Visible Signals

RGB Matrix - Input

DIY Video Synthesizer module for eurorack

Manual V0.5e

The RGB Matrix is an expandable three channel, dual-bus video-rate matrix mixer for colourising and mixing pattern and video sources in full colour RGB, allowing manipulations previously only possible through the combination of a large number of other separate modules. It also includes three-channel RGB crossfader/keying functionality, for complex image compositing and effects.

The RGB Matrix Input module takes a single video-rate CV and provides separate attenuation, boost, invert and mute controls for each of the Red, Green and Blue output channels on one of the two output busses.

All Visible Signals manuals include a version number, which corresponds to the version number printed on the PCBs, plus a revision letter. Please make sure the manual you use has the same version number as your PCBs! Contact info@visiblesignals.net if you can't find the right manual.

Suggested Build Order

RESISTORS

Part	Value		Part	Value
☐ R9	100K		☐ R5	1K
☐ R1	10K		☐ R6	1K
☐ R2	10K		☐ R7	**1M**
☐ R4	10K		☐ R10	499R
☐ R3	1K		☐ R8	75R

SEMICONDUCTORS

Part	Value
☐ U1	LM6172

MLCC CAPACITORS

All unlabelled capacitors on the PCB silkscreen are 100nF MLCC types.

Part	Value		Part	Value
☐ C3	100n		☐ C4	100n

SOCKETS & POTS

Make sure the socket and pots fit into the front panel as you solder them.

Part	Value		Part	Value
☐ IN	PJ302M		☐ VR2	10K
☐ VR1	10K		☐ VR3	10K

SWITCH SHIM PCBS & PIN HEADERS

*Make sure the large shim PCBs (3P3T) has the **Bottom** side facing out (away from the switch), and the three small shim PCBs (1P3T) have the **Top** sides facing out (away from the switch) or else the switches will work backwards! Solder the shim PCBs to the main PCB first, then attach the switches to the front panel, then put the socket and pot nuts on to hold the panel in place and finally solder the switches to the shim PCBs.*

Part	Value		Part	Value
☐ PCB1	3PDT		☐ PCB4	1PDT
☐ PCB2	1PDT		☐ J1	Pin Header 2x7 right angle
☐ PCB3	1PDT		☐ J2	Pin Header 1x3 right angle

ELECTROLYTICS CAPACITORS

The long legs of C1 and C2 go in the hole marked '+'.

| Part	Value		Part	Value
☐ C1	10uF		☐ C2	10uF

Circuit Details

The RGB Matrix Input module first buffers and inverts the CV input, then three identical circuits allow for either the inverted signal, non-inverted signal or no signal to be chosen via a panel switch. That signal is then sent through an attenuation pot and a three-pole switch which connects it to either the A or B bus, or to neither bus in order to 'mute' it.

Take particular note of the ingenious scheme for attenuating the signal with the pot – it's not your usual voltage divider, since that would short the mix bus to ground when the attenuation pot is turned fully anti-clockwise.   This cool technique is kindly borrowed (with permission) from Ken Stone's CGS matrix mixer for audio.
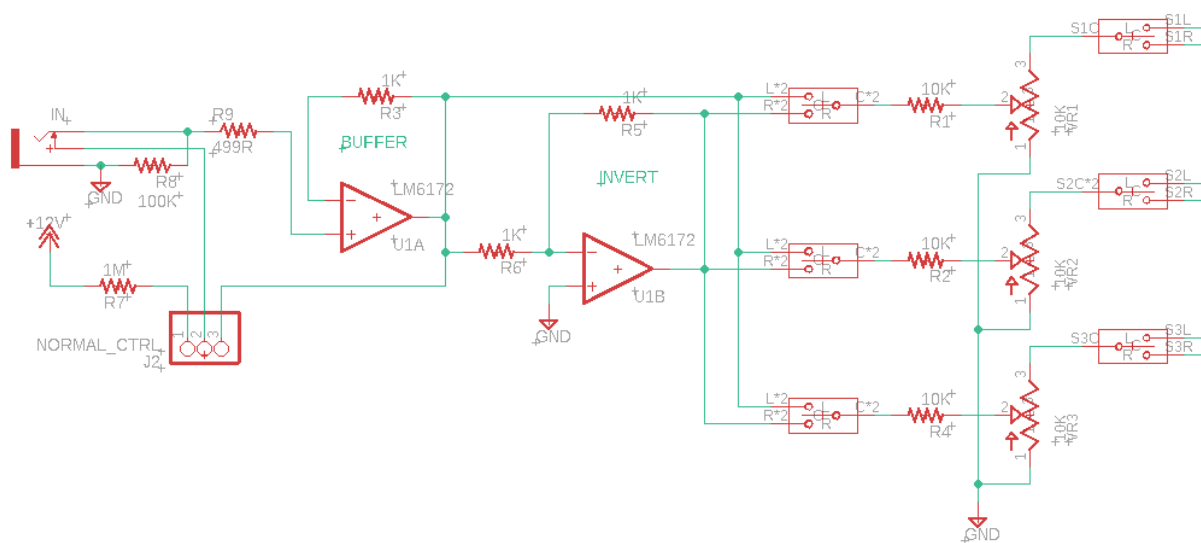
Build-Time Options

