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## Chords symbols and their chords

This article simply describes how to determine the notes for each chord symbol, and sometimes gives a little extra information.

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### **Intro**

The music for rock, pop, jazz, folk music, musicals and the like often shows *chord symbols* that give an indication of the harmony needed to accompany the melody. In particular, sheet music that gives just the melody and chord symbols (plus maybe lyrics) is called a *lead sheet*. With an understanding of chord symbols and a little bit of talent, a pianist or guitarist or other instrumentalist can construct an acceptable accompaniment from a lead sheet.

There are limitations to all this – for instance the system relates only to certain genres of music, and even then there are musically useful chords for which there are no standard chord symbols. It also has to be admitted that the system of chord symbols is not entirely logical, consistent or in accord with every aspect of musical theory, but we take it as we find it. In any case, a more logical, consistent and correct system could also be more long-winded.

Be warned that there is no definitive standard for chord symbols. You will find variations from what is described here – not just variations *within* the system described here, but entire alternative systems of chord symbols, from the figured-bass system of Baroque music to the numerical system associated with Nashville. Also, the system of note names in this article is the one for the English speakers. That is, the system of note names based on the letters A to G, and with no note called H! And we assume modern tuning (“[equal temperament](#)”), in which G $\sharp$  and A $\flat$  are the same note.

Classical music has a vocabulary for talking about chords, in which there are terms like *German Sixth* and *French Sixth*, but such terms are ignored in this article, and instead the names used for chords are those commonly associated with the chord symbols discussed.

There are different ways to read out a chord symbol like **C7 $\flat$ 5**. You could say, for example, “C seventh flattened fifth”, or “C seven flat five”. This article uses the longer version.

Be also warned that in written music the chord symbols are often unreliable or inadequate, and not just on the internet. And where sheet music gives both chord symbols and a fully written-out accompaniment, these are sometimes intended as alternatives, and may work badly together.

## ***Some basics***

Before looking at chord symbols, we offer this section providing a little information about music.

How high or low a note is is called its *pitch*.

The size of the difference of pitch between two notes is called an *interval*.

On a piano keyboard, the interval between any two neighbouring notes is always the same and is called a *semitone* (and the lower of the two notes is always the one on the left).

There are many tuning systems other than that used by the piano. These systems mostly relate to intervals that naturally occur when sound is made, and mostly are older than the mathematically-based tuning system used for pianos. These older systems have left their mark on the language that we use to talk about music, but in this article subtle distinctions relating to older tuning systems are ignored.

So we can express any interval on the piano as a number of semitones. For example, the interval from the white note C to the white note D just to its right is *two* semitones. That's because there is one note (a black note) between the C and the D.

1 tone = 2 semitones.

A *scale* is a set of notes in order of pitch (lowest to highest or maybe highest to lowest). There are many kinds of scale, but the most common in Western music is the *major scale*, whose notes,

going from low to high, are often represented by the syllables **doh-re-mi-fa-so-la-ti-doh**. (There are other spellings of these syllables, and in some places **si** is used instead of **ti**.) Notice that the lowest and highest notes there are both called **doh**.

Countless tunes use notes from a major scale only. Many other tunes can be divided into just a few sections so that for every section there is a scale that all the notes in the section belong to.

In a major scale, some of the intervals between consecutive notes are tones and some are semitones. Here is the major scale again, this time with the intervals inserted.

**doh-2-re-2-mi-1-fa-2-so-2-la-2-ti-1-doh**

In this, 1 and 2 are the intervals in semitones. It is this pattern of intervals (2-2-1-2-2-2-1 in semitones) that makes the scale a *major scale*.

Choose *any* note as a starting note (**doh**), then two semitones up is **re**, two more semitones up is **mi**, one more semitone up is **fa**, and so on, using the 2-2-1-2-2-2-1 pattern of intervals. So there are lots of different major scales, depending on how high or low the chosen **doh** is.

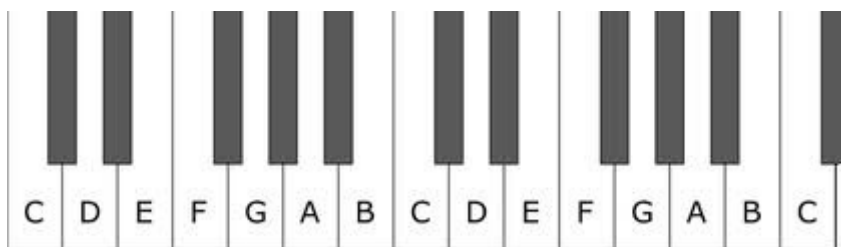
By the way, the first half of the major scale (doh-re-mi-fa) and the second half (so-la-ti-doh) have the same pattern of intervals (2-2-1).

For a major scale going beyond eight notes, the note names and interval patterns repeat:

**doh-2-re-2-mi-1-fa-2-so-2-la-2-ti-1-doh-2-re-2-mi-1-fa-2-so-2-la-2-ti-1-doh**

Another **system of note names** (the important one for chord symbols) relates to the layout of a piano keyboard, which is a bit tough on those of us who play instruments that do not have a piano-style keyboard.

On a piano keyboard, the name of each white note is a letter of the alphabet (A-G), these names are used in a repeating cycle (A,B,C,D,E,F,G,A,B,C,D,E,F,G,A,..).



The white notes from one note C to the next note C happen to give the 2-2-1-2-2-2-1 pattern of intervals that makes a major scale :

**C-2-D-2-E-1-F-2-G-2-A-2-B-1-C**

That is why the white notes on a piano give the scale known as *C major* (the major scale with the note C as doh). Every other major scale (every major scale for which doh is a note other than C) has at least one black note.

Where the interval between neighbouring white notes is **2** semitones, there is an intervening black note. Where the interval between neighbouring white notes is **1** semitone, there is no intervening black note. The black note between C and D has two names: C<sup>#</sup> ("C sharp") and D<sup>b</sup> ("D flat"). C<sup>#</sup>

means the note one semitone up from C;  $D^b$  means the note one semitone down from D. Similarly the black note between A and B is called  $A^\sharp$  or  $B^b$ . Since the notes E and F are one semitone apart,  $E^\sharp$  is the same note as F, and  $F^b$  is the same note as E.



All the way along a piano keyboard, the black notes occur in twos and threes: each “two” is  $C^\sharp$  and  $D^\sharp$  (=  $D^b$  and  $E^b$ ); each “three” is  $F^\sharp$ ,  $G^\sharp$  and  $A^\sharp$  (=  $G^b$ ,  $A^b$ ,  $B^b$ ). These twos and threes of black notes are vital landmarks for the pianist. So although the black notes are *named* relative to the white notes, the white notes are usually *located* relative to the black notes.

