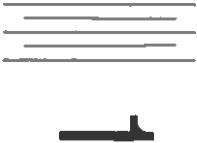


The String Instrument Family



INSTRUMENTS

Instruments in the modern string family include bowed, plucked, and hammered strings. The bowed string family instruments include violin, viola, cello, and double bass. The plucked string family instruments include the guitar, harp, and harpsichord, whereas the piano belongs to the hammered string family. There are also folk instruments such as the dulcimer and banjo that are plucked and, in the case of the dulcimer, are also hammered.

The focus of this book is on the bowed string instruments. Although there exists another body of bowed instruments that includes viols and gambas, the focus is placed only on the modern bowed string instruments. Those instruments are the violin, viola, cello, and double bass.

The best modern bowed string instruments are made of wood; however, other types of materials, such as carbon fiber or fiberglass, are being used to produce student-grade instruments. Laminated wood is also used in the production of student-grade cellos and double basses. High-grade, evenly narrow-grained resonant pieces of spruce are used to make the tops of stringed instruments. Generally, a single piece of wood is split in half to make a top for any given string instrument. The back and sides of most instruments are constructed of maple; the fingerboard, nut, saddle, inlaid purfling, pegs, tailpiece, and end button are usually constructed of ebony.

History of the Modern Bowed String Instruments and the Modern Bow

It was a long-held belief that the violin, viola, cello, and double bass had a direct developmental relationship with the viol. This belief has changed, and it is now more commonly held that our modern-day instruments developed around the mid-1500s in Italy. Although there may be some similarity between the instruments of the viol family and the violin family, differences in the construction of instruments from the two families are significant enough to now

hold that the modern-day bowed string instruments developed as a family of their own (Boyden and Woodward 2007). Undoubtedly it could be argued that the modern bowed string instruments were influenced by other bowed string instruments, as many of the makers of viols also made violins, nonetheless it is now widely believed that our modern instruments developed during the mid-1550s. A brief history of the modern violin, viola, cello, and double bass, as well as a concise history of the modern bow, follows.

History of the Violin

The classic "outline" of the violin became standard in Italy around 1550. It is thought that violin makers may have borrowed ideas for the violin from three stringed instruments in use prior to the advent of the violin: the rebec, the *viola da braccio*, and the *lira da braccio* (Holman 2007). The rebec was a small, pear-shaped instrument with two or three strings and a flat bridge or no bridge at all. The *viola da braccio* was a tenor viol or viola sometimes called an "alto" because its part was written in the alto clef. It usually had five or more strings, one of which could be a bourdon running off the fingerboard. The *viola da braccio* is usually depicted with either no bridge or a flat bridge. The *lira da braccio* had a similar shape to the violin, with seven strings, of which five were over the fingerboard, tuned like a violin with a low "d" added to the bottom, and was played with a bow. The other two strings were off the fingerboard, served as drones, and were usually tuned in octaves. They could be plucked, often with the left-hand thumb.

Although we often have only Ferrarese wall paintings on which to base our conclusions, it appeared that the Brescian violins conformed closely to the standard shape of what we now identify as the violin. One of the earliest explicit descriptions of the violin, as we now know it, appeared in the *Epitome musical* by Jambe de Fer, published in 1556 in Lyon.

Both Gasparo da Salo (1540–1609) and Andrea Amati (1500–1577) are credited as the first luthiers to make violins with the present shape. As with Gasparo da Salo, Andrea Amati was one of the famous Italian luthiers whose instruments still survive and are identified with the modern-day violin. The oldest surviving violin of Andrea Amati was made in Cremona in 1564 and is called the "Charles IX." Other members of the Amati family also made violins, including Antonio Amati (1540–1607), Hieronymous Amati I (1561–1630), Nicolo Amati (1596–1684), and Hieronymous Amati II (1649–1740).

The violin did undergo what are generally considered minor changes, including a longer and more tilted fingerboard, a longer and less bulky neck, a longer and heavier bass bar, a thicker sound post, and a mortised rather than a nailed and glued application of the neck to the block. Yet the instrument since the time of Amati has remained basically unchanged. In addition to the Amati family, other famous luthiers between the late sixteenth and eighteenth centuries included the Guarneri family of Italy, Andrea Guarneri (1626–1698), Pietro of Mantua (1655–1720), Giuseppe Guarneri (1666–1739), Pietro Guarneri (1695–1762), and Giuseppe (del Gesu) (1698–1744); Jacob Stainer (1617–1683) of Absam in Tyrol, Carlo Giuseppe Testore (1665–1716) of Italy, Carlo Bergonzi

(1683–1747) of Cremona, and perhaps one of the most famous luthiers, Antonio Stradivari (1644–1737) of Cremona.

History of the Viola

Whether we should credit the beginnings of the viola before those of the violin is not clear, but the viola came into existence in the early to middle sixteenth century, probably around or before 1530. Being the first in a long line of Cremona family members to become famous for their fine instruments, Andrea Amati (1500–1577) was one of the first luthiers to produce violas. Another important nucleus of luthiers was in Brescia. Gasparo da Salo (1540–1609) is perhaps the most noted luthier associated with the Brescia makers. Andrea Guarneri (1626–1698) was the first of another important family of luthiers to build fine, but few, violas. Antonio Stradivari (1644–1737), too, made few violas and is credited with making between ten and eighteen of them. One of Stradivari's violas was played by the famous violinist, composer, and guitarist Niccolò Paganini (1782–1840).

Like the violin, the viola underwent several modifications, including alteration of the neck, fingerboard, bridge, bass bar, sound post, and most important, the size. However, unlike the violin, which was thought to have reached acoustical perfection early in its development, the viola's development was, and some would argue still is, in transition (Milward 2004). As Romantic era composers Berlioz, Weber, and later, Wagner, began to write more demanding parts for the viola, there were attempts to improve the small viola or develop a new instrument entirely. Jean Baptist Vuillaume (1798–1875) experimented with the contralto viola and later in that century violist Hermann Ritter (1849–1926) developed his large "viola alta," which had a body length of 19 inches (48 cm). Ritter was one of the principal architects of modern viola-making, establishing the trend toward larger instruments. English violist Lionel Tertis (1876–1975) developed the 16¾ inch (42.6 cm) viola. The Tertis viola became the model for the full-size modern-day viola, and many makers are using this model for their instruments. But even today, the length of a viola varies, as does the body length, rib depth, and width of bouts. Full-size violas can vary from instrument to instrument with a range in size from 38 (15 inches) to 48 (19 inches) cm.

Established as one of the principal members of the new violin family by 1535, the alto-tenor violin (our modern viola) was not then called the viola. Around 1500, the word *viola* was used to refer to any Western classical bowed stringed instrument and could also have specific reference to the Renaissance fiddle or a *lira da braccio*. It wasn't until the eighteenth century that the term *viola* (also referred to as the *alto violin*) was equated with the term *viola da braccio* from the term *viola da braccio* (meaning the viola played in the arms), hence the German term *Bratsche* that is still used as the name for the viola today.

History of the Violoncello

The origins of the violoncello, commonly known today as simply the cello, has been somewhat difficult to trace. Its history begins with the bass violin. The

of the viol. Among Italian luthiers, however, examples of double basses with violin corners and curved backs exist.

The Italian double basses modeled after the violin family of instruments were generally larger than the German basses. Many of the double basses made in Italy had three strings. Some of the more famous Cremona luthiers known to have made double basses were Gasparo da Salo (1540–1609) and Andrea Amati (1505–1577).

Interest in the double bass seemed to languish in the 1700s. However, with the development of the overwound gut string in the 1650s, the size of the double bass could be reduced without sacrificing the contra octave sounding ability of the instrument. The “new, smaller” instrument regained some interest. Domenico Dragonetti (1763–1846), one of the great virtuosos of his time, established the bass as a permanent member of the orchestra. Giovanni Bottesini (1821–1889), another virtuoso, brought more interest to the instrument due to his expanded technique on the bass, which he showcased in numerous concerts.

Changes in the double bass included the number of strings used (which ranged from as many as six strings to three strings), the shape of the instrument (more viol-like shapes with sloped shoulders and flat backs versus the violin-inspired shape with rounded shoulders and curved backs), and the size of the instrument (from huge, 13- to 15-foot [396 to 457 cm or 4 to 4.6 meters] basses, which required two individuals to play them, to the modern standard orchestral double bass that is considered a 4/4 size instrument). Along with the physical developments came technical advancements and changes, which included changes to the bow/bow hold.

Two bow hold styles/bows are still used today: the German bow and the French bow. Franz Simandl (1840–1912) refined the so-called German bow. The German or Butler bow is sometimes called the Dragonetti bow, as the virtuoso used the underhanded bowing approach associated with this bow. It is typically broader and shorter than the French bow. The French bow was made popular by virtuoso Bottesini in the nineteenth century. Both the German and French bows continue to be used today, and the choice between the two is often a matter of personal preference. However, it is often thought that the German bow is easier to use for staccato, spiccato, and détaché bow strokes, whereas the French bow is often considered more maneuverable and provides the player with better control.

History of the Bow

A history of the instruments is not complete without at least mentioning the bow and its development. The use of a bow to play a stringed instrument has been traced back to AD 800 in China. It was believed that the erhu, a Chinese instrument thought to sound similar to the violin, was one of the first instruments known to have been played with a bow (Landson 2008).

The history of the violin bow is most often traced to the medieval period. Bows were used to play the rebec, *lira da braccio*, and medieval fiddle. The bows used in this period had a convex shape, resembling an archery bow where the curve of the bow moved away from the bow hair. These bows were often

rudimentary, with the hair fixed directly to the stick without a device to adjust the hair tension ("History of the Bow" 2007).

It wasn't until the Baroque period, around 1600, that bow development began to change significantly. Although the curvature of the bow remained convex, one development was the use of a plug to hold the hair in the bow tip. The hair was no longer simply tied to the stick. The use of a plug not only helped to hold the hair on the stick but it also allowed for the hair to be flattened, resulting in better playing control. Another advancement was the development of a separate block of wood for the frog in which the hair was held in place by putting it in a hole.

Initially, frogs did not have a screw to tighten the hair, as screws had to be made by hand, individually. Until screws were used a device called a *crémaillère* mechanism was used to tighten bow hair. The mechanism consisted of a metal loop that attached to the frog and a ratchetlike track that was placed on the top of the stick. The *crémaillère* mechanism enabled the player to tighten the hair using this loop-and-ratchet system. It wasn't until screw manufacturing was industrialized that they began to be used for tightening bow hair.

In the mid to late seventeenth century, from about 1760 to 1800, violinists sought to find ways to increase the sound of their instruments for the larger concert halls and to compete with new pianos that produced more sound. These challenges, as well as violinists' need to be heard over orchestras in concerto performances, prompted bow makers to experiment with the bow. Stick curvature remained convex, but bow length was increased, and stronger and lighter woods, such as pernambuco wood, were used. Bow tips became more rigid and less sloped than bows made previously.

In the 1780s, Francois Xavier Tourte (1747–1835) experimented with bow construction. Credited with the development of the modern bow, Tourte created a bow with a concave stick. This resulted in a stronger structure when the hair was tightened through use of a screw on the frog. The bow head was changed to a solid square tip, and the ferrule was invented. The changes in the bow allowed for greater sonority, power, projection, and dynamic range and encouraged a wider range of bowing techniques.

