parts. Nobody will be re-checking them. Years later, parts will be replaced. This is where speed increases your accuracy.

Damper Adjustment
Ed demonstrated his damper tool jig. Insert the damper wire. Rotate the hammer and feel the bend. Squeeze the wire bender to make the wire straight at that point. Rotate the damper 180 degrees and squeeze again until the wire is completely straight.
The head should be at 90 degrees from the line of the damper wire.

Once the wire is straight, drop it into the bushing rail. It is time to bend the wire to fit the piano. To move the damper closer, place it in the jig and bend it slightly at the top bend.
The top bend moves the head from side to side, the next bend under the head determines the line up into the guide rail. To create the two lower bends, insert the wire into the jig and feel. The two bends should be equal angles in opposite directions. A damper wire-bending tool will always make the forwards and backwards direction change. Start with everything square, and then match the bottom to the angle of the top post. Is the top is square? If it's crooked, then

you know you didn't bend the lower part enough. This jig enables us to go faster and to do cleaner and more consistent damper work.

Jacks
How tight does a jack need to be? Your repetition is determined by two things: back-check height and speed of the jack. If the jack bounces back and forth, or sideways, things won't work well. A jack should be pinned around 4 grams; this is snug, but loose enough to move freely. If you have an extremely light key, it doesn't take a tight spring, and the jack can be looser. Remove the spring, drop a 4 gram weight on the jack and see what it does. Once you've measured and done this a few times, feel it. You should be able to do this 88% of your time by feel. If the jack rubs on the knuckle, you need to add graphite to reduce friction.

Repetition Levers
Repetition levers are often pinned around 7-9 grams. Ed believes that 7 grams is too much. The repetition lever needs a lot more spring than the jack needs. Since there is no friction in the hammer shank, maybe 1.5-2 grams. Balancier pins should be more like 5 or 6 grams; it's difficult if there is no pressure on the balancier.

Hammers
Swinging hammers is fast. Putting on weights takes longer. Hammer shanks should be pinned fairly tightly. You can hear a loose pin long before it clicks. The stability of the shank on contact with the shock has a lot to do with the behavior of the hammer strike.

Composite bushings work with only 1 gram, whereas other flange bushings work on 10. With felt bushings, the pinning needs to be firm, which helps with resistance.

Whippen flange
Whippen flanges move so little that it doesn't really matter how they are pinned, as long as they don't make noise.

Damper Flanges
Loose damper flanges can rattle. Bass damper flanges should be a little tighter than the tenor.

After-Touch.
Set after touch after regulation. Pianists cannot tell differences in dip, but they can feel after-touch. The differences of blues and pinks can make a big difference.
Hammer blow, let-off, and dip are all set. If I want 40 thousandths aftertouch, put a 40 thousandth punching (gray cardboard) and press the key. Adjust the dip with that punching until the jack comes up just as the jack touches the knuckle. Feel this.

The capstan to the whippen-felt dimple changes, which is why the after-touch changes. Also, the consistency of let-off is a factor for the leverage of changing the hammer. It could also be the shape of the knuckle, the tightness of the screws, etc. Start by setting all the key dip with a weighted block. Then go back and feel with the addition of .006 punching.

The moment of after-touch is when the jack comes out from under the knuckle, and when the weight of the hammer is off the jack. The harder we push on the key, the bigger after-touch we need. Pushing hard onto a thick punching is not quite correct because pianists don't play that hard. Sharp edges don't feel like rounded edges. Take a burnisher, like hard wood or a very smooth screwdriver, and burnish a sharp edge. This rounds it and increases the radius. We want escapement to feel the same everywhere. We are trying to push 88 keys to be exactly the same.

REGIULATION

1. Create an income stream
2. Build customer loyalty
3. Advertise your ability

The First Level of Regulation

There are millions of pianos that need work. As students improve, they will need a better functioning piano. Sell your services. Most homeowners are shocked by high prices for a full regulation. There are levels of regulation. Remember that the first thing to do is what makes the most profound difference. In general, capstans make the biggest noticeable difference. Rather than getting into heavy explanations, explaining the benefits of well-adjusted capstans will make the biggest difference. The next time, after making the big gross adjustment, explain that there are more adjustments that will make big differences. Sell the big regulation down the road.

Make it clear that you are *not selling perfection: you are selling a vast improvement*. If they expect perfection, they will expect future free work. The average piano owner will not know if you have burnished something or made tiny invisible adjustments. Upgrade from noticeable changes to doing it all. Little things help you sell yourself and the piano's needs.

1. Start with capstans.
2. Let-off is the second most noticeable adjustment.
3. Cleaning is the most often requested non-tuning service. It allows you to examine what you're in for if the piano is going to be worked on. Be aware of pianos with silk cords.
4. *Space what you have to do, and plan efficient travel routes if you have to travel.
5. Pin only parts that wobble. We are repairing the big problems.
6. Fix the pedal squeak.
7. Set the damper lift to the tray.
8. Feel the dip.
9. Checking jack position, damper lift, etc. helps us determine what stage the piano is in.
10. Making sample adjustments in front of the customer demonstrates changes that the customer can see, hear and feel so that it is obvious that there are more things to consider besides tuning.
11. Do we need to level the keys? Not at the beginning.

How do we sell a full regulation?
"Wow, that's hard to play. How do your kids play this?"
"A child will never be able to develop a delicate touch on an instrument in this condition.
It's like trying to drive a car without any air in the tires."
"Well, if it's hard to play, your children are going to have to play harder.
You do have to play harder to play each note, and they will learn to play that hard all the time."
The interest of their children is more important than their bank account.
Put the thoughts in their mind, and eventually they will call back. They will understand that more needs to be done.

