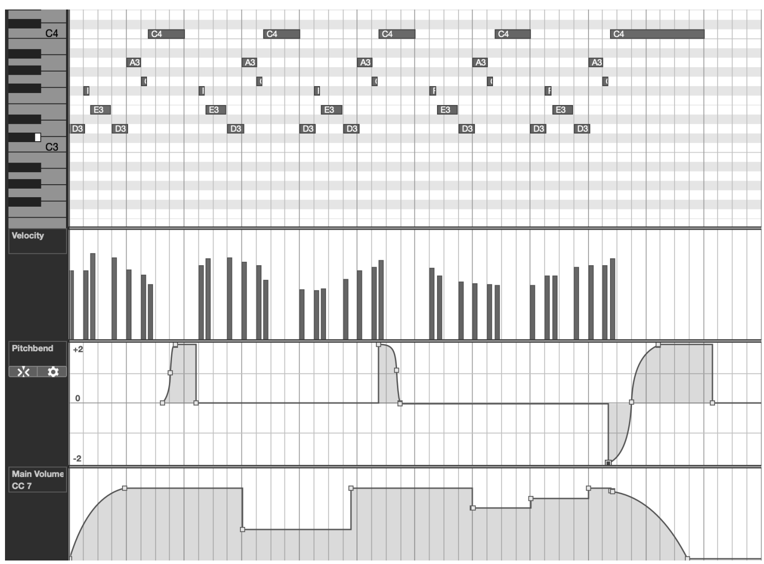
Effective Sequencing



For your sequencing to be successful, it needs to be more detailed. The reason for this is simple – most of the music we listen to has been played by people, and whenever they do something they put in slight variations (whether intentional or unintentional) in what they do, both in terms of their timing, and also of the loudness of each note they play – their performances may well be consistent, but when compared to the rigid metronomic precision of a computer, they are often quite varied.

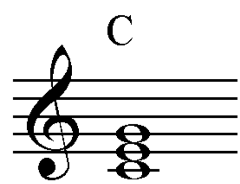
In addition to this, to effectively sequence an instrument realistically, we need to understand how the instrument makes its sound, and how it is played.

The Guitar

The guitar can be a difficult instrument to sequence effectively, especially for the non-guitarist, but use of some knowledge of the guitar and playing techniques will allow you to produce sequenced guitar performances that are convincing to most, if not all listeners.

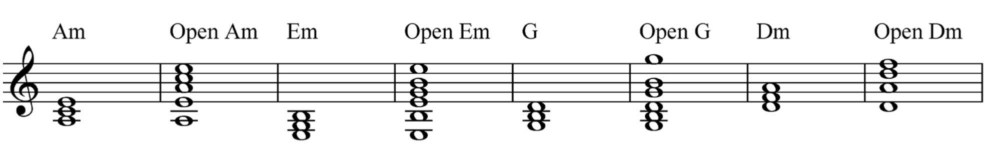
Firstly, chord playing – the most common error when sequencing a guitar sound is to use simple, root position triads for guitar chords. While these are possible on the guitar, it is not the most common way to play chords, and certainly isn't something that is evocative of the guitar. The reason for this is the tuning of the instrument and the physical way the chords are played. Take, for instance, a simple C major chord played on the guitar – this would be played as an "open" chord, meaning that open (unfretted) strings are used.

Here we see the C major on the keyboard, root position. It consists of C, E and G. It is called root position because the root note (C) is at the bottom of the chord; the notes appear in ascending order of root, third and fifth.



However, playing the C major chord on the guitar in the shape that most guitarists would use gives us these notes – like two triads on top of each other, but with the top note missing. It consists of C, E, G, C, E. This will sound somewhat different to the root position triad that a keyboard player would probably initially play.

There are several common open chords, are shown below with the keyboard versions first, followed by the 'guitar' versions.



Note that some of these chords can only be played as 'open' chords – you can't necessarily take a shape or pattern of intervals as shown and move it to another root note to make another chord, although in some cases you can do so. Unless

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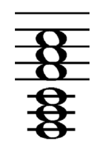
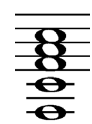
you are producing a piece for playing by a ‘real’ guitarist then this may be irrelevant – if you produce a sequence which is mostly correct in this respect it will sound convincing to most listeners.

However, it is important to note that most chords can be played in a number of positions, as we will see now. The next type of chords is a “barre” chord, which involves using the first finger of the fretting hand fretting all the strings at a given fret, and then forming a shape above that fret. The most common of these are the “E shape” and “A shape” barres, which take their names from the open chords whose shapes they use. They are not E or A chords, but can be any note, depending on the root note of the chord (which is played by the first finger, as we will see), but are often referred to as E or A shape as it tells the guitarist what chord shape to use. An example should show this more clearly.

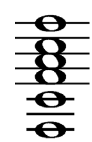
To construct this type of chord, take two root position triads and put them on top of each other – in this case F,A,C and F,A,C, although this is a “moveable” chord form, so it could be based on any root note, and could also be a minor chord as well. The lowest pitch playable on the guitar is the E chord a semitone below this one.



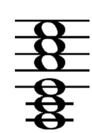
Then remove the 3rd note of the bottom triad (in this case A). This is because it is not physically possible to play the two triads on the guitar because of the tuning of the instrument



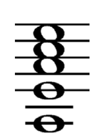
Finally, add another note on top (F), giving us F, C, F, A, C, F. This same pattern (Root, Fifth, Root, Third, Fifth, Root) would be repeated on any note if this shape of chord was played on the guitar.



For an A-shape chord, the situation is similar, but they are only played across 5 strings, not 6. Take two root position triads, and place them on top of each other. As with the ‘E-shape’ chords, they can be major or minor, but with an A-shape chord, it should not be lower in pitch than the first A below middle C.



Remove the 3rd note from the bottom triad (in this case E). Because the chord is played across 5 strings, there is no note to add on top. The pattern of notes in this case is Root, Fifth, Root, Third, Fifth.



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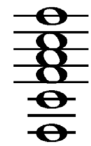
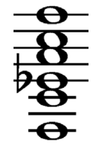
In addition to these major and minor chords, it's common to have to play Dominant 7th (7) chords and minor 7th chords. For a dominant 7th chord, construct the chord as you would normally – in this case we see the completed F Major chord (E shape), as seen above.

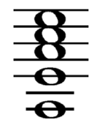


Next, the root note of the upper triad (F) is moved down by a tone, to E♭. This is the dominant 7th (♭7) note, giving us a Dominant Seventh chord.

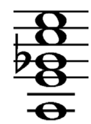
Note that if this procedure was carried out on an F Minor chord, you would obtain an F Minor 7 chord.



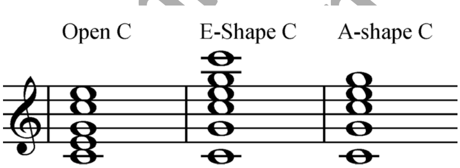
For the A shape chord, the procedure is the same – here's the finished C major (A shape) chord. Again, a minor chord could be used as the starting point to generate a Minor 7th chord.



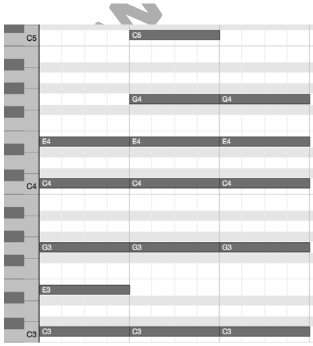
The root note of the upper triad (C) is moved down a tone, to B♭. Again, this is the dominant 7th (♭7) note.



To sum up, on the guitar it is possible to play one chord in a number of positions – these may not affect the pitch of the root note, but can alter the number and pattern of the notes inside the chord, although they will all belong to the chord – see this example for three different ways to play a C major chord:



Here are the three versions on a treble staff – the Open-chord version, and the E- and A-shape Barre chords. All three are C, but each will have a different sound.



Here are the same three chords, but in Cubase's Key Editor window, showing the pitches of each. Despite them looking different here, it's important to remember that each chord is still C Major, but a different inversion of it, and some players could use all three within a song.

