

Care and Maintenance of Stringed Instruments

Prepared by

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· V I O L I N M A K E R ·



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Basic Care of String Instruments

Keep the instrument in the case when not using it and latch it. One of the more horrifying events for a violinist is to pick up a case by the handle and see the violin fall to the floor when the lid flies open! If the case is not nearby, the instrument may be placed on a towel or case blanket on a flat surface for short durations. Never set the instrument on its side (except cellos and basses). It may easily fall over or damage the delicate edge.

Hold the instrument by the neck or if using two hands, horizontally by the neck heel and the bottom end by the end-button. Hold the instrument in front of your body, especially when passing through doorways.

The best way to keep the instrument clean is by wiping with a soft cloth after every use. Accumulated rosin dust will eventually eat away at the varnish, especially when combined with sweat and air-borne moisture. Sweat also eats at varnish and dislodges glue joints. Cleaning solutions and polishes are best avoided. Never use any commercial household cleaners on the instrument.

Clean the rosin off the strings with a separate soft cloth. Some people use alcohol to clean the strings, but it exposes the varnish to unnecessary risk from drops of alcohol. A cloth is good enough.

Never remove all the strings at once. The sound-post may fall. If it does fall, take the instrument to a violin shop for the violin maker to re-set. This is a very inexpensive procedure.

NEVER leave the instrument in a car or trunk of the car. Hide glue dissolves at 120 degrees Fahrenheit and the varnish will bubble even at lower temperatures within 30 minutes to 1 hour.

Store the instrument in a controlled temperature area if possible, ideally between 60-75 degrees and 45-65% humidity. This will prevent the fragile top from cracking due to expansion and contraction of the wood. A good rule of thumb is if you are comfortable, so is your instrument. Do not store the instrument case near a AC vent or radiator. Most cracks occur due to sudden changes in humidity. A humidifier is especially important for musicians that travel. The average relative humidity in varies widely from city to city.

Do not attempt any repairs by yourself. Home repairs only make the problem more difficult and more expensive to repair by a professional.

If the instrument is damaged, don't fuss with it. Place it the case and take it to a reputable shop as soon as possible. A clean crack is easiest to repair.

If the bridge collapses, loosen the strings and place a cloth under the tailpiece to prevent damage to the varnish. Remove the bridge and take it to a violin shop.

How to Clean a Stringed Instrument—Properly

This seemingly trivial task can lead to big savings when executed correctly

By Erin Shrader

Ask violin maker James McKean, author of *Common Sense Instrument Care*, about the use of cleaners, polishing, and even having your instrument professionally cleaned and polished, and his advice is straight from the hip: “Avoid it at all costs,” he says. “The best approach is to stop the dirt from building up in the first place.”

Just wipe off rosin and sweat with a very soft, well-laundered cloth when you’re done playing, or more frequently, McKean says. Do it every time and nothing more is required to maintain the finish on your instrument. The virtuous and conscientious can stop here and add a gold star to their practice charts. However, if excessive rosin, sweat, and dirt have built up—due to circumstances beyond your control or because of some misstep—read on.

Like virtually everything to do with stringed instruments, information about cleaning seems to conflict and expert opinions contradict. Some dealers market attractive little bottles of cleaners and polishes to their customers while other shops refuse to include them in their inventory. One expert will advise an annual French polish while another shudders at the practice, since these substances can soften the uppermost layer of the varnish and add a new layer of shellac and oil.

Some of the apparent contradictions have to do with the number of variables involved. For example, a solvent that would leave most violin varnishes unharmed might dissolve the finish on a mass-produced instrument.

“Then there’s the question of how settled-in the varnish is,” pipes in violin maker James Wimmer of Santa Barbara, California. “It gets fairly impervious once it’s hardened into what it’s going to be.”

The next question is just what’s in those attractive little bottles. “You cannot know what’s in a polish, and they don’t label them. It could be anything,” says maker Joe Grubaugh of Petaluma, California. Most contain highly-processed waxes, some with a slight abrasive, he says. Others contain silicone, which goes down into cracks, preventing them from ever being repaired. At best, polishes sit on the surface and absorb dirt. A simple buffing with a clean cloth will produce a subtle shine that no polish can imitate.

“Commercially available cleaners don’t work—if they did they’d be dangerous,” says McKean, who points out that alcohol, the solvent for rosin, is the same as for varnish. Most cleaners are a combination of wax and linseed oil, he says, which will build up and harden over time into a second varnish that obscures the original coat and is very hard to remove. Other possible ingredients include turpentine, acetone, alcohol, talc, and something to make it smell good.