Each RGB Matrix Input module has a three-pin configuration jumper (J2) for configuring the normalised signal (what the module's input is when no cable is plugged in to the front panel socket).
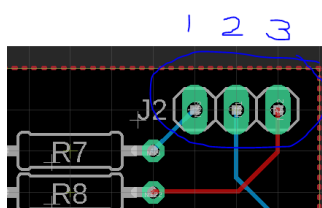
If pins 1 and 2 are connected together then the input will be roughly +1V (i.e. +12V from the power supply, minus the voltage drop across the 1N400x protection diode, divided by 11 which is the ratio of R7 to R7+R8). Note that since this voltage is not regulated in any way there may be artifacts in the signal if the power supply isn't very clean.

Alternatively, if pin 3 of J2 is connected to pin 2 of J2 on a different Input module, then that other Input module will see the same input signal as this one when nothing is plugged in. This is handy if you want to send the same signal to both busses at the same time, since each Input module can only be switched to bus A or B and not to both at the same time.

Bill of Materials

Parts marked with an asterisk are frequently used in Visible Signals modules, so consider stocking up if there's a quantity discount available.

Type	Value/Description	Qty	Vendor	Part Number	*	Notes
Resistor	10K	3	Mouser	603-MFR-25FTF52-10K	*	
Resistor	1K	3	Mouser	603-MFR-25FBF52-1K	*	
Resistor	499R	1	Mouser	603-MFR-25FBF52-499R	*	
Resistor	100K	1	Mouser	603-MFR-25FBF52-100K	*	
Resistor	1M	1	Mouser	603-MFR-25FRE52-1M		
Resistor	75R	1	Mouser	603-MFR-25FTE52-75R	*	
IC	LM6172	1	Mouser	926-LM6172IN/NOPB	*	
Capacitor	100n	2	Mouser	594-K104K15X7RF53K2	*	
Socket	PJ302M	1	Thonk	PJ302M	*	
PCB	RGB Matrix Input PCB set	1	Visible Signals	MM-IN or MM-SP		
Panel	RGB Matrix Input PCB set	1	Visible Signals	MM-IN or MM-SP		
Pin Header	Pin Header 2x7 right angle	1	Mouser	649-1012938291402BLF		Or get a 2x40 and snap off what you need
Pin Header	Pin Header 1x3 right angle	1	Mouser	649-1012937990501BLF		Or get a 1x40. Snap off what you need
Electrolytic Capacitor	10uF	2	Mouser	80-ESL106M050AC3AA	*	
Switch	3PDT ON-OFF-ON Toggle	1	Mouser	108-0006-EVX or 7303SYZQE		Needs the centre-off position for muting
Switch	1PDT ON-OFF-ON Toggle	3	Mouser	118-1MS3T1B1M2QES		Needs the centre-off position for muting
Potentiometer	B10K	3	Thonk	Alpha 9mm Right Angle	*	T18 or Round shaft to match knobs
Knobs	Red, Green and Blue	3	Thonk	Davies 1900H	*	T18 or Round shaft to match pots