USER'S MANUAL

BRASS | 2.0

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Thank you for purchasing ARTURIA BRASS 2!

In this package you will find:

- a CD-ROM containing the BRASS 2 installer for MAC OSX and Windows 7/Vista/XP/2000
- a paper manual for BRASS 2
- the Authorization Card below

Keep this card in a safe place!

We recommend that you register your product. By registering, you identify yourself as the legitimate owner and will be sure to receive the latest news and updates for your product. After registration, you will receive a user ID and password in order to access a protected area on our site. It also puts you on our user notification list, so that you can be the first to know when there are updates or new product offers.

BRASS: go beyond sampling

There is nothing original in noticing that the center of musical creation has switched to the computer platform during the last decades. The evolution of composition modes associated with software sequencers and hard disk recordings, along with virtual instruments and effects, have undeniably had an impact on the nature of musical creation. The musical genres particularly suited for computer creation, those using loops or electronic sounds and processing, have seen a large and significant growth.

In this context, the contemporary musician that searches to integrate a brass section into a musical piece has a choice: either hire a performer that can play his piece in a studio, or find an electronic means that simulates a brass piece at low cost. This being said, the two choices are not exclusive; a composer might wish to program a brass part individually as a preview before recording a real performer for the final version of the song.

In any case, a composer that constructs the basics of his work on a computer and wishes to program individual instrument parts, such as a solo trumpet or a section of saxophones, is always looking for new ways to express himself.

The first possibility offered to him is the use of a sampler. With such a tool, musicians can easily perform the recorded sound of each instrument on their keyboard. Unfortunately, this simplicity often has a price: a certain lack of expression, flexibility and instrument control. Once the performance is captured within the individual sample, it's difficult to modify the performance into something resembling a live player. The search to find the right sample can also be long and tiresome, which often does not match the productivity criteria set by the music industry today.

For a composer the second method consists of introducing a complete loop/cycle in the composition; that is to say a small, previously recorded musical phrase that guarantees an expression and interpretation closer to reality. Unfortunately, the downside of the loop is that we cannot modify the content, articulations, tone, or the mood, which strongly limits the musical usefulness of the recorded phrase.

Beyond sampling and loop playback, there is yet another solution – physical modeling. Particularly through research done at Stanford University (USA) and IRCAM (France), the concept came forth to emulate acoustic musical instruments with mathematics – and created a new path of musical exploration. The third method is, by far, the most promising since it allows the composer to recreate the performance of an acoustic instrument with all its finesse, while working within an interface that is familiar. Thus, in the case of physical models, keyboard control permits a level of expression that samplers don't offer. In this way, the composer once again becomes the interpreter, escaping the trap of limiting technology, and is allowed to once again focus on the creation of expressive music.

Of course, let's not pretend physical models are the Holy Grail of music, offering the exact same quality and expressivity as a live performance. The musician maintains a strong advantage since the player defines what the results must be with the instrument as they are performing. However, the path established by IRCAM opens a new generation of physical models, based on the technology called "Non linear multiple feedback loop",

giving a promising new choice. It permits us to access a solution that goes beyond the samplers and loop libraries, and in many ways surpasses previous physical modeling approaches. Arturia has created BRASS as the first incarnation of this next generation of physically modeled musical instruments.

The goal of BRASS is to offer new possibilities, placing the composer in the perspective of the musician. The software is built around two major components: LIVE mode that allows a musician to create full, expressive performances in real time, and RIFF mode that offers a multitude of pre-written, yet easily modifiable loops that leave audio loop libraries behind.

While it offers much more than sample playback and flat looping systems, the core modes of BRASS don't ask you to radically modify your manner of working. As an extension, with the usage of adapted controllers such as a breath controller and with practice and understanding of the behavior of the underlying models, you can realize the full measure of possibilities that BRASS offers. A physical model is in a way a living instrument, much like their acoustic counterparts – it will become more responsive with practice. But don't worry; this will always be infinitely faster than the mastery of the real instrument.

We hope that you find a lot of pleasure in playing and composing with BRASS software. It is based on years of research and development, and we wanted to present a device easily understood that's ready for you to use right now. Enjoy your new musical instrument, and let us know what you think. We're always looking and listening for new ways to connect musicians with cutting-edge technologies, and your input is important to us.

Don't hesitate to give us your feedback by emailing us at info@arturia.com – or by selecting an option from the Contact page on our website at: http://www.arturia.com

Musically yours,

The Arturia and IRCAM development team

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1 INTRODUCTION: ARRANGING FOR BRASS 2

Brass instruments are used in a great many music styles – sometimes discretely and sometimes taking center-stage. To know which moment is best to insert a brass section, musically and creatively speaking, is often the work of a brass arrangement specialist. But what do you do if you are not a "brass arrangement specialist"?

First of all, listen to and emulate other songs of your chosen genre. Basing your arrangement on the approach of a known work is a well-worn tradition in many musical styles. Also, be creative. Don't think that brass is limited merely to the styles of music where we are accustomed to hearing them. Used appropriately, brass can give a hot, lively touch to your piece regardless of whether your style of music fits neatly into a pre-defined category or not.

Next, determine what role you want to give to your brass section. You can use it as accompaniment, marking transitions or strong moments in the piece (where it serves as a response to a melodic line with singing, for example). A brass section can be used to create melodic phrases for introductions, as the principal themes of a piece, or even to be played along side with other instruments. Lighter arrangements (arrangements less present in the mix) can also serve as the counter melody or harmonic reinforcement. A single instrument can be used occasionally to punctuate a melody and, more than that, as an instrumental solo in a transition or bridge.

Finally, consider the arrangement itself. Don't try to overload it or do too much. A simple, expressive horn line can be highly effective. Appreciate the work of harmony and chords that form the notes between the different instruments, don't settle by simply playing all the instruments in unison. With all the parameters that BRASS 2 offers, work on expression in your arrangements: profit from real time playing parameters such as the attack, pressure, tone, vibrato, etc. A true instrumentalist naturally adjusts his playing approach; that is what brings music to life.

Along those lines, think about the idiosyncrasies of an instrumentalist or of several players together. For example, if all notes are precisely fixed using quantization, the brass sections will sound a bit too "clean" because even the best of musicians play with a certain shift in sound between them; this is what makes a brass section living and allows us to perceive the subtle differences between the attack of each instrument. This observation is true for all styles of music, to varying degrees, according to extensive research regarding precision in performance and tempo variations. Below we have, for the some general styles of music, some very general suggestions on using BRASS 2 to create quality arrangements.

1.1 Pop/Rock

In general, the horn line is used to accentuate certain strong passages of the piece (crescendo, transitions, etc.) Look for passages in you piece that can be accentuated, the places that "miss something", to give them the dimension of power and change that you're looking for. Brief and efficient riffs will be the easiest to insert into your song. Sometimes a single, well-placed chord is enough. Until very confident with this genre, avoid mixing the horn line with singing portions; instead, alternate them to fill empty

spaces. You might do this with the melody for example. If you do put the different portions together at the same time, it can be specifically for a passage that requires a particular impact. Also, consider that many rock and pop songs use keyboards, organs, and synth pads to fill in chords during certain passages. A horn line can work with these instruments, or can replace them. Just be careful that "human" phrasing is used, as a synth pad can be held much longer than a note from a brass instrument, and careful attention to phrasing is required if a synth effect is to be avoided. There are countless examples of bands that use horn lines effectively. Of course, the band Chicago stands out as a Classic Rock group that used the horn line as their center-piece, and of course Bruce Springsteen's work with the E-Street Band. But there are also many, many current rock groups and artists that use brass effectively in their work: Morphine, Cake, No Doubt, Mighty Mighty Bosstones, Sublime, and Beck are all fine examples, with many others that you will hear on the radio or see on television nearly every day.

1.2 Reggae

Brass sounds in this genre are well established – even fundamental, and we can usually distinguish the different instruments in the arrangement. The phrasing has the role of accompaniment to the melody, but is also found very often in refrains guiding the melodic line. Horns can also serve as a rhythmic complement from a harmonic base. Reggae is a style that permits a large amount of creativity and liberty for the usage of BRASS 2. It is, therefore, natural that you can begin to integrate the riffs and different parts of brass very early in the creation of a piece. Begin by determining what different roles it is going to play throughout the arrangement, and then by selecting or creating the riffs and phrases so that each instrument is discernable in the mix. However, in the relatively open arrangements of Reggae music, horn lines do not need to have a very high sound volume to be correctly mixed and heard. Of course, the most important part of the reggae horn line is how it interacts with the "riddim". Just about any reggae song with a horn line will provide a general sense of the genre, but some obvious discography choices would be anything from either of the Marley brothers or Burning Spear.

1.3 Dance/Funk

Brass instruments are very important in this style. It brings the bright, festive, energetic, and rhythmic touch that these styles demand. The spread of dynamics are important and play an integral part of an effective arrangement. Therefore, the level of expression in your instruments, particularly the attack, will require a great deal of focus. Elaborate harmonic portions with two trumpets, one saxophone and trombone, for example. Sometimes, two trumpets are enough to create parts at octaves, fifths or even thirds… Experiment several ways to harmonize. It takes a bit of time, but in general the results should contain harmonic richness that will get the audience moving. Sometimes effects such as a "fall", "swell", or "up" techniques are sufficient to launch the piece into a creative intro. Some well-placed short "hits" also enrich the piece in a simple, yet efficient way. Again, there are many good examples for these genres, but as a start, consider the amazing horn lines from James Brown or Tower of Power, and for classic dance tracks there's no better example than Earth, Wind and Fire.

1.4 Jazz

No other style of music explored the different playing palettes as much as jazz. For this reason, it is a bit difficult to describe a certain way to use any horn in jazz because it is so varied and uses a bit of everything. We can describe, however, several very general configurations. Large sections, called "Big Band" sections, are found in many configurations. Arrangements of this type of formation are fairly complex, more so on the

level of rhythm than melody. There are many examples of this – Benny Goodman and Glenn Miller, even today the Brian Setzer orchestra makes good use of horns in a big band setting.

In smaller sections there are fewer instruments, of course, and often a wider harmonic selection is explored. With the smaller sections, we can use BRASS 2 with harmonized trumpet, saxophone, and trombone to create a tight ensemble. Consider any of the Blue Note recordings of smaller jazz ensembles for ideas on this approach. McCoy Tyner's "A Search for Peace" and Herbie Hancock's "On Green Dolphin Street" are prime examples.

In solo, jazz has always given a large place to brass players. There are a number of legendary soloists who have changed history with their instruments. To reproduce all the finesse and nuance of these musicians seems daunting, but nonetheless, you can reproduce a quite a number of solo playing modes with BRASS 2. To elaborate your brass performance in a jazz style, begin by deciding on the focus of a single instrument. A complex portion with several instruments would probably be a bit too long and really difficult to arrange, given that you have to take the parameters of expression for each instrument into consideration to obtain a good sound; this is, after all, what happens in reality with the true musicians in brass sections who play each of their instruments with unique expression. The sound palette in Jazz is vast. Phrasing is often played with a subtle combination of legato and detached notes, while alternating styles or punctuating the notes that follow. Expression is also carried by the variations in the pressure sent to the instrument, so much so that the note can sometimes be inaudible for one fraction of a second or might finish in a rapid decrescendo. Consider the trumpet work of Miles Davis or Wynton Marsalis, the sax performances of Stan Getz or Wayne Shorter, or the trombone solos of JJ Johnson or Bill Watrous. There is a vast array of virtuosos to draw from.

1.5 Classical

Using Brass in this style is centered mostly around the trumpet and trombone, with seldom an entry for the saxophone. The sound can be very different in function of the usage: either in sections or solos. For example, using trumpets in a section can give a majestic aspect to the piece; the sound will be straightforward and have easily discernable attacks. In this style of arrangement, take care not to synchronize the different trumpets too precisely in order to give the ensemble a realistic effect; even in classical arrangements there needs to be a space between the notes played. For the part of trumpet soloists, use a more subdued sound with well-controlled attacks. Play while alternating between detached and linked notes to give lightness to the playing style. For a sequence of fast notes, put the accents on the "key notes", or on the notes a bit higher than the others, such that the musician has to "search for it". Any of the classical solo works from Wynton Marsalis will present a clear image of this approach.

1.6 Fanfare/Military

These styles of music use brass in a powerful and commanding way. Expression in the playing technique is not the principal element: the ensemble needs to be coherent with a good level of synchronization. The sounds are very strong and the attacks are direct. Most of the notes should be attacked without legato in order to give the phrasing a powerful and detached aspect. The harmonies are simple in general; there are unisons or often fifth intervals based from the beginning in order to hear several instruments playing simultaneously. To create an interesting ensemble effect, think about the effect of multiplication of BRASS 2 instruments; this quickly gives an impression of playing a

section to the ensemble. Make the principal attacks vary, with pressure and tone usually raised even on the notes which have a weak attack. Aaron Copland's "Fanfare for the Common Man" has a fair combination of separated and slurred phrasing that illustrates both extremes for this sub-genre. Also, Respighi's "Pines of Rome" has very strong trumpet and trombone parts in the section "Appian Way". Many modern film scores also use brass in this manner. One should not be required to venture too far to find an example worth study and emulation.

This is only "the tip of the iceberg". The most important thing is to listen, learn, and most of all – create.

2 INSTALLATION

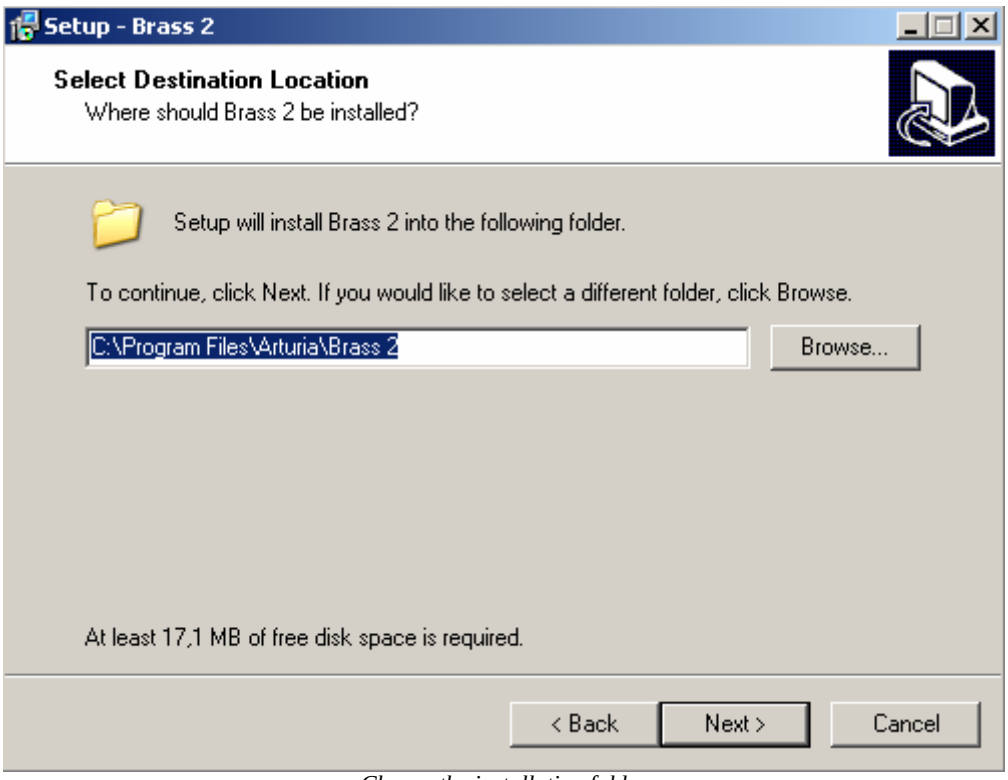
2.1 WINDOWS installation (2000, XP, Vista, 7)

Insert the CD-ROM into the drive. Explore the contents of the CD-ROM, double click on the icon named **`Brass 2 Setup.exe`**.

At the first step of the installation, choose the destination folder for the BRASS 2 installation. By default, it will be installed in this location:

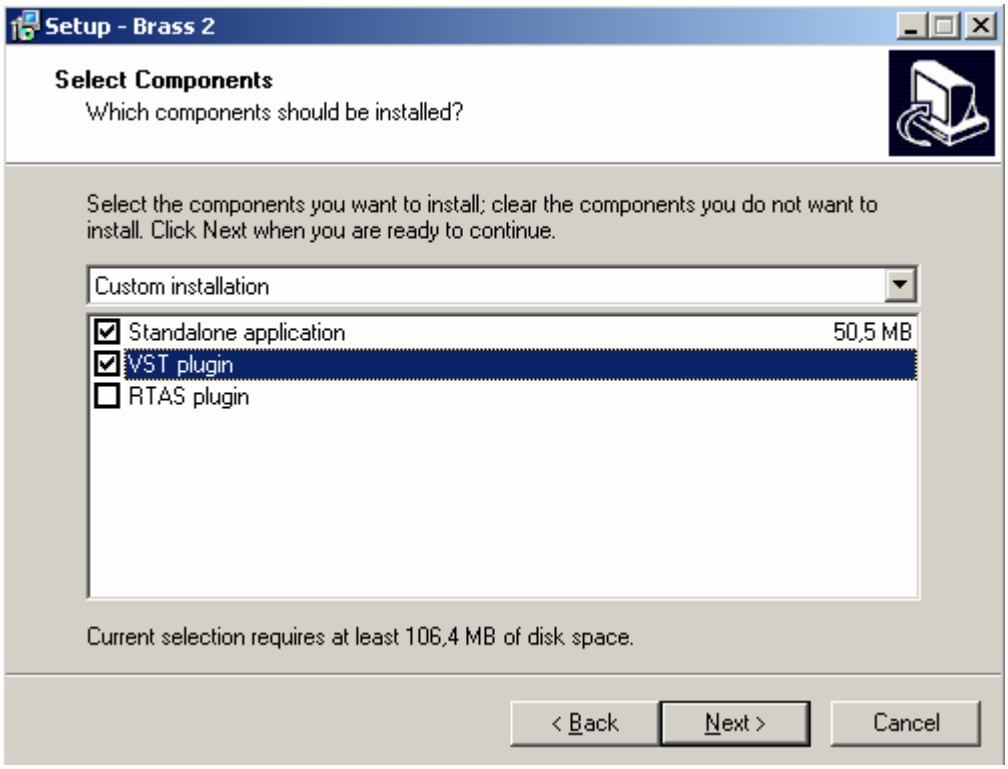
`C:\Program Files\Arturia\Brass 2`

You can change the destination with the Browse button.



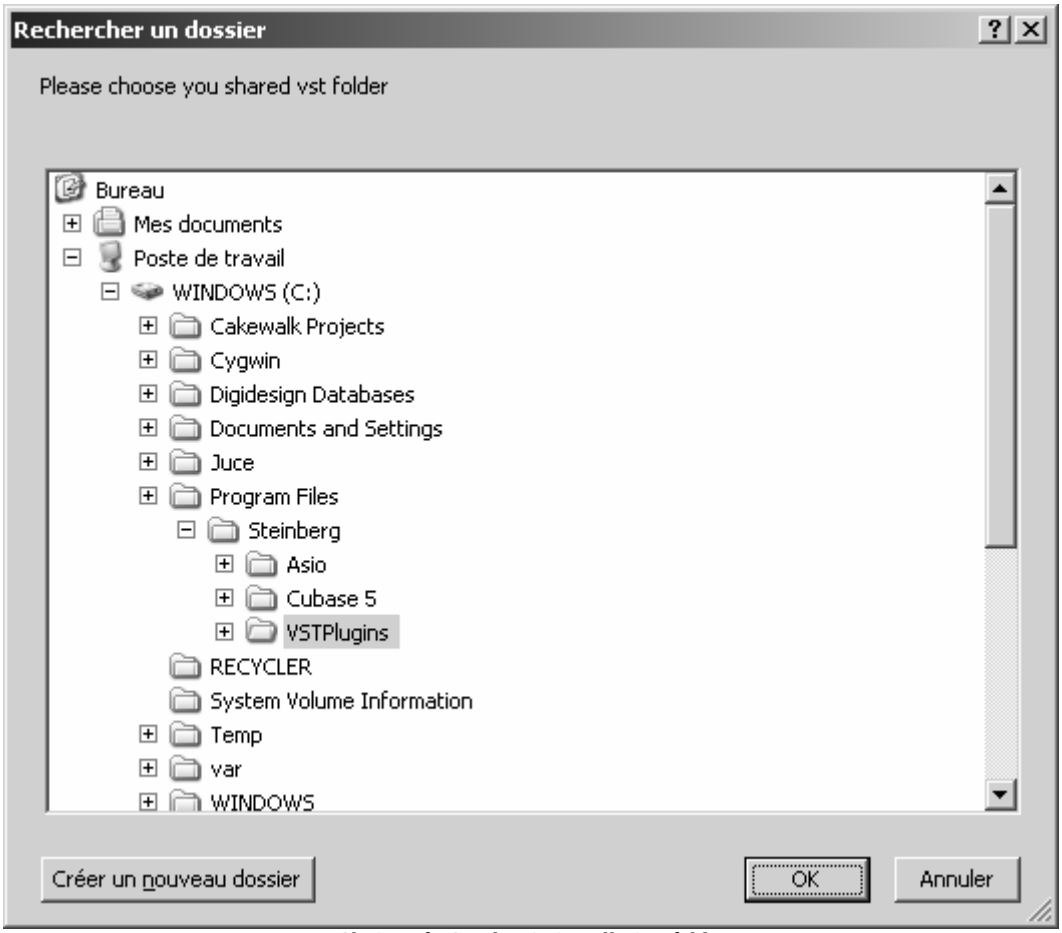
Choose the installation folder

BRASS 2 will be installed as a standalone application. The following stage will let you choose to install BRASS 2 as a plug-in. To do this, choose the protocol(s) that you wish to use (VST or RTAS). For more information on these protocols, go to Chapter 7.



Choice of protocols

For the VST protocol, you must choose an installation folder in order for the host application to use BRASS 2 as a plug-in. If you do not know how to make this choice, go to Chapter 7.



Choice of VST plug-in installation folder

The installation program now has enough information to complete the installation. When the installation process is completed, please proceed to the authorization step (Chapter 3).

2.2 MAC OS X installation

Insert the CD-ROM into the drive. Explore the content of the CD-ROM, then double click on the icon named "Brass 2 Setup Mac".

Follow these steps:

1. read and accept the End User License Agreement,

2. select a destination.

When prompted, enter the administrator name and password of your computer in the authentication window.

Authentication window

BRASS 2 will next be installed as a standalone application, but also as VST, AU and RTAS plug-ins.

The installation program now has enough information to complete the installation. When the installation process is completed, please proceed to the authorization step (Chapter 3).

3 AUTHORIZATION

Now that your BRASS 2 has been installed, you have to authorize the synthesizer.

This doesn't apply to owners of the previous 1.x versions, who may use the software immediately by using their USB-eLicenser hardware dongle.

Contrary to 1.x versions that used the USB-eLicenser protection scheme, BRASS 2 uses the "Soft-eLicenser" virtual dongle solution by default. Avoiding the use of a USB port, this system allows using the synthesizer on one machine which must be connected to the Internet during the authorization process.