David Bonsey, a violin maker and instrument specialist at Skinner’s auction house in Boston,

believes some commercial cleaners can be used safely, if used as directed. His personal formula is still marketed by a former employer. “You have to shake the bottle,” says Bonsey, noting that ingredients can separate and the most astringent may be the first to reach your varnish.

Most of the commercial products sampled by *Strings* came with no instructions at all. Those that did were minimal, saying nothing, for example, about the dangers of the contents separating or getting the product into cracks.

Surprisingly, one of the most common, and certainly the most readily available, solvents is spit, which is also used in fine-art restoration. Spit will dissolve anything eventually, acknowledges Bonsey, who was not the only expert to suggest it.

A LITTLE BIT OF LOVE

Wimmer uses Hill cleaner when necessary. He applies it with cotton balls, rubbing until dry and then wiping away the residue with a clean rag, assiduously avoiding cracks and openings. “Not too much elbow grease, though. Especially in the wings.”

As they said in the German shop where he trained: do it “mit liber”—with love.

But McKean advises against attempting to clean your instrument yourself. Too many things can go wrong. During cleaning, the top layer of varnish can soften and become tacky, leading to “more rag left on the violin than dirt on the rag,” says McKean. “It takes a practiced eye to know where the dirt ends and the varnish begins.”

Even a “practiced eye” can be a bit heavy handed for some makers’ comfort. Another reason expert advice can seem contradictory is that a new ethic has started taking hold in the trade. Joseph Grubaugh, who helped organize the first violin makers’ seminar on surface finishes at the Smithsonian Institute, says that the fashion for shiny violins is a 20th-century aesthetic. He speculates that the high-gloss look came in with the heyday of the automobile, around the 1920s. “That’s old school now,” he says. “new school is, ‘Don’t do that!’”

That new school approach reflects the appreciation collectors have for the unsullied look of vintage instruments. “The modern ethic started with Beare’s shop,” adds Grubaugh, referring to the influential J & A Beare’s violin shop, which routinely handles classic Italian instruments. A Strad that has never seen a “clean and polish” has a sensuous, subtle luster. It also has virtually all of its varnish.

“Slowly people have caught on to that,” Grubaugh says. “For the longest time in this country people would do a French polish, shine ’em up.” French polishing adds a layer of shellac, sandarac, and oil to the surface. It’s a procedure that does make a wooden instrument shiny, but it also bonds with and debases the original varnish.

Historically, some of the most famous shops were the worst offenders. “If the original varnish is what’s so special about the old instruments, why would you want to do that?” puzzles McKean.

BUILT TO LAST

Simply keeping your instrument clean before dirt and grime build up is the safest, most economical approach. McKean prefers soft cotton rags made from old t-shirts or handkerchiefs. Some makers also like the new micro-fiber cleaning cloths, whose tiny fibers are woven into hooks and loops designed to absorb dirt without added products. Whatever you choose, keep a supply on hand to cycle through your case and into the wash.

Players with aggressive perspiration should clean it off fast, says McKean. The salt it contains is corrosive, eating away varnish, wood, and even strings. "Wiping off the sweat should be good enough for most people," he says. "If it's like raindrops—those spots on the surface—a Kleenex lightly moistened with hot water will take off the salt without damaging the varnish. But be gentle and quick."

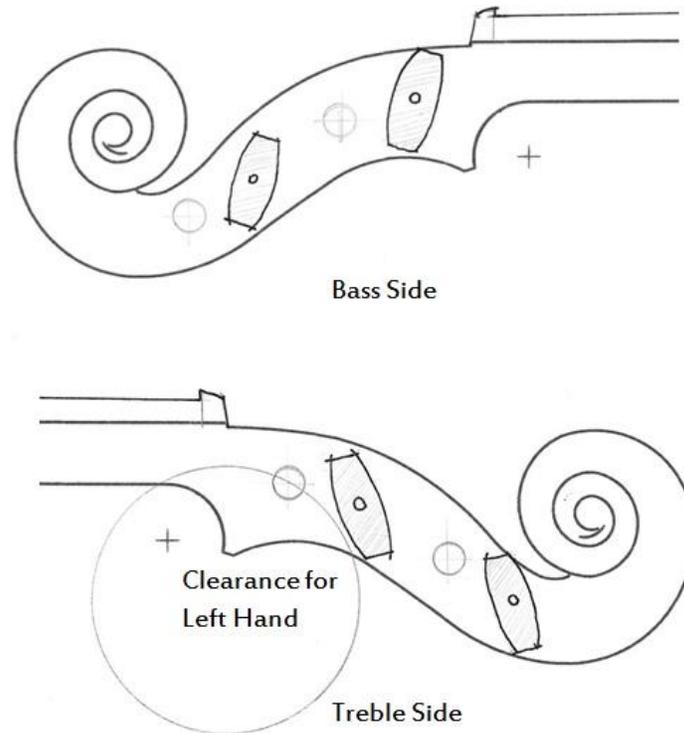
Varnish will wear in certain places just from normal playing, especially on the heel of the neck and the lower rib of the upper bout on violins and violas where the hand touches when playing in the upper positions. McKean advises keeping an eye on such spots and having them retouched before exposing the bare wood. For players with aggressive perspiration, it is possible to add a protective plastic film that doesn't harm the varnish as a barrier.

