CHAPTER 3

Intervals and Transposition

TOPICS

Interval
Octave
Unison
Perfect, Major, and Minor Intervals
Consonance and Dissonance
Augmented and Diminished Intervals
Enharmonic Intervals
Tritone
Inversion of Intervals
Compound Intervals
Simple Intervals
Tuning Systems
Melodic Intervals
Harmonic Intervals
Transposition

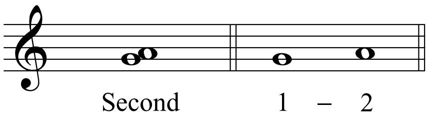
IMPORTANT CONCEPTS

Tone combinations are classified in music with names that identify the pitch relationships. Learning to recognize these combinations by both eye and ear is a skill fundamental to basic musicianship. Although many different tone combinations occur in music, the most basic pairing of pitches is the interval.

Intervals

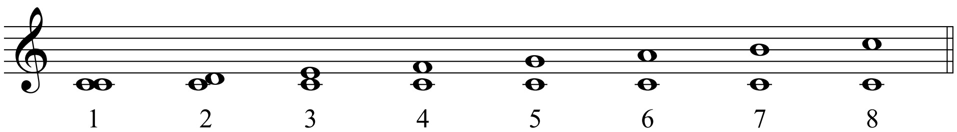
An *interval* is the relationship in pitch between two tones. Intervals are named by the number of diatonic notes (notes with different letter names) that can be contained within them. For example, the whole step G to A contains only two diatonic notes (G and A) and is called a second.

Figure 3.1



The following figure shows all the numbers within an octave used to identify intervals:

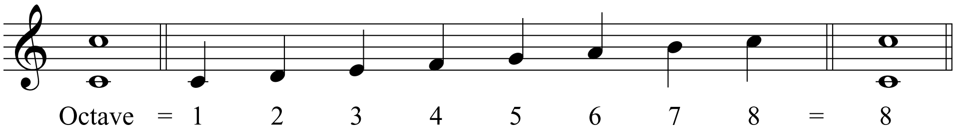
Figure 3.2



Notice that the interval numbers shown in Figure 3.2 correspond to the scale degree numbers for the major scale.

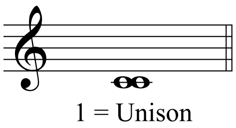
The term *octave* refers to the number 8, its interval number.

Figure 3.3



The interval numbered “1” (two notes of the same pitch) is called a *unison*.

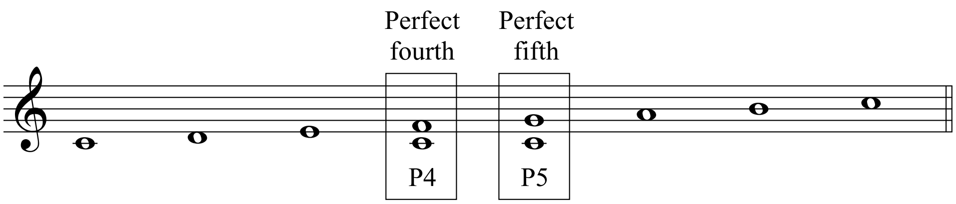
Figure 3.4



Perfect, Major, and Minor Intervals

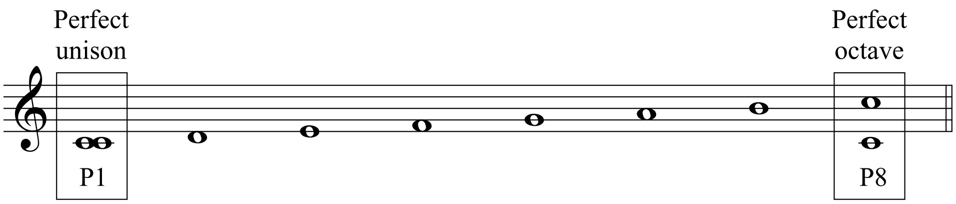
The intervals that include the tonic (keynote) and the fourth and fifth scale degrees of a major scale are called *perfect*.