We can figure out the notes of any major scale using the 2-2-1-2-2-2-1 pattern of semitone intervals. For example, for the scale of A major, the first note is naturally A (doh, the *keynote*, for this scale); 2 semitones up is B; 2 more semitones up is  $C^\sharp$ ; 1 semitone up is D; 2 semitones up is E; 2 semitones up is  $F^\sharp$ ; 2 semitones up is  $G^\sharp$ ; 1 semitone up is A (doh again). So the A-major scale is A-B- $C^\sharp$ -D-E- $F^\sharp$ - $G^\sharp$ -A.

A tune described as being in the *key* of A major would typically use notes entirely (or mainly) from the A-major scale; the final chord would typically be an A-major chord (see [below](#)), or a chord based on the A-major chord; the final note of the tune would typically be A, if not another note of the final chord.

The *keynote* is also called the *tonic* or sometimes, less formally, the *home note*.

There is a way of naming the interval between two notes in the same scale. Call the lower note of the interval the *first*. Moving up the scale from there, call the notes the *second*, the *third*, the *fourth*, and so on, until the upper note of the interval is reached. Whatever we call the upper note is also used as the name of the interval.

For example, consider the interval from D up to B in the scale of C major. Taking D as the first, E as the second, F as the third and so on, we find that the note B is the sixth. So the interval D-B is a *sixth*.

In a major scale (and in many other scales), an interval of an *eighth* (e.g. doh-doh or re-re or A-A or C-C or  $C^\sharp$ - $C^\sharp$ ) is an interval between two notes of the same name. Such an interval is better known as an *octave* (from the Latin word *octavus* = eighth). So an octave = 12 semitones.

When a crowd of people join in the singing of a tune, and the higher voices sing one octave higher than the lower voices (as they usually would), then that does not sound out of tune. This effect (that a note an octave higher is somehow the same note, except higher) is why it works to have more than one note called doh, say, or more than one note called C, say.

An interval of 7 semitones (e.g. doh-so or C-G) is called not just a *fifth* but also a *perfect fifth*. The interval B-F is an example of a fifth that is *not* a perfect fifth, since it is 6 semitones.

An interval of 5 semitones (e.g. doh-fa or so-do or C-F or G-C) is called not just a *fourth* but also a *perfect fourth*. The interval F-B is an example of a fourth that is *not* a perfect fourth, since it is 6 semitones.

An interval of 6 semitones (e.g. ti-fa or fa-ti or B-F or F-B) is called a *diminished fifth* (i.e. one semitone less than a perfect fifth) or an *augmented fourth* (i.e. one semitone more than a perfect fourth) or a *tritone*. The word *tritone* (= "three tones") arises because obviously 6 semitones is 3 tones. When playing the C-major scale, F-G-A-B takes you up a tritone (F-B), and each of the three steps F-G, G-A and A-B is a tone.

The fifths in a major scale are all perfect fifths except for the tritone ti-fa. The fourths in a major scale are all perfect fourths except for the tritone fa-ti.

When an interval is called simply *a fourth* or *a fifth* it nearly always means *a perfect fourth* or *a perfect fifth*.

Now  $5 + 4 = 8$  is bad arithmetic, but a perfect fifth plus a perfect fourth makes an octave. [The underlying reason for this seemingly strange result is that when we are figuring out the size of an interval by counting notes up a scale, we call the lower note *note one* instead of *note zero*.]

More arithmetic! Notice that the note an octave higher than the first is the eighth, and that 8 is **seven more** than 1. In the same way, the note an octave higher than the second is the ninth, and the note an octave higher than the fourth is the eleventh. This add-7-to-go-up-an-octave (or subtract-7-to-go-down-an-octave) idea is worth remembering.

Thinking about major scales was a useful way to understand the terms *octave*, *perfect fourth* and *perfect fifth*, but an octave is always 12 semitones, a perfect fourth always 5 semitones and a perfect fifth always 7 semitones, even when the context has nothing to do with major scales.

The interval between a note and the next-but-one note in the major scale (e.g. doh-mi or re-fa) is naturally called a *third*.

It follows that those thirds come in two different sizes. A third of size 4 semitones (like doh-mi) is called a *major third*. A third of size 3 semitones (like re-fa) is called a *minor third*.

A tritone may also be thought of as two minor thirds. For example, B-D is a minor third, D-F is another minor third, and B-F is a tritone.

There are various types of *minor scale*, and these are not described in this article, but every minor scale includes the note that is a minor third above the keynote – without that note it would not be a minor scale.

The most common way of building up a chord is like this. Pick a note to start with (called the *root* note). Add another note a (major or minor) third higher. Add another note a (major or minor) third higher than the last note. Possibly add further note(s), each time going up a (major or minor) third. The individual notes of such a chord are referred to as the 1<sup>st</sup> (= the root), 3<sup>rd</sup>, 5<sup>th</sup>, 7<sup>th</sup>, ..., the idea being that the notes of the chord are alternate notes of some scale.

A *triad* is a three-note chord of this type. So there are four possible types of triad (depending on

whether the intervals between notes are major or minor thirds):

- Major third + minor third, for example doh-mi-so. This is the *major* triad, the basic *major chord*.
- Minor third + major third, for example re-fa-la. This is the *minor* triad, the basic *minor chord*.
- Minor third + minor third, for example ti-re-fa. This is the *diminished* triad.
- Major third + major third, for example C-E-G#. This is the *augmented* triad.

So, of the triads that use only notes of the major scale (doh-re-mi-fa-so-la-ti-doh-re-mi-fa-so-la-ti-doh is the two-octave version of the scale), three are major triads (doh-mi-so, fa-la-doh, so-ti-re), three are minor triads (re-fa-la, mi-so-ti, la-doh-mi), one is a diminished triad (ti-re-fa), and there is no augmented triad.

All the chords covered by the common system of chord symbols are triads, or triads built-on and/or altered in some way. So there are musically useful chords for which there is no plausible chord symbol, even in everyday music – for example the third chord of the hymn tune *Angel Voices* has the notes (from the bass note up) D, C#, G and B.

Information such as in this ***Some basics*** section is part of *music theory*.

In the rest of this article, *third* refers to an interval and 3<sup>rd</sup> refers to a note.

## ***Chord symbols***

In this article, chord symbols are in bold italics. So ***C*** is a chord symbol, whereas C (not in bold italics) is the note. Each chord symbol is the root note of the chord (the note on which the chord is built), possibly followed by something to specify the type of chord – as explained below.

### ***Basic major and minor chords***

e.g. ***C*** or ***Cm*** or even ***C-***

The simplest sort of chord symbol is for a [major chord](#). The symbol is just the root note of the chord. So when there is nothing to specify the type of chord, it is a major chord.

