String Harmonics

by Cliff Colnot

PREFACE

The major purpose of this treatise is to provide extensive examples of natural harmonics and of artificial harmonics which are produced on the bowed string instruments by lightly touching a third, fourth, or fifth above a stopped tone. The goal has been to provide a comprehensive reference while realized that instrument size and hand size may make some of the examples impractical.

A string set into vibration will vibrate not only along its full length but also along fractions of its length. At least ten identifiable pitches are simultaneously produced, giving a tone its characteristics color. These tones are the harmonic series, the natural foundation of musical acoustics, and each tone can be isolated by preventing smaller string lengths from vibrating.

I recommend that composers and arrangers write bass harmonics at real pitch with a note of explanation; otherwise, the standard 8va transposition should be shown with a small accompanying notehead indicating the sounding pitch. Whatever notation is used, explanatory notes should be provided at the beginning of the score and the parts.

Special thanks to Dan Armstrong, Stephen Balderston, Loren Brown, Tom Hall, Peter LaBella, Everett Zlatoff-Mirsky, Brad Opland and Collins Trier for their invaluable advice.

GENERAL OBSERVTIONS ABOUT HARMONICS

A diamond indicates finger location, a round note with a circle above it indicates sounding pitch.

When harmonics are played, the string's fundamental is canceled.

Using artificial harmonics allows greater control of pitch.

Natural harmonics ring longer than tones produced by stopping the string.

NATURAL HARMONICS

Touching one octave above the open string produces a tone one octave higher than the open string.

Touching a fifth above the open string produces a tone one octave and a fifth higher.

Touching a fourth above the open string produces a tone two octaves higher.

Touching a major third or a major sixth above the open string produces a tone two octaves and a major third higher.

Touching a minor third above the open string produces a tone two octaves and a fifth higher.

Diamonds alone always refer to natural harmonics.

Some higher natural harmonics tend to be flat, and the use of artificial harmonics may be preferable.

ARTIFICIAL HARMONICS

***Touching a minor third above a stopped pitch produces a tone two octaves and a fifth higher than the stopped pitch.**

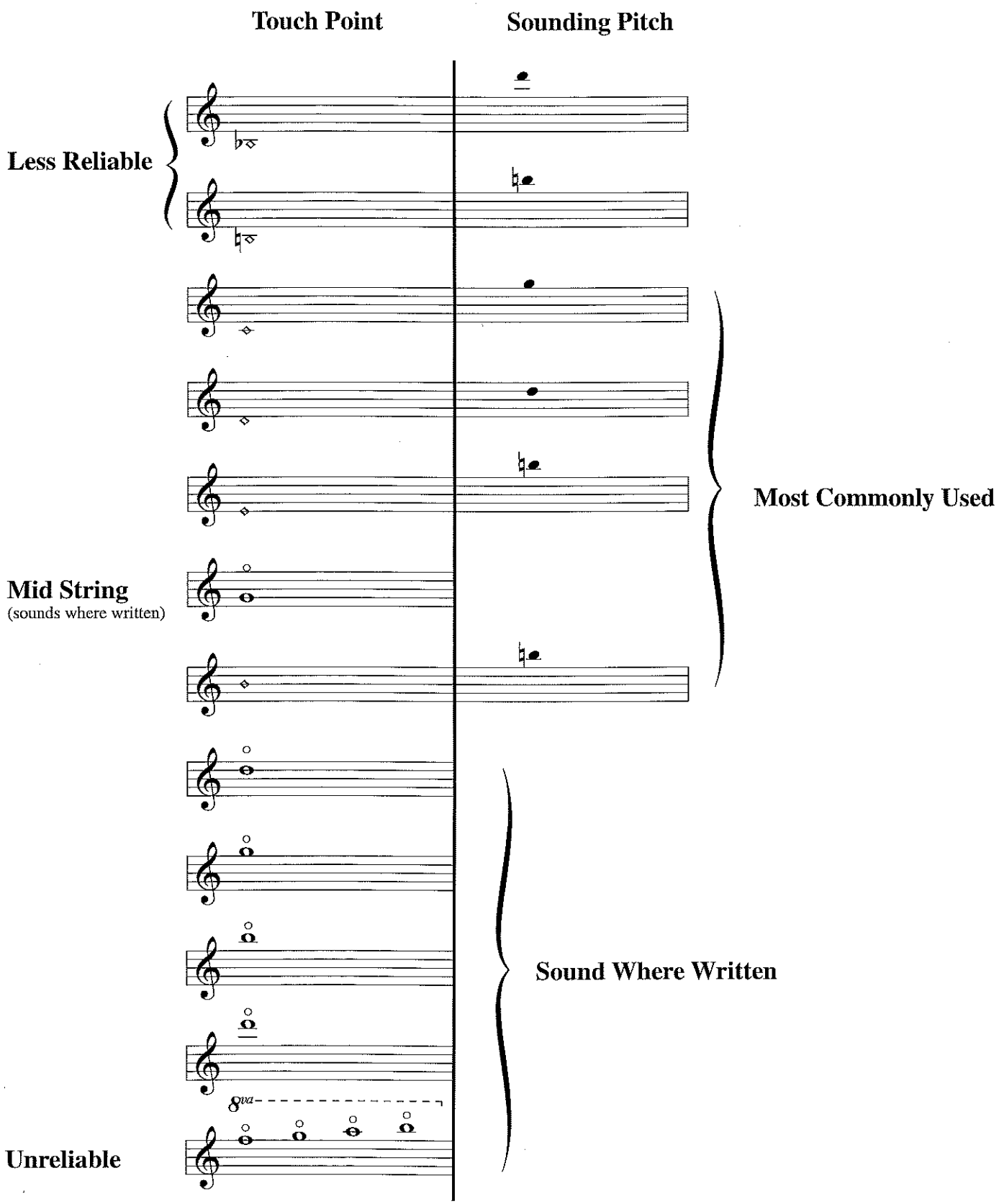
***Touching a major third above a stopped pitch produces a tone two octaves and a third higher.**

Touching a fourth above a stopped pitch produces a tone two octaves higher.

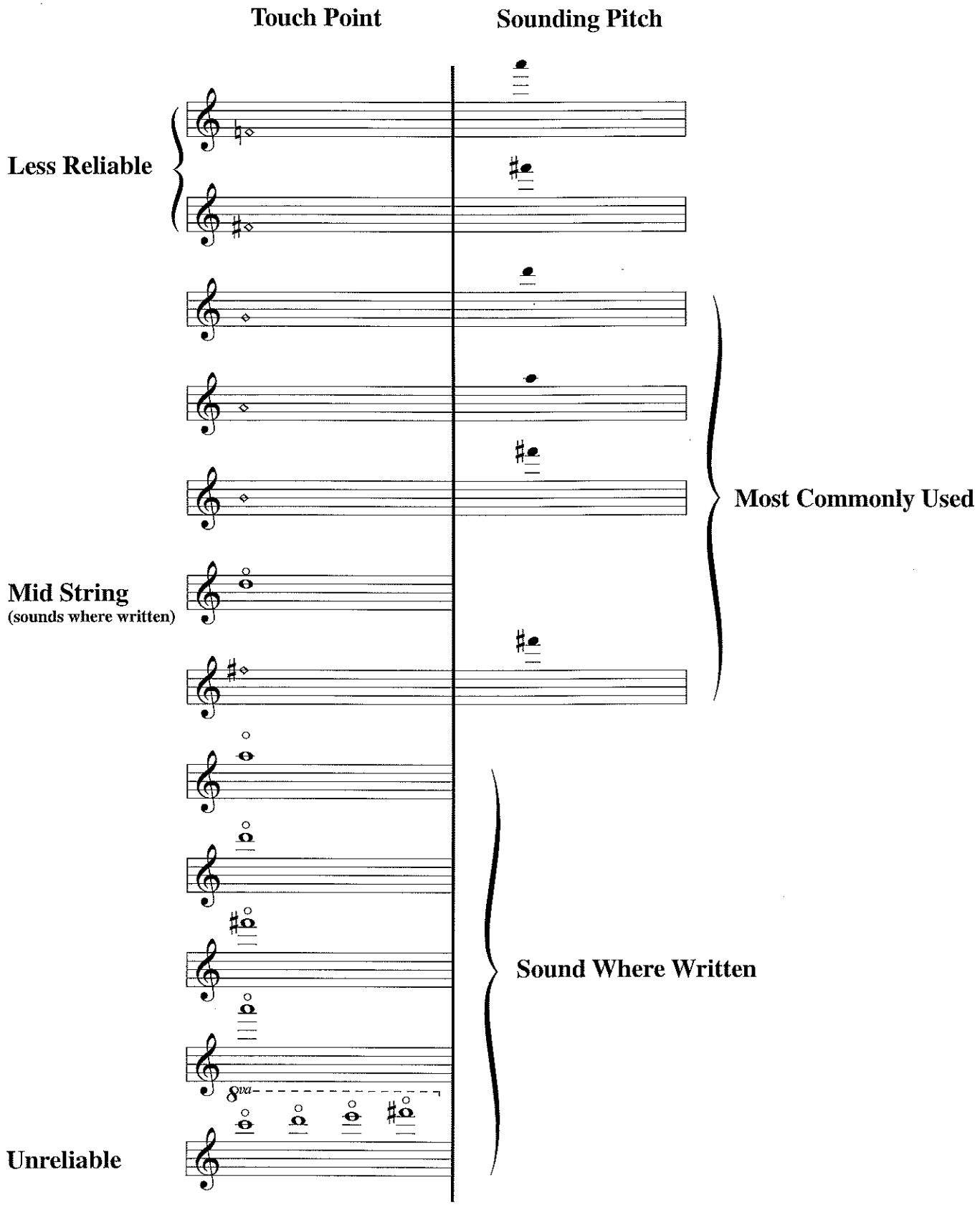
Touching a fifth above a stopped pitch produces a tone one octave and a fifth higher.