Tom Sparks of Indiana University suggests taking a lesson from the previous generation of players. As head of the violin-making program at the school of music, Sparks has observed the cleaning ritual of the older string faculty for decades. At the end of the day they will sit down and clean their instruments, winding down and chatting as they work. First they clean the strings and fingerboard with a chamois, then clean the chinrest. With a soft cloth they wipe away the rosin, carefully inspecting the whole instrument before putting it away and closing the case. "It's a relationship," he says, "and they're mindful of the relationship."

"It's not your violin. It was not created for you," Grubaugh says. "You're just the caretaker 'til the next guy comes along. In fact, you probably have it because some other guy took care of it. In this throw-away society, this is something made to last."

Pegs

- When the instrument is strung, ideally the pegs should have the orientation shown below after the strings are at full pitch. The vertical position aids in tuning and on the E-string peg, allows for maximum clearance for the left hand to perform vibrato in the first position. The orientation can be achieved by extending the string a couple of millimeters more or less through the string hole in the peg, as long as the string has completely passed through the peg shaft to avoid slipping.



- The pegs should fit the peg-holes perfectly to make turning them smooth and prevent the walls of the peg box from cracking.
- Pure chalk (non-powderless) may be used to help a slipping peg stick. Hill brand peg compound sparingly applied will assure a smooth turning peg. I do not recommend liquid Peg Dope.
- The peg shafts should not be allowed to become too thick in diameter. It becomes hard to turn and risks damaging the peg wall. This happens after several sets have been installed over time, due to the holes being reamed. If it seems that the shaft is too thick, consult a violin maker to see if the peg hole should be bushed and smaller diameter pegs installed.

Cases and Hygrometers

- A good violin case should have pads that suspend the top and bottom of the violin body above the bottom of the case and have a Velcro strap to secure the neck. The scroll should not touch the bottom of the case, as well.
- A silk violin bag is great for keeping the violin varnish safe from dust from the bow.
- A celloist friend of mine covered her cello in a T-shirt, with the neck extending through the neck collar! You can even get silk T-shirts.
- The hygrometers supplied in cases are pretty much useless. They give widely variable and inaccurate readings. It is best to purchase a hygrometer and humidifier system separately from the case. I recommend the Stretto brand humidification system with a digital hygrometer. The humidifier has a replaceable silicon pouch that is periodically soaked in water. It releases moisture into the case enclosure in dry conditions and soaks moisture in humid conditions. The ideal humidity ranges between 45 and 60% relative humidity.



Stretto Humidifier System

Causes of Buzzes

By Erin Shrader – Lutherie Editor: Strings Magazine

Buzzes always seem to happen at the worst possible time. My most recent buzz started on the eve of a recording session, just as spring was giving way to summer, when the temperature suddenly shot up and humidity plunged. I went through the mental checklist, peering closely and prodding cautiously. Nothing suspicious . . .

Many things can cause an instrument to buzz. Some are easy to spot once you know what to look for, while locating others can bedevil even the experts. Buzzes fall into two broad categories: the ones you fix yourself and the ones that need professional attention.

The advice from violin maker and restorer Jeffrey Holmes of Ann Arbor, Michigan, to anyone experiencing a buzz is to first check for the obvious and then adjust the humidity in the instrument's environment to an appropriate level. "At 20 percent or 30 percent relative humidity, you may as well play a percussion instrument," Holmes says. "At 40–45 percent humidity, [the buzz] often goes away."

Maintaining adequate humidity for your instrument is always a good idea and can ward off trouble before you can hear it. Humidifying (or dehumidifying) the room you keep your instrument in is probably the best option, Holmes says. He views case humidifiers as "a remedy, not a cure," but says, "doing nothing is a bad thing."

Here's a checklist of other common and uncommon causes of that most annoying of sounds. I'll start with the easy stuff and work my way toward the issues that require a visit to the repair shop.