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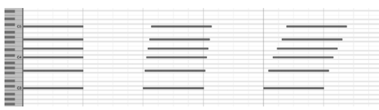
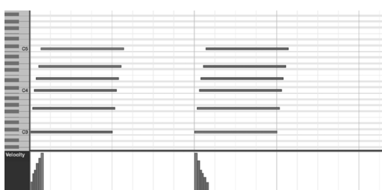
In addition to this, when guitars are played as rhythm instruments (i.e. with a chord being played), then it is extremely uncommon for the notes to all be played simultaneously – most of the time they will be played with a slight delay between first and last as they are strummed, and sometimes the player will accentuate this natural tendency by making the strum last over a noticeable period. See the example below for details on this.



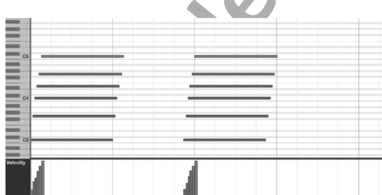
Here is a chord played three different ways – all the notes being played at the same time and then two 'strummed' patterns, where there is a lag between the first and last notes.

These strums can be generated using the trim tool (seen to the left) by clicking and dragging across existing quantized chords (holding **ALT** to allow the front of the notes to be removed) to create the progressively staggered starts.



Next is velocity – in the real world, notes aren't played totally consistently and in addition it's common for them to be played with varying loudness depending on the musical situation. For many guitarists, the strum will start with a high velocity and die down, but sometimes the reverse is true – here are two examples, the second of which is more common, but both have their places.

Rhythmic emphasis/feel is also an important part of sequencing – the same notes can sound dramatically different because of their placing in relation to the beat.



The example to the left shows two identical chords that have been placed differently – the first one starts the strum on the beat, the second one ends on the beat, giving a markedly different feel as a result – the first one is 'behind' the beat, while the second 'pushes' the beat forward.

Each has its own merits, and only experimentation and a keen ear can decide which option is suitable at any given point.

Solo playing

In addition to the eccentricities of chord playing on the guitar, there is another area to tackle with sequencing, that of the melodic or solo guitar part. Because of the nature of the guitar, it is possible to add effects after a note has been struck that are simply not possible with instruments such as the piano – this is one of the things that has made the guitar so popular as an instrument of self-expression, but also makes it difficult to sequence as much of what you hear is not the notes themselves, but other non-note information and phrasing/playing techniques.

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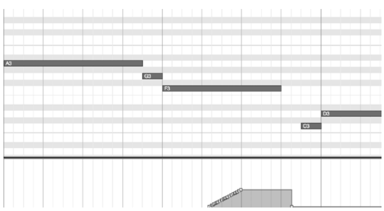
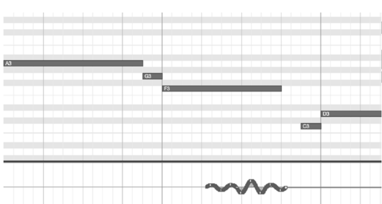
Vibrato

Vibrato is a fairly easy thing to simulate – many guitarists add vibrato (some unconsciously), and this adds a lyrical quality to a section. This can be done in one of two ways – either using the modulation controller (which adds a vibrato at a fixed speed with most synth modules), or using pitch bend.

Typically using modulation will work, and often only a small amount is needed to give the desired effect; adding in too much will sound rigid and unnatural. However, for some situations this will not suffice and careful use of the pitch bend wheel (or programming) will help – see the example below for two ways of achieving this end:



Firstly, modulation. Here we can see that is has been progressively applied (although not to the full amount), so the long note in bar 12 will have some vibrato applied, as will the following ones. It's important to note with this technique that the vibrato that you obtain will be totally down to the sound module you are using, both in terms of speed and intensity. Sometimes this can sound artificial if over-used.



Here, the same passage has been programmed using pitch bend, to give total control over the vibrato. This, however, is a more involved technique and can mean there is a great deal of MIDI data generated, which some synth modules can have problems with. With good programming, this can be a very convincing technique, however.

Bending Notes

Another extremely common technique on the guitar is that of bending strings – this allows the player to move outside the confines of the fretted notes (fixed at semitones) and smoothly move between pitches, and possibly use microtonal (smaller than a semitone) intonation, using notes between the frets on the guitar. In either case, pitch bend is the way to simulate this, although in most cases the range will only be 2 semitones, which is less than most guitarists can bend a note (see the next paragraph on how to get round this). There are two common ways to add bending to a performance – either hold the pitch bend wheel down before playing the destination note and then releasing it, or to hit one note, use the pitch bend wheel to get to the new note, then release it and play the new note; the two (seen below) give quite different results.

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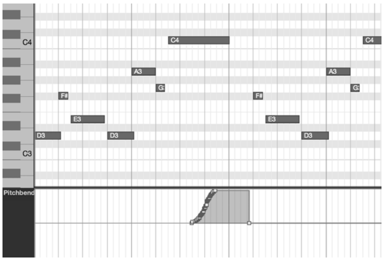
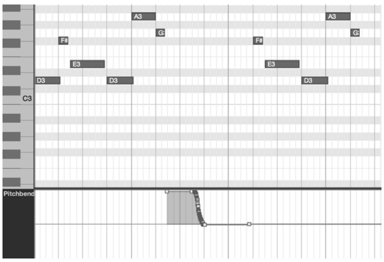
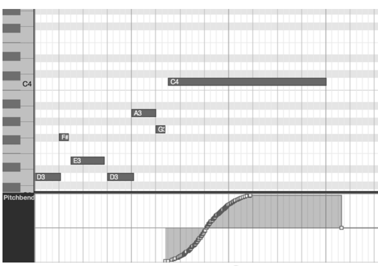


Here we see a passage where one of the notes has a simulated string bend – the note is played, and then bent up a tone using pitch bend. The original note is a C, but it is bent up to a D. Note that the bend is released while there is nothing playing.



Here we see a note which is 'pre-bent' – the pitch bend is applied before the note is played, and then released after the note is played. In this example, while the original MIDI note is a B♭, it would be heard as a C, then released to a B♭.

If the range of the bend is more than 2 semitones (3 is not uncommon, and 4 is possible), then you will need to plan ahead, and apply negative bend before the note is played, and then keep a positive bend amount on while the final note plays.



Here is an example of this technique – there is a tone's worth of downward bend applied before the note is played, so the played C will be heard as a B♭. The pitch bend will then bend the note up to be a D, smoothly as if a guitarist had applied a 4-fret string bend.

Multiple note bending

There is another technique that is performed on the guitar that is not possible using a single MIDI channel – that is bending notes against a pedal (or static) note. To do this, you will need to use two MIDI channels, both playing the same sound; one will be used for the pedal note, one for the bent note which can be programmed as above. It is not uncommon for a guitarist to play a pedal note and bend a note a semitone below up to 'meet' it – for instance, play an E and then bend the D up. In addition it is also possible to bend two strings at once, but moving them the same amount physically on the guitar doesn't yield the same amount of pitch bend – for instance doing this on the G and B strings will give a bend of 3 semitones for the G string and 2 for the B string, so you would need to place these on two different MIDI tracks and bend accordingly to simulate this.

This programming technique can be taken to the extreme of using a single MIDI channel per string – this will give complete control of the sound and simulate a guitarist effectively, but can take some time. Some guitar synthesizers provide a mode which does this, allocating a MIDI channel per string and generating a huge

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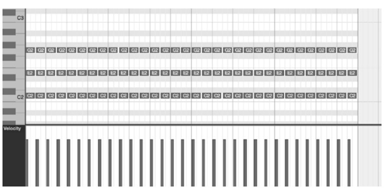
amount of data, albeit with a convincing performance. For most situations, however, this is overkill and two channels will suffice.

Strumming sounds

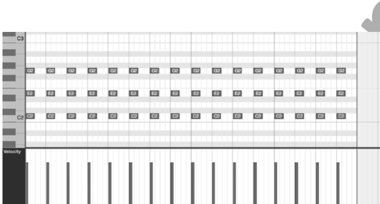
One of the most limiting aspects of trying to sequence a guitar is to emulate strumming – when doing this with a MIDI sequencer or keyboard the problem is that the sound of the previous chord gets cut off and leads to a very 'choppy' sounding sequence.

This can be overcome using a technique similar to the one above – using two MIDI tracks (which must be sent to different channels on an instrument or two separate instruments), where the notes alternate from one part to the other, thereby allowing them to decay more naturally. It's not perfect, but often gives far more convincing results than a single track/channel will do.

