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# Quantus Pax

## 4-channel transposable precision adder

- [Overview](#)
- [Etymology](#)
- [Power](#)
- [Interface](#)
- [Patch tutorial](#)
- [Technical details](#)
- [Input & output voltages](#)
- [Design notes](#)
- [Warranty](#)
- [Special Thanks](#)

## Overview

Quantus Pax is a four-channel precision adder, buffered multiple, and polyphonic transposition utility. Each channel has two CV inputs and can be further modified by the three `xpose` inputs. Quantus Pax is made with high quality low-tolerance resistors for unbeatable accuracy. Patch-wide key changes, polyphonic movement,

mathematically derived melodies, and more are all to be had with this simple but useful utility.

- **Type:** Quad adder
- **Size:** 6HP Eurorack
- **Depth:** 0.8 inch
- **Power:** 2x5 Eurorack
- **+12 V:** 85 mA
- **-12 V:** 85 mA

## Etymology

Quantus -- from Latin: *"how many"*

Pax -- from Latin: *"harmonious"*

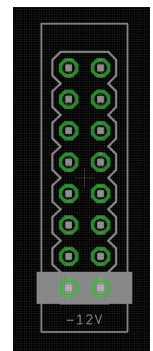
**"How much harmony"**

## Power

To power your Noise Engineering module, turn off your case. Plug one end of your ribbon cable into your power board so that the red stripe on the ribbon cable is aligned to the side that says **-12 V** and each pin on the power header is plugged into the connector on the ribbon. Make sure no pins are overhanging the connector! If they are, unplug it and realign.

Line up the red stripe on the ribbon cable so that it matches the white stripe and/or **-12 V** indication on the board and plug in the connector.

Screw your module into your case **before** powering on the module. You risk bumping the module's PCB against something metallic and damaging it if it's not properly secured when powered on.



You should be good to go if you followed these instructions. Now go make some noise!

A final note. Some modules have other headers -- they may have a different number of pins or may say "not power". In general, unless a manual tells you otherwise, **do not connect those to power**.

# Interface

## Upper input 1-4

CV input. Summed with channel's lower input and the three `xpose` inputs. The upper inputs of each channel are circularly normalised together; patching to an input breaks normalization.

## Lower input 1-4:

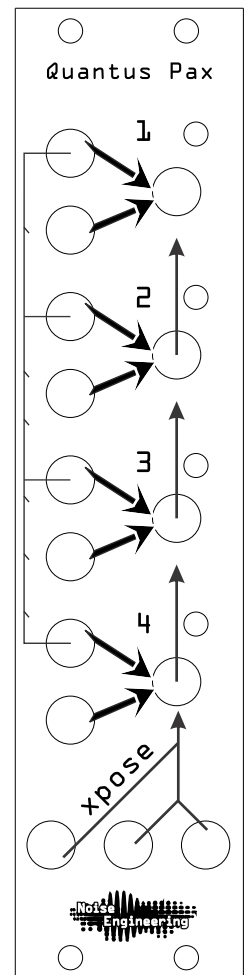
CV input. Summed with channel's upper input and the three `xpose` inputs.

## Output 1-4

CV outputs. Sum of each channel's two inputs and the three `xpose` inputs.

## Xpose inputs

CV inputs for global transposition. Each input is summed to all four channels simultaneously.



# Patch tutorial

## Patch 1

Patch a sequence to the upper input of channel 1. Patch another sequence or other 1v/octave voltage source to channel 1's lower input. Patch channel 1's output to an oscillator's pitch input. Listen to how the two sequences sum together and create new-but-related melodies

## Patch 2

Since the upper inputs of each channel are normalled together, Quantus Pax can be used as a buffered multiple with a twist. Using the same patch as the previous example, patch some of the other channel's outputs to other pitch destinations in your system. The signal is split pitch-accurately to each output.

For even more fun, the original sequence can then be modified per-channel by inputting other voltages to each channel's lower input.

## Patch 3

Patch each CV of a polyphonic pitch sequence (like a chord or multiple melodies/harmonies) to separate channels on Quantus Pax. The `xpose` inputs can now be used to transpose all four inputs at once. A separate sequence or octave switch like Quant Gemi can be used for transposition, an LFO can be used to add universal vibrato, and more.

## Patch 4

Summing melodies and harmonies to create new countermelodies is a great way to generatively create mathematically related musical ideas.

Take two pitch CV sources. Mult them to two oscillators and to the first and second inputs of a channel of Quantus Pax. Take the Quantus Pax channel's output and patch it to a third oscillator. A new melody has been created, based off of the pitch information of the other two notes.

# Technical details

Quantus Pax is built using extremely high quality .01% tolerance resistors for zero-compromise accuracy in voltage summing.

## Input & output voltages

All of Quantus Pax's ins and outs are rated to -10 V to +10 V.

## Design notes

Quantus Pax started simply enough to address the relative lack of ease of transposing things in Eurorack. Our first prototype had a slightly different layout, with only two transpose ins and a third CV input on channel 4. Some internal warring occurred within NE -- the typical kind we have here where we take a side, argue, and by the end, everyone has changed their side. Over time, we all came to agree that a third transpose in would be more useful to most people than the third CV input. So we revised the PCB and rebuilt.

Somewhere along the way, the idea of normalizing the top inputs came to us too. It seemed quite odd at first, but the more we talked about it, the more all of us were in love with the idea. It got put into second version.

When it came time for production, we were concerned about price. The high precision resistors we were using pushed the build cost up so high that all of us just stared at it for a while. Concerned about cost, Kris spent a couple of hours carefully replacing every resistor on the board to see if a lower precision part would suffice... only to test it and find way too much drift.

Stephen then wrote a program to test the probability of failures at each value for the resistor that we could find (math ftw) and if we learned that if dropped to a lower value, about 20% of the modules we made would have at least one channel that

wasn't pitch accurate. Begrudgingly, we stuck with the more expensive part, because the build really just required it.

## Warranty

We will repair or replace (at our discretion) any product that we manufactured as long as we are in business and are able to get the parts to do so. We aim to support modules that have been discontinued for as long as possible. This warranty does not apply to normal wear and tear, including art/panel wear, or any products that have been modified, abused, or misused. Our warranty is limited to manufacturing defects.

Warranty repairs/replacements are free. Repairs due to user modification or other damage are charged at an affordable rate. Customers are responsible for the cost of shipping to Noise Engineering for repair.

All returns must be coordinated through Noise Engineering; returns without a Return Authorization will be refused and returned to sender.

Please [contact us \(https://noiseengineering.us/pages/contact\)](https://noiseengineering.us/pages/contact) if you think one of your modules needs a repair.

## Special Thanks

Bana Haffar was one of the inspirations for the Quantus Pax as we lamented (multiple times over multiple years) how hard it is to do a key change in modular. A chance visit with the legendary Patrick Leonard informed a redesign of the initial idea (and many more modules to come). JJ Abrams gave us the kick we needed to get the Quantus Pax into production.

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