Fine Tuners

Strings, fittings, and accessories cause the majority of buzzes. Fine tuners are prime suspects. Make sure no screws are loose. Some models have parts that screw together in addition to the screws that adjust string tension. Make sure the screws are engaged with the little levers underneath the tailpiece, and, while you're looking under there, make sure they're not too close to the top of your instrument. If your tailpiece has a raised wire or wooden fret across which the strings ride, check that it is not loose. If it is, a little glue should do the trick.

Chin Rest

While you're in the neighborhood, check the chin rest, another usual suspect. Can you wiggle it? If so, it needs to be tightened. You need the right tool, but the good news is that chin rest tools start at about \$2. First make sure that the cork pads that protect the instrument from the chin rest are intact. Make sure not to overtighten, which can cause serious damage.

Strings

On to the strings. Some of the higher strings come with a little plastic sleeve or chamois that is intended to prevent the thinner strings from cutting into the bridge. Those can rattle and buzz. Bridges sometimes have a little slip of parchment glued over the E-string groove for the same reason. That can work loose, too. The culprit could be loose windings at either end or strings contacting each other inside the peg box. Too-low strings can rattle against the fingerboard, Holmes says, and fall into the category of things that need professional attention. This problem may be caused by changed height of the neck due to environmental fluctuations (dry winter months), or the strings may work their way down into the bridge or nut, which would require the attention of a repair person.

Open Seams

Your instrument is held together with hide glue, a natural glue that is very strong, easily reversible, can last for centuries, and breaks under stress. This is a good thing because the glue breaks instead of the wood. Stress can be caused by impact and also by shrinking and swelling due to changes in humidity. Open seams between the plates (top and back) and the ribs are common and easily glued. If you can't see the open seam, you may be able to hear it by lightly tapping or brushing your thumb off the edge all the way around the instrument. The sound is different where the glue is broken. Resist the temptation to wiggle it or poke at it. Sometimes an open seam is hard to spot because the very outer edge of the glue is still intact.

Holmes also points out what he refers to as open flank cracks (cracks in the flanks of the arch, which are not under the same kind of tension as those near the bridge area).

Open f-hole cracks are another possible cause of a buzz.

Other items that can come unglued include the ebony saddle over which the tailgut passes, and purfling.

Other Causes

Holmes came up with another easily overlooked item: "crud in the f-holes." The points of some f-holes come very close to the body. Occasionally, rosin and dust will build up in the gap, forming a little bridge which then breaks and buzzes. The ornamental collars and little balls on certain styles of pegs also come loose and buzz. The tailpiece has several small parts that may cause a buzz. There is a metal collar piece for the tailgut ferrule. The tail gut should not extend beyond the ferrule. The extra length can vibrate against the wood of the tailpiece.

Bass Bar (very rare! –RH)

The bass bar, glued inside the top, is often thought to cause problems, but according to Holmes it rarely does. He's found that a loose bass bar caused a buzz only once in the 25 years of his career.

Past Problems

Even aging repairs can be a source of trouble. Cleats, used to reinforce cracks from the inside of the plate, can come loose and buzz, as can the linings and edge doubling restorations. Insect, or "worm damage," if not properly filled, can rattle and buzz internally.

So next time you hear that unmistakable buzz, keep in mind that there are any number of possible causes: sometimes it just takes perseverance to identify the right one.

Chinrests 101 by Lynn Denig, contributor to Strings Magazine

Ask string players why they chose their chin rest and many will reply that it came with the violin or viola when they bought it. Unfortunately, many instruments are sold or rented with chin rest models that fit relatively few people. But by playing with a generic chin rest that “works for someone else” or “came with the instrument,” a player may miss an opportunity to improve technically or to prevent physical problems. In fact, a well-fitted chin rest can help to facilitate better posture and support of the instrument in an ever-changing balancing act between the collarbone and left hand. But ill-fitting chin rests can cause such problems as clenching and aches and pains as well as sores, due to constant pressure of one small part of the chin rest against one part of the neck.

Signs of Discomfort

Ill-fitting chin rests can cause players to look right and tilt their heads left while simultaneously reaching forward with their heads, in order for the jawbone to secure the instrument. These positions can cause neck aches, headaches, and other injuries as the player compensates for the unnatural head position. In addition, rather than adjust the setup of the instrument, players often adjust their technique in order to make the instrument feel secure and minimize discomfort.

Other signs that the chin rest might not be the best fit are when players allow their instrument to “droop” out of position or play with the chin positioned over the crossover piece of a rest with the “plate” or “cup” to the left of the chin. In this instance, the player is trying to use the crossover piece as a ridge to secure the instrument, probably in response to a chin-rest shape that curves up from the player’s neck, such as the popular Guarneri model.

