

USER'S GUIDE for the Buchla 218e Firmware card/225m and 208 Card Doubler



by the staff of
Buchla USA
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For 218e Software version 30.8 and higher

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Introduction

If you have a 218e with a Music Easel or for using in a larger system, welcome to the 200e system. These notes will acquaint your 218e and other Music Easel accessories.

Important Safety Precautions

Do not disassemble this equipment. Refer all servicing to a qualified service engineer. But if you insist, be sure to follow the next advice.

When installing, removing, or exchanging a module, please be certain to turn off the power supply. – power must be turned off before plugging in or unplugging modules.

Buchla power connections and cables are keyed to be used in one direction only! Reversing the connectors can cause significant system damage.

We are not liable for damage or injury due to lack of common sense:

Do not use the system near water; do not take it into your bath, sauna or hot tub. Take care not to spill liquids on or into the 200.

Exercise close supervision when using the instrument near children or when children are using it.

The 200's power supply is for indoor use only. Do not use a damaged or alternate supply.

Refer all servicing to qualified personnel. There are no user serviceable parts or adjustments inside the 200h.

System/"Boat" set up

Retrieve the system from its case or carton, saving all packing materials, and confirming the presence of a DC power adaptor with an AC cord, and patchcords. If anything is missing, inform your source of the shortage. Place the system on a flat surface. Unlatch the cover and slide it off it's hinges to remove. Connect the power adaptor to AC (110VAC or 220VAC) and the 12-volt DC (center-positive) to the power input jack. Be sure to use the power supply with the Amperage rating appropriate for your system. Typical systems use power supplies rated 5.3A or higher. Turn on the switch.

Connect Audio. Convenient audio outputs may be located on the side of the case. If provided, these audio outputs are redundant ¼" outputs to the Tini-Jax outputs on the front of the modules. Connect to your sound system. You can use common 3.5mm mono audio cables for your final output, but they may be too loose. For the best audio connections between Buchla modules, use the Tini-Plug audio cables that come with the Buchla system.

NOTE: Switchcraft "Tini-Jax" are the standard historical Buchla audio cable connections and are just slightly larger diameter and longer length than 3.5mm connections. Many synth manufacturers now use 3.5mm cables. 3.5mm cables often work in a Tini-Jax jack.

COMMON BUCHLA SYSTEM STUFF

Before getting into the details of particular modules, let's pursue some items that all 200 modules share in common. First the connections: Like its predecessors--the 200, and 100--the 200e and 200h series differentiates between control voltages, signals, and pulses.

Control voltages (C.V.'s) are used to specify parameter levels, range from 0 to 10 volts, and are interconnected with banana jacks and cords.

Pulses are used for timing information, and have two levels: 10 volt pulses transmit only transient information; while 5 volts carries the sustain information. Pulses, like C.V.'s, also employ banana interconnections.

Signals (audio signals) are the raw material of electronic music, and ultimately become the sounds we actually hear. They are nominally 1 volt in amplitude, but can range from infinitesimally small to 20 db in excess of the nominal. Signals are connected via Tini-Jax connectors and shielded patchcords.

Color-coding of cables and Banana Jacks:

Note that both types of patchcords are color coded to indicate their length-- a handy feature in complex patches.

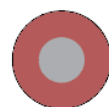
But more importantly, banana receptacles/jacks are color coded to indicate their function:



C.V. INPUTS are black (and sometimes grey.)



C.V. OUTPUTS are blue, sometimes violet, and occasionally green (such as velocity on 225's).



Pulse INPUTS are orange*.

Pulse OUTPUTS are invariably red.



(*The Music Easel/208 includes some exceptions to the color-coding standard, Orange is used for its association with the 208 EG fader and switch covers.

Yellow is likewise used for the 208 Pulser output, though it's CV output is a cross between a pulse output and a CV output.)

Ground reference connection:



On every Buchla boat/housing there is a black banana jack (sometimes labeled “gnd”, often near the card slot. When interconnecting/patching between two synthesizer systems, it is important that the ground reference is shared between the systems--including between two Buchla systems. The ground references should connect here through a banana cable. Without this shared connection, control voltages will have behave unpredictably. The connection is not necessary on an isolated system, but important on a LEM218 or if combining an Easel with another 200e system.

Card Slot:

This card connector is used for both Memory Cards and USB Firmware Cards. (And this is the one card slot that is reversible!)

Memory cards--used in conjunction with a preset manager (i.e.225e, 206e)--can be used to store settings of all the modules in a 200e/h system. Modules store their own preset parameters, but there is a way to store these modules parameter information on the Memory Card so that if your system was stolen or damaged, you could replace the module(s) are rewrite all the saved parameters onto the new module by writing to and from the memory card.

