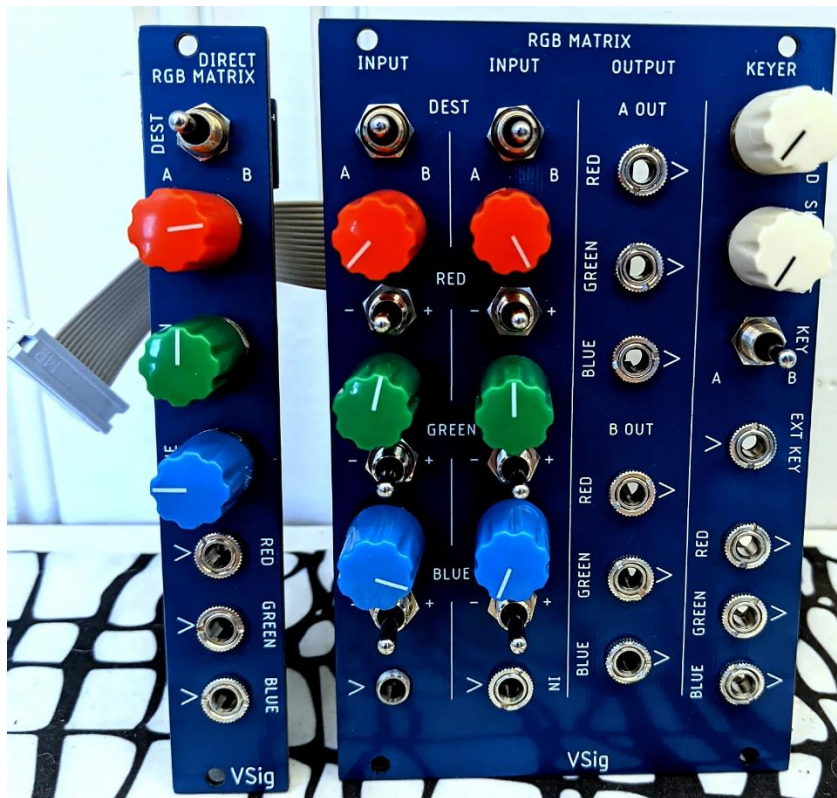Visible Signals

RGB Matrix Connection Guide

DIY Video Synthesizer module for eurorack

Manual V0.1b

Thank you Teleos Modular for your nice photo

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.

This manual explains how the various RGB Matrix modules connect together and provides an overview of the interconnection architecture for DIYers who want to add their own expansion modules to an RGB Matrix system.

How It Works

The RGB Matrix consists of a number of separate modules that connect together behind the panel. The **Input** and **Direct In** modules allow for signals to be patched in on the front panel, level adjusted, and then routed to the six signal lines (red, green, blue for each of bus A and bus B) on the 14-wire "RGB Matrix bus" ribbon cable. The **Output** module mixes those signals together and provides panel output sockets for direct access to the six signal lines. The **Keyer** module takes the signals mixed by the **Output** module and provides a triple crossfader between bus A and bus B. It does not use the bus interconnect ribbon cable, but instead uses a direct pin header/socket to obtain the pre-mixed bus signals directly from the **Output** module (see the manuals for those modules for more details).
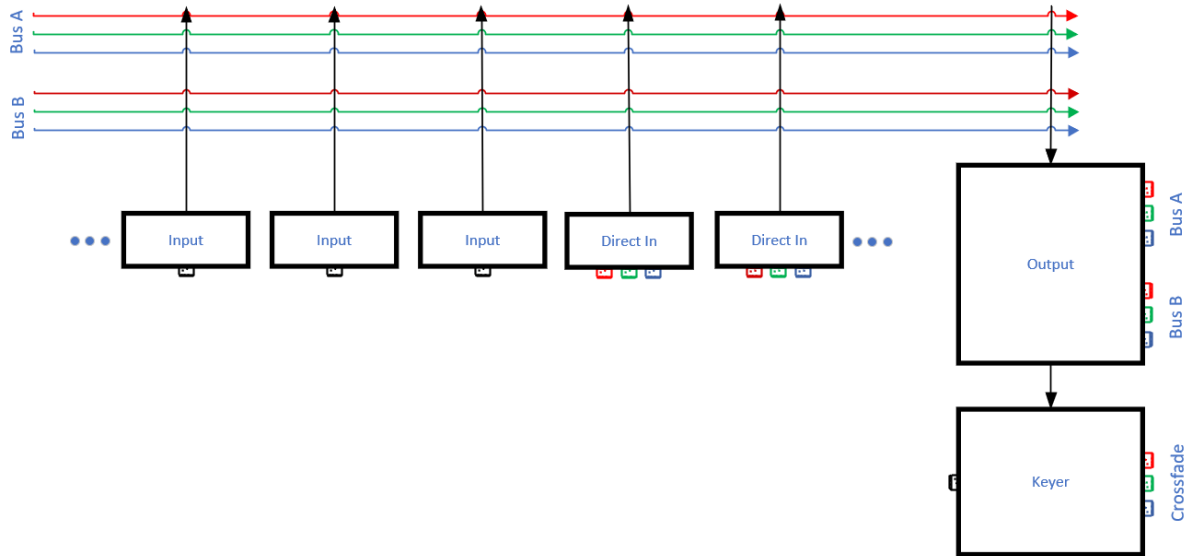