For example the symbol ***C*** represents the major chord with root-note C (the C-major chord), that is doh-mi-so for the scale of C major, that is the notes C, E and G.

For example the ***F#*** represents the major chord with root-note F# (the F#-major chord), that is, doh-mi-so for the scale of F# major, that is, the notes F#, A# and C#.

For a [minor chord](#), the symbol is the root note followed by *min* or *m* in lower case, or (rarely) the root note followed by a minus sign.

For example the symbol **Cmin** or **Cm** represents the minor chord with root-note C. Up a [minor third](#) from C is E $\flat$ . Up a [major third](#) from E $\flat$  is G. So the notes for **Cm** are C, E $\flat$  and G. Notice that the notes for **C** and **Cm** are the same except for the E and E $\flat$ .

For example the symbol **F#min** or **F#m** represents the minor chord with root-note F#. Up a [minor third](#) from F# is A. Up a [major third](#) from A is C#. So the the notes for **F#m** are F#, A and C#. Again the notes for **F#** and **F#m** are the same except for the A# and A.

Sometimes a minus sign is used to indicate a minor chord, e.g. **C-** as an alternative to **Cm**. A [minus sign](#) is sometimes used for other purposes.

## **Power chords**

e.g. **C5**

A “power” chord is a major chord without the third. Or, what comes to the same thing, it is a minor chord without the third. So if we take the chord **C** (notes C, E and G) and omit the third (E), we obtain the power chord (notes C and G) for which the symbol is **C5**. Or if we take the chord **Cm** (notes C, E $\flat$  and G) and omit the third (E $\flat$ ), we again obtain the power chord **C5** (notes C and G). It is common to repeat the root note one octave up, giving the notes C, G and C for **C5**. The term *power chord* is not heard much outside of rock music, though such chords have uses outside of rock music.

## **Sevenths**

E.g. **C7** or **Cm7** or **Cmaj7** or **Cmin#7** or even **C-7**

A seventh chord is formed by taking a triad such as a major or minor chord (whose notes we may refer to as the 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup>) and adding a further note, the 7<sup>th</sup>, a third up from the 5<sup>th</sup>.

There are two possibilities. The 7<sup>th</sup> can be either a [major third](#) up or a [minor third](#) up from the 5<sup>th</sup>.

Now if there is nothing to specify otherwise, the 7<sup>th</sup> is a [minor third](#) up from the 5<sup>th</sup>. Or, what comes to the same thing, the 7<sup>th</sup> is two semitones down from the note that is an octave above the root note.

For example, the symbol **C7** (“C seventh”) represents the chord formed from the chord **C** by adding a 7<sup>th</sup>. **C** has the notes C, E and G. So the 5<sup>th</sup> is G. A [minor third](#) up from G is B $\flat$ . Therefore **C7** has the notes C, E, G and B $\flat$ .

For example, the symbol **Cm7** or **Cmin7** (“C minor seventh”) represents the chord formed from the

chord **Cm** by adding a 7<sup>th</sup>. **Cm** has the notes C, and G. So the 5<sup>th</sup> is G. A [minor third](#) up from G is B $\flat$ . Therefore **Cm7** has the notes C, E $\flat$ , G, and B $\flat$ . **C-7** has been used as an alternative to **Cm7**, but be aware that the [minus sign](#) in chord symbols is used with a variety of meanings.

To specify that the 7<sup>th</sup> is a [major third](#) up from the 5<sup>th</sup>, the chord symbol includes **maj7** or **M7** (note the upper-case **M**) or **#7**. Also  **$\Delta$**  or  **$\Delta 7$**  is a further alternative to **maj7**, perhaps more common in hand-written chord sequences.

For example, the symbol **Cmaj7** or **CM7** or **C $\Delta$**  or **C $\Delta 7$**  (“C major seventh”) represents the chord formed from the chord **C** by adding the 7<sup>th</sup> that is a [major third](#) up from the 5<sup>th</sup>. **C** has the notes C, E and G. So the 5<sup>th</sup> is G. A major third up from G is B. Therefore **CM7** has the notes C, E, G and B.

For example, the symbol **CmM7** (“C minor major seventh”) represents the chord formed from the chord **Cm** by adding the 7<sup>th</sup> that is a [major third](#) up from the 5<sup>th</sup>. **Cm** has the notes C, E $\flat$ , and G. So the 5<sup>th</sup> is G. A major third up from G is B. Therefore **CmM7** has the notes C, E $\flat$ , G, and B. Other symbols for this chord are **Cmin#7** and **Cm#7**.

So in these chord symbols, **min** or **m** governs the pitch of the 3<sup>rd</sup>, and **maj** or **M** governs the pitch of the 7<sup>th</sup>.

And the word *seventh* can refer to a note, to an interval or to a chord.

## Sixths

E.g. **C6** or **Cmin6**

A *sixth* chord is formed from a major or minor chord by adding the note (the '6th') that is a tone above the 5th.

For example, **C6** is the chord formed from **C**, the C-major chord, by adding the note A that is a tone above its 5th-note G. So **C6** has the notes C, E, G and A.

For example, **Cmin6** or **Cm6** (“C minor sixth”) is the chord formed from **Cm**, the C-minor chord, by adding the note A that is a tone above its 5th-note G. So **Cm6** has the notes C, E $\flat$ , G and A.

## Inversions

Although we figure out the notes for a chord by working up from the root note, we would not always choose to play the notes stacked in that order.

For example, for the chord **C**, instead of the obvious C-E-G, it can be pleasing to move the E up an [octave](#), making it C-G-E.

Each way of stacking the notes of a chord is called an *inversion* of the chord.

Altering the inversion of a chord can change its effect from reasonable to perfect (or vice versa).

Another example for the chord **C**. An inversion with E as the lowest note can be useful when the



next chord is **F**. An inversion's lowest note is often its most important characteristic.

## Diminished sevenths

E.g. **Cdim7**

A four-note chord for which every interval between consecutive notes is a [minor third](#) gets called a *diminished seventh* chord.

So for example the chord *C diminished seventh* has the notes C, E<sup>b</sup>, G<sup>b</sup> (= F<sup>#</sup>) and A; this chord has the symbol **Cdim7** or **C◦7**. Notice that adding further notes going up a [minor third](#) up each time would just repeat the notes C, E<sup>b</sup>, G<sup>b</sup>, A, ... This happens because four minor thirds make an [octave](#).

It follows that the chords **Cdim7**, **E<sup>b</sup>m7**, **F<sup>#</sup>dim7** and **Adim7** all share the same four notes. In practice, the only way these chords differ is that it is common to use an [inversion](#) that has the stated root note as the bass note.

