

The CV/gate Card for Buchla 208 and Music Easel

BOM and build notes

Hi

Thank you very much and congrats for purchasing the CV/gate Card PCB DIY set.
You'll definitely enjoy how it expands your 208 or Easel.

Features

- **gate in** minijack : for incoming gate signals between +5V and +15V
- **LED** displaying the incoming gate signals
- **pulse out** banana : Buchla pulse to patch to the 208 pulse input - can be wired internally to the 208's pulse in

- **CV in** minijack : for 1V/oct incoming CV
- **CV out/in** banana : patch to the 208's voltage from keyboard input with multiturn trimmer to scale to 1.2V/oct or 2V/oct - also works as an input to the MO and CO scaling circuits when the bypass switch is to the left
- **bypass** mini slide switch located on the PCB behind the panel : switch to the left if the 208 is calibrated to 1V/oct to bypass the scaling circuit so that the incoming CV is available as is on the CV out/in, the MO and CO direct CV scalers are still working
- **MO CV** switch : connects scaled CV internally to the MO, adjust with trimmer and multiturn trimmer for fine tune
- **CO CV** switch : connects scaled CV internally to the CO, adjust with trimmer and multiturn trimmer for fine tune

- **rear edge connector** : to plug another card, like on the other Portabellabz expansion cards

BOM

Resistors – metal film 1% 1/4W

100	2
220	1
1k	3
1k8 [470 for 2V/oct output]	1
3k3	2
6k8	1
10k	3
12k4 [22k for 2V/oct output]	1
20k	1
120k	2
SOT 1k to 10k - select according to desired LED brightness	1

3362 trimmers – top adjustment

10k	3
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3296 trimmers – top adjustment

100	1
1k	2

Capacitors

100nF multilayer ceramic	5
4.7nF film	1
22µF electrolytic	2

Diodes	
1N4148	1
Zener 3V6	1
LED 3mm	1
ICs	
741	1
LM358 or TL072	2
IC sockets	
DIP8	3
Switches	
SPDT on-on	2
Red switch cap	1
Blue switch cap	1
Mini slide switch	1
Edge connector 56 contacts	
LW-N28A2G	1
Standoffs	
M3 5mm female/female	4
<i>[M3 13mm female/male if banana sockets are used instead of switches]</i>	1
Screws	
M3 4mm	8
M3 16mm	2
M3 self-locking nut	2
Banana sockets	
Black	1
Red	1
<i>[Any color of your choice if banana sockets are used instead of switches]</i>	2
Minijack sockets – vertical mount	
Cliff FC681374V or FC681375V or FC681375VH or PJ3410	2
<i>Thonkicon should be ok but not tested</i>	

Calibration

Pulse out scaling

Insert the card into the 208's slot, patch the external controller's gate out to the gate in minijack and the pulse out banana to the 208's pulse input.

Set the sequencer, envelope and pulser trigger source switches to keyboard and the envelope mode select switch to transient.

Depress a key of the keyboard.

It should fire the sequencer, envelope and pulser.

The envelope and pulser should behave in transient mode and their length shouldn't be related to how long the key is depressed, if it is adjust the trimmer located above the pulse out banana in order to get correct behaviour.

Some may prefer a sustained behaviour of the pulser and keep it on as long as the key is depressed, this is possible with a fine adjustment of the trimmer, keeping the envelope working well in both sustained and transient modes.

CV out/in 1.2V/oct scaling

Let the 208 warm up for 10 minutes to stabilize the oscillators. Unscrew the rear panel, insert the card into the 208's slot, patch the external controller's CV out to the CV in minijack and the CV out/in banana to the 208's voltage input.

Set the CO and MO key switches to the top position.

Monitor either the CO or MO output.

Play several intervals on the keyboard and adjust the multiturn trimmer located above the CV out/in banana to get in tune over about 5 octaves.

You can also use a multimeter to measure the voltage on the CV out/in banana.

Play the keyboard's lowest note, the voltage should be 0V.

Play 5 octaves higher and adjust the trimmer to get an exact 6V output.

Check the lower octaves, should be 1.2V, 2.4V, 3.6V, 4.8V. A drift of 1 or 2 mV is ok.

The oscillators of a good working properly calibrated 208 track in tune over 5 octaves with minimal drift, if you can't calibrate the card in order to get this range, your 208 requires adjustments, refer to the manufacturer's instructions.