The ribbon cable also carries power from the **Output** module to all of the **Input** and **Direct In** modules, and there is a second pin header/socket providing the **Keyer** with power from the **Output** module.

This is the pinout of the bus ribbon cable. Every second pin (i.e. the even-numbered ones) in between the signal lines is grounded, to help reduce crosstalk.
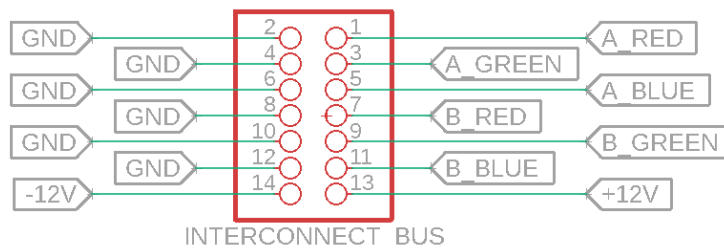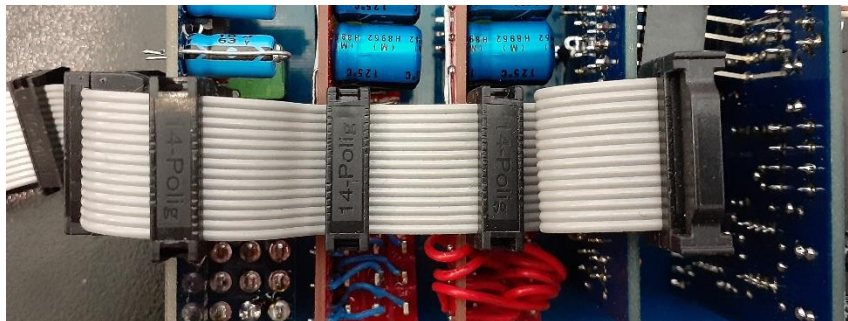
The RGB Matrix Bus (ribbon cable)

Assuming you used the (recommended) 90-degree pin headers on your PCBs then the ribbon cable connects them together like this:
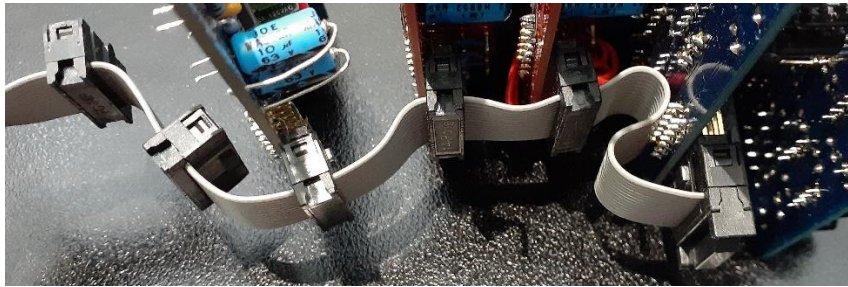
The module in this photo was a prototype so please ignore the oversized capacitors and the weird blue and red wires on the switches! 😊