Parts of the Instruments

The terms used to label the various parts of the stringed instruments are universal for the violin, viola, cello, and double bass. Cellos and double basses do not have chin rests, but because they rest on the floor, they have endpins with adjusting screws, which the violin and viola do not have. The various parts of the stringed instruments are shown in Figure 1.1 and Figure 1.2.

Additional diagrams of the bowed string instruments can be found in the following websites:

1. "Parts of a Violin" (<http://www.google.com/search?hl=en&client=safari&rls=en&biw=1020&bih=606&site=search&tbn=isch&sa=1&q=parts+of+a+violin&aq=f&aqi=g3g-m2&aql=&oq=>) provides numerous photographs, with labels, identifying the various parts of the violin.

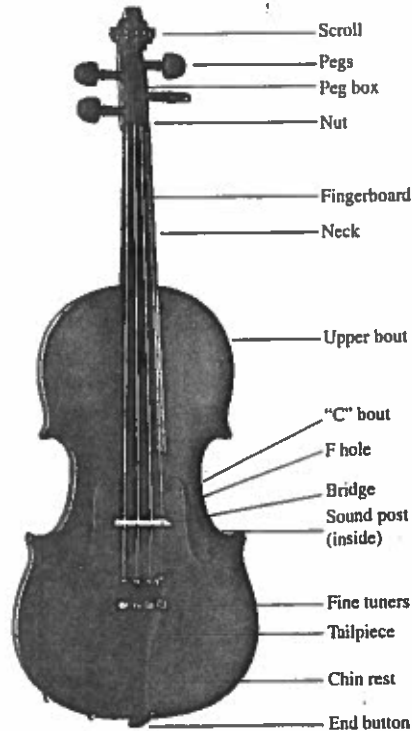


Figure 1.1 Parts of the violin.

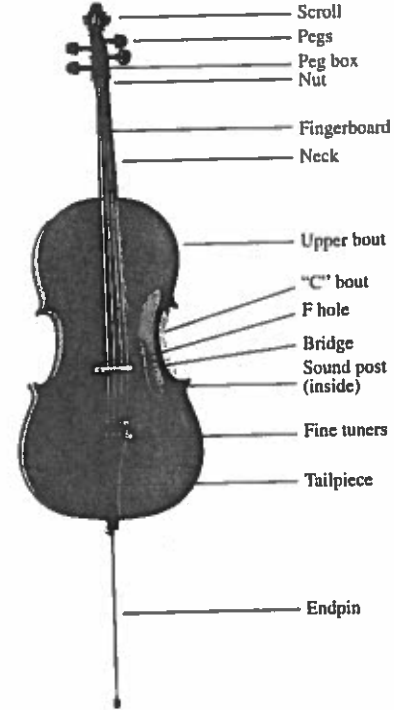


Figure 1.2 Parts of the cello.

2. "Violin: Parts and String Instruments" (<http://schoolworkhelper.net/2010/12/violin-parts-string-instruments/>) contains a clear and concise overview of violin parts including an inside view of the lower, corner, and upper blocks, the sound post, bass bar, and linings.
3. Provided in a video format: "Violin Basics: Parts of a Violin" (<http://www.youtube.com/watch?v=8a3UUHZq0JY&feature=BF&list=SPF25A0B3D099D4E76&index=12>) shows the various parts of the instrument such as the F holes, bouts, scroll, pegs, neck, fingerboard, bridge, and chin rest.
4. Another video: "The Parts of a Violin: The Top or Sound Board of the Violin & Its Functions" (<http://www.youtube.com/watch?v=T9YpkFTUcLE&feature=fvwrel>) reviews the various parts of the violin.
5. "The Parts of a Violin: About the Ribs of the Violin & How They're Made" (<http://www.youtube.com/watch?v=AN8jGw4DU18&feature=relmfu>) offers additional information on the ribs of a bowed string instrument, in this case the violin.
6. "Parts of a Viola" (<http://www.google.com/search?hl=en&client=safari&rls=en&biw=1020&bih=606&site=search&tbm=isch&sa=1&q=parts+of>)

+a+viola&aq=f&aqi=g1&aql=&oq=) shows numerous photographs of the various viola parts.

7. As with "Parts of a Violin" and "Parts of a Viola," "Parts of a Cello" (<http://www.google.com/search?q=parts+of+a+cello&hl=en&client=safari&rls=en&prmd=ivns&tbn=isch&tbo=u&source=univ&sa=X&ei=B7aLTdrqHY-4sQO-yNH5CA&ved=0CCsQsAQ&biw=1020&bih=606>) details the various parts of the cello.
8. "Parts of a Double Bass" provides excellent diagrams of double bass parts (<http://www.google.com/search?hl=en&client=safari&rls=en&biw=1020&bih=606&site=search&tbn=isch&sa=1&q=parts+of+a+double+bass&aq=0&aqi=g5&aql=&oq=parts+of+a+double>).

One of the major elements of a bowed string instrument is the strings. The strings are supported by an integral system of parts. On the bottom of the instrument is the button or end button. The end button is generally made of ebony and is inserted into the bottom of the instrument and then into the end block. The function of the button is to secure the tailpiece gut to the tailpiece.

The tailpiece gut is flexible and wraps around the end button. The tailpiece gut attaches directly to the tailpiece. At one time, most tailpiece guts were made out of gut. Today, tailpiece guts are generally made out of high-grade plastics.

The saddle helps guide the tailpiece gut over the top of the instrument to the end button. It adds additional support to the instrument and is generally made of ebony. The saddle is located on the top of the instrument underneath the tailpiece near the end button.

The tailpiece holds one end of the strings. It is often made of ebony. Often one or more fine tuners are attached to the tailpiece. The function of fine tuners is to help adjust string tension, which changes the pitch of the string. Double basses do not use fine tuners. In the video titled "The Parts of a Violin: About the Tail Piece & Tail Cord of the Violin" (<http://www.youtube.com/watch?v=0fTMRn7v7aI&feature=related>) a discussion of the function of the tailpiece and tail gut is provided.

The bridge supports the strings and is often made of a hardwood such as spruce. Vibrations travel through the bridge to the sound post, which helps produce the characteristic bowed string sound. The sound post sits directly behind the right foot of the bridge (the higher-pitched string side). The sound post is basically a high-quality wooden dowel. Sound is also enhanced by the bass bar located under the top of the left side of the bridge (the lower-pitched string side). In the video "Resources—How to Set a Sound Post" (<http://www.violins.on.ca/luthier/soundpost.html>) a diagram of the sound post as it appears within the instrument is shown.

The nut, made of ebony, supports the strings at the top of the instrument. The nut helps guide the strings to the pegs, which are located in the peg box. The ebony pegs rest in holes that are drilled in the peg box. Small holes are drilled into the pegs, through which the strings are attached. The peg box is ornately finished with a carved scroll.

The body of the instrument consists of the top, sides or ribs, and the back. The top and back of higher-quality bowed string instruments have an inlay

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referred to as purfling. Purfling helps prevent cracks from beginning at the edge of the top or back and traveling farther than the purfling. Purfling is located near the edge of the top and back of the instrument. Purfling is also considered ornamental. F holes are cut into the top of the instrument. F holes allow the sound to travel from the instrument. The "C" bout is formed at either side of the instrument and is sometimes referred to as the waist.

The neck block supports the neck. The neck supports the fingerboard. The neck block is located on the inside back of the instrument where the neck meets and is joined to the body. Fingerboards are generally made of ebony or rosewood. The fingerboard allows the player to shorten the vibrating area of the string by holding it down with a finger. When the string length is changed, the string vibrates at a different rate, producing a different pitch. "Violin: Parts and String Instruments" (<http://schoolworkhelper.net/2010/12/violin-parts-string-instruments/>) contains a clear and concise overview of violin parts including an inside view of the lower, corner, and upper blocks, the sound post, bass bar, and linings.

Violins and violas have a chin rest. The chin rest can be made of wood or plastics. The chin rest is used to help support and hold the instrument. Cellos and basses have an endpin that is used to help support the instrument.

Instrument Ranges

When discussing instrument ranges, one can talk of possible playing ranges and practical playing ranges. The practical playing ranges of the bowed string instruments are more germane to our purposes. Therefore, each of the bowed string instruments has a practical, playable range, defined as a range in which players, such as moderately advanced high school students, would be able to perform with some degree of ease and ability. On the stringed instruments, this playable range is usually from three to four octaves, beginning on any open string. The open string pitches on the instruments are g^0 , d^1 , a^1 , e^2 for the violin, c^0 , g^0 , d^1 , a^1 for the viola, C_0 , G_0 , d^0 , a^0 for the cello, and E_1 , A_1 , D_0 , G_0 for the double bass. Thus, a moderately skilled cellist should be able to play a three-octave C-major scale easily beginning on C_0 . Similar instrument range possibilities are also evident on the other bowed string instruments. Within the context of an orchestral selection, the practical playing range should be a smaller consideration, as elements of pitch accuracy and technical skill need to be considered. It should be noted, however, that string players who do not have difficulty performing in the upper ranges of their instruments when playing by themselves often find it difficult to play in the upper ranges of their instruments when they play with a group.

Instrument Sizes

Bowed string instruments are made in various sizes to accommodate various-size people. As the orchestra director, you may be working with students as young as six years (first grade students) to high school students. Because many string programs begin in the fourth, fifth, or sixth grades, the smallest instruments you may encounter in your orchestra program are half-size



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instruments. However, smaller-size instruments are made, especially for the violin and cello, and are often referred to as Suzuki instruments. Note that 4/4 or 7/8 size basses are generally used only by professional players and are not normally suitable for school use. The standard double bass size at the high school level is the 3/4 size bass. The following chart, from *The Complete String Guide: Standards, Programs, Purchase, and Maintenance* (Music Educators National Conference 1988), provides the approximate lengths for the various-size instruments. Measurements are provided in inches. In the chapter *Beginning String Class Instruction* additional information on instrument size selection is provided under the heading "Determining Proper Instrument Sizes." Information concerning student instrument selection procedures and criteria can be found there.

