

## Soft Tuning Technique

Advice for tuners who want to work without developing hearing damage.

The Soft Tuning Technique is often said to be inadequate for setting tuning properly. If you are totally convinced of this, you can stop reading and continue to ruin your ears. You will probably not be able to hear properly for the last 10 to 20 years of your career.

This article is intended for tuners who want to continue tuning pianos without hearing problems and who do want to be able to hear what their grandchildren are saying.

The Soft Tuning Technique can reduce the average sound exposure by around 10 dB. Another 3 dB reduction can be achieved by increasing the distance to the piano, by standing and not bending over 'the strings' to listen more closely. Even with this reduced sound exposure (up to 13 dB), the workload of a piano technician is on the edge of the officially 'safe limits' of 80 dB. We now know that acoustic impulse levels are more damaging than what we measure according to European standards.

The best solution to prevent excessive sound exposure is to "Reduce the sound level at the source."

Making all musical instruments play more softly would reduce sound exposure to safer levels. Until this happens, tuning with the Soft Tuning Technique will help save our hearing.

The Soft Tuning Technique described here is the result of three years practice, forced on me because my ears cannot endure more than an average of 80 to 90 dB for a few hours without starting to buzz, ring, hurt and distort sound. The few pianos I am able to tune (including some concert tunings) with the Soft Tuning Technique hold well, without any complaints. I can still tune six per week, working way below the average of 80 dB.

My thanks go out to all tuners who came up with suggestions on how to improve handling the piano sound. I have tried all suggestions and integrated them into the Soft Tuning Technique.

The Soft Tuning Technique: "How to reduce sound exposure"

The Soft Tuning Technique aims to prevent hearing disorders whilst continuing to perform quality tunings.

I will start with some general remarks on sound and tuning. Ears that are 'musical' from birth or trained can easily perceive pure tuning. Pure intervals are obvious when all harmonics fall into place. Tuning becomes difficult when we tune intervals deliberately out of tune, as we do when tuning pianos and other keyboard instruments. Tuning organs, harpsichords and forte pianos is still easier than tuning modern pianos, because of the great inharmoniousness of the modern pianos we often encounter.

Great inharmoniousness creates a 'virtual' impression of a fundamental tone which may significantly differ from the actual fundamental. In the worst case, one can perceive a difference between the 'actual' and 'virtual' fundamental in excess of a semitone. To get to the proper spreading of the temperament over all octaves on a piano we have to adjust the pitch to get a musically satisfactory result.

The suggestions below are intended to reduce sound exposure and will be obvious to most experienced tuners.

Nobody taught me these things 25 years ago. I wish I had known about them before my ears started ringing.

### General Advice

Ensure that you have knowledge of 'dirt' in the sound: disharmony, self-beating strings, 'drawing' (two strings sound lower or higher than each individual string), etc.

Make sure that you have knowledge of 'tuning behaviour', of individual pins and instruments.

Learn to hear the 'total cluster' of harmonics that produce the 'virtual' fundamental.

Train yourself to put the combination of 'actual' and 'virtual' fundamentals in the right perspective, using the central temperature area as a reference, checking bass and discant to this central area (f to a-1) with all consonant intervals and multiple octaves.

Be alert to 'colour changes' within the instrument. You might be tricked into judging correct pitch incorrectly (the musical correct combination of 'actual' and 'virtual' fundamental), especially around transition areas: from single to double choir, from wound to unwound strings and where the frame crosses the bridge.

Other colour problems can occur when intonation is bad – the front of the hammer is not in line with the choir – or the wedge used for damping is pushing the 'dead' string towards the hammer, so that it is touched before the 'free' strings. Get the feel (literally in your hand) for movement of the string over its resisting points as well as the movements of the tuning pin (its turning, its springy movements in the wood and its point of equilibrium). Try to 'feel' the string as far as possible, on or even beyond the bridge.

There is only one point of equilibrium where all divided parts of one string have the same tension. In theory fortissimo should not lower tension in the sounding part of the string.