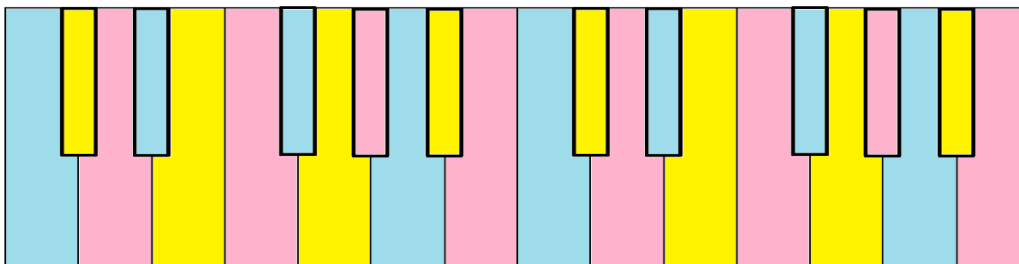
Similarly the chords **C<sup>#</sup>dim7**, **Edim7**, **Gdim7** and **B<sup>b</sup>dim7** all share the same four notes.

Similarly the chords **Ddim7**, **Fdim7**, **A<sup>b</sup>dim7** and **Bdim7** all share the same four notes.

So the twelve possible diminished seventh chords involve only three different sets of notes, which is illustrated below by using a different background colour for each set of notes.

**C C<sup>#</sup> D E<sup>b</sup> E F F<sup>#</sup> G A<sup>b</sup> A B<sup>b</sup> B C C<sup>#</sup> D E<sup>b</sup> E F F<sup>#</sup> G A<sup>b</sup> A B<sup>b</sup> B C**

Or on a piano:



Take any diminished seventh chord, and choose any three of its four notes. Then there is exactly one major scale that includes those three notes, but there is no major scale that includes all four.

The name *diminished seventh* is not ideal, but *diminished* means *flattened* or *down by a semitone*. Start with **C7**, diminish the 3<sup>rd</sup> **and** the 5<sup>th</sup> **and** the 7<sup>th</sup>, and you have **Cdim7**.

The note A that is the diminished 7<sup>th</sup> for the chord **Cdim7** is the note that is the 6<sup>th</sup> for the chord **C6**.

Occasionally the chord is met without the 7<sup>th</sup>. For instance **Cdim** or **C◦** may represent the chord

with notes C, E<sup>b</sup> and G<sup>b</sup>, the [diminished triad](#), which can also be written as **Cm<sup>b</sup>5**. In some music, though, **Co** or **Cdim** is equivalent to **Cdim7** – let your ear be your guide.

It is very rare to meet a **dim7** symbol that has anything added to it to indicate additions or alterations to the chord. It is, however, fairly common for a **dim7** chord to accompany a melody note that is not in the **dim7** chord. For example, **Bdim7** contains the notes B, D, F and A<sup>b</sup>, but it can sometimes be found accompanying a melody note that is C<sup>#</sup>, E, G or B<sup>b</sup>. Notice here that the set of notes C<sup>#</sup>, E, G and B<sup>b</sup> is one tone up from the set of notes B, D, F and A<sup>b</sup>. Or, referring to the colour-coding used above, sometimes a chord of pink notes accompanies a yellow note!

Sometimes a chord of blue notes accompanies a pink note.

Sometimes a chord of yellow notes accompanies a blue note.

There is no common symbol for a chord such as **Bdim7** with a C<sup>#</sup> on top.

Sometimes a musician will try to give a **dim7** chord more character by adding a yellow note to a pink chord (or a pink note to a blue chord, or a blue note to a yellow chord). The possibilities are numerous (which [dim7 inversion](#) to use, which note to add, and where to add it). The resulting chord has the same notes as the **7<sup>b</sup>9** chord whose root is the added note.

The added note can be used as a [passing note](#).

## Augmented fifths

E.g. **C+**

A three-note chord for which both intervals between consecutive notes are [major thirds](#) is the [augmented triad](#) and it gets called an *augmented fifth* chord.

So for example the chord *C augmented fifth* has the notes C, E and G<sup>#</sup>; the symbol for this chord is **C+**. Notice that adding further notes going up a [major third](#) up each time would just repeat the notes C, E, G<sup>#</sup>, ... This happens because three [major thirds](#) make an [octave](#).

It follows that the chords **C+**, **E+** and **G<sup>#</sup>+** all share the same three notes.

Similarly the chords **C<sup>#</sup>+**, **F+** and **A+** all share the same three notes.

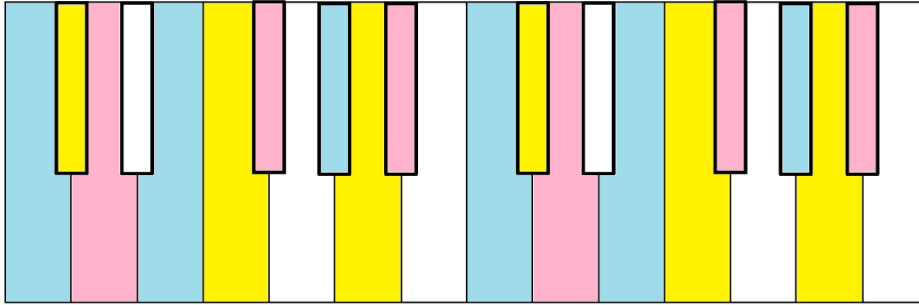
Similarly the chords **D+**, **F<sup>#</sup>+** and **B<sup>b</sup>+** all share the same three notes.

Similarly the chords **E<sup>b</sup>+**, **G+** and **B+** all share the same three notes.

So the twelve possible augmented fifth chords involve only four different sets of notes, which is illustrated below by using a different background colour for each set of notes.

**C** **C<sup>#</sup>** **D** **E<sup>b</sup>** **E** **F** **F<sup>#</sup>** **G** **G<sup>#</sup>** **A** **B<sup>b</sup>** **B** **C** **C<sup>#</sup>** **D** **E<sup>b</sup>** **E** **F** **F<sup>#</sup>** **G** **G<sup>#</sup>** **A** **B<sup>b</sup>** **B** **C**

Or on a piano:



Given an augmented fifth chord, there is **no** major scale that includes all three of its notes.

*Augmented* means *sharpened or up by a semitone*. If you take the chord **C** and raise its 5<sup>th</sup> by a semitone you get the chord **C+**.

## ***Ninths***

E.g. **C9** or **Cmin9** or **Cmaj9** or **C6/9**

A ninth chord, unless specified otherwise, is a [seventh](#) chord with an extra note, the 9<sup>th</sup>.

Unless specified otherwise, the 9<sup>th</sup> is the note an [octave](#) plus a tone above the root note.

So, for example, the chord **C9** (“C ninth”) is **C7** with the note D on top.

