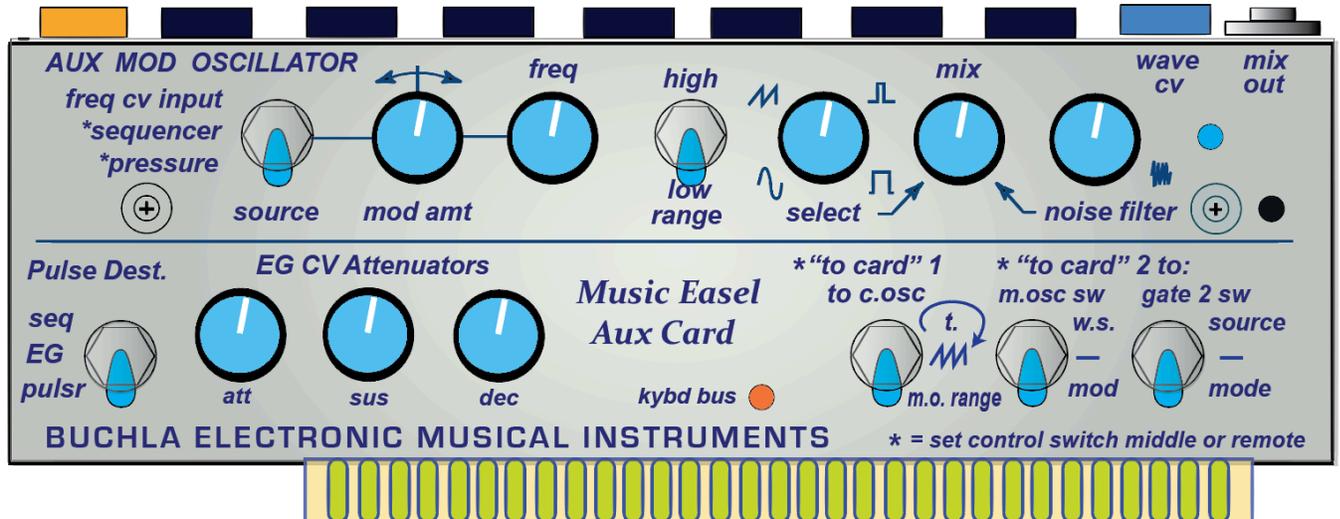


# Music Easel Aux Card User's Guide v1.0

by Joel Davel 1/15/2017

Congratulations!!!! The Aux Card is a natural complement to the Easel and way to expand your palette.



## Introducing the Music Easel Auxiliary Card: how and why

What controls have been missing from the Easel in the past and how do we make them available? Use the Program Card connections, of course. Don was forward thinking and the original program card offered many possibilities even in 1973. We can use these Program Card connections to not just offer preset patch possibilities, but as a way to expand your resources.

**LET GET STARTED: Plug it in!** First a word of CAUTION:

- 1) **Always plug in** the Aux Card (or any other Easel Program Card) **with the panel--** the switches and knobs-- **facing the performer.** (It is not reversible!)
- 2) **Always plug in the Aux Card** (or any other Easel Program Card) **with the power off.** (A good habit is to also carefully line up the pins first and push straight in or out without rocking the card. If you do that, then PERHAPS you will avoid damaging the unit even if you forget to power off.) Plugging it in with the power on is to be avoided at all times.

**Failure to properly insert the unit could result in damage.**

**Set the CONTROL switch on the 208 to the middle (or local)**

The best position for the 208's CONTROL switch (just to the right of the card slot) is to it's middle, between it's "remote" and the "local" setting. (The middle position on older Easels is labeled "both", but it is unlabeled on newer Easels.)

Most functions will be fine in just "local" mode, but CV signals from the 208 will not be passed to the card unless it is in the middle setting. This is indicated with an asterisk (\*) on certain inputs labels: In particular for the "to card" inputs or the sequencer and pressure inputs to the AuxCard oscillator.

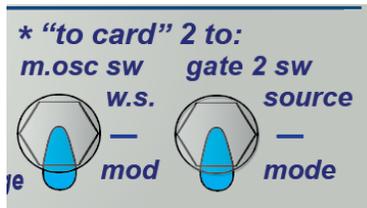
*Note: The colors of your switch covers—though they differ from the above AuxCard picture and other pictures in this manual--are associated with a color from the source of the control. (The pot covers are grey—not blue-- to distinguish them from the 208's Modulation Oscillator.)*

Let's start from the left and explain the panel



### To use the “to card” 2’ input:

- 1) Plug a 0-10v CV in the the “to card” input in the ENVELOPE DETECTOR section of the 208.  
*(Fun fact: This signal was called ENV DET. on the old Program Card though it was not related the Envelop Detector circuit. Calling it “to card 2” is less confusing.)*
- 2) Select the destination for the first switch:
  - the top position the CV will control the modulation oscillator’s waveshape selection;
  - the middle position disconnects the control;
  - in the bottom position the CV will control the modulation oscillator’s modulation type/variation (bal ext./a.m. osc./f.m. osc.)
- 3) Select the destination for the second switch:
  - the top position the CV will control the gate2 source selection;
  - the middle position disconnects the control;
  - in the bottom position the CV will control the gate(s) mode selection.