Figure 3.5



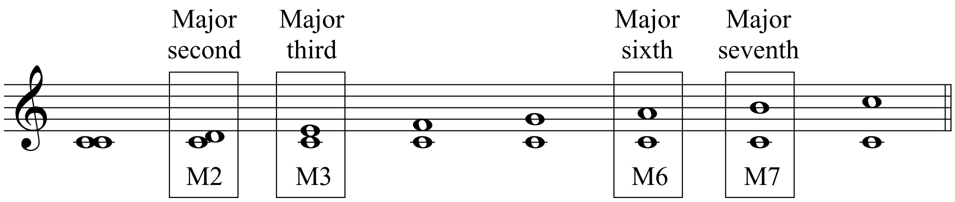
In addition, the unison and the octave are called *perfect*.

Figure 3.6



The intervals from the tonic (keynote) in an upward direction to the second, to the third, to the sixth, and to the seventh scale degrees of a major scale are called *major.*

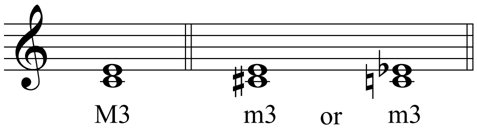
Figure 3.7



Notice the standard abbreviations for intervals in Figures 3.5, 3.6, and 3.7. For example, P1 = perfect unison, M2 = major second.

When a major interval is made one half step smaller, it becomes *minor*. This can be done either by raising the bottom note or lowering the top note.

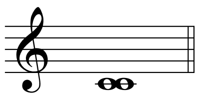
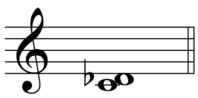
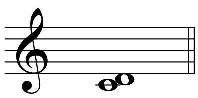
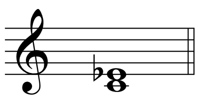
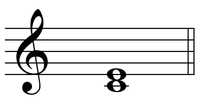
Figure 3.8

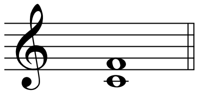
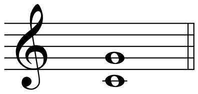
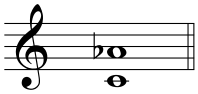
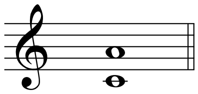
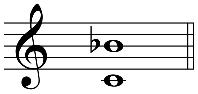
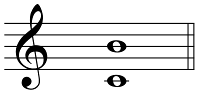
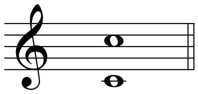


Notice the standard abbreviation for minor intervals: a lower case "m" followed by an interval number.

Major, minor, and perfect intervals are illustrated in Figure 3.9.

Figure 3.9

Name	**Abbreviation**	**Illustration**	**Number of Half Steps**	**Convenient Example**
Perfect Unison (also Prime)	P1		0	
Minor 2nd	m2		1	$\hat{7}$–$\hat{8}$ of Major Scale
Major 2nd	M2		2	$\hat{1}$–$\hat{2}$ of Major Scale
Minor 3rd	m3		3	$\hat{1}$–$\hat{3}$ of Minor Scale
Major 3rd	M3		4	$\hat{1}$–$\hat{3}$ of Major Scale

Name	Abbreviation	Illustration	Number of Half Steps	Convenient Example
Perfect 4th	P4		5	$\hat{1}$–$\hat{4}$ of Major or Minor Scale
Perfect 5th	P5		7	$\hat{1}$–$\hat{5}$ of Major or Minor Scale
Minor 6th	m6		8	$\hat{1}$–$\hat{6}$ of Harmonic Minor Scale
Major 6th	M6		9	$\hat{1}$–$\hat{6}$ of Major Scale
Minor 7th	m7		10	$\hat{1}$–$\hat{7}$ of Natural Minor Scale
Major 7th	M7		11	$\hat{1}$–$\hat{7}$of Major Scale
Perfect Octave	P8		12	$\hat{1}$–$\hat{8}$ of Major or Minor Scale