To transfer your license on another computer, or simply use BRASS 2 on several computers (one instance at a time), you will need:

_ to use one USB-eLicenser hardware dongle (sold separately, also used by many other software editors);

_ in the eLicenser Control Center, to drag-and-drop your license from Soft-eLicenser to USB-eLicenser.

This transfer, requiring a valid Internet connection, can be done both ways:

_ from Soft-eLicenser to USB-eLicenser;

_ from USB-eLicenser to Soft-eLicenser.

Please check the eLicenser documentation installed on your computer for any further technical detail.

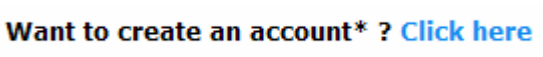
The first step is to register your software in order to obtain the activation code that will enable you to actually use the software.

You should have handy the license serial number of BRASS 2 and the unlock code (these are an integral part of the software and are printed on a small plastic card)

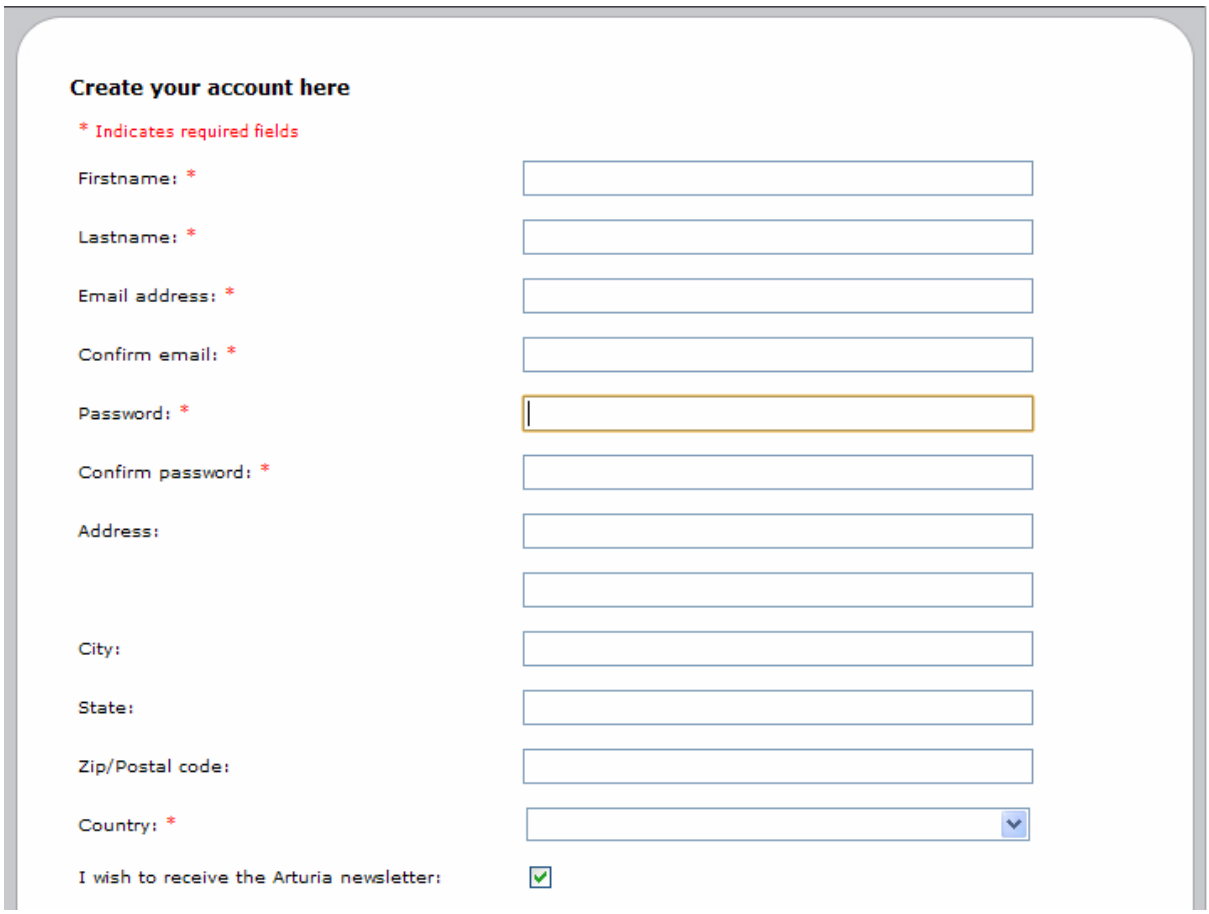
Connect your computer to the Internet, and go to this web page:

http://www.arturia.com/login

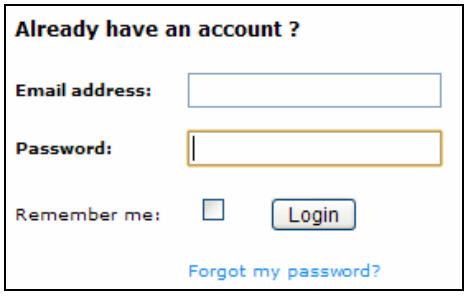
If you don't have an Arturia account yet, please create one now:



This will send you to this form:



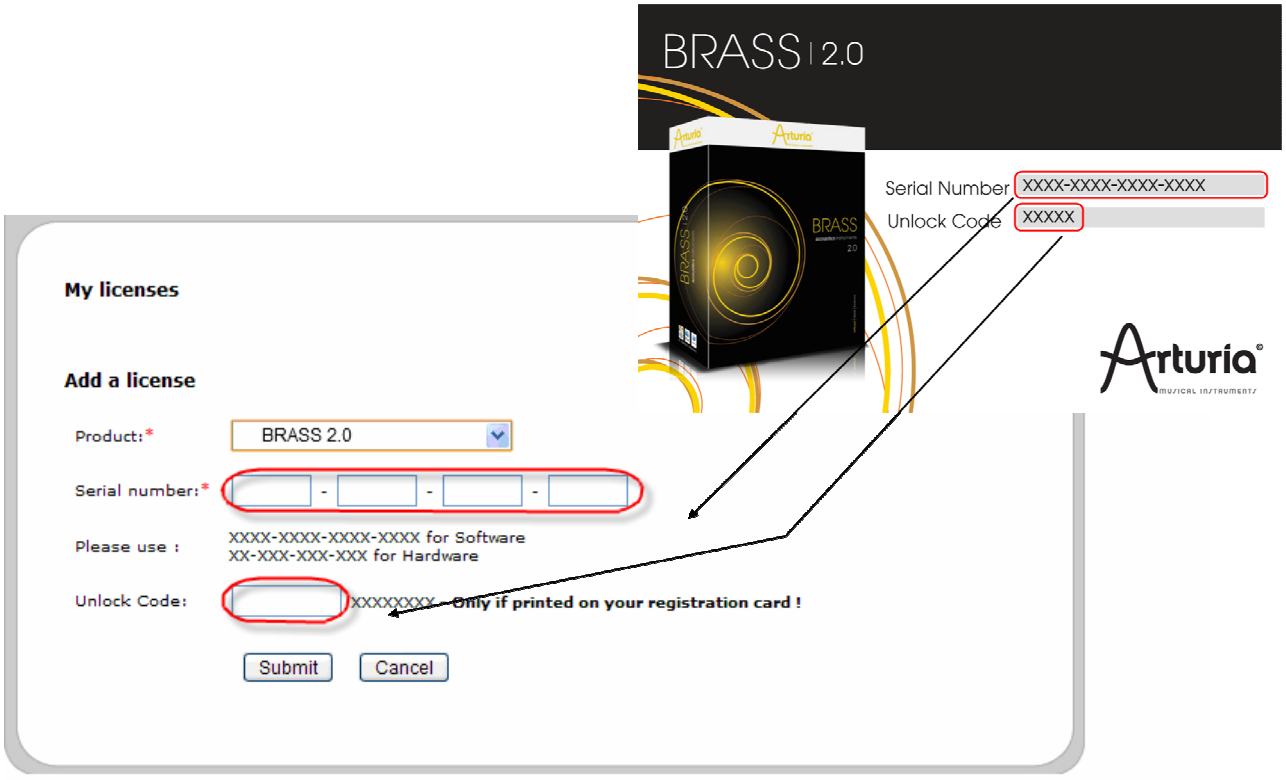
If you already have an account settled, simply log in:



Once you are logged into your account, you can register your BRASS 2 and request your activation code.

Go to the "My Registered Products" section of your account and click on the "Add" button:

In the form that appears, select "BRASS 2" in the drop down menu, and key in your synthesizer serial number and unlock code (as written on the registration card):



You will then see the confirmation screen:

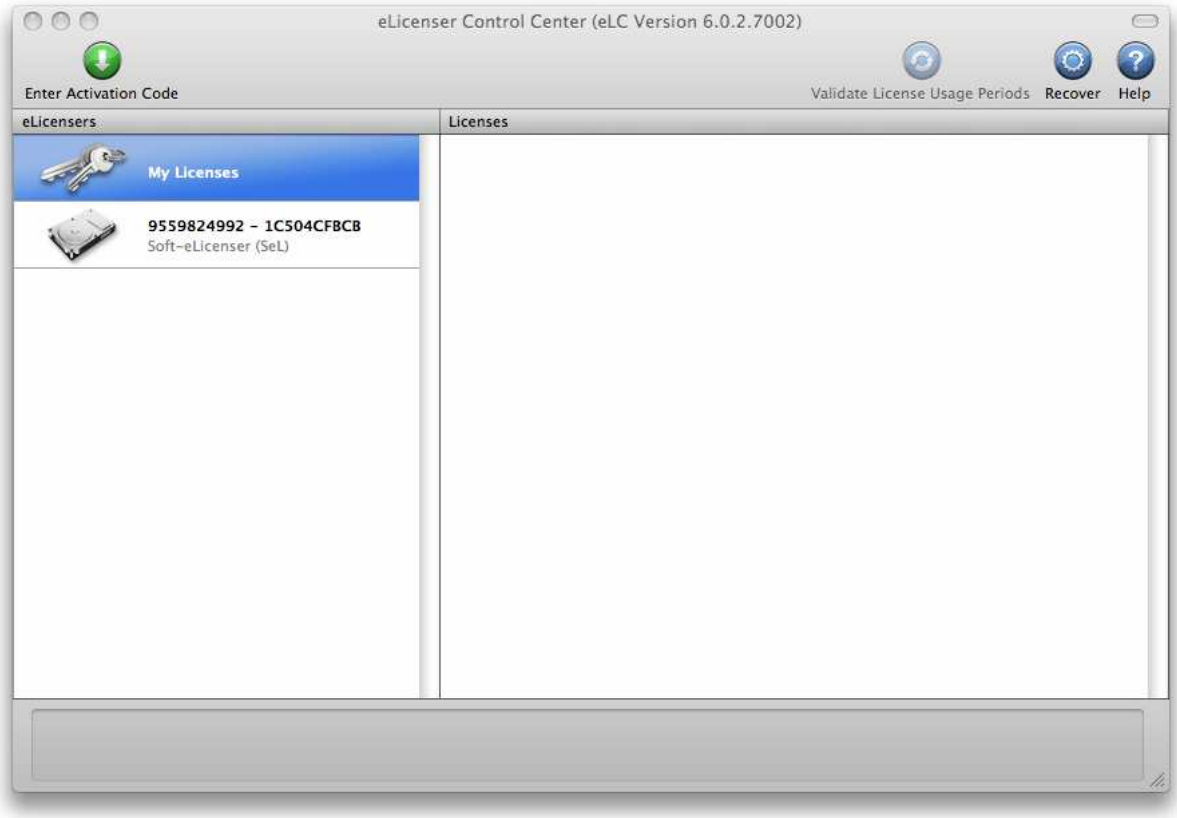
And finally there is a screen from which you can copy the **eLicenser activation code**. The very same information is sent to you by email as a backup.

Now that you have retrieved the activation code, launch the eLicenser Control Center. This application has been automatically installed on your computer along with BRASS 2, it can be found here:

- Windows: *Start > Programs > eLicenser > eLicenser Control Center*
- Mac OS X: *Finder > Applications > eLicenser Control Center*

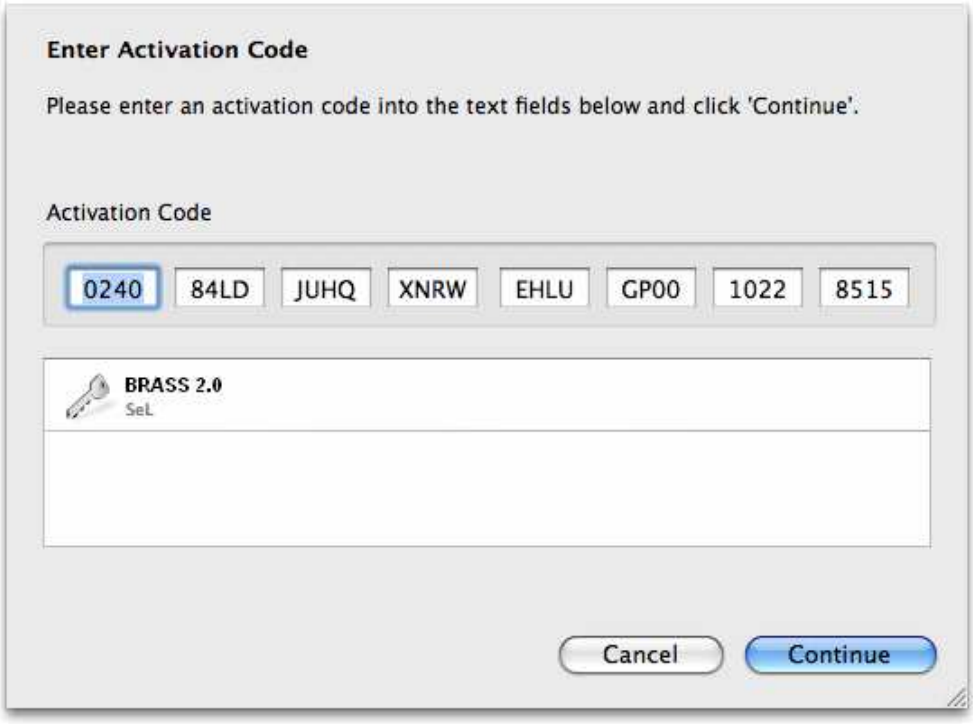
The screenshots below have been taken on a Mac OS X operating system; however the process is strictly identical under a Windows XP/Vista/7 environment. The same functions apply, only the graphical user interface slightly differs.

In the eLicenser Control Center main window you should see a "SeL" virtual dongle installed onto your computer.



The eLicenser Control Center main window, showing an empty Soft-eLicenser.

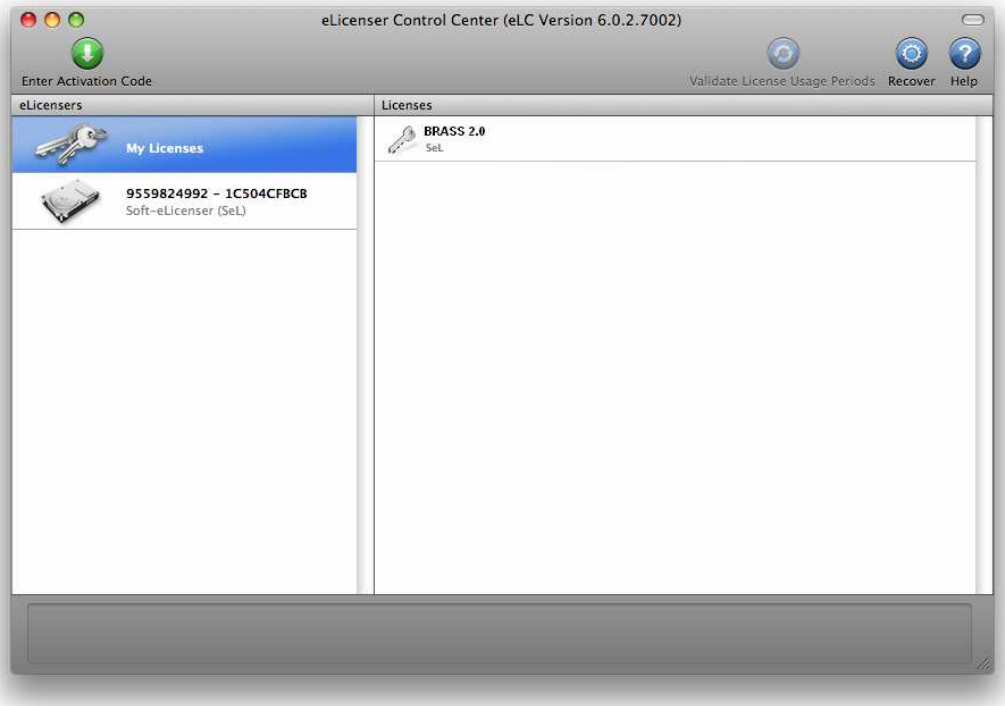
In the eLicenser Control Center menu, click on the "Enter Activation Code" button, and enter the code when prompted. Simply paste in the 32-digit code you've just copied from your account on the ARTURIA website:



Enter the activation code

The eLicenser Control Center is now ready to download the software license that will allow you to use BRASS 2. Click on Start, the progress bar should increase until download completion. A popup window will confirm completion, then just click "Close".

Now the main eLicenser Control Center window should show your BRASS 2 license installed and activated.



License is installed and activated

It’s now time to launch BRASS 2.

4 QUICK START

This chapter will introduce you to the general principals of the functions in BRASS 2. You will find a precise and detailed description of each function in later chapters.

BRASS 2 is a virtual instrument that offers the possibility of programming and playing different brass instruments quite easily. It offers 3 types of instruments: the trumpet, tenor saxophone, and trombone either in solo or ensemble modes.

The BRASS 2 software is divided in two parts: ***Live*** and ***Riff*** modes.

4.1 LIVE mode

Live Interface

As the name indicates, the "LIVE" mode is designed to play in real time on a MIDI keyboard or with the help of a breath controller. In version 2 you can play up to four brass instruments simultaneously, using different harmonization modes. It is also in this interface that you can change the tonal characteristics of each instrument and create new presets. By "preset" we mean either instrumental settings that permit you to obtain a particular sound and performance response, or up to four such presets along with the harmonization settings to use with these instruments (this forms a kit "preset"), or the harmonization settings, grouped in a harmonization "preset".

The Live mode window is composed of three distinct parts:

- on the left side reside the kit, harmonization and instrument presets as well as the harmonization editor and file manager;
- on the center is the real time synthesizer;
- on the right, is the general configuration that concerns all of the following: the instrument selected, the spacialization, and MIDI settings.

4.1.1 Management of documents

4.1.1.1 Kit Zone

In the "Kit" tab there is a drop down list containing all the kits (sections of one up to four instruments with harmonization options). For now, simply choose a solo kit.

4.1.1.2 Harmonization Zone

- You can load a second instrument on the second instrument slot, for example a saxophone. In order to play these two instruments together, harmonization options are provided. You can either load a harmonization preset, or set the different options for each instrument slot in the Harmonization Page accessed by clicking the EDIT button right of the harmonization preset list.

4.1.1.3 Instrument type and preset zone

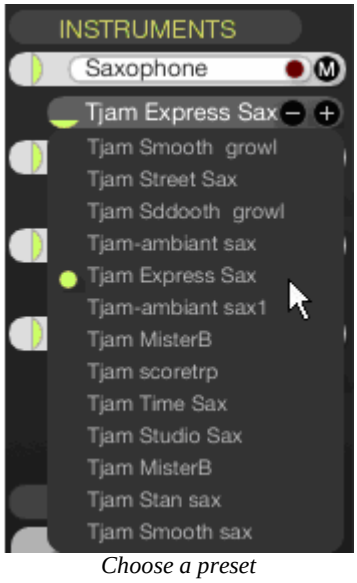
In the INSTRUMENTS tab, four identical zones set the type and preset of each of the four instruments.

With the light grey drop-down lists you can choose one of the 3 instruments proposed in BRASS 2: for the first example we'll choose the trumpet on the first slot.

With the dark grey ones, one of the presets can be loaded for the instrument in the respective slot.

Select one among the 30 presets created for this instrument. This preset recalls:

- all settings of the synthesis parameters (seen in the center section of the screen),
- the configuration of the instrument and the spatialization (seen to the right of the screen)
- the MIDI control settings for playing the instrument using a keyboard, a keyboard and a Breath Controller or an Akai EWI.



Choose a preset

- Start by playing a few notes on your MIDI keyboard (or on the keyboard situated in the middle of the screen). Change the pressure and tone parameters, and listen to the changes while you play.

Change the pressure parameters

The BRASS 2 faders are unique. The colored bar graph indicates the value of the fader. The two arrows situated to the right and the left represent the boundaries between which the fader will be modulated if we assign it to a MIDI control.

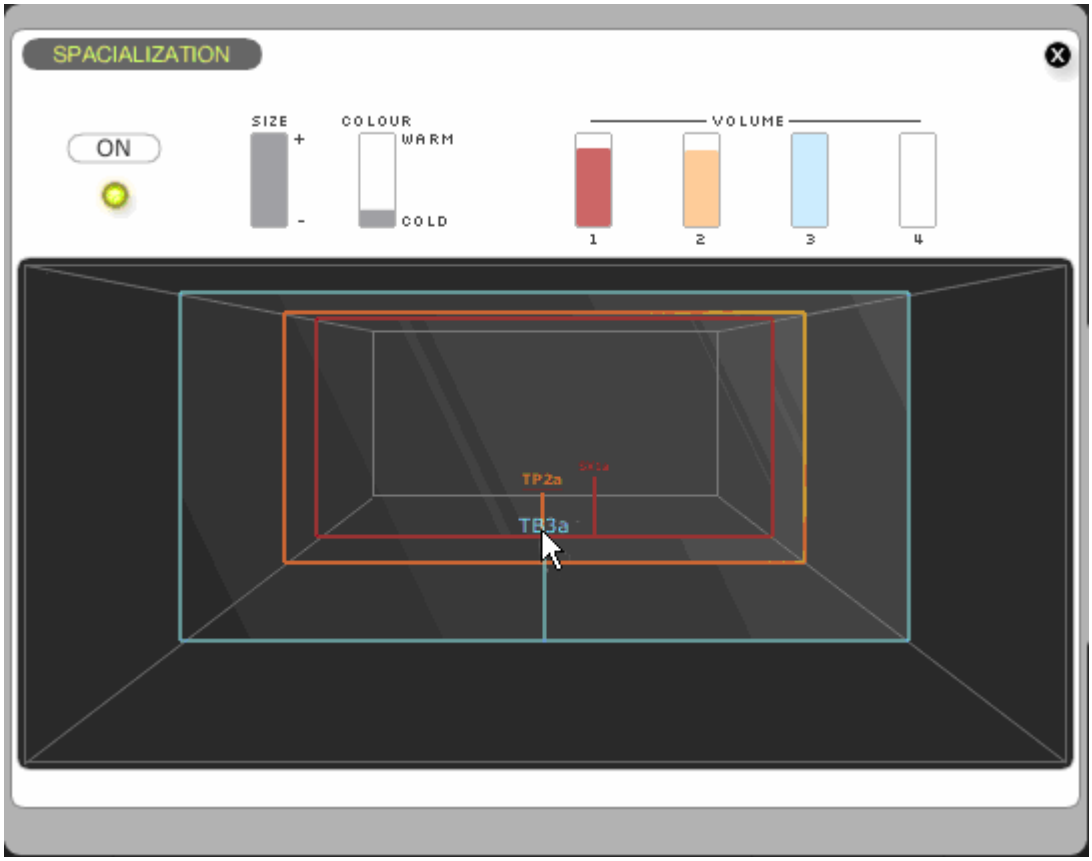
4.1.1.4 Instrument Configuration Page

- Change the global playing characteristics of the trumpet by adding and removing a mute to this example. Click on the "Configuration" tab then apply the mute to the instrument by clicking on the adequate icon. To take away the mute, click on the "no mute" icon.

