



Yamaha CS6x/R Control Synthesizer.

How to set-up an ARPEGGIO so that it will sync to MIDI Clock.

Introduction.

Many CS6x/R users are producing contemporary dance music and the arpeggio is one of the most widely used elements in this scene. Whilst the CS6x/R has a vast array of arpeggios to choose from, it is often difficult to get these recorded 'in-time' with the rest of your song. Ideally, you also want the arpeggio-speed to match the tempo of you song and to follow any tempo changes that you may have programmed in. This is what makes the CS6x/R so good for dance music production. It has the ability to sync the arpeggio to MIDI Clock and output the arpeggio as MIDI data (please see the notes on the limitations of the MIDI Clock time-code reference). This means you can record the arpeggio back into your MIDI sequencer as a sequence of notes like any other MIDI part. This guide will show you how this is achieved and with a little time, effort and patience you too can arpeggiate with the best of them. For the purposes of this guide I will be using Cubase VST as an example. However, the information in these pages can be adapted to run with any sequencer you like.

A little background information on MIDI Clock and the limitations.

MIDI Clock is a time-code reference generated by most sequencers. Basically it is a series of timing markers that are transmitted down the MIDI OUT cable to the MIDI IN of another compatible device. In the example used in this guide, the sequencer is the Master and the CS6x is the Slave. Therefore, any slave device that is set to derive its timing information from an incoming MIDI Clock signal will play at the same tempo as the master device.

The CS6x allows the arpeggiator to be synchronised to this clock and then outputted via the MIDI out port. You can then re-record the arpeggio back into the sequencer on a separate MIDI channel. This also means that the arpeggiator will follow any tempo changes in your song – useful for emulating those 1991 “speedy-up” dance anthems! Theoretically, this can give you unlimited arpeggio's because you can record one into your sequencer, choose a new one, record another one, and so on.

It is not the most stable form of time-code reference and the resolution of the clock is fairly low. The resolution of MIDI Clock is 96 t.p.q.n. (Ticks Per Quarter Note), so for every ¼ of a whole note there are 96 timing markers. The resolution is very low when compared to the more professional reference clocks such as MTC (MIDI Time Code) or SMPTE (Society of Motion Picture & Television Engineers) where frame-to-frame synchronisation is paramount. However, for our purposes MIDI Clock is adequate for the controlling the speed of the arpeggio.

There will also be a delay introduced into the system through using MIDI Clock. Here is the signal path-flow so you can understand why the delay is introduced: -



You will notice that when you compare the recorded arpeggio with the original chords it will be up to 32nd out of time. Hence, you will need to edit the recorded arpeggio and move all notes back to the beginning of the block in the sequencer. You may also find it useful to quantise the MIDI data, but on some complex arpeggios this can destroy the 'feel' or 'groove'. In this case, manually moving each note may be preferred.

You may also notice that the tempo of the arpeggio may fluctuate up and down a little when synchronised to MIDI Clock. This is because the timing markers in the MIDI Clock data stream can get jostled about and moved from where they should be in linear time. This is caused by there being too much MIDI information being squeezed through the MIDI port. The result is that some of the timing pulses are received a little later than they should be.

The best way to overcome this difficulty is to quantise or manually edit the re-recorded arpeggio. If you are using a single repeating pattern then simply re-record one 'good' loop and reproduce it several times on the sequencer. Also, the MIDI Clock might not stabilise until after the first few bars of your song. Therefore, it is not a good idea to use the first 'take' of a re-recorded arpeggio. Instead let the arpeggio record for a while and then choose a section from later on in the re-recorded MIDI part. If you want to adjust the musical key of your looped arpeggio section use the sequencers transpose function.

OK, I understand the limitations so how do I do it?

The principle is simple, but it can be quite confusing, especially if you have a MIDI interface with multiple IN's and OUT's. If you are using a Multi I/O interface, then you really need to be familiar with how it is operated. It's a much simpler procedure if you only have a single I/O interface, such as your soundcards game-port or serial port.