Note: The 218e does not have any stored preset parameters.

USB Firmware Card: Firmware Update mode or USB-MIDI mode

To allow improvements in firmware, we’ve come up with a USB card that can upload the various modules with the latest firmware versions.

See the Buchla.com support website for up-to date instructions for each module.

Firmware updates:

If you have a 218e and need to reprogram the 218e with a program update, the “code loader” is activated by having all knobs turned clockwise when the system is powered up.

Older BEMI 218’s do not have “code loaders” and need to be reprogrammed at a service center for them to become 218e’s.

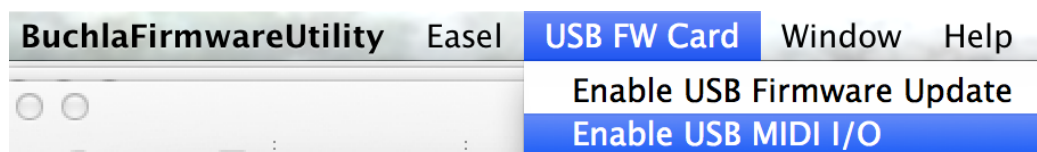
Wait up to two minutes for the 218e to program.

Other indications of successful firmware downloading: You will the LED on the USB Firmware card blinking quickly when it is downloading software and any preset manager in a system will suspend it’s operation while the module downloads it’s firmware.

The USB Firmware Card's alternate use is as a USB MIDI to internal MIDI bus interface.

USB MIDI I/O Card (225m):

To Enable this facility, hook up the Firmware Card to a Mac computer and use the BuchlaFirmwareUtility application to reprogram it's function as a MIDI interface for a 200e or 200h system.

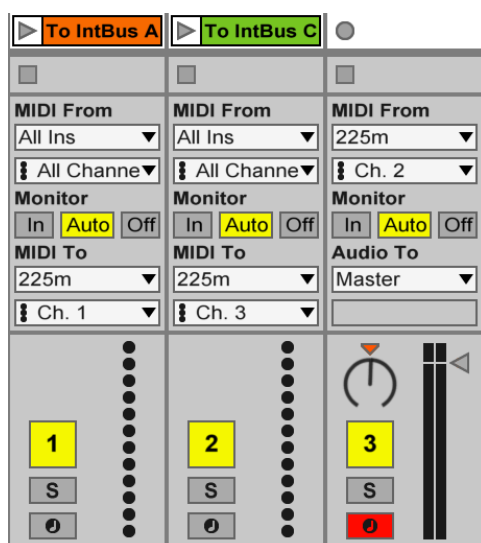


In this mode, the USB device name for the Card becomes "225m".



An example of the device listed in an Ableton "Live" MIDI preferences window.

MIDI note messages sent on channels 1-4 will be put onto the internal busses A-D, as will MIDI clock/start/stop messages and vice-versa. That is, modules that generate messages on the internal bus will also produce USB-MIDI output on the 225m. That includes the 226h or 218e note messages (if enabled) or the 252e clock/start/stop.



The example to the left shows the card being used to send Ableton MIDI clips to the Internal MIDI bus A and C as well as recording Internal MIDI bus B.

For more information on the internal busses utilized by 200e and 200h modules, please see the 225e section of the 200e User's Guide.

If you loose 225m Port, use the BuchlaFirmwareUtility to program the card again and you should see the port reappear on your computer. It will remain like this while it is powered.

To return a Firmware Card's function to do Firmware Update's, simply use the BuchlaFirmwareUtility again to Enable/reprogram the card for Firmware Update.

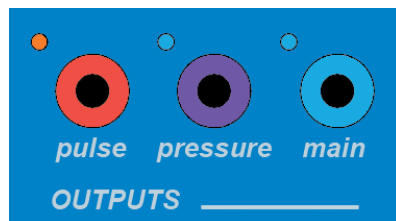
Description - model 218e Touch Activated Voltage Source

The 218e is capacitive keyboard modeled after the original 218 built in 1973, but adding an arpeggiator, fourth preset voltage source, and MIDI capabilities.

First, the keyboard surface and its outputs:

Tactile keyboard Surface

The surface consists of 29 individual keys comprising 2-1/3 octaves. Each touch of the keyboard generates a pulse, a pressure CV, and a main pitch CV. These outputs are placed in the upper left of the 218, expecting to be plugged directly into the nearby the pulse, pressure, and pitch CV inputs of a 208.