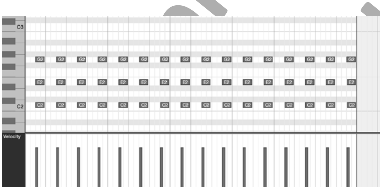


Here we see the original part, which features a strummed eighth-note pattern. However, when played it sounds unnatural as the notes cut off too sharply.

To stop this, we will play every other note on a different MIDI channel (using the same sound/instrument so that they sound the same).



To do this, duplicate the original track (right-click on the track and select `Duplicate Tracks..`, and once you have done that delete every other one on each track, as shown to the left (one will play the 'odd' notes, one the 'even' ones). Here is the above part having had this technique applied to it.



Often just doing this on its own will suffice, but you can also increase the lengths of the notes a small amount to make them overlap more to give more convincing effect.

Tuning

Sometimes a guitar may be slightly out of tune – normally this would be taken care of in the recording, but it is not uncommon for a guitar to be slightly out of tune, and also this can intentionally add to the sequence by thickening the texture (in much the same way as a 12 string guitar can do). To do this, simply add a small amount of pitch bend to the track in places – a small amount positively or negatively can bring a part to 'life', making it sound far more like the real thing. Also if you have two guitars playing similar (or identical) parts then making one of them slightly out of tune will add depth to the sequence. Remember that if you are going to use a GM synth then you can use Controller 93 to add chorus to

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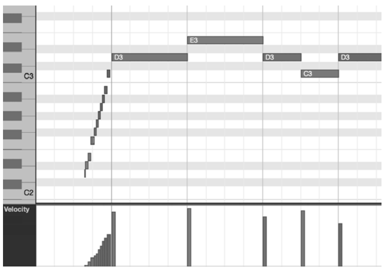
the part, or you can add chorus as an insert effect on a VST Instrument (see page 590)

Slides

The last technique on the guitar we will cover is sliding – a common thing to do on the instrument. This can be simulated by using a number of notes (not necessarily rhythmically placed, so turn quantize/snap off for this) which chromatically approach the destination note.

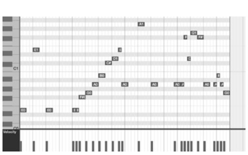


Here is a slide, programmed as a number of notes which are extremely short and a semitone apart, leading to the desired note that happens at bar 5. They are all short, and mostly of low velocity, leading to the note that is heard at the end. Care is needed whenever using this technique to get timing and velocities right to make this sound natural rather than machine-gun like!

The Bass Guitar

Many of the techniques outlined above apply to the bass guitar, although usually less so; while it is possible to play chords (albeit with only 4 or 5 notes on most basses), it is uncommon. Bending notes isn't too common (although again, some do it), but slides and vibrato are common. If you are simulating a fretless bass, using the 'bending' technique will do this (as the notes are not fretted, it is simple to slide the finger up the fret board in a smooth manner), and also you may use some small elements of pitch bend to simulate poor intonation on a fretless sound (don't go too far with this, but some 'colour' can certainly be introduced), as with the guitar "tuning" technique.

However, there is another area which is common with the bass guitar, and that's 'slapping' – often, more accurately, the 'popping' of notes as they are pulled by the fingers of the picking hand, usually to snap back against the frets. To simulate this, it is often best to duplicate the bass part into two tracks, and play one on a "normal" bass sound (to play the notes that are played with the thumb) and one to play a "slap" sound (for the 'popped' notes). Decide on the notes that are to be slapped, and delete them from the 'normal' part, and then delete all the non-slapped notes from the slap part. Now some careful blending of the two sounds should give a convincing facsimile of a slap bass player.



Above left is the original bass part - some of the notes we want to be played as 'popped', so the track is duplicated and then the appropriate notes deleted from each part.

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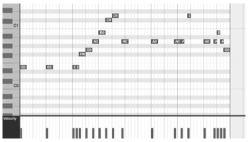
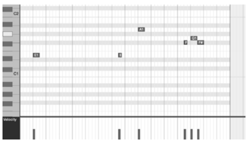


The next two diagrams are the two MIDI tracks, generated from the original bass part. This one is the "fingered" sound...

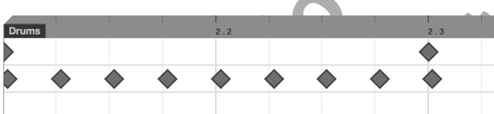


...while this is the "popped" sound. Because the two don't occur together and have been mixed well, they sound like a single player playing slapped and popped notes.

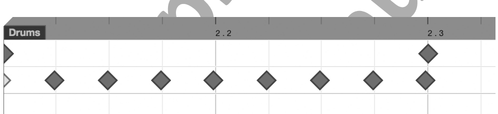
The Drums

The drums can be sequenced without knowing much about drumming technique, but learning something about the instrument will greatly improve your sequencing. Firstly, for the most part, drummers have only one pair of arms and one pair of legs, so there shouldn't be more than 4 things happening at any one time, and much of the time one of their legs will be controlling the hi-hat, so this should be remembered along with the other leg mostly playing the kick (bass) drum – most drummers don't move from these two items at all, leaving their hands to provide the most variation, therefore allowing only 2 other sounds to be triggered at any one time.

The next thing to remember is timing – there are very few drummers who are totally metronomic and 'accurate' – there are two areas to look at here. Firstly the position of the first beat in the bar – some drummers will play slightly ahead with some part of the kit, some behind; this gives "feel" or "groove", as shown below:



This first example shows the hi-hats behind the beat, although only minimally. This will be enough to give a 'laid back' feel.



Here the hi-hats are ahead of the bass drum, giving a 'pushed' feel and making the drums sound a little faster than they actually are.

Note that if everything is ahead or behind the beat, the effect will be lost – there needs to be something that the feel is being created against.

Secondly, the way the beat is divided up within the bar can alter too – although the bar should be 4 equal divisions, it is not uncommon for a drummer to get to beat 2 or 3 early or late; this is usually most noticeable when trying to place samples of two different drummers together – many grooves will not fit together as a result of this.

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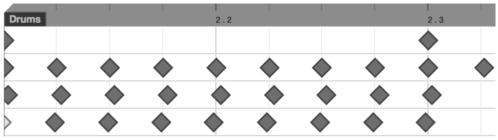

Here are three different hi-hat feels superimposed over one bass drum – one is 'accurate', one is 'late' the other is 'early'.

All 3 in isolation will work, but when played with each other they will usually not sit well together.

Simulating these two playing techniques can give considerable life and feel to your sequenced tracks; in some cases you can use groove quantize to move your original playing nearer to the beat without totally removing your original feel, but sometimes you might need to edit notes manually to achieve this – it depends on the original method of input and the desired end product.

Another often-overlooked area of drum programming is use of velocity. Listen to any good drummer and you will hear a huge amount of variation in dynamics of the whole kit, and most often in the hi-hats – listen to Stewart Copeland's playing on Regatta De Blanc to hear a good example. Many drummers will accent certain beats within bars, and also build dynamically throughout sections, and if your sequenced drum track is missing these details it won't sound as good as it could do.

The next area to look at is cymbal use – the best way to learn this is to listen to drummers in the style of music that you are sequencing. Cymbals are often used to demarcate different sections of songs, either highlighting the end of one section or the beginning of a new one. However, it is not uncommon for a good drummer to use them in a less obvious way, and listening to a great drummer making use of his entire kit to help build an arrangement is something that you can learn a great deal from – here it's more a case of knowing what to play rather than how to actually sequence it, but again listening to real players will teach you a great deal in this area.

String Instruments

Accurately sequencing string instruments can be one of the most challenging tasks to complete effectively. The reason for this is fairly simple – an instrument such as a piano or organ has little other than the notes themselves and how hard they are played, making them easy to sequence correctly and convincingly. However, instruments such as the Violin offer a huge number of techniques for generating the sound from the instrument, and as a result can make an equally wide range of sounds. In addition to this, MIDI was never really designed to communicate such a wide range of playing information – at the time of its conception, just being able to play notes on another synthesizer was an achievement in itself!

There are, however, a number of ways of sequencing string instruments more effectively. Firstly, using some of the techniques above for the guitar will help – often the intonation can be simulated using small amounts of pitch bend. Secondly, using up-to-date software synthesizers or sampled sounds will often give a much better performance even using exactly the same MIDI information – this area

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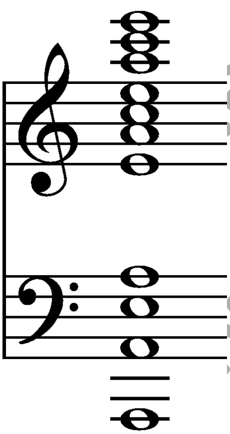
of music technology has improved greatly in recent years, allowing a convincing simulation of solo string players. This can be greatly accentuated by experimenting with the velocity of the notes that you play – often this will lead to a change in the timbre that will allow you to create more expression.