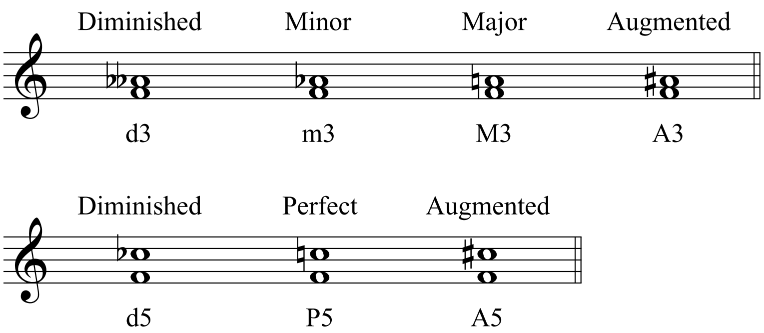
Consonance and Dissonance

The terms *consonance* and *dissonance* are defined in a variety of ways, depending on the context. In acoustics, the consonances are those intervals that are found as the lower members of the harmonic series (see page xv). We will define the term consonance in a musical sense as intervals that are treated as stable and not requiring resolution. The consonant intervals are the P1, m3, M3, P5, m6, M6, and P8. All other intervals within the octave are considered dissonant.

Augmented and Diminished Intervals

If a perfect or major interval is made one half step larger (without changing its interval number) it becomes *augmented*. If a perfect or minor interval is made one half step smaller (without changing its interval number) it becomes *diminished*.

Figure 3.10

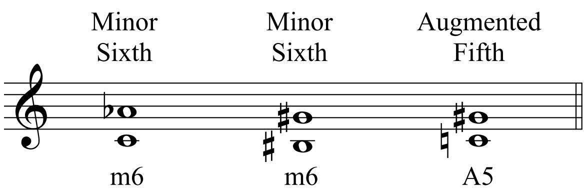


Notice the standard abbreviations for augmented and diminished intervals. For example, d3 = diminished third and A3 = augmented third.

Enharmonic Intervals

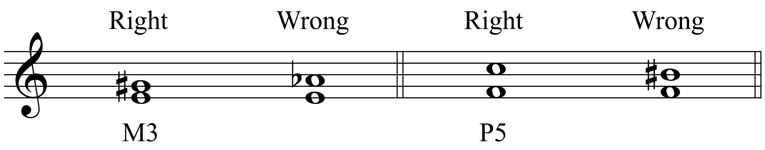
Enharmonic intervals are intervals with the same sound that are spelled differently. Such intervals result, of course, from enharmonic tones (see "Enharmonic Equivalents," page 8). All of the following intervals sound identical but are spelled differently.

Figure 3.11



You must take care in spelling intervals. If a specific interval is requested, the enharmonic equivalent spelling is not correct. Thus, if a major third above E is called for, A-flat is not correct, even though it sounds the same as G-sharp. If a perfect fifth above F is called for, B-sharp is not correct, even though it sounds the same as C.

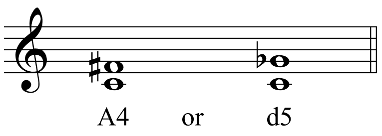
Figure 3.12



The Tritone

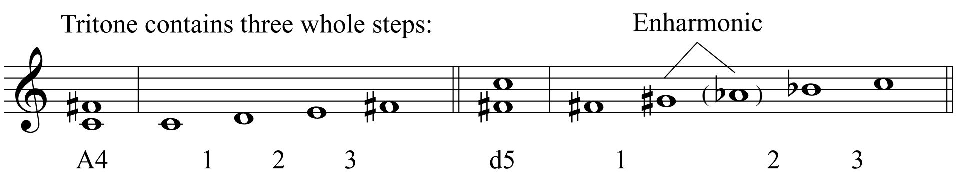
The most common enharmonic intervals are the augmented fourth and the diminished fifth, which divide the octave into two equal parts.

Figure 3.13



These intervals are usually referred to as the *tritone*, since they contain three whole steps.

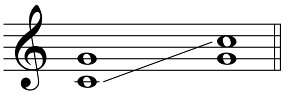
Figure 3.14



Inversion of Intervals

The *inversion of an interval* means that the lower tone of an interval becomes the higher tone, or the higher tone becomes the lower tone.

Figure 3.15

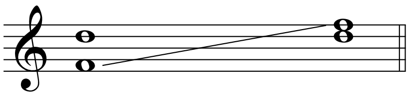


The following table shows various intervals and their inversions:

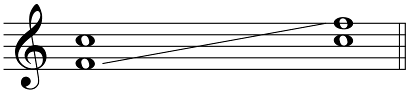
Interval Name	When Inverted Becomes
Perfect	Perfect
Major	Minor
Minor	Major
Diminished	Augmented
Augmented	Diminished
Unison	Octave
2nd	7th
3rd	6th
4th	5th
5th	4th
6th	3rd
7th	2nd
Octave	Unison

Figure 3.16 shows some typical intervals and their inversions.