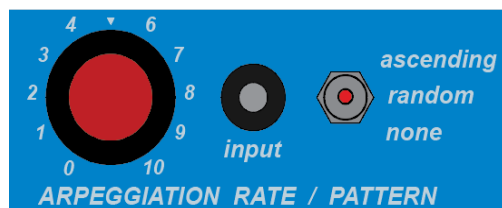
The **pulse** output is red banana on the upper left. A red LED will indicate every pulse output. The **pressure CV** output correlates to the detected amount of finger contact on the keys. The blue LEDs next to the pressure output will get brighter as the voltage gets higher.

The “**main**” output corresponds to the pitch of the key.

At the Buchla standard of 1.2v/per octave, that means that the pitch C will be 0v, 1.2v, 2.4v, 4.8v or 6.0v depending on the octave being played. (Notice how conveniently that relates the MIDI “C” notes 0, 12, 24, 48 and 60.) Every ½ step higher will be .1v higher.



To the right of these outputs is **Portamento** control. Adding portamento will make the pitches slide from one to the next like a violinist sliding a finger to the next pitch. It is an endearing musical affect. To control the speed of the slide, turn the knob higher. At 0, it does not slide; At 10 it may take several seconds to reach the next pitch. The input banana is another way to control this parameter with a CV. The CV input will add to the portamento time set by the knob.

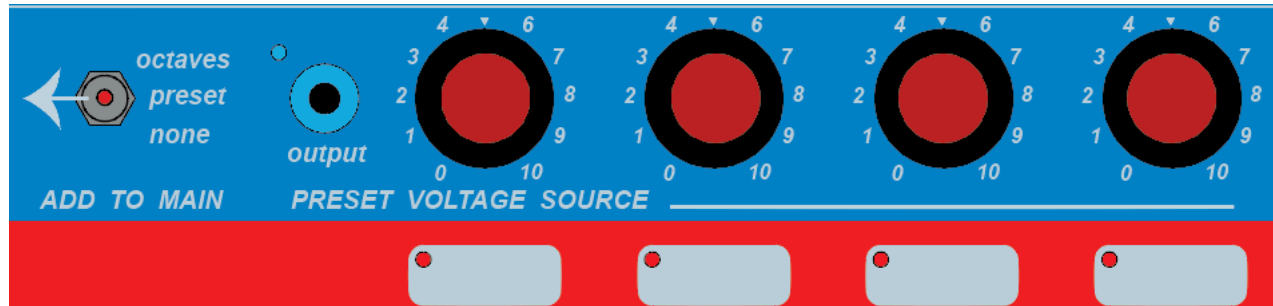


To the right of portamento is the **Arpeggiator**. The 218 will arpeggiate based on the keys that are sustained with the fingers or sustain pedal. The rate can be controlled by the knob or the CV input. The switch determines whether the arpeggiation is active or whether it plays an ascending or a

random pattern.

(Note: pulse outputs during arpeggiation are 10v pulses with sustain, and therefore the voltage drops to 5v and does not drop down to 0v.)

Next is the **PRESET VOLTAGE SOURCE**



Only one “preset voltage source” can be selected at a time as indicated by the LEDs. The knob above each pad sets the output CV from 0-10v. The corresponding voltage will appear at the blue “**output**” banana when that knob/source is selected.

Additionally, that preset voltage source can affect the “main” pitch CV output per the **ADD TO MAIN switch** setting.

The “**preset**” setting will add the CV--as set by the selected knob--to the main output. But the most common application is to use the “**octaves**” setting for **instant transposition of the main output**. If used in combination with the “output” CV, the user might use the preset output to automatically change a parameter of a sound based on the octave being played.

218e Input and output jacks:

Sustain: The Easel comes with a ¼” connection labeled “(opt. right)/sustain.” the factory jumper setting should be set for the 218e sustain pedal input since the Easel is really just a mono audio output. While it is not polyphonic, the keyboard will hold one pitch or latch arpeggiated pitches.

MIDI: Use of the 218e for MIDI to CV conversion:

The 218e converts incoming MIDI signals **on MIDI channel 1** from the 5pin DIN MIDI input just as if you were playing the 218e keyboard. MIDI notes become pulses and main pitch CV outputs, and channel pressure messages from 0-127 get sent out the pressure output as 0-10v.

In fact, all the controls of portamento, arpeggiation, and preset voltage source selection will still apply when using this MIDI input. Octave setting will transpose the input just as it would when you play the 218e keyboard. Use the

lowest octave setting when switched to “octaves” or switch to “none” if you want to get the non-transposed input. (C0 or [MIDI note 25] will equal 0 volts in this setting and is the lowest note the 218e responds to.)

You can also use the internal MIDI bus A to if you have remote enabled your 218e.