Another area to be aware of is the different playing techniques used by string players – at the most basic level this is to be aware of the use of pizzicato (plucked) playing, which is quite a common technique, and usually a separate MIDI channel is needed for this along with a different sound. If you wish to be more accurate, there are a number of ways of bowing the strings and different levels of 'attack' which produce quite different tones – short and long notes tend to be articulated quite differently, so again splitting these onto different MIDI tracks and channels using different sounds (but ones which sound similar enough to be the same instrument) will make the performance sound far more convincing.

Choosing between "solo" sounds and "section" sounds can also make or break a sequence – usually when sequencing a smaller string section (such as a quartet) it is far preferable to sequence each line individually using a solo sound, but in some cases judicious use of a 'section' patch may thicken the sound up. Conversely there are sometimes situations where you have a section which needs a solo instrument in addition to clearly define the way the part is being played.

Another often-overlooked detail when sequencing string sections (usually with ensemble-type samples or synthesizer string 'pad' sounds) is arrangement of the notes that are used. It is quite typical to put too many notes in while attempting to thicken the texture and ending up with a mess instead.



The general rule is this – the lower the note, the larger the interval to the next note. In the left hand (Double Basses) the sound is often clearer and more powerful if only octaves are present, often of the root of the chord.

As the chord moves upwards, the intervals can become smaller, so that 5ths can appear, and in the right hand/treble clef, all of the notes can be present without the sound becoming too dense – to the left we see such an arrangement, with an A minor chord as an example, with an octave interval at the bottom, then fifths, then two triads.

The Voice

The human voice is one of the hardest instruments to imitate – it is capable of a huge range of expression, both in terms of the sounds it produces and the message that is conveyed with words. The sequencing that you are going to do will clearly not imitate a human voice in terms of the words, etc – the technology to do this does exist, but it is at best embryonic. However, it is possible to simulate

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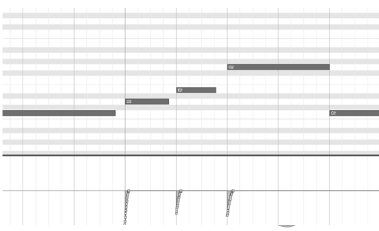
a melody being sung by a human with another instrument (such as an oboe or clarinet) and add programming techniques to this to closely emulate the melodic performance – here again attention to detail will pay off in the long run, although to do so can be quite time consuming and involve analysis of each note of the original performance.

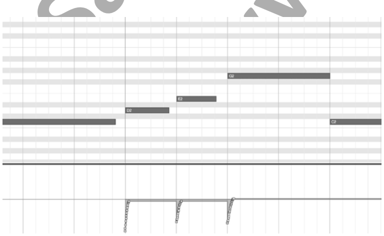
Firstly, many singers take liberties with the material they are performing – their timing may be quite a way from the rigid, metronomic performance you might expect from another instrument. This is extremely important as it is often the thing that people listen to first, and also incorporates much of the 'feel' of the piece. Simply listening to the timing of your sequence against the original (if you are copying one) should help here (once you have mastered the Tempo Mapping technique on page 22 this will be easy as the MIDI and audio will align perfectly, allowing you to use Cubase's grid accurately), listening through for the phrasing of each line/note.

Secondly, the voice is not a fixed pitch instrument such as the piano – it is quite possible to move smoothly between pitches with the voice, and a great many singers do this in their recorded performances; some will actively slide between notes (something that is less common), but a great many will 'scoop' into notes, and this is something that can be achieved with careful pitch-bend programming.



Here we see that technique sequenced – small amounts of negative pitch bend have been applied to make the played note momentarily a small amount flat, and this is quickly released to the 'correct' pitch.

Using this technique gives a bit more life to the attack of the notes, although it shouldn't be used too often or too strongly – the range of the pitch bend needs to be quite narrow for this to work in the desired manner (i.e. subtly), although sometimes this can be used over a wider range where a note can be 'slid' from a semitone or tone below.



Thirdly, many singers are not totally accurate with pitch – quite often they will be slightly out of tune, and sometimes they will be considerably so. This can be achieved with a small amount of pitch bend being added on the appropriate notes, as seen to the left.

It takes very little to make a sequenced vocal melody sound more authentic – often just a few notes within the scale need to be made a little sharp or flat to add some 'life' to a performance. However, some singers can be quite a way out of tune, although this is often a part of their appeal; simulating their performances will take more effort.

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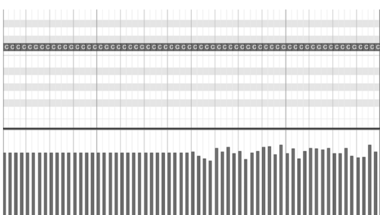
Vibrato is another area which is often overlooked – most singers will add vibrato to longer notes, and simulation of this can be done in two ways, as for the guitar; either use the modulation controller to add some vibrato courtesy of the synthesizer's onboard LFO, or use programmed pitch bend to achieve this, remembering as ever that this technique will give you total control but may generate enough MIDI data to confuse or slow the receiving synth. See the section on guitar sequencing on page 2 for details of this, and remember that listening to the original is the best way to sequence this accurately.

General Techniques

There are a number of programming techniques that can be applied to a wide range of situations, each of them will allow the production of a more realistic sequence, regardless of the instrument/sound in question.

Velocity

The velocity of notes is one of the areas where many programmers fall down. As mentioned above, each performance by a human will contain small differences between notes in terms of volume.

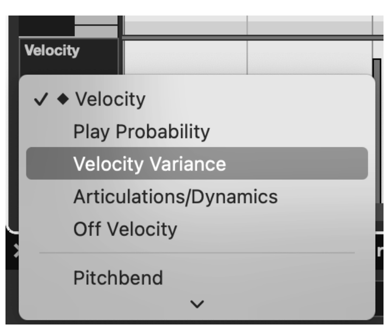


When dealing with MIDI data that has been recorded, these velocity changes will be present, but if the data has been input using an editor then all the notes will be at the same velocity - this can be fixed manually or using the Logical Editor (see page 436) , or with Velocity Variance.

This example shows the difference, and the second section sounds far more natural, having only had this small change applied.

Velocity Variance

Cubase 14 introduced the ability to create Velocity Variance within any MIDI event, allowing Cubase to randomize MIDI Velocities with each performance. This makes creation of realistic-sounding parts much easier than either manual editing or use of the Logical Editor. Velocity Variance is a parameter attached to each note, allowing precise control of this function. To make use of Velocity Variance, select it in the controller lane:



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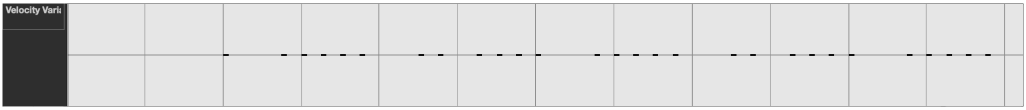
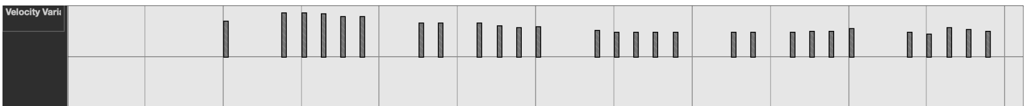
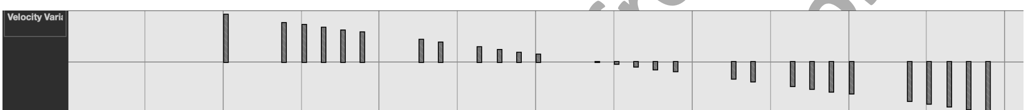
Once selected, the controller lane will change to show the currently-present variance (which initially will be zero):



The central value (the default) means no variance - the programmed velocity of the note will be played back precisely. The variance can be edited in the usual manner, with the pencil...