Instruments	Size	Overall Length	Body Length	Vibrating String Length
Violins	1/4	23 1/8	14	12 13/16
	3/4	21 3/8	13 1/4	12
	1/2	20 3/8	12 3/8	11 5/16
	1/4	18 3/5	11 1/4	10 3/8
	1/8	17	10	9 1/4
	1/10	15 1/2	9 1/4	8 3/8
	1/16	14 1/4	8 1/4	7 5/8
Violas	16 1/2	27 3/8	16 1/2	14 7/8
	16	26 1/2	16	14 3/8
	15 1/2	26 1/16	15 1/2	14 5/16
	15	25 1/4	15	13 5/8
	Intermediate	23 1/8	14	12 13/16
	Junior	21 5/8	13 1/4	12
Cellos	1/4	48 1/4	29 5/8	27 1/8
	3/4	44 3/8	27 3/8	24 1/2
	1/2	41 1/2	25 1/2	22 15/16
	1/4	33 1/2	21	18 7/8
	1/8	29	17 7/8	16 1/2
	1/10	26 1/4	16	14 5/8
	Double Basses	1/4	74 1/2	45 1/2
3/4		72 1/2	42 1/2	40 5/8
1/2		65 1/2	40	37 3/8
1/4		61 5/16	37 5/16	35 6/16

BOWS

It is important for each student to have as good a bow as possible. The bow is one of the most important components in sound production. In general, students who have higher-quality bows have a better chance to produce a higher-quality tone and execute various bowing styles. The highest-quality bows are made of pernambuco wood; however, many carbon-fiber bows perform very well compared with pernambuco wood bows. The highest-quality bows are

generally equipped with ebony frogs with nickel silver, silver, or gold trim and are strung with horsehair. Other types of wood are also used for lower-quality bows. Brazilwood has been considered of sufficient quality for use in these student-line bows. Fiberglass has also been used in student bow construction. Bows, made from brazilwood or fiberglass, are strung with synthetic hair or horsehair and may have plastic frogs instead of ebony frogs.

Parts of the Bow

The main part of the bow is referred to as the stick. See Figure 1.3. The head of the bow is called the tip. The frog is located at the other end of the stick. The adjusting screw tightens or loosens the bow hair and is directly behind the frog on the stick. In front of the frog, on the stick, is the winding or finger grip. The ferrule is usually made of nickel or silver and is located on the bottom portion of the frog.

The German Bow

The double bass is the only instrument that uses two styles of bows: French and German. The French bow, the same style of bow used on the violin, viola, and cello, is more commonly used in school programs. Many teachers believe that the French bow is easier for string crossings and short articulations, whereas the German bow is easier for legato passages. Some teachers believe that the German bow hold is easier for beginning double bass players to learn unless they are switching from cello, viola, or violin. Nevertheless, both the German and French bows tend to complement each other.

The Complete String Outfit

A complete string outfit for the beginning player should include several items including the instrument, an instrument case, a quality bow, and several accessories. Detailed in the publication *The Complete String Guide: Standards, Programs, Purchase, and Maintenance* (MENC, 1988), a beginning outfit—the instrument, bow, case, and accessories—should be comprised of quality materials and be constructed with excellent craftsmanship. The standard quality instrument should be made of aged maple (back) and spruce (top) that are carved. The neck, scroll, and bridge should be constructed of maple, and the sound post and bass bar constructed from spruce. Ebony is preferred for the saddle, nut, fingerboard, and tailpiece. The rib structure should be lined around the edge of the top and back and have corner, upper, and lower blocks. The fingerboard, neck,

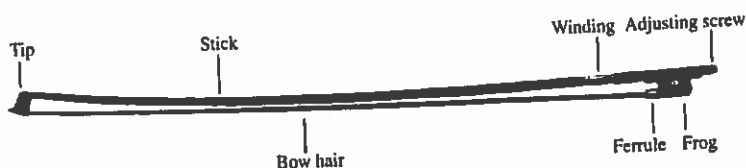


Figure 1.3 Parts of the bow.

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Vibrating string Length

- 12 13/16
- 12
- 11 5/16
- 10 3/8
- 9 1/4
- 8 3/8
- 7 5/8

- 14 7/8
- 14 3/8
- 14 5/16
- 13 5/8
- 12 13/16
- 12

- 27 1/8
- 24 1/2
- 22 15/16
- 18 7/8
- 16 1/2
- 14 5/8

- 43 1/8
- 40 5/8
- 37 3/8
- 35 6/16

The bow is general, stu- ce a higher- ty bows are perform very ty bows are

top, back, pegs, bridge, sound post, bass bar, and so forth must be correctly fitted and properly adjusted to assure optimum playing performance. The bow should be constructed of quality pernambuco, Brazilwood, or fiberglass (or like materials) with synthetic or genuine horsehair. The violin and viola case must be constructed of well-padded, molded plastics, while the cello and double bass case is usually made of canvas or padded soft "cloth" materials.

In addition to strings, the basic accessories for all string instruments generally include the following: cleaning cloth, rosin, tuning device, peg compound, and fine tuners for the violin, viola, and cello. The violin and viola require a chin rest and shoulder rest or shoulder pad. The cello and double bass require an endpin holder. A more detailed discussion of these and other accessories and supplies follows.

There are at least three companies that provide some of the basic accessories in kits. The Glaesel Care Kit for violin/viola/cello contains peg compound, a humidifier, rosin, an "A" pitch pipe, a chinrest key (used to tighten the chinrest), a tension peg key (this is a key used for mechanical or tension pegs adjustment and is produced by Glaesel), polish, and a polishing cloth. Super Sensitive makes a starter kit for violin/viola and one for cello. The Super Sensitive violin/viola kit contains polish, a polishing cloth, rosin, a pitch pipe, and a violin shoulder rest. The cello kit contains polish, a polishing cloth, rosin, a pitch pipe, and an endpin holder. Conn-Selmer/Scherl and Roth also provide a stringed instrument care kit. This kit, primarily for violin/viola, contains a cleaning cloth, a polishing cloth, rosin, a shoulder pillow, and violin care kit instructions.

ACCESSORIES AND SUPPLIES

Bowed string players should consider owning or should have several accessories and supplies. General accessories and supplies include the following: (Note: Items marked with an asterisk are essential for the beginning student.)

- *1. A clean cloth for removing rosin from the strings.
- *2. A tuning device such as a tuning fork, pitch pipe, or an electric tuner that clips on the bridge.
- *3. A metronome.
- *4. Some type of humidifier to protect the wood from cracking. Dampit is a brand of humidifier used to increase humidity in stringed instruments.
- *5. Peg compound. This is a product that helps pegs move easily.
6. Powdered graphite is an excellent lubricant and can be used on fine tuners, the adjusting screw on the bow, and other instrument parts that require ease of movement. Powdered graphite can be purchased at most hardware stores.
- *7. Mutes. Some mutes slide onto the bridge, and others clip on or are placed onto the bridge. Mutes are made of wood, rubber, or a combination of materials. Practice mutes made of metal, rubber, and plastic are sometimes

used for practicing, especially when sound production needs to be reduced to a minimum.

- *8. Rosin. Violin and viola rosin are less coarse and harder than cello or bass rosin, with bass rosin being the softest and most coarse of the rosins.
- *9. Fine tuners are essential when metal-core strings are used. Fine tuners enable your students to make slight adjustments to string tension. Such slight adjustments are needed when metal-core strings are being tuned, as small adjustments to metal-core strings create rapid pitch change.
- *10. Endpin holders are needed to help hold and stabilize the endpin in cellos and basses. Endpin holders come in a variety of styles. Some require an anchor to a chair leg, and some do not require such an anchor. Endpin holders not only help hold the instrument but also prevent damage to floors. One of the more common endpin holders is called a "rock stop." A photograph of a rock stop can be found at the following site: <http://www.buy.com/prod/rockstop-cello-end-pin-rest/q/sellerid/31397457/loc/101/218252108.html>. Other types of endpin holders can be found at <http://www.amazon.com/Super-Sensitive-Stoppin-Cello-Endpin/dp/B0002D0M8A>.
- *11. Chin rests are made of ebony, boxwood, rosewood, and plastic and are used to help support the violin and viola. Because it is important that the chin rest be comfortable, chin rests come in a variety of shapes and sizes. Finding the correct size and height of a chin rest is an individual matter, and each student should try out various chin rests until the appropriate one has been found. Chin rest pads, available commercially, and covers (a soft cloth, for example) can also be used to make the player more comfortable. The process of choosing a chin rest can be involved. There is an excellent discussion on chin rest selection titled "Chinrest Choice Based on Jaw Type" by Gary Frisch and Lynne Denig. This PDF can be found at the following site: <http://www.chinrests.com/pdf/Chinrest-Choice.pdf>
- *12. Shoulder rests or shoulder pads are used by violin and viola players to help support their instruments. The shoulder rest or pad is placed between the shoulder and the back of the instrument. Shoulder pads can be as simple as a folded handkerchief or sponge placed underneath the instrument, to a crafted, commercially produced device that attaches to the back of the instrument. The use of shoulder rests or pads should be encouraged, especially if students are raising their left shoulders to help secure the instrument. Shoulder rests or pads help reduce this tension and thus promote better playing habits. Finding the right shoulder rest, like choosing the proper chin rest, is important. The video titled "Choosing a Shoulder Rest" (<http://www.youtube.com/watch?v=921-KjEJtIU&feature=related>) provides suggestions for finding appropriate shoulder rests. Another video titled "The Parts of a Violin: Importance of the Shoulder Rest of the Violin" (<http://www.youtube.com/watch?v=lfZT3bW7G8A&feature=related>) discusses the use of the shoulder rest.
- 13. An adjustable bridge can be an important accessory and is considered essential by many individuals for the double bass. Bowed string instruments



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are made of wood. Wood tends to contract and expand with climatic changes, causing the bridge height to change. Adjustments to bridges to maintain appropriate string height distances from the fingerboard are often necessary. An adjustable bridge has a metal turn-screw device built into the feet of the bridge that enables the bridge height to be varied. Because some tone quality may be lost because of this device, it is generally not recommended for all bowed string instruments. However, it is widely used on the double bass.

14. A bridge jack enables the strings of the instrument to be raised and a bridge to be removed for repair or replacement without the fear of losing tension on the top of the instrument, which could result in the sound post falling. In climates where bridges must be changed frequently to maintain appropriate string height, the purchase of a bridge jack is important. Photographs of a violin bridge jack and a cello bridge jack can be found at the following sites: <http://www.gostrings.com/brjk.html> (cello bridge jack) and <http://www.gostrings.com/violbridjac1.html> (violin bridge jack).
- *15. A variety of strings are on the market, but the three basic types are metal (steel, aluminum, etc.), gut-core, and synthetic core—often known as perlon-core. Because each type of string produces a different sound, and because individual instruments respond differently to the various string types, many players experiment with the various types and brands of strings. Most student instruments, especially beginning instruments, are strung with metal strings. Metal strings tend to maintain their pitch better and generally are more durable than nonmetal strings. Perlon-core and gut-core strings tend to be less brilliant and produce a softer tone than metal strings and thus are preferred by some players. The choice of strings is as much a matter of personal taste as it is an issue of matching the most appropriate string to the instrument. Whatever strings are chosen, it is important that the string end conforms to the fine tuner. Additionally, it is important that the player have an extra set of strings available should a string need to be replaced immediately, as in a concert situation.

SELECTING STRING INSTRUMENTS

Good-quality string instruments for student use are essential to the success of a string program. The instruments must be in good playing condition and their tone pleasing to attract and keep students in the school orchestra. Less expensive, lower-quality instruments may be initially more attractive to school systems when purchasing string instruments, but their tone will be inferior. Also, cheaper instruments are harder to play, wear out faster, and require more maintenance over the life of the instrument.

