

## The 208 ToolBox

Hi

Thank you very much and congrats for purchasing the 208 ToolBox. You'll definitely enjoy how it expands your Music Easel or 208 clone.

To get familiar with how the CV of the various parameters works it's good to start with the 208's related sliders and switches in their lowest position.

The amplitude of the CV controlling the CO waveshape and envelope times have attenuators allowing to scale the CV.

### **Modulation Oscillator**

The MO frequency switch transposes the MO to a higher or lower range, each range can be set accurately thanks to the 2 multiturn trim pots accessible via the small holes to the left. Central position is the normal unmodified MO range.

The MO waveshape banana socket is a CV input to the MO waveshape switch, it works like switching, the change is not progressive.

### **Complex Oscillator**

The CO waveshape banana socket is a CV input to the CO waveshape switch, it works like switching, the change is not progressive.

The banana socket and pot to the right are a CV input to the waveshape's amplitude.

### **Pulse Sequence**

The "stages" switch affects the Sequential Voltage Source stages number : CV via the banana socket or 2 stages.

The "all" banana socket outputs pulses related to the 208's Sequential Voltage Source switches position. These are short pulses.

The "1 2 3 4 5" banana sockets output a dedicated pulse for each stage. These are like gates, the signal sent has the duration of the stage.

### **Random**

The "rand" banana socket is a pulse input to clock the Random Voltage.

### **Envelope generator**

*The envelope sliders and switch on the ToolBox are NOT an extra envelope but control the 208's envelope.*

The 3 sliders and related banana sockets are CV inputs to the envelope times.

The envelope looper sends a pulse and retrigs the envelope at the end of its decay phase when the switch is in its lowest position. The LED shows the retrig pulse and still works when the looper is not active so you can anticipate its retrig time.

Thanks to the "self" knob the retrig time can be delayed up to about 7 seconds.

The envelope needs an initial pulse to start looping, if the envelope generator is off it won't loop on it's own when switched.

The banana socket above the switch can be either a CV input to the delay time or a pulse input to trig the envelope generator, depending on the position of the mini slide switch accessible behind the panel.

If your ToolBox has a dedicated envelope generator pulse in as an option, this switch is not present and the banana socket is hard wired to the CV position.

The 208's panel "sustained/transient" switch works with the 208's "keyboard pulse" input only and won't work with the pulses sent via the ToolBox.

The ToolBox's envelope generator pulse in features a special gate to trigger converter circuit making it work in transient mode, i.e. the duration time is not related to the pulse length.

### **CV Mixer**

This is a 2 inputs CV mixer, with attenuverter pots (CCW is full inverted CV, centre mutes the CV, CW is full CV).

The LED displays the output levels.

### **Rear edge connector**

A program card can be plugged into this connector which is connected in parallel with the 208's one.

BEMI iProgram Card and Aux Card can be plugged this way as well, but you want to support it with something placed below because of the weight which might damage the connector on the long term.

### **Optional features**

Various extra features are possible thanks to the 3 top left corner emplacements and the 2 "to prog" banana sockets on the 208's panel.

These are implemented on demand and were discussed when you ordered your ToolBox. Any wiring can be easily modified.

The edge connector pinout is on page 3 (some NC contacts are used on the BEMI Easel, these connections are not in the list).

The Easel manual's Meta-Programming section will give you useful indications on the resistors values, for CV inputs you want to select on test the one which best suits your own needs

### **Recommendations and disclaimer**

Ensure that the Easel or 208 is powered off before inserting or removing the ToolBox in the program card slot.

Do not insert it backwards.

To reduce action and pressure on the 208's edge connector, hold the ToolBox with a hand when you patch or unpatch a cable, this connector is not as strong as a module screwed on a boat and you don't want to damage it.

Some features depend on the 208's "control" switch setting. If something doesn't seem to work, check that this switch is well in the "both" central position.

Each ToolBox is carefully tested and will work with original B&A 208, 208r rev2 clone and BEMI 208. It doesn't work with 208r rev1 clone, do not attempt, this might damage the ToolBox or the 208r rev1.

Although 100% safe with any 208, the 218e and any other 200e modules could be damaged if you send an audio signal or a negative CV to a CV or pulse input banana.

The ToolBox's CV mixer and BOB expander's envelope inverter are able to output negative CV therefore do not patch these to a 200e module.