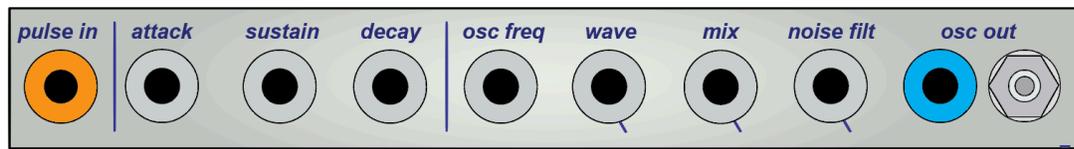


These routings give the user a lot of variety. Whether a CV control of a switch will have much perceptible effect will be based on your patch. This switchable routing allows you to experiment. Have fun.

**IMPORTANT NOTE1:** For full remote control of switches, the switches on the 208 should be in the bottom position. (CV’s can only remotely move the switch “up”)

**\*\*IMPORTANT NOTE2\*\*:** The signals from the “to card” bananas are only sent to the card if the setting for the 208’s CONTROL switch (just to the right of the card slot) is set to it’s middle position (unlabeled) or the upper “remote” setting. This is what the asterisk signifies.

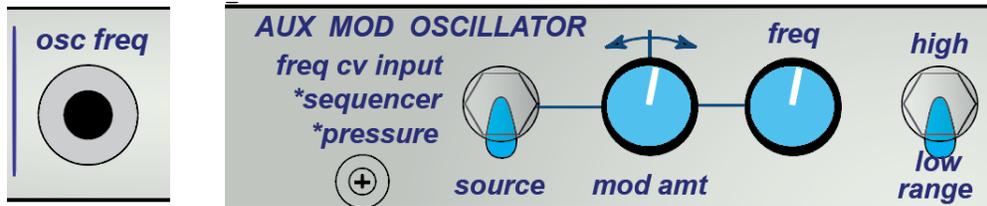
But the inputs on the top of the Aux Card and the Aux Mod Oscillator will always work regardless of the 208’s CONTROL switch setting. So let’s talk about the Aux Mod Oscillator



## Auxiliary Modulation Oscillator:

You see several bananas and the upper portion of the Aux Card dedicated to oscillator and noise controls. Not to be confused with the modulation oscillator on the 208, the intent of this auxiliary oscillator was to provide an additional modulation oscillator and a white noise audio source. But we’ve expanded the white noise audio output to include the ability to mix in the auxiliary oscillator and included a filter to the noise. It is not just an LFO, but a bonus audio source to take advantage the “aux in” on your Easel.

## The Oscillator pitch controls:



The “**source**” switch selects the sources of pitch control of the oscillator. The top selection “freq cv input” selects the black banana input labeled “osc freq.” The other 2 selections use the inputs from the 208.

*\*Note: the inputs \*sequencer or \*pressure are only sent to the card if the setting for the 208’s CONTROL switch (just to the right of the card slot) is set to it’s middle or the “remote” setting. (The middle position on older Easels is labeled “both”, but it is unlabeled on newer Easels.)*

The “**mod amt**” pot controls how much of that CV input influences the pitch of the oscillator. In it’s middle position, the source input has no influence.

Fully clockwise, the influence on the pitch is 1.2 volts per octave (the Buchla standard is 1.2v per octave or .1v per half step). To play standard scales from the 218 main output, turn the knob fully clockwise. To use it for the sequencer or pressure, turn it less to get the range you want.

To make the frequency go down as the voltage goes up, turn the knob to the left of the middle position. Fully counter-clockwise the influence is also 1.2 volts/octave but in the negative direction.

The “**freq**” pot controls the frequency of the pot. This frequency is added to or subtracted from by the incoming control voltage as determined by the “mod amount”.

The “**range**” switch selects the range for the frequency pot. Low range is .12 Hertz (sub-audible) to 64 Hertz. The high range is 16.35 Hertz to 5274 Hertz.