So what’s a player to do? The search for a good-fitting chin rest starts with a trip to a violin shop. Finding a chin rest whose shape best suits you may require that you play through many of the dozens of different types of rests. Also, specific models of chin rests, but by different manufacturers, can have variations in shape. This is good in that there are more shapes available to fit more jaws. But these factors make online shopping impractical.

Here are some guidelines to help you find the best fit:

Jaw Shape & Neck Length

Chin rests that fit the two key dimensions of height and jaw shape can allow the head to serve as a counterbalance to the weight of an extended bow arm. This balance can keep the neck and shoulders healthy. The head will feel relaxed and players may say that they have never felt so comfortable.

No two jaws are the same shape, but some jaw types match best with certain chin-rest styles. For instance, round, fleshy jaws are the only ones suited to a flat plate and a long, low ridge across the back of the chin rest. Rests with a higher ridge are favored by players with a long, thin face, while the Brandt model is a comfortable fit for a variety of jaw shapes.

A chin rest that exhibits a downward slope from the rear of the rest will direct the chin pressure toward the neck, providing good leverage.

To avoid skin irritations created by the jawbone pressing on the ridge, the contour of the chin-rest ridge should be lower under the ear and higher on the right side, fitting the jawbone and pulling the instrument in while providing stability and a feeling of security.

The Right Height

The proper height for a chin rest is one that leaves a gap of about one finger-width between the top of the rest and the jaw when the eyes are looking forward (and not looking up or down). If one must nod down in an exaggerated fashion to touch the top of the chin rest, it is too short. If the nod is too shallow, the chin rest is too high.

Sound & Technique

Here's a tip: a well-fitted chin rest can be raised to the right height by adding a riser or lift made of cork. Depending on the density of the cork, a piece about 2 mm in height can be glued to the bottom of a chin rest without destabilizing it. Other variations of raised chin rests can be seen at chinrests.com and violinistinbalance.nl.

Flexibility & Placement

Another factor to consider when selecting the proper chin rest is the flexibility of the left shoulder joint. Players who are flexible in this joint often prefer the chin rest placed to the left of the tailpiece. A player who has less flexibility, or narrow shoulders, may prefer a chin rest that reaches slightly over the tailpiece. Due to the breadth of the instrument, violists, who must balance out the weight of the instrument, tend to prefer a chin rest that extends slightly over the tailpiece.

A well-fitted chin rest adds a sense of security when shifting down or when performing vibrato—two techniques that can cause a lot of insecurity. There also are health benefits: with the proper chin rest, the bulk of the instrument's weight is transferred to the collarbone close to the spine, the body's natural support system. The left collarbone is then freed to move and static tension is avoided—oftentimes, with the proper chin rest, a player may experience for the first time the sensation of being able to move the left arm to the left and right. Also, because the weight is now close to the body, the instrument feels lighter to the left arm and scroll height automatically improves.

There is one additional benefit to sound production: with the proper chin rest, instrument placement on the collarbone next to the neck can allow the violin or viola to create a more ringing sound.

The Relationship of String Tension to Injuries and Pain

By Horst Kloss – Geigenbaumeister Boston, MA

Pain due to muscular-skeletal injuries are all too common among musicians and string players are especially susceptible. While the source of these injuries are varied, many of these problems can be attributed to excessive string tension due to the improper maintenance and adjustment of the musician's instrument.

Often, the cause of these injuries is the distance of the strings to the fingerboard. While the pressure exerted on the string may contribute to injuries, a precise measurement of the pressure required to press the string to the fingerboard is impossible to obtain. This is because the pressure needed to produce a desired sound varies widely with factors such as the instrument's construction, set-up, environmental conditions along with the size, strength, and personality of the musician.

Nevertheless, to reduce the occurrence of injuries and pain, string players should be aware of several accepted measurements in the set-up of the instrument that affect string tension. Some of these factors can nearly double or halve the amount tension on the player's fingers. These factors are outlined in the following.

String / Fingerboard Dimensions

Average height of string at saddle edge (to lower edge of string)

	E String	G String
VIOLIN:	.3 mm	.5 mm

	A String	C String
VIOLA:	.5 mm	.75 mm

CELLO:	.75 mm	1 mm
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Average height of string at end of fingerboard (to lower edge of string)

	E String	G String
VIOLIN:	3.6 mm	5 mm

	A String	C String
VIOLA:	4.2 mm	6.2 mm

CELLO:	6.5 mm	7.8 mm
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These dimensions may be higher or lower for many reasons.

10 Factors Which Affect String Height and Tension

The amount of string tension dictates the amount of pressure needed to depress the string onto the fingerboard. All of these factors impact upon a player's ability to play effortlessly and without injury. When choosing string the string type, thickness and pitch, there must be a carefully considered match between the amount of tension desired for the performance and the physical or medical constraints of the player and their instrument.

