

# MUTES

*Con sordino (It.); Avec sourdine (Fr.);  
Mit Dämpfer (Ger.)*

All string instruments can be muted. The designation most often used when a mute is called for is *con sordino* (“with mute”). At that point in the score, the player places a small rubber, wooden, or metal object on the bridge, thus absorbing some of the vibrations to obtain a very soft and smooth sound. When a mute is used, the tone quality is radically altered, and although most muted passages are soft, it is possible to write *forte* or *fortissimo* portions of a work for muted strings. The loud muted passage takes on a special quality of restraint and a sound that is more constricted, tenser. The composer or orchestrator should listen carefully to both soft and loud muted passages to recognize and appreciate this peculiar sound.

**EXAMPLE 2-64.** Weber, *Oberon*, Overture, mm. 13–21

The musical score for Example 2-64 consists of two systems of four staves each. The first system (measures 13-15) is marked *Adagio con sordino* and *pp*. The second system (measures 16-18) is marked *senza sordino* and *f*. The Viola and Violoncello parts include *pizz.* and *arco* markings.

*Senza sordino (It.); Sans sourdine (Fr.);  
Ohne Dämpfer (Ger.)*

It is important to allow enough time between muted and unmuted passages so that players can put on or take off the mutes quietly. Some players now use clips that easily

**EXAMPLE 2-67.** Stravinsky, *Le Sacre du printemps*, last measure

Descendez le "la" un demi-ton plus bas

Vlc. *non arpeggiato*

*s.fff*

At the end of Stravinsky’s *Le Sacre du printemps*, the composer asks the cellos to lower the A string to G# so that the final chord can be played. This chord could not be executed if this scordatura were not asked for.

In the Mahler example, scordatura is used coloristically to make the violin sound like a “cheap fiddle”; the straining of all four strings caused by raising each a whole tone removes much of the noble sound we usually associate with the instrument. Scordatura is used much more today for similar reasons. In years past, it was sometimes used to facilitate playing in difficult keys; for example, a viola would be retuned D $\flat$ –A $\flat$ –E $\flat$ –B $\flat$  and its part written out in D major. This may be observed in the solo viola part of Mozart’s *Sinfonia concertante* (K. 364) in E $\flat$  major, where scordatura was thought to facilitate the performance. Another valid musical reason for the retuning is the increased tension on the string that gives the viola much greater brilliance.

## HARMONICS

*Armonici* (It.); *Harmoniques* (Fr.); *Flageolettöne*, *Flageolet* (Ger.)

Up until now we have focused on pitches produced either on an open string or sounded by pressing the string tightly against the fingerboard with the finger. All string instruments are capable of two other ways of producing pitches. The first produces a series of pitches called the *natural harmonics*, the second, a series called the *artificial harmonics*.

### Natural Harmonics

Natural harmonics are pitches produced by touching a string lightly at various points called nodes\* along the string. On a G string the resulting pitches, called *harmonics* or *partials*, are as follows (pitches with solid noteheads are out of tune):

**EXAMPLE 2-68.** Harmonic Series on G

Every pitch produced on any sounding body—whether a string or a vibrating air column—is a combination of the open string, called the *fundamental* or *first harmonic*

\*Nodes are the points of rest between vibrating (or oscillating) portions of a string.

(or *first partial*), and some overtones (second partial and higher). These notes are usually heard as a single or composite tone. The overtones give individual color or timbre to the fundamental and can be isolated from it on a string instrument by touching the string lightly at different nodes rather than by pressing the string firmly against the fingerboard. When the A string of a viola is lightly touched halfway between the nut and the bridge, for example, the string is prevented from vibrating as a whole. Its vibrating length is actually cut into halves, each sounding an octave higher than the pitch of the open string itself (in a ratio of 2:1). In theory it does not matter whether the bow is drawn across the string at the nut or on the bridge side of the node, since either half of the string gives the higher octave.

On the violin, the natural harmonics can be translated into the following notes:

**EXAMPLE 2-69.** Natural Harmonics

In Example 2-69, the first six partials (remember that the first is the fundamental) are given because they are the strongest and most successfully produced harmonics. Higher harmonics (up to the seventh or eighth partial) are quite easy to obtain on the viola, cello, and double bass, since the strings are longer and thicker.

Examples 2-70 through 2-73 show where on the lowest string of each string instrument the various natural harmonics can be produced (the different notations are discussed next).

1. First partial: The fundamental, of course, is played on the open string.
2. Second partial: Lightly touching the string halfway between the nut and the bridge will produce a pitch an octave higher than the fundamental.

**EXAMPLE 2-70.** Natural Harmonics, Second Partial

3. Third partial: This partial can be produced in two different ways:
  - a. Lightly touching the string a perfect 5th above the open string.
  - b. Lightly touching the string a perfect 12th above the open string.

**EXAMPLE 2-71.** Natural Harmonics, Third Partial

4. Fourth partial: This partial can be obtained in two different ways:
- Lightly touching the string a perfect 4th above the open string.
  - Lightly touching the string a perfect 5th above the open string.

**EXAMPLE 2-72.** Natural Harmonics, Fourth Partial

5. Fifth partial: This partial may be produced in four different ways, but only options a, c, and d (circled in Example 2-73) are secure enough to employ for orchestral use. Option b is used mainly in solo and chamber music.
- Lightly touching the string a major 3rd above the open string.
  - Lightly touching the string a major 6th above the open string.
  - Lightly touching the string a major 10th above the open string.
  - Lightly touching the string a major 13th above the open string.

