

Visible Signals

Wrangler

DIY Video Synthesizer module for Eurorack

Manual V0.4a



The Wrangler is voltage processing module designed for manipulating and monitoring video synth control voltages. It features a two-input video signal mixer (one of which is normally inverted), panel controls for voltage offset and scaling to allow conversion to and from conventional Eurorack +/-12V signal levels, a five-LED level meter to indicate the output voltage signal, and two buffered outputs (one with 0 to 1V video-range clipping).

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

SIGNAL DIODES

Make sure the diodes are in the right way.

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> D3	1N5711	<input type="checkbox"/> D8	1N5711
<input type="checkbox"/> D4	1N5711	<input type="checkbox"/> D9	1N5711
<input type="checkbox"/> D5	1N5711	<input type="checkbox"/> D10	1N5711
<input type="checkbox"/> D6	1N5711	<input type="checkbox"/> D11	1N5711
<input type="checkbox"/> D7	1N5711		

RESISTORS

Take note of which resistor is R22 for when you do the MLCC capacitors below!

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> R27	1.5K	<input type="checkbox"/> R38	1K
<input type="checkbox"/> R21	100K	<input type="checkbox"/> R39	1K
<input type="checkbox"/> R25	100K	<input type="checkbox"/> R40	1K
<input type="checkbox"/> R29	100K	<input type="checkbox"/> R17	2.2K
<input type="checkbox"/> R22	100R	<input type="checkbox"/> R19	2.2K
<input type="checkbox"/> R1	1K	<input type="checkbox"/> R20	2.2K
<input type="checkbox"/> R2	1K	<input type="checkbox"/> R18	220R
<input type="checkbox"/> R5	1K	<input type="checkbox"/> R3	22K
<input type="checkbox"/> R6	1K	<input type="checkbox"/> R4	22K
<input type="checkbox"/> R7	1K	<input type="checkbox"/> R12	27K
<input type="checkbox"/> R8	1K	<input type="checkbox"/> R13	27K
<input type="checkbox"/> R9	1K	<input type="checkbox"/> R15	4.3K
<input type="checkbox"/> R23	1K	<input type="checkbox"/> R28	4.99K
<input type="checkbox"/> R26	1K	<input type="checkbox"/> R11	43K
<input type="checkbox"/> R31	1K	<input type="checkbox"/> R10	499R
<input type="checkbox"/> R32	1K	<input type="checkbox"/> R24	499R
<input type="checkbox"/> R33	1K	<input type="checkbox"/> R30	499R
<input type="checkbox"/> R34	1K	<input type="checkbox"/> R35	499R
<input type="checkbox"/> R36	1K	<input type="checkbox"/> R14	6.8K
<input type="checkbox"/> R37	1K	<input type="checkbox"/> R16	6.8K

ICs

Make sure the ICs are in the right way, with the notch (or the left side relative to the writing on top of the chip) lined up with the silkscreen.

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> IC1	LM6172	<input type="checkbox"/> IC2	TL074
<input type="checkbox"/> IC4	LM6172	<input type="checkbox"/> IC3	LM339N
<input type="checkbox"/> IC5	LM6172		

FERRITES & PROTECTION DIODES

Make sure the diodes are in the right way.

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> D1	1N400x	<input type="checkbox"/> L1	Ferrite bead
<input type="checkbox"/> D2	1N400x	<input type="checkbox"/> L2	Ferrite bead

MLCC CAPACITORS

C7 and C8 are tricky to identify on the silkscreen – they're the top two of the three directly to the right of IC3 and directly underneath R22.

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> C1	100n	<input type="checkbox"/> C9	100n
<input type="checkbox"/> C2	100n	<input type="checkbox"/> C10	100n
<input type="checkbox"/> C3	100n	<input type="checkbox"/> C11	100n
<input type="checkbox"/> C4	100n	<input type="checkbox"/> C12	100n
<input type="checkbox"/> C5	100n	<input type="checkbox"/> C7	10n
<input type="checkbox"/> C6	100n	<input type="checkbox"/> C8	10n

VOLTAGE REFERENCE

Make sure the flat side of the TL431 voltage reference is oriented the same way as shown on the silkscreen. Bend the middle pin out slightly so it goes the correct hole.