... or any other editing tool such as the line tool:

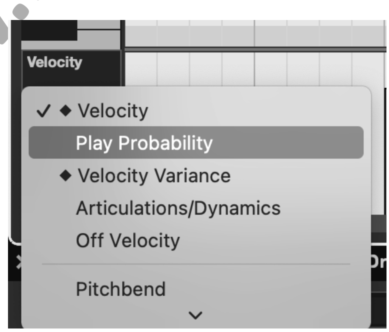


When the value is above the line, then the random amount will be added to the original value (a higher line meaning a greater amount will potentiall be added), and a value below the line will subtract from the original velocity value.

As you may expect, the variance follows the originally-programmed velocity. If the velocity of a note is already 127, there will be no positive variance (as 127 is the upper limit). If a note is already a low velocity and has a large negative variance, it may not play. This is both something to be aware of but also something to take advantage of in some situations (allowing a degree of randomness of the playing of notes). Velocity Variance is available in the Key Editor, Drum Editor and Pattern Editor.

Play Probability

Another introduction in Cubase 14 was Play Probability. This is also a parameter attached to each note, and can be selected in the controller lane:



The default value for a new note is 100% probability (i.e. it will play every time). Reducing this for any note introduces an element of randomness which can make sequences more convincing, and allow generative composition.

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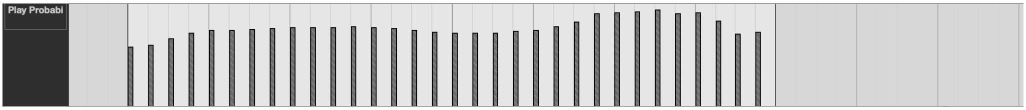
Here the probabilities for a 16th-note part have been edited:

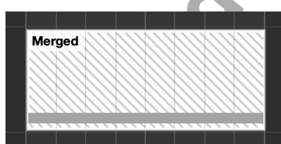


As with velocity variance, play probability is available in the Key, Drum and Pattern editors.

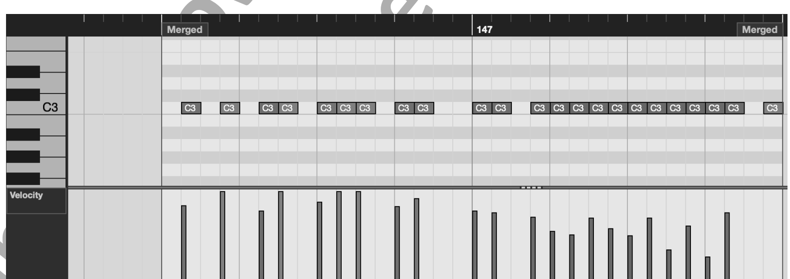
Making Changes Permanent

If you want to ensure that the randomness created by Velocity Variance or Play Probability becomes permanent (and therefore will be the same every time the part is played back), then this can be done firstly by setting the locators around the part in question. Next, solo the track that the part is on (otherwise other MIDI data will be merged as well). Finally, go to `MIDI > Merge MIDI in Loop...` and hit `OK` (none of the options in the window that appears need to be selected).

A new part called `Merged` will appear on top of the original part:



The parts then need to be moved or muted to ensure only the merged part is played back. It is often useful to keep the original part for editing later. Here the 'burnt in' values of Play Probability and Velocity Variance are seen in the resulting merged part:



Note that the velocities display the randomness selected, and that some notes are missing as play probability meant they were unplayed that particular time.

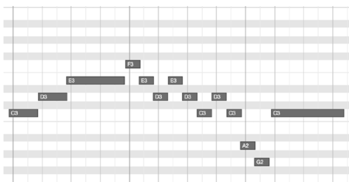
Quantization

Often the most basic form of quantization (moving notes directly to the nearest point on the grid) is adequate when starting sequencing – it is useful to overcome sizeable errors in playing when recording in real-time and for some players the only way to get a usable performance. However, as we develop as listeners and players, we realise that the totally metronomic performance (with each note being played at precisely the right time) can be somewhat lacking in 'feel' – this is the human element in a performance where notes may be played before or after the 'actual' beat, imparting a different rhythmic feel to the part and indeed the whole piece.

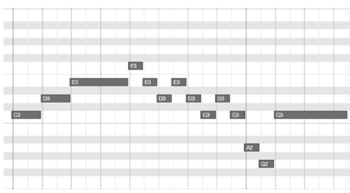
There are a number of ways that this sort of performance can be sequenced. Firstly, it can be done when recording a performer whose playing is accurate enough to have this feel already – many good players will be able to play either 'in front of' or 'behind' the beat, giving the required result.

Soft Quantize

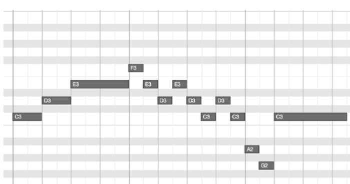
It is possible to have a player who may be too sloppy (with 'too much feel') – manually fixing these issues would be long-winded and tedious, but fortunately there is a way of applying quantize to a performance to make it closer to being in time without removing all traces of the feel that is desirable, and it is called Soft Quantize.



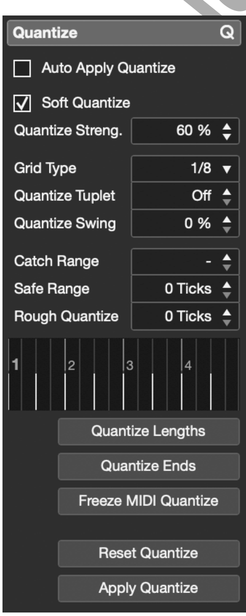
Here we see the original performance – the notes are often in front of the beat, but too much so in some cases. Over-quantizing would destroy the feel of the part, so...



... Soft quantize is used instead. This has moved the notes 50% of the way towards the grid positions they should be at, removing some of the sloppiness. Doing this again will remove more...



... but eventually the notes move close enough for them to be ignored. Each setting (Soft Strength and Safe Range) can be adjusted in the Quantize Setup box, which is in the key editor's Inspector (to the left of the editing area).



Here we see the quantize settings, as seen in the editor inspector in the left zone. To activate Soft Quantize tick the box (here seen as active), and you can adjust the strength (here set to 60%). You can also adjust the `Safe Range` here, which is the range where notes will no longer be quantized; this is useful for retaining some of the feel, and often a setting in the low teens will be adequate. You can now apply Soft Quantize by hitting `Q` or clicking the `Apply Quantize` button which is at the bottom of the section in the inspector. You can reset the quantization you've applied with the `Reset Quantize` button - note that these buttons work for all forms of quantize, not just soft.

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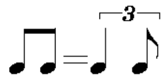
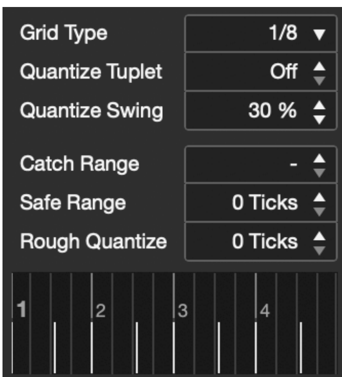
Swing

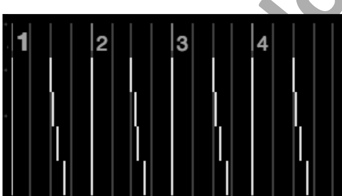
By default, Over Quantize uses a straight grid – i.e. the grid is divided up equally, with every beat or sub-beat having the same length. But this is often not how people play - when most people play an eighth-note part, they tend to add “swing” – this is the tendency for the first note to be a bit longer than the second. When performed to a greater degree, it will often end up being notated as such (hence the familiar sign seen to the right).



It is possible to alter Cubase’s grid to reflect this, making such swung parts quick and easy to create. Adding swing is done in the quantize section of the Inspector, and can be from 0 to 100% and then adjust the swing slider to suit.



Here is the relevant part of the inspector, with 30% swing set - note how the graph at the bottom displays how the swing will alter the grid positions, and you may note that the grid in the key editor also does so.



The diagram to the left shows the difference that swing makes, from 0% through 20%, 50% and finally with 100% at the bottom.

Many parts that do not have an overt swing feel can benefit from small percentages being added here, while some styles (such as swing Jazz) may need up to 50% to give the right feel - experimentation is the key, particularly when you are first using swing. Hit `Apply Quantize` or **Q** to hear the difference, and remember that this technique can be combined with Soft quantize as well.