Due to the way that Cubase VST operates, it is not possible to play the arpeggio from the keyboard whilst it is synchronised to MIDI CLOCK, unless the channels are set to ANY. This is because to play the arpeggio through your MIDI sequencer you must have the channel highlighted and THRU turned on. In order to record the arpeggio it must be outputting on a different MIDI channel to that which you are playing on. However, the highlighted track in the sequencer over-rides the output channel settings for the arpeggio. This means that although the arpeggio output MIDI channel may be different to the channel high-lighted in your sequencer, it is changed and causes MIDI choke to occur. This has the effect of cutting off the notes prematurely because the CS6x/R is receiving the same MIDI data twice. To put it simply, the synthesiser gets very confused with the sheer volume of MIDI Note ON's and OFF's being received! If the channels are set to ANY this problem can be avoided. However, if you record and play at the same time it will record the chords you are holding down and the arpeggiated notes onto the same channel, which is less than ideal. So it is best to turn the arpeggio output option OFF, then record the chords into the sequencer. Then set the arpeggio MIDI receive to the channel you recorded the chords on. Set the arpeggio output to a different MIDI channel and highlight this channel in the sequencer. Now press RECORD and PLAY and the arpeggio will be recorded on the output channel. You can now delete the old chords and quantize the arpeggio so that it sits tight.

Instead, you must set the arpeggiator to the INTERNAL clock and match the tempo as close as you can. Now you can play along with your song until you reach a point where you are happy with the progression of the arpeggio.

Let's take it step-by-step.

Okay, so the first step is to connect your CS6x to your computer, load the sequencer on your choice and make sure that everything is communicating. Please refer to your CS6x manual for details on how to connect the CS6x to your computer-based sequencer. For the duration of this guide I will be using Cubase VST as an example.

Now we should FACTORY RESET the synthesiser. This will ensure that we are starting from the same position by resetting all parameters to their default values. Before we start you should ensure that you have stored and backed up your user data. Saving ALL DATA to your SmartMedia card will usually suffice, but if your work is very important you should make several backups in different locations. This can be accomplished by performing a Bulk Dump to your sequencer or using the CS6x Editor in XGWorks v3. Please see your owner's manual and software manual for details on these procedures.

➤ **Setting up Cubase VST.**

1. Load Cubase VST and go to OPTIONS > MIDI SETUP. Here you need to make sure that MIDI THRU is ACTIVE and that the THRU OFF CHANNEL is set to OFF. You must also ensure that the MIDI IN is active in INPUTS section. Exit the menu by clicking the OK button.
2. In the OPTIONS > MIDI FILTER section make sure that you're not filtering out NOTE ON messages. If you want to be extra sure that all MIDI data is getting THRU and being RECORDED, then do not tick anything on this page. Also make sure that none of the CHANNEL buttons are depressed. Exit the menu by clicking the OK button.
3. In the OPTIONS > SYNCHRONISATION section, for the MIDI CLOCK option make sure you have selected the MIDI OUT which is connected to the MIDI IN of the CS6x/R. This is to ensure that the CS6x/R is receiving MIDI CLOCK information from Cubase. Otherwise there will be no time-code reference for the arpeggiator to 'lock-up' to. Exit the menu by clicking the OK button.
4. It is best to set aside two tracks for composing the arpeggio in your song. Use one track for recording or programming your chords, namely MIDI channel 1. Use MIDI channel 2 for re-recording the actual arpeggiated notes back into the sequencer.

➤ **Initialising the CS6x/R.**

1. Perform a FACTORY RESET so that we are at the same starting point. You may wish to back-up your user data to the SmartMedia before hand. Please see the Owner's Manual for details on saving or backing-up your data. To execute the FACTORY RESET, hold down the VOICE, PERFORMANCE and STORE buttons when turning the power ON for about 5 seconds. On the menu that appears press the CARD button. The CS6x/R will display the message "**TE26: Factory Reset OK**" and then re-boot automatically.
2. Press the PERFORMANCE button followed by the EXT button and then the ENTER key. Choose an unused performance using the DATA knob, e.g. Performance 001 A01.
3. Now, we need to INITIALISE the performance so that we are at the same starting position. You can do this by pressing the JOB button in PERFORMANCE mode and choosing "**PFM INITIALISE**". Make sure the type of initialise is set to "**CURRENT PERFORM**" and press the ENTER button followed by the YES button. Press the EXIT button to exit from the JOB mode. The selected performance should now read "**001 A01 [--: Init Perf]**".