****These touch points have limited application and are not illustrated.***

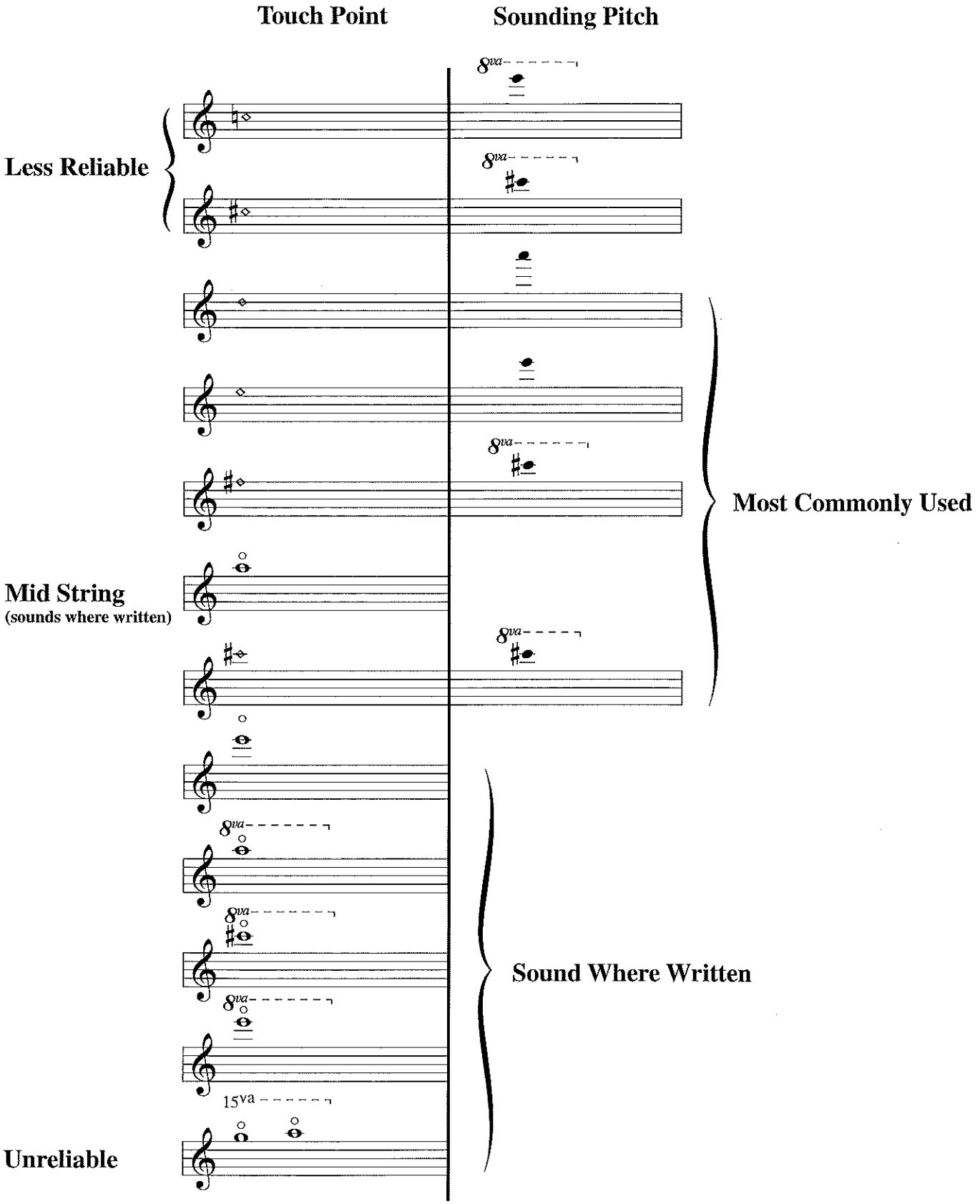
Violin - G String Natural Harmonics



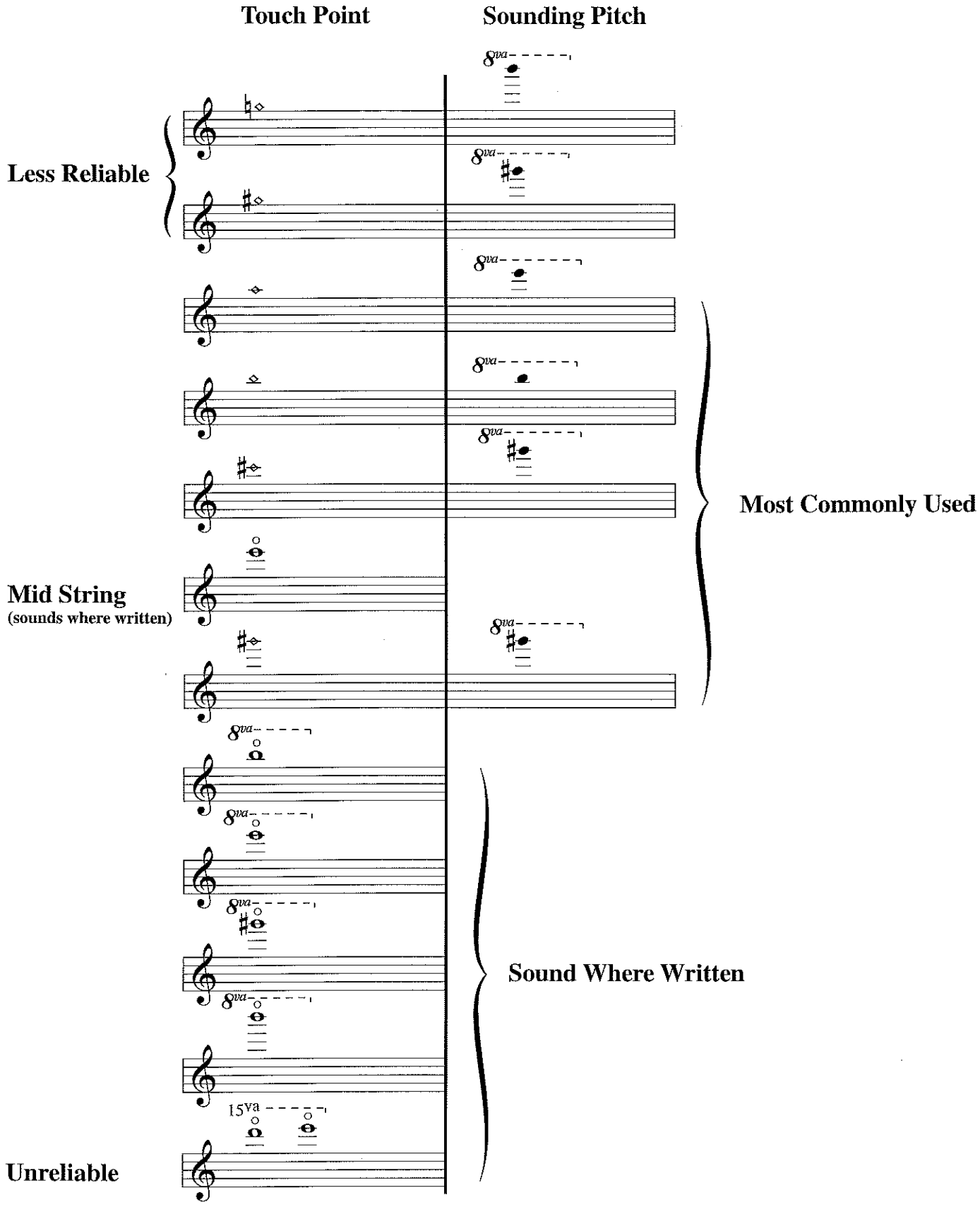
Violin - D String Natural Harmonics



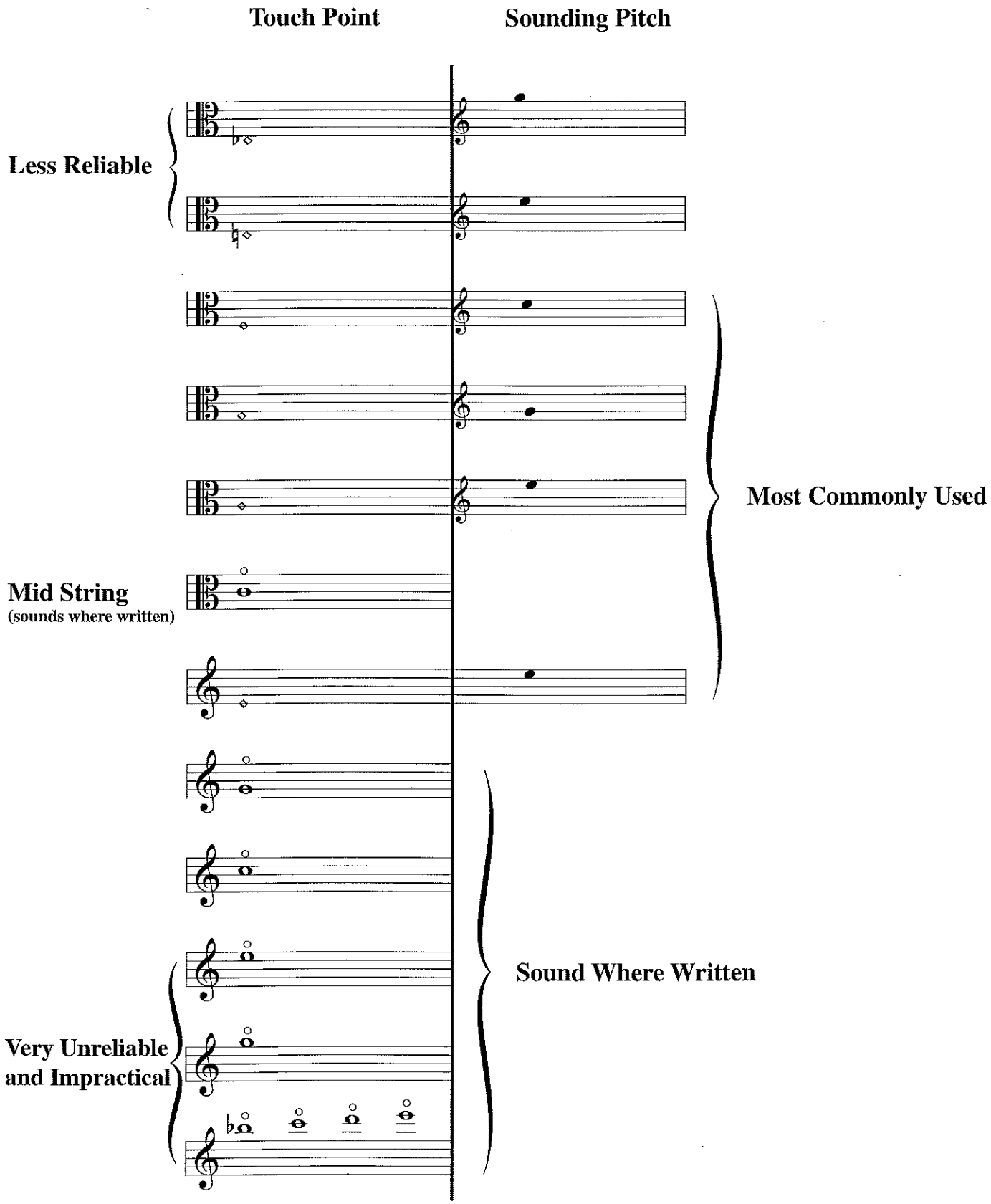
Violin - A String Natural Harmonics



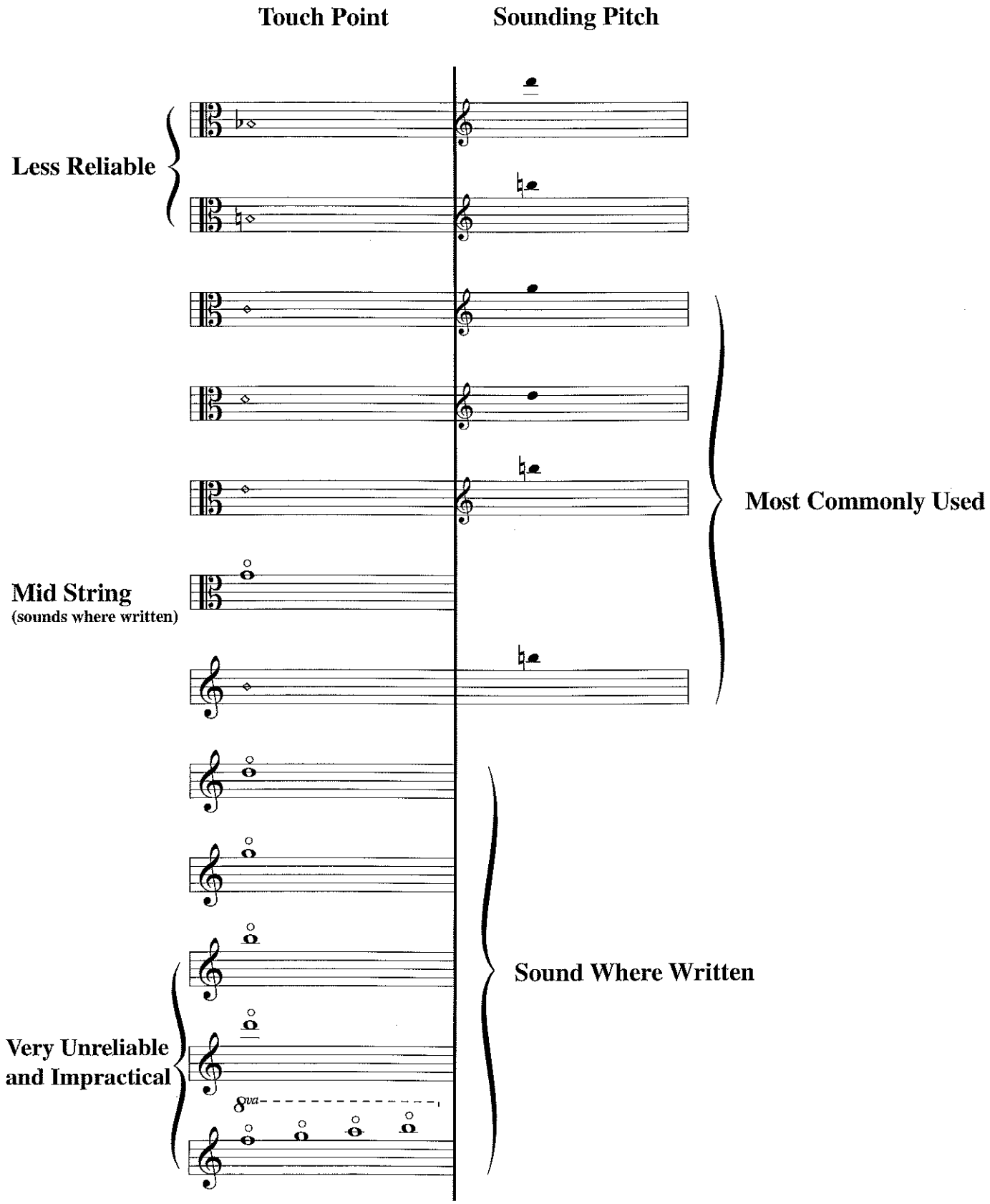
Violin - E String Natural Harmonics