<u>Part</u>	<u>Value</u>
<input type="checkbox"/> REG1	TL431

PIN HEADERS

Make sure the notch on the shrouded power header (JP3, unlabelled on the silkscreen) is on the outside edge of the PCB.

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> JP1	3x1 Pin Header	<input type="checkbox"/> JP3	5x2 Pin Header (not labelled)
<input type="checkbox"/> JP2	3x1 Pin Header		

SOCKETS

Make sure the sockets fit into the front panel as you solder them.

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> IN	PJ302M	<input type="checkbox"/> OUT	PJ302M
<input type="checkbox"/> INV	PJ302M	<input type="checkbox"/> CLIP	PJ302M

POTS

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

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> VR1	B10K	<input type="checkbox"/> VR2	B10K

LEDS

This step can be a bit fiddly, so take your time and follow these instructions carefully. Remove the front panel. Carefully bend the legs of the five LEDs as follows: hold each LED vertically with the shorter leg and the flat edge of the LED body closer to you and the longer leg further away from you. Bend the two legs of each LED to the left at a 90 degree right angle, at the following bend point distances as measured from the LED body: The green centre 'OK' LED has a 10mm bend point. The remainder of the LEDs are red, with the '>+5' and '<-5' LEDs both having a 9mm bend point, the '>+1' LED a 14mm bend point and the '<0' LED a 6mm bend point. Insert the legs of all five of the LEDs into their respective holes in the top side of the PCB, with the LED bodies pointing towards the front panel. Fit the front panel and tighten the nuts on pot VR2 and IN socket to hold it in place. Use needle-nose pliers to line the LEDs up with their holes and gently push them into place with a small flat-bladed screwdriver on the back of the LED body between the pins. Make sure they're all in the correct holes, with all the LED pins bending at 90-degree angles. Finally, solder the LEDs into place.

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> LED1	3mm red round	<input type="checkbox"/> LED4	3mm red round
<input type="checkbox"/> LED2	3mm red round	<input type="checkbox"/> LED5	3mm green round
<input type="checkbox"/> LED3	3mm red round		

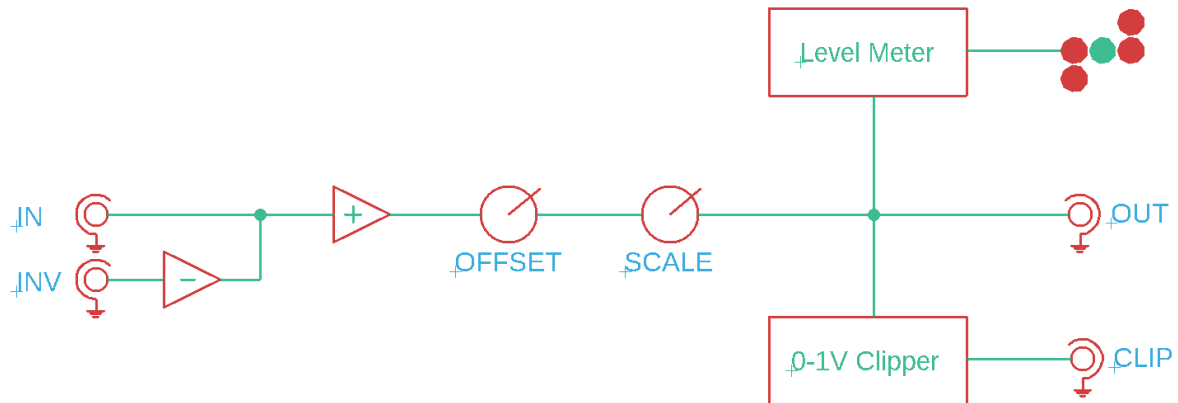
ELECTROLYTIC CAPACITORS

Make sure the long legs go in the hole marked with a '+'.