Similarly, the chord **Cm9** or **Cmin9** (“C minor ninth”) is **Cm7** with the note D on top.

Similarly, the chord **CM9** or **Cmaj9** (“C major ninth”) is **CM7** with the note D on top.

Similarly, the chord **C6/9** (“C sixth ninth”) is **C6** with the note D on top.

Similarly, the chord **Cm6/9** or **Cmin6/9** (“C minor sixth ninth”) is **Cm6** with the note D on top.

## ***Elevenths***

E.g. **C11** or **Cmin11**

An eleventh chord is not very common, and is a [ninth](#) chord with an extra note, the 11<sup>th</sup>.

Unless specified otherwise, the 11<sup>th</sup> is a [minor third](#) above the 9<sup>th</sup>. Or, to put it in doh-re-mi terms, if we take the root note as *doh*, then the 11<sup>th</sup> is *fa*, but in a higher octave. Or, if we take the root note as *so*, then the 11<sup>th</sup> is *doh*, but in a higher octave.

So, for example, the chord **C11** (“C eleventh”) is **C9** with the note F on top.

Similarly, the chord **Cm11** or **Cmin11** (“C minor eleventh”) is **Cm9** with the note F on top.

## **Thirteenthths**

E.g. **C13**

A thirteenth chord is a [ninth](#) chord (or maybe an eleventh chord) with an extra note, the 13<sup>th</sup>.

The 13<sup>th</sup> is a [major third](#) above the 11<sup>th</sup>. Or, to put it in doh-re-mi terms, if we take the root note as *doh*, then the 13<sup>th</sup> is *la*, but in a higher octave. Or, if we take the root note as *so*, then the 13<sup>th</sup> is *mi*, but in a higher octave.

So, for example, the chord **C13** ("C thirteenth") is **C9** (or maybe **C11**) with an A on top.

## **Sevenths, ninths, elevenths & thirteenthths related to a major scale**

Here is a major scale, running from the **so** below low **doh** to the **so** above high **doh**.

**so**-*la*-**ti**-*doh*-**re**-*mi*-**fa**-*so*-*la*-**ti**-**doh**-*re*-**mi**-*fa*-*so*

Notice that alternate notes are in **bold** type.

The first three notes in **bold** give a major chord, with **so** as the root note.

Still with **so** as the root, the first four notes in bold give a seventh chord, the first five notes in bold give a ninth chord, the first six notes in bold give an eleventh chord, and the first seven notes in bold give a thirteenth chord (maybe omit **doh**).

Chords built on the so-ti-re triad are called [dominant](#) chords (for this key), and commonly lead into a *tonic* ("home") chord built on the doh-mi-so triad.

## **Standard chords, but with little changes**

E.g. **C7 b5** or **C7#5** or **Cm7 b5** or **C7 b9** or **C7#9** or **C7#9 b5** or ...

Sometimes a chord symbol represents a standard chord that has been altered by changing a note or two by a semitone.

For example, if we take the chord **C7** and lower the 5<sup>th</sup> by a semitone, we get a chord with the notes C, E, G<sup>b</sup> (= F<sup>#</sup>) and B<sup>b</sup>, for which the symbol is **C7 b5** or **C7-** ("C seventh flattened 5th").

Similarly, we can raise the 5<sup>th</sup> by a semitone and get the chord with notes C, E, G<sup>#</sup> (= A<sup>b</sup>) and B<sup>b</sup>, for which the symbol is **C7#5** or **C7+** ("C seventh augmented 5th").

Or if we take the chord **Cm7** and lower the 5<sup>th</sup> by a semitone, we get a chord with the notes C, E<sup>b</sup>, G<sup>b</sup> (= F<sup>#</sup>) and B<sup>b</sup>, for which the symbol is **Cm7 b5** or **Cmin7 b5** or **Cm7-** or **Cmin7-** ("C minor

seventh flattened 5th"). Sometimes this chord is called *C half-diminished seventh*, or *C half-diminished*, and given the symbol **CØ** or **CØ7**. No-one said that it is logical. **CØ** sometimes stands for the diminished triad C, E<sup>b</sup> and G<sup>b</sup>.

Start with **C7**, diminish (flatten by a semitone) the 3<sup>rd</sup> and the 5<sup>th</sup> but not the 7<sup>th</sup>, and you have **CØ**.

If we take the chord **C9** and lower the 9<sup>th</sup> by a semitone, we get a chord with the notes C, E, G, B<sup>b</sup> and D<sup>b</sup>, for which the symbol is **C7<sup>b</sup>9** ("C flattened 9th"). Notice that **C<sup>b</sup>9** would be something different - the ninth chord with root note C<sup>b</sup>. **C7-9** has been used as an alternative to **C7<sup>b</sup>9**.

Similarly, if we take the chord **C9** and raise the 9<sup>th</sup> by a semitone, we get a chord with the notes C, E, G, B<sup>b</sup> and D<sup>#</sup> (= E<sup>b</sup>), for which the symbol is **C7<sup>#</sup>9** ("C raised 9th"). Notice that **C<sup>#</sup>9** would be something different - the ninth chord with root note C<sup>#</sup>.

If we take the chord **C11** and raise the 11<sup>th</sup> by a semitone, we get a chord with the notes C, E, G, B<sup>b</sup>, D and F<sup>#</sup>, for which the symbol is **C9<sup>#</sup>11** ("C raised 11th"). Notice that **C<sup>#</sup>11** would be something different - the eleventh chord with root note C<sup>#</sup>. The tune *Chelsea Bridge* makes much of raised eleventh chords.

There can be more than one note altered. For instance, **C7<sup>#</sup>9<sup>b</sup>5** represents a chord with notes C, E, G<sup>b</sup>, B<sup>b</sup> and D<sup>#</sup>.

Usually the alterations are written in descending order, that is, **C7<sup>#</sup>9<sup>b</sup>5** rather than **C7<sup>b</sup>5<sup>#</sup>9**.

Suspensions (see below) are also standard chords with little changes.

## **Suspensions**

E.g. **Csus2** or **Csus4** or **C7sus4**

A chord in which the 3<sup>rd</sup> is *replaced* by the 4<sup>th</sup> or the 2<sup>nd</sup> is generally called a *suspended chord*.

If we take a C-major chord and replace the 3<sup>rd</sup> (E) with the 2<sup>nd</sup> note of the C-major scale, we get a chord with notes C, D and G, for which the symbol is **Csus2**.

Similarly, if we take a C-major chord and replace the 3<sup>rd</sup> (E) with the 4<sup>th</sup> note of the C-major scale, we get a chord with notes C, F and G, for which the symbol is **Csus4** or simply **Csus**.