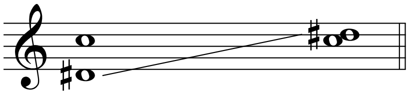
Figure 3.16



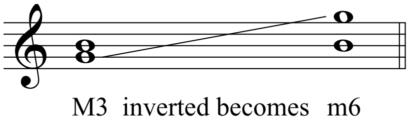
M6 inverted becomes m3



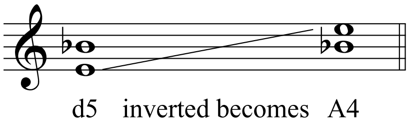
P5 inverted becomes P4



d7 inverted becomes A2



M3 inverted becomes m6

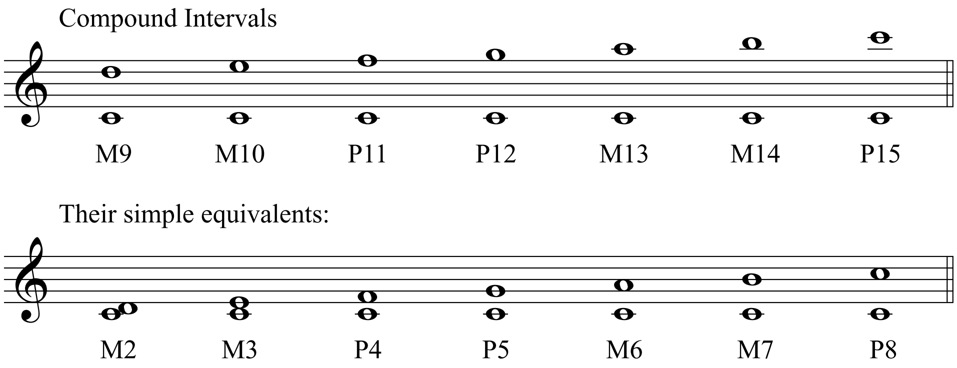


d5 inverted becomes A4

Compound Intervals and Simple Intervals

Intervals greater than an octave are called *compound intervals*. These intervals are named in a similar manner to the intervals within an octave (*simple intervals*).

Figure 3.17



Compound intervals are often labeled as their simple equivalents—as if an octave were removed from the interval. The compound names are used only if it is important to stress the exact interval size.

History

Not all intervals are exactly the same size today as they were in earlier times, and in fact, the size differences in many cases are audible. Various *tuning systems* throughout the centuries have dictated specific distances between interval pitches.

Tuning Systems

In modern times the equal temperament system of tuning has been accepted as the standard for nearly all music written in the Western world. Nevertheless, the history of music reveals a variety of methods that preceded equal temperament. Many are still in use throughout the world.

Pythagorean Tuning

Attributed to the sixth-century B.C. philosopher Pythagoras, Pythagorean tuning is a system of tuning that uses only the pure fifth found in the harmonic series. The Pythagorean system would appear to be ideal because of the purity of the fifths, but other intervals, particularly the seconds and thirds, are compromised. Major seconds and thirds in Pythagorean tuning are larger than their equal-temperament counterparts, whereas minor seconds and thirds are smaller.

Just Intonation

Just intonation, which flourished in the fifteenth century, solved the problem of out-of-tune major chords by tuning a few major thirds according to the harmonic series. The result of this method was that the majority of thirds and some of the fifths were pure, but the remaining fifths were smaller.

Unequal Temperaments

By 1650, musicians had found a number of unequal temperaments that met their needs for playing in a variety of keys. These temperaments gave up the purity of the thirds and fifths, but distributed the error over enough intervals that most chords were acceptable. Many systems were used, but the best known are those of Andreas Werckmeister (1645–1706), whose treatise *Musikalische Temperatur* (1691) gave a number of unequal temperaments that are still in use today, particularly in pipe organs. It is certain that Bach's *Well-Tempered Clavier* (1722–1742) was composed for an instrument tuned to one of the unequal temperaments rather than equal temperament, as has sometimes been supposed.

Equal Temperament

Equal temperament divides the octave into 12 equal half steps, thus further compromising both pure fifths and pure thirds. Fretted string instruments were responsible for much of the early interest in equal temperament, since the frets passed under all the strings, and this required that all the half steps be as equal as possible. During the later nineteenth and twentieth centuries, equal temperament became the standard system of tuning, and most modern instruments approximate this system as nearly as possible.