« Mute » and « no mute » icons

4.1.1.5 Spatialization Page

- Try to change the position of the trumpet in the stereo space. Click on the "Spacialization" button, and then click on the trumpet icon to instantly position it in the middle of virtual room. Move the instrument by sliding it across the room.



Spatialization

4.1.1.6 MIDI PRESET page

- To finish, click on the MIDI PRESET tab in order to connect the playing parameters to the external MIDI controllers.

MIDI PRESET page

- By default the page focuses on the selected slot's midi configuration; in this case the second saxophone
- You can add connections between MIDI control sources and instrument parameters by clicking on the "+" button.
- For a connection you can choose:
  - The MIDI modulation source (velocity, pitch bend, MIDI CCs...),
  - The instrument's parameter to be controlled using the MIDI control set above,
  - The mapping curve for the controller's values onto the parameter and,
  - The previously set control's gain.

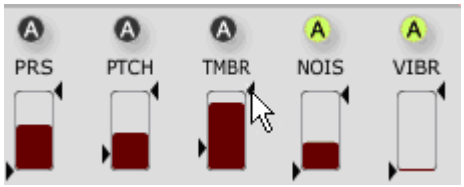
Thus, the way the instruments respond to your playing can be tweaked very precisely !

- Connect, for example, the velocity to the attack, then the modulation wheel to instrument pressure and vibrato.

Connect "modulation wheel" to the "pressure"entry

It's possible to connect several parameters from one modulation source. In order to do this, add connections and choose the modulation parameter as source in all of them and the parameters you want to control as destinations.

- In order to delete the connection, select the connection then press the button "-" ("Remove Connection").
- You can also change the border (extreme values) between which the control parameter of MIDI will maneuver. Close the MIDI PRESET page then click on the arrow surrounding one of the 8 synthesis sliders of the main page.



Change the response rate of each modulation

4.1.2 Automation

As an option, it is possible to program the evolution of a parameter through time, each time you press a key. Thus, you can program the beginning of a progressive vibrato, or a light point of white noise in the sound attack. To assign a modulation curve to one of the 8 available parameters:

- Click on the "A" button situated above a synthesis fader in order to open the design interface of the curve. Open, for example, the interface corresponding to "noise".

Click on the "A" button

- You can choose the tool type that helps you design the curve that you wish to apply to the parameter. Take the "pencil" tool to design a curve by hand.

A hand-drawn automation curve

- Listening to the results, we notice that the sound evolves in time, as desired.

4.1.3 To Save

When you have made some settings that you are happy with, you might want to save these changes as a preset to be recalled later.

In BRASS 2 you have the choice of saving:

- all of the settings of the brass section you built (Save > Kit);
- the instrument you edited separately for use in other kits (Save > Instrument);
- the harmonization settings you're applying to your kit (Save > Harmonization).

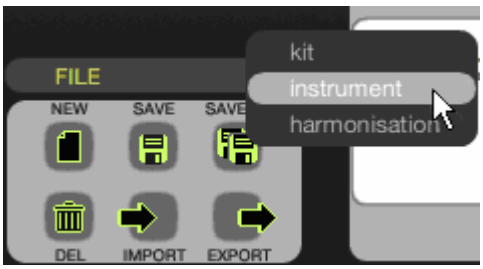
- Click on the button SAVE AS. A popup menu will appear, containing choices for the types of preset you want to save: Kit, Instrument and Harmonization.
- If you choose to save the entire kit the following dialog window will appear:

"Save As" window

In this Window, aside from saving the entire kit, you can also choose to save separate copies of any of the four instrument presets used in the kit and/or a separate copy of the harmonization settings.

- Choose a new kit name by double clicking on the name
- If you only want to save an instrument or the harmonization, choose the respective option from the popup menu and enter the name you want your preset to have.

⚠ *When only one instrument is loaded (Solo Mode), only the instrument preset can be saved, initialized, deleted, etc.*



Click on the "Save As" button

4.2 RIFF mode

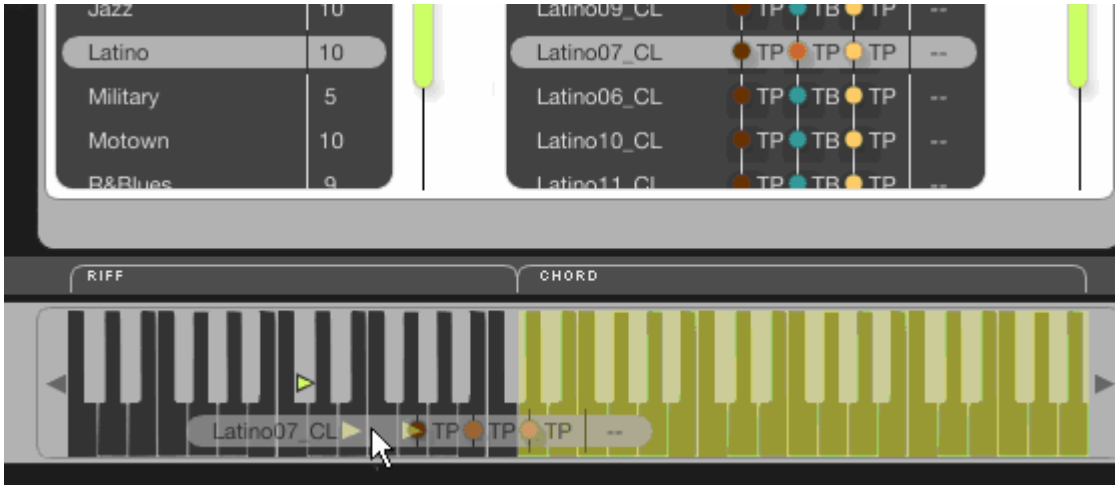
Riff Interface

The "Riff" mode provides a simple interface that allows selection or creation of short keyboard-triggered performance arrangements. It is possible to use up to 4 instruments simultaneously in each riff. A large riff palette is shown and provides examples of arrangements in different musical styles.

- To load all performance parameters for a particular riff, simply click on a preset in the list. To play the riff on repeat, click the button "Play" or the [Space] key. To stop the riff reader, click on "Play" or [Space] again.

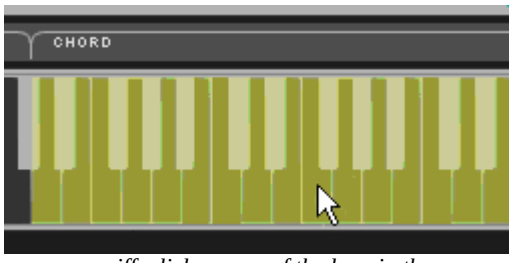
Click on the "Play" button to stop the riff reader

- You can also place a riff on one note of the keyboard on the screen to map that particular riff to on note on your MIDI keyboard. Choose a riff in the list then move it by dragging and dropping it on one of the virtual keyboard keys situated at the bottom of the Riff window (left part of the keyboard). An orange triangle indicates the position of the riff on the keyboard. To stop the reader, click on the "Stop" button.



Place a riff on a MIDI note

- To transpose the riff, click on one of the keys in the orange zone (right part of the keyboard). You can also activate this transposition on your MIDI keyboard by playing a key corresponding to this orange zone.



To transpose a riff, click on one of the keys in the orange zone

- To delete a riff placed on a key, right-click on the corresponding key and choose the "Remove" option.

4.2.1 Editing a short riff

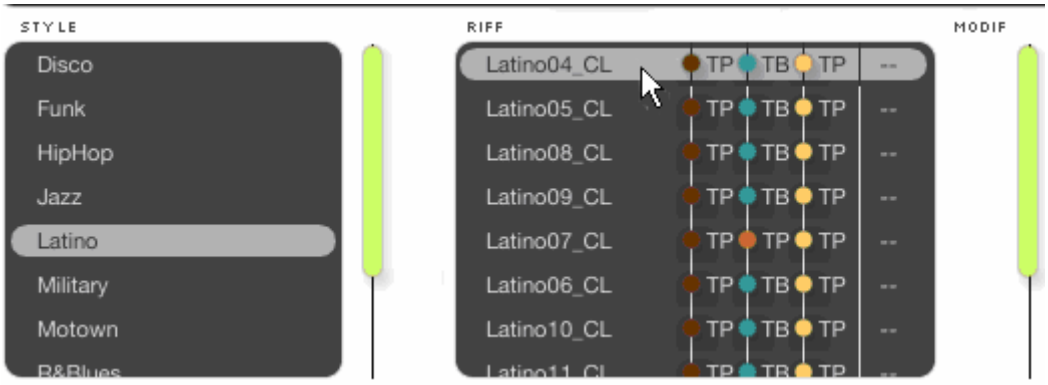
Editing your Riffs

The "Edit" button opens the editing interface for the current riff. It consists of two distinct parts:

- the note editor, where you can write or modify Riff notes,
- the sound control interface, where you can design the modulations that correspond to individual instruments (breathe, pressure, vibrato, pitch, etc...).

This is how to work on an existing riff and how to save it:

- Choose a riff in the list:



Choose a list among Presets

- On the piano roll grid, change the pitch of one (or several) of the notes.
- Click on one of the notes situated on the editing space then move it horizontally

to change its place in time, or vertically to transpose it higher or lower.

Add an effect to the sound:

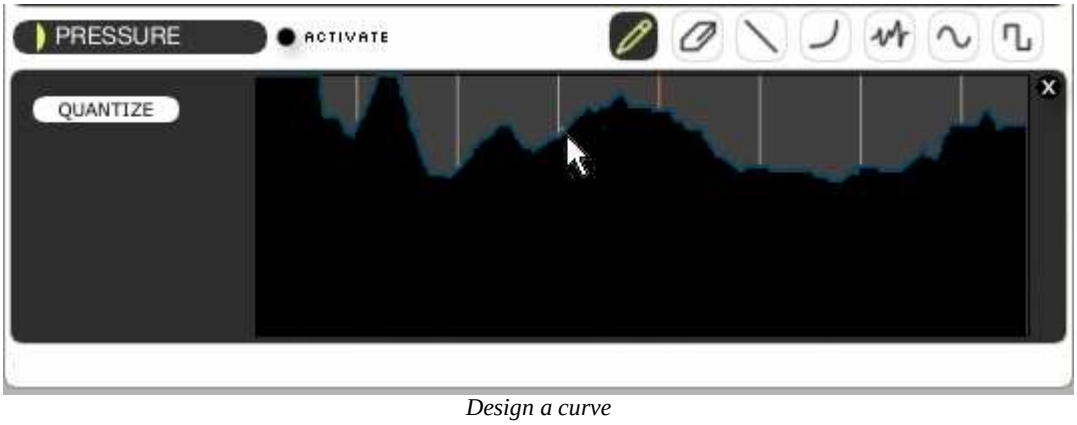
- Click on the EDIT button to open the tool box and the editing interface of the expression curves.

Click the "Edit" button

- Choose the "Pressure" parameter among the proposed options by clicking on the arrow situated to the left of the selection field.

Choose the "Pressure" parameter

- Click the "Activate" option to activate the action of the parameter.
- Choose the pencil tool in the tool box then draw a curve by hand.



Design a curve

You can also choose the type of tool that will help you design the curve you wish to apply to the parameter:

- Click on one of the 5 last options of the utility bar to apply it to your curve. Take, for example, the "curve" tool.

Click the "curve" tool

- Design a climbing line starting at the beginning of the editing space to bring up the pressure progressively.
- Save your Riff preset by clicking on the "Save As" button. This will create a copy of the current preset. Choose a new name by double clicking on one of the 3 fields.

It's possible to import a previously programmed riff and format it to a MIDI file. In the same way a new riff composed in BRASS 2 can be exported in the same format.

4.3 Using BRASS 2 via MIDI

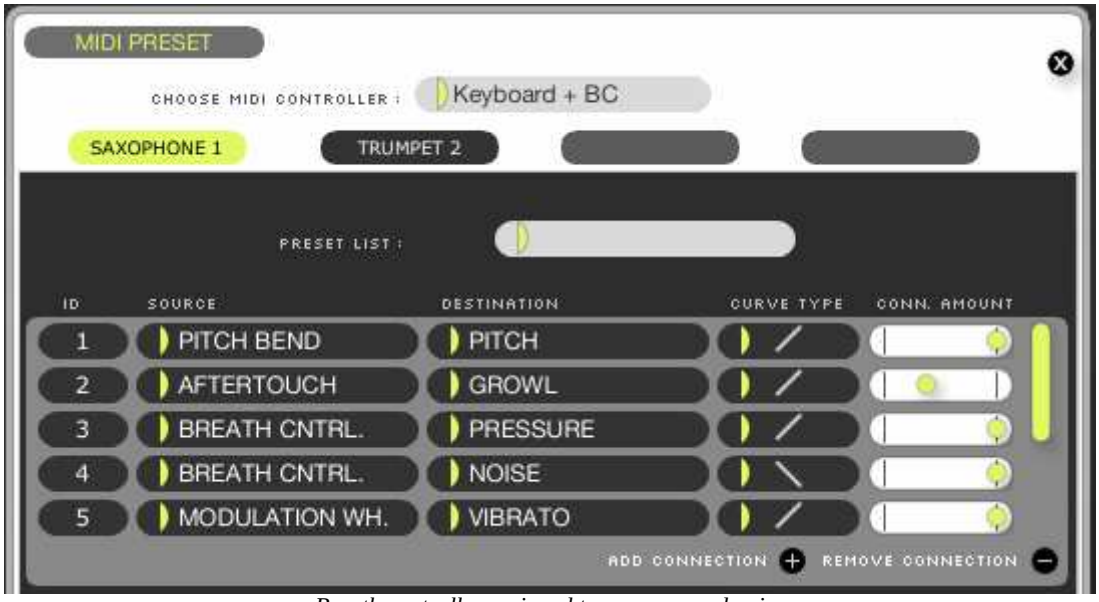
As we have previously seen, it is possible to play an instrument directly on a MIDI keyboard (or through a sequence coming from a MIDI sequencer).

Additionally, BRASS 2 can be controlled with the help of a MIDI breath controller or an Akai EWI (uniquely in "Play" mode).

- To do this, return to **Live** mode then choose the "Keyboard + BC" option in the MIDI PRESET page.

Choose the "Keyboard Breathe controller" option

- Choose the parameter(s) that you wish to assign to the breath controller by connecting to the last of the 9 types of modulation.
- Make a connection from a "breath controller" to the desired parameter ("Pressure" and "Noise" for example).



Breath controller assigned to pressure and noise

As you may have noticed, the control of BRASS 2 in Live mode is very simple, but using MIDI control in the Riff mode is very easy as well. You can set the parameters that will trigger your riffs by simply playing a MIDI note (either on a MIDI keyboard or a host sequencer):

- Go back into **Riff** mode, then choose the MIDI channel by clicking in the field "MIDI Channel" from the MIDI SETUP page.
- When you want to synchronize the riff with the tempo of the MIDI host sequencer, click on the option "Host Tempo" to activate such synchronization.

Choose the "Host Tempo" option

- When you want to change the "internal" tempo of BRASS 2, click on the "Fixed Tempo" button, then choose the tempo by clicking in the tempo field.

5 USER INTERFACES

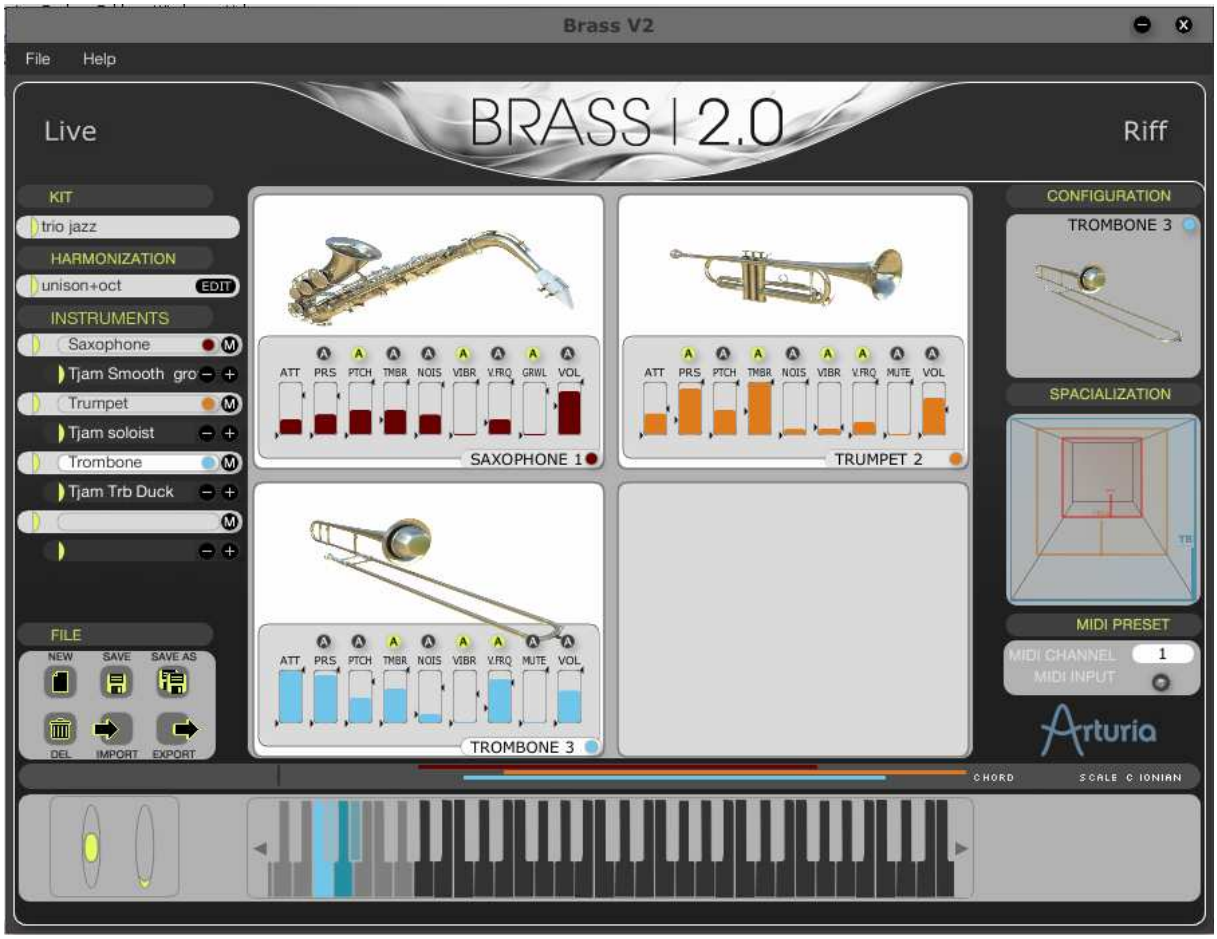
This section describes the functions of each of the two principal playing modes:

- Live mode permits playing and editing of an instrument in real time.
- Riff mode permits playing and editing of riffs in real time

These two modes correspond to the **Live** and **Riff** screens of the software.

5.1 Live Mode

Live mode of BRASS 2 allows real time control of the trumpet, saxophone and trombone, to configure instruments and use presets.



Live screen of BRASS 2

Interface can be divided in four parts:

- In the **center** zone, the kit instruments parameters are visualized. Each parameter value is displayed in a dynamic controller gauge, each instrument gauge being a different color in order to quickly mark the changes in the sound.
- The **left** zone contains kit, harmonization and instrument preset control, which allows loading, saving, creation, deletion, importing and exporting of the presets.

The instrument preset area also indicates the instrument color codes used in the interface.

- The **right** zone displays configuration elements of the current preset, along with the instrument settings including spatialization and MIDI control.
- At the **bottom**, a virtual keyboard with the modulation and pitch wheel control which allows to play or test the sound of the instrument with the mouse. The keyboard is scrollable.

5.1.1 Center Section - Controlling Parameters in real time

In the center of the user interface there is a visualization of the kit's instruments, and the real time parameters that are associated with each instrument.

5.1.1.1 Presentation of the Parameters

Real time parameters of an instrument

ATT (Attack) Set the attack force: higher settings provide a faster and stronger attack; and lower parameter values create a slower and softer attack. We can set different types of attacks in the instrument configuration window* in order to adapt the model of different playing styles.
* see "5.1.3 Right Section - Instrument configuration," Types of attacks.

PRS (Pressure) Set the pressure of the air to be entering the instrument. Allow variation of tone and volume of the instrument at the same time, in the same way a musician would blow stronger into the instrument.

PTCH (Pitch) Vary the notes around the notes played. By default, the "pitch" parameter is set to value "0" in the middle of its range.

TMBR (Timbre) Set the tone of the instrument in order to obtain a variation in the timbre of the sound.

NOIS (Noise) The noise parameter adds some breath noise air into the sound.

VIBR (Vibrato) This allows adding vibrato while playing, from null to full amplitude. The maximal amplitude allows interesting effects.

V.FRQ (Vibrato Frequency) This parameter adjusts the vibrato frequency applied.

MUTE	The mute is accessible uniquely for the trumpet and the trombone. In the case where a muted wahwah effect is chosen*, this parameter allows us to set the intensity of the effect, otherwise said the position of the hand for a muted wahwah or the position of the mute plunger. When no mute is activated, or one static mute is chosen, the real time controller is disabled. * muted wahwah or muted plunger, see "5.1.3 Right Section – Instrument Configuration", Mutes.
GRWL **(Growl)**	The growl effect is only accessible for the saxophone model. This effect simulates "growling" into the mouthpiece in order to modulate the saxophone's sound with the player's voice. This effect can be very expressive even at small amounts.

5.1.1.2 Live display of parameters

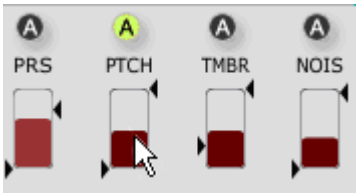
The parameters viewed in the central band are representative of the sound and the control of the instrument.

There are several ways to vary the parameters:

- Control with the mouse on the parameter bar.
- With your sequencer host plug-in automation, clicking on the "A" button and beginning to draw will activate the control and open the editing window.
- Using assignable MIDI controllers in the configuration section of the instrument (see "5.1.3 Right Section – Instrument Configuration", MIDI PRESET).

5.1.1.3 Direct settings with the mouse

At any time, a parameter can be set with the mouse by clicking on the dynamic controller zone.

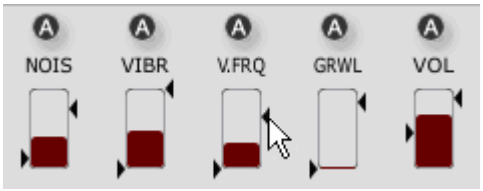


Tweak a parameter with the mouse

5.1.1.4 Real time control

When a parameter is assigned to a MIDI control (see "5.1.3 Right Section – Instrument configuration" MIDI PRESET), the maximum range of the parameter can be set with two arrows displayed on each side of the dynamic controller zone. This option is particularly useful, and permits great flexibility in the real time parameter control.