When crimping the connectors to the ribbon cable you should allow 20mm between connectors for modules of the same type (i.e. **Input** to **Input**, or **Direct In** to **Direct In**), 30mm between **Direct In** and **Input** module connectors, and 40mm between the **Input** and **Output** module connectors. It can be tricky to get the distances just right so if you are unsure you can just make them all 40mm (or slightly more) and carefully put loops in the cable where needed.

If you didn't use the 90-degree headers then you'll need to use a longer ribbon cable and loop it in and out between each module. Unfortunately, the strain relief probably won't help you with that because there's no room for it under the next module!

How to build the RGB Matrix Bus cable

To build the RGB matrix bus cable you will need some 14-core ribbon cable (you can use wider cable and pull off the extra cores you don't need), one 14-pin crimp IDC connector (two rows each with 7 pins) for each **Input**, **Direct In** and **Output** module you want to connect to the bus, and either an IDC crimping tool (can be expensive), a bench vice, or if all else fails a pair of 'slip joint pliers' (sometimes also called 'open jaw pliers'), to connect (crimp) the IDC connectors to the cable.

 ← Wrong!   Right! →

Other than lining up the ribbon correctly, the most important thing about crimping IDC connectors is to apply <u>even</u> and <u>gentle</u> pressure on the connector. If you use a bench vice then stop as soon as the

connector closes on the ribbon cable (it will often click softly when it's in place). If you use pliers then make sure the 'jaws' close parallel to each other and work your way along the connector crimping it gently, a bit at a time. Don't push one side all the way down before the other, and don't push too hard once it's together or else the plastic might break and the connector could be compromised. Repeat for each connector, checking and making sure the spacing is correct. All the connectors should be on the same side of the ribbon cable!
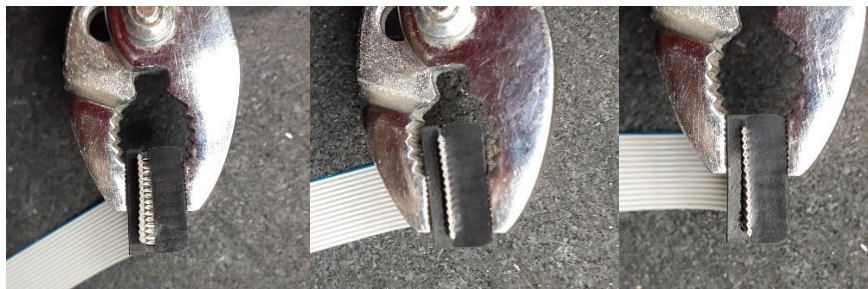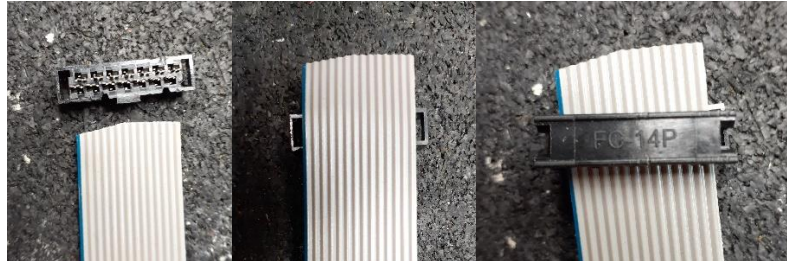
If your IDC connectors come with strain relief then it's probably best to leave them off, otherwise the cable will loop around and come out the wrong way. You can use it if you really want to – just make sure you have enough distance between the connectors to reach each board.

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
Ribbon Cable	14 Conductors	1	Mouser	517-3365/9FT		I just used an old PC hard drive cable I had spare
IDC connector	14 pin (2x7) 0.1"	4+	Mouser	653-XG4M-1430		One for each **Input, Direct In** and **Output** module. These are also listed in the separate module BoMs, and are just replicated here for convenience.