**EXAMPLE 2-73.** Natural Harmonics, Fifth Partial

## Notation of Natural Harmonics

As can be seen in Examples 2-70 through 2-73, two methods are used to notate harmonics:

- A small circle over the note intended to sound as a harmonic; or
- A diamond-shaped note at the pitch where the node producing the desired note can be found on the string.

Notice that in the examples just given, the string on which the various harmonics are to be reproduced is specified. That is because some pitches of the harmonic series on one string are duplicated on another. For example, on the violin, the pitch series on one string are duplicated on another. For example, on the violin, the pitch series on one string are duplicated on another. For example, on the violin, the pitch series on one string are duplicated on another. Therefore, the string on which the pitch should be obtained must be specified. If it is to be on the G string, the term *sul G* should be used; or, for those who wish to designate the strings by roman numerals, IV (the lowest string). The following chart gives the roman numerals for each string on the four instruments of the violin family:

## Nomenclature of the Strings

Violin	Viola	Cello	Double Bass
I = E	I = A	I = A	I = G
II = A	II = D	II = D	II = D
III = D	III = G	III = G	III = A
IV = G	IV = C	IV = C	IV = E

4th above. Since artificial harmonics on the double bass are hard to produce, we do not recommend their use—even though some contemporary composers have called for them in solo music. The necessary stretch of the bassist's hand makes it practically impossible to play them cleanly. Other methods of producing artificial harmonics on the violin and viola, which are used in solo and chamber works, will be discussed in the next chapter in sections devoted to those instruments.

## Notation of Artificial Harmonics

1. A normal note with a diamond-shaped note a 4th above it.

**EXAMPLE 2-74.** Notation of Artificial Harmonics



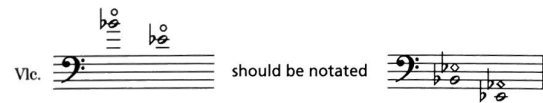
2. A normal note with a diamond-shaped note a 4th above, plus the actual intended note added above in parentheses.

**EXAMPLE 2-75.** Notation of Artificial Harmonics



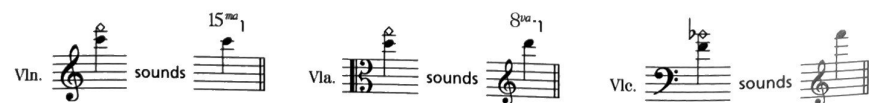
3. A small circle above the note that is actually heard as a harmonic. This manner of notation is chancy, for the orchestrator should be responsible for indicating the method of producing the harmonic (that is, touching a 4th above the stopped note) rather than the performer.

**EXAMPLE 2-76.** Notation of Artificial Harmonics



A question often asked is how high one can or should write artificial harmonics. Although theoretically there is almost no limitation, practically, there is a reasonable limit, especially for orchestral use, as shown in Example 2-77. Artificial harmonics higher than these are insecure and often do not speak.

**EXAMPLE 2-77.** The Highest Practical Artificial Harmonics



# Representative Passages from the Literature

Here are three extended passages that employ harmonics:

**EXAMPLE 2-78.** Debussy, *Ibéria*, part 1, at 15

**EXAMPLE 2-79.** Saint-Saëns, Violin Concerto, second movement, end (last 13 mm. only heard on recording)

**EXAMPLE 2-80.** Borodin, String Quartet No. 1, third movement, Trio, mm. 1–20

7

Vln. 1

Vln. 2

Vla.

Vlc.

- - A - - - - - D - - - - G - D - A - D - A - - - -

12

*p dolce*

Sul A - D - - - - G - D - A - D - - - - A - - - - -

Vln. 1

Vln. 2

Vla.

Vlc.

- - - - D - - - - G - D - A - - - - D - A - - - - - D -

17

Vln. 1

Vln. 2

Vla.

Vlc.

- - - - D - - - - G - D - A - D - A - - - - E - - - - - A

- - - - G - D - - - - A - - - - -

In Example 2-81 the violas (one measure after 30) and the cellos (the next measure) are asked to play the harmonic series on the C and the G string respectively.

Example 2-81 Ravel, Piano Concerto for the Left Hand, at 30

**Allegro** ♩. = 138

◆ **ADDITIONAL PASSAGES FOR STUDY**

Barber, *Medea*, "Dance of Vengeance," at 31

Berg, *Wozzeck*, Act I, Scene 2, just before 230, and Act III, Scene 5, 1 m. before 380

Copland, *Symphony No. 3*, second movement, mm. 100–106 (first violins); see also Example 3-18

Ravel, *Shéhérazade*, 3 mm. after 5

Rimsky-Korsakov, *Scheherazade*, second movement, *Vivace scherzando*

Schoenberg, *Violin Concerto*, first movement, mm. 212–225 (extensive use in solo part)

Webern, *Six Pieces for Orchestra*, Op. 6, No. 5; see also Example 3-19

Webern, *Five Pieces for Orchestra*, Op. 10, second movement

## CONTEMPORARY STRING TECHNIQUES

During the past century, a great number of innovations in string technique have been added to the vocabulary. There are so many modifications, in fact, that entire volumes are devoted to a discussion of these newer techniques. Here, it is only possible to mention some of the most important and codify in terms of notation those most commonly used. Such books as David H. Cope's *New Directions in Music* (Waveland Press), Gardner Read's *Contemporary Instrumental Techniques* (Macmillan), and Kurt Stone's *Music Notation in the Twentieth Century* (W. W. Norton) can be consulted for a more complete discussion of these techniques.