For example, if the modulation wheel is assigned to vibrato amplitude (via the MIDI PRESET panel), and if you want the maximum amplitude of the modulation wheel to match a measured value of the vibrato amplitude, you must set the parameters as indicated below:



Modification of the range limit of a parameter

If the 2 arrows limiting the amplitude of the MIDI controls are located at the top and bottom of the dynamic controller zone, then the amplitude will be at its maximum when the control is MIDI assigned (see "5.1.3 Right Section - Instrument configuration", MIDI PRESET).

Nevertheless, the automation applied to a parameter (see following part, "Automation of the Live parameters") can push this parameter to "overflow" the range limits defined by the arrows.

5.1.1.5 Control in real time - Pitch Bend and Aftertouch

When the pitch bend or the aftertouch control a real time parameter (see "5.1.3 Right Section - Instrument configuration", MIDI Settings), the behavior is different from that of other controllers.

- **Pitch bend**
  The pitch bend wheel returns to its central position when it is released. A controller assigned to pitch bend also returns to its original position. For example, if you assign the keyboard pitch bend with the Live interface pitch, the real time controller will always return to his steady position, normally pitch=0, no matter what the positions of the MIDI control amplitude arrows are.
- **Aftertouch**
  The aftertouch is released after pushing on the key of a MIDI keyboard. It changes the sound in function of the force applied to the key once the key is pushed. Due to this, the modulation obtained with the aftertouch starts with the initial value of the real time control, and changes this value in function of the MIDI setting parameters.

For example, if we assign the Velocity and aftertouch controllers to the pressure parameters, the initial value of the pressure is defined by the velocity of the playing. Pushing on the key with more or less strength edits the pressure parameters accordingly.

5.1.1.6 Automation of Live parameters

All the parameters of Live play can be automated (except for the Attack). By clicking on the A button above the parameter name, you open an automation window corresponding to that parameter.

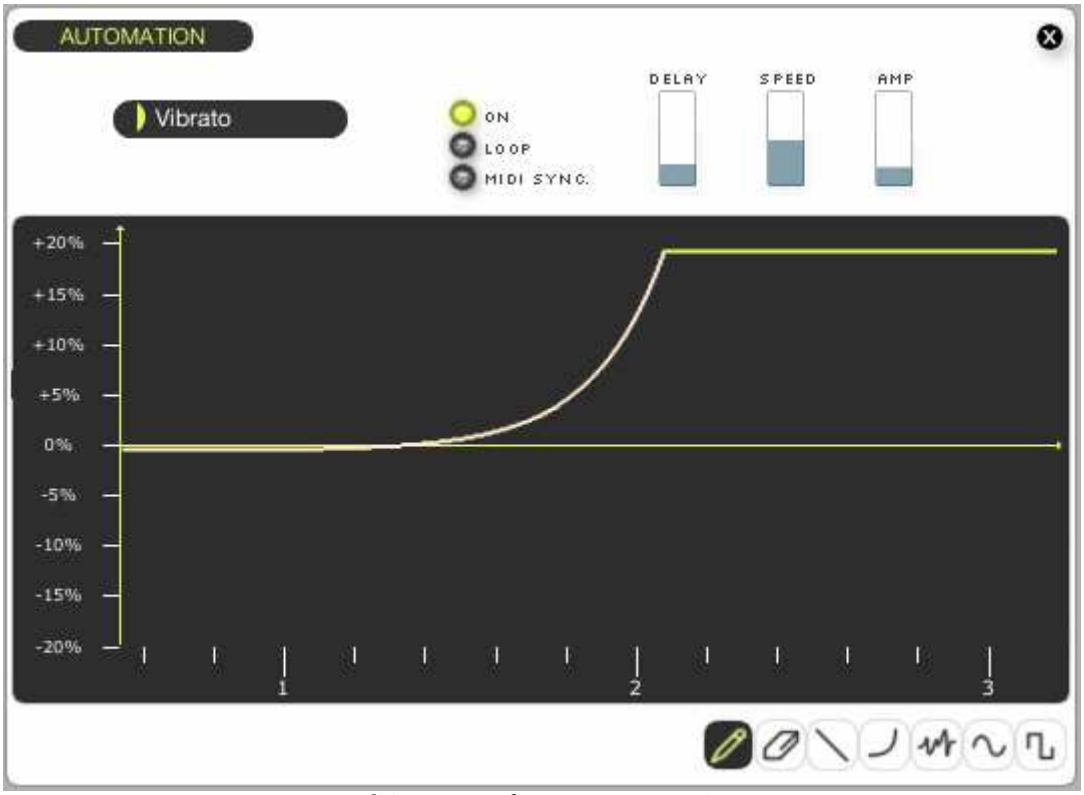
The automation allows you to vary the parameter value for each note, making it possible to play more realistically while making interpretation and control simpler.

The automation begins with the parameter's current value, set with the mouse or using a MIDI controller. The automation value added to the parameter is seen via a change to a clearer color zone of the real time controller. Thus, you can visualize the controller's original value and the automation effect on the current value at the same time.

Automation of a parameter value

In the automation window, you will find the following buttons and settings:

Parameter	Switch the parameter whose automation you want to edit.
On	Activate or deactivate the automation on the corresponding parameter.
Loop	Activate or deactivate the loop mode on the automation. When the loop is deactivated, the automation is read only once.
Sync	Synchronize the speed of the player of the automation window to the tempo of the sequencer.
Delay	Delay the automation to be read. This option makes it possible to launch the automation playback a certain time after pressing the key.
Speed	Automation of the player time. When synchronized to the sequencer, the player time is displayed as a fraction of time.
Amp	Sets the automation amplitude.



Edition screen of parameter automation

The horizontal time and vertical amplitude scales are updated when you modify the "Delay", "Speed" and "Amp" controllers. A vertical bar makes it possible to follow the course along the curve when you are in the playing phase in order to be able to set these various parameters in a more intuitive way.

The posted units are:

- Time in seconds on the horizontal scale. The modification of the "delay" parameter shifts the displayed units, and the modification of the "speed" parameter modifies the time scale.
- The relative amplitude of the parameter variation. This amplitude is posted in percents, relative with the maximum range of the parameter. Thus, you can vary the automated parameter on its entire value range with the amplitude set to the maximum. The automation values exceeding the allowed maximum value for the parameter won't be taken into account, and then the parameter will be limited to this maximum value.

5.1.1.7 Drawing tools

- To select a drawing tool, you can use the bottom left button of the draw zone, or right-click (Windows), click and press the Ctrl key (Mac) on the drawing zone to display a menu with the different tools.

Pencil 

Freely draw a curve with the shape that you want.

Eraser 

Delete the values you put on the editor.

Line 

Trace a straight line.

Curve 

Trace curves with different shapes, by varying its amplitude, direction and curve. You can use the curve tool in the following way:

- Click on the origin point of the desired curve. While keeping the mouse button pressed, move the cursor towards the second desired curve.
- By releasing the mouse button, you can now modify the line curve between the two points previously defined. A new click will validate the curve you have established.
- You can also redraw a curve starting from the second point of the preceding curve, by clicking and immediately releasing the mouse button. Then by moving the cursor, a curve automatically appears which you can set the curve in the same way.

Noise 

The noise tool allows you to add noise to the modulation. This signal is added to the already present curve. The added noise amplitude is proportional to the distance of the mouse cursor from the principal curve axis. To add noise, click on the curve. For less noise, bring the horizontal axis closer to the curve; to add more noise, move away from the horizontal axis.

Sine 

Allows you to draw a centered sinusoid on the horizontal axis. Click on the drawing zone where you'd like to begin the sinusoid, move the mouse cursor while holding the mouse button, and slide with the

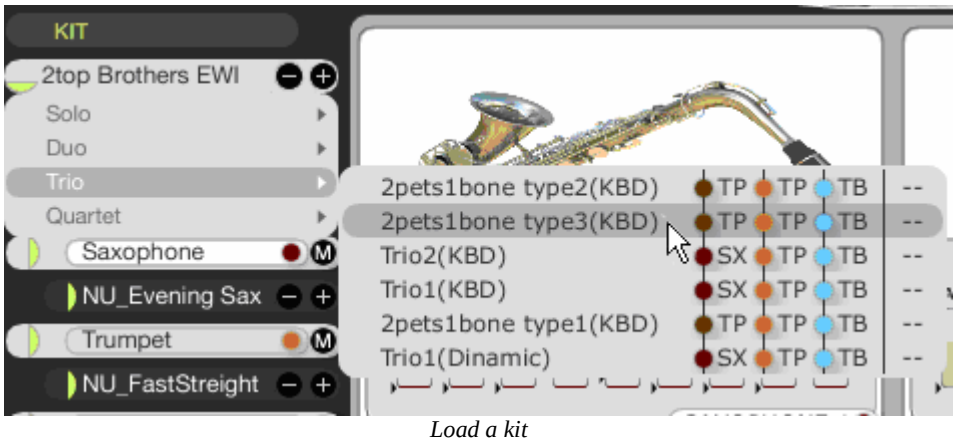
desired sinusoid end height. The distance of the mouse cursor from the horizontal axis when you release determines the sinusoid amplitude.

Square  Allows you to draw square wave. Works in the same manner as the sinusoid form.

5.1.2 Left Section – Instrument Presets

5.1.2.1 Choose your kit

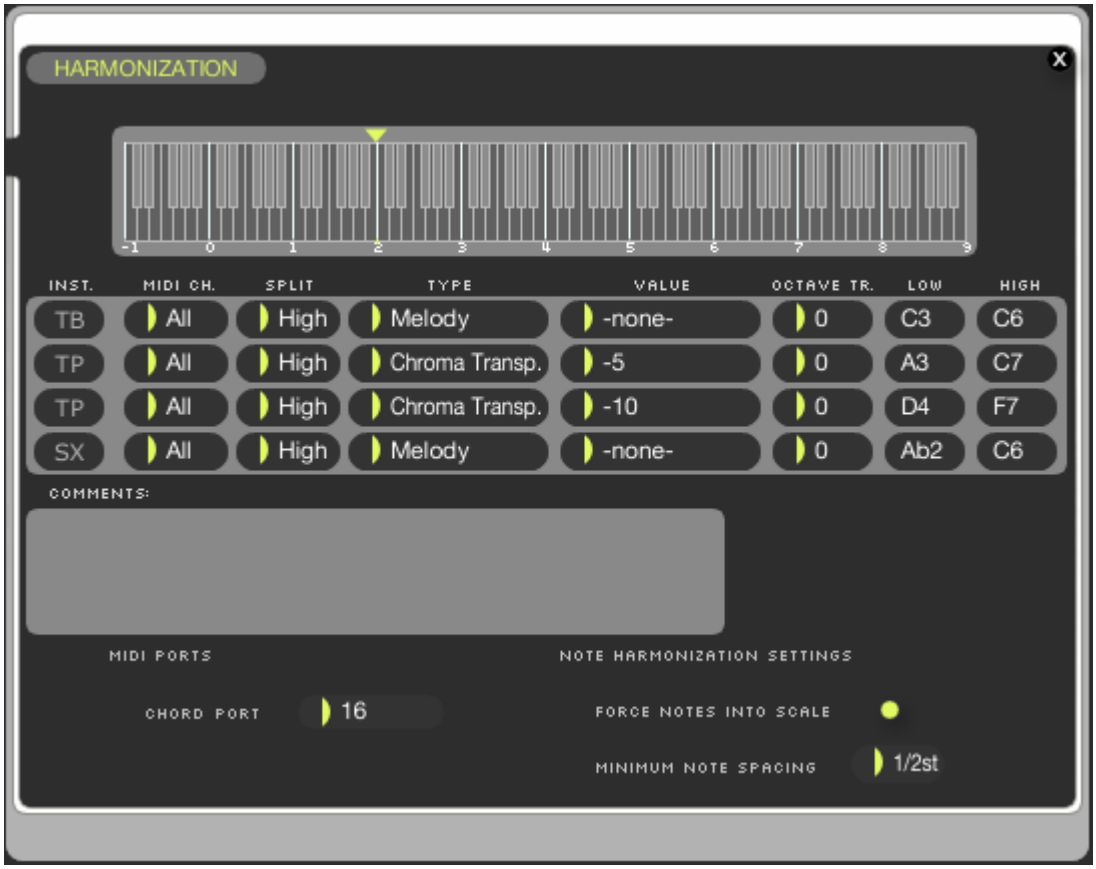
In this list you will find all the kit presets available. Loading one of these presets implies loading up to four instrument presets and the harmonization options to be used to play these instruments.



Load a kit

5.1.2.2 Choose your harmonization

The harmonization zone contains a list for loading harmonization presets to use with the currently loaded instrument presets as well as a button opening the Harmonization Page in which the split and harmonizing settings are found.



The Harmonization page

The Harmonization page is accessed by clicking on the "EDIT" button found at the right of the Harmonization Zone.

In this page you can:

- Change the split point using the yellow indicator above the keyboard,
- For each of the four "slots", choose the harmonization settings:
    - the MIDI channel to which it will respond;
    - the split zone in which it will play;
    - the harmonization mode used:
        - **Melody**: this mode makes the instrument play exactly what is played on the keyboard;
        - **Chroma Transpose**: using this mode will transpose the instrument chromaticaly using the interval chosen in the "Value" drop-down list;
        - **Scale Transpose**: this transposition is done according to the scale calculated from the chords input on the "Chord Port" (a MIDI channel set using the "Chord Port" drop_down list at the bottom of the page). Chords played on the Chord port are recognized and shown at the left of the key range indicator, as well as the corresponding scale mode.
        - **Multi**: this mode is a polyphonic mode: You can play up to four notes simultaneously and choose which of these notes will play a certain instrument: the highest note, the second highest, etc.

- The harmonization mode's specific parameters: except for the "Melody" mode, each mode has a parameter:
  - For the **Chroma Transpose** the parameter chooses the number of semitones to transpose
  - For the **Scale Transpose** mode the interval (calculated in the scale detected from the Chord Port) to transpose is to be chosen;
  - For the **Multi** mode the order (counting from the top) of the note is set. For example if "2nd note" is selected for the first instrument, the instrument in this slot will play the second note from the top when two or more notes are played on the keyboard.

    ⚠ *In this mode if only one note is played on the keyboard, all instruments will play this note!*
- An octave transposition is provided to allow you to choose by how many octaves you want the instrument to be transposed.

- The **Comments** text box contains explanations about how the preset is organized and how to use it, for instance: " *1st instrument solo on high zone(of the split keyboard) and the rest of the instruments harmonized in a Maj chord in the lower zone (of the split keyboard).*"
- The general harmonization settings:
  - The MIDI **Chord Port** sets the MIDI channel through which the harmony chords are to be entered, you can also choose to harmonize using the Lower part of the current midi channel.
  - **Force notes into scale** turns on an automatic correction system which , if you play a note that is not found in the current scale (calculated from the "Chord Port"), it will change the note you played into the nearest note from the current scale(this feature is intended for beginners)

5.1.2.3 Choose the type of an instrument

Three instruments are available in BRASS 2: trumpet, saxophone, and trombone. In the INSTRUMENTS section you can choose an instrument type for each of the four "slots" in the kit. According to the slot number and the instrument type a color will be assigned to each "slot". This is the instrument's color code which is used all throughout the interface to make the distinction between instruments of the same type but in different slots easier.

Choose an instrument

5.1.2.4 Preset selection

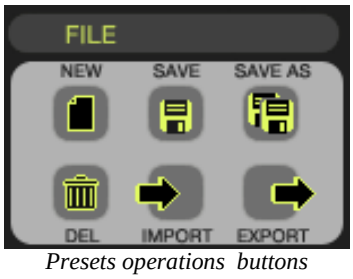
Each instrument has an ensemble of presets associated with it, allowing us to quickly find a sound adapted to the style or playing type desired. For each instrument, different presets covering all playing styles are displayed.

Select a preset

5.1.2.5 Preset management

In the lower left part of the screen is the file management section:

New	Inserts a new preset called "Untitled" in the current bank of presets.	
Save	Saves the selected preset	
Save As	Saves the selected preset under another name	
Delete	Deletes the selected preset (note that you cannot delete factory presets). WARNING: This operation has no confirmation screen and can't be cancelled.	
Import	Imports the selected preset from a pre-selected file.	Extensions: **.brk** for kits **.brs** for instruments **.brh** for harmonization.
Export	Exports the selected preset in a pre-selected file.	



Presets operations buttons

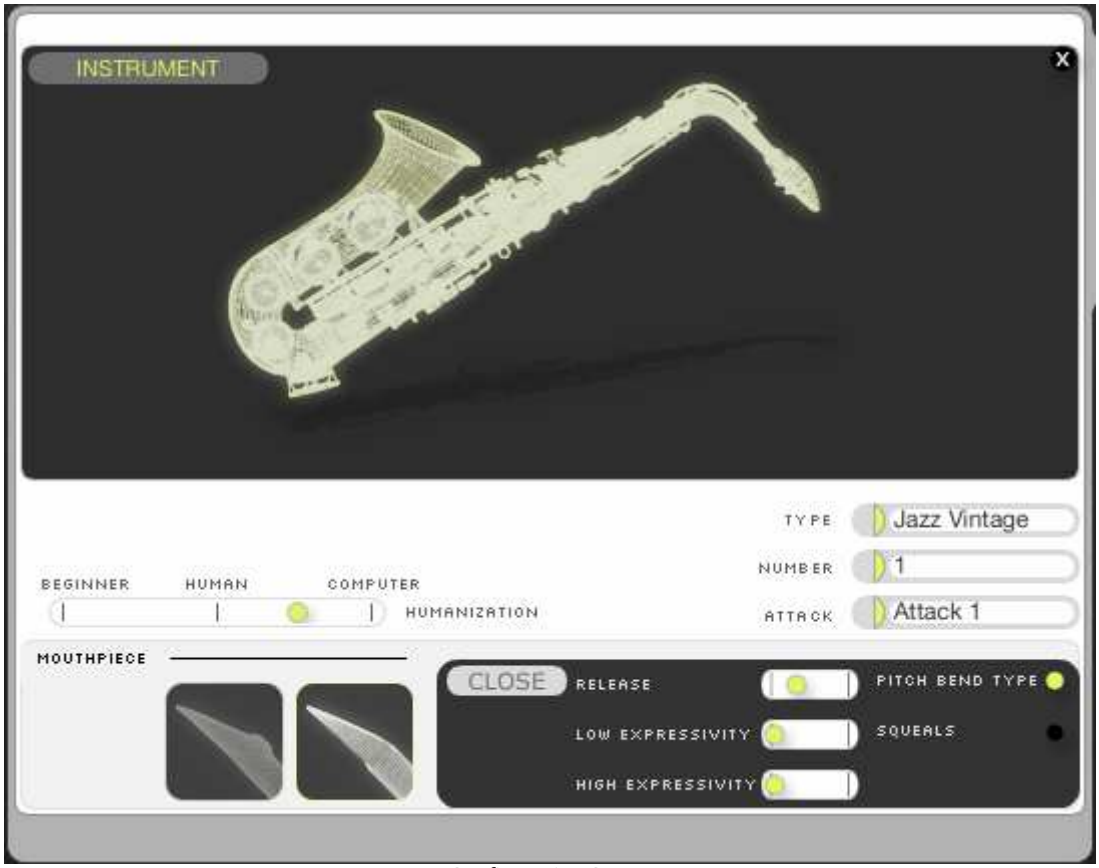
5.1.3 Right Section – Instrument configuration

5.1.3.1 Instrument parameters

The right section of the Live screen is dedicated to the settings for the selected instrument. This part shows the instrument configuration (a trumpet, a saxophone or a trombone) including the number of instruments playing at the same time (1, 2, 3 or 4 at the same time with the chorus mode).

5.1.3.2 Configuration

The configuration button opens the following window:



Configuration Screen

Type This allows changing the instrument sound according to its style. You will be able, depending on your needs, to obtain a more subdued, brighter, or clearer sound, etc.
Many different selections are available for each instrument, each reproducing different characteristics specific to these instruments.

Number This allows multiplying up to four times the number of identical instruments playing at the same time. In doing this we can give an instrument the sound of an ensemble, each element of the ensemble varying in a natural way and being placed distinctively in its own way

Attack

An instrumentalist can make several different attacks according to the pressure he gives to the beginning of the note, or the way he lets the air pass, etc.

It would be too complex to want to control and maintain all the types of attacks at the same time; this is why BRASS 2 offers 4 different types of attacks in order to adapt to all the playing modes.

The attack typess are different for each instrument:

Trumpet & Trombone

- Attack 1: direct, without breath, moderately brassy, appropriate in most situations. The transitions between notes are rather short.
- Attack 2: direct, very brass-like and marked attack. Is appropriate for pop sounds or brass band sounds which need to be crisp. The transitions between the notes are very short.
- Attack 3: with a lot of breath, adapted to a more jazz or ballad type of playing. The transitions between notes are short, and long enough for values with a weak attack.
- Attack 4: rather short, direct, without breath. Interesting for playing traditional/orchestral trumpet parts. The transitions between the notes are from short to fairly long.

Saxophone

- Attack 1: direct, without breath, adapted to a broad range of playing.
- Attack 2: direct and accentuated, for clear and precise sounds.
- Attack 3: staggered, for a more jazzy sound.
- Attack 4: without breath, quite soft.

Humanization

This attribute is useful to make the sound of the instrument livelier; even a very good instrumentalist never plays the notes the same way a computer does. The breath pressure, the tension of ones mouthpiece and many other aspects are always fluctuating. It is what gives the sound its living aspect.

The humanization attribute allows us to reproduce the tendency of an instrumentalist to fluctuate in the way he plays:

- **Computer**: no fluctuations will be sent to the sound.
- **Human**: the variations of the sound will be those normally produced by an instrumentalist.
- **Beginner**: makes it possible to strongly exaggerate those fluctuations, as a beginning instrumentalist might play.

The humanization varies the following aspects in a very human-like manner:

- The pressure
- The noise
- The vibrato frequency and amplitude

Moreover, the more dominant the humanization is, the more the automation variation is limited, i.e. the automation parameters become smoother. For example, an instrumentalist can't instantaneously make the pressure or the position of the mute change.

The bottom part of the control display depends on the selected instrument.

For the **trumpet** and the **trombone**, it makes it possible to choose among several types of mutes:

Dry mutes	Choked and clear sound, used in classical or jazz playing.	
Bowl mutes	Sound more open, adapted to jazzy New Orleans playing.	
Harmon	Also called the "Miles mute", because frequently used by Miles Davis. This mute rules for jazz, acid jazz, etc.	
Plunger	Removable mute, which is held by the instrumentalist and completely covers the bell or can be released to have no effect on the sound.	These two mutes can be modulated in real time with the parameter "Mute" of the Live interface, when one of them is selected.
Wahwah	Fixed mute, on which the removable section can be more or less filled up by the instrumentalist's hand when he plays	

For the **saxophone**, you will be able to choose among these two types of mouthpieces:

Classic	Gives a clearer sonority, rather neutral
Jazz	Gives a more jazzy, noisy sound.