1. Humidity

As humidity increases, the top of the instrument expands upward and moves the bridge away from the fingerboard. The string height is increased dramatically, even double. If this occurs, a summer bridge is required to readjust the distance between the strings and the fingerboard.

2. Dryness

With lower humidity levels, the top of the instrument contracts. The bridge is affected and the height of the string above the fingerboard decreases. At times, the bridge may be so low that the strings will rattle. A higher winter bridge is needed to correct this condition.

3. Thinner Strings

Thinner strings reduce tension. They are typically called: dolce, soft or weich. They are available in gut core, synthetic core and chrome core.

4. Thicker Strings

Thicker strings increase tension. They are called: orchestra or stark.

5. String Type

Gut Core: Least amount of tension. Gut is the most elastic core material.

Synthetic Gut Core (Nylon, Perlon): More tension. Produces greater tonal brilliance.

Steel Core: Most tension. Least elastic core. Produces the most brilliant sound.

6. Raising the Pitch of A above 440Hz

Raising the pitch of A to a pitch above 440Hz raises tension. Many orchestras and performers raise the concert A pitch above 440Hz to project a more brilliant sound.

7. Too Steep Neck Angle

When the neck angle is too steep (above 97 degrees), the string tension is increased. The neck should be reset to the standard angle.

8. Excessive Concavity of the Fingerboard

When a fingerboard is planed with too much concavity (scoop), the string tension increases due to the extra distance needed to stop the string. The fingerboard should be re-planed to the correct degree of curvature: 1mm deep at the G string and .5mm deep at the E string.

9. Tight Soundpost

The violin's top and back contract with decreases with lower humidity levels. Accordingly, the inside distance between the top and back decreases and the soundpost may become too long. The strings will become very tight. To produce specific tonal qualities, one may loosen or shorten the soundpost. This is rare, however.

10. Compensatory Tightness

Tension is increased when strings are raised above the normal height at either the saddle or bridge for the purpose of achieving greater brilliancy or to gain an "edge" to the sound. This is also done when the fingerboard isn't concave enough, the soundpost is too short or to compensate for other defects in the instrument.

Care of the Bow

- Never tap the bow-tip on anything. Don't "applaud" by tapping the music stand. Pernambuco wood has a very tight grain structure. This makes it very strong under tension with excellent "memory," but it is easily fractured. The wood can even have a deep hairline fracture that is invisible until it ultimately fails long after it was originally damaged. Bow tips have been known to spontaneously fly apart, to the surprise of the owner, not realizing the *coup-de-gras* occurred days before without incident.
- Always loosen the hair after each use. This will prevent the stick from pulling to one side and requiring straightening or re cambering. Loosen it just enough to take the tension off the stick. Hairs that are too loose might snag on a bow spinner or other object.
- Generally avoid the urge to rosin too often, but when you do rosin, apply it lightly with a few even strokes from one end to the other. Do not end each stroke by vigorously stroking quickly at each end of the bow. It only takes a few long, smooth strokes to complete rosining. It is usually only necessary to rosin the bow about once a week with regular use. Contrary to what is commonly believed, *there are no barbs or hooks on bow-hair to wear off despite what some musicians or teachers may tell you. It is not necessary to re-hair a bow until too many hairs have broken off. I know of professional players who have used the same hair for 20 years. If the hair gets dirty, the bond between the horsehair and the rosin diminishes. You can then clean the hair to its initial condition and it's as good as new.*

Norman Pickering - July, 1994, Bulletin of the Southern California Association of Violin Makers

- Only use a round cake of rosin and vary the rubbing pattern to avoid wearing a groove in the cake. Rectangular rosin cakes with worn grooves put pressure on the side of the hair and bow, damaging them.
- Wipe rosin off the bow stick and strings after every use. Use a lint free cotton cloth that is used only for this purpose. Use a separate cloth to wipe the violin otherwise you may rub rosin onto the varnish, damaging it. Some use alcohol to clean the strings, but it risks dripping alcohol on the varnish, causing irreparable harm. A cloth will work just fine if used every day.
- Fine bows should be repaired only by an experienced bow-maker/restorer. File marks caused by a poor repair can significantly reduce the value of the bow.
- Re-hairs: See **"When Does My Bow Need Re-hairing?"** by Lynn Armour Hannings on the following page.

Useful Bow Information

Bow Hair

Bow hair should grab the string quickly and respond to the player's minute application of pressure on the string. It should also stretch. Old hair will break quickly.