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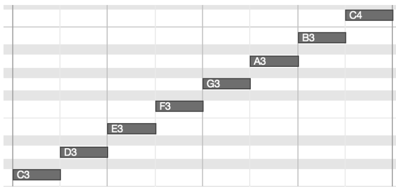
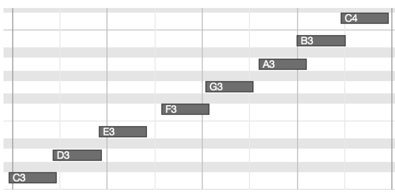
Randomness



If a part has been created using the editor with snap turned on and is therefore completely rigid, it can sometimes be difficult to add any random human feel to it. However, the quantize setup box has another setting we can make use of – Random Quantize.



This adds in a random timing element to each over quantize operation, meaning that each note will be in a random position centred on the quantize grid, with a distance defined by the number of ticks set in the Quantize Setup box, up to a maximum of 48 - as seen to the left.

NOTE that if you leave a random quantize value in there, you may forget and then get odd results later on!

Controllers

MIDI controllers are extremely important when it comes to detailed MIDI programming. As we have seen in some of the specific examples above, controllers such as Modulation can be used to simulate real-world performance techniques such as vibrato, but using other controllers can improve a sequence and also make programming easier to do.

Using Volume / Expression / Velocity

When reading through the MIDI specification it would be possible to see some redundancy – there seem to be three ways of controlling how loud a given note is – Velocity, Volume and Expression. But it is important to realise that they each have a specific task, and correct use of them will improve your sequences and also make them easier to edit.

Volume – Controller 7

Originally called Main Volume (and now correctly called Channel Volume), this sets how loud sounds are on the specified MIDI channel. It is an absolute measure of how loud a sound is, from 0 (off) to 127 (maximum). Nearly all MIDI synthesizers respond to it. While it is possible to send different Volume messages throughout a song, it is not good practice to do so – it is best to just send one Volume message at the beginning of the song (to control the overall level of the channel within the piece) and then use Expression and Velocity to control the rest, as seen below. The reason for this is simple – Expression and Velocity will take care of the dynamics within the piece (i.e. relative changes in volume), so the Volume message should just be sent once to control the overall volume, allowing a change in the mix (i.e. bringing an instrument up or down in volume overall) to be done with just one message, Volume, at the beginning.

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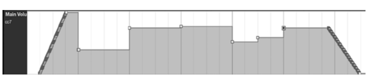
Expression – Controller 11

Expression is best defined as a relative change in volume, from 0 (off) to 127 (maximum). It only works within the range provided by the Volume controller, so if Volume is set very low (say 40) then expression will range from that level at maximum down to nothing at zero. Expression is used for creating dynamics within a performance, such as crescendos, diminuendos and other such directions. As explained above this is to allow the programming of relative settings for dynamics, leaving a single volume message to control the overall level in the mix. It is unfortunate, however, that many current synthesizer plugins do not respond to expression, making changes much harder to perform than before. Conveniently, Cubase has a remedy for this, as we will see next.

Editing controller data in a relative manner

The lack of response of some synthesizers to Expression could mean a real problem, as needing to use Channel Volume leads to the problem above of making it difficult to then set the overall volume and retain the dynamic changes you have programmed in. There are two ways to approach this - editing the data itself, or altering the audio output fader.



Editing the data is straightforward in Cubase. Make sure the controller lane is set to `CC7 (Main Volume)`.

Click in the controller area and then hit **CTRL + A** on the keyboard. All of the controller data will be selected, and it should be highlighted.

You should also see a square "handle" in the middle at the top of the data -  When you hover your mouse over this, it will turn into a downwards-pointing V; clicking and dragging scales the data.

There is something important to remember here though - if you reduce the levels greatly and then increase them again, resolution will be lost as some of the points will have been rounded up or down.

The last example shows how the originally smooth fades in and out have now become visibly (and audibly) stepped. As long as you are careful to avoid this, this method works well.

An alternative method is to use Volume for dynamics, and then using the channel fader (of a VST Instrument / Instrument track) to control the overall level. If you are creating a MIDI file, however, this may lead to overall level issues with your final output file as the channel fader level will not be exported.

Velocity

Velocity is not a controller, it is information that is sent with each and every MIDI note. It is used to provide the note-to-note changes which make a piece sound

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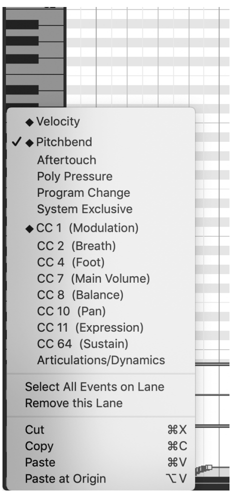
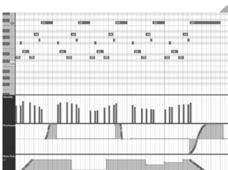
well performed and dynamic, and in the case of some sounds to change timbre as well; most sounds respond to velocity with a change in level but some also change tone. Using this in combination with Expression and Volume allows a complete range of dynamic control to be achieved.

Viewing Multiple Controllers

If you need to read controller information and make sense of it you may need to view multiple controllers at once - for instance, to see the effects of modulation and pitch bend on a part. You will already be familiar with the Key Editor, and the default controller lane (which you have used to view various data), but you can make use of Cubase's ability to show more than one controller lane at a time.



To add another controller lane, **SHIFT-right-click** in the note area and select `Create Controller Lane`, and another will appear. The default is to show note velocities, but the lane can show any controller (plus non-controller data such as pitch bend and velocity). To see the menu of the most common options, click the small black triangle, and the menu shown will appear. Note the most commonly used options are present, but also importantly some of the options have a diamond by them. This shows that this information is present in the current part – here aside from Velocity there is also Pitch Bend and CC1 Modulation. Either of these could be selected individually, but if you want to see the overall picture, you can create another controller lane, and then set one to `Pitch Bend` and one to `Modulation`. This will allow you to see exactly what's going on, as shown below.



Here we can see that the volume is being altered with the Main Volume (bottom track) controller, while some of the notes have pitchbend applied, and we can still see an overview of the note velocities as well for the complete picture.

Without viewing the controller lanes in this way, it can be difficult to keep track of what is happening, particularly if you have two controllers which overlap in terms of their effect on the sound (such as Expression and Main Volume, or pitch bend and modulation).

The most commonly-used controllers are normally available in the pop-up menu for the controller lane, but if you need to add a specific one, then it can be done by picking `Setup Available Controllers...` from the menu where you select the controllers. This will create a new window where you can pick any of the missing controllers.

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Note that the descriptions given for them are from the General MIDI standard (see page 60), so may not always be interpreted in the same way by any given synth, if at all. Viewing the instrument's MIDI implementation or experimentation is a good way to find out, and remember that many allow you to program their response to controllers.

Tempo Mapping

While many sequenced pieces will follow a fixed tempo, live performances seldom do – humans will change tempo subtly throughout a piece, and in some cases quite dramatically; sometimes this is intentional, sometimes not. To successfully sequence a piece such as this requires mapping the tempo of Cubase to the tempo of the audio. Although this process can take some time, it will make work easier in the long run as it will mean that learning/practicing the parts can be done as a straight comparison (playing along with the piece), that the bar numbers of the original and your sequenced versions will tally, and it will be possible as a result of this to use quantization, etc, on the sequence, while still listening to the original audio for comparison. The half hour or so that you use to work to map the tempo out will pay great dividends.

Importing the Original Audio File

This can be done from an audio file that is already on the PC, such as an MP3 or WMA file. To do this, go to `File > Import > Audio File` and find the file you wish to import. Make sure that `Copy to Working Directory` is ticked as we want to work on a copy of the file, not the original – this is always good practice.

If the song is on a CD, then go to `Pool > Import Audio CD` and in the new dialogue box tick the track you wish to import and then click hit `Copy`. Once it has ripped the file to your hard drive, click `OK`.

You should then have the audio file placed on a track in the project, as seen below. Note that in this case there is some silence before the song starts. Also note there is a very definite start to the piece. Listen to your song now, and get an idea for where the song starts, and also what beat it starts on – this may be immediately apparent, or it might take several listens to get right. When first doing this, it's best to start with a song which starts very definitely and does so at the beginning of a bar – any other case makes things more complex which isn't ideal for your first attempt.