Traditionally, **Csus2** and/or **Csus4** would be directly followed by a **C** or **Cm** chord, which would *resolve* the suspension. So it was a way to introduce a little temporary dissonance by arriving at a **C** or **Cm** chord in staggered fashion. The term *suspended* arose because the 4<sup>th</sup> (or 2<sup>nd</sup>) originally would be a note that occurred in the preceding chord and was "just left hanging there" when the rest of the preceding chord was replaced with some combination of C and G notes (the 1<sup>st</sup> or 5<sup>th</sup> of **C** or **Cm**).

Suspensions occur in other chords. For instance, **C7sus** or **C7sus4** represents a chord with notes C,

F, G and B $\flat$ .

If the suspension is immediately resolved, then the suspended chord may be thought of as a [passing chord](#).

### ***Standard chords, but with little extras***

E.g. ***Cm(add2)***

For instance, the symbol ***Cadd2*** represents a ***C*** chord with an extra note, the 2<sup>nd</sup>, which is D. So its notes are C, D, E and G. ***Cadd9*** also represents a ***C*** chord with an added D, but in that case the added D would commonly be the top note of the chord.

Similarly the chord ***Cm(add2)*** has the notes C, D, E $\flat$  and G.

Similarly the chord ***C6add9*** or ***C6/9*** has the notes C, E, G, A and D.

Sometimes ***+*** is used instead of ***add***. The advantage is that ***+*** is shorter. The disadvantage is that ***+*** also stands for *augmented 5<sup>th</sup>*. ***C+2*** would be the same as ***Cadd2***. ***C+9*** ought to be the same as ***Cadd9***, but ***C9+*** is ***C9*** with an augmented 5<sup>th</sup> (the chord with notes C, E, G $\sharp$ , B $\flat$  and D.)

### ***The minus sign***

In chord symbols, the minus sign is used with different (and somewhat conflicting) meanings, which may be a cause of confusion.

Some people who write chord symbols never use the minus sign.

Some people who write chord symbols use the minus sign only to indicate a flattened *fifth*, as in ***C7-***. That makes good sense, since the plus sign is used only to indicate an augmented (i.e. sharpened or raised) *fifth*, as in ***C7+***.

Other people who write chord symbols use the minus sign for flattening almost any note within a chord, for instance writing ***C7-9*** instead of ***C7b9***.

Now I have never seen the chord symbol ***C-3*** used, but it would represent ***C*** (= a C major chord) with its 3<sup>rd</sup> flattened. That is, ***C-3*** would represent a C minor chord (***Cm*** or ***Cmin***). This line of thought has led to ***C-*** (i.e. ***C-3*** without the ***3***) being used as an alternative to ***Cm*** or ***Cmin***.

What then does ***C-7*** mean? Is it ***C-*** with a ***7*** (i.e. ***Cm7***)? Or is it ***C*** with a ***-7*** (i.e. ***C*** with a flattened 7<sup>th</sup>)? Well, ***C*** with a flattened 7<sup>th</sup> would just be ***C6***. So in practice ***C-7*** is just an alternative to ***Cm7*** or ***Cmin7***.

### ***Standard chords, but with omissions***

E.g. ***Cm7omit5*** or ***Cm7no5***

For instance, the symbol **C9omit3** or **C9no3** represents a **C9** chord without the 3<sup>rd</sup>, which is E. So its notes are C, G, B $\flat$  and D.

Similarly the chord **Cm7omit5** or **Cm7no5** has the notes C, E $\flat$  and B $\flat$ .

### **Specifying the bass note**

E.g. **C7/E**

Sometimes a chord symbol specifies the bass note (the lowest note of the chord) by appending a slash followed by the required bass note.

For example, **C7/E** represents an [inversion](#) of **C7** that has E as its lowest note.

Sometimes specifying a bass note introduces a new note to the chord.

For example, **Dm7/G** represents a **Dm7** chord (notes D, F, A and C) above a G bass note.

For example, **AM7/E $\flat$**  as in John Coltrane's *Naima* represents an **AM7** chord (notes A, C $\sharp$ , E and G $\sharp$ ) above an E $\flat$  bass note.

### **Same again, please**

E.g / or  $\sloppy$ .

Here is a two-bar chord sequence with four beats in each bar.

| **Am7 / D9 /** | **Gm7 / Gm6 /** |

Each chord symbol or slash indicates one beat, and a slash indicates that the previous chord symbol still applies.

Here is another two-bar chord sequence with four beats in each bar.

| **C7sus4 / / /** |  $\sloppy$  |

The symbol  $\sloppy$  in the second bar indicates that the chord symbol in the previous bar still applies.

### **Different chords but the same notes**

E.g. **Am7** and **C6**

It has been mentioned above that **Cdim7** and **E $\flat$ dim7** both have the same notes. Likewise **C+** and

**E+**. Here are some further examples of different chords that use the same notes.

The chord **Am7** has the notes A, C, E and G.

We have already seen that **C6** has the notes C, E, G and A.

So are **Am7** and **C6** different chords? Well, **Am7** encourages the musician to play something A-minor-ish, whereas **C6** encourages the musician to play something C-major-ish. So to that extent the chords are different.

And context matters here.

**C6** is usually appropriate in a chord sequence like **CM7 C6 CM7 C6** or like **B b6 B6 C6**.

**Am7** is usually appropriate in a chord sequence like **Am7 Am6 Am7 Am6** or like **Am7 D7 G**.

The chords **C9omit3** and **Gm/C** both have the notes C, G, B $\flat$  and D. There is the slight difference that C is the specified bass note for **Gm/C** but just the probable or obvious bass note for **C9omit3**.

The chords **Cm7 b5** and **E b m6** both have the notes C, E $\flat$ , G $\flat$  and B $\flat$ .

The chord **C7 b5** has the notes C, E, G $\flat$  (= F $\sharp$ ) and B $\flat$ . The chord **F $\sharp$ 7 b5** has the notes F $\sharp$ , A $\sharp$  (= B $\flat$ ), C and E. Curiously, these two chords share the same notes, but the keys associated with the chords are as far apart musically as can be. Despite that, it is not always clear whether the symbol for a chord with those four notes should be **C7 b5** or **F $\sharp$ 7 b5**. For instance, suppose the next chord is **Fmaj7**. The chord sequence **C7 b5 Fmaj7** can be thought of as a version of the familiar sequence **C7 F**, whereas the sequence **F $\sharp$ 7 b5 Fmaj7** suggests a bass line that descends from F $\sharp$  to F (if the chord root notes are used as bass notes); each of these possibilities has merit. Using a chord based on **F $\sharp$ 7** instead of one based on **C7** is called a *tritone substitution*, since the root notes C and F $\sharp$  are a tritone apart.