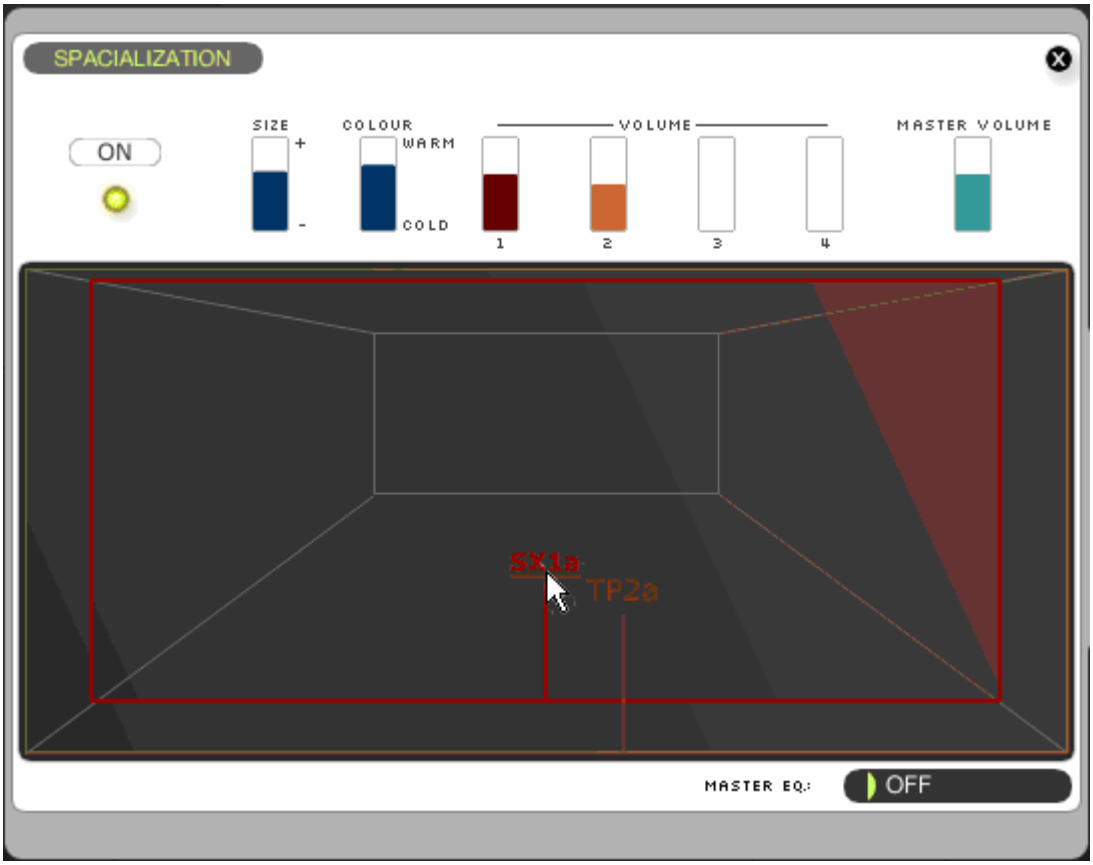
For the saxophone model in version 2, there are some special parameters that can be set. These parameters are found in the zone that opens by clicking on the **Expert** button at the bottom right of the configuration page, when a saxophone instrument is selected.

The special parameters available are:

Release	Changes the saxophone release time within natural limits.
Low/High Expressivity	These two parameters change the saxophone behavior at low or high velocity notes. The more one of these parameters is increased, the more range will be available either for low velocity notes (the smooth register) or for high velocity notes (the loud and noisy register).
Pitch Bend	Toggles between a natural modeled pitch bend (using the instrument's reed) which sounds realistic but is not very precise, and an artificial pitch bend (attained by "moving" the current playing hole on the sax) which is precise but sounds more synthetic than the natural one.
Squeals	This switch allows for squeals (wrong notes) to be generated at very high velocity values in order to imitate a real saxophone behavior when blown into too strongly.

5.1.3.3 Spatialization

The spatialization allows placing the different instrument instances in a virtual room. Move the instrument in the room by clicking on its representative icon.



Virtual instrument placement in the virtual room

Amount	Sets the effect intensity. This means the amount of reverberation added to the sound.
Color	Regulates the sound tonality of the room: duller or brighter
Dry/Wet	Allows to set the proportioning of the effect, from spatial sounds to a dense, ambient sound.
Volumes	Sets the instruments' volumes separately.

5.1.3.4 MIDI PRESET page

This window allows setting of MIDI controls for the selected instrument. Use this screen to assign MIDI controllers such as the velocity, the modulation or the aftertouch with instrument attributes such as the attack, pressure or noise.

With this, it's possible to control the instrument in real time, in a way both flexible and easy to configure, through any MIDI interface.

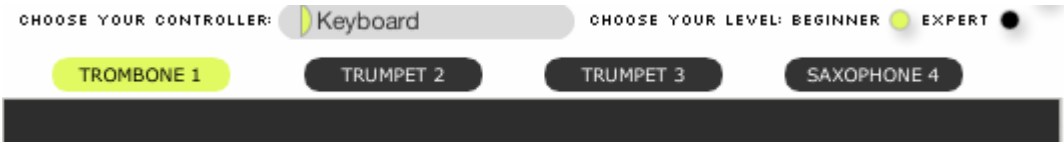
MIDI PRESET page

The main controller options to choose from are:

Keyboard	Standard MIDI keyboard
Keyboard + BC	MIDI keyboard with a Breath Control module : in this mode notes do not sound even if keys are pressed on the keyboard until BC values are received.
EWI	Same functioning as keyboard with BC module, but with specific settings.

For each controller mode, a different set of presets is provided, in order to cover different playing possibilities and styles.

Different presets are used for each instrument type. You can choose the instrument for which to load or edit a preset by clicking on one of the tabs:



Three MIDI control presets are saved for each instrument preset.

These presets consist of a series of connections between MIDI controllers (velocity, Pitch

Bend, After Touch, CCs...) and the instrument parameters you want to control with these controllers(for example the pitch bend wheel controls the pitch parameter of the instrument).

Each connection between a MIDI controller and a real time parameter can be configured according to a response curve. Click on the connection you want to configure, and it will highlight.

The connection can be set in different ways: with curves which increase rapidly from the very beginning, with curves that slowly increase, upwards, downwards or anywhere in between. The control parameter can also be reversed.

Take into consideration the different types of controllers and their action on the parameters to which they are linked, notably the pitch bend and the aftertouch.

5.1.4 Virtual keyboard

The keyboard allows testing the sound directly in BRASS 2, with the help of the mouse. When you push on the key, the velocity controller is a function of the position of the mouse on the key. The farther toward the bottom that the key is clicked, the higher the velocity is raised.

On the left of the keyboard, the two modulation wheels allow you to test the reaction of both the pitch bend and the modulation. It also permits us to view their position when controlled by a MIDI keyboard.

When using an external MIDI controller, you can view MIDI message input when the MIDI Input indicator (to the top right of the keyboard) flickers. The notes played are also indicated in color on the virtual keyboard of BRASS 2.

Above the keyboard there is a key range zone, which indicates the playing range of each of the kit instruments after considering the split and harmonization parameters. The playing ranges are represented by horizontal lines between the instrument's playing notes in the keyboard below. The lines are colored according to the color code indicated in the Instrument preset management zone in the left section.

While playing BRASS 2, for each note that sounds in an instrument, a yellow circle will appear above the concerned sounding note on the corresponding instrument's colored line.

5.2 Riff mode Presentation

The screen in Riff mode makes it possible to select, listen, play the keyboard, edit, import and export phrases of brass sections.

Riff mode

The screen breaks up into 4 zones:

- At the **center**, the selection and editing section of the riffs which allow choosing a riff, editing the notes and the real time parameters for each instrument.
- On the **left** side, the configuration of the selected riff with the choice of instruments, length and riff tonality and the buttons used for riff managements (saving, etc...)
- On the **right** side is the configuration part of the instrument and the selected riff, with the spacing and MIDI control parameters.
- At the **bottom** is the keyboard which can be used to trigger riffs, according to the mode chosen by the user in the MIDI configuration menu.

5.2.1 Riff selection, preset management

BRASS 2 contains an ensemble of riffs with several different styles and configurations.

The lower central part of the Riff screen, called "riff explorer" allows us to classify and select the riffs, and contains 4 columns:

Style	Musical style of the riff.
Riff	Displays the riff names, which matches the previous criteria.

You can also move an existing riff by directly click-and-dropping it into another instrument or style bank. To do this, click on the riff you want to move, and move the mouse to the desired destination bank while holding the mouse button down.

5.2.1.1 Management of riff presets

The file menu allows use of the riff presets in different ways:

New Creates an empty riff at the place of the current Instrument/style selection.

Save Saves the selected preset

Save As Saves the preset under a new name

Del Deletes the current selection.
⚠ This operation can not be cancelled!

Import Imports a riff in MIDI format
(see below)

Export Exports a riff in MIDI format
(see below)

5.2.1.2 Import and Export Riffs

It is possible to import and to export riffs in MIDI format thanks to "Import" and "Export" buttons.

A riff can be imported from a MIDI file, but first the file needs to be constructed so that the programmed tracks and controllers coincide with the riff instruments and its parameters.

- The tracks 1 through 4 of the MIDI file correspond to instruments 1 through 4, respectively.
- The different controllers are automatically associated to the following parameters of each instrument:

Parameter name	MIDI controller default association	Associated controller number (from 0 to 127)
Attack	Velocity of the Note	
Pressure	Breath Controller	2
Pitch	Pitch Bend	
Tone	After Touch	
Noise	General Purpose 1	16
Vibrato	Modulation Wheel	1
Vibrato Freq	General Purpose 2	17
Mute Position	General Purpose 3	18

5.2.2 Riff properties and visualization

5.2.2.1 Instrument choice zone

You can choose up to 4 instruments per riff simultaneously, or load a kit preset.

For each instrumental line (which will correspond to an instrument), there are several possible options:

- Choice of an instrument type : trumpet, saxophone or trombone. In order to choose or to change the type of instrument, use the scroll down menu while clicking on the arrow. Choose the option "none" if you want to remove the

instrument. Choosing the option "none" doesn't remove the programmed notes for this instrument.

- Choice of the sound preset, connected to the selected instrument. This menu will allow you to choose among the presets of available instruments in the Live screen.
- The Mute button Ⓜ allows to mute the instrument.

Choice of instruments and presets, and the Mute button

5.2.2.2 Riff properties

Programming Time parameters

Length	Riff length in number of beats.
Tempo	Speed at which the riff will be played in desynchronized mode see "5.2.3 Control of the riff mode via MIDI"
Tune	Riff tonality. A click on the arrow makes it possible to either transpose the current riff to another tonality, or to change the basic riff tonality without transposing it (right-click on Windows, [Ctrl]+click on Mac).

5.2.2.3 Properties of each riff instrument

The properties for each instrument in the riff mode are the same as in the Live mode (see "5.1.3 Right Section – Instrument Configuration"). These properties are loaded during the selection of an instrument preset, but can be modified and saved with the riff. If a preset modification comes in the Live section, you have to reselect the preset in the riff section so that the modifications of the instrument preset will be taken into account in the riff.

5.2.2.4 Spatialization

The spatialization of the riff mode allows us to easily manage the 4 riff instruments at the same time. This is done the same as in the Live mode (see "5.1.3 Right Section -

Configuration of the instrument"), except that one can lay out the four instruments in the space.

5.2.3 Control of the riff mode via MIDI

The MIDI SETUP panel makes it possible to configure the use of a MIDI keyboard and the synchronization mode in riff mode.

MIDI screen settings in riff mode

5.2.3.1 MIDI synchronization

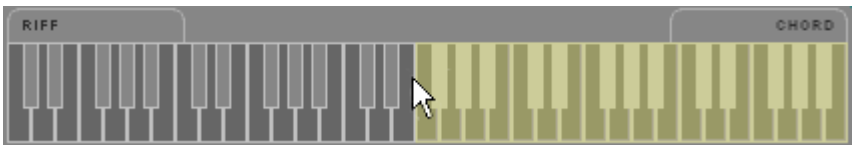
The tempo of the riffs can be configured by clicking one of the "Tempo Sync" options:

Riff tempo	Riffs are played in their original tempo.
Host tempo	Riffs are played in the tempo of the host sequencer.

5.2.3.2 Keyboard and control MIDI configuration

The keyboard is divided into two zones: the **Riff** zone and the **Chord** zone. These two zones can be reversed with the "Mode" option of the MIDI SETUP configuration window.

The limit between the two zones can be moved by clicking on the keyboard of the MIDI SETUP window.



Adjustment of separation between the riffs and chords with the mouse

The "Trigg On" option allows starting the riff while pressing a key in the riff zone or in the chord zone. This option allows, for instance, not starting a riff before having fixed the chords, and transposing the riff in progress without restarting it ("Trigg on Riff"). On the contrary, it is possible to start a single riff in several following tonalities quite simply ("Trig on Chord").

The "Hold Riff" and "Hold Chord" options make it possible to release the pressed key while continuing to play the beginning riff thanks to a combination of keys in the two zones, Riff and Chord.

5.2.4 Editing riffs

When a riff is selected, you can listen to and edit it in the piano roll window, above the riffs explorer.

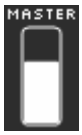
Edit mode of the Riff screen

You find some buttons located in the middle of the Riff screen:

Play		Press on the button to start or stop the playing.
Loop		Press on the button to play a riff as a loop.

Edit 

This button, located in the middle of the Riffs screen, brings up a panel showing the edition tools and real time parameters for each instrument.

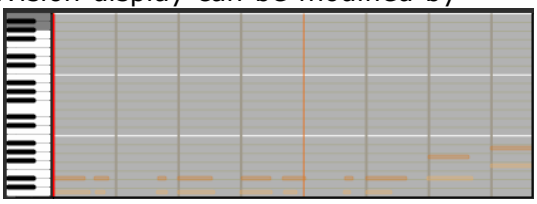
Master Vol 

Sets the general sound volume.

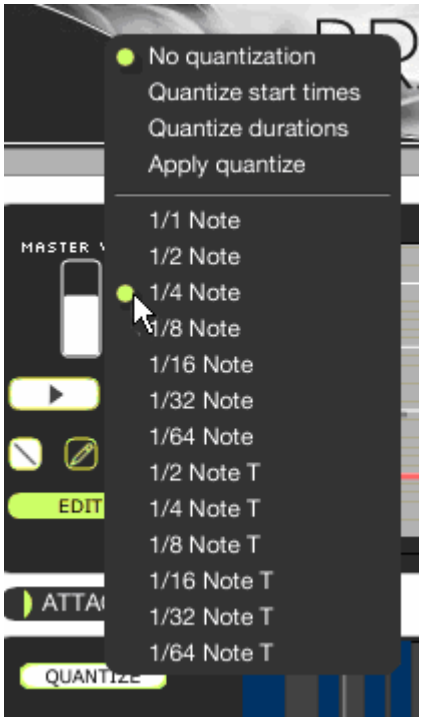
5.2.4.1 Piano roll visualization

The piano roll represents the notes played by each instrument.

The temporal scale is horizontally represented above the piano roll. This bar reveals measure divisions and the time signatures. The time division display can be modified by clicking on the "Quantize" button and by selecting the desired temporal division.



To display only one division per measure, select the "1/1 Notes" option. To view 'n' division per time, select the "1/n Note" option. The options "1/n Note T" displays time divisions in triplets.



Selection of the display grid

5.2.4.2 Zoom

To visualize the different riff sections a bit more precisely, the piano roll can be "zoomed" vertically and horizontally. The two bars located in the bottom right of the piano roll allow the user to select the zoom factor of the two vertical and horizontal scales. The scroll bars on the bottom right of the piano roll allow us to scroll the view.

Horizontal and vertical zoom bars

5.2.4.3 Editing Notes

Three tools are available for editing notes:

Pencil 

Enables you to draw notes onto the pianoroll for the selected instrument, as well as to change the notes length.
Accessible by a click on the corresponding button in editing mode, and by the "Draw/Resize" menu when you right click (Windows) or [Ctrl]+click (Mac) on the piano roll zone.

Select 

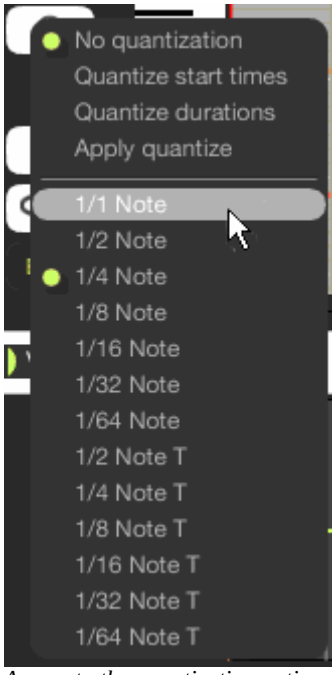
Allows to select one or more notes and to move them on the pianoroll.
Accessible by a click on the corresponding button in editing mode, and by the "Select/Move" menu while the right clicking (Windows) or [Ctrl]+click (Mac) on the piano roll zone.

Eraser 

Erases notes from the selected instrument on the pianoroll.
Accessible by a click on the corresponding button in editing mode, and by the "Delete" menu while right clicking (Windows) or [Ctrl]+click (Mac) on the piano roll.

Just a reminder: once the notes have been inserted, they can be quantized. The quantization menu is accessible by clicking the QUANTIZE button.

The applied quantization depends on the selected resolution value: 1/4 Note, 1/8 Note T, etc.



Access to the quantization options

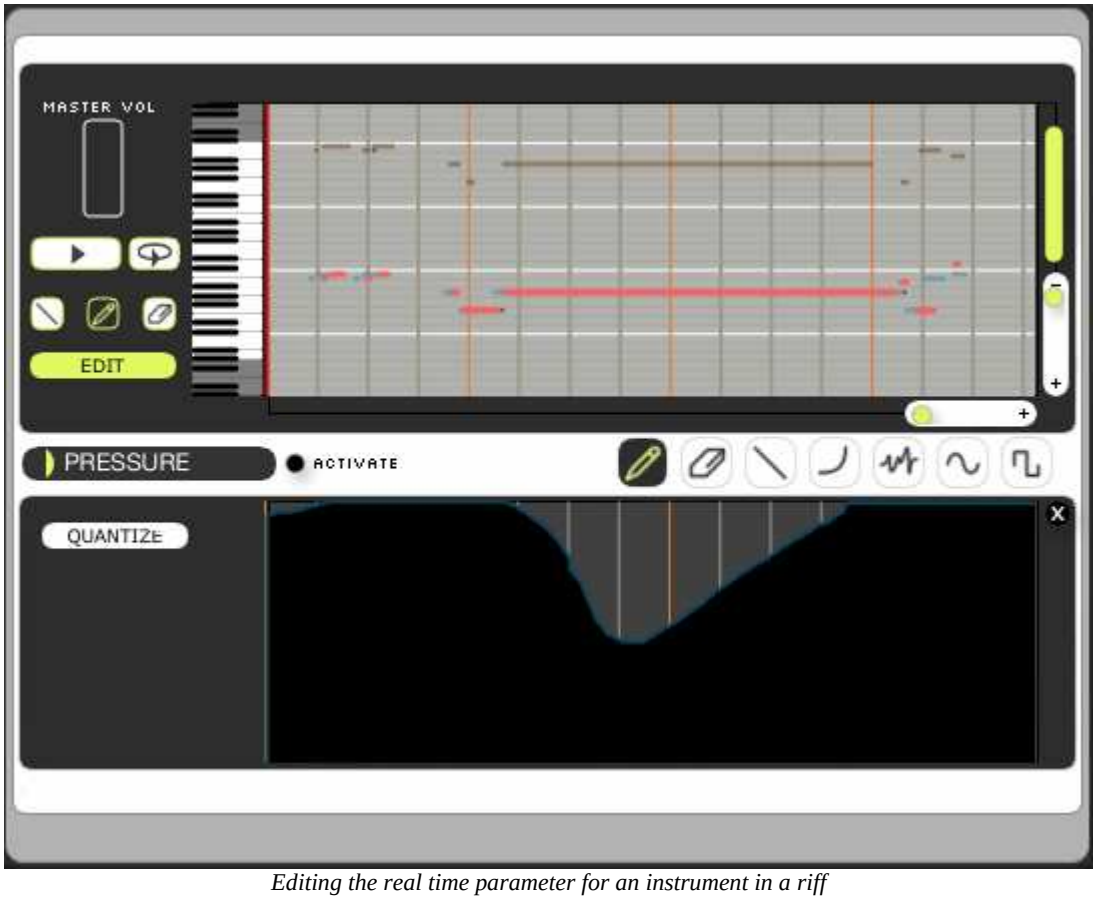
- To quantize the beginning of the notes, click the option "Quantize start time".
- To quantize the note length, click the option "Quantize duration".
- The quantization will be applied when you select the option "Apply quantize" of the menu.
- To reset note placement, select the option "No quantization".

5.2.4.4 Editing the real time controls

The real time controls available in the live section (Attack, Pressure, Pitch, Tone, Noise, Vibrato, Vibrato Frequency, and Mute) can be separately edited and saved for each instrument in the riff.

To open the editing panel of the real time controls, select the EDIT button in the middle of the Riff interface. This same button, once the panel is open, changes into a CLOSE button and allows you to come back to the riff explorer display.

The editing panel makes it possible to select one of the parameters, to activate its control in the riff ("Activate" button) and to draw the controls with different tools. Those tools are the same as those used for automation in live mode (See "5.1.1 Middle Part – Controlling Parameters in real time" Automation of the live parameter).



Editing the real time parameter for an instrument in a riff

When a real time control is deactivated in the Riff interface, the parameter varies according to the original sound preset, in the same way as the Live interface. This means that the starting value and the original automation in the instrument preset are taken into account. When the option "Activate" is selected, values drawn in the Riff interface of the parameter replace the original instrument preset values.

6 USING BRASS IN MIDI

6.1 LIVE Mode

In the Live mode, using a MIDI controller is indispensable if you wish to truly play your instrument or kit. A MIDI controller is a physical interface, a control keyboard or a pedal for example, that permits control of your software by a MIDI protocol device.

One of the major interests of the physical model synthesis that are proposed in BRASS 2 is the fact that they offer a control instrument close to that which we find on the original instrument.

Working on the keyboard will be more practical and useful for the studio musician that searches to compose in a well-known environment. Controlling the pressure by a breath-controller will give a degree of additional realism. Controlling through pedals, joysticks, etc. also permits enjoyable ease in your search for realism and expressivity.

Using a MIDI wind controller like the Akai EWI allows the most intuitive control over the physical models by going back to the original playing modes of these instruments, and sending by MIDI messages the performance parameters of your playing.

6.1.1 Using a MIDI keyboard

A MIDI keyboard literally permits you to play an instrument proposed in BRASS 2 in the same manner an instrumentalist would.

Example of a MIDI control keyboard

In using the possibilities of control offered by the keyboard (velocity or after touch for example) you're going to be able to get closer to the level of expression of a master instrumentalist on the trumpet, saxophone, or the trombone.

- The velocity is the force with which the keys of the keyboard are pushed. The MIDI keyboards of a certain level can transmit this information to BRASS 2 which will transform itself and send back the sound associated with the pressure.