Trimming the Audio

The first thing to do is to trim any silence (or any unwanted noise before the song starts) from the audio file. This is done by clicking on the audio part with the arrow tool, and then using the white 'handle' at the bottom left of the part to drag the beginning of the audio part to the correct position. See the example below:

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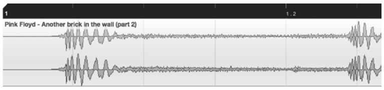
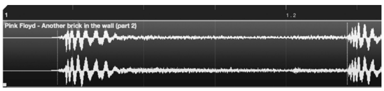
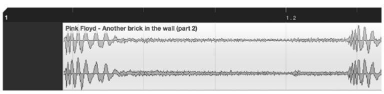


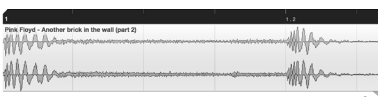
Here we see the original beginning of the song, as imported from CD. There is a brief silence and then the song starts. The first step is to trim the recording to this point. To do this, click on the part and…



... 'handles' will appear - what we're interested in is the little square at the bottom left - this allows the start point to be moved. Make sure that Snap is Off (Hit **J** to toggle it), and then click and drag the handle to the right, and…..



... to the appropriate point. Now you should have an audio part which starts at the right place, precisely on the beat (we are talking in terms of listening at the moment, not the beat as far as Cubase is concerned). Now turn snap on, and move the part to start at Bar 1, Beat 1. This means that Cubase and the song both agree at this point in time….



… and it should look like this. In this process we have aligned only one point of the song – Bar 1, Beat 1.

Next, turn the metronome on (**C**), and listen to the audio and metronome play together. You should hear that the first click (for bar 1 beat 1) happens at the right time, but after that things will probably go a bit awry (unless the song is at, or close to Cubase's default tempo of 120bpm). Turn the click off (**C**), and listen carefully and note where bar 2 starts (in the audio, not Cubase's bar 2). You can usually do this by hitting **SPACE** in time with the music (remember you need to do this where bar 2 will start, not where the last beat of the first bar is; this can take some practice). Now what's needed is to alter the tempo to make Cubase's bar 2 coincide with the song's bar 2. This used to be a case of trial and error, but now there's a much quicker way to do it: The Time Warp Tool.

The Time Warp Tool

PRO

As its name suggests, the time warp tool warps time in Cubase. Well, more precisely, it allows Cubase's tempo to be changed to fit with anything visually. This is done by selecting the time warp tool and then clicking on a bar in the project window's main area (not the ruler) and dragging the bar to the desired location. Once this has been done, Cubase will work out the tempo that is necessary to make that happen, and alter the previous event on the tempo track accordingly. This sounds complex, but in practice it's reasonably simple.

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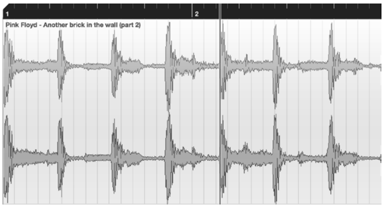
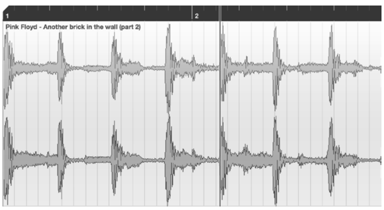
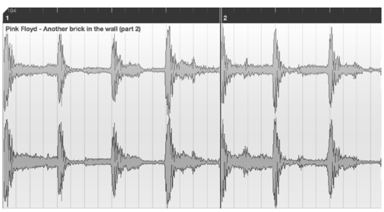


Here we see the original audio from the example above. The vertical play position pointer shows where in the audio Bar 2 actually is (this is found by listening and hitting Stop at the appropriate point). Cubase's bar 2 doesn't align with it correctly - Cubase's tempo needs to be faster.



Once the time warp tool is selected, the ruler turns red. To correct Cubase's tempo, move the tool over Bar 2 on the project (**NOT** on the ruler), and you will see a vertical line appear where you are. You can now **SHIFT + click** and drag Bar 2 to the 'correct' position (i.e. where bar 2 happens in the actual audio).



Here we see the effect of doing that – Bar 2 is now is the correct place, and Cubase's tempo has been altered to make this happen. We have found the tempo of the first bar - turn the click back on and play this back and you should hear that the click is in time.

Now, if our players were super-human, they might stick to precisely the same tempo all the way through the piece. But this is almost unheard-of; the tempo will usually alter throughout the piece – one tempo won't fit everything. So what we have to do is insert new tempo points in the tempo track before things go out of time, and then perform the same time warp action as shown above.

Here we are continuing with the track - Pink Floyd's Another Brick in the Wall, Part 2 - which is clearly being played by musicians of the highest calibre, but also allows us to see where beats are visually, to aid in explanation. From our previous example, the first bar is correct – when bar 2 starts, it's perfectly in time. In our ideal world the song might continue at precisely this tempo for some time without needing alteration.

By the time we reach bar 3, things are wrong, as seen to the left. In fact, all of bar 2 is at the wrong tempo - Cubase is running slower than the audio is. The tempo of Bar 1 is correct, but Bar 2 needs a different tempo to work correctly.

What we need to do is to add a new tempo at Bar 2, which is done using the Time Warp Tool. When you click on the project window without using **SHIFT**, a new tempo will be inserted at the point that you click.

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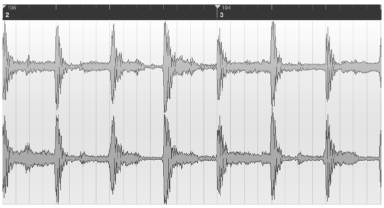
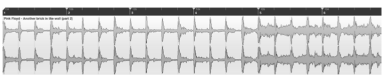
Without moving anything, Bar 2 has been clicked below the ruler using the Time Warp Tool. This means we can now repeat the process we did before, but this time we will be making sure that the beginning of Bar 3 is correct.



Using the procedure on the page before, Bar 3 has been moved to the correct location, and now all of Bar 2 sounds in time.



Repeating this over a number of bars will look like the next diagram, and indeed the entire song can be mapped in this manner.

With this technique, it is a case of listening for a section which is drifting out of time, then going back to check where Cubase was perfectly aligned with the audio, and once you have found that point, inserting a tempo change at that point and then using the time warp tool to re-align the following bars. It can take some time to do this for a song if the performers have changed tempo a lot during the performance, although often you will find that several bars (if not entire sections) maintain a constant tempo. Although these changes can be minimal, mapping them has two effects – firstly, it means you can use Cubase's quantizing features while still listening to the original track in audio form – this means it is far easier to transcribe an original track as you can listen to your version and the original head-to-head. Secondly mapping these tempo changes mimics the original performance perfectly, and often these changes are put in by the performers as a reaction to the material they are performing – some sections are faster, some slower.

Here are the tempo changes for the first few bars of the song - note that the tempo changes a little on almost every bar. They are viewed in the Tempo Editor (**CTRL + T**), which allows you to alter or insert tempo changes as you wish.

You may notice that there is a pattern, with specific sections slowing down or speeding up; there may also be a general progression, such as the tempo speeding up throughout the piece (as happens in Pulp's "Common People"). Such changes in tempo, when applied to your sequenced version, will make for a far more realistic-sounding sequence. In addition, using a tempo map like this is a seldom-used technique for improving your own compositions – for instance, it is possible to record a performance which has been done without reference to a click track (whether the tempo changes are subtle and unintentional, or are pronounced), and then use a similar technique to that above to map out the tempo

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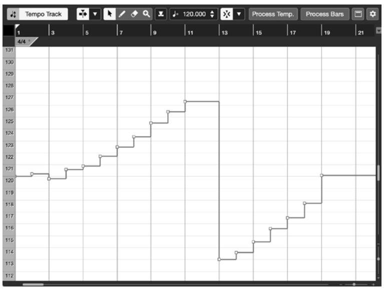
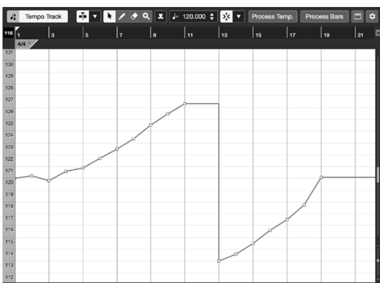
of the MIDI information that has been recorded. It is important when doing this to ensure that the MIDI track is set to Linear Timebase - - this will ensure that the original MIDI performance is unchanged by the changes that are made to the Tempo Track when using the Time Warp tool. With a few minutes' work it is possible to work out the tempo of the piece when played, and this can either be kept wholesale, or a new one programmed, as shown next.