If the chord **Bdim7** accompanies the melody note G, then the chord plus the melody note give the notes of **G7 b9**. Now **Bdim7** accompanying a G has a different quality to **G7 b9**, but in both cases the next chord could well be **Cm7** or some other C-minor chord.

A person who writes chord symbols obviously has to analyse each chord and choose a chord symbol to suit the context. This is called *parsing* a chord. Even in published music, the best choice is not always made. For instance, you may see **A b m6** where **Fm7 b5** would give a better insight into how the harmony progresses.

I have seen the chords for the first four bars of Cole Porter's *All Of You* given as

| **A b/E b** / / / | **E b** / / / | **Fm7 b5** / / / | **B b7 b9** / / / |

Now the chord **Fm7 b5** has the merit of suiting progression into **B b7 b9**. On the other hand, having **A b m6/E b** in bar 3 would have the merit of echoing bar 1. You choose!



## ***Chords within chords***

Sometimes when one or more notes are omitted from a standard chord, what remains is also a standard chord.

Some examples are almost too obvious to mention. Omit the A from **G9** and you have **G7**. Omit the F from **G7** and you have **G**. Omit the B from **Dm6** and you have **Dm**. And so on.

More interesting is when the root note is omitted. Here are some examples. Omit the C from **Cmaj7** and you have **Em**. Omit the G from **G9** and you have **Bm7b5**. Somehow that makes **Bm7b5** seem less exotic. Omit the B from **Bm7b5** and you have **Dm**. Omit the A from **Am7** and you have **C**.

Omit the G from **G7b9** and you have **Bdim7**. Omit the B $\flat$  from **Bb7b9** and again you have **Bdim7**. Omit the D $\flat$  from **Db7b9** and again you have **Bdim7**. Omit the E from **E7b9** and again you have **Bdim7**. So that is four different **7b9** chords each of which contains the notes of **Bdim7**.

Cole Porter wrote the music and lyrics of the song *Ev'ry Time We Say Goodbye*. It includes the line 'But how strange the change from major to minor' that invites the listener to take note of the song's harmonies. He makes a joke by setting a minor chord (**Abm7**) to the word *major*, and a major chord (**Db9**) to the word *minor*. The joke goes largely unnoticed, though, perhaps because **Abm7** contains the major chord **Cb (= B)**, and **Db9** contains **Fm7b5** and **Abm**.

## ***Which notes may be omitted?***

Of course, all of them, if the melody is to be unaccompanied.

Just melody and bass-line can be very effective, even when much simpler than J S Bach's Two-Part Inventions.

**Obviously, a chord accompanying a melody note might not have to include that melody note; indeed it can be better to omit it.**

More generally, the question *Which notes may be omitted?* is a good one to bear in mind when learning about harmony. The question is too hard to answer fully here (or at all). The answer depends on what each note in the chord contributes in the particular musical context and genre. As a brief introduction to some of the ideas, the following comments are offered, at the definite risk of being too dogmatic.

Consider a simple song in which **G7** is followed by **C**.

For the **C**, imagine omitting one of C, E and G. Miss out the C, and you are left with E and G, which could suggest E minor. Miss out the E, and you are left with C and G, and there is nothing left to make the chord major or minor. Miss out the G, and you are left with C and E, which still suggest C major fairly strongly. So the notes C and E (the 1<sup>st</sup> and the 3<sup>rd</sup>) are more important than the G (the

5<sup>th</sup>) in establishing the C-major chord.

In the **G7**, the notes B and F (the 3<sup>rd</sup> and the 7<sup>th</sup>) are the two notes that most strongly lead into the C-major chord – perhaps because from B to C is only a semitone (up) and from F to E is only a semitone (down), and as just mentioned, the C and E are the two most important notes of **C**. (B and F are therefore sometimes called the *guide tones* of **G7**.) The root note G of **G7** also leads into **C**, because G-C is *so-doh* (if the key is C); very many pieces of music have bass lines that finish *so-doh*. For the purpose of leading into **C**, we may perhaps rank the notes of **G7** in the order B, F, G, D (most important first).

But where a chord leads is only one of its aspects, only one reason why a note can matter. What the chord itself sounds like is another. Now consider **G7+** followed by **Cmaj7**.

**Cmaj7** is **C** with the note B added as a decoration. So that B must be important, more important than the G.

The augmented fifth in **G7+** is D $\sharp$ , a note not in the C-major scale. So the note D $\sharp$  commands attention. For **G7+**, the root note G may be the least important note.

*Shell voicing* uses pared-down chord [inversions](#) containing (at most) the root, 3<sup>rd</sup> and 7<sup>th</sup> of each chord. For some musical genres, it is a good place to start.

## Summary

Most chord symbols can be readily interpreted by taking as our reference the pattern

**so-la-ti-doh-re-mi-fa-so-la-ti-doh-re-mi-fa-so**

mentioned [above](#). The notes in bold (notes 1, 3, 5, 7, 9, 11 and 13) are

**so-ti-re-fa-la-doh-mi**

and taking the key of C major (keyboard white notes) as an example these notes are

G-B-D-F-A-C-E

which gives us our reference for chord symbols beginning **G**. In this way of thinking, all of these chords are built up by taking the first however-many notes of G-B-D-F-A-C-E and then in some cases making alterations. For the chord symbol that is an unadorned **G**, the chord uses notes only as far as the 5<sup>th</sup> (D); so the notes are G, B and D. For other chord symbols beginning **G**, the rest of the symbol will be (in the following order) one or more of these:

- **m** or **min** to indicate that the 3<sup>rd</sup> (B) is to be flattened (to B $\flat$ ), or **5** to indicate that the 3<sup>rd</sup> (B) is to be omitted;
- **maj** (if followed by an odd number) or **M** or  $\Delta$  to indicate that the 7<sup>th</sup> (F) is to be sharpened (to F $\sharp$ );
- **7** or **#7** to indicate the inclusion of a 7<sup>th</sup> (F or F $\sharp$ ) or **6** to indicate that the 6<sup>th</sup> (E) replaces the 7<sup>th</sup>;

- **9, 11** or **13** to indicate that the chord uses notes as far as the 9<sup>th</sup> (A), 11<sup>th</sup> (C) or 13<sup>th</sup> (E, in which case it is common to omit the 11<sup>th</sup>);
- **other stuff** to indicate that notes are to be flattened/sharpened/added/omitted.

There are exceptions. The diminished seventh chord symbol **Gdim7** or **G<sup>o</sup>7** is not in this pattern. Also the handy symbol **G<sup>o</sup>7** does not follow this pattern, but writing that same chord as **Gm7<sup>b</sup>5** does follow the pattern.