**Low range is used for the CV output to work as an LFO;** the LFO waveshape will not mix to audio with the noise.

High range also sends CV output to the blue banana output, but **high range sends the oscillator wave to audio output and can be mixed with the noise.**

The “**range**” switch has a middle setting too. It’s function is indicated with the **keyboard bus LED**. In this setting the oscillator frequency will be a “C” that can be used for tuning your Easel to a 440Hz standard. (Or use it as a drone pitch.)

**kybd bus** 

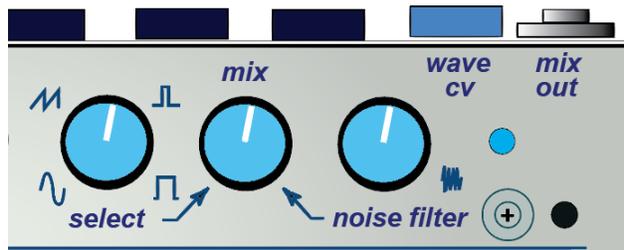
This **kybd bus** setting has an additional function for 218e’s that can send internal pitch messages:

In this setting the pitch of the oscillator is exclusively controlled by **internal bus** messages sent from the 218e or any other device that can send internal bus messages (such as the 226h, 225e). The **Keyboard bus LED** will flicker when it is receiving messages.

By using the internal bus, the user does not require a patch cable to control the oscillator pitch from the keyboard. But more important than that, it will immediately play the associated pitches tuned to a standard equal-tempered scale with A=440 Hz. This means that not only can this oscillator be a convenient pitch reference for tuning up the 208’s analog oscillators, it can also be used when you want to immediately start jamming with others without having to worry about tuning an analog oscillator or relying on imperfect control voltage ranges.

See **Appendix A: More about the “keyboard bus”: Internal Busses** at the end of this manual.

## The Oscillator waveshape/noise and audio mix controls:



The “select” pot selects between 3 oscillator waveshapes: Sine wave, sawtooth wave, and pulse wave. The pot only select the waveshapes—it does NOT morph between the 3 waveshapes. But you see 4 selections. That is because the pulse width of the pulse wave does continuously vary with the knob position. In other words, the duty cycle changes as the knob turns and between the two extremes of the pulse wave. (With the knob at about 75% you will likely get square wave.)

The “noise filter” pot opens up a simple low pass filter on the white noise generator.

The audio “mix” pot crossfades between the oscillator output and the (post filter) noise generator

Each of these pots can also be put under CV control. Each of these **black bananas** is directly associated with a knob below it. The input CV can have the same control over the sound as if the user was twisting the knob.

But unlike the frequency input, which has a “mod amt” pot, there is no additional pot to limit the influence of the CV. Instead **the control voltage that is applied will be ADDED proportionally to the pot position.** For instance, for full 0-10 volt CV control, the knob position should be set fully counter-clockwise to get the full range of values. **But if it is set in the middle, the CV input will start at that knob position and be proportional for 0-10v from that position to the top of the knob.**

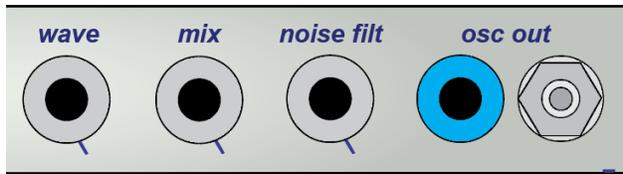
### Examples using the waveshape “select” CV input :

To get continuous Pulse width modulation out of a 0-10v CV, turn the wave select pot to as in the picture and the CV will only control the pulse width but will NOT select the triangle wave or sine wave. This is useful since the other waveshape selections do not work as well for continuous control.

But if you assign the the random output (with discrete CV’s) to the waveshape selection CV input, you get a wonderful variety if you turn the knob fully to the left to allow the full range of wave shape selection.

Using the CV inputs can result in interesting effects, while also turning the knob by hand will control the CV’s influence in real time.

## The Oscillator outputs:



To the right of the banana inputs are **the two “osc out” outputs. The blue banana is a CV output of ONLY THE WAVESHAPE. The blue LED** on the panel is directly connected to the CV output and so will indicate 10v at it’s brightest.

The Tini-jax output is **the audio output** set by the “mix” pot. With these outputs the Aux Card provides an alternate LFO and white noise generator with exclusive outputs, but also give the audio output some interesting variations.

In the low range, only “noise” will come out the audio output; LFO CV from 0-10v will come out the blue banana jack.