A schottky diode added in series with the 218e or other 200e module's input bananas is a straightforward easy to DIY protection from accidental negative CV / audio patching.

I assume no liability for personal injury or damage to equipment or loss of use caused directly or indirectly by the use of the ToolBox.

Thank you and have fun !

### Edge connector pinout

Front	Rear
1 : +15V	1 : -15V
2 : 0V	2 : NC
3 : NC	3 : NC (+5V on BEMI 208)
4 : NC	4 : NC
5 : NC	5 : NC
6 : NC	6 : NC
7 : seq step 1 out	7 : seq step 2 out
8 : seq step 3 out	8 : random 1 out
9 : seq step 4 out	9 : pulser period CV in
10 : seq step 5 out	10 : MO index CV in
11 : seq steps #	11 : MO freq CV in
12 : seq pulse setting	12 : sequencer pulse in
13 : seq CV setting	13 : CO pitch CV in
14 : random pulse in	14 : keyboard pulse out
15 : seq CV out	15 : keyboard key CV out
16 : random 2 out	16 : pulser pulse in
17 : EG pulse in	17 : timbre CV in
18 : pulser pulse out	18 : attack CV in
19 : duration CV in	19 : keyboard pressure CV out
20 : pulser out	20 : EG CV out
21 : decay CV in	21 : sequencer pulse out
22 : LPG1 level CV in	22 : MO modulation switch CV in
23 : MO ws CV in	23 : inverter "to prog"
24 : CO & MO key	24 : CO waveshape pot CV in
25 : LPG2 level CV in	25 : CO waveshape switch CV in
26 : preamp "to prog"	26 : LPG1 mode switch CV in
27 : LPG2 mode switch CV in	27 : offset (+13.5V)
28 : inverter "from prog"	28 : signal routing switch CV in

## OVERVIEW

The Portabellabz 208 Toolbox Card expands the Buchla Easel's functionality by providing additional control over the 208 and providing new resources. Additional controls are available for CO and MO, the 208 Envelope Generator with looping capability (including trigger delay when looping the envelope), selectable Stage 2, and Pulse Sequence outs.

Also provides a 2- or 3-input CV mixer. An extra perpendicular connector can be found in the back, to connect an extra Easel card.

## RANGE TRIMPOTS

Each range can be accurately set thanks to the two multi-turn trimpots accessible via the small holes to the left of the switch.

**CENTER** — Normal unmodified MO range.

## RECOMMENDATIONS

Ensure that the Easel or 208 is powered off before inserting or removing the card into the program card slot. Do not insert it backwards.

Some features depend on the 208's "control" switch setting. If something doesn't seem to work, check that this switch is well in the "both" central position.

The Toolbox's CV mixer and BOB expander's envelope inverter are able to output negative CV therefore do not patch these to a 200e module.

A Schottky diode added in series with the 218e or other 200e module's input bananas is a straightforward easy to DIY protection from accidental negative CV / audio patching.

To reduce action and pressure on the 208's edge connector, hold the card with a hand when you patch or unpatch a cable, this connector is solid but not as strong as a module screwed on a boat and you don't want to damage it.

Each Toolbox is carefully tested and will work with original B&A 208, 208r rev2 clone and BEV1 208. It doesn't work with 208r rev1 clone, do not attempt, this might damage the Toolbox or the 208r rev1. Although 100% safe with any 208, the 218e and any other 200e modules could be damaged if you send an audio signal or a negative CV to a CV or pulse input banana.

**CO WAVESHAPE CV IN**  
CV input to change state of CO waveshape switch (change is not progressive)

**SQUARE WAVE OSC**  
(Customizable feature)  
**KNOB** — Wave level  
**TINI/JAX** — Square wave out

**JACK** — Osc CV modulation out

**CO AMPLITUDE CV ATTENUATOR**  
Controls CV modulation amount of CO waveshape amplitude using signal in jack  
**CW** min — **CCW** max

**DELAY TIME CV/PULSE IN MINI SWITCH**  
(behind panel/jack)

Selects whether signal present in jack is a CV input to the delay time, or a pulse input to trigger the envelope generator  
**L** — Selects Delay Time CV  
**R** — Selects Pulse In

The Toolbox's envelope generator **Pulse In** features a special gate-to-trigger converter circuit to make it work in transient mode, i.e. the duration time is not related to the pulse length.