MO and CO CV switches scaling

The card's CO and MO CV outputs available via the switches have a wide range in order to match any 208 and calibration, so that each owner can calibrate the card according to the actual 208 it will be used with. For each switch there's a single turn trimmer to the rear of the PCB to scale the amp gain roughly and a multiturn trimmer on the panel.

This scaling should be performed after the CV out/in scaling is done (or bypassed if your 208 is calibrated for 1V/oct), scaling the CV out/in afterwards will impact the CV switches scaling.

The procedure is the same for the MO and CO and 2 trimmers are to be adjusted for each : firstly the single turn trimmer located next to the switch on the back side of the card and then the multiturn trimmer located above the switch.

Let the 208 warm up for 10 minutes to stabilize the oscillators. Unscrew the rear panel, insert the card into the 208's slot, patch the external controller's CV out to the CV in minijack and set the card's MO CV and CO CV switches to the top position.

The 208's key switches should be in the bottom position and no other CV should control the oscillators.

For each oscillator, play several intervals on the keyboard and adjust the single turn trimmer.

Then fine tune the CV with the multiturn trimmer to get in tune over about 5 octaves.

If the multiturn trimmer is off range, readjust the single turn trimmer.

Optional internal pulse out wiring via the card slot

Those who are not afraid to solder in their 208 and likely void warranty can wire the card's pulse out directly to the 208's pulse input via the card slot so that patching is no longer needed.

It is a straightforward non permanent modification.

On the 208 : run a cable between any N/C contact of the card edge connector (contacts 5 and 6 of both rows in 208p, 208r rev2, 208e) and the pulse input banana jack.

On the CV/gate Card : run a cable between the second pulse out pad and the corresponding contact of the rear edge connector.

In the late 208e and in the 208c, contacts 5 and 6 of the card slot may be already in use and no longer available for this purpose, check by yourself or ask Buchla before doing this mod.

Replacing the MO and CO CV switches with banana sockets

Enlarge the panel switch holes to 8mm to fit the banana sockets.

Enlarge the switches central pad to 6mm to fit the banana sockets' solder pad.

Drill a 3mm hole where marked with a circled cross to the rear of the panel.

Use a M3 13mm female/male standoff instead of the bottom right 4mm screw.

The 120k resistors can be omitted.

Connect the banana socket to the square pad located below the 10k trimmer.

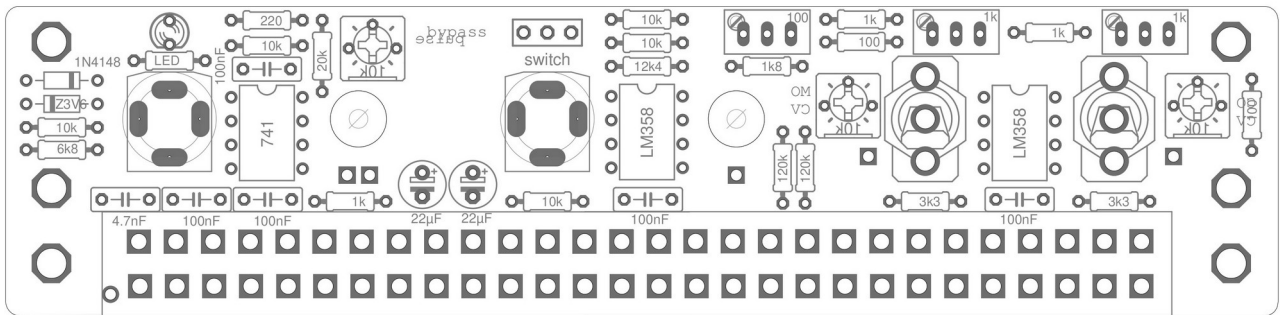
Calibrate as explained above with a cable patched to the oscillator's panel CV input with the slider all the way up so that when using this input you'll simply have to push the slider all the way up to get proper tracking.

2V/oct CV output instead of 1.2V/oct

Replace the

12k4 resistor with a 22k

1k8 resistor with a 470 ohms



Disclaimer

I assume no liability for personal injury or damage to equipment or loss of use caused directly or indirectly by the use of the CV/gate Card or any info shared in this manual.

This build should be performed only by those experienced in electronics. If in doubt, don't do it.

Happy building !

C.