- Use a mini power sander and an entire set can be shaped in about ten minutes.
- When doing crude regulations on old pianos, watch out for time-suckers. If one spring breaks, others are suspect.
- Sometimes a small adjustment will make a big difference for a little while; for example, capstan cushions or let-off button felts will be grooved more on one side.
- To avoid breaking off let-off screws, use a micro torch of heat for 4 seconds. This will loosen the rust and wood. Turning a cold screw will tighten and break. The screws could also be lubricated.

Second Level of Regulation.

1. Remove all the repetition levers.
    a. Number the whippens.
    b. Remove them all with an electric screwdriver.
        i. Now they are easier to re-pin.
        ii. Lets you check the jack and the spring.
    c. Clean all the junk. Polish the springs
        i. Drop behind and under all the springs, & place a 1' rod under the springs
        ii. With a Dremmel tool, polish the ends of all the springs
        iii. Replace all the springs, giving each a tug.
    d. Replace the wippens back on the rail.
2. Knuckles
    a. Resurface the knuckles with 320 black wet-dry paper strip.
    b. Lube with Teflon powder
    c. Burnish the jacks.
3. Let-off
    a. If there is a dent in the let-off button felt, replace all the felts.
    b. Put hot water on them, take a break and they will all fall off.
    c. Put new ones on with hot hide glue.
    d. A hard let-off feels different than a resilient let-off.
4. Keys
    a. Remove all the keys to check for pinning and friction.
    b. Check the balance holes, the leads, the bushings, and the key buttons.
    c. If the key bushings are loose, add re-bushing to the regulation.
    d. Turning the front pins are a quick way to reduce slop. The wear is already there.

5. Hammer-to-String Mating
    a. Start with a smooth regular surface on the hammers.
    b. Agraffes are not perfect.
    c. If the strings are not level, bend them until they are.
    d. If a string won't raise, you might have to trim the hammer so that they mate.
    e. Bending the wire is the last thing to do, and it can be done only once.
    f. Use touch to feel how level the strings are.
    g. How hard you pull the hammer up against the string determines how fine the difference is in string height.
    h. Recording studios have extremely fine tolerances and want pure tones.
6. Springs
    a. Set the springs to rise as fast as possible without feeling a kick.
7. Jacks under the knuckle
    a. Chris says back the jack out until you feel the knuckle. Ed found that feeling this scrape is not worth it.
    b. The extra half mm on composites is virtually undetectable.
    c. How much pressure do you want on the jack? How do you know it will return? I want to feel that scrape and know it will return. Turn until the jack will not go back under the knuckle.
    d. Now what does it take to get the jack to go back under? Turn until it just scrapes under the knuckle.
8. Punchings
    a. Replace front rail punchings. Old ones never go back where they were before.
    b. Dents make adjustments inconsistent.
9. Drop
    a. The drop stops the repetition lever so that the hammer is as high as possible. We want the action screw for the drop to be as late as possible. Ideally the jack will touch the drop screw at precisely the same time. However, these timings do not all coincide.
    b. In harpsichord regulation, the adjustments are staggered.
    c. Ed sets his drop at let-off. The height of the drop doesn't matter, but it does matter under the stroke of the key.
    d. Set let-off just short of the maximum excursion point of the string. Set it so the hammer touches the string as it vibrates, then lower it slightly.
    e. At C5 turn until it blocks. Then turn it down so it blocks but doesn't hit the string. Turn more until you feel the let-off. Turn down again until it finally is just below. Performance level let-off is as close to the string as possible.
    f. The harder you press, the smaller the drop.
10. After-Touch
    a. Can't set springs until you set back-checks.
    b. If you change the back-checks back, the springs may need to be re-set.
11. Back-checks
    a. Half the distance from hammer rest to the string will give sufficient repetition.
    b. The higher the back-check height, the less the key has to move.

c. Excessively high back checks for high speed causes less power.

12. Sharp height
    a. No higher than 1/2 “
    b. Sometimes you can lower the sharp height and still have good aftertouch.
13. Re-check everything.
14. Voicing
    a. Remember what you hear and feel when you push in the needle.
    b. For single-needling, use a thin needle.
    c. A hard spot in the felt can affect the sound.
    d. Single needling is our most delicate sense of touch.
15. How do you sell $1500 worth of regulation to an accomplished pianist?
    a. “This piano is difficult to play pianissimo. What I’m talking about is not a nuance. It is a night and day difference, and if you don’t notice a difference, you don’t owe me a penny.”
    b. “You’re struggling where you don’t need to. It’s not you; it’s the piano.”

ON THE STAGE

- You cannot jeopardize your reputation or their confidence.
- Voicing is the most important part of stage regulation. It is generally preferred to be bright.
- Set the springs so you can feel them bump the strings lightly.
- Make sure the hammers are not dragging on the back-checks, because this drag could break a hammer.
- How hard do you adjust? Each hammer at some time will be hit with triple forte. Even if the hammer just drags going up slightly, it won’t feel right. The key feels heavy.
- We have replaced the punchings, bullet-proofed the action, and voiced.
- Check the pinnings within 10%-15% of each other on the balancier, the jack and the hammer. The jack pinning is insurance.
- Remember the underlevers.
- Make sure the leads are tight. Ed uses superglue.
- Setting damper lift late or early varies with the hall.
- Run your fingers lightly over the keys and watch what moves. Turn front rail pins slightly but watch that they don’t stick at the bottom.
- Pedals.
- How do you sell a stage regulation? You don’t. It comes to you. If you are to the point that you are doing stage servicing, you will have all the jobs. However, if you blow a performance you will lose all respect and future jobs. Be prepared to be able to improve anything.