**ENVELOPE GENERATOR**  
Inputs to envelope times

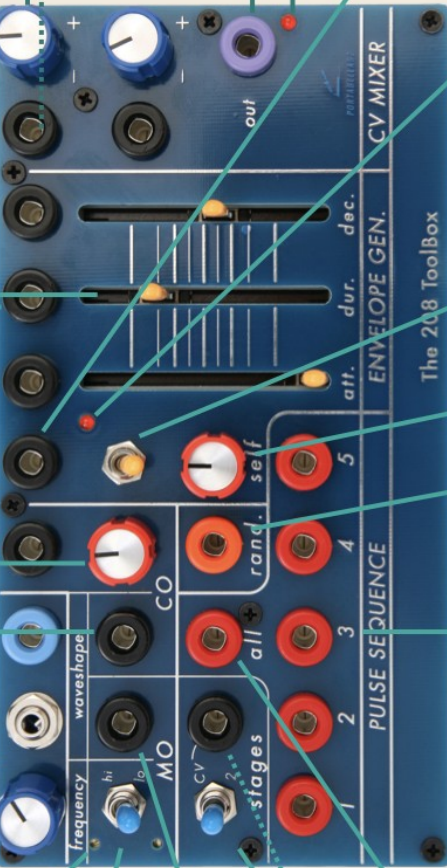
The **envelope sliders and switch** on the Toolbox are NOT an extra envelope but control the 208's envelope

**MO FREQ SWITCH**  
Transpose MO to high or low range

**MO WAVESHAPE CV IN**  
CV input to change state of MO Waveshape Switch (change is not progressive)

**STAGES SWITCH**  
Selects the number of stages in Sequential Voltage Sources  
**UP** — CV in banana jack  
**DOWN** — 2 stages

**ALL PULSE OUT**  
Outputs pulses as per the 208 Sequential Voltage Sources stages switch positions (these are short pulses)



**CV MIXER INS**  
Three input CV mixer (3rd input optional)  
**IN 1, 2** — (Attenuator) **CCW** full inverted CV,  
**CENTER** mute CV, **CW** full CV  
**IN 3** (optional) — fixed input jack

**CV MIXER OUT**  
Mixed output of CV Mixer

**MIXER LED**  
Displays output levels

**ENVELOPE CV IN**  
Delay time CV or pulse in signal (depending on mini-switch setting)

**ENVELOPE TRIGGER LED**  
Flashes every time the envelope loop re-trigger signal is sent

**ENVELOPE LOOPER SWITCH**  
**UP** — No retrigger (no looping)  
**DOWN** — Envelope looper sends a pulse and retriggers the envelope at the end of its decay phase

The **envelope** needs an initial pulse to **start looping**, if the envelope generator is off it won't loop on it's own when switched.

**STAGE PULSE OUTS**  
Dedicated pulse for each stage. These are like "gates", the signal produced has the duration of the stage.

**RAND PULSE IN**  
A pulse input to clock Random Voltage

**ENVELOPE SELF-RETRIG TIME CONTROL**  
Delay envelope retriggering for up to 7 secs  
**CCW** min — **CW** max

If your Toolbox has a dedicated envelope generator **Pulse In** as an option, the Envelope Looper Switch is not present and the banana socket is hard wired to the CV position. The 208's panel "sustained/transient" switch works with the 208's "keyboard pulse" input only and won't work with the pulses sent via the Toolbox.





## OVERVIEW

The Portabellabz BOB Card expands the Buchla Easel's functionality by providing additional routing/input/output options to the 208, plus one customizable 3x-control processor area.