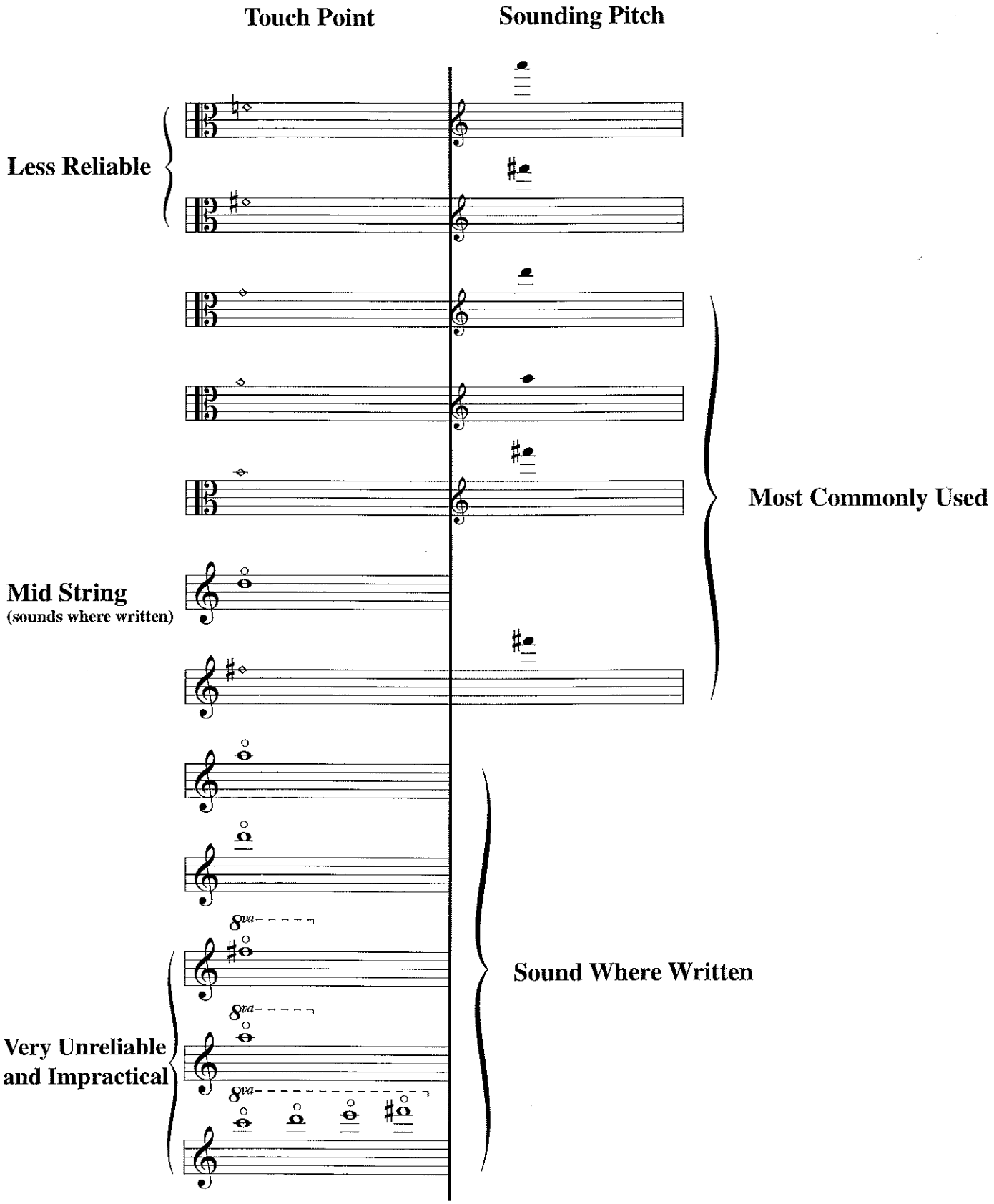
Viola - C String Natural Harmonics



Viola - G String Natural Harmonics



Viola - D String Natural Harmonics



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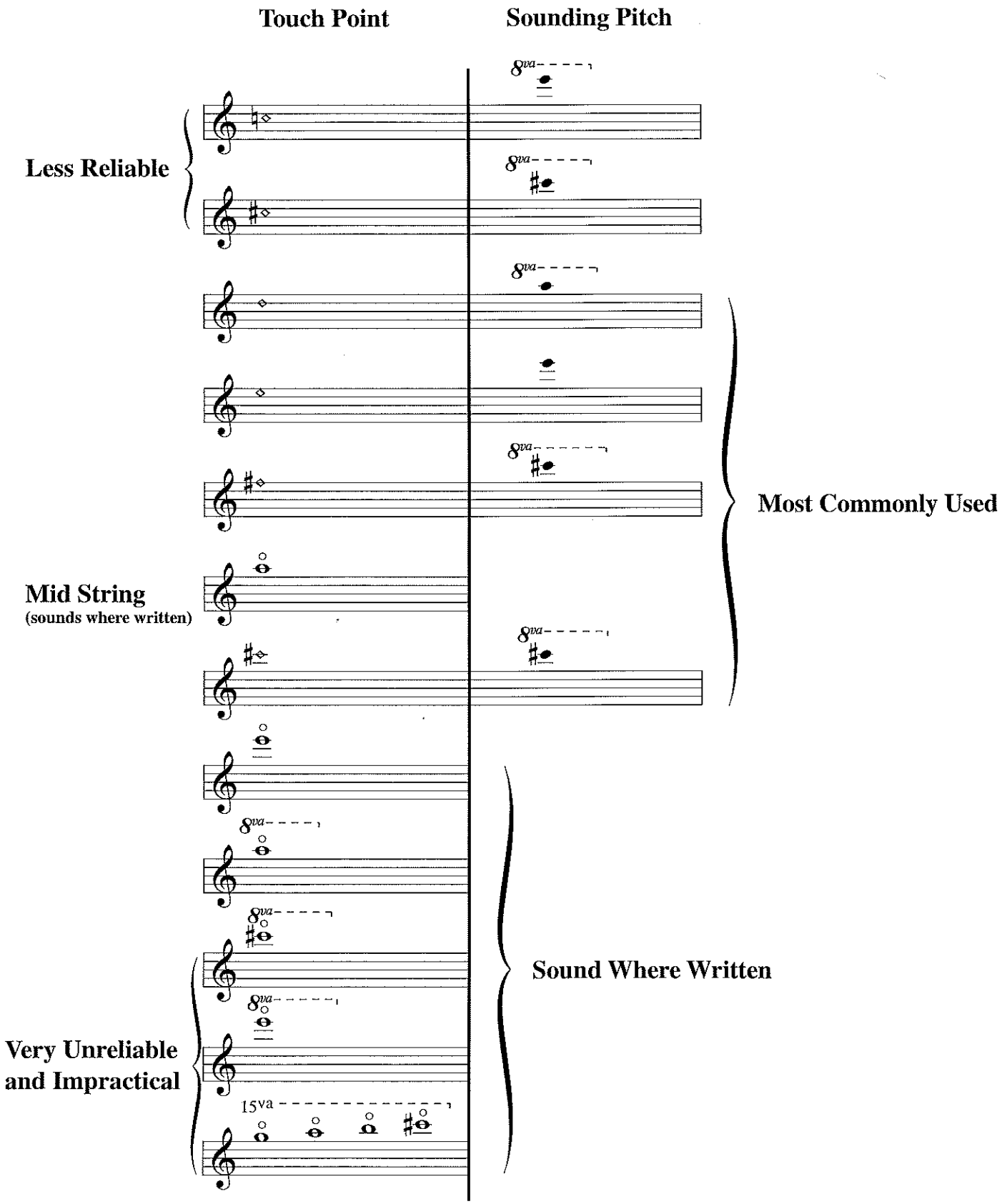
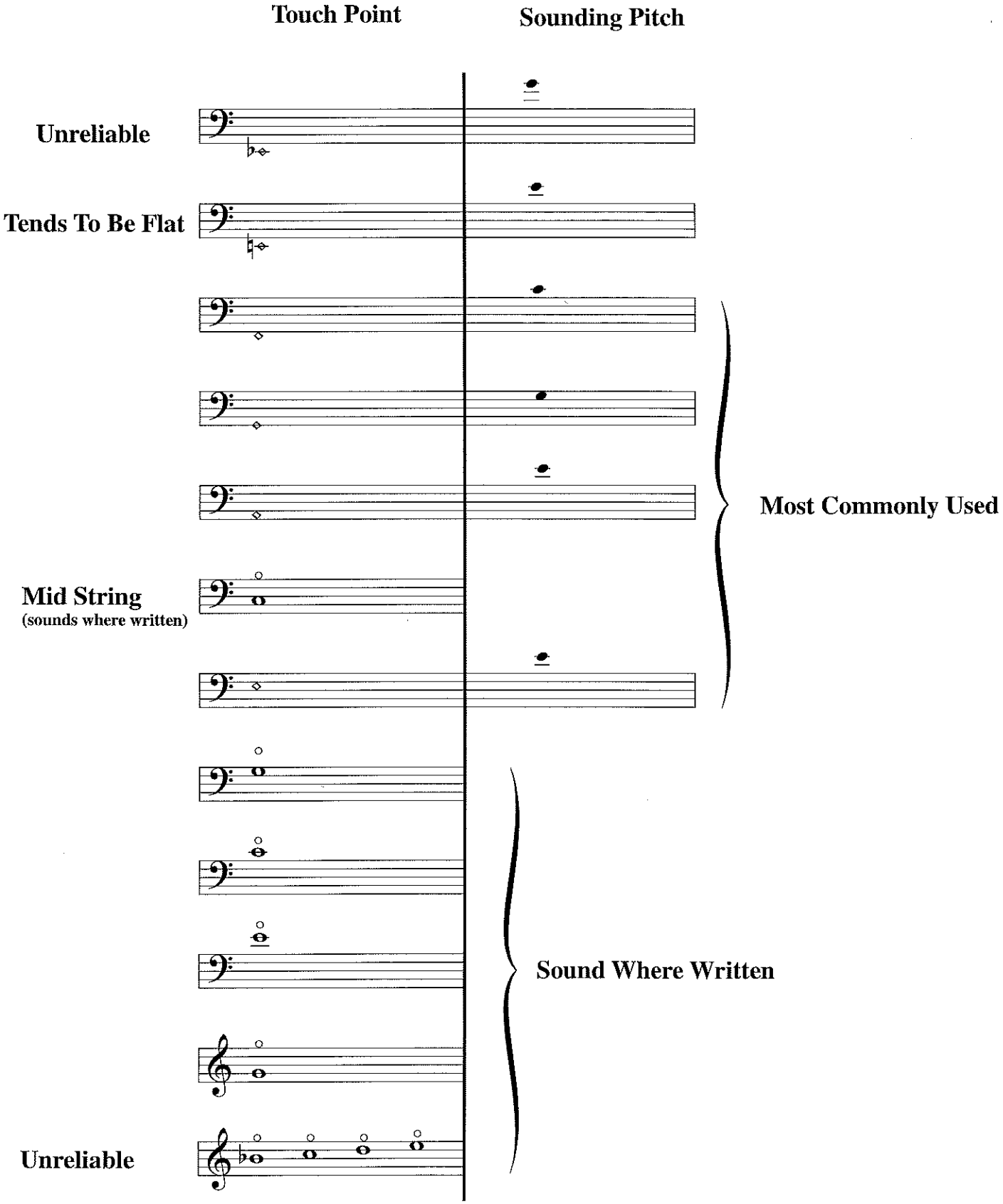


Cello - C String Natural Harmonics



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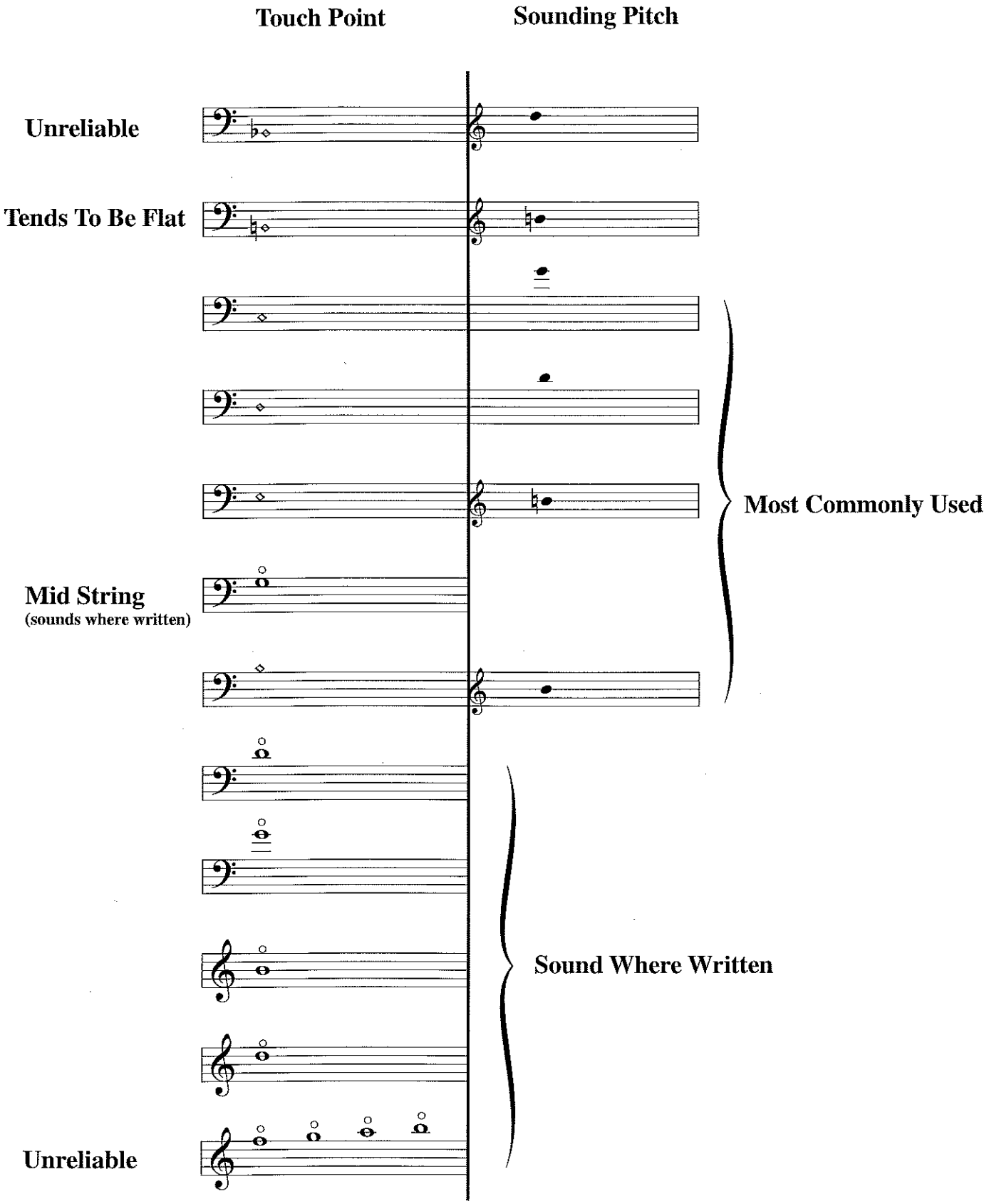