- The aftertouch is a function that certain MIDI keyboards offer. It is the measure of pressure value on the keys over a period of time. In effect, you can decide to push strongly on the keys, then release, and then push with a different amount of force, etc. The keyboards that save the variations permit a control very close to BRASS 2.

Other controls are proposed for the MIDI keyboards, for example by the means of a pitch-bend wheel or modulation wheel.

- The **pitch-bend wheel** which (all things being normal) should come back to the center, is by default assigned to the pitch of the note played.
- The **modulation wheel,** that doesn't come back to the center, can be used for controlling all kinds of parameters.

In the section MIDI PRESET of BRASS 2 you can decide to allot the diverse controls offered by the keyboard to the playing parameters of the software. The ideal is having a maximum of controllers assigned to a few free modulations in real time.

MIDI-Settings Panel

6.1.1.1 The MIDI adjustment configuration panel

Before making your adjustments, begin by selecting the type of controller you wish to use (if you haven't already done this in the First Run dialog that opened when you first executed Brass 2). Three choices are possible:

Keyboard	Standard MIDI keyboard
Keyboard + BC	MIDI keyboard with a breath controller module

EWI	the famous dedicated controller from Akai

Once the controller is selected, you can load a control preset for each type of instrument.

The control preset is a set of "connections" from a MIDI control source(velocity, BC, aftertouch, CCs, etc.) to one of the instruments' parameters(attack, pressure, pitch, etc.). These "connections" define the way in which you control a trumpet, a sax or a trombone preset using your MIDI controller.

The **connections** given in the presets can all be modified at your convenience. For instance:

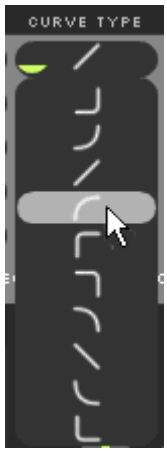
- Connect the Velocity to the Attack and from then on it will be the force with which you push the key that decides the attack of the note.
- If you link the Aftertouch to the Pressure, you can control the pressure sent to the instrument simply by pushing the key.
- Same way, connect the Modulation Wheel to the Noise, with a negative curve value. You will obtain an high breath level when playing softly on the keyboard, and inversely, the breath will disappear when you play louder.

For more precision in the control of your editing, it is possible to set the maximum and minimum limits of the editing in order to determine the range of action of the parameter. To do this, close the window "MIDI Settings" and return to the principal screen. Click on one of the 2 small black arrows situated around the parameters to define the extremes of you editing. A horizontal white line marks the editing threshold you just defined.

The nature of the **response curve** chosen for each connection can have an affect on the final results.

In the following example, make sure that you have connected the velocity of the keyboard to the pressure parameter of the model saxophone. A curve of this nature means that one weak push permits us to immediately attain one dominant pressure value. In an inverse sense, the curve implies that one must push strongly on the key to attain the true pressure needed.

Adjusting the curves depends upon your keyboard and on the results that you wait for in the playing phase.



Possible Response curves for the MIDI control parameters

Taking another example, connect the modulation wheel on the breath "Noise" with a backwards curve value . Doing so, you obtain an important breath level when you play softly on your keyboard, and inversely the breath disappears when you play strongly.

Each connection can have a variable influence depending on its **Connection Amount** value.

Do not forget that, as seen in chapter 5.1.1, it is possible to adjust the inferior and superior limits of the modulation in order to have a better control. This of course is accomplished through the adjustment of the two small black arrows that surround the adjustments of the playing parameters in real time (pitch, pressure, timbre, etc.).

The **Comments** text box is used to give explanations or suggestions for using the respective MIDI control preset, such as: *"Expert preset, aftertouch growls and modulation changes timbre, no vibrato control (use pitch bend for manual vibrato)".*

6.1.2 Using a Breath Controller

The MIDI breath controller is an ideal tool for augmenting the realism of playing BRASS 2. If you use such a controller, choose option "Keyboard + BC" in the menu CHOOSE YOUR CONTROLLER in the MIDI PRESET screen.

Breath controller and MIDI keyboard combination

Thanks to the breath controller, you can control the intensity of pressure with more precision or, for example, make vibrato effects; thus, you will have mastered the intensity and speed.

⚠ *When in Breath Ccontrol or EWI modes, no sound is produced when notes are played if there is no breath controller value, i.e. if you do not blow into the controller.*

In order to use the breath controller, connect the source of the same name to the

modulation destination(s) desired on the MIDI Settings screen. Of course, it is the attack and the pressure that one must, before all else, link to the breath-controller. It is by the means of the keyboard that you will normally decide the pitch of the note.

You might also want to link breath values to the noise parameter for even more realistic effect!

As in the other sources of modulation, you can adjust the action curve positively or negatively.

6.1.3 Using an EWI or EWI USB

The Akai EWI and EWI-USB are excellent MIDI controllers to use with BRASS 2. The "EWI" mode is pretty much like the "Keyboard + BC" mode, but with specific settings. You also have a button for editing the EWI-USB.

The Akai EWI dedicated controller

6.1.4 Assigning the external MIDI controllers

They permit the assignment of one or several modulations to some non-described elements from the beginning in the list of dispensable MIDI controllers (a potentiometer or a MIDI keyboard fader, a MIDI joystick, a MIDI pedal, etc.).

You can play and control BRASS 2 from an external MIDI sequencer, such as Cubase or Logic Pro for example.

This option permits you to program the melodic lines in Live mode and construct an arrangement of brass in real time. You can also program control automations in order to make the sequence more realistic. Automation is the act of programming and saving the evolution of one parameter in time.

For example, let's make automation on the pressure ("swell" in the language of wind instruments). For this, we assign the pressure to one MIDI track of your sequencer, and then draw the curve of the swell corresponding to the note played.

We'll reference you to chapter 7 for more training on the usage of BRASS 2 instanciated in a sequencer.

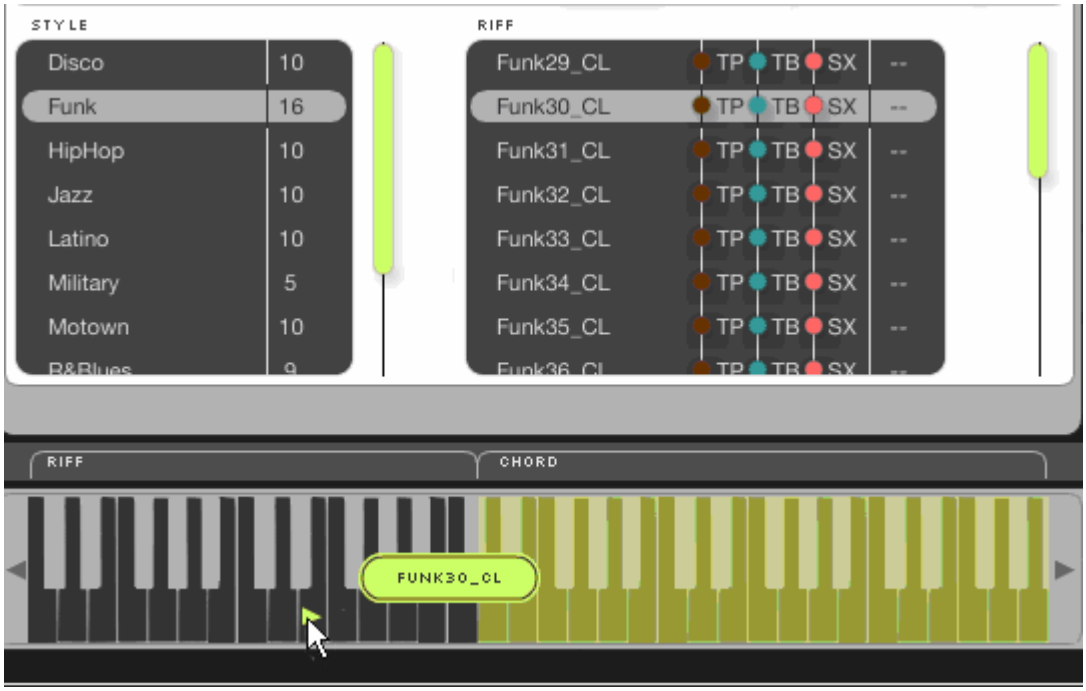
6.2 Riff Mode

6.2.1 Playing riffs on a MIDI keyboard

In Riff Mode you can select, modify, or program brass riffs. Thanks to the MIDI protocol, it is possible to launch riffs from your keyboard. To do this, slide the riffs of your choice onto the notes of the virtual keyboard. Next, play them by pushing on the corresponding notes on your MIDI keyboard.

- In the initial configuration, launch the riff on the left portion of your keyboard

(from C1 to C3) and choose their transposition mode by clicking on the right portion of the keyboard (beginning at D3).



Distribute the riff on the left portion of the keyboard

- To delete one or several Riffs, right-click on it in order to choose the "Remove" option.

Right-click on a riff to delete it

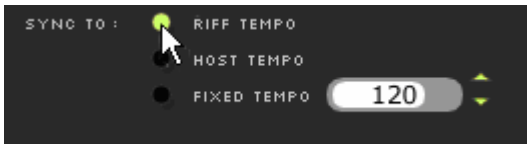
6.2.2 Riff control through a MIDI sequencer

Two main features must be presented here: the synchronization of riffs with an external sequencer, and the possibility of importing or exporting riffs via MIDI (notably for programming riffs in a sequencer).

6.2.2.1 Riff synchronization with external sequencers

One of the useful attributes of this mode is the ability to play the riffs with an external MIDI sequencer (by opening BRASS 2 in VST mode for example). You can launch the riffs by playing notes in a sequence created and synchronized on the host sequencer.

In this case, choose the option "Sync to Host Tempo", in the MIDI SETUP window so that the riff is synchronized in tempo with the MIDI sequencer.



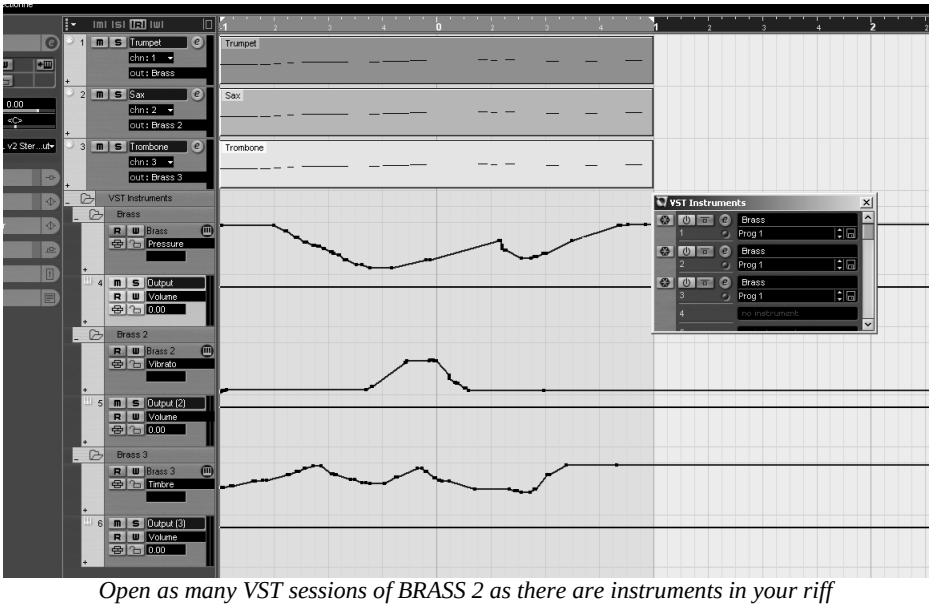
Synchronization modes

In order to save a maximum charge on your CPU, we highly suggest using Riff mode as much as you can when you wish to play a brass section with a MIDI sequencer rather than opening several sessions of BRASS 2 in Live mode.

6.2.2.2 Importing/Exporting riffs

You can also compose riffs in MIDI directly by opening several sessions of BRASS 2 in your sequencer, as long as the number of VST plug-ins matches the number of instruments in your riff. Choose "Play" mode to hear the sound of each instrument and assign the necessary connections to the sound controls. You can create the sequence of notes then, make the control automations that correspond to the instrument playing.

- Make sure to create as many tracks as there will be instruments and reserve channels 1, 2, 3, and 4 to assign to 4 instruments.



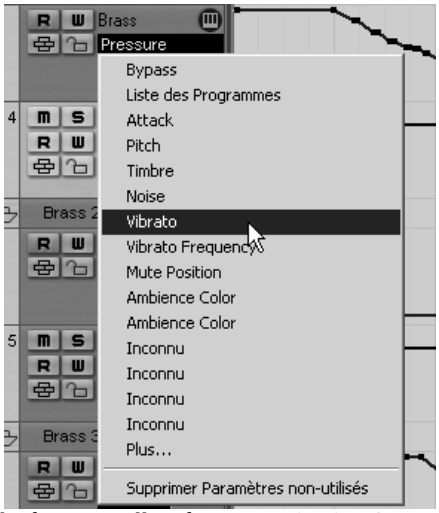
Open as many VST sessions of BRASS 2 as there are instruments in your riff

- Save the results of this riff as a "MIDI file" so you can import it in Riff mode.

You will find the same configuration as in the arrangement of your host sequencer (choice and number of instruments, notes and automations assigned to the correct parameters).

You can also export a riff included in BRASS 2 as a "MIDI file" to inject it into a host sequencer; this allows you to re-work certain portions easier or to re-play certain portions directly.

Only the controllers listed in the MIDI PRESET page or in the principal page of "Play mode" will be taken into consideration by automation in a MIDI sequencer.



The free controllers for automation in VST mode

7 MODES OF OPERATION

7.1 Stand-alone

The standalone application allows the use of BRASS 2 outside of any host application. You can open one or several instruments, and play directly with the help of a master MIDI keyboard or external sequencer on a separate computer.

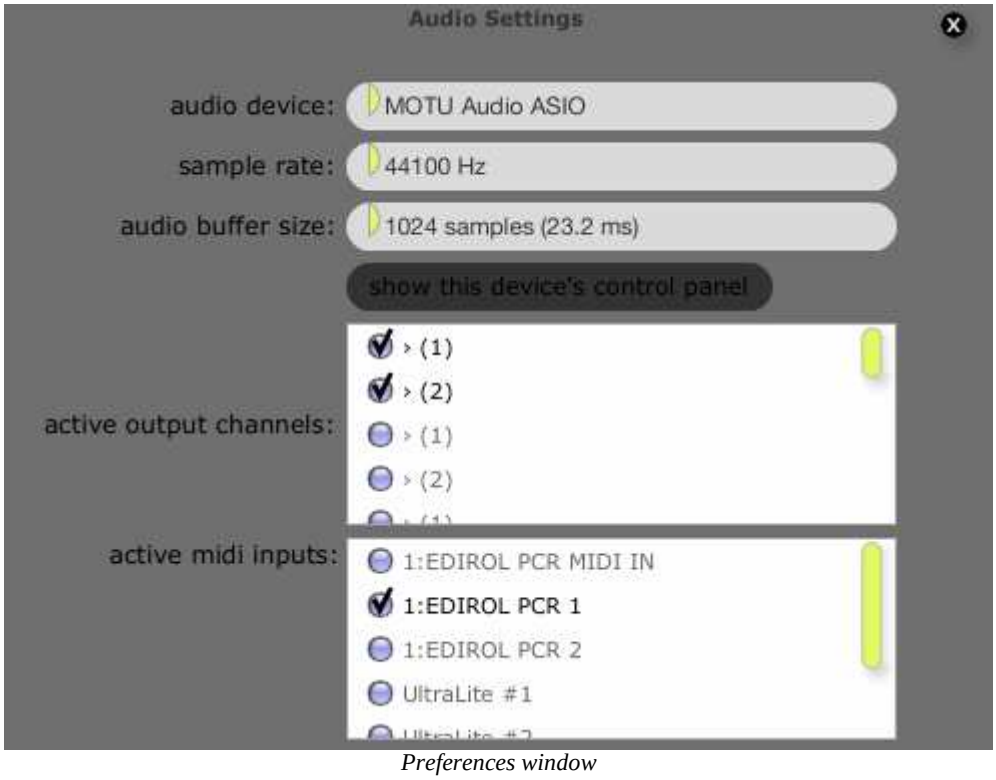
7.1.1 Launching the Stand-alone application

- To launch the standalone application on Windows, go into the menu *Start > Programs > Arturia > BRASS 2* and choose BRASS 2.
- On Mac OS X, open the folder: */Applications/Arturia BRASS 2/* and double click on the application icon BRASS 2.

You can also double-click on a previously saved document in order to open the corresponding configuration of the BRASS 2 application. This will be described in Section 6.1.6 of this document.

7.1.2 Preference Configuration

- In order to access the preferences window, click on the menu **Settings**. A pop-up window allows you to configure the global preferences of the BRASS 2 application. These are automatically saved.
- If you have an EWI-USB and you want to configure it using BRASS interface (the MIDI PRESET page, the "EWI setup" button), you don't need to select the EWI as the MIDI output port as it is detected and selected automatically.



Preferences window

audio device	Select the driver corresponding to the sound menu that you wish to use.
sample rate	Choose the sampling frequency among those proposed by your sound menu. Note that a large sampling frequency will demand increasing processor performance on your computer.
audio buffer size	Here, you can configure the optimal audio latency as it relates to performance of your sound card. Be careful with this setting, as a latency setting lower than your system can support can cause unwanted artifacts in the sound.
configuration panel	This button opens your audio card's configuration panel, if it is available. *(Windows only with ASIO protocol)*
active output channels	Allows you to select the main audio outputs for BRASS 2
active midi inputs	List of MIDI controllers detected by the system; select one to control BRASS 2.

7.1.3 Saving the configuration

- The configuration is saved automatically, as well as the last loaded kit and riff, when BRASS 2 is closed. These settings are then loaded at next startup.

7.2 VST

7.2.1 Installation

7.2.1.1 Under Windows

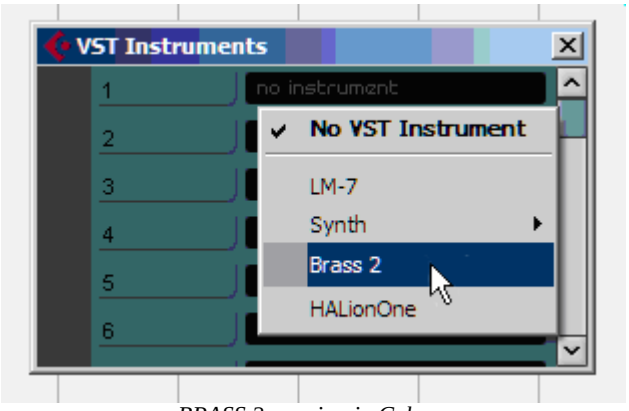
During installation, select the box "VST" among the proposed format choices of plug-ins. The installer will automatically detect the VST folder of the instruments used by Cubase. In the case of another compatible VST sequencer, such as Logic Audio, you will have to select another folder that shall be scanned.

7.2.1.2 Under Mac OSX

The VST plug-in is automatically installed in the folder of the system corresponding to the VST instruments: **`/Library/Audio/Plug-Ins/VST/`**
The VST plug-in will be usable by all your VST host applications.

7.2.2 Instrument use in the VST mode

The opening of VST BRASS 2 plug-ins is the same as opening all other VST plug-ins. Please consult the instruction manual of your host sequencer for more specific information. Under Cubase, open the menu VST Instruments, and choose BRASS 2 in the rack.



BRASS 2 opening in Cubase

7.2.2.1 Connection to a MIDI track

So that BRASS 2 can play information coming from a MIDI track, you have to choose a MIDI track and select BRASS 2 as MIDI output of this track. See the picture below for more detail on how this is accomplished.

Connection of a MIDI track to BRASS 2

The events played on a MIDI keyboard are recorded by your host sequencer, and now you can use the MIDI editing possibilities of the sequencer to control any parameter with BRASS 2.

7.2.2.2 Saving of presets

When the session/project is saved, BRASS 2 is saved in its last mode of operation, with all modifications intact. For instance, if you were working on a "P1" preset in which you have modified parameters (without saving them as a separate voice in the plug-in itself), at the next opening of the piece, BRASS 2 will load the "P1" preset and the modifications.

The drop-down menu which the VST sequencer allows you to save a new voice is of course usable with BRASS 2. However, it is highly advised to use the BRASS 2 internal menu: the presets saved in this way are usable in any other mode (standalone or other sequencer), they can be exported and exchanged more easily, and they will remain compatible with the future BRASS versions.

7.2.2.3 Automation

Automation works the same with BRASS 2 as with any VST plug-in (for more details about automation, refer to the VST sequencer documentation).

7.3 Audio Unit (Max OSX only)

7.3.1 Installation

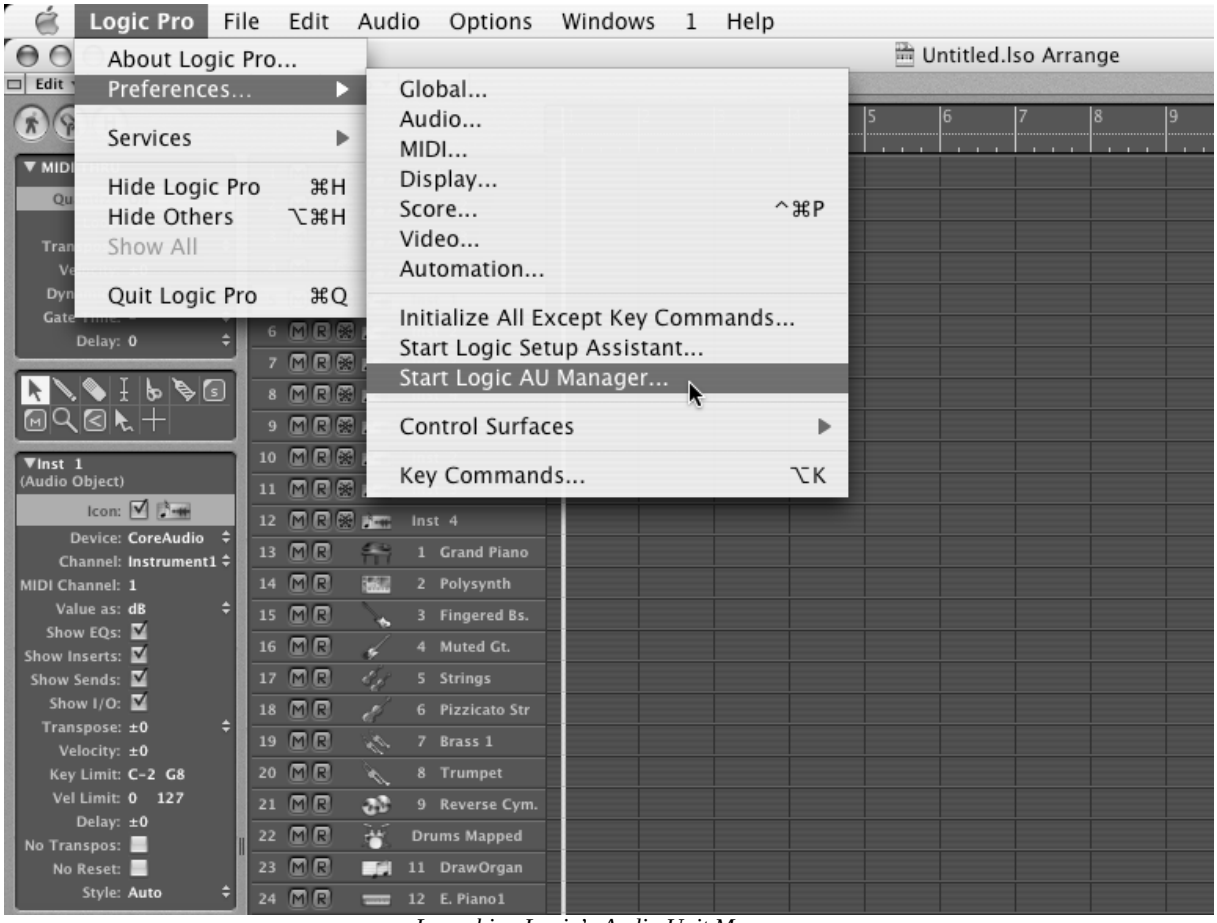
The Audio Unit plug-in is automatically installed in the folder reserved for this purpose, in: **`/Library/Audio/Plug-Ins/Components/`**

7.3.2 Use in Logic Audio

- Select an instrument track.
- On the part of the mixer corresponding to the selected track, click on the button "I/O" to obtain the list of plug-ins, then select Stereo > AU Instruments > Arturia BRASS 2.