## RECOMMENDATIONS

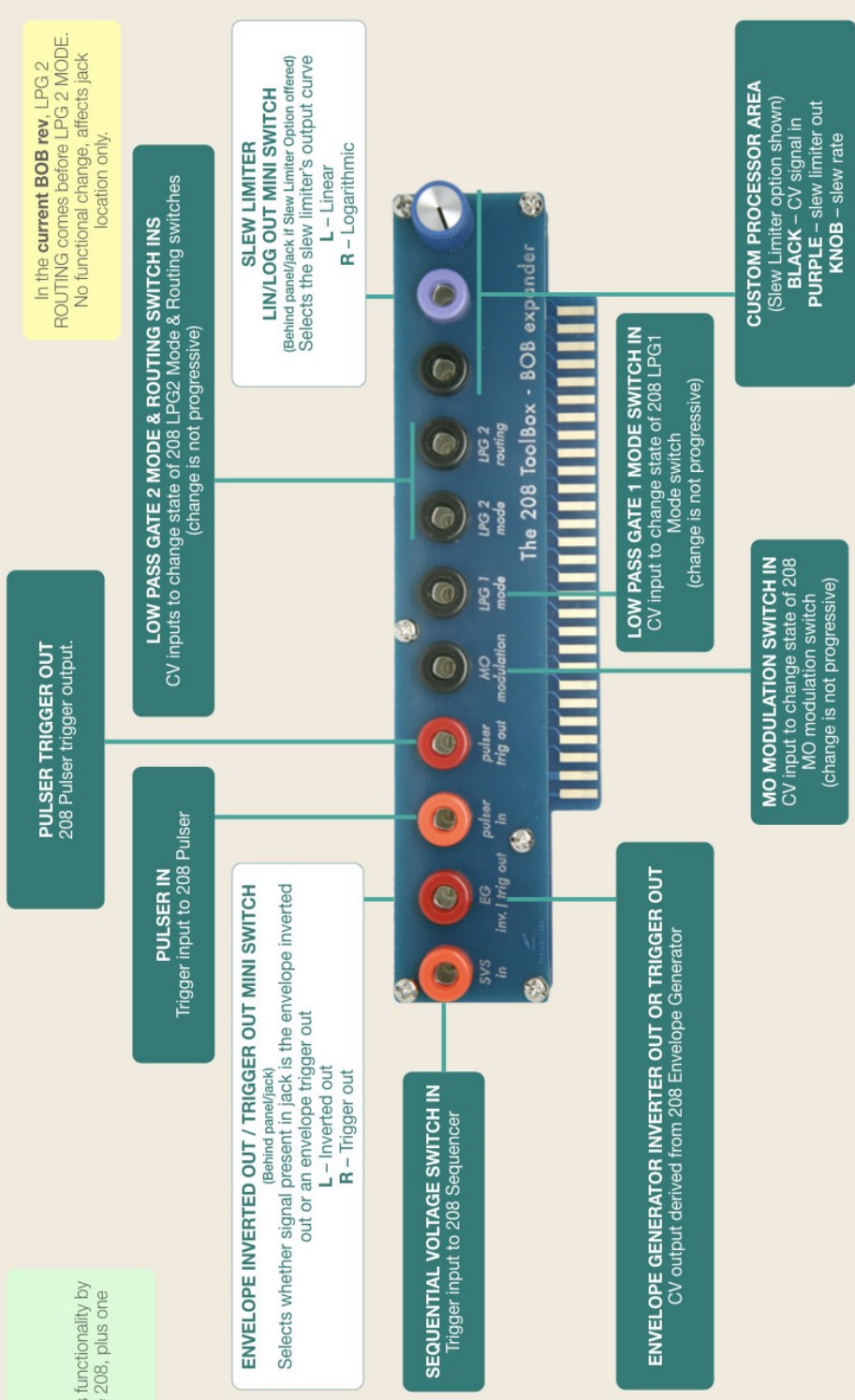
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A Schottky diode added in series with the 218e or other 200e module's input bananas is a straightforward easy to DIY protection from accidental negative CV / audio patching.

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In the **current BOB rev.** LPG 2 ROUTING comes before LPG 2 MODE. No functional change, affects jack location only.

**LOW PASS GATE 2 MODE & ROUTING SWITCH INS**  
CV inputs to change state of 208 LPG2 Mode & Routing switches  
(change is not progressive)

**SLEW LIMITER LIN/LOG OUT MINI SWITCH**  
(Behind panel/jack if Slew Limiter Option offered)  
Selects the slew limiter's output curve  
L – Linear  
R – Logarithmic

**SEQUENTIAL VOLTAGE SWITCH IN**  
Trigger input to 208 Sequencer

**ENVELOPE GENERATOR INVERTER OUT OR TRIGGER OUT**  
CV output derived from 208 Envelope Generator

**MO MODULATION SWITCH IN**  
CV input to change state of 208 MO modulation switch  
(change is not progressive)

**CUSTOM PROCESSOR AREA**  
(Slew Limiter option shown)  
**BLACK** – CV signal in  
**PURPLE** – slew limiter out  
**KNOB** – slew rate