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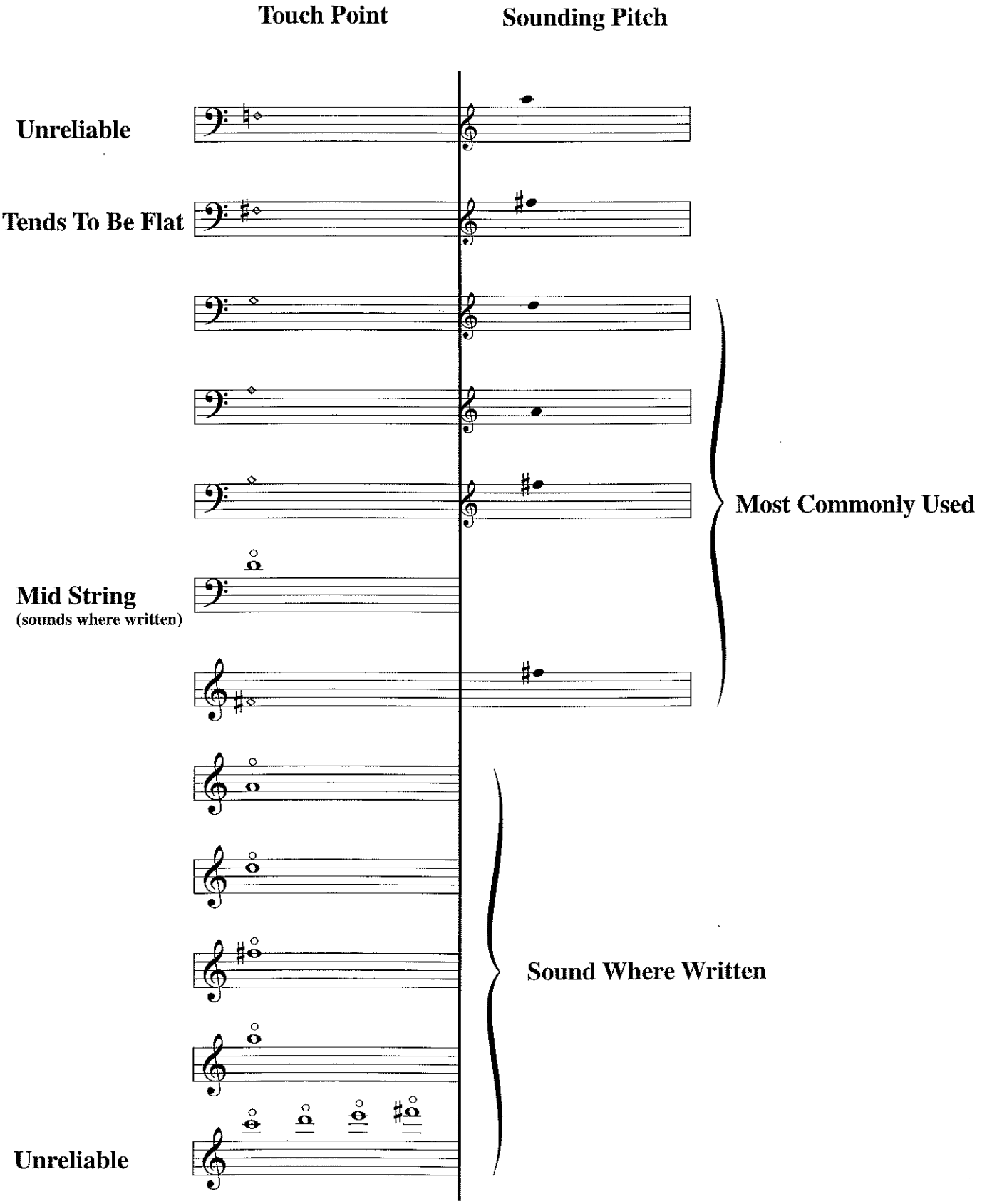
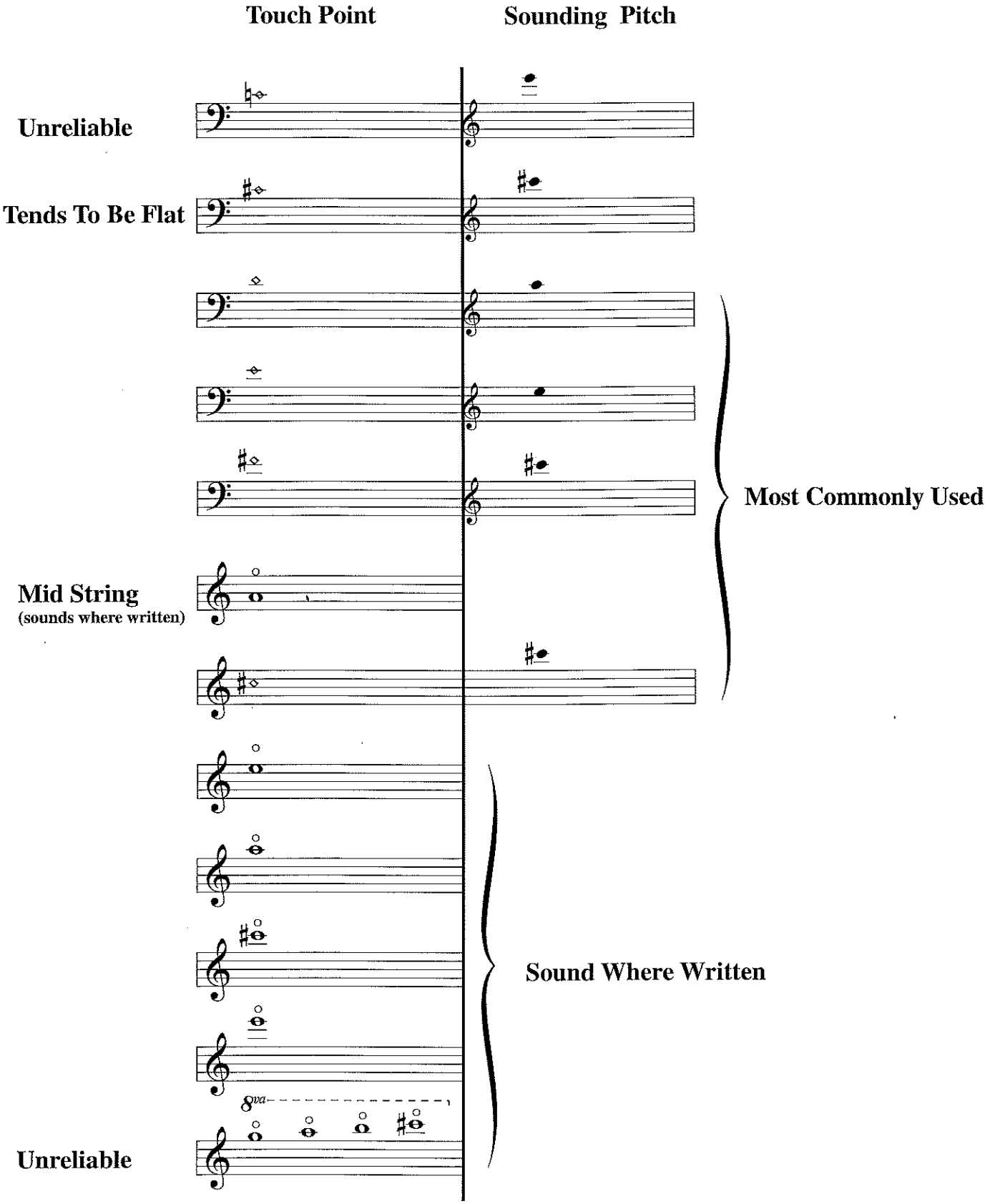
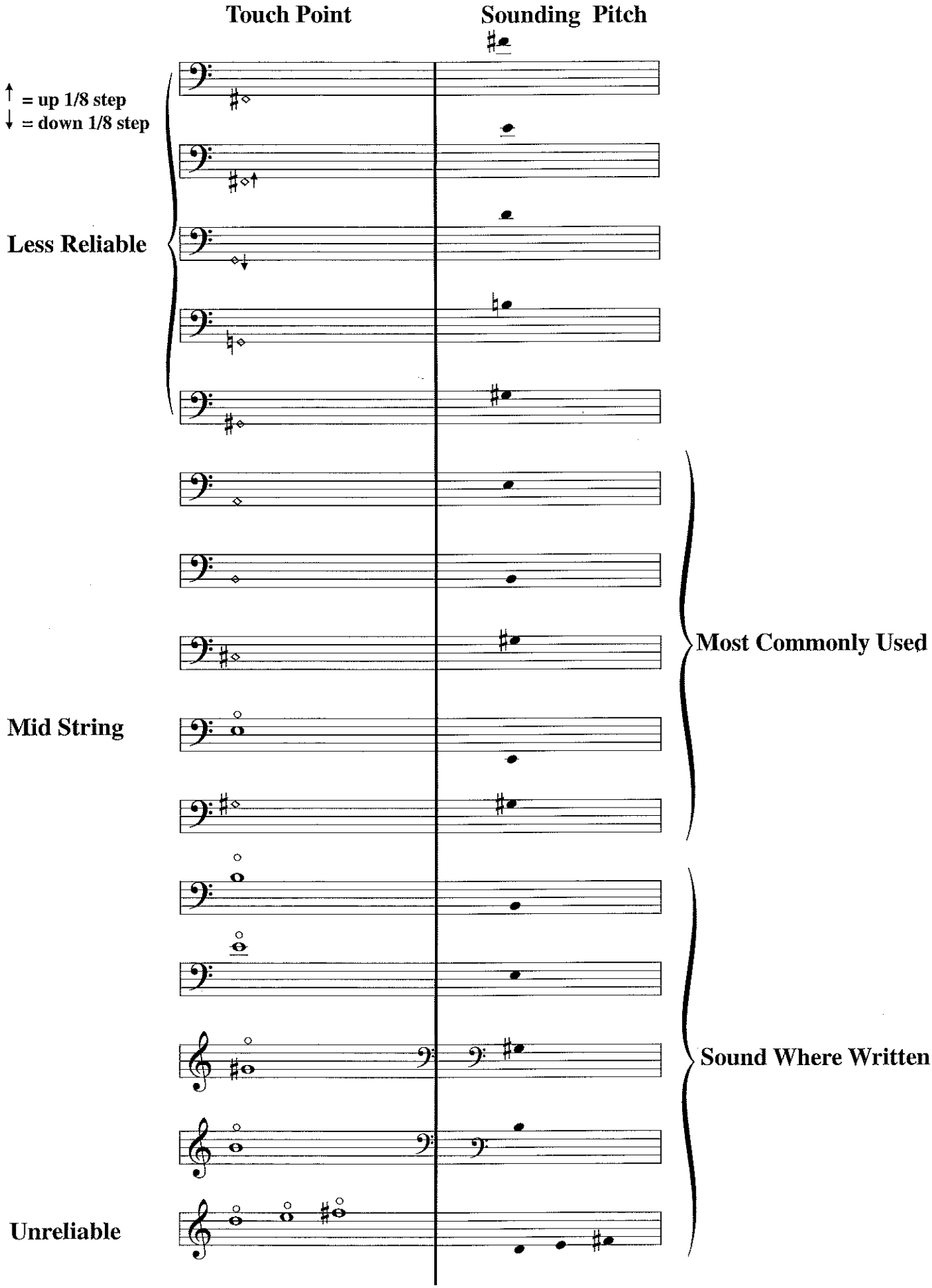