Despite the standardization of equal temperament as the prevailing tuning system, the interest in historically accurate performance has led to the construction of instruments employing various historical tunings. New applications of the tuning systems continue to be developed. A number of twentieth-century composers have experimented with tuning systems as the basis for new musical styles.

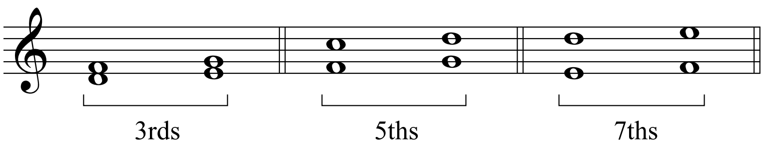
APPLICATIONS

Fluency with Intervals

It is vital that you develop speed and accuracy in the identification and spelling of intervals. Much of your future work in music theory will require this ability. Many musicians use the following method to help them identify intervals more quickly.

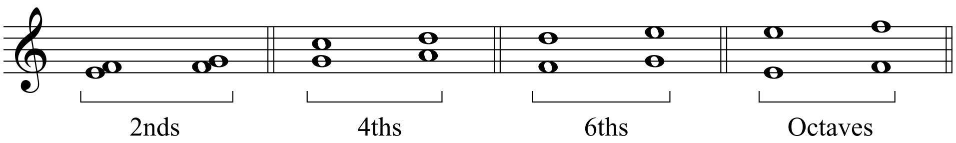
1. Notice in writing thirds, fifths, and sevenths that the two notes are either on lines or on spaces.

Figure 3.18



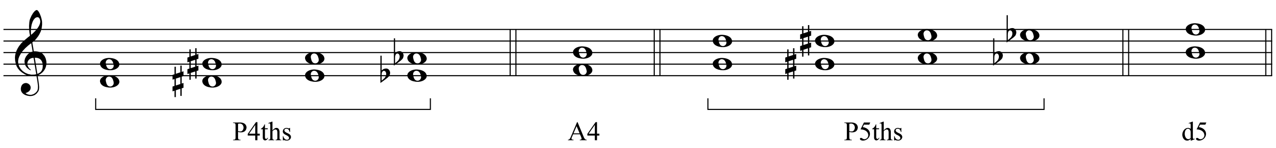
2. Seconds, fourths, sixths, and octaves involve a note on a line and a note on a space.

Figure 3.19



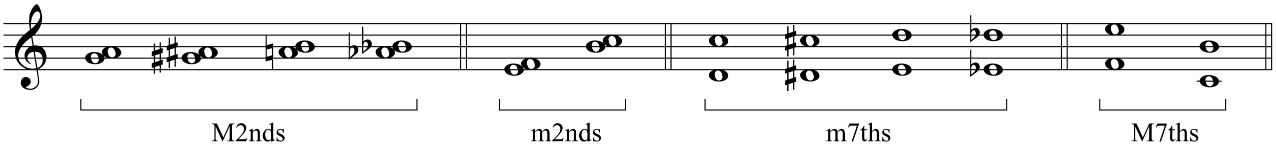
3. Fourths, fifths, and octaves are perfect if the accidentals are the same, except for the fourth and fifth involving B and F.

Figure 3.20



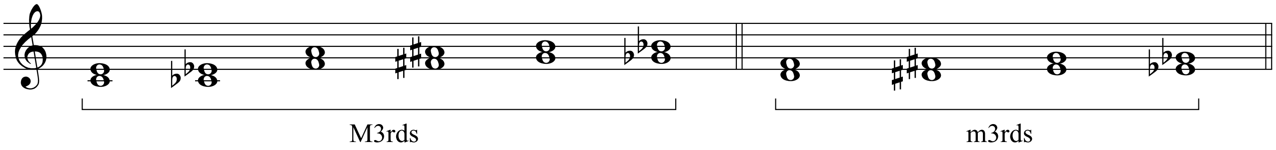
4. Seconds are major and sevenths are minor if the accidentals are the same, except for those involving E–F and B–C.