USING THE PRESET PADS for additional features of the 218e:

*Many of these features are new for firmware version 30.8 and higher***

How to know what Firmware you have:**

To end the firmware information to be displayed by a preset manager, **hold presets pad 2, 3, & 4** until the message is displayed by the preset manager (after about 2 seconds).

If this does not work, you have an earlier version of the Firmware.

How to REMOTE ENABLE the 218e:**

To remote enable, **press and hold preset pads 3 & 4** until they flash. Quick flashes indicates turning on remote enable; slow flashes indicates the turning off of remote enable. Note: The 218e will not be remote enabled upon boot up. This is a temporary setting.

Now that you have remote enabled your 218e, MIDI input on channels 1-4 will be turned into internal bus messages on bus channels A-D, respectively. For instance, to send a MIDI message to the AuxCard on bus C, you can send a MIDI message on channel 3.

218e settings: Configuration mode*

To enter configuration mode, **hold the preset pads 1 and 2** until they both flash twice. (The 4th preset pad LED 4 will start flashing.)

Assigning Internal MIDI bus output (with Preset knob 1):

In configuration mode, the illumination of the four preset pads indicates the internal MIDI bus assignment. Assign it to an internal bus by turning preset knob 1 through selections: none, A, B, C, D, A+B, C+D, A+B+C+D. (Note: **The AuxCard oscillator listens to internal bus C.**) Other Buchla modules that can respond to the internal MIDI bus from the 218e include 261e, 259e, 281e/h, and 292e/h.

Velocity adjustment for internal bus and MIDI output of LEM218 (knobs 2 & 3):
In configuration mode, preset knobs 2 and 3 adjust the minimum and maximum velocity values: Knob 2 is the minimum; knob 3 is the maximum. If a constant velocity value is desired, set the minimum higher than the maximum. In other words, If knob 2>3, then the velocity will always be the value set by 2.

Pressure sensitivity is set by preset knob 4.

Exit configuration mode the same way you entered the mode: hold preset pads 1 and 2 until they flash twice.

*Upon exiting the configuration mode, these settings are now saved***

Note: **If you have an older 218 (without and “e” in the “218e” model number), you may have earlier firmware with only a basic “Adjustment Mode” for pressure sensitivity only. You cannot send MIDI over the internal bus for those.*

For this pre-code loader version of the firmware, the procedure for setting pressure sensitivity is setting all knobs fully clockwise with the two switches in the “none” position when booting up. Then use preset knob 4 to adjust the sensitivity of the keyboard. Changing any of the other knobs or switches will exit that adjustment mode.

Using the USB MIDI I/O Card---the 225m-- to send and receive MIDI messages.

Now that you know how to remote enable and assign the internal MIDI bus output, you can take full advantage of a 225m to send and receive MIDI through USB.

If you assign an output to the internal MIDI bus, this output will be transmitted on a MIDI channel by the 225m. You can change the channel assignment by changing the internal bus assignment. This way you can record your 218e performance.

You can then send USB MIDI back into the 218e through the 225m, but only if you have REMOTE ENABLED the 218e.

The 225m will turn messages on USB MIDI channel 1-4 into internal bus A-D respectively. And, as mentioned earlier, if the 218e is remote enabled, messages on bus A will act just as if you are playing the 218e keyboard. You will be able to transpose, arpeggiate and play with portamento just the same.

So go ahead and record your 218e performances.

Outputs for Eurorack equipment:

The optional LEM218 housing includes 3.5mm jack outputs with 1v/octave pitch, 0-8v pressure, and 5v gate and trigger outputs for use with Eurorack equipment.

But there is also a mode to turn the standard 218e banana outputs into 1v/octave pitch, 0-8v pressure, and 5v pulse outputs. **Hold down all four preset pads** until the LEDs flash to get into this **Euro mode**.** This mode is not saved. Rebooting the 218e will reset to 0-10v outputs and 1.2v/octave

The optional LEM218 housing includes its own 5-pin DIN MIDI output.

How to upload Firmware to the 218e:

To upload new firmware to your 218e, **turn all of the knobs fully clockwise**. When you boot up, this knob setting will signal to the computer to download new firmware from the inserted firmware card.

(Remember to turn at least one of the knobs counter-clockwise before booting up again or you will be stuck in a waiting state.)

About auto-calibration: keep hands away on boot up:

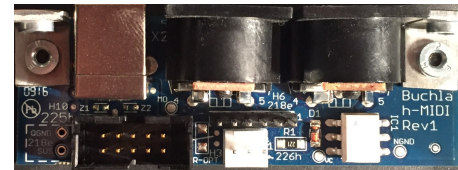
Every time you boot up the 218e, the keyboard auto-calibrates to its environment. That means that if a finger is near a key when you turn it on, that key will be desensitized to your finger. For instance, if you are holding on the keyboard area when you plug in a LEM218 (which does not have a power switch), several keys may seem to fail to function at all. Considered holding the LEM218 from the top.