- Unbleached Mongolian Hair: sorted 3 times - This is an excellent all-purpose hair. It does not stretch very much and for professionals is excellent for outdoor performances.
- Unbleached Live Stallion Hair: sorted 3 times - The best hair available for professionals. It is harvested from live horses and thus retains its flexibility. Flexible hair responds best to the player's bow-hand.

Mixed black and white hair is good for bass bows. All black should not be used. Good quality hair should be washed thoroughly before it is used for re-hairs.

MUSICIANS DO NOT HAVE TO SUFFER!

A poorly balanced bow can be a cause of musician pain and injury. Two factors that affect the balance of the bow are cambering and the winding material. The following winding materials are used in order of weight, heaviest to lightest: Gold, Silver, Whalebone, Tinsel, Silk

Balance is more important than weight in the playability of a bow. A properly balanced bow can feel heavier than a bow that is actually heavier.

Mass produced bows are not graduated for proper balance. The balance can be readjusted by using a different winding material or adding a small piece of lead tape under the leather.

Leathers: Moroccan goat leather is an excellent all-purpose leather. Lizard skin leather is best for "hard grippers."

Balance Point

How to measure the balance point on a bow:

Position the frog fully forward

Balance the bow stick on the index finger

Measure the distance from the finger to the end of stick (excluding the screw)

Acceptable ranges of weights and balances

	Balance Point	Bow Weight	Ideal or Average
Violin	8 ½" – 10"	58 – 63 grams	9 ½" : 60 grams
Viola	8 ½" – 10"	67 – 71 grams	9 ½" : 70 grams
Cello	8 ½" – 10"	78 – 94 grams	9" : 80 grams
Bass F	7 ½" – 9"	135 – 145 grams	N/A
Bass G	7" – 8"	125 – 135 grams	N/A

When does my bow need rehairing?

By Lynn Armour Hannings - Bowmaker Portland, ME

A checklist:

- Many broken hairs from the playing edge (playing on it in this condition will cause warpage)
- Increased need for rosin to get the necessary grip (you'll see it on the instrument as well)
- Hair length wrong for the season:
 - Too short—very dangerous to the head and camber;
 - Too long—very dangerous to the end of the stick and the button
- Something contaminates the hair (oils from the hand, polish; a bow came in recently smelling suspiciously of peanut butter)

I recommend re-hairing every six months (professionals as often as necessary)—that correspond with one dramatic weather changes .

Bugs in your bow case can eat bow hair: the bow will need to be re-haired and the case will need immediate attention. Vacuum out the case and store cedar blocks or a few drops of lavender essential oil. As a rehairer, I do not allow the old black "coffin" cases into my shop. The felt lining seems to attract these small, hard shelled bugs that will very quickly destroy the bow hair.

What is a good rehair?

- Fresh and responsive, unbleached horsehair
- Hair spread to the full width of the ferrule
- Even-tensioned hair (not looser on one side or the other)
- Hair length appropriate to the season:
 - Winter: longer hair to allow for shrinkage
 - Summer: shorter hair to allow for stretching
- Hair length that allows for the hair to be loosened to remove tension from the stick when not in use, to avoid warpage

A good re-hair is not overloaded with hair—putting more hair than just an even band at the ferrule endangers the fragile head and frog mortises, and has a dramatically negative effect on sound production. There is ample evidence from scientific study and personal experience that proves more hair = less sound—as the sound is quieted by the layers of hair. The sound is without clarity and elasticity needed for quick response.

...in response, the frustrated musician applies more rosin, exacerbating the problem.

Exploring the Facts and Folklore Surrounding Rosin

By Erin Shreder, Lutherie Editor - Strings magazine

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What does a string player really need to get down to business? An instrument. A bow. Everything else is a mere accessory. Right? Well, not quite. Without rosin to facilitate the dance between strings and hair, you're out of business: no rosin, no music. It turns out that the most humble, least expensive item in your outfit is the secret ingredient that enables the bow hair to engage the string.

Given rosin's central role, there is surprisingly little information about the stuff, aside from marketing copy. Rosin makers are as tight-lipped about their recipes as world-famous chefs, and no studies have been done on how different rosins sound or feel to the player, or even on player allergies to rosin. So how is a poor musician, peering at all the colorful little boxes and bundles in the violin shop, supposed to figure out which one to buy?

The short answer is, whichever one works for you. Some musicians perceive significant differences among rosins, while others are simply not picky. Ultimately, each player's experience is subjective and preferences are highly personal.

"In general, any of the major brands are good," notes Norman Pickering, a giant in the world of violin acoustics. The rosins that work best break up into tiny particles, coating the hair with a thin, uniform coating. "Small particles stick to hair better. It's the larger ones that fly all over the instrument and do no good at the string."