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> C13	10uF	<input type="checkbox"/> C14	10uF

Description

The IN and inverted INV inputs are summed and processed by the OFFSET and SCALE controls. The resulting signal is sent directly to the OUT socket, a 5-LED meter circuit and also to a hard limit (clipping) circuit for the 0-1V CLIP output.



Build-Time Options

JP1 is used to set whether the “INV” input is inverted or not. Connect the middle pin to the pin nearest the back of the board for invert, or to the pin nearest the front of the board for non-inverted.

JP2 is used to set whether the “CLIP” output is clipped or not. Connect the middle pin to the pin nearest the output sockets for clipped, or the pin nearest the input sockets for non-clipped. If you don't ever plan to use the clipped output then you don't need to solder IC5, D3, D4, D5, D6, R32 through R34 and R36 through R40.

Bill of Materials

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

<u>Type</u>	<u>Value/Description</u>	<u>Qty</u>	<u>Vendor</u>	<u>Part Number</u>	<u>*</u>	<u>Notes</u>
MLCC Capacitor	100n	10	Mouser	594-K104K15X7RF53K2	*	
MLCC Capacitor	10n	2	Mouser	594-K103K15X7RF53K2	*	
Diode	1N400x	2	Mouser	750-1N4001-G	*	Any part like 1N4001, 1N4004, etc is fine
Diode	1N5711	9	Mouser	511-1N5711	*	
Electrolytic Capacitor	10uF	2	Mouser	80-ESL106M050AC3AA	*	
Ferrite bead	Ferrite bead	2	Mouser	623-2743001111	*	
IC	LM6172	3	Mouser	926-LM6172IN/NOPB	*	
IC	LM339N	1	Mouser	595-LM339N		
IC	TL074	1	Mouser	595-TL074CN		
LED	Red 3mm round	4	Mouser	710-151031SS06000	*	
LED	Green 3mm round	4	Mouser	710-151031VS06000		
PCB	Wrangler PCB set	1	Visible Signals	WGLR		
Panel	Wrangler PCB set	1	Visible Signals	WGLR		
Pin Header	3x1 Pin Header	2	Mouser	710-61300311121		Or get a 40 pin one and snap off what you need
Pin Header	5x2 Pin Header	1	Mouser	710-61201021621	*	Shrouded
Knobs	Davies 1900H	2	Thonk	1900H	*	T18 or rounded shaft to match Pots T18 or rounded shaft to match Knobs
Potentiometer	10K Linear	2	Thonk	Alpha 9mm VERTICAL		
Resistor	1.5K	1	Mouser	603-MFR-25FBF52-1K5		
Resistor	100K	3	Mouser	603-MFR-25FBF52-100K	*	
Resistor	100R	1	Mouser	603-MFR-25FBF52-100R		
Resistor	1K	18	Mouser	603-MFR-25FBF52-1K	*	
Resistor	2.2K	3	Mouser	603-MFR-25FBF52-2K2		
Resistor	220R	1	Mouser	603-MFR-25FRF52-220R		
Resistor	22K	2	Mouser	603-MFR-25FBF52-22K		
Resistor	27K	2	Mouser	603-MFR-25FBF52-27K		
Resistor	4.3K	1	Mouser	603-MFR-25FBF52-4K3		
Resistor	43K	1	Mouser	603-MFR-25FBF52-43K		
Resistor	4.99K	1	Mouser	603-MFR-25FBF52-4K99	*	
Resistor	499R	4	Mouser	603-MFR-25FBF52-499R	*	
Resistor	6.8K	2	Mouser	603-MFR-25FBF52-6K8		
Socket	PJ302M	4	Thonk	PJ302M	*	
Voltage Reference	TL431	1	Mouser	511-TL431CZT	*	