Cello - A String Natural Harmonics



Bass - E String Natural Harmonics



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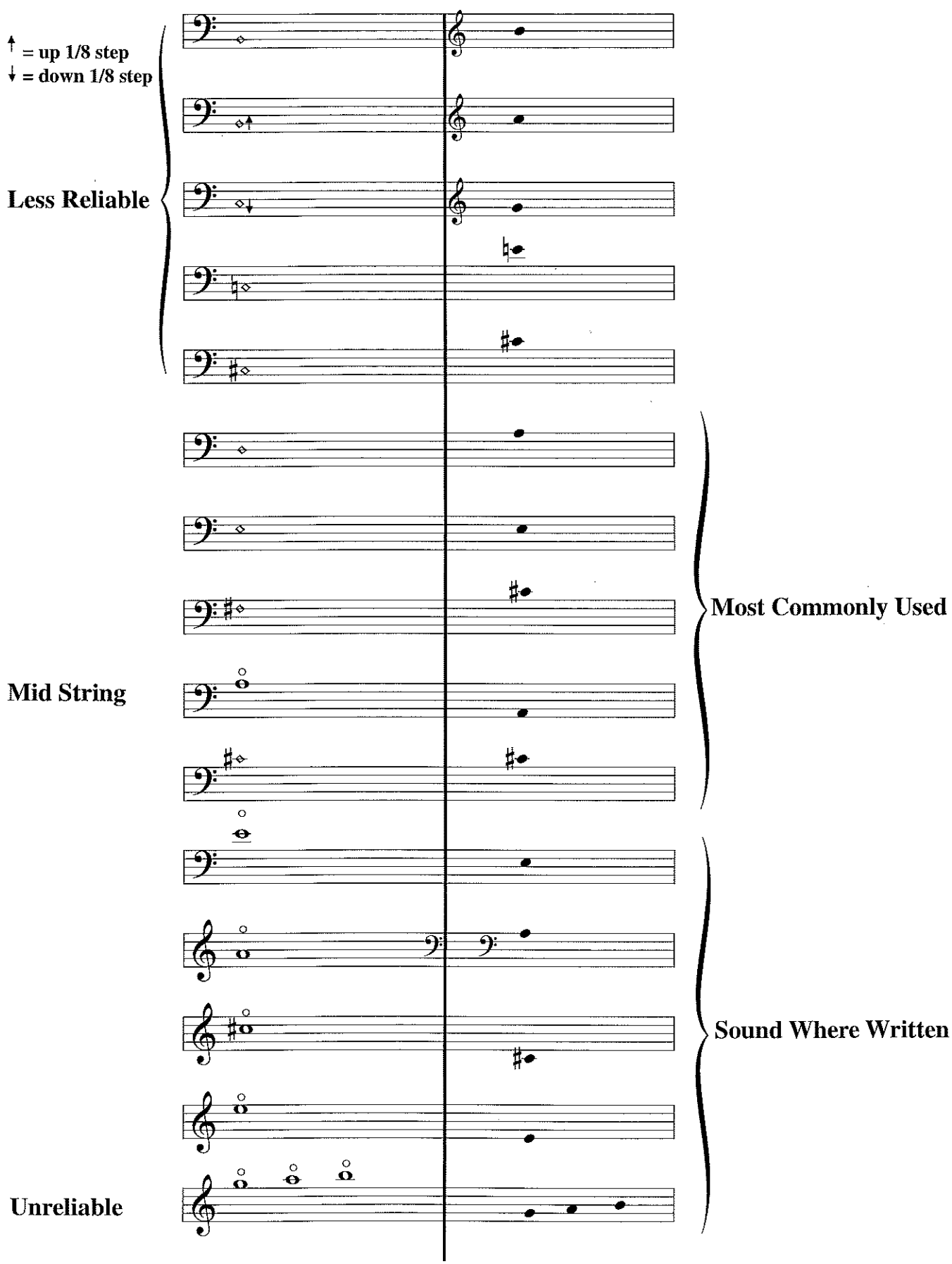

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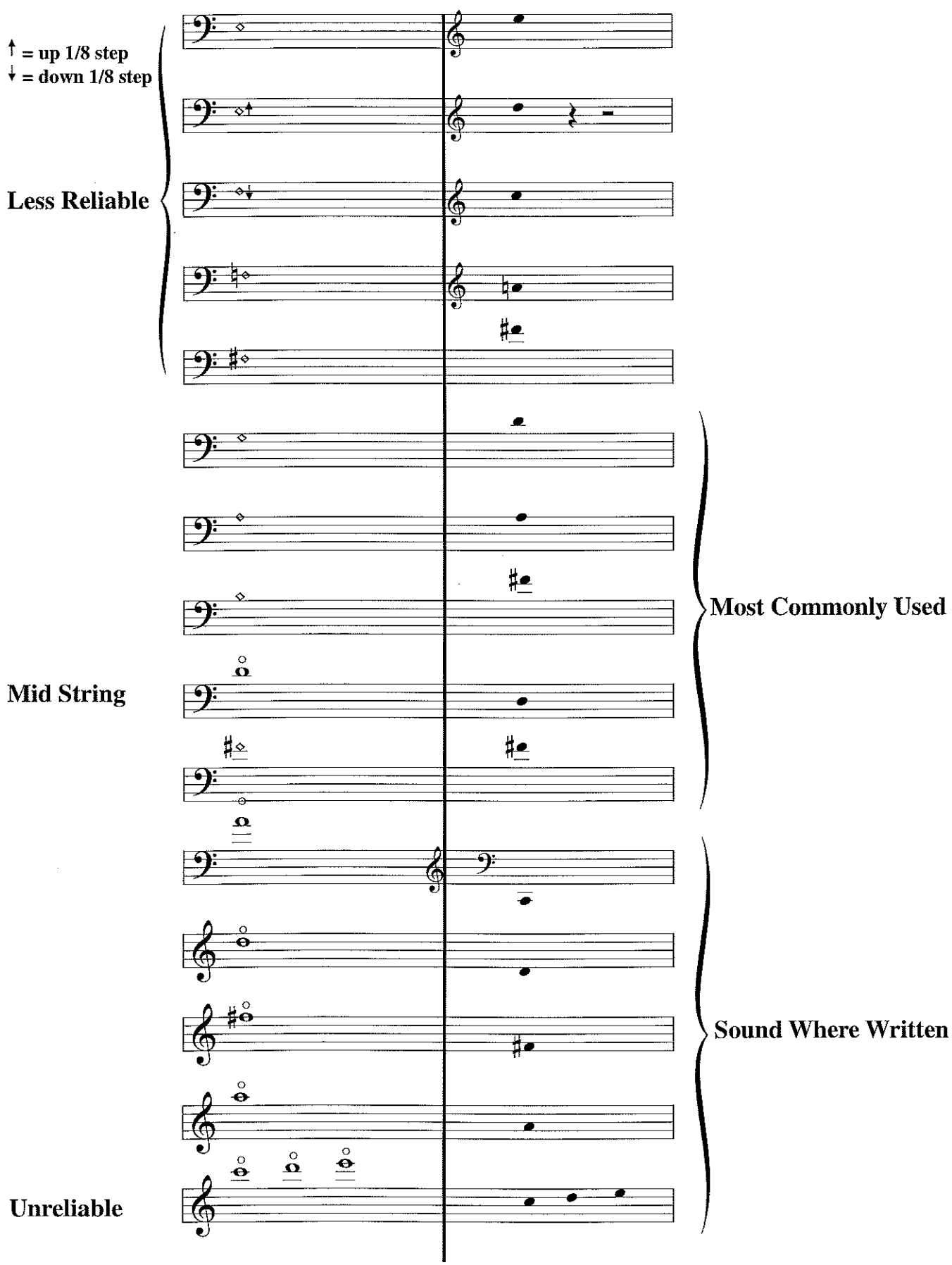
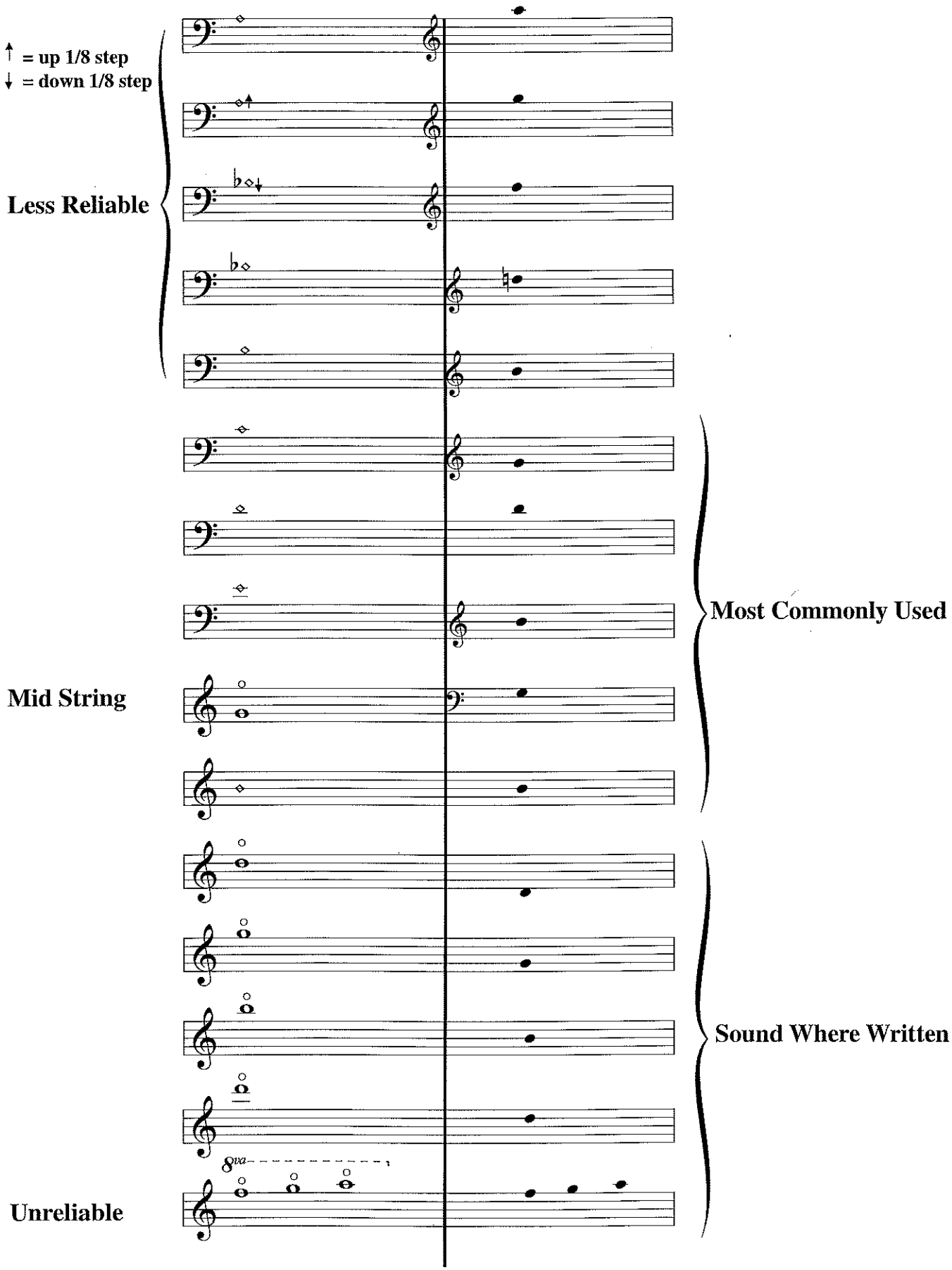
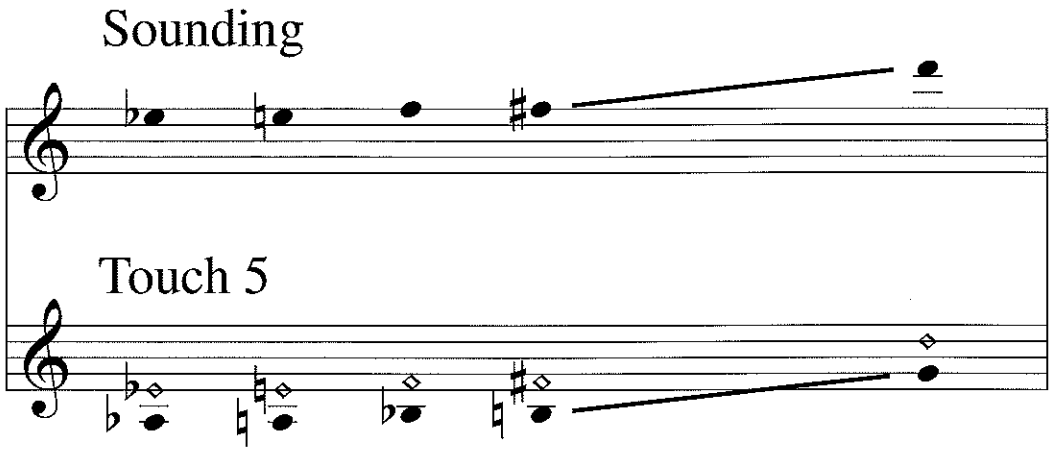
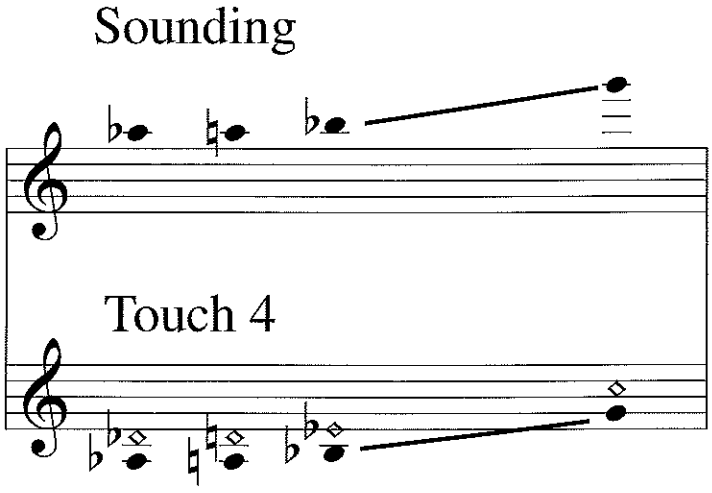