Sometimes the point of equilibrium seems to lie in a fuzzy area (practice). By probing the pin without turning (moving the tuning hammer very gently to lift up and help down the tuning pin in the direction of the string's tension) you may find that the area sometimes equals the range of a semitone. It is crucial to feel the pin's 'way of turning' and its 'springy movements' in the wood when trying to establish the 'point of equilibrium' in this fuzzy area.

Sometimes the pitch will tend to go down as we are tuning an instrument. Try to hear and especially 'feel' the pin's springiness when putting a little more tension from bar to pin, to get the string to hold better. In cases of rising pitch, one should particularly perform the feeling of 'pushing down', deliberately putting the 'point of equilibrium' lower or higher in the 'fuzzy area of equilibrium' according to the pins behaviour.

After tuning the temperament area, tune the bass area before the discant. This is particularly important when the frame is not around or covering the tuning block, as in forte pianos and a lot of instruments from before 1920.

Use a medium or long, very stiff tuning hammer. The longer the hammer, the less force is needed to turn the pin and smaller movements can be made and felt.

The position of the hammer should be around 10 degrees before becoming parallel with the string on pianos, on

grands from parallel position to around 10 degrees past parallel to the strings.  
Dampen the bass with foam to reduce additional noise. Press the foam on the strings by weight (grand) or by pushing the hammers to the strings fixing a wedge between the dolce register (piano).  
Silence while tuning is a necessity. Demand silence "Environmental background noise for a tuner is the same as adding oil in the water of a window cleaner." Everyone will understand your point.

Soft Tuning Technique Touché Push the key down as softly as possible (requires good mechanical regulation) reducing unnecessary and annoying attack noises. In a quiet environment, you will hear everything needed to tune properly and save your ears.

HARD Tuning Technique Touché - a warning Firm touché will trigger several muscular and neurological dampening reflexes in the ear system. It is highly questionable whether you will hear better with these dampening reflexes working constantly in high sound exposure. Our natural dampening reflexes cannot handle high acoustic impulse peak levels very well. One thing is sure: you will dramatically increase the risk of developing hearing disorders.

Tuning, 'taking all former remarks into account'

Choose an optimal general pitch for the piano. Follow seasonal pitch changes (for instance between 437-441) when strict 440 Hz pitch is not necessary. Explain and ask for consent from the client. Minimal tuning gives better tuning results and the tuning will hold for longer.

Start by checking where the 'string equilibrium' lies, (for example A-1, A, a, a-1, a-2 and a-3) and by manipulating all pins for these choirs without turning them. Some strings will 'move up' and some will 'move down'. Check whether the highest a-strings of each choir more or less match the other highest strings of other consonant intervals choirs. Then, taking seasonal circumstances into account, choose the optimal average pitch, based on the highest general level. Feel where the pin's equilibrium is both with and through the tuning hammer, not by turning the pin, but by moving the tuning hammer very gently to lift up and help down the tuning pin in the direction of the string's tension. Rather than trying to change the pitch by manipulating the pin in this way, 'feel' what movement the pin allows when probed. The pin is in command, not the tuning hammer or the person holding it. The aim is to feel where the pin and the string are in equilibrium.

An additional advantage of this probing is that the strings are loosened from the bar, where corrosion might cause breaking strings when they are tuned up immediately.

Sometimes the newly developed equilibrium is the right pitch.

If the pin has to be turned to lower or raise the pitch, tension can slowly be increased on the tuning hammer until it turns. Another way is to make short pulling movements while slowly increasing tension on the tuning hammer.

When the pin turns it is important to 'feel' its tiny movements. You can feel and hear tiny 'ticks' and use these 'ticks' as a measuring tool. If you know how many 'ticks' you need to get to the new equilibrium point, you can turn the pin without using sound.

The turning direction should be a circular line, putting as little 'up and down' friction as possible on the tuning pin.

Hammer position is crucial.