Pickering, who is also a violist, finds the difference in physical action among the major brands to be negligible.

According to Pickering, and many others in the violin business, most people use far too much rosin. "Ninety-nine percent of the rosin falls on top of your instrument. So I use very little," says Fan Tao, a violinist and head of research and development for D'Addario Strings. An avid player, Tao has barely scratched the surface of a rosin cake he started nine years ago and has never needed to have his violin cleaned.

While it's crucial to use enough rosin, over-rosining to get a better grip or improve the tone often has the opposite effect. Bow maker Michael Vann is fond of the following demonstration. He asks a violinist to play for him, perhaps a passage of Bach, and then asks to see the bow. He removes much of the rosin with a soft, clean cloth, and then asks to hear the same passage. Says Vann, the player is always surprised at the bigger, more beautiful tone that ensues with less rosin. He also points out that vigorous rosining, rather than working rosin into the hair, actually melts rosin into a glassy coating on the hair.

What Rosin is Made Of

The main ingredient in instrument rosin is a hard, friable resin distilled from tree sap, usually pine. Larch, fir, and spruce work, but are less prolific, so their resins are more expensive. According to the rosin maker Petz, sap collected early in the spring makes a lighter-colored resin while sap collected later in the year yields the darker stuff. Some dark rosins, however, have color added.

Rosin formulas frequently do include other ingredients, but this is where the information trail abruptly ends. Aside from whatever ingredient is touted in the marketing copy, rosin makers remain mum about their formulas.

One of the best-advertised additives is gold. Many players swear by its ability to produce a warm tone. Asked his opinion of metallic rosins, longtime violin dealer David Kerr of Portland, Oregon, says, "Personally I think metals do nothing to enhance performance and metal dust, I am sure, is bad for varnish.

"Just think what you are doing when you try to wipe the rosin off your violin."

"Pure rosin is all that is needed for good bow adhesion, but is slow to apply," Pickering says. "Additives like beeswax and pitch help [with application], but do not improve the quality of the rosin."

Bow maker and violist Stephen Salchow, of Salchow and Sons in New York, adds that wax will make rosin stickier, a characteristic often appreciated by bassists, who do require more rosin than violinists.

Salchow rosin, developed by Stephen's father, bow maker and cellist William Salchow, is one of the simplest on the market. Resins for their light and dark varieties come from different trees in two different countries. The light resin is simply heated and poured into molds, while the dark has some additional color dissolved in turpentine.

Stephen Salchow doesn't notice much of a difference between the two.

Exceptions to the "Rules"

Opinions, advice, and conventional wisdom about rosin abound. But for every rule of thumb, it's easy to find a ready exception to the rule. The differences between light and dark rosins are most commonly discussed among players.

Light is reputed to be harder, less prone to melting, and preferable for treble instruments. Dark is supposed to be softer, more likely to melt, and better at "grabbing." But you can't tell by color alone. Some dark rosins are really light rosins that have had color added, and other ingredients can be contributing to the experience of how the rosin sounds or feels.

Musicians are sometimes advised to use rosins designed specifically for their instruments or climate. Liebenzeller rosin is sold in six gradations of hardness for specific instruments, but Jade rosin comes in just two grades: bass, and everything else. In general, bassists are known for liking dark, sticky rosins, but Salchow was surprised to meet a Japanese bassist living in Germany who uses only Salchow Light, the antithesis of a "bass rosin."

As for the concept of seasonal rosins, Salchow points out that the weather conditions are quite extreme in his native New York City, but he has never noticed a need to change rosins seasonally. Bow maker (and bassist) Peg Baumgartel "starts" freshly haired bows with a medium rosin, neither light nor dark. "It works well in either humid or dry," she says, "or hot or cold climates."

Some players are extremely concerned about mixing rosins, says Julie McKenzie of Johnson String Instruments in Newton, Massachusetts. She has had clients who won't draw a bow on a string that has a second type of rosin on it. Others borrow or try out rosins with impunity.

Baumgartel has found one case in which mixing doesn't match: "It has been my experience that when a metallic rosin, such as 'gold,' is mixed with other nonmetallic rosins, bow hair can become slippery feeling."

While many knowledgeable musicians aren't picky about rosin, some players are simply more sensitive to differences. "I have noticed that different rosins can completely change the sound of instruments," says Baumgartel, who warns not to try out too many different types of rosin at once. "Too many different rosins loaded into the same hair can cause problems, such as a gritty sound with a lot of surface noise."

Instead, she suggests experimenting slowly, taking time to evaluate the differences, and keeping a log of your impressions.

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