When working with local dealers it is important to insist that they provide your students with the best instrument possible. Many teachers provide local dealers with a list of instrument models/brands they want their students to rent/purchase. By doing so, dealers have guidelines they can follow when assisting



your students/parents and you are ensured that quality instruments are secured. *The Complete String Guide: Standards, Programs, Purchase, and Maintenance*, a joint publication of the American String Teachers Association, the Music Educators National Conference and the National School Orchestra Association, was published in 1988 by the Music Educators National Conference, and is an excellent source for information on bowed string instruments. The book is available through Amazon.com.

School systems need to provide cello and bass instruments for the orchestra program. Some violas and violins may need to be purchased by the schools if local rental fees are too expensive for families in lower economic areas.

Guidelines for Purchasing String Instruments

School System Instrument Purchases

1. Determine the number and type of instruments needed.
2. Consult local dealers and national mail-order companies for prices and available instruments. Some national instrument manufacturing companies also offer school system lease-purchase plans.
3. Compare the price of purchasing an instrument outfit that includes a bow and case with the price of purchasing those items separately.
4. Prepare a bid and present it to those vendors that have the highest-quality instruments for the price. Close the sale once the price is negotiated and after you have inspected and approved the instruments upon their arrival.

Parent Instrument Purchases

Parents need to be provided with information they can use to purchase quality bowed string instruments. *The Complete String Guide: Standards, Programs, Purchase, and Maintenance* publication mentioned earlier is helpful when they choose to buy through dealers outside of your area of influence, through large wholesale companies, or through the Internet. Frugal parents may purchase instruments that are seemingly inexpensive, but they may be unaware that such instruments can require repair or setup that can add significantly to the overall cost of the purchase.

1. Encourage parents to purchase the best quality they can afford. More expensive instruments sound better and are easier to play. Point out to parents that string instruments are a good investment because their financial value remains the same or increases over time if an instrument is well cared for. Also, educate parents that a higher-quality instrument sounds better when played with a better bow. The quality of the bow has much to do with the quality of sound produced on an instrument. Perhaps the parents should consider purchasing a better quality bow along with the instrument.
2. Suggest more than one string instrument shop for the buyers to visit. Comparison shopping helps parents find the best instrument for the price.

3. Suggest they have an independent repair technician inspect the playing condition of the instrument if they are considering purchasing an older instrument.
4. Suggest that they narrow their selections to two or three possible instruments and that they request a loan of the instruments for at least one week. This gives the player time to play and evaluate the instruments outside of the dealer's shop.
5. Once an instrument is selected for purchase, advise parents to negotiate the price of the instrument with the dealer. Much like car dealers, string instrument dealers expect buyers to negotiate prices.

Guidelines for String Instrument Rental Programs

If students are renting their string instruments to play, we recommend that they rent from a local dealer. A local business can be easily contacted if necessary, and service may be obtained more readily. Local companies must provide good-quality instruments for rent that are in excellent playing condition. An instrument that produces a pleasing tone and is easy to tune is critical for students' success. Rental violins, violas, and cellos should have fine tuners for each string that turn easily. Violin and viola shoulder rests and cello and bass endpin rests should be available.

String instrument rental programs should include rental purchase and step-up provisions. In a rental-purchase agreement, rental money for an instrument should be applied toward the purchase of the instrument, less maintenance and insurance, if any. In effect the renter is purchasing the instrument over time.

A step-up provision specifies that (1) the rental money toward an instrument applies to the purchase of a larger size instrument of similar quality as the players' arms lengthen as they grow, and (2) the rental money may be applied toward the purchase of a better-quality instrument.

CARE AND MAINTENANCE OF STRING INSTRUMENTS AND BOWS

Instruct students to carefully follow these guidelines for caring and maintaining their instruments and bows:

1. Only the player or teacher should be allowed to touch the instrument and bow. String instruments and bows are very fragile. Well-meaning parents and curious siblings can easily damage an instrument or a bow without intending to do so.
2. Keep the instrument and bow in the case when not in use, with the case latched or completely zipped.
3. Keep the instrument and bow out of direct sunlight.
4. Keep the instrument and bow in moderate temperatures only. String instruments and bows warp and crack in extreme temperatures and high humidity.

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5. Clean the instrument and bow after every use. Use a cotton cloth to wipe perspiration and rosin off the instrument and bow stick. Students should keep a cloth for cleaning in the instrument case.
6. Have all cracks repaired and open seams glued immediately.
7. Every time after playing, loosen the bow hair. Loosen until just before individual bow hairs begin to touch the stick.
8. Never touch the bow hair. Do not attempt to clean it.
9. Hold the instrument only by the neck. Touching the body of the instrument will eventually damage the varnish.
10. Store music away from the violin or viola case unless there is a specific zippered compartment designed to hold music.
11. Rubbing alcohol or an alcohol-based product such as cologne or perfume may be applied to a soft cloth or cotton ball and used to clean the strings, fingerboard, and chin rest. The alcohol must not touch any varnish on the instrument, as it will damage it.
12. Periodically clean the instrument and bow stick with professional string instrument cleaner applied to facial tissue. Only cleaner manufactured for cleaning string instruments should be used, not wood furniture cleaners.
13. Replace strings when they break, fray, or become false.
14. Replace the bow hair annually.

String Instrument Repair Checklist

Use the following stringed instrument and equipment checklist when evaluating instruments for repair.*

OK	Needs Attention
Instrument:	
___ Cleaned ___ Polished ___	___
___ Pegs: Stick ___ Slip ___	___
___ Tension pegs: Loose ___ Need tightening ___	___
___ Strings: Wound straight on all pegs ___ Frayed ___ False ___ Replace ___	___
___ Fingerboard: Clean ___ Grooved ___ Needs dressing ___	___
___ Bridge: Off-center ___ Leans ___ Warped ___ Grooves too deep ___ Curvature too flat ___ Replace ___	___
___ Sound post: In wrong place ___ Missing ___	___

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OK	Needs Attention
___ Tuners: Too low ___ Need to turn up ___ Bent ___ Replace ___	___
___ Tail loop: Too long ___	___
___ End button (violin and viola): Poor fit ___	___
___ Endpin (cello and bass): Too short ___ Bent ___	___
___ Opening in seams: Upper bout ___ Lower bout ___ Sides ___	___
___ Open cracks: In top ___ At bottom saddle ___ In rib ___ Other ___	___
Bow:	
___ Tightened too tightly ___	___
___ Bow grip: Loose ___ Missing ___ Needs replacement ___	___
___ Bow stick: Needs cleaning ___ Warped ___ Too straight ___	___
___ Bow facing: Cracked ___ Chipped ___ Missing tip ___ Replace ___	___
___ Frog: Cracked ___ Ferrule loose ___ Slide cracked ___ Screw worn ___	___
___ Bow hair: Twisted ___ Dirty ___ Needs rosin ___ Repair ___ Replace ___	___
Case:	
___ Fasteners: Loose ___ Lock doesn't close tightly ___	___
___ Handles: Worn ___ Loose ___ Replace ___	___
___ Bow clips: Bent ___ Worn ___ Broken ___	___
___ Recommend instrument be covered in case ___	___
Miscellaneous:	
___ Shoulder pad ___	___
___ Endpin stop (cellos and basses) ___	___
___ Cleaning cloth ___	___

String Instrument Maintenance and Repair

Now that you've reviewed the fourteen points under the section titled "Care and Maintenance of String Instruments and Bows" and reviewed items in the "String Instrument Repair Checklist" it is time to discuss the maintenance procedures that will need to be performed periodically to keep an instrument at peak performance capacity. A student can easily perform some basic maintenance;

other procedures may require the assistance of the instructor or parent/adult. Finally, there are some maintenance procedures that should only be performed by a qualified string repair-person. Various maintenance procedures will be discussed with notations as to who might be able to perform the task. Rather than go into lengthy discussion of each procedure, various Internet resources are listed, many of which are videos, which detail and/or demonstrate the procedure.

Cleaning the Instrument and Bow: Student or Teacher Procedure

A student of any age can perform the task of routine instrument and bow cleaning if shown how to do so. A clean, soft cloth, such as a soft 100% cotton cloth, should be used to clean the instrument after each playing session. The instrument should first be wiped clean of all rosin with careful attention to the area underneath the strings and between the fingerboard and bridge. The fingerboard should also be wiped, as should the strings themselves to prevent rosin build-up. Before the bow is untightened, a soft cloth should be run on the stick to remove rosin. The cloth should be placed underneath the bow hair (between the hair and stick), and only the stick should be wiped. It is extremely important that the cleaning cloth be kept clean. Frequent washing, at least once every two weeks and more often if needed, should be completed. If the cloth can't be cleaned properly it should be replaced.

While proper cleaning will often negate the necessity to polish your instrument, some individuals like to do so nonetheless. Only special bowed string instrument polish should ever be used for this purpose. Other types of polish can damage the instrument varnish. Some accessory kits, previously discussed, include special polish and/or a polishing cloth that can be used for such polishing purposes. "Violin" polish can be purchased from your local music dealer or from an online string dealer. If you feel the need to polish your instrument, do so sparingly and always clean your instrument of rosin and other dirt first before applying polish or using a polishing cloth.

String Replacement: Student or Teacher Procedure

Depending on the age and ability of the student, string replacement is a basic maintenance that can be performed by the student. Under the heading "Guidelines for Replacing Strings" the procedure for this task is outlined. Additionally, "How to Replace the Strings on a Violin" (http://www.ehow.com/how_4835104_replace-strings-violin.html) provides a six-step process to changing strings on the violin. This procedure can also be used for other bowed stringed instruments. "How To Change Violin String With a Fine Tuner" (http://www.ehow.com/how_5147210_change-violin-string-fine-tuner.html) discusses a five-step process for changing a violin string with a fine tuner. The same procedure can be used for viola and cello. A video version titled "How to Change Violin Strings With a Fine Tuner" can be found at http://www.ehow.com/video_5574586_change-violin-string-fine-tuner.html. Another video on violin string changing can be found at <http://www.youtube.com/watch?v=vqV0-hgZSJl> and is titled "Changing a Violin String."

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Demonstrating how to change violin strings, the video titled "Violin Basics: How to String A Violin" (<http://www.youtube.com/watch?v=34Vp8cTNq0M&feature=fvwrclc>) illustrates string changing procedures as well.

Guidelines for Replacing Strings

Replace strings when they break, fray, or become false. When they are false, they do not ring and cannot be tuned accurately. Metal E strings become false quickly and need to be replaced frequently, especially before special concerts or contest performances. Students can successfully change their strings by following seven steps.

Step 1

Remove only one string at a time so that the bridge and sound post do not move.

Step 2

Check to see if the peg turns smoothly. If not, apply a small amount of peg compound to the peg. Apply graphite from a pencil to the groove on the top of the bridge where the string rests and the string's groove on the nut. This will help the string slide on top of the bridge.

Step 3

Insert and pull the end of the string through the hole in the peg. The string should rest on top of the peg, not underneath.

Step 4

Turn the peg so that the string wraps around the peg. Be sure to bend the end under the string as you are turning the peg. This helps prevent the string from moving in the peg and changing pitch frequently. Tweezers may be used to pull the string through the peg hole.

Step 5

The highest- and lowest-pitched strings should be positioned next to the sides of the peg box. As you are turning the peg, guide the direction of the wrapping so that the string will end up next to the peg box. The other two strings should be positioned closer to the middle of the peg box. If wrapped properly, the length of the string should end up positioned straight, or at a ninety-degree angle across the nut.