Here we see the original tempo map, which has been created by using the above techniques but on a MIDI part. It is accurate, but there are steps in each bar – usually acceptable, but you may want to smooth things out…



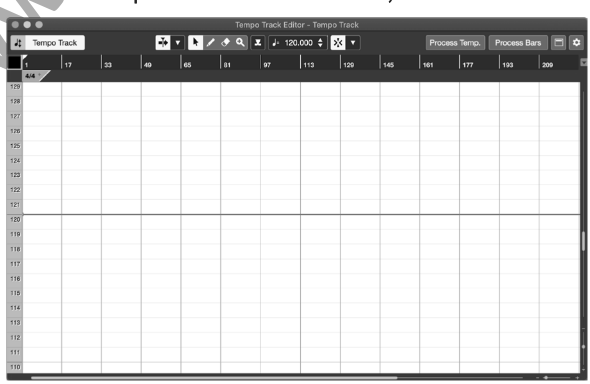
… using ramps instead of steps (changing the **Insert Curve** setting at the top of the editor). This will make for a smoother change, and also facilitate further alterations (changing one point will alter the whole ramp, whereas a group of steps would need to be altered above).

The Tempo Track

The tempo track has already been seen on page 23 - the Time Warp tool allows generation of tempo changes by dragging Cubase's grid. It is, however, capable of more, and we will examine some of these possibilities next.

Changing Tempo

As already seen previously on page 23 it is possible to create tempo changes using the Time Warp tool, usually to allow Cubase's tempo to match the tempo of a recording. It is possible to enter changes directly into the Tempo track, however. The Tempo editor is opened with **CTRL + T**, and looks like this:



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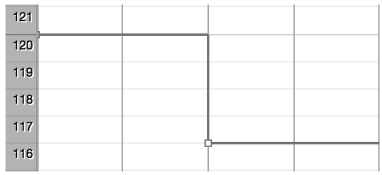
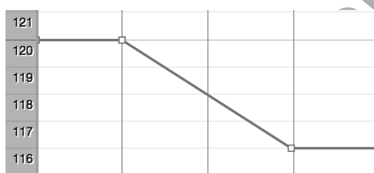
As with other Cubase windows, time runs from left to right. The tempo is represented by a line which shows the current tempo at a given time. Each tempo change is shown as a square. There are two kinds of tempo event - jump and ramp. A jump event will lead to an instantaneous change to the tempo, which will remain at that speed until a new event occurs.



A ramp event will progressively alter tempo from one event to the next, allowing a smooth transition between tempi.



To create a tempo event, pick the type of event you want to insert (Jump or Ramp), and you can insert it in one of two ways - either click and drag on the tempo line, or use the Pencil tool and click wherever you want to insert the tempo. Setting the insert type to automatic will let Cubase insert the same type of events as those already around the location you are putting a new tempo into.

When creating a composition, it is often useful to be able to alter the tempo of sections of a piece, or to introduce gradual changes in tempo, and the tempo track will allow you to do this quickly and easily.

Deleting a Tempo event

To delete a tempo event, you can either select it and hit **Delete** on the keyboard, or use the Eraser tool.

Using Tap Tempo

As seen on page 4, it is possible to enter a tempo using the **Tap** button located on the transport bar. Clicking several times on the Tap button will lead to Cubase inserting a new tempo into the tempo track. If there is nothing selected, then the tempo will be inserted at the current play position. Otherwise the insertion will happen at the start of any selection. The tempo inserted will be a Jump type, regardless of the selection in the Tempo Track Editor.

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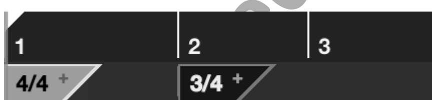
Changing Time Signature

At the top of the tempo track, there is a section where the time signature of the piece can be altered. By default Cubase starts with a single event, a 4 4 at the beginning of the piece.

If you want to change the existing time signature, you can do it by double-clicking on the event, and entering the signature you wish to use.

If you want to change signature during the course of a piece, you will need to use the pencil tool to insert it at the appropriate bar of the piece. Once you have created it, you can enter the signature (which by default will be 4 4).



Deleting a Time Signature

Changes you have made can be deleted either by selecting and pressing **Delete** on the keyboard, or using the Eraser tool. It is not possible to delete the time signature that appears at bar 1.

Transpose

Often, you will want to change the pitch of the notes of a part, and often multiple parts or even an entire track. While you can do this manually by opening the editor and moving the notes up or down, it is often quicker to use Cubase's transpose function. This is accessed via `MIDI > Transpose Setup...` once you have selected the parts you wish to transpose, and you will see the following dialogue box.

It has a number of features, the most important of which is the Semitones box at the top. This is where you set the number of semitones up (positive) or down (negative) you want to transpose the part by. There are 12 semitones in an octave, so applying large transpositions is easily done.

We will look at some examples - firstly, semitone-based transposition. Here Cubase will move the notes by the set amount, with no changes in the relationships between notes being changed. In this example, 2 semitones have been set, so the original melody (which was in C major) will now be in D major. In this mode,

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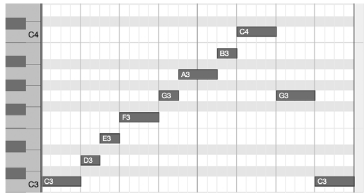
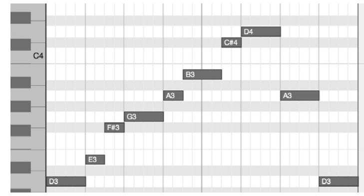
Cubase has no idea what key a part is in, and just moves the notes up or down by the set amount.

Transpose set to 2 semitones



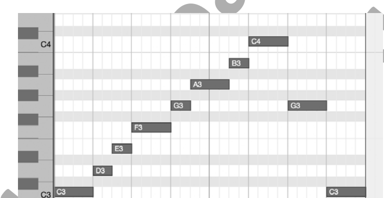
The original melody, in C major



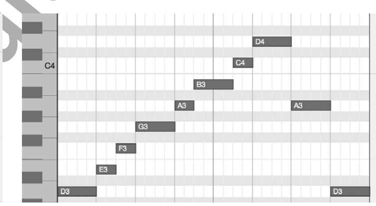
The transposed melody, now in D major

Next, scale-based transposition. By activating the Scale Correction box, it is possible to tell Cubase what key the original part was in, and the desired destination key. With the same 2 semitone transposition applied, we see the different effect of this when trying to keep the new part in the original key (C Major) - notes which previously were ending up being sharp have now been moved to a natural note, but this changes the relationship between some of the notes, and changes its sound.

Scale correction enabled

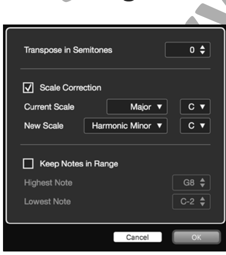


The original melody, in C major

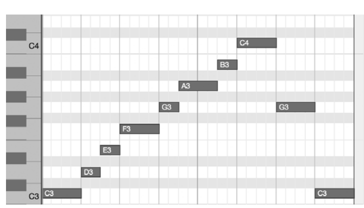


The transposed melody, also in C Major

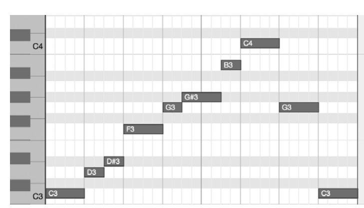
This technique can be extended to use the transpose dialogue box to alter the tonality of a piece. By applying a 0 semitone transposition (so the notes will not change because of a transposition) and then picking a desired key, it is possible to alter the scale that a melody (or chords) are based on. Here the melody has been set to change from Major to harmonic minor.



C Harmonic Minor selected as New Scale



The original melody, in C major



The altered melody, now in C Harmonic Minor

It's important to remember that this setting is applied to the notes in the part in the same way as if you had edited them yourself - the transpose setting is not 're-membered' for each part. If you apply a 2 semitone transposition to a part, and then come back to it and apply a 3 semitone transposition, it will be 5 semitones away from the original pitch, not 3.

This sample represents around half of one chapter of the book, and 29 of the 700+ pages of content in the book.

If you find it useful, please support its creation by buying this book from Amazon.com

https://tinyurl.com/cubase14book

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