*(Fun fact: Black bananas are always inputs on Buchla instruments. And the Buchla standard for CV outputs is blue or purple. But the 208 is unique: The white, orange, and yellow bananas on the 208 indicate their output function with a color association. The orange banana (for the EG output) in particular breaks the Buchla rule for 200 series modules that orange signifies a pulse input. But Don was known as rule breaker—even his own.)*

### Typical “osc out” connections:

- 1) Plug an audio cable from this jack to the “aux in” audio input on the top of the 208. Use gain setting on “low” for the cleanest sound (though higher gain settings can have interesting saturation effects on the noise.)
- 2) To function as a modulation oscillator, plug the (blue) banana output into any (black) banana input on the 208.

### More Tips for using the audio:

- 1) The oscillator sounds best when it goes through the 208’s VCAs.
  - 2) Make sure to switch the Gate 2 source switch to the top position when using the “aux in” (unless you have switched control the source switch position with AuxCard “to card” CV.)
  - 3) The Modulation Oscillator modulates the “aux in” input if the Modulation switch is in the “bal. ext” setting.
- Explore this option for additional timbres.
  - If you hear unexpected modulation, double check this setting when troubleshooting.

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### Aside: Analog vs Digital oscillator:

For analog purists there will be a certain amount of disdain for a digital oscillator. After all, if you own an Easel, you are getting the 1973 exclusively analog oscillator circuitry that the 208 is known for. Yet analog purists can use just the CV expanding capabilities of the AuxCard and get quite a lot out of it. The ability to tune your 208’s analog oscillators to a reliable generated pitch, the ability to use the 218e’s internal bus messages for perfectly tuned pitches, and other features, this model was the more complementary choice. And since using the “aux in” will put the audio through the signature Buchla VCA’s, even purist’s will be tempted to use it’s audio. After all, Don Buchla himself was fond of generating a sine wave digitally to get oscillators that were reliably tuned while using many many purely analog processes after that original generation to shape that simple sine wave to be as spectrally interesting as his earliest unpredictable modules. And for more omnivorous noise or rhythmically focused artists, finding the sweet spot of aliasing on certain waves can be a unique noisy or percussive timbre. Give it a go and use in whatever fashion you choose.

## **Appendix A: More about the “keyboard bus”: Internal Busses**

The busses designated A,B,C, and D are dedicated internal busses sent by the 225e or 226e or 218e. All modules within a system share internal communication and some of these modules will respond to note messages. (Portamento will not be sent.) The Buchla modules that respond to pitch messages include the 259e, 261e and the Aux Card. (Other messages can include clock and note on and velocity messages that the Aux Card ignores.)

### **Internal bus Assignment.**

Up to four 259e or 261e Complex Oscillators can be assigned to the four internal MIDI busses A – D.

### **The Aux Card listens only on internal bus C by default. (C for “Card”)**

This way a system can include a 259e and 261e that listen on Bus A and B and that use the 281h and 292h on those same busses.

***See the 218e manual or read below for how to enable and assign the 218’s internal bus output.***

#### ***How to enable and assign the 218e’s internal bus output:***

Hold down the first 2 Preset Voltage Source pads (above “20” and “23”) simultaneously until both LEDs flicker. (about 2 seconds). The LED in pad 4 blinks. Then use Preset Voltage Source Pot 1 to move the steady LED to select the internal bus. For the AuxCard, move the LED to blink above the third “pad” (bus C) or turn the pot all the way to the right select all of the busses (all four LEDs lit up.) You can play the internal bus now. Exit this mode as you entered this mode: Hold down the first 2 Preset Voltage Source pads simultaneously until both LEDs flicker. (Unfortunately this mode is not saved on the 218e and you will need to repeat the procedure whenever you boot up the 218e. )

*If your 218 does not have this feature, contact your Buchla representative to see you if can upgrade yours. It is possible a standard Firmware upgrade procedure will work.*

## **Appendix B: Using the 2-pin jumpers for more options:**

Adding jumpers is a hidden feature of the Aux Card reserved for advanced users. But it merely requires unscrewing the back panel and popping on 2-pin jumpers to easily accessible pins. These jumpers are accessible from the side of the unit. Install or remove the back cover unit only with the panhead screws on the back. Do not attempt to remove the flathead screws on the front.

On the upper left: JUMP1 will add control of the number of sequencer stages from the “atk” banana input. This is a technique many advanced users have used to vary the sequencer. To isolate this jumped CV from the EG, simply turn down the attack attenuator.

On the lower right: JUMP3 will connect both gates1 and gate2 mode controls together from the “to card” input. (This may come standard on your card.)

*At this time JUMP2 (on the middle left) should not be used. It will send the sequencer pulse output to the “from card” banana of the 208. That pulse that can be used for a unique short gate. But it can interfere with the ability of the sequencer to trigger the envelope.*