Step 6

Place the other end of the string through its corresponding hole at the end of the tailpiece. Sometimes the end will need to be knotted to remain secure in the hole. The ball at the end of a metal string is designed to fit in a metal tuner.

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Step 7

Slowly tighten the string until it is in tune. Push in on the peg as you are turning so it will stay secure in the peg box. Once it is in tune, you may slightly pull up on the string to stretch it. Retune. You may repeat this process a few times. This helps adjust the string to its tension. As a result, it will shorten the length of time it takes for a new string to adjust and stay in tune.

Fine Tuner Maintenance and Replacement: Student or Teacher Procedure

Fine tuners need some minimal maintenance. A student or teacher can complete such maintenance. Fine tuners need periodic lubrication for smooth operation. An appropriate lubricant that can be used for this purpose is powdered graphite. Powdered graphite can be purchased at most hardware stores. To lubricate the tuner the screw of the tuner should be loosened and removed. The screw threads should be lubricated with powdered graphite and inserted by into the fine tuner mechanism. This maintenance should be completed periodically to ensure the smooth operation of the fine tuners.

When a fine tuner becomes worn, and no longer turns smoothly even with lubrication, it should be replaced. Music stores or online/Internet string companies sell different sized fine tuners. If you have a 1/2 size violin you would purchase a 1/2 size fine tuner, and so forth. A student who can replace a string should also be able to replace a fine tuner. "How to Install a Fine Tuner on a Violin" (http://www.metacafe.com/watch/4374340/how_to_install_fine_tuners_on_a_violin/) is a video that shows and discusses changing fine tuners. The procedure presented in this video is applicable to all bowed string instruments. To change a fine tuner the string must first be removed. The fine tuner screw should be removed, followed by the removal of the nut holding the fine tuner mechanism to the tailpiece. Once the nut is removed the mechanism can be removed. The new tuner can then be installed—install the tuner mechanism, tighten the fine tune mechanism nut to secure the mechanism to the tailpiece, insert the finer tuner screw, and re-attach the string.

Peg Maintenance: Student or Teacher Procedure

A common problem that is experienced by string players is peg slippage and sticking. A student or teacher can easily work with these issues as long as the peg and peg hole are fitted properly. "How to Stop Slipping Pegs (Violin and Fiddle)" at <http://www.youtube.com/watch?v=byau0C5je5Y> discusses reasons that pegs slip and provides some trouble-shooting solutions such as the use of "Peg Drops" or "Peg Compound," both of which are available from local music stores or online/Internet string companies. If pegs slip you can either use peg drops, which can be applied to the area where the peg enters the peg box hole without loosening the string, or you can use peg compound, which requires the string to be loosened at which point peg compound is sparingly put on the peg area that makes contact with the peg box. Both are recommended to reduce the problem of peg slippage. Using peg compound or lubricating the peg with graphite can remedy sticking pegs. The compound or graphite

needs to be applied to the area that contacts the peg box hole. When the string is loosened and the peg removed, this area will appear to be very shiny. The video titled "The Parts of a Violin: How to Lubricate the Pegs of a Violin" at http://www.youtube.com/watch?v=G3y_pTZ6n28&feature=related demonstrates this procedure. If after these procedures the peg or pegs continue to cause problems the instrument should be looked at by a qualified string repairperson to determine whether the peg needs to be repaired or replaced and/or the peg hole needs to be reamed.

Chin Rest Adjustment: Student or Teacher Procedure

Through the course of normal playing and practice a violin or viola chin rest can become loose. A "chin rest key" that looks like a large piece of thick wire that is slightly curved on one end is normally included with your violin/viola and is used to tighten the chin rest. The key is inserted into the chin rest clamp screw holding the chin rest and is turned to tighten or loosen the clamp. Care should be taken not to overtighten the clamp as this can cause damage to the instrument. A student or teacher can easily perform this task.

Straightening a Bridge: Student or Teacher Procedure

It is not uncommon for stringed instrument bridges to lean—not be straight—to be slightly warped. Repeated tuning pulls the bridge toward the fingerboard, causing a slight bend in the bridge itself. If not corrected, it will cause the bridge to severely warp, necessitating its replacement. The bridge needs to periodically be straightened. The procedure is simple to perform and can be performed by an older student or adult.

The strings generally do not need to be loosened much, if at all, to perform this procedure. The procedure for straightening the bridge is as follows:

1. Holding the violin or viola as if you were holding a cello or in the case of a cello, holding it as if you were playing, place at least your index and middle finger of each hand behind each foot of the bridge. The idea is to have as much support on and behind the bridge feet (that area between the bridge and the tailpiece) as possible—stacking the fingers on and behind the bridge until they touch the strings.
2. Next, place both thumbs on the front of the bridge (the area between the bridge and fingerboard) on either side of the bridge—near each other or touching—as near the top of the bridge as possible (as close to the strings as possible).
3. Gently push the bridge top back—keeping the feet of the bridge in place with your other fingers until the bridge is once again straight.

In the video "Straightening Your Violin's Bridge" (<http://www.youtube.com/watch?v=YbfBlrTDdhA>) the procedure for keeping your violin bridge straight is shown. The same procedure is demonstrated for cello in the video "Keeping Your Cello's Bridge Straight" (<http://www.youtube.com/watch?v=eFkknA2ziA8&feature=related>).

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These procedures can also be used for straightening viola and double bass bridges. It should be noted that straightening a double bass bridge would require the loosening of all strings to the point that minimal pressure is being exerted on the bridge to initiate this procedure.

Sometimes, due to a jar or bump, a bridge may be moved. If the bridge is still standing but moved, it can easily be put back into position. "How to position, setup, and adjust a violin or fiddle bridge, by Ryan Thomson, "Captain Fiddle" (<http://www.youtube.com/watch?v=4XIFu9NxCRU&NR=1>) demonstrates how to adjust a bridge if it is standing but gets knocked out of place.

Since bridges are not glued, a sharp jar or bump can cause the bridge to fall. In some cases, bridges will not have been set up prior to you receiving it. Whether a bridge has fallen or has yet to be set up, the procedure will need to be completed. Before setting up a bridge, make sure the sound post is standing. If the sound post is not standing, it will need to be set up. (See the following section on setting a sound post.) If the sound post is standing, the procedure for setting a bridge is similar to that of straightening a bridge. The placement of the bridge should be between the f-hole notches with the right foot of the bridge (the side with the highest pitched open string) being centered about $\frac{1}{8}$ to $\frac{1}{16}$ of an inch in front of the sound post. The strings should not be tight while setting the bridge but can have some tension on them. Once the bridge is set, the strings should be slowly tightened with adjustments to the bridge as needed to correct for any leaning caused by tightening the strings. The videos "How to Install a Violin Bridge" (<http://www.youtube.com/watch?v=b0peWaEIKLI>) and "Setting Up a New Violin Bridge" (http://www.youtube.com/watch?v=x0cm_pUI9zw) demonstrate the procedure for setting up a violin bridge. These procedures can also be used to set up a bridge on viola, cello, and double bass.

Sometimes a bridge becomes very warped and will need to be replaced. Bridge replacement should only be completed by a qualified string repairperson, however there is a technique that can be used to straighten a bridge to delay bridge replacement. The video "How to Straighten a Cello Bridge" (<http://www.youtube.com/watch?v=jTM2GNFPLas&NR=1>) demonstrates a technique that can straighten a badly warped cello bridge. The technique can be used to straighten a violin, viola, or double bass bridge as well. This procedure should only be undertaken by an adult/teacher.

Replacement of the Tail Gut/Tail Cord: Instructor or Adult Procedure

Occasionally the cord, referred to as the tail gut/tail cord, that holds or connects the tailpiece to the end button will need to be replaced. Replacing the tail gut should only be attempted by a competent string instructor/adult. The tail gut (originally called this because the cord was literally made out of gut) or tail cord can easily be replaced, however the strings must be removed from the tailpiece and the bridge removed until the new tail gut has been installed. A tail gut can be purchased from a music store or online music company. The Sacconi tail gut, available from Shar Music Products, is one of the easiest tail guts to use. It is a nylon cord with threaded ends and is adjustable with the accompanying knurled nut.

When replacing a tail gut, care must be taken to ensure the sound post does not fall during this procedure and that the bridge is properly positioned after completing the task. The procedure for replacing a tail gut is as follows.

1. With the instrument lying on its back, loosen and remove the strings from the tailpiece.
2. Remove the old tail gut.
3. Insert the new tail gut and adjust the length to match that of the old tail gut (the tail gut length should be adjusted to allow the tailpiece to be slightly in front of the saddle—the ebony insert at the bottom of the instrument. The tail gut should go around the button or, in the case of a cello or double bass, the endpin holder).
4. Once the proper adjustment has been made the strings should be re-attached and the bridge set up. The strings can then be slowly tuned to pitch.

The video "The Parts of a Violin: About the Tail Piece & Tail Cord of the Violin" (<http://www.youtube.com/watch?v=0fTMRn7v7aI&feature=related>) discusses the procedure for replacing the tail gut/tail cord. Another video, titled "How to Replace a Tailpiece on a Violin" (http://www.ehow.com/how_7279508_replace-tailpiece-violin.html), demonstrates this procedure as well. Regardless of the bowed string instrument the technique for tail gut replacement is similar.

Setting a Sound Post: Instructor or Adult Procedure—Instrument Repair-person

Setting a sound post is a procedure that should only be attempted by a competent instructor, qualified adult, or string instrument repair-person. The sound post is held in place with pressure from string tension pushing down on the bridge. String pressure on the bridge applies pressure to the top of the instrument through the bridge feet. This pressure stabilizes the sound post. A properly fitted sound post rarely falls, but if the string tension is removed, or should the bridge fall, the sound post can fall. "Resources—How to Set a Sound Post" (<http://www.violins.on.ca/luthier/soundpost.html>) details the technique and equipment needed to successfully set a sound post. This excellent resource shows diagrams of the sound post setter, the sound post as it appears within the instrument, placement of sound post on a sound post setter, inserting the sound post into the f-hole, positioning the sound post within the instrument, and determining the height of the sound post. "How to Fix a Fallen Sound Post" also discusses the procedure for setting a sound post (<http://cool-discountinstruments.com/Tutorials/Violin-&-Cello-Tutorials/how-to-fix-a-fallen-sound-post-on-violin.html>). In the video titled "Andy Fein Setting a Cello Sound Post to a Bach Cello Suite at Fein Violins" (<http://www.youtube.com/watch?v=Xe3fZqqhBTE>) the sound post setting procedure is demonstrated using a cello. Sound post setting is one of the more challenging procedures that can be completed by a competent instructor or adult, but often this task is best left to a professional string instrument repair-person.

Fingerboard Repair: Instrument Repair-person

Fingerboards are made of very hard wood, usually ebony or rosewood, but with constant practice/performance they can become worn and occasionally warped due to climatic change. Small indentations, from repeated finger placement, or other such wear—contribute to performance problems and/or buzzing strings. It is at this point that the fingerboard may need to be planed. Should your fingerboard need to be planed—your teacher would be able to tell you—the repair should be completed by a qualified string instrument repair-person. In the video titled “Andy Fein, of Fein Violins, Planing a Violin Fingerboard” (http://www.youtube.com/watch?v=_s4tU4fgMwY) the procedure is shown.