Opening BRASS 2 in Logic

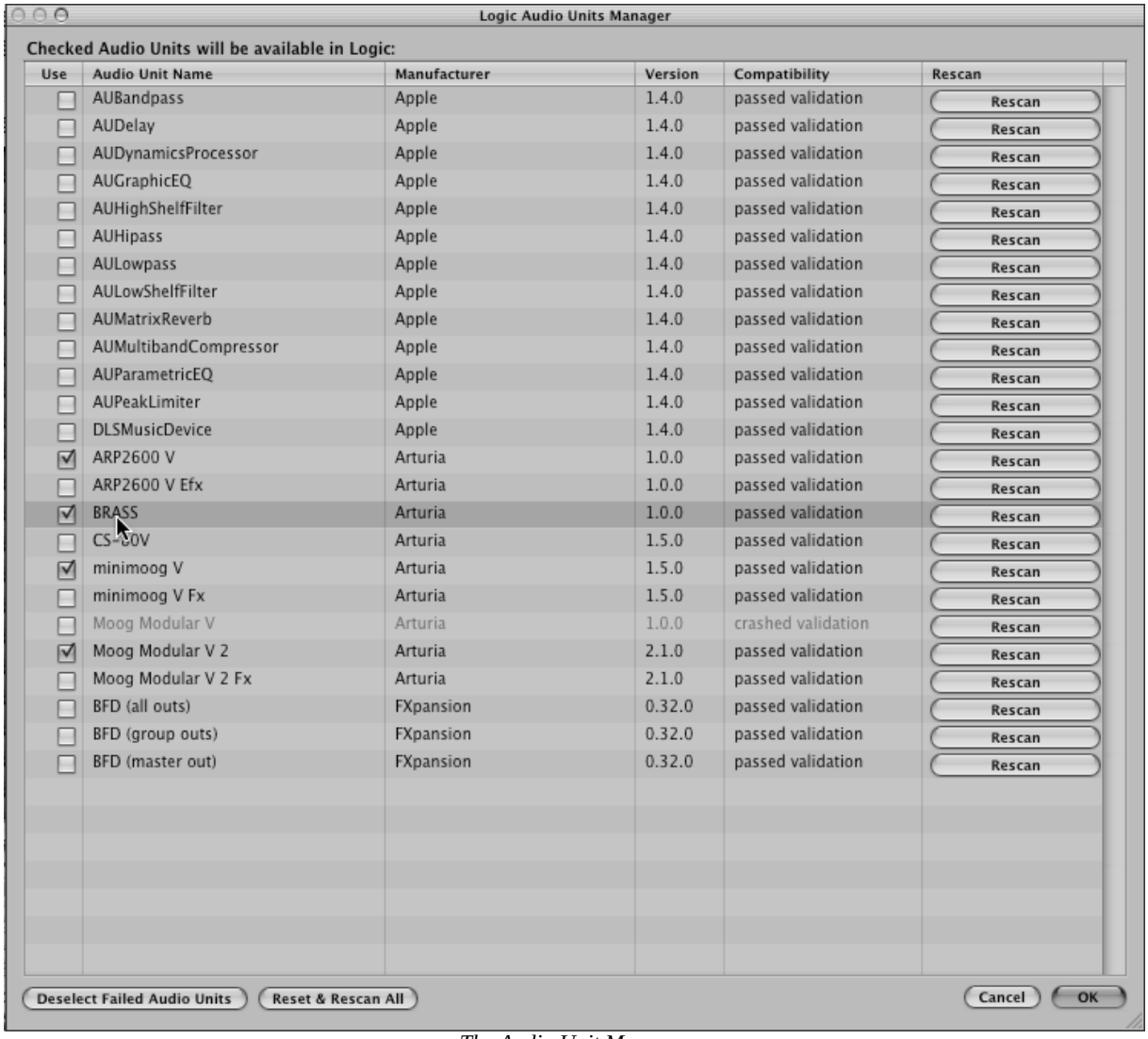
Since version 7, there has been an Audio Unit plug-in manager in Logic. To launch it, click on the menu Preferences > Audio Units Manager.



Launching Logic's Audio Unit Manager

This Manager allows us to see the list of the available plug-ins, to test their compatibility with Logic, and to activate or de-activate them.

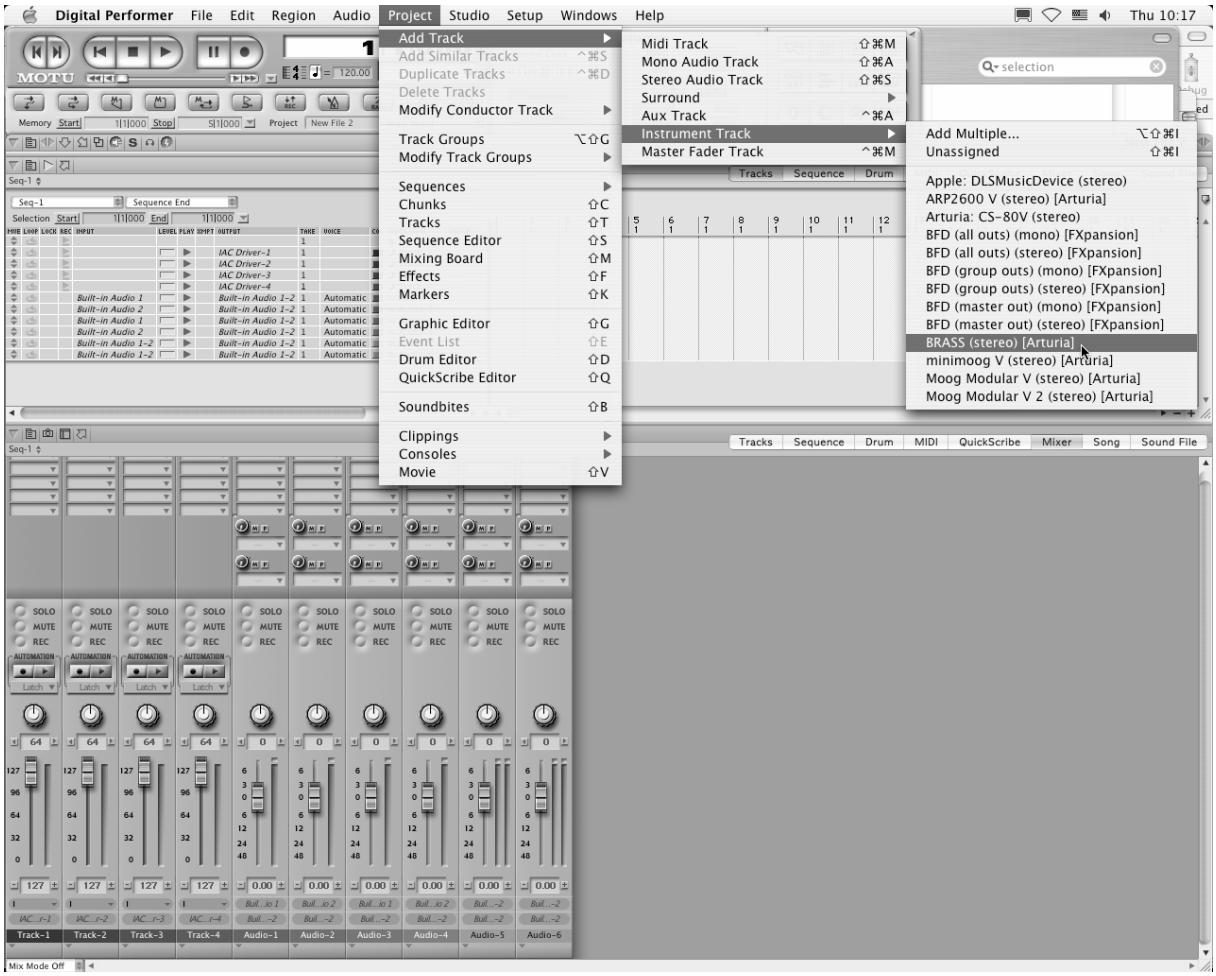
If it happens that one of the Arturia plug-ins poses a problem in Logic, start by checking that this plug-in has passed the compatibility test, and that it is actually selected for use.



The Audio Unit Manager

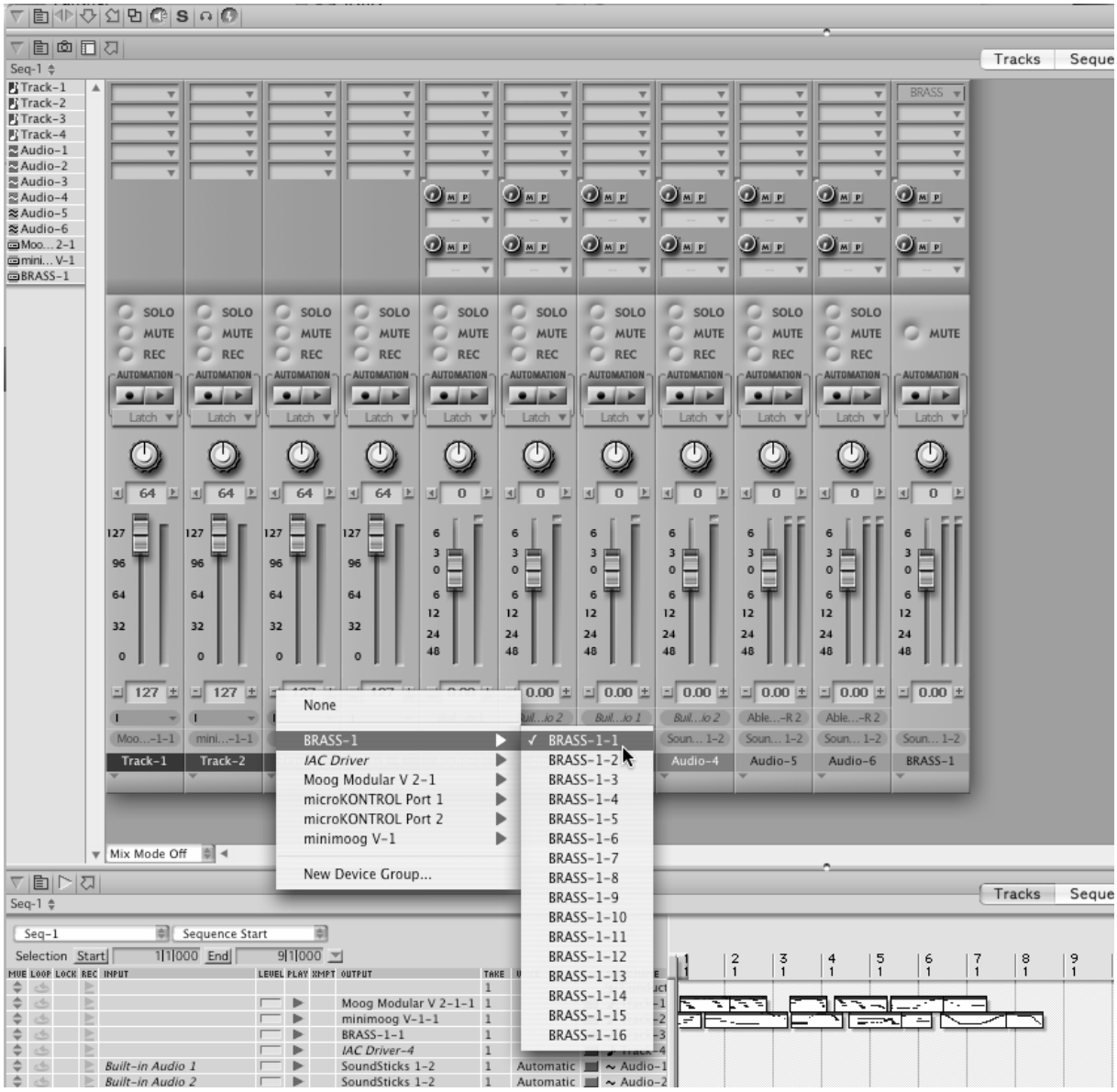
7.3.3 Use in Digital Performer

- To add an instrument, choose the menu Project > Add Track > Instrument Track > BRASS 2.



Opening BRASS 2 in the Digital Performer

Once you have added this instrument, it's possible to assign a MIDI track to it. In the connection menu of the MIDI track, select the instrument and the MIDI channel that you want to use.



Connection from a MIDI track to BRASS 2

7.4 Pro Tools

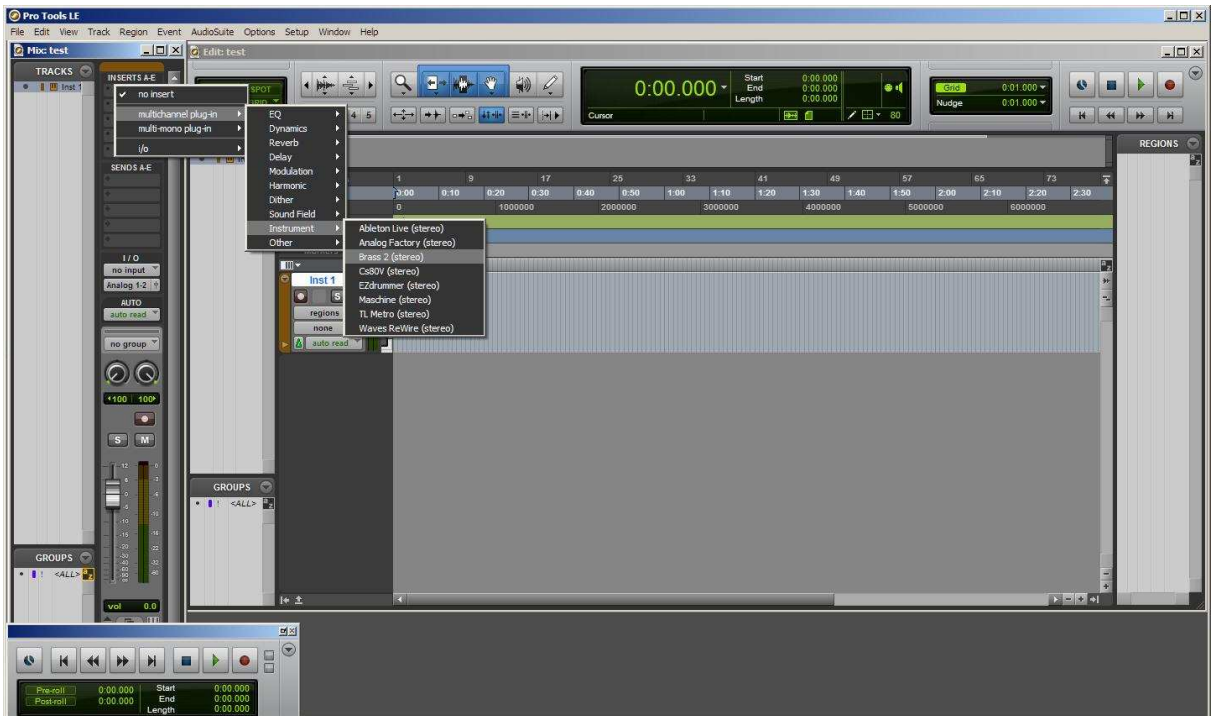
7.4.1 Installation

- On Mac OSX, the plug-in is directly installed in the folder reserved for the Pro Tools plug-ins, in : **`/Library/Application Support/Digidesign/Plug-Ins/`**
- On Windows, at the time of the installation procedure, select the RTAS plug-in among the proposed choices of plug-ins. Then, when the system asks, indicate the folder in which the other RTAS plug-ins are located. Usually, the path is : **`C:\Program Files\Common Files\Digidesign\DAE\Plug-Ins\`**

7.4.2 Utilization of the plug-in

7.4.2.1 Opening of the plug-in

Access to the BRASS 2 plug-in is like all other plug-ins, via an audio track insert:



Opening BRASS 2 in Pro Tools

BRASS 2 must be loaded on an audio stereo track. We can now make BRASS 2 sound by playing with the mouse on the virtual keyboard.

7.4.2.2 Connection to a MIDI channel

So that BRASS 2 can play the information coming from a MIDI track, you have to connect it to a MIDI channel via the appropriate menu.

We can thus also control BRASS 2 from a control keyboard (see the Pro Tools menu for more information on plug-in connection).

7.4.2.3 Saving the presets

When the session is saved, the status of BRASS 2 is saved as it is, even if its programming does not correspond to the preset. For example, if you are working on a preset "P1" in which you have modified the parameters (without saving them in the plug-in itself), the next time you open the session, BRASS 2 will charge the "P1" preset plus the modifications.

The "Librarian Menu" of Pro Tools is able to be used with BRASS 2 like with all other plug-ins. Nevertheless it is highly recommended to use the internal BRASS 2 menu: with the presets saved like this, they are usable no matter which mode (standalone or other sequencer), and they can be exported, exchanged more easily, and will stay compatible with the future versions of BRASS.

7.4.2.4 Automation under Pro Tools

The automation function with BRASS 2 like with all RTAS/HTDM plug-ins (make reference to the Pro Tools documentation for more details on the plug-in automations).

8 RESEARCH

8.1 Trumpet and Trombone

8.1.1 Trumpet

8.1.1.1 How does it work?

The trumpet is a wind instrument in the brass family, composed of a mouthpiece and a curved brass tube/cylinder that uses three valves to change the length of the tube, and therefore the selection of notes that the player can choose. In the condition where sound is formed to create a note with a well defined frequency, operation of the trumpet can be described as the synchronization of several oscillations or waves at the same frequency: the oscillation and vibration of the lips of the trumpeter (which open and close, for example 440 times a second for the A of tuning fork), the waves of pressure in the interior of the mouth and lungs flowing into the instrument, and then from the instrument outward to create a musical sound (to be heard by the ears of listeners). This common frequency allows the ear to distinguish notes played from each other (each note corresponding to a particular frequency).

8.1.1.2 A little musical physics… a little instrumental practice…

When a trumpeter wants to play a note, he presses his lips together, increases the air pressure in his mouth and lungs, and contracts his diaphragm (the muscle allowing inhaling and exhaling). If the pressure is strong enough, the lips open temporarily and a puff of air escapes into the mouthpiece. The acoustic disturbance generated by this small release of air at the opening of the lips spreads out along the instrument and is refracted through the internal sections of the instrument. Thus, one reflected wave brings back the energy necessary to the lips in order to develop and eventually sustain the oscillation. When the resonance frequency from the lips (the frequency at which the lips would vibrate if the instrument wasn't there) is close to the frequency of instrument resonance (the frequency at which the internal pressure oscillates if the lips were not there), the exchange of energy is constructive and allows a note to develop.

As with other brass instruments, the production of trumpet sound depends on the cooperation between the lips of the musician and the instrument. The frequency of oscillation (thus the sound!) is at the same time controlled by the instrument resonance and the frequency of the lips. Thus, two possibilities are presented for the trumpeter to choose a note:

- The trumpeter can increase or diminish the frequency of sound by modifying his embouchure (the embouchure is what we call the ensemble of lip and face muscles used in playing an instrument). In practice, he stiffens his lips to increase the resonance frequency. It is like this that the trumpeter can produce different notes with the same fingering. It is the bugle principle which, even without a valved instrument, allows one to play all the notes in a harmonic series. Try to modify the "pitch" parameters in BRASS 2 and you will obtain the exact same results.
- The changing of a note can equally be achieved by increasing/diminishing the resonance frequency of the instrument. One needs only to modify the position of the three pistons. By pushing the pistons one increases the length of the pipe that the trumpet is made of and in effect lowers the resonance frequency. Pushing the n°1 piston lowers the frequency one half step, n°2 one full step, and n ° 3 one and a half steps. The effect is increased when you press several pistons

simultaneously: thus the resonance frequency of a trumpet with all pistons held down is three steps lower (0.5+1.0+1.5) than a trumpet with all the pistons released.

By playing notes in these two ways, it is possible for the trumpeter to play all the notes of the chromatic scale. It is the same when you play a note in BRASS 2; it is good that one or the other of these options is put into place by the model.

8.1.1.3 Brassy sounding… Brass!

One of the essential characteristics in the performance of brass instruments is their ability to transform and enrich the harmonic content produced when the volume level augments. We're talking about a metallic, bright, or even brassy sound. This transformation of sound is principally due to the progressive distortion of acoustic waves as they spread into the body of an instrument. The phenomenon is similar to the formation of ocean waves, nearly winding in high tides, and that progressively crash into one another while approaching the shore until surging and breaking onto the beach. The equivalent of crashing for acoustic waves is the formation of shock waves in the interior of the instrument. It is this spectacular distortion of pressure waves that is identified by the ear and associated with a brass sound. To experience this with BRASS 2, breathe stronger and stronger by increasing the "pressure" parameter and listen: the sound is not only louder, it is also richer and colorful, in effect…brassy!

8.1.2 Trombone

The functioning of the trombone is very similar to that of the trumpet. The main difference is that while a trumpeter is limited to a finite number of ways to elongate his instrument (only 8 possible positions) the trombonist has a nearly-infinite range of possibilities by setting the position of the slide at will.

One of the playing techniques unique to the trombone is due precisely to the possibilities offered by means of the slide; the trombone can play a glissando like no other. Imagine for example that the musician wishes to perform an ascending glissando: starting with a precise note, progressively shorten the length of the instrument (and thus increase the resonance frequency) by pulling the slide inward. But this is not enough! As we have said for the trumpet, the sound frequency is influenced by the resonance frequency of the instrument and lips. Thus, the trombonist must increase the resonance frequency of his lips at the same time that he is moving the slide. This technique is very delicate and takes a lot of work to master with the real instrument, but luckily, the technique is put at the disposition of all BRASS 2 users in an easily accessible way.