Bass - G String Natural Harmonics



Violin - G String Artificial Harmonics





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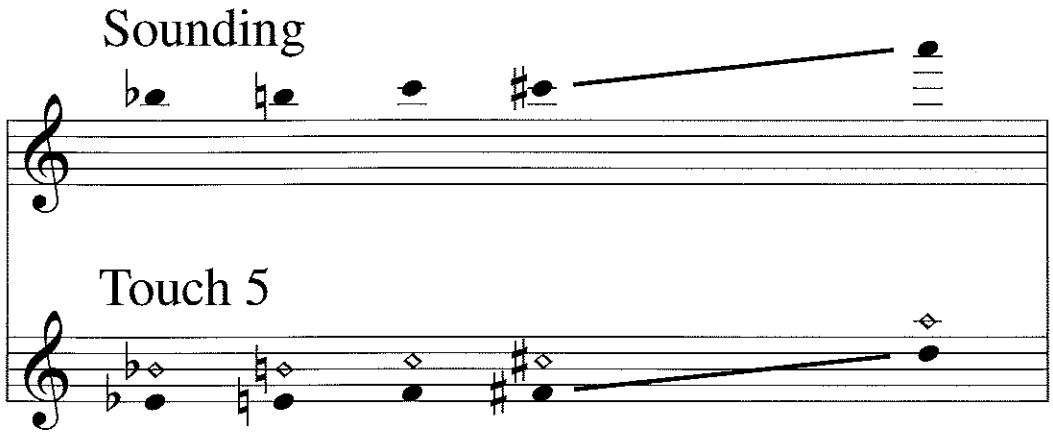

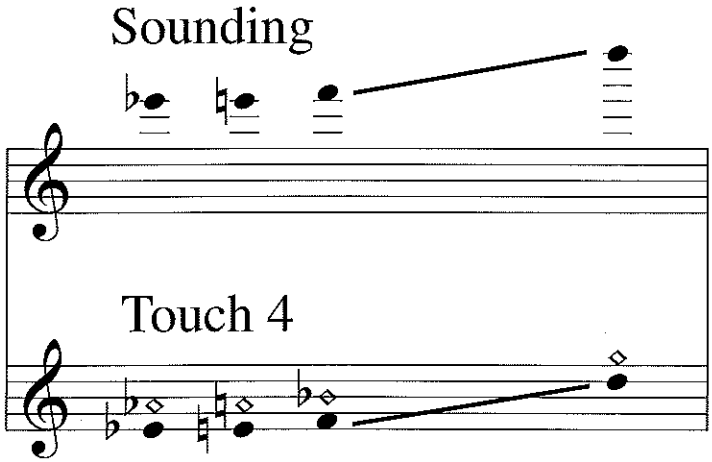

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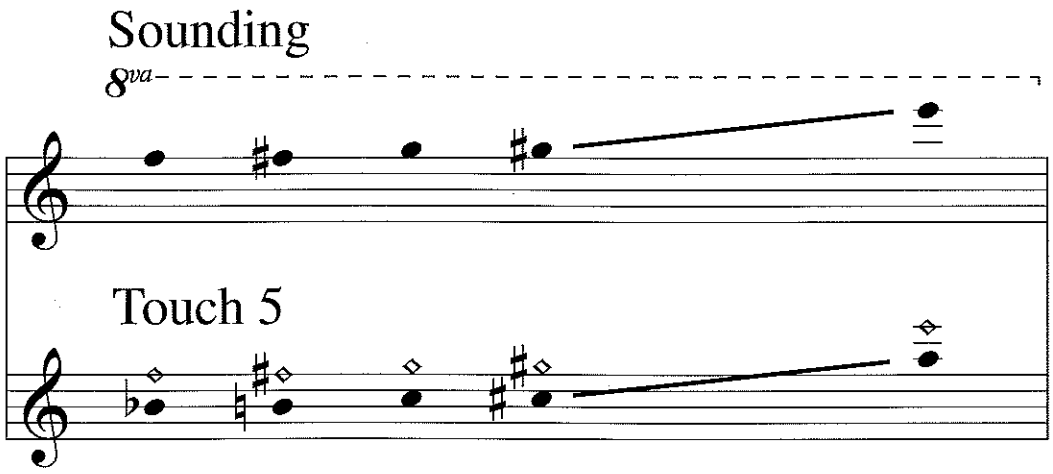

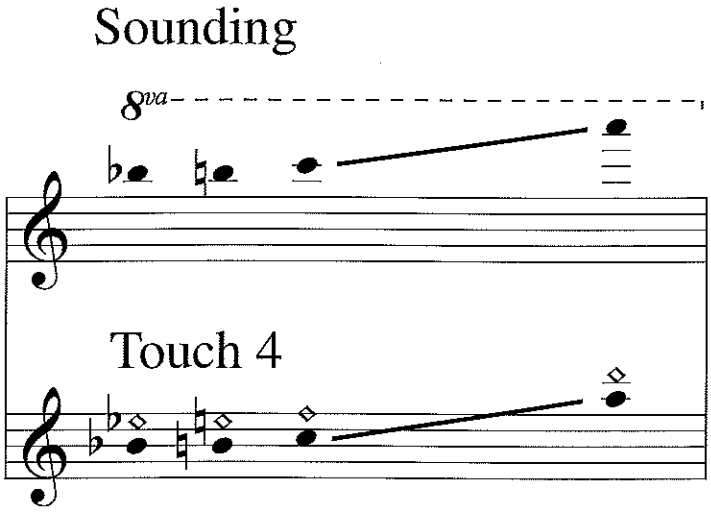

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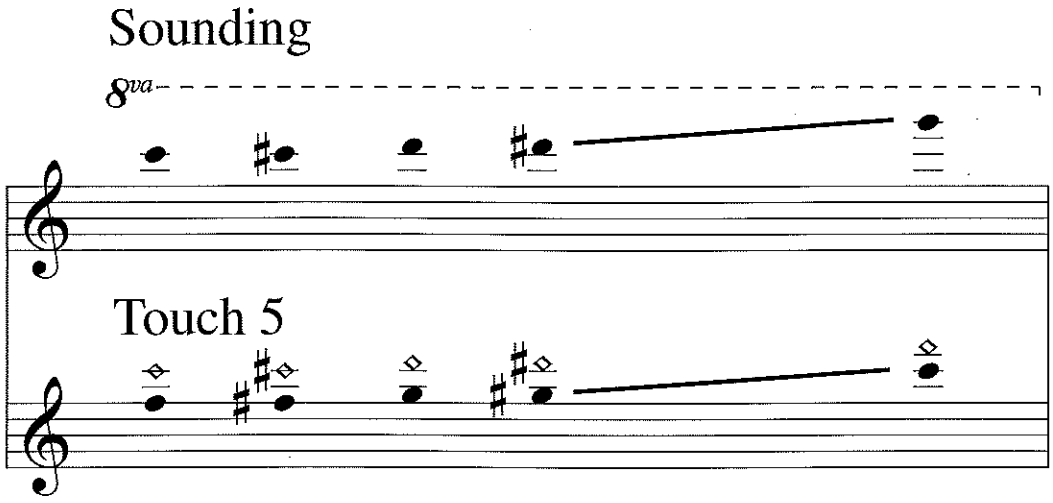
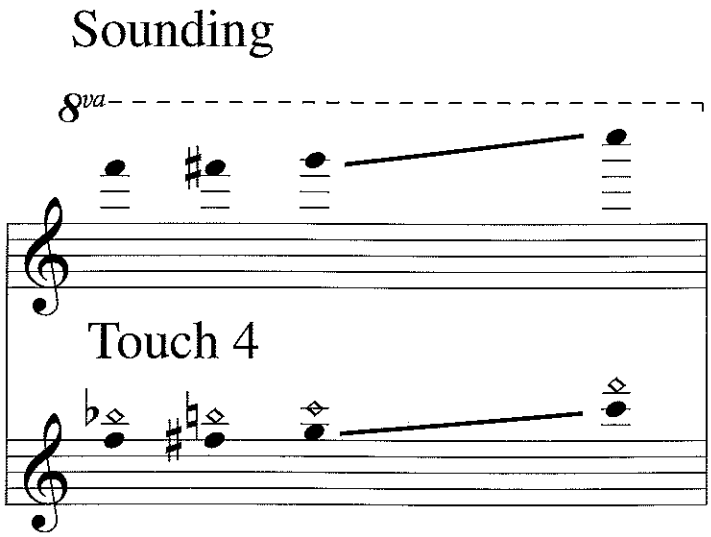
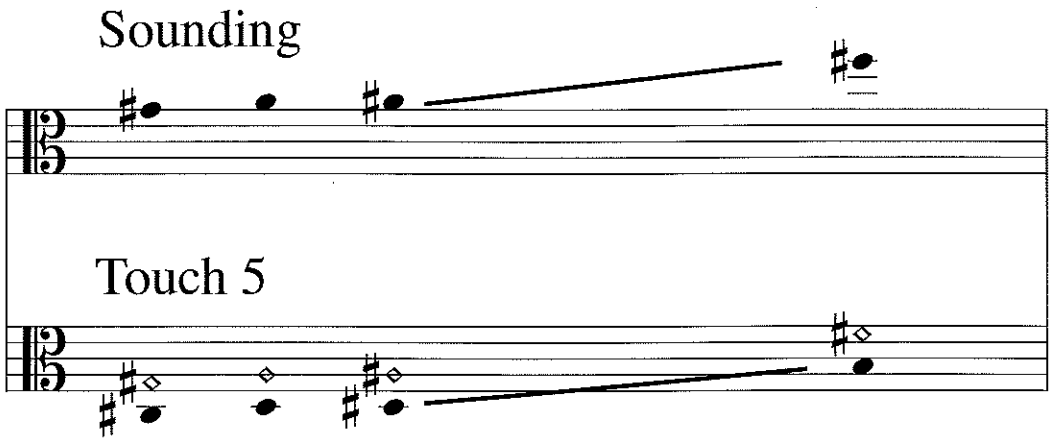
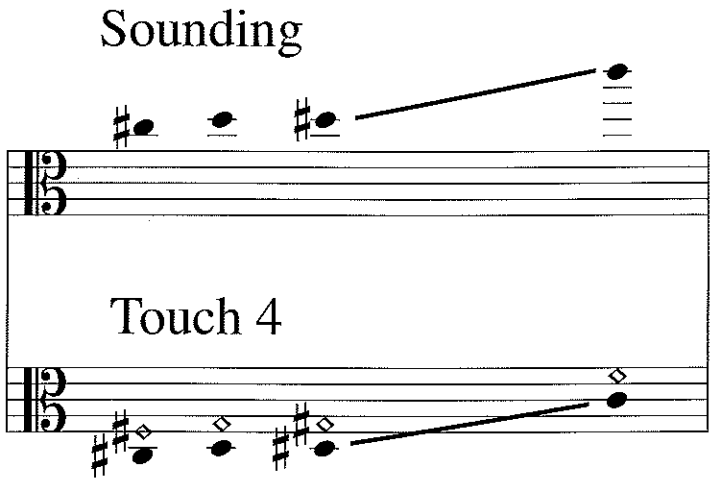