Fingerboards are glued to the neck of the instrument. When the glue dries out or should the fingerboard be violently hit, the fingerboard can become loose—it will move from side to side. While not a serious problem, it must be repaired immediately. The fingerboard can be glued using a special kind of glue (hide glue—see “Artisan Violin Restorations” <http://www.artisanviolin.com/repairs.html> for additional information), the procedure should only be completed by a qualified string instrument repair person as the procedure involves removal, cleaning, and adjustment before the fingerboard is once again attached.

Open Seams/Cracks in the Top or Back: Instrument Repair-person

A seam is formed where the top and back meet the side or ribs of the instrument. The top and back are glued to the ribs with hide glue. Because the wood on the bowed string instruments is thin and will expand and contract with temperature and humidity changes, pressure often builds on the seams. Hide glue will allow for minimal expansion and contraction, but if there is too much pressure the hide glue will fail, allowing the seam to open. To check for open seams simply tap, with your knuckles, around the seams on the top and back of the instrument. If the sound of the tapping doesn't produce a solid, resonating tone, this is an indication of a potential open seam, at which point a visual inspection may also reveal a slight opening in the seam. Once an open seam is identified, a qualified string instrument repair-person should be contacted to effect the repair.

A more serious problem that can occur with bowed stringed instruments is a crack in the top or back of an instrument. Even though preventive measures such as the use of hide glue in seam gluing and the use of purfling (a narrow binding inlaid into the edges of the top and often bottom plates of stringed instruments used to help prevent cracks) are used, a crack in an instrument top or back can occur. Should a crack appear, the instrument should be taken to a qualified string instrument repair-person immediately to prevent further elongation of the crack and/or additional damage.

Bow Maintenance

In addition to daily cleaning of the bow stick, some additional bow maintenance should be performed. “The Violin Bow” by bow maker Don Reinfeld

(<http://www.drbows.com/vnbow.html>) details the various parts of the bow. Two parts of the bow that require lubrication are the bow screw and eyelet, and the metal piece or slide that is on the frog and contacts the frog with the stick. Using powdered graphite, the screw and eyelet as well as the contact slide between the stick and the frog should be lubricated at least twice each year. An older student or an adult such as a parent or teacher can do this.

Upon repeated use the brass eyelet that allows the bow to be tightened or loosened wears out. The eyelet can easily be replaced by unscrewing the old eyelet and screwing in the new one. Finding the appropriate sized eyelet is important, and often a trip to a well-stocked violin repair shop is necessary to find the appropriate eyelet replacement. An older student or adult should be able to replace the eyelet.

When a bow has been rehaired or if the bow has never been used before you will need to get rosin onto the new bow hair. "How to Rosin Your Bow for the First Time" (<http://www.youtube.com/watch?v=q8UsIwa-BhQ&feature=related>) demonstrates a procedure used to get rosin onto a freshly rehaired bow. In addition to this procedure some individuals suggest taking an old "cake" of rosin, wrapping the rosin in a clean cloth, and then smashing it into fine, powdered particles. The rosin can then be applied to the bow by unwrapping the cloth and carefully holding the powdered rosin in one hand as it is applied to the bow hair. The smaller, finer rosin particles will adhere more readily to new bow hair than will rosin from a solid block. An older student or adult can perform this procedure.

Cleaning the bow hair is another procedure that can be performed. Sometimes oils from the fingers or hand or other substances are accidentally spilled on the bow hair, preventing proper grabbing/gripping of the string. Bow hair can be cleaned, but only a qualified teacher or string instrument repair-person should do this. "How to Clean a Violin Bow" (<http://www.youtube.com/watch?v=SZGDMdwrlPo&feature=relmfu>) is a video that details the procedure for cleaning bow hair.

Bow rehairing is a procedure that needs to be performed periodically. There are several reasons for the need to rehair a bow.

1. Bow hair has tiny barbs that catch and release the string as the hair is drawn across it. As these barbs become worn they are not able to grab the string as efficiently.
2. As the bow is used, the hair stretches and eventually the bow can't be properly tightened.
3. Bow hair will break during the course of practice and performances and at some point the hair becomes too sparse for optimum performance.
4. If the bow hair becomes dirty and can't be cleaned or if the plugs holding the bow hair in the stick are coming loose, these are additional reasons to replace the bow hair.

If any of the above is occurring, the bow should be taken to a qualified string instrument repair-person for rehairing.

SUMMARY

The purpose of the chapter was to help familiarize you with the bowed string family and its accessories. Many articles, books, and manuals are available that can provide you with purchase decision criteria. Some of these sources are listed in the resources section of this chapter. In addition to the basic maintenance suggestions provided in this chapter, you may wish to know many other instrument care and repair procedures. Excellent sources on this topic are available and are listed in the resources section of this chapter.

RESOURCES

General

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- End pin holders. 2011. <http://www.amazon.com/Super-Sensitive-Stoppin-Cello-Endpin/dp/B0002D0M8A> (accessed April 4, 2011).
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Beginning String Class Instruction



GUIDING PRINCIPLES FOR TEACHING BEGINNING STRING CLASSES

Careful Development and Review of Playing Skills

The beginning and second-year string classes lay the foundation for all future playing. The skills taught need to be carefully presented and reinforced so that the need for remedial instruction in future years is limited. Much time must be spent reviewing previously introduced skills so that good posture, instrument and left-hand positions, bowing skill habits, and a high standard of intonation can be firmly established. These foundational skills must become so well established that they become habits. Careful attention to each aspect of students' playing skills in these early classes, reinforced with much review, gives students a solid basis for developing more advanced playing and listening skills in later classes.

To accomplish this, we recommend that teachers devote the majority of time to carefully teaching and reviewing those skills introduced initially in their first- and second-year string classes. Only one or two new skills or concepts should be presented in each class. This allows time for students to process new ideas and much time for review. The successful string teacher of first- and second-year students is one whose students' playing skills are firmly established. Successful teaching is not a race to see who first gets done with Book 1. Rather, it is the careful development and reinforcement of playing skills and concepts. The playing skills learned early are those that lay the foundation for the success of the high school orchestra. In short, review should characterize the majority of time in young string classes.

Teaching Bowing and Left-Hand Skills Separately

Beginning string playing skills are complex. The right and left hands do something very different; that is, the left hand fingers while the right hand bows.

This requires a sophisticated level of physical coordination. In the beginning string class, we recommend that bowing and left-hand skills first be taught separately. Students' bow hand shape and parallel *détaché* bowing skills should be developed independently of left-hand shape and beginning fingering. Once these skills are mastered, it is time then to begin combining right- and left-hand playing skills. Once these skills are developed, along with note reading and aural discrimination skills, they can be combined. This sequence of instruction is discussed in detail under the heading "Performance Goals and Objectives of First- and Second-Year String Classes" in this chapter. Criteria for selecting method books for teaching beginning playing skills in the string class are found in Chapter 10.

Teaching Different Learning Styles

Students' natural learning styles are different. Students who are visual learners often learn best by watching the teacher demonstrate or model skills. Tactile learners develop skills better through physically trying to imitate the skills modeled by the teacher on their own instruments, whereas auditory learners achieve more through listening. A first- or second-year string class will have students with all of these different learning modes as well as global, sequential, analytical, and discovery learning styles.

The teacher must allow for different learning styles when presenting a new concept or skill. For example, if a new bowing skill is introduced the teacher will want to model it for the visual learners, explain the different motions involved for the conceptual and analytical learners, allow the tactile learners to touch the teacher when modeling it, demonstrate the different sounds that are produced for the aural learners, teach sequentially each of the motions involved for the sequential learners, and play different kinds of music that incorporate the new skills for the global learners.

Efficient Teaching of Playing Skills

Teachers need to adapt their instruction to the ways their students best learn. With beginning students, that means teachers must show, explain, and let students try the playing skills they are attempting to teach. Research suggests that students in early instrumental classes learn the most efficiently by watching teachers model the skills and then attempting to imitate on their instruments. String teachers will want to demonstrate the skill on a string instrument for the students and then give them an opportunity to try it.

Many skills necessary in playing string instruments require a high level of physical coordination. It is a good idea for the string teacher to break larger skills into smaller ones, model each of them, review them frequently, and then sequentially combine the smaller skills, leading to a more complex one. Finally, do not forget that the auditory learners are waiting for you to explain the skills and concepts that are presented in class! See Chapter 6 for more guidelines for effectively relating to and teaching first- and second-year students.

ROTE-TO-NOTE TEACHING SEQUENCE

Students often learn playing skills more effectively first through rote instruction. Rote instruction is that which is presented without the use of printed notation. This allows students to focus on their playing skills without needing to read printed notation at the same time.

After a particular playing skill is established, printed music that incorporates the skill may be used for reinforcement. For example, as students are learning to properly shape their left hand through rote exercises, reinforcement of the skill can be accomplished by having students read music lines from a printed method series that helps reinforce that skill. As the skill becomes well founded, printed orchestra music can be introduced to further reinforce the skill. See Appendix A for a listing of orchestra music correlated with specific playing skills.

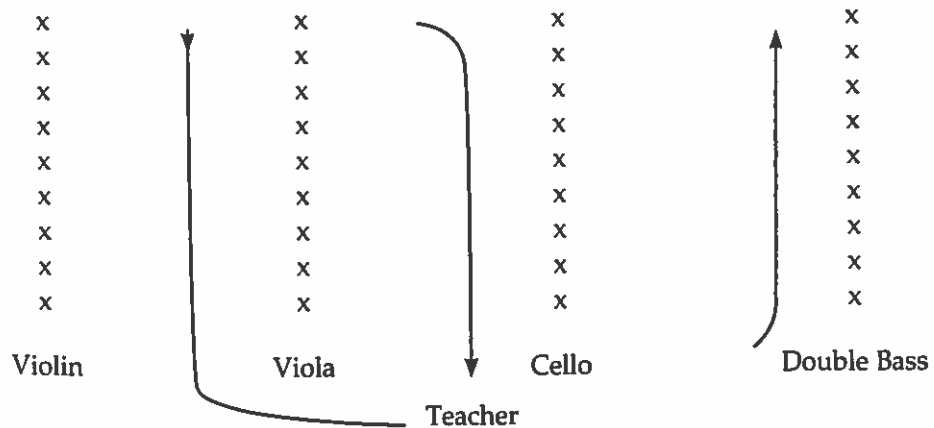
The use of physical proximity and pedagogical touch is important in classes of young string players. The teacher needs to be able to get physically near each of the students. This allows the teacher to evaluate and remedy the playing posture and skills of individual students. It also provides the opportunity for the teacher to physically move students' shoulders, elbows, and fingers to help them learn proper body positions and movements. Of course, teachers must first have students' permission to touch them and teachers must be gentle and careful when doing so. It is important to have the permission of the students' parents and of the school administration before using pedagogical touch as a teaching method.

The following row seating configuration is recommended to help the teacher easily move among the students.