8.2 Technology used with the Trumpet and Trombone

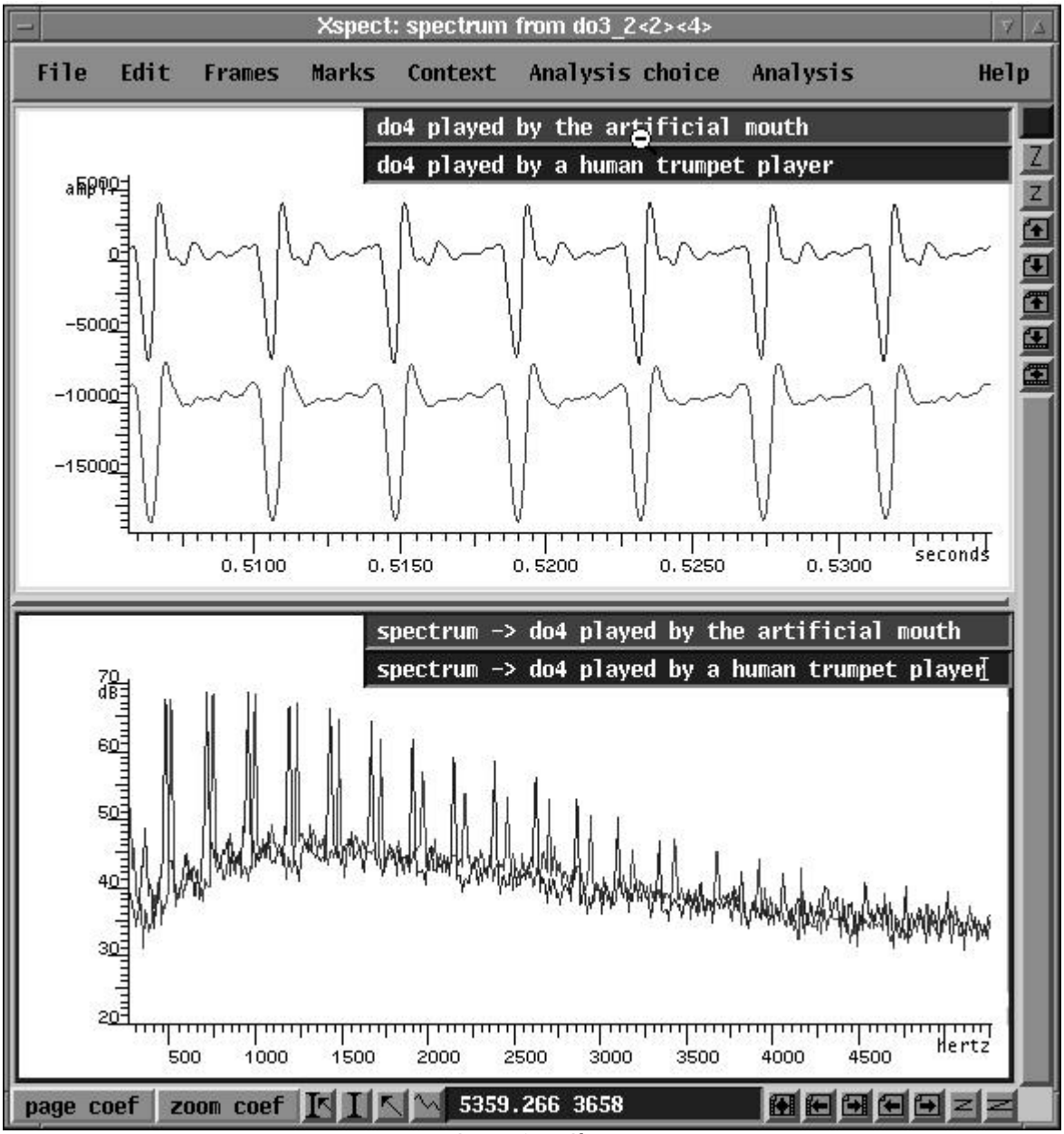
The trumpet and trombone models were developed by the researchers at IRCAM who based all experiments on experience with real instruments. Through a few examples we will see how the models used in BRASS 2 benefit from the most recent research in musical acoustics.

8.2.1.1 The acoustic signature of the instrument

In order to define instrumental behavior, measures of acoustic impedance and impulse response in an anechoic chamber were performed. This method acts as a precise measure of the echo produced by a trumpet in response to an acoustic impulse: It is in some way as though we shot a rifle in a room in the form of a trumpet or trombone and saved the echo or reverberation returned by the room. The impulse response on an instrument is made up of its acoustic signature and is an integral part of the physical model used in BRASS 2.

8.2.1.2 The virtual trumpeter/trombonist

To define and shape the essential role held by a musician, an artificial mouth was constructed: the experimental device was fed in compressed air and possessed latex lips that really played the trumpet. It is, in any case, much easier to measure the pressure at the interior of an artificial mouth than to convince a real musician to pierce his cheek! One other advantage of the artificial mouth is to allow those conducting the experiments to modify one parameter of the cheek at a time and study the consequences of the sound produced at his leisure (an artificial mouth doesn't need to breathe). It is ideal for dissecting the physical mechanism playing a part of the production of sound and allows us to propose some convincing physical models in BRASS 2.



Comparison Chart

8.2.1.3 The Physical Model

The physical model is the ensemble of equations that explain in mathematical language the different phenomenon in physics, and are well-understood thanks to the studies of

the previously mentioned researchers. In fact, the sound produced by BRASS 2 is the solution of equations calculated more than 44,000 times a second! Indeed, with a physical model the sound is always in evolution; we told you in the introduction that you would be impressed by the liveliness of our manual. Since the physics of the most up to date studies are included in these equations, the model (and thus the sound) reacts in the same way as the real instrument.

In this way the physical models included in BRASS 2 permit us to simulate innumerable possibilities of playing on the instrument, naturally reproducing the sound effects made by changing the valves and slide position, changing the tension in the lips of a trumpeter, increasing the breath and thus the level of sound (effecting the brass sound)… The sound of turbulence from the release of air in the instrument is equally modeled on an analytical base of real sounds.

8.2.1.4 Why is BRASS 2 incomparably easier to use?

The possibilities offered by the model are comparable to those of the real instrument, but the practice of the virtual instrument doesn't require the long and difficult training demanded by the real instrument. Due to this, with BRASS 2 you do not need to know how to use breath control or tighten your lips to make a note. Why? We have, in a way, taught the model how to produce notes or desired effects while playing naturally from a keyboard. This setting of the model parameters has also benefited from recent research since an optimization procedure was specially developed. The algorithm starts as a beginner might: it tests thousands of different values, at first randomly, but at its rate of progression, it allows chance to intervene less and less in its training. By the end, the algorithm has determined the optimal values for the model parameters to produce the varied notes and effects. You have nothing more to do than to be inspired.

8.3 The saxophone

8.3.1 Musicians Technique

8.3.1.1 How does it work?

As is true with other wind instruments, while playing a note on the saxophone two elements of the instrument oscillate in synchronization: the air stream (contained in the resonator) and the reed vibrating on the mouthpiece. These two components are not necessarily at the exact same oscillation frequency and can also be different from the note played; this means that if we played only the reed (by removing the mouthpiece from the rest of the instrument) we obtain an extremely sharp sound (a false note), generally above any other note that the saxophone can produce. We can produce a sound specific to the resonator as well by tapping on the head stock from which we have removed the mouthpiece. The sound created by tapping on this the instrument will be rather short, and its pitch will depend upon both the position of each key (open or closed) and slight variations in the manner of fingering the notes. The playing frequency of the saxophone is, therefore, strongly influenced by the configuration of the resonator (size, fingering), but the reed and the pinch of the lips on the reed also play a large role on the pitch of the note produced.

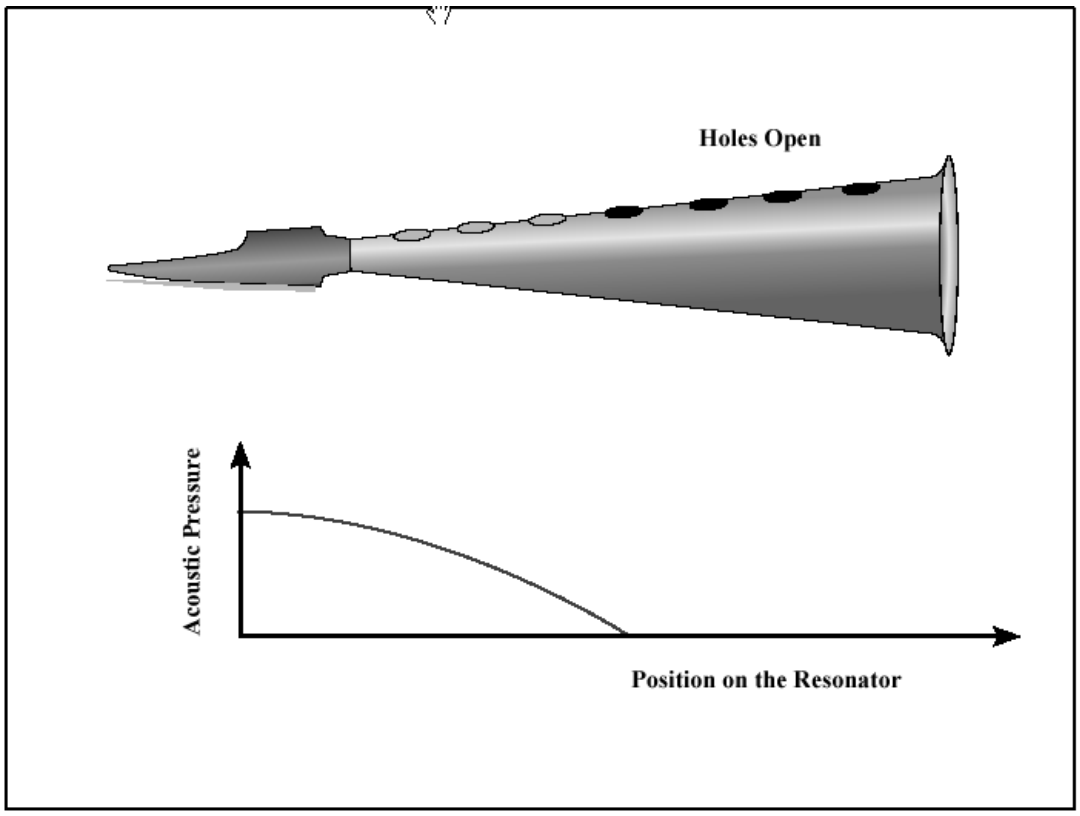
8.3.1.2 Pitch of the note

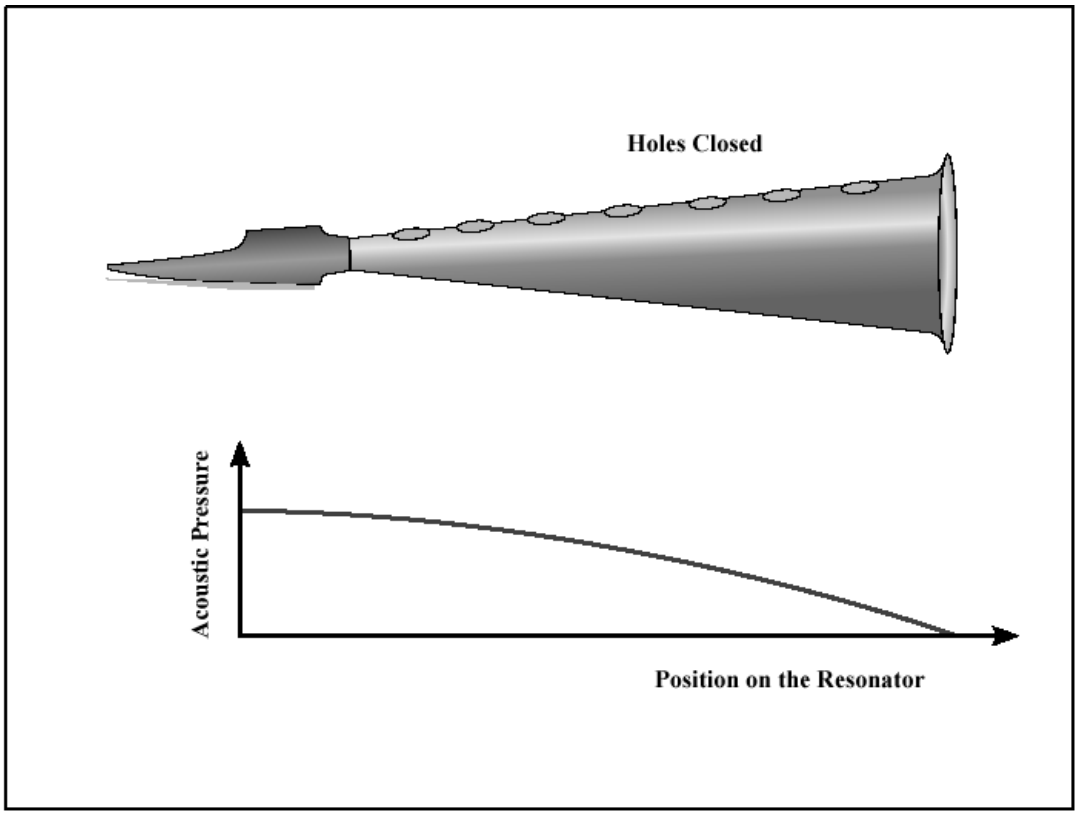
As a general rule, the saxophonist selects the note by modifying the resonator configuration.

From the physics point of view, the simplest configuration of the resonator is with all the keys closed. In this case, an acoustic wave (periodic oscillations of air pressure and speed whose amplitude vary throughout the instrument) develops on the interior of the

instrument and spreads through the length of the instrument. The frequency of this oscillation (and thus the pitch of the note produced) is proportional to the length of the acoustic wave in the instrument.

We see right away that one simple way to produce a change in pitch will be to modify the length of the resonator. However, being that this procedure will be practical neither for the instrument maker nor for the instrumentalist, we use holes perforated on the wall of the resonator to produce these changes in length. Roughly speaking, by opening a hole on the saxophone we shorten the air stream vibration length up to the point of the hole.





Different positions of the Resonator

In the world of virtual saxophones, the instrument makers are less limited to these questions of practical order, and it is much easier and more flexible to reduce the length of the resonator than to introduce 10 to 15 holes on the virtual resonator.

8.3.1.3 Role of the Reed

We have seen that the reed also plays its role on the pitch when an instrument produces a note. Normally, it cannot change the frequency of the note produced more than a fraction of the tone in relation to the notes selected with fingerings. These small variations in the frequency are used to produce, for example, vibrato.

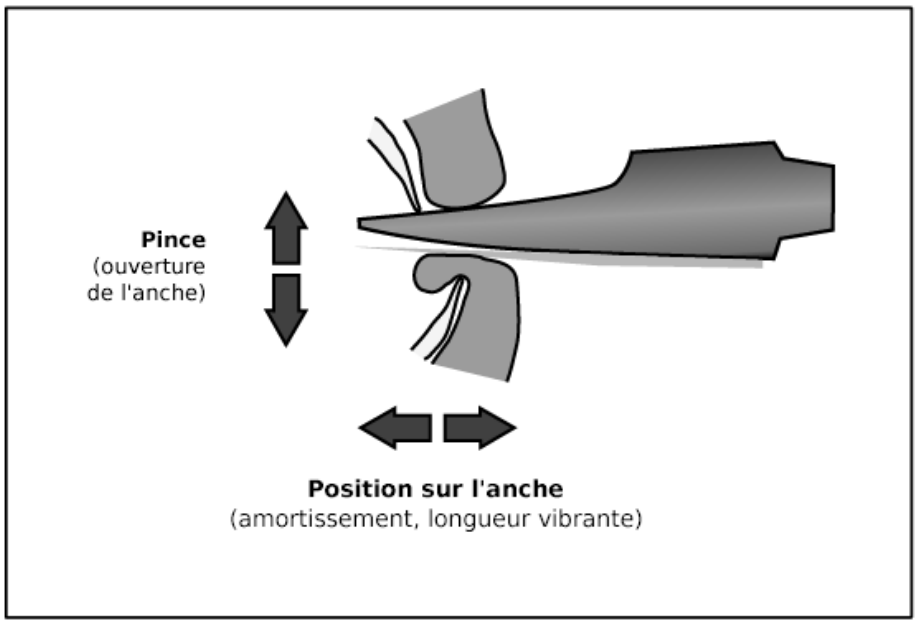
Moreover, the reed offers the saxophonist much more flexibility than the resonator because there is much more liberty to change pressure on the reed, breath, etc. This control translates physically into a number of parameters that influence more or less the timbre (color) of the results. One problem with these parameters is that they can influence the frequency of the final note at the same time. In BRASS 2, we free ourselves of this problem by precisely determining the variation of frequency produced by each parameter so that one "A" always remains an "A" independently of the reed parameters.

8.3.1.4 A bit of musical physics… a bit of instrumental practice…

To play the saxophone, the saxophonist pushes his bottom lips firmly against the reed and his top teeth against the mouthpiece. The pressure must be equal in force: neither too strong (because the reed would then be closed off and will have a sound too dismal and weak) nor too weak (because the reed will begin to vibrate on its own oscillation frequency resulting in a false note). The position of the lips on the reed is also important because if the mouthpiece is pushed too far into the mouth the pinch of the lips will not have enough control over the reed, but if it is not pushed in enough, the vibration on the

length of the reed is reduced too much.

Once he has found the right amount of pressure, the saxophonist breathes in the instrument by increasing the pressure in his lungs and mouth. Once again this pressure must be strong enough to inject the proper amount of energy into the instrument allowing it to create and maintain the oscillations, but not so strong that it risks holding the reed against the mouthpiece, closing off the entry of air.



Playing parameters Pinch on the Mouthpiece

8.3.2 Pressure

It goes without saying that the most important attribute of the process is the air pressure imposed by the musician when he breathes into the mouthpiece. This factor largely affects the note's sound volume because it is the pressure provided by the instrumentalist that injects energy into the saxophone. If the pressure is too weak there will not be enough energy to maintain the oscillation in the instrument (we say that it is below the threshold of oscillations). However, if it becomes too strong the pressure forces the reed to a nearly closed position against the mouthpiece; after a certain amount of pressure, the reed will stay stuck against the mouthpiece impeding the flow of air into the instrument (we say it is above the plating threshold). To simplify a bit, if the musician doesn't breathe enough or breathes too much, he will not obtain a sound! Luckily, there remains a large range of possible pressure. More than the sound volume, the timbre varies a lot between two limits: a more muffled sound for weaker pressures and brighter sound for a stronger amount of pressure. Enriching the timbre while increasing the pressure corresponds to the shocks between the reed and the mouthpiece leading to a progressive distortion of the sound wave.

8.3.2.1 Timbre

Next, we will talk about the pinch of the lips on the reed; this causes the position of the reed equilibrium to vary in its range of vibration. We can say at first approximation that this parameter makes a scale of reed oscillations, making the pressure thresholds described above vary. This means that we could obtain a more intense sound while keeping a similar timbre by simply increasing the pressure and the pinch of the reed at the same time. By keeping the pressure constant and modifying the pressure of the lips, we move between the timbres described above without modifying the intensity too

drastically.

8.3.2.2 Damping

refers to the "quality" of reed oscillation and to its ability to vibrate more or less freely. In practical terms, a musician can play a little bit with these attributes by modifying the stiffness of the lip that pushes on the reed or by moving the lip's position on the reed. The effect of these attributes sets the range of reed oscillation in relation to the air stream. If the damping is too weak, the reed oscillation at its own frequency (the mouthpiece frequency without the resonator) becomes too dominant and we can only hear the false note produced by the reed. By progressively increasing the damping we change the sound: initially, it will be brighter because the reed enriches the principal vibration by its oscillations; then, it will be more and more velvety and weak. The two pressure thresholds approach each other at the same time until the reed will no longer be able to maintain the oscillation of the instrument.

The "Timbre" parameter in BRASS 2 is a mix of these two physical attributes allowing a strong margin of sound color variation while maintaining the conditions necessary for oscillation.

8.3.2.3 Noise

When the instrumentalist breathes strong enough into the instrument, the release of air becomes more and more turbulent and formulates the sound of breath, affected by the acoustic response of the resonator. When the pressure of the air is not strong enough to generate the reed oscillation (below the oscillation threshold), we only hear the sound of breath; if we were to increase this air pressure step by step, it would begin to approach the oscillation threshold and the "breath" noise would slowly but surely gain the sound characteristics of the instrument. Above the threshold, the noise is added to the sound of the note giving it the real timbre of the saxophone. The proportion of noise in the final sound is thus adjusted to this parameter. Attention; if the sound of breath is too strong, the principal note can be disturbed or even stopped.

8.3.2.4 Instrument Control

The parameter setting on the principal BRASS 2 window does not signify that the physical parameters apply to the instrument (neither when it is applied in a way that is constant with all the notes nor while playing one note). It would not be realistic because the instrumentalist does not maintain constant pressure or pinch throughout a musical phrase; it would not be desirable either because the instrument often needs variations of parameters to change states: saying that you can either change from one note to another or silence a note.

8.3.2.5 Envelopes

In regard to the evolution of the physical parameters, there are three possible types of transitions:

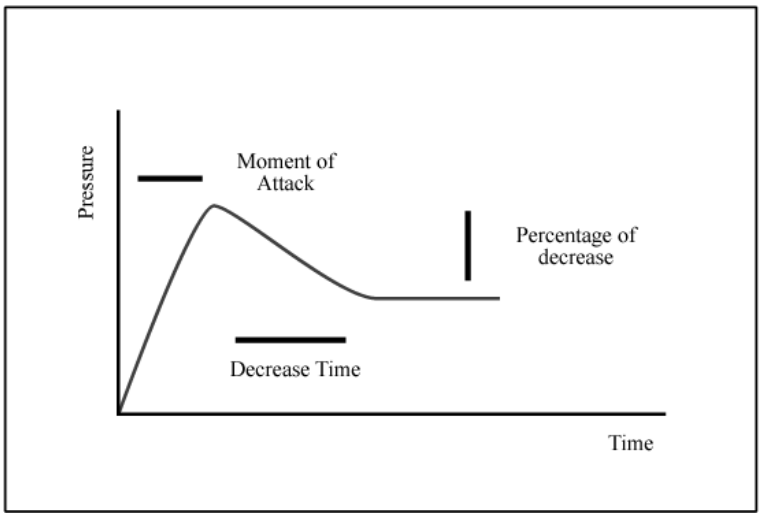
- Attack: when the instrument is silent and the musician plays a new note.
- Relaxation: when one is being played an the musician wants to stop it.
- Transition: between the notes (legato).

8.3.2.6 Attacks

Starting a musical phrase (or passing from silence to a note) can be done in several ways: fast, slowly, in between, and with varying amounts of energy. The choice of type of attack is up to the musician, but it must obey certain conditions so that the start of the note is done correctly. For example, with certain low notes it is often necessary to apply

strong pressure for a short interval so that the oscillation can begin, then reduce the pressure to arrive at the desired intensity. In other cases, the initial impact of pressure may sometimes be strong enough to start the note, but it will start the note slowly. In this situation, one must increase the pressure to an amount more than the volume of the note simply to facilitate the speed of the attack; otherwise the note would begin much slower than desired.

For an actual saxophone, it is the musician who automatically generates these variations. This "gesture" can be reproduced with a breath controller for example, but when we play on the keyboard, the synthesizer must reproduce these gestures automatically for each note. In our case, an Attack/Decrease envelope is not only applied to pressures like the pinch and the breath sound. The attack parameter in the BRASS 2 window sets the attack time and rate simultaneously, and the decrease time to simulate the attacks is more or less flexible.



Attack Figure

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