➤ **Configuring the Arpeggiator settings.**

Now, we will have completely initialised the CS6x/R and have initialised the performance. Each part will already be set to receive on a different channel and will have the Grand Piano voice selected. This is how it will look:

Part 01 → Midi Receive **Channel 1**, Grand Piano.

Part 02 → Midi Receive **Channel 2**, Grand Piano.

Part 03 → Midi Receive **Channel 3**, Grand Piano.

↓ ↓ ↓ ↓
Part 15 → Midi Receive **Channel 15**, Grand Piano.

Part 16 → Midi Receive **Channel 16**, Grand Piano.

First you will need to turn off the keyboard and stop it from triggering the internal sounds. This is known as the LOCAL On/Off switch.

1. Press the PERFORM button followed by the UTILITY button.
2. Turn the PAGE knob until it reads "**MIDI Ch**" in the top-left hand corner. You will see the LOCAL parameter on the page.
3. Using Knob 1, change the LOCAL parameter so that it reads "**OFF**".

Whilst we are still in the PERFORM > UTILITY menu, there is one other setting that needs adjustment. We need to set the MIDI OUT channel that the arpeggiator will be transmitted on.

1. Whilst you are still in PERFORM > UTILITY mode, turn the PAGE knob one notch to the right, or until the screen displays "**MIDI Arp**" in the top-left hand corner.
2. There are two parameters here called the "**Out (Vce)**" and "**Ch (Vce)**". The "**Out (Vce)**" parameter determines whether the arpeggio data will be outputted or not. The "**Ch (Vce)**" parameter determines the MIDI channel that the arpeggiator will respond to.
3. Using Knob 1, change the "**Out (Vce)**" parameter so that it is set to ON and set the "**Ch (Vce)**" parameter so that it is set to channel 1.

The PERFORM > UTILITY page is also where we set the MIDI Clock settings. We need to instruct the CS6x/R to determine the arpeggiator tempo from an incoming MIDI Clock signal.

1. Whilst you are still in PERFORM > UTILITY mode, turn the PAGE knob two notches to the right, or until the screen displays "**MIDI Other**" in the top-left hand corner.
2. Using Knob 1, change the "**Sync**" parameter so that it is set to MIDI.
3. Once these settings have been made, press the PERFORM button to return to PERFORMANCE mode.

Now, what we need to do is configure the COMMON arpeggiator settings for the performance. Please be aware that you can have one arpeggiator type per performance, but you can assign multiple PARTS to the same arpeggiator pattern.

1. Press PERFORM and then EDIT.
2. Turn the PAGE knob left to ensure that the screen reads "**MIX Vce**" and "**Part nn**" (where **nn** is the part number between 01 and 16) in the top-left hand corner.
3. Turn PART/ELEMENT Knob A left so that the screen reads "**GEN Name**" and "**Common**" in the top-left hand corner.

4. Turn the PAGE knob one notch to the right so that the screen reads **"GEN Midi"** in the top-left hand corner. Here you will see the **"ArpOut"** parameter, which must also be set to ON if the arpeggio data is to be transmitted via the MIDI OUT port. *Do you remember discussing the choking problem earlier in this guide?* Well, this is the parameter that is most likely to cause this problem. If you ever have a MIDI choke problem, changing this parameter to OFF will usually solve it.
5. Using the PAGE knob, turn in to the right until you reach a screen named **"ARP Type"**. You should notice here that the Tempo is now set to MIDI, which is due to the **"Sync"** setting we changed in the PERFORM > UTILITY page. You can also change the arpeggiator type on this screen, but for now leave it as **"UpOct1:Sq"**.
6. Use Knob 1 to change the **"Switch"** setting to ON (or press the dedicated Arpeggiator On/Off button). Leave the **"Hold"** parameter set to OFF.
7. That's it for the COMMON area. You may need to come back here to change the **"ArpOut"** setting later on, especially if you want to record you notes into the sequencer rather than program them in. So it is a good idea to make a note of how to get back here.