RECOMMENDED SEATING CONFIGURATION FOR BEGINNING STRING CLASSES

Key: X represents student
Lines with arrows indicate teacher travel path

Row Seating: Recommended for first- and second-year classes



PERFORMANCE GOALS AND OBJECTIVES OF FIRST- AND SECOND-YEAR STRING CLASSES

During the first and second years of string class, instruction in bowing skills, instrument position and fundamental left-hand skills, music reading, and beginning aural skills need to be developed. The extent of students' skill development depends on the frequency of class meetings and the degree of time available for review. If students have received instruction a minimum of two days a week, most of them, by the end of the second year of instruction, will be able to demonstrate at least the following basic performance skills. Please note that these skills are in alignment with both the national standards for music education established by MENC (1994) and the *ASTA Curriculum: Standards, Goals, and Learning Sequences for Essential Skills and Knowledge in K-12 String Programs* (Benham, Wagner, et al. 2011).

Bowing Skills

- Acceptable bow hand shape
- Basic détaché stroke: bow parallel to bridge and acceptable tone production
- Basic string crossings
- Two-, three-, and four-note slurs
- Basic staccato stroke
- Acceptable hooked bowing
- Accurate bowing of basic rhythmic note and rest values
- Piano, mezzo forte, and forte dynamics

Instrument Position and Left-Hand Skills

- Acceptable body posture
- Acceptable instrument position
- Acceptable left-hand shape
- Play violin and viola finger patterns, cello extensions, and bass shifting required for D, G, C, and F-major scales [(Other scales such as B-flat major, A major, and g minor may be introduced if classes meet more than twice per week.) These keys are included in Chapter 3.]
- Play violin and viola finger patterns, cello extensions, and bass shifting for the d natural minor scale

Music Reading

- Name notes in major keys: D, G, C, F
- Name notes in the d natural minor scale
- Accurately sight-read musical examples in the major keys of D, G, C, F, and d natural minor, incorporating rhythmic note and rest values involving whole, dotted half, half, quarter, and eighth notes

Aural Skills

- Imitate raising and lowering a pitch by ear
- Imitate simple four-note pitch patterns by ear
- Imitate simple rhythms involving whole, dotted half, half, quarter, and eighth notes
- Imitate simple major and minor scales by ear
- Basic instrument tuning

STRATEGIES FOR DETERMINING PROPER INSTRUMENT SIZES

String instruments come in many different sizes. Determining the proper size is critical to the comfort and technical progress of the student. Each student needs to be sized individually because physical dimensions of students vary widely. As students grow, their instrument sizes need to be periodically reevaluated.

Violin and Viola

To determine the proper violin and viola size, place the instrument on the student's left shoulder in playing position. Then have the student extend her left arm underneath the instrument with the hand cupped around the scroll (see Figure 2.1). There should be at least five to six inches of space between the elbow and the center of the back of the instrument. If there is not, the student should play the next smaller instrument size. (See DVD Clip 1 and Clip 2.)

Cello

When determining the proper cello size, first have the student adjust the length of the endpin so that the scroll is near the height of the player's nose (see Figure 2.2a). Then have the student sit and place his left hand on one string in first

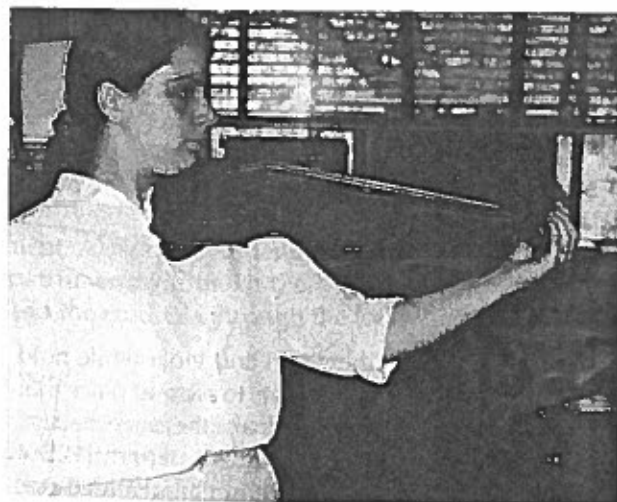


Figure 2.1 Instrument sizing for violin and viola.

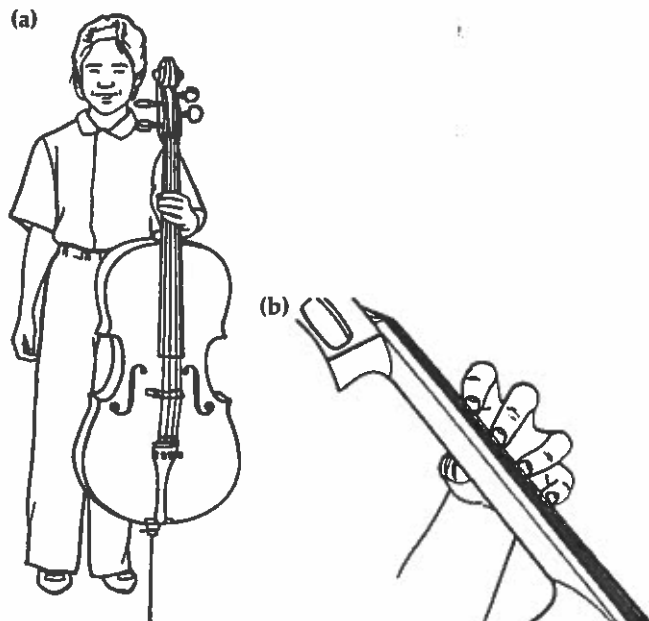


Figure 2.2 Instrument sizing for cello.

position (see Figure 2.2b). The student should be able to comfortably play an interval of a minor third between the first and fourth fingers. If the player's hand is too small, the next smaller instrument size should be used. (See DVD Clip 3.)

Bass

First adjust the length of the endpin so that the nut of the bass is near the top of the student's forehead when standing (see Figure 2.3). Then have the student place her left hand on one string in first position. The student should be able to easily play an interval of a major second between the first and fourth finger on the string. If this is not possible, a smaller instrument size is best. (See DVD Clip 4.)

PEDAGOGY FOR TEACHING INSTRUMENT POSITION

There are many ways to teach children how to hold their instruments. The following four-step process may be used with all four string instruments in the heterogeneous class.

Violin and Viola

Our recommendation is that students first play the violin and viola while holding the instrument in guitar position. It is easier for students to see and place their left hand properly on the instrument initially. Once they learn the correct shape, location for the thumb and base hand knuckles, and 2-3 finger pattern (1 2 3 4) they can place their instrument on their shoulder with their left hand already set.

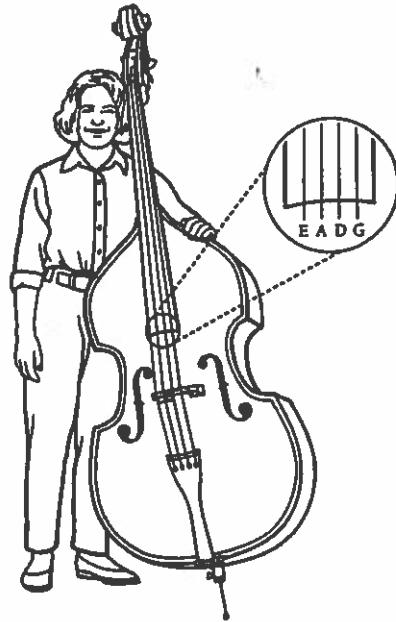


Figure 2.3 Instrument sizing for playing the bass while standing.

Introduce the parts of the instruments to prepare students to learn how to hold their instruments in playing position. Be sure students have some kind of shoulder support material on the back of their instruments. The purpose of the material is to help stabilize the instrument on a student's shoulders and to fill the space between his jaw and the top of his shoulder. The height of the shoulder support material should allow the student's jaw to be parallel to the floor when his jaw is touching the chin rest. Many different shoulder support materials can be used: commercial shoulder rests, foam rubber pads, and so on. Be sure the height of the support is proper and that the material is secured to the back of the instrument so it does not slide around. See Chapter 1 for more information and examples of different kinds of shoulder rests and materials that can be used.

As students are developing left-hand shape and fingering skills with the instrument in guitar position, gradually teach them how to hold their instruments in shoulder position. There are many ways to do so. The following is one method.

Begin by having them touch their left shoulder, collarbone, and side of the neck, which forms a triangle. Refer to it as the platform or shelf for the instrument. Also, have students touch the middle of their necks, as the button of the instrument will touch there when the instrument is in playing position. Then lead the students through the following four steps.

Step 1

Have students stand with their feet shoulder width apart. Ask students to turn their left feet to the ten o'clock position and step out one or two inches. They should adjust their body weight so that they are slightly leaning on the left foot.

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Some students may want to slightly turn the heel of their right foot toward the center of their body to be comfortable (see Figure 2.4a). (See DVD Clip 5.)

Step 2

Have the students hold their instruments parallel to the floor at eye level. Ask them to place their left hand on the high string bout to hold the instrument and to touch the instrument button with their right index finger (see Figure 2.4b). (See Clip 6.)

Step 3

Ask students to lift their instruments in the air and gently bring them down to their left shoulders without turning their heads. Instruct them to keep their left hands on the bout and to use their right hands to feel if their instrument's shoulder rest is resting comfortably on the platform or shelf. They should also touch the button to see if it is touching near the middle of their neck. The instrument scroll should be generally parallel to the floor and positioned over the left foot (see Figure 2.4c). (See Clip 7.)

Step 4

Students are now ready to turn their heads so that the sides of their jaws touch the chin rest. Suggest that students check their instrument position by asking them to touch the end of their nose, top of the bridge, and scroll with the right index

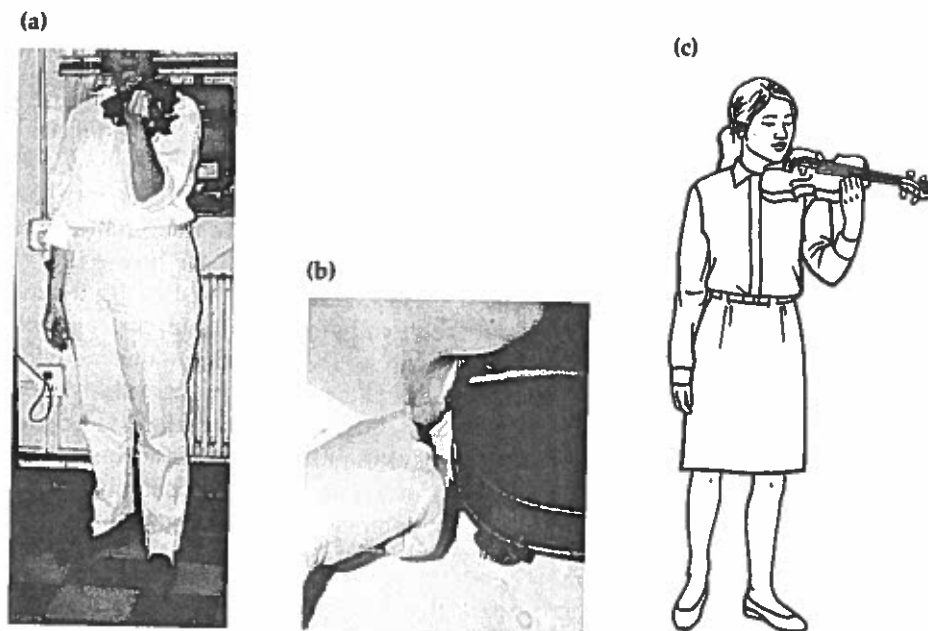


Figure 2.4 (a) Standing position for violin and viola. (b) Button position preparation for violin and viola. (c) Button positioning for violin and viola.

finger to see if they are generally in a straight line. The nose should be in the direction of the scroll when the instrument is in proper playing position (see Figure 2.4c). Walk behind students to see if there is a straight line between the tops of their heads and the bottoms of their spine to be sure that their body is in alignment. When students begin to play sitting down, check to see if their scrolls are parallel to the floor and that their feet are flat on the floor and positioned so that the frog of the bow can travel past the right side of their right leg. (See Clip 8.)