### **Not a chord but just one note**

E.g. **E<sup>b</sup>pedal**

The word **pedal** requires not a chord but just a single note. Such a symbol is very rare; one arrangement of Richard Carpenter's tune *Walkin'* has the symbol **Apedal** in a couple of places, indicating not a chord but just the note A.

Some works for pipe organ, including many by Johann Sebastian Bach, have passages with a prominent long sustained low note which is held while higher parts are being played. On a pipe organ, the pedalboard is for producing low notes. So any prominent long sustained low note (even if the music is not for pipe organ) is known as a *pedal point* or an *organ point* or a *pedal note* or a *pedal*.

### **No chord at all**

The symbol **N.C.** ("no chord") requires that there should be no harmony.

### **Chord symbol index**

As noted above, each chord symbol starts with the **root note**, and the type of chord is determined by what, if anything, follows the root note.

For each **main chord type**, here are links to the relevant sections above, based on what follows the root note: [nothing](#); [o](#); [o7](#); [Δ](#); [∅](#); [+](#); [6](#); [6/9](#); [5](#); [7](#); [9](#); [11](#); [13](#); [dim](#); [dim7](#); [m](#); [m6](#); [m6/9](#); [m7](#); [m9](#); [m11](#); [m#7](#); [M7](#); [M9](#); [maj7](#); [maj9](#); [min](#); [min6](#); [min6/9](#); [min7](#); [min9](#); [min11](#); [min#7](#); [mM7](#).

A chord symbol also may have further parts to indicate **alterations/omissions/additions** to the main chord type. Here again are links to the relevant sections above: [-](#); [+](#); [+2](#); [b5](#); [b9](#); [#5](#); [#9](#); [#11](#); [/9](#); [a slash then a note-name](#); [add2](#); [add4](#); [add9](#); [no3](#); [no5](#); [omit3](#); [omit5](#); [pedal](#); [sus2](#); [sus4](#).

Here is the link to the [section](#) explaining the various uses of the minus sign.

Here is the link to the [section](#) in which the symbols / (on its own) and  $\cancel{\phantom{x}}$  are discussed.

Click [here](#) for a table giving the notes for chords with root-note C.

## **Chord symbols in jazz**

As with other genres of music, fashion in chord symbols in jazz varies with time and place, which is why there are alternative symbols for many chords. Of those alternatives, current practice in jazz commonly uses these symbols:

**Δ** to indicate a major seventh – e.g. **C Δ9** has the notes C, E, G, B and D;

**+** to indicate a raised fifth – e.g. **C7+** has the notes C, E, G $\sharp$  and B $\flat$ ;

**∅** instead of **m7  $\flat$ 5** – e.g. **C∅** has the notes C, E $\flat$ , G $\flat$  and B $\flat$ ;

**$\flat$ 5** to indicate a flattened fifth (when the symbol **∅** does not apply) – e.g. **C7  $\flat$ 5** has the notes C, E, G $\flat$  and B $\flat$ ;

**o7** to indicate a diminished seventh – e.g. **Co7** has the notes C, E $\flat$  and G $\flat$  and A.

Also not uncommonly:

- instead of **m** or **min** – e.g. **A-7** has the notes A, C, E and G.

## **Etc**

Here is a very brief look at some related topics, including other ways of referring to or denoting chords.

A **figured-bass** system is used in Baroque music. The notes of the bass line are written out in full, and, wherever a chord is required, number(s) are written under the bass note to indicate the further note(s) needed to construct the chord. For example,

6

4

written under a bass note asks for the notes which are a 4<sup>th</sup> and a 6<sup>th</sup> above the given bass note in the scale being used. So if the scale is C major and the bass note is E then the further notes would be A and C, which is an A-minor chord with bass-note E, which is an instance of **Am/E**.

Now the doh-re-mi system of referring to notes is independent of the key, which can be extended in various ways to create systems that refer to chord sequences *independently of the key*. This table indicates alternative ways of referring to the notes of the major scale independently of the key.

doh	1	I	tonic
re	2	II	supertonic
mi	3	III	mediant
fa	4	IV	subdominant
so	5	V	dominant
la	6	VI	submediant
ti	7	VII	leading note

The **Nashville** number system uses digits to represent the root notes of chords. For instance

**1 1/3 4 4-**

assuming four beats in the bar would be equivalent to

| C /// | C/E /// | F /// | Fm /// |

when the key is C major, but it would be equivalent to

| E /// | E/G# /// | A /// | Am /// |

when the key is E major.

**Numbers** are also used in discussing chord sequences. For instance, much has been said about the 2-5-1 or II-V-I sequence, which in the key of C major could be **Dm7-G9-Cmaj7**, say, or in the key of C minor could be **Dm7<sup>b5</sup> - G7<sup>b9</sup> - Cm6**, say.

There are **further systems** in which the symbols for minor chords have the root note in lower case, with upper case indicating a major chord. In one such system, *c* is the symbol for C minor and **C** is for C major. In another such system (if the key is C major), *ii7* is equivalent to **Dm7** and **II7** equivalent to **D7**.

A seventh chord like **G7** is sometimes called a **dominant seventh** chord, since the root note G is the dominant in the scale of C major, the only major scale to which the notes of **G7** all belong (and see also the [Summary](#) above). It is a little misleading, though, to call **G7** a *dominant* seventh (see the table above for the meaning of *dominant*) if the keynote is not C, for instance when using **G7** in a blues in the key of D.

A **passing chord** is a chord inserted between two other chords to create more movement or interest. Usually a passing chord lasts just a beat or two. For instance, if the two-bar chord sequence | **D** /// | **Em** /// | seems too basic in a particular context, then it *could* work to insert the passing chord **B7/D#**, giving | **D** / **B7/D#** / | **Em** /// | instead. This will not always be suitable, but it can work very well because **B7** leads into **Em** and also the root or bass notes (D, D#, E) form a rising sequence.

A **passing note** is a note that does not belong to the current chord and that soon gets replaced with a note (generally a tone or semitone up or down) that does belong to that chord.

A symbol like C6 may sometimes refer not to a chord but to a *single note*: C6 is the note C in octave number 6. This **system of naming notes** distinguishes between notes of the same name by adding an octave number. The system is used when writing about how high or low an instrument can play or a singer can sing. On a grand piano, the lowest note is A0, the highest note is C8, and middle C is C4. Be warned that the note one semitone below C4 is B3 (and not B4 as you might have expected), because in this system each numbered octave runs from C up to B. The inventors of this system seem to have been thinking in C major (C = doh). So on a grand piano there are 88 notes as follows: octaves 1 to 7 are complete (at 12 notes per octave, that gives 84 notes), plus 3 notes down in octave 0 (A0, B $\flat$ 0 and B0), plus one note up in octave 8 (C8).

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