Figure 3.21



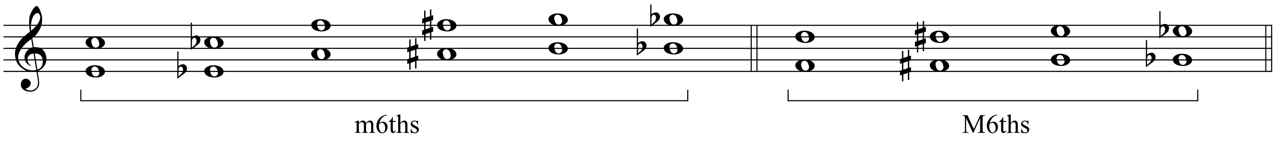
5. Thirds built on C, F, and G are major if the accidentals are the same. Thirds built on the remaining notes are minor if the accidentals are the same.

Figure 3.22



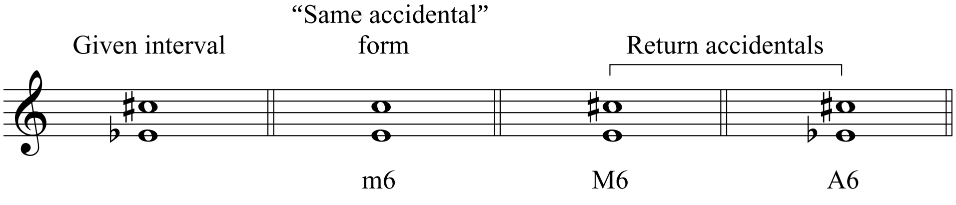
6. Sixths whose upper tones are C, F, or G are minor if the accidentals are the same. Sixths whose upper tones are any of the remaining notes are major if the accidentals are the same.

Figure 3.23



7. You can quickly determine other interval qualities by reducing the interval to the "same accidental" form and then noting the effect on interval size when the accidental(s) are replaced.

Figure 3.24



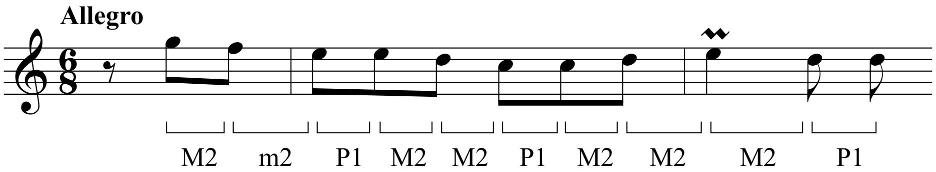
With sufficient practice, determining the size of intervals will become automatic. In the assignments for this chapter, work first for accuracy and then try to develop speed.

Melodic and Harmonic Intervals

The two pitches of an interval will occur either in succession or simultaneously. If two tones are positioned adjacently and sound one after the other, the resulting interval is considered to be *melodic*.

Figure 3.25

D. Scarlatti: Sonata in C Major, K. 159, L. 104, mm. 1–2.



If two tones sound at the same time, the resulting interval is said to be *harmonic*. Figure 3.26 demonstrates a series of harmonic intervals occurring between the left-hand and right-hand parts of a keyboard composition.

Figure 3.26

D. Scarlatti: Sonata in C Major, K. 159, L. 104, mm. 1–2.

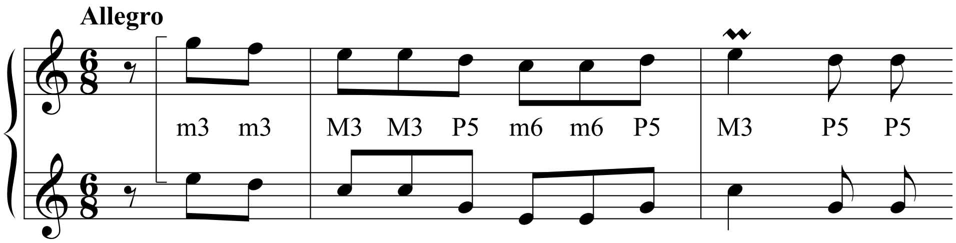
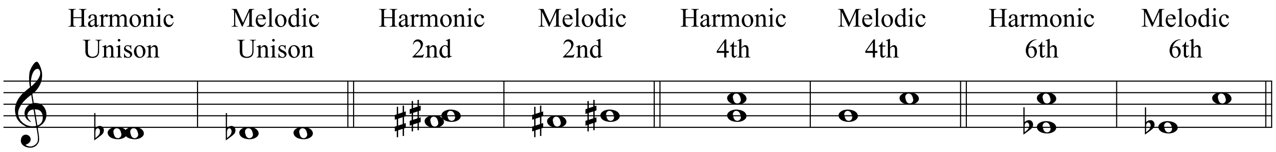


Figure 3.27 illustrates the notation of both types of intervals. Although most harmonic intervals are aligned vertically, unisons and seconds require offset positioning. Notice that the noteheads of harmonic unisons and seconds touch, but never overlap.