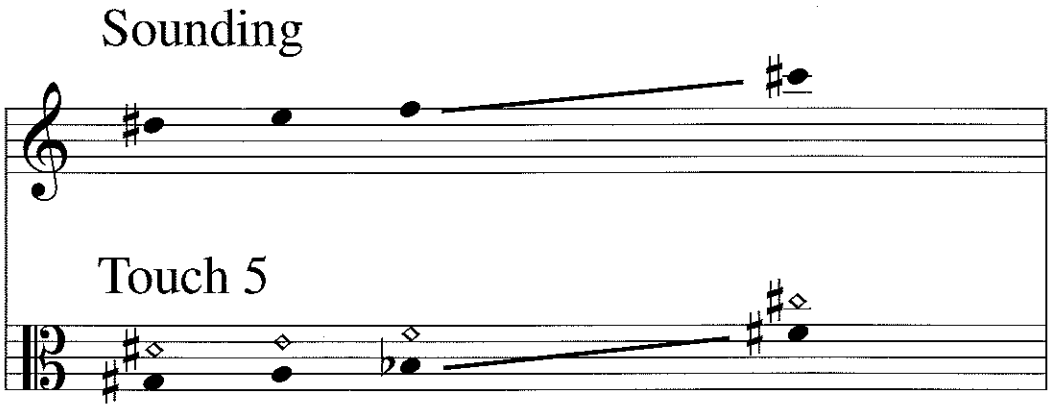


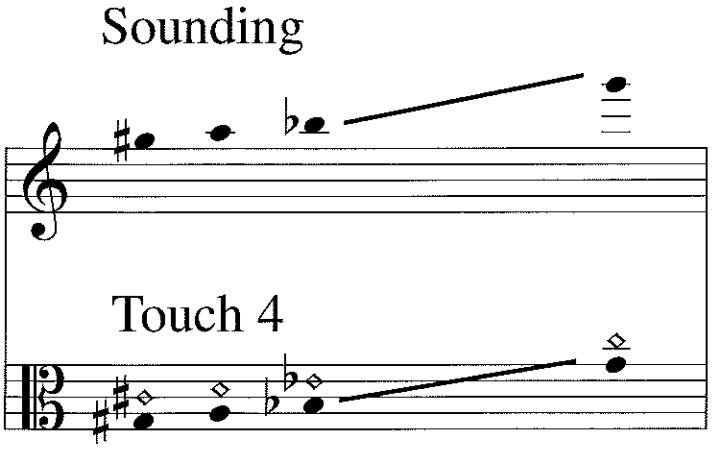
Viola - C String Artificial Harmonics



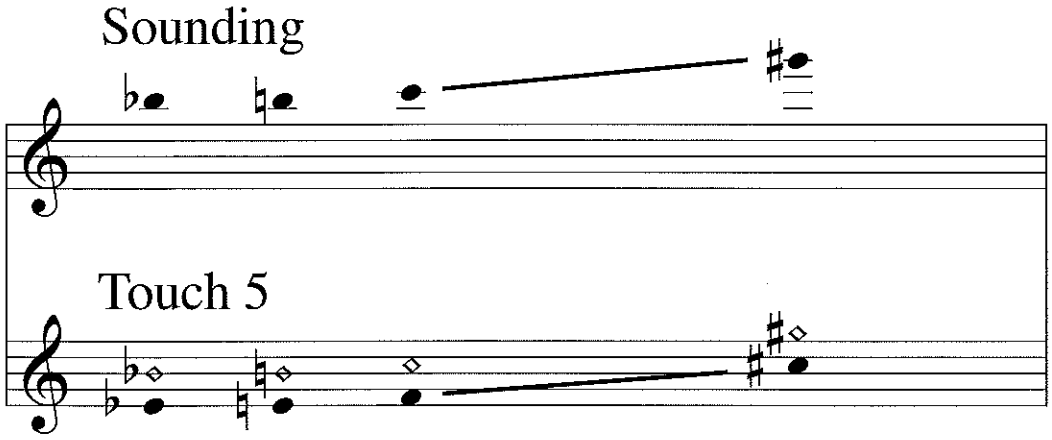


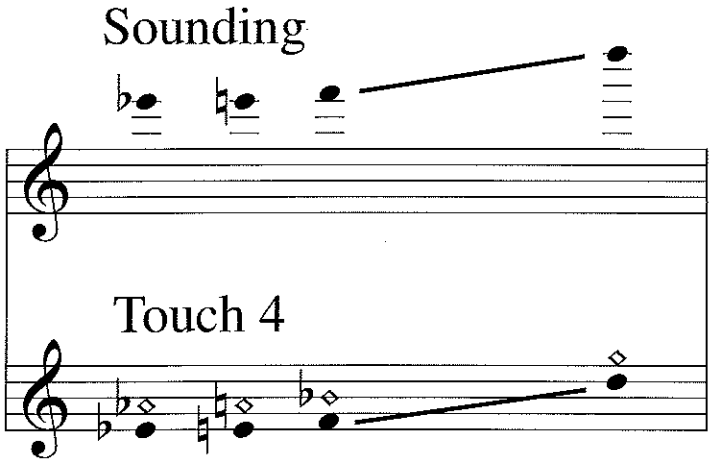
Viola - G String Artificial Harmonics





Viola - D String Artificial Harmonics





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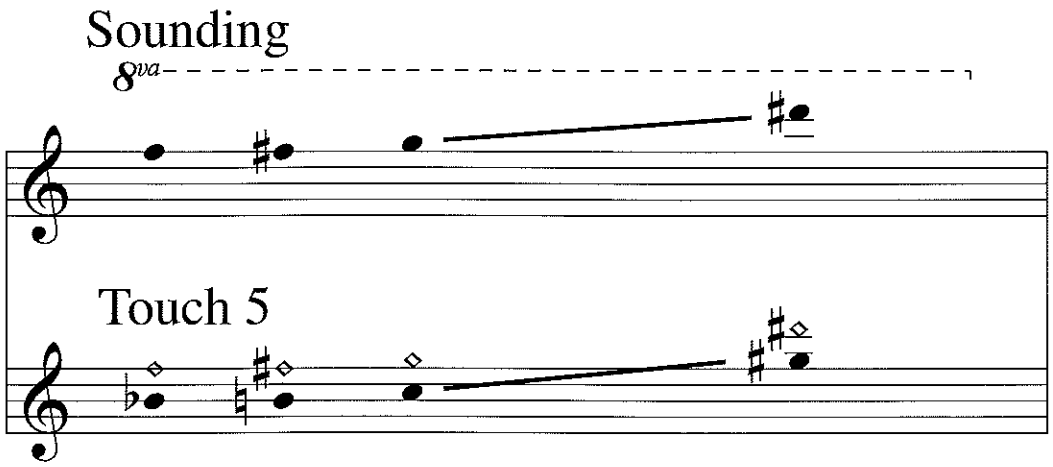
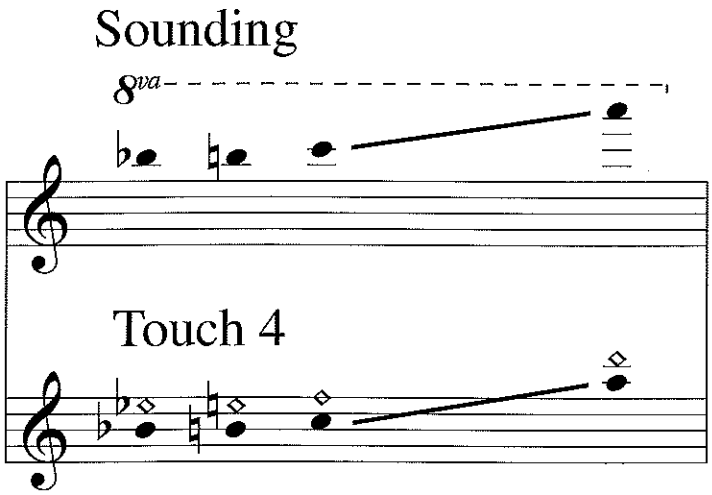
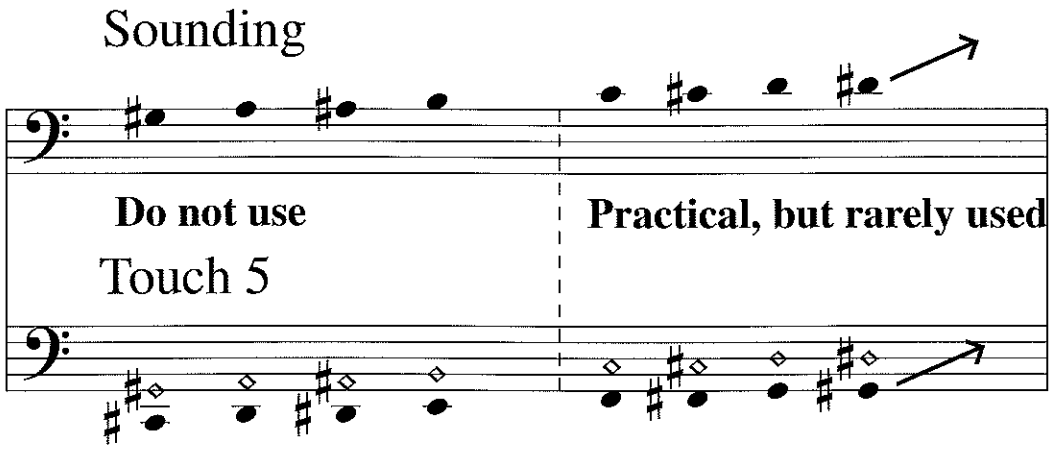
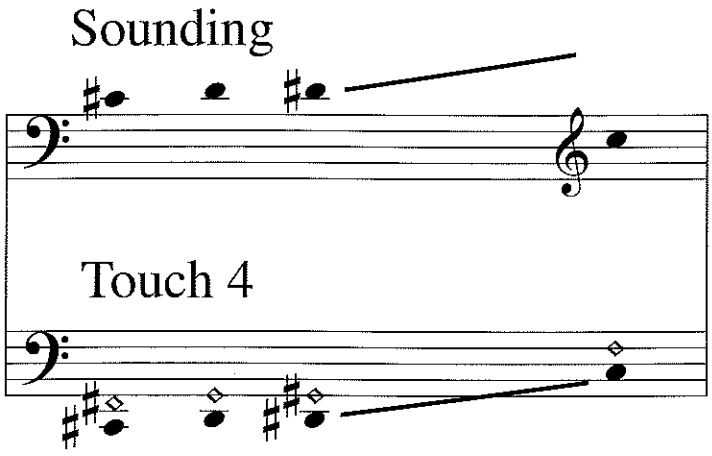