Troubleshooting: It is true that moisture and grounding can also affect the detection of your finger. Experiment with touching ground or moistening your finger. Accessorizing with a fashionable grounding strap shouldn't be necessary, but that works. Or experiment with "pressure" sensitivity in configuration mode. None of these procedures should be necessary in a typical environment, but the 218e is not a typical keyboard.

I-O connections to a 218e in other housings: The 6-pin SIP header.

Factory installation of your 218e includes the connection to the Buchla housing that it came with. Various Easel cases include MIDI In and Sustain, and the LEM housing adds MIDI Out. The Buchla 218e can also be put in another housing and still retain those connections via the 6-pin SIP header. This 6-pin connector (on the inside board on the right side) was designed to connect directly to panel jacks: The 2 MIDI In pins (pins 1&2) can be connected directly to a panel mounted 5-pin DIN jack (pins 4&5 respectively); MIDI Out (pins 3&4) connect to 5-pin DIN (pins 5&4 respectively); Ground (pin 5) should connect to MIDI Out Din pin 2 (and not to MIDI In) and also to Sustain pedal ground; and the Sustain switch signal (pin 6) should connect to a sustain pedal input.

Inside a 200e system, the simplest way to connect MIDI to a 218e is with the Buchla “h-MIDI” IO board header H6. This header connects MIDI In and MIDI Out 5-pin DIN connections (not USB) via the 6-pin connector from the 218e and a panel 1/4" jack can be wired to pads on the left side for sustain.



Additional inputs on the side of the LEM218 :

Power: The **LEM218 housing** may include a 16-pin optional power connection to power from something other than standard connection. This is a similar pinout to a Eurorack connection, but it is not compatible with Eurorack power. The cable has a header that is reversed. (The LEM218 does NOT provide power TO Eurorack equipment.) This connection includes internal MIDI bus lines if a compatible connection to a 200e system is made. In other words, this is not a standard connection.

If you have a later 218e (post-summer 2018) with a smaller 2mm 10-pin header on the side, this header can be used to connect to ground and the internal MIDI bus through an h-series power cable.

1v/oct trimpot: Sometimes a voltage output varies or sags after getting plugged in. The LEM218's 1v/octave trimpot can be adjusted to maintain 1 volt per octave at the 3.5mm jack output.



Description – Easel 208 Card Doubler

If you have purchased a 208 Card Doubler, Congratulations! The Easel Card Doubler allows owners of a model 208 to double the number of external program interface card slots and adds a firmware card input.

Installing the Card:

Cards are not reversible and not hot-swap-able! Remember, the program card slot was design in 1973. So with the power off, insert the Card Doubler with the Firmware Card slot on the left. (Text on the board indicates the orientation and it's relationship the sequencer and Mode control switch on the 208.)

Putting the Card or the Card Doubler in backwards can result in damage to your system. It is recommended that the user install two 4-40 thread 1 1/16" long Male-Female Standoffs in place of the two screws in the top left corner of your 208 to give the Card Doubler additional stability.

The LED on the right is a reminder that the sockets are powered.

Uses for the Program Card Slots:

Uses for two card slots include the sharing an AuxCard and an iProgramCard or use of an AuxCard with a Retro 1970's style Program Card. As usual, the cards need to be installed in one direction only.

The Firmware Card Slot:

The addition of the Firmware Card slot allows users with older Easel cases that don't have the Firmware Card slot to have a card slot.

Typical uses for this small card slot include using a Firmware Card in it's USB-MIDI mode to send and received MIDI from the internal bus or for Firmware updates to Buchla modules. See the Firmware description earlier in this manual for a full description of the uses for Firmware cards.

An LED next to this card will indicate activity on the internal MIDI bus.

Remove for travel:

The Card Doubler is designed to accommodate two cards without interfering with the 208 switches. As a result, the Card Doubler must be removed before attempting to replace the cover for your Easel case. If you have installed the support standoffs, those standoffs can remain in place.

Remember to power off your system before installing or removing cards in the Program Card slots.

Extra connections and testpoints:

Easel users are a clever bunch, and so a few test points have been added as well as pads for banana jacks at J1 and J2. In the spirit of the Original "Retro" Program Cards, connections between added CV inputs through resistors to these points is possible. Buchla Electronic Musical Instruments is not responsible for any user circuit modifications.