The most important source of information while turning the pin is NOT the sound, but the information the pin gives to the hand in respect of its 'turning and springy' behaviour. Hearing and judging the right pitch is the easy part of the job, it's a matter of measuring. Finding the right spot to mechanically set the pin in a firm position so that it holds as long as possible is the art of tuning. This cannot be taught, the feel has to be learnt, you can only point the way; the learning lies in 'feeling' the complex matter of 'tuning hammer - pin - woodblock - string - resistance points - sound'.

Although movement of the string can help the transport of the string over its resistant points, you can learn to feel how to turn and find the equilibrium point with minimal string movement, especially when you are familiar with the instrument and it has been tuned regularly by the same tuner and pitch differences are within 1 Hz.

A professional tuning device can help to discover 'dirt' in the sound.

A professional tuning device can also be used to tune 'by sight', not by listening, but by very quickly levelling the instrument to a requested pitch, using the hard tuning technique and WEARING proper professional earmuffs, followed by fine-tuning with the soft tuning technique.

When needed, one can test a concert tuning by hitting all keys with a firm and short hit, with all damper released from the strings for maximum vibration. Always WEAR professional earmuffs with maximum damping while doing so. Then adjust the tuning again softly, taking both the deviations and tuning behaviour into account.

Learning the Soft Tuning Technique may take some time. For most tuners it requires a change in attitude, leaving behind fixed concepts and control. It is a more open attitude:

Constantly learning to hear the complexity in sound that is received through our ears.

Learning to feel the complexity of pin and string movement through our hand.

Getting a 'feel' for what 'is present' in tone, colour and movement from each specific instrument, string and pin by hearing and feeling.

'Knowing' by 'feeling' the instrument's behaviour in 'movement and sound', one can go along with and use the instrument's behaviour to tune with greater quality and speed.

In other words, as a fine colleague once said: "You should never try to get it your way when tuning a piano. You have to listen to the instrument, hear and feel how it wants to be tuned. It will even tell you how to get past the difficult spots. Let the instrument dictate what to do."

This is pure 'Zen and the Art of Tuning'. This is not an airy-fairy approach, but a down to earth practical way of making contact with the instrument through our senses to understand the nature of its specific 'sound' and 'tuning behaviour'.

With the Soft Tuning Technique you will be able to manipulate with accuracy towards optimal quality tuning. I can assure you that it will reduce a lot of stress, save your ears and your experience will grow in this openness, making tuning a real art and joy.

#### Additional Advice

Dose your sound exposure, spreading noise and silence evenly over the weeks.

Allow the ears appropriate amounts of rest.

Always use professional hearing protection when working with machinery, etc.

Beware of overprotecting your ears. Don't use earplugs all day and all week.

Make sure you are well informed and don't assume that all specialists are too.

Avoid too much reflection in the workspace; it adds up to sound exposure.

Avoid loud and low-quality instruments, reduce them in volume (or number).

Provide for a steady income, not too much idealism, be practical.

Reduce your 'work region', exchange clients with colleagues. This saves money and time: reducing driving, traffic jams, unpaid hours and pollution.

#### Posture and Attitude

Relax; avoid stress and work overload, which will ruin quality in the long run.

Take care of your body. Do sport, go to the gym, but don't overdo it. Keep the body strong and supple, especially the back and neck. Get advice or training from a physiotherapist, if possible one with experience treating musicians and piano tuners.

Do not allow yourself to get irritated by the inharmonic sound of the piano. Irritation to sounds can cause problems, just relax

Focus on quality and enjoy the work.

#### Motto for the piano branch

Be aware of the possibility of hearing damage.

Be well informed about sound, hearing, hearing damage and protection.

Practice preventative skills when working and in your free time.

Aim for a healthier way of working with increased quality and pleasure.

Pass on knowledge and skills to colleagues and clients.

Take care, save your ears and enjoy music and tuning... softly.

With kind regards,

Hans Troost.

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