Now we need to make some final adjustments in the actual Part that we want the arpeggiator running on. But first, *do you remember discussing that it is a good idea to keep channels 1 and 2 in Cubase for composing and re-recording your arpeggios?* Likewise, it is also a good idea to keep Part 1 and Part 2 spare for arpeggio generation. By doing this you help to keep things simple for yourself and retain continuity between the CS6x/R and the sequencing package.

1. Whilst still in PERFORM > EDIT mode, turn the PART/ELEMENT Knob A to the right until the screen read PART01. Now we will choose a nice sound for the arpeggiator on selected part.
2. Using Knob B, change the **"Memory"** parameter to INT. Using Knob C, change the voice number to **"106(G10)[Sq:Navigator]"**.
3. Turn the PAGE knob to the right until it displays **"LYR Mode"** in the top-left hand corner. Change the **"ARP"** setting to ON. Also make sure the **"Layer"** option is set to ON as this determines the PART which the arpeggiator will affect.

You may notice that the arpeggiator still is not playing when you hold down the keys. This is because the CS6x/R will not be receiving MIDI Clock until the sequencer is playing. Press PLAY on Cubase and hold down a chord on the CS6x. You should hear the arpeggio start but then choke itself off! This is the problem I was illustrating early on in this guide. To stop this from happening return to the COMMON > **"Gen MIDI"** page and turn the **"ArpOut"** setting to OFF.

Now, when Cubase is playing and you are holding down a chord on the CS6x, the arpeggiator will play along quite happily. You can even get the arpeggiator to follow tempo changes in the song. Try changing the tempo that the song is playing at and you will that the arpeggiator plays at the same speed as well!

So far, so good...but let's get to the point of this whole exercise. We are going to record a few chords into Cubase on channel 1, then have the CS6x output the arpeggio onto channel 2 and re-record it back into Cubase.

Highlight channel 1 in Cubase and record some chords from the keyboard of the CS6x. This should be easy enough. If you are using a CS6R you can record the notes in from a controller keyboard or simply program in some chords into the PIANO ROLL editor. I have inputted a C

major chord over a 4 bar period. You may want to tidy up the recorded sequencer and quantise the chords for maximum effect. Once you have recorded the chords, you can play the sequencer and it will happily play the arpeggio back from the CS6x, using the chords as the basis. *But what if you want to free up the arpeggiator to use on a different part?*

1. Using the PART/ELEMENT Knob A, go back to the COMMON > "Gen MIDI" page and change the "ArpOut" setting to ON.
2. Highlight channel 2 in Cubase, make sure that LOOP is not activated and hit RECORD and PLAY. You will notice that the MIDI OUT and MIDI IN lights are flashing. This is a strong indication that the arpeggio data is being output from the CS6x/R; which is good news. Also, you will hear the Grand Piano voice on Part 02 being played as the arpeggio notes coming from the CS6x/R go into Cubase on channel 2 and then THRU to Part 02 of the Performance. You can stop this by turning the MIDI RECEIVE for Part 02 to OFF, but it is not necessary at this stage.
3. When it has finished press the STOP button and you will see a block on the screen. Double-click on the block and inside you will see all the individual notes generated by the arpeggiator.
4. It is likely that the arpeggiated notes will not start exactly at the beginning of the block. This is due to a latency introduced in the path of the signal as it passes out from the computer, into the CS6x/R, through and back out to the computer again. (Please see the diagram at the beginning of this document for details.)
5. To correct the latency problem, highlight all the notes (or use EDIT > SELECT > SELECT ALL to do this for you), grab them with the mouse pointer and move them to the beginning of the block. Do not be tempted to use Quantise to do this for you yet and it will either totally destroy the feel or give inaccurate results. It is far better to move all the notes manually at this stage, therefore retaining the groove.
6. Proceed to QUANTISE the newly recorded arpeggio and perform any manual alterations you desire. You may feel the need to experiment with the quantise function as it may not give you the desired results the first time around.
7. Once you are happy with the newly recorded arpeggio, move it to another track in Cubase (other than 1 or 2) and change the Voice on the related Part on the CS6x to suit your needs.

And there we have it! Voilà...done to a turn.

If you have any questions about this guide, or if you simply want to thank me for ruining your social life, then get in touch with me at Yamaha Technical Support on 0870 4445575.

Happy arpeggiating.