Figure 3.27



Transposition

Transposition is the process of rewriting a piece of music or a scale so that it sounds higher or lower in pitch. This involves raising or lowering each pitch by the same interval.

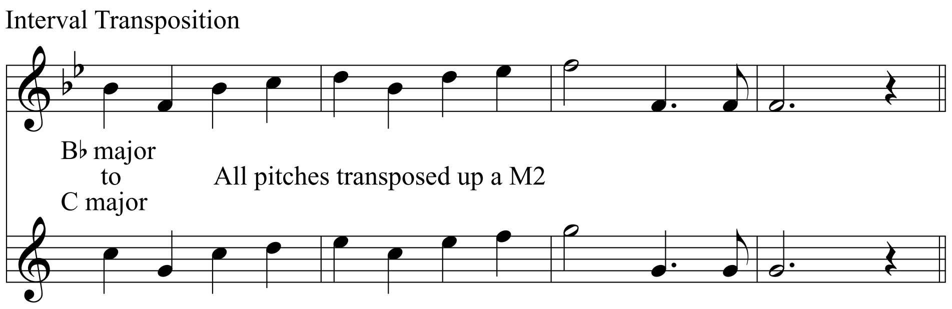
Methods of Transposition

The ability to transpose rapidly and accurately is a fundamental skill that all musicians need. Singers often transpose songs to fit their particular voice ranges, and anyone writing for instrumentalists will often need to transpose parts for them. Many musicians are expected to be able to transpose while they perform. This is particularly true of certain wind instrumentalists, but pianists and organists are also called on to transpose at sight. There are several methods of transposition; the choice of method is an individual matter. We will examine two methods here.

Method 1: Interval Transposition

One common technique for transposition is by interval. In this method an interval of transposition is established, and all pitches are moved up or down by that interval.

Figure 3.28



Method 2: Clef Transposition

Some musicians prefer to transpose by clef. In this method a clef is chosen that would put the part on the correct transposed pitch, and any key signatures are changed. For example, a baritone saxophone player can take music written in the bass clef and transpose it by imagining that it is written in the treble clef with a key signature that has three fewer flats or three more sharps. (Accidentals within the part will have to be converted also.)

Figure 3.28 will now be transposed from B-flat major to C major by substituting the alto clef and changing the key signature. Notice that it is sometimes necessary to change the octave of the clef in making a clef transposition.

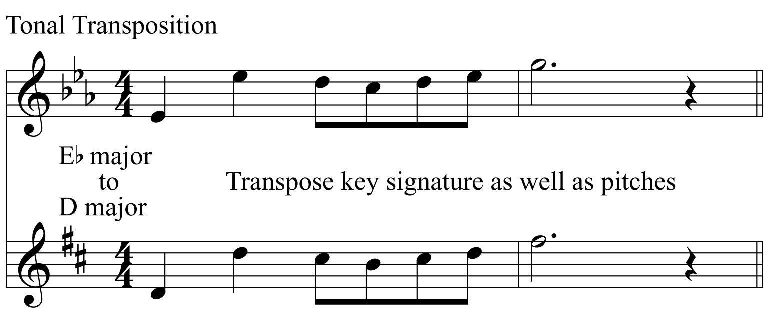
Figure 3.29

If a particular transposition is often required, particularly when you are transposing at sight, clef transposition may be the easiest method.

Tonal and Nontonal Transposition

If the music is tonal and written with a key signature (including C major), the transposition includes transposing the key signature.

Figure 3.30



If the music is written without key signatures and is chromatic, the transposed parts will also appear without key signature. In this case, you must take particular care to ensure that the line is transposed accurately, but enharmonic notations may be freely written. For example, the A-flat on beat two in Figure 3.31 could just as easily have been written as G-sharp.

Figure 3.31

Nontonal Transposition