Cello

A similar four-step process can be used to teach cello students how to properly hold their instruments. Students should learn the parts of their instruments at this time in preparation for this process.

Step 1

Ask students to gently remove their bows from their cases and put them in a safe place and then remove the instruments from their cases. Adjust the length of the endpin so that the scroll of the cello is near the player's nose when standing (see Figure 2.5). With the endpin touching the floor, have the students balance their instrument about an arm's length in front of them with the student's right hand on the bout on the low string side of the instrument. The instrument scroll should point to the ceiling. (See Clip 9.)

Step 2

The seat portion of the chairs student cellists will use should be flat and generally parallel to the floor. Have students sit on the front half of their chairs, with their feet placed flat on the floor, positioned underneath their knees, and spread far enough apart to accommodate the width of the cello. The height of the chair should allow the player's thighs to be generally parallel to the floor. The cello endpin should be directly in front of the student, one arm's length away (see Figure 2.6). (See Clip 10.)

Step 3

Ask students to gently bring the instruments back to their bodies while keeping their heads looking forward. The cello should lean slightly to the left and rest comfortably on the upper torso of the player. The C string peg should be near the player's head behind the left ear. You may need to readjust the length or position of the endpin. Check to see if there is space between the neck of the cello and the student's neck, and between the back of the neck of the cello and the top of the player's shoulder. The student should be able to easily move her head side to side without bumping into the cello (see Figure 2.7). (See Clip 11.)

Step 4

Students may now move their knees so that they touch the cello just below the "C" bout. The knees should gently balance the cello, with the instrument

the D, G, and C-major scales that the other string students are learning if octave transpositions are to be avoided. We recommend that bass players learn their initial scales without switching octaves for each tetrachord to avoid inherent string crossing, tempo, and intonation problems.

One of the decisions you will have to make in teaching basses is what left-hand position system to use with your students. There are two systems that are used frequently. One system uses Roman numerals to indicate the position. Examples of this system appear in Figure 4.3.

Another system labels the position by the pitch that is played by the first finger on the G string. For example, when the first finger is playing the note A on the G string the left hand is in "A Position." If the left hand fingers B the hand is in "B Position." We suggest you use the system that is used in your beginning string class materials and/or the system that is used by the local bass teachers.

BOWING INSTRUCTION: GENERAL GUIDELINES

The beginning of this chapter recommends that students develop body posture, instrument position, left-hand shape, and finger placement skills independent of bowing skills. Though instrument and bowing instruction should occur at the same time, beginning from the very first classes, the independent development of these skills allows students the opportunity to develop a level of mastery through review before trying to combine them. Remember that students may pizzicato the various scales and melodies they are learning as they are developing their bowing skills independently. See Chapter 6 for further discussion.

We recommend that bowing skills be taught sequentially because of their complexity. In beginning string classes, this involves first teaching bow hand shape, followed by instruction about simple *détaché* bowing, string crossings, and staccato and hooked bowing. Be sure to use much review to help students master each skill level before proceeding to the next skill.

BOW HAND SHAPE: GENERAL GUIDELINES

We recommend that students first learn to hold the bow at the balance point so that the fingers and thumb may be relaxed while holding the bow. This also helps students understand that the instrument will help support the bow when they are playing.

Violin and Viola

Examine carefully Figures 2.21 and 2.22 and notice the following:

- The index finger rests on top of the bow stick near the second knuckle joint.
- The second finger is curved across from the thumb, is draped over the side of the bow, and touches the stick near the second knuckle joint.
- The third finger drapes over the side of the bow, and the fingerprint touches the concave side of the frog.



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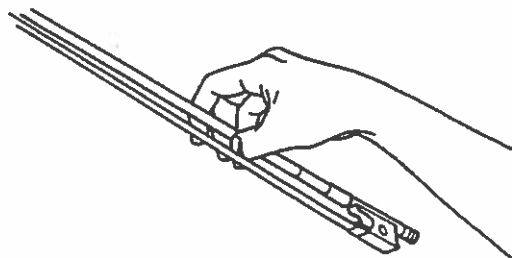


Figure 2.21 Bow hand shape at the balance point for violin and viola.



Figure 2.22 Bow hand shape for violin and viola.

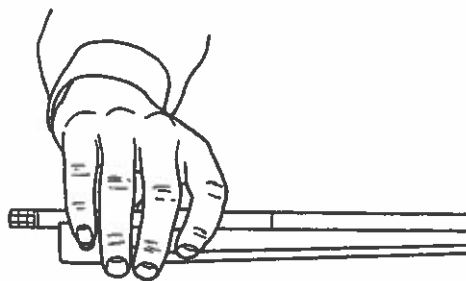


Figure 2.23 Bow hand shape for cello (view of the fingers).

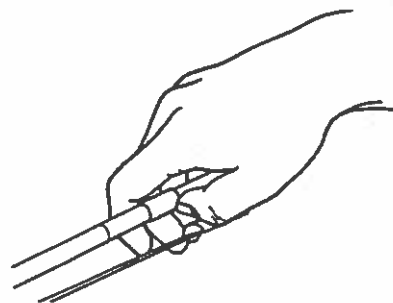


Figure 2.24 Bow hand shape for cello (view of the thumb).

- The little finger is curved and its tip rests near the inner side of the bow stick.
- The thumb is across from the second finger forming an oval shape.
- The hand leans slightly on the index finger.

Cello

Examine carefully Figures 2.23 and 2.24 and notice the following:

- All fingers are relaxed, slightly curved, and draped over the side of the frog and bow stick.
- The index finger is draped over the bow stick near the first or second knuckle joints.
- The second finger rests near the ferrule of the bow.
- The third fingerprint is near the U cutout of the frog.
- The fourth finger is near the eyelet of the bow.

All Instruments

Finger Bowing. Step 1: Have students hold their left index finger parallel to the floor in front of their face at the height of their chin. Step 2: Instruct students to place their right-hand fingers on the left index finger without their thumb touching. The right-hand fingers should hang on the left index finger. Students should point their fingertips over the side of the index finger. Step 3: Ask violin and viola students to tap their pinky on top of the left index finger. Step 4: Tell students to place their thumb tip across from their second finger, thumb knuckle curved outward. The thumb and the index finger should form an oval shape. Step 5: Have students move their bow hand formed on their left index finger to the place where it will be when bowing their instrument. Learning to shape their bow hand on an index finger allows students to incorporate the sense of touch when learning how to shape their fingers for bowing. See Figures 2.31 and 2.32 for a similar sequence using a pencil or pen rather than the index finger. (See Clip 30 and Clip 32.)

Pencil Bowing. Have students form their bow hand shapes on a pencil before placing them on the bow. This allows students to form their hand shape without having to balance the weight of the bow. Figure 2.29 shows an example of violin and viola bow hand shape formed on a pencil.

Straw Bowing. Have students form their bow hand on a straw. This encourages students not to squeeze or tense their hand because the straw is light and easily bends if pressure is applied.

Spyglasses and Telescopes. After students' bow hand shapes are formed, have them look through the spyglass or telescope shape formed by their long finger and thumb. (See Clip 31.)

Eyes Closed! Have each student form the bow hand with their eyes closed to help him focus on the *feel* of the bow hand when it is correctly formed.

Balance Point Bows. Instruct students to form their bow hand at the balance point of the bow. This helps the bow hand to be relaxed while holding the bow.

Tap, Tap, Tap. Instruct students to tap their fingers lightly while forming their bow hand shape on a pencil, straw, or at the balance point of their bow. This helps relax the fingers and hand.

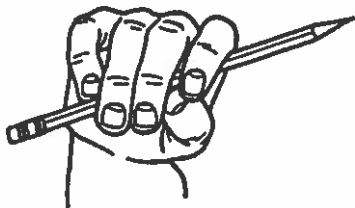


Figure 2.29 Bow hand shape on a pencil for violin and viola.



Figure 2.30 Bow hand thumb shape on a pencil for violin and viola.

Bow Paths. Draw a line or an X on the students' fingers where the bow stick should touch. This helps students correctly position the bows in their hands.

Thumbs Up. Have students hold their bows with their bow hands. Ask them to turn the bows upside down in a counterclockwise motion so that the hair is facing the ceiling. Instruct them to check to see if their thumb is touching the bow correctly and if its middle knuckle is curved outward, forming an oval shape with their longest finger. See Figure 2.30 for an example of this hand position for the violin and viola when holding a pencil.

Thumb Bends. Step 1: Shape students' bow hands on a pencil, straw, or bow. Step 2: Ask them to turn their bow hands upside down by turning their hands in a clockwise motion. The bow hair should be facing the ceiling as a result. Step 3: Instruct students to bend their thumbs slightly, along with all their fingers. The contact point of the thumb should stay the same while the thumb bends. This promotes flexibility throughout the fingers and thumb.

Violin and Viola

Flop Hand. Have students do the following steps. Step 1: Hold a pencil in the left hand at eye level. Step 2: Hang right-hand fingers over the top of the pencil, as shown in Figure 2.31. Step 3: Place the fourth finger on top of the pencil, as shown in Figure 2.32. Step 4: Touch the tip of the right thumb on the pencil just opposite the second finger, forming an oval shape, as shown in Figure 2.33. Step 5: Lean the right hand toward the index finger, as shown in Figure 2.34. After completing Step 5, remove the left hand from the pencil.



Figure 2.31 Step 1 for forming bow hand shape.



Figure 2.32 Step 2 for forming bow hand shape.

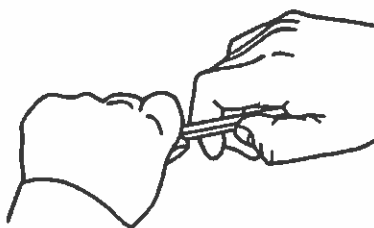


Figure 2.33 Step 3 for forming bow hand shape.

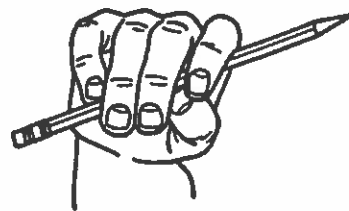


Figure 2.34 Step 4 for forming bow hand shape.

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