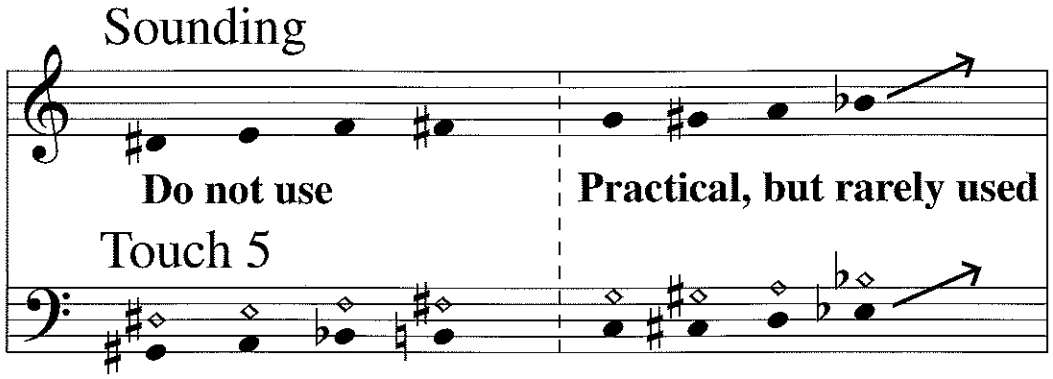


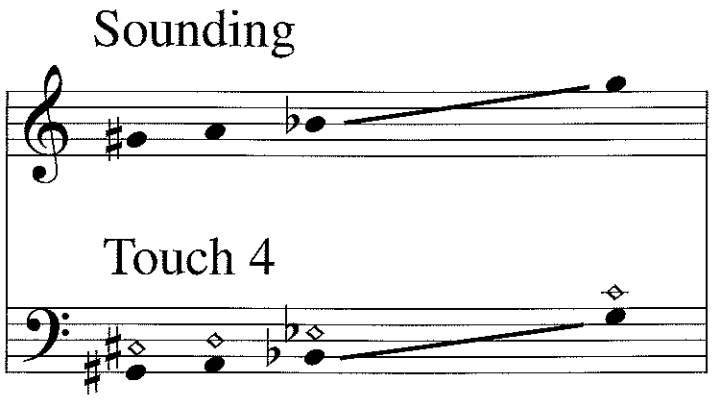
Cello - C String Artificial Harmonics





Cello - G String Artificial Harmonics





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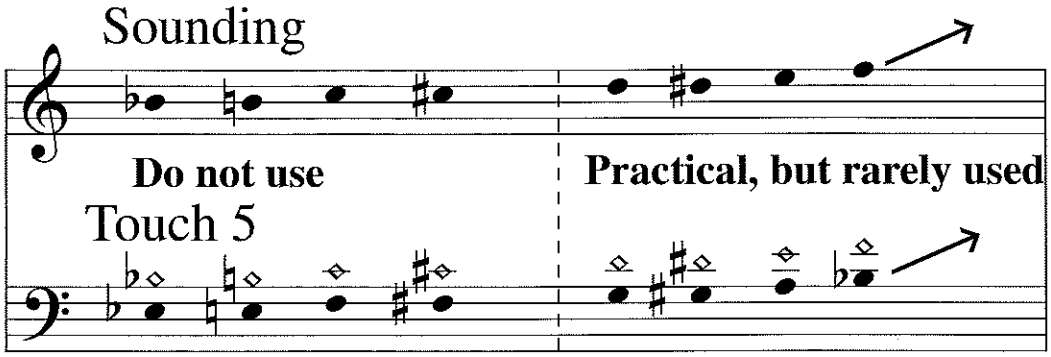
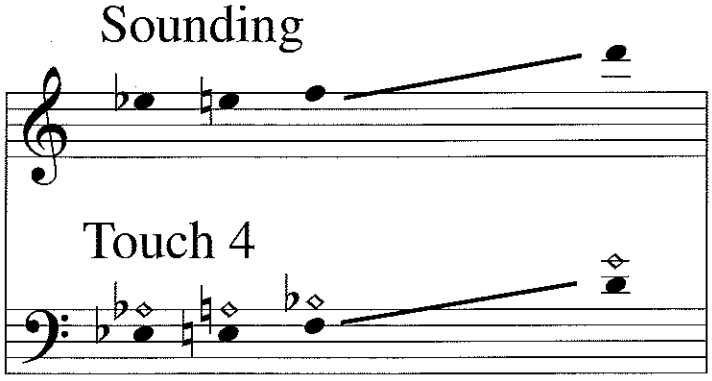
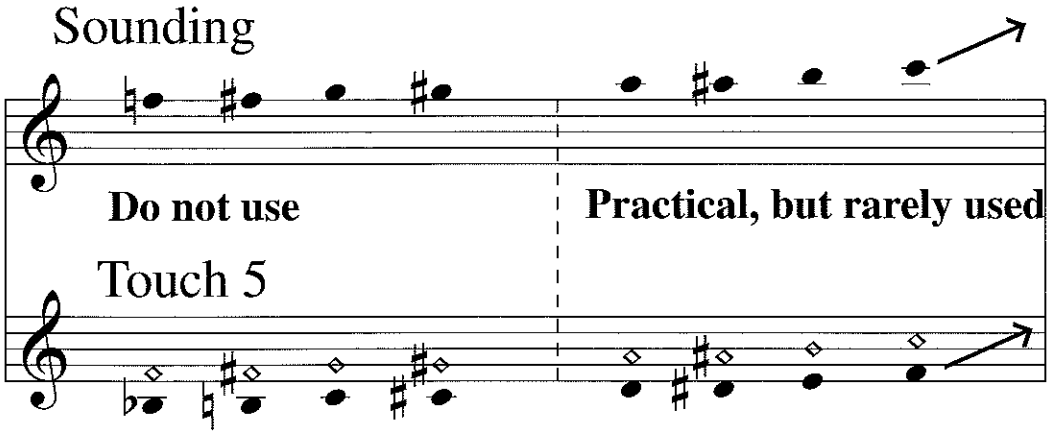
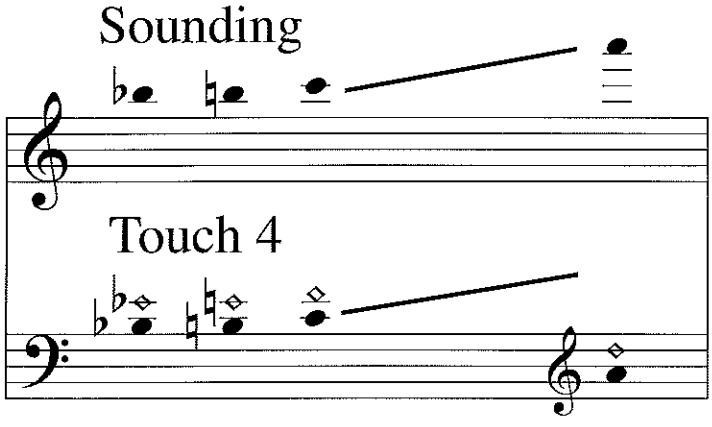


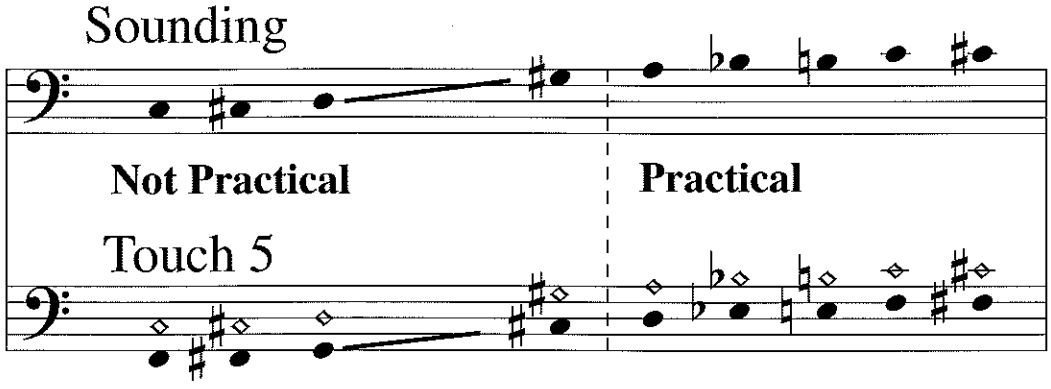


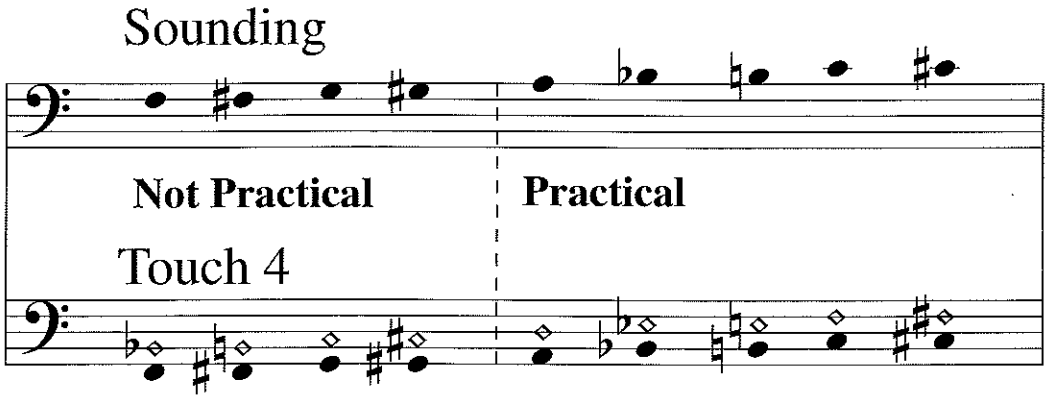
Cello - A String Artificial Harmonics



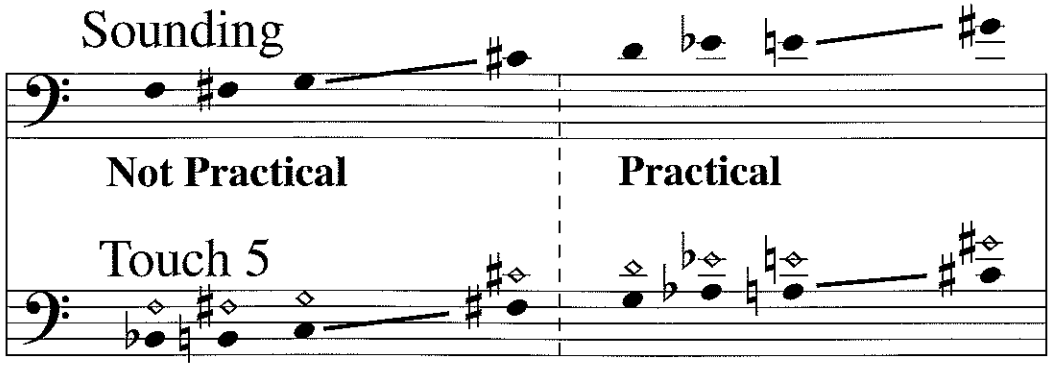


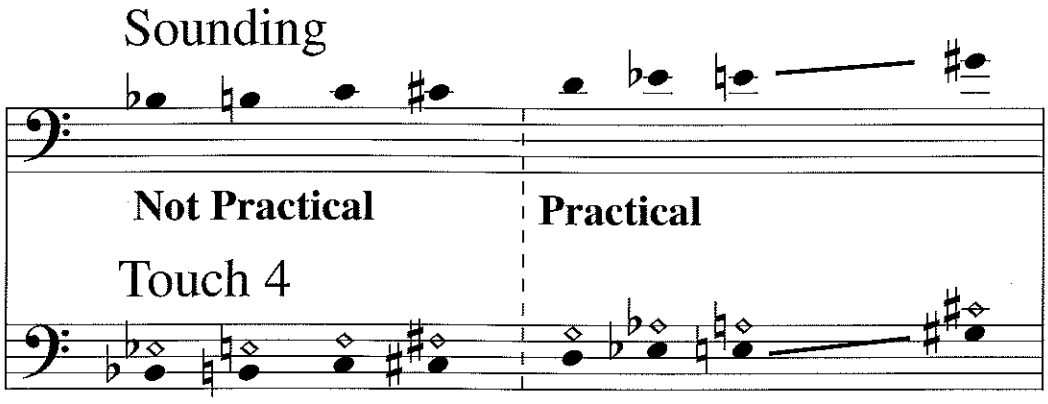
Bass - E String Artificial Harmonics





Bass - A String Artificial Harmonics





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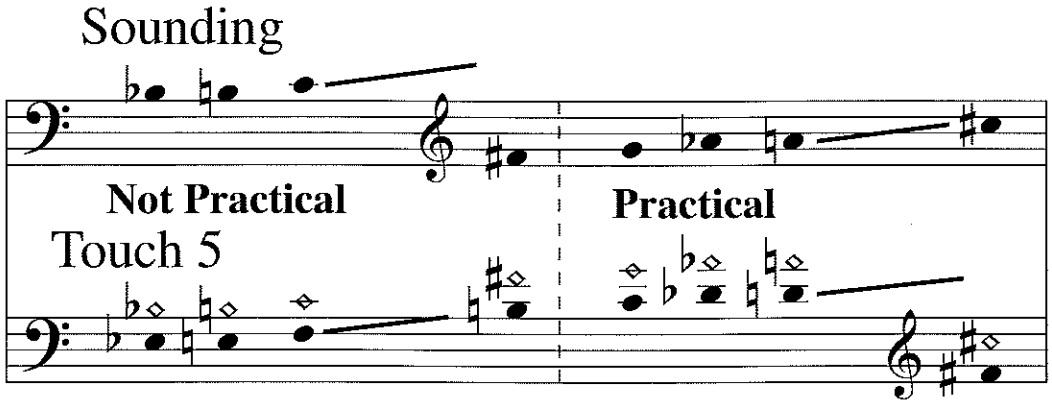

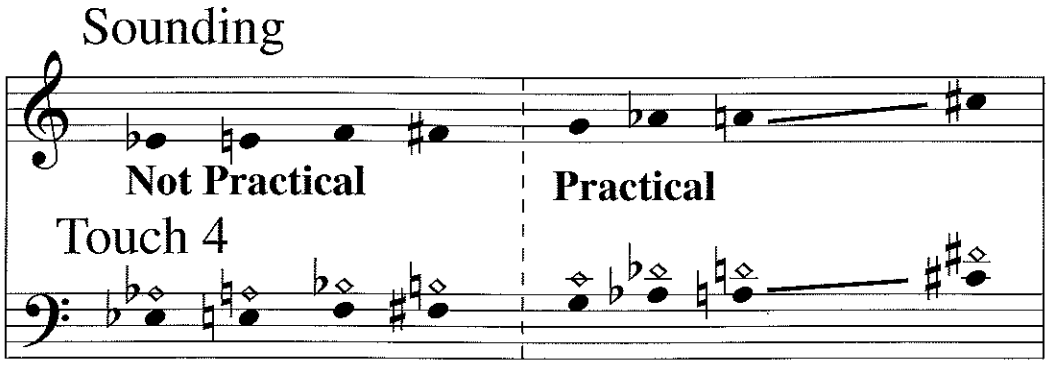

Bass - G String Artificial Harmonics