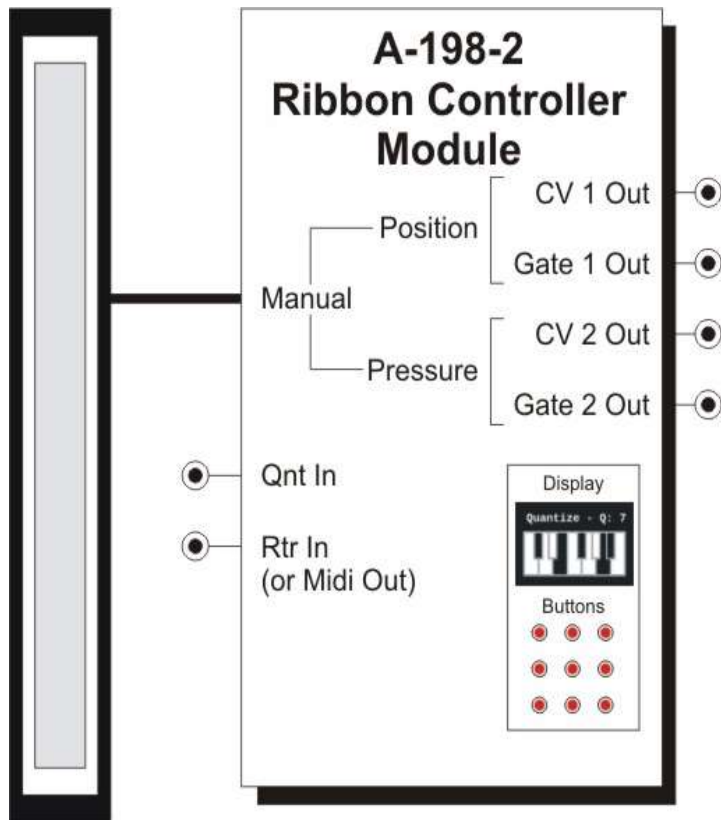




1. Introduction

The **A-198-2** is a **Trautonium/Ribbon controller** that and is made of two units: module and manual. It converts the position and pressure data of the ribbon controller manual into two CV and Gate signals:

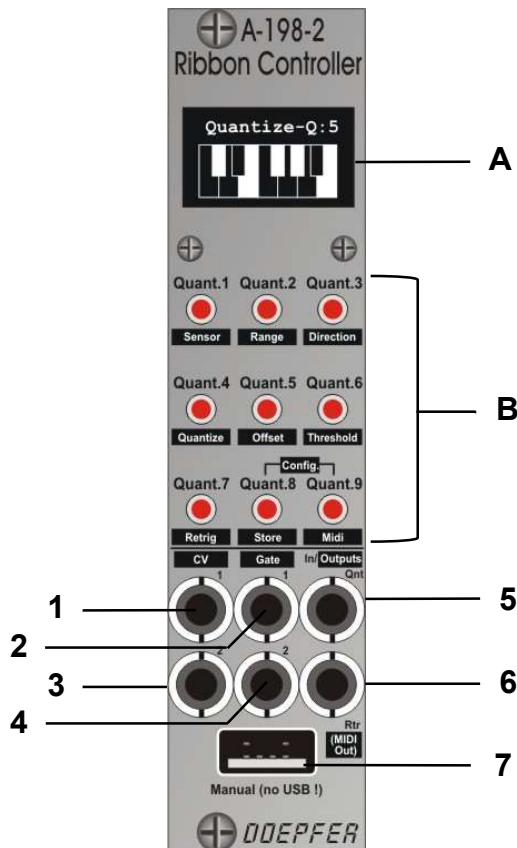
CV1 and Gate 1 are controlled by the position of the finger on the manual, CV2 and Gate 2 are controlled by the pressure of the finger applied to the manual.

The A-198-2 has a lot of features available like

- quantized or non-quantized output of CV1
- 9 different user-defined quantization tables
- adjustment of CV ranges
- direction of the manual
- threshold adjustment for Gate 2
- external inputs that are used to control quantization on/off and retrigger on/off
- programmable DC offset voltages for CV1 and CV2 and some more.

The module is operated via 9 illuminated momentary switches (buttons) and a black/white OLED display. It has also rudimentary midi functions available. For this the retrigger control input has to be configured as midi output (the external retrigger function is then no longer available).

2. Overview



Controls and Display:

- A. Display:** OLED LED display, shows information about the currently selected function.
- B. Buttons:** Momentary switches, used to call up certain functions and parameter changes.

Inputs and Outputs:

- 1. CV1 Out :** CV output controlled by the position sensor
- 2. Gate 1 Out :** Gate output controlled by the position sensor
- 3. CV2 Out :** CV output controlled by the pressure sensor
- 4. Gate 2 Out :** Gate output controlled by the pressure sensor
- 5. Qnt In :** Control input for quantize on/off
- 6. Rtr In :** Control input for retrigger on/off
Can be configured alternatively as Midi output
- 7. Manual:** Connector for the ribbon controller manual (no USB!)

Module width: 6 HP / 30 mm

Module depth: 45 mm

Current consumption: 50 mA@+12V, 10 mA@-12V

3. Function of the A-198

A-198-2 is made of two units: module and manual. The module contains the electronics that is required to convert the data coming from the manual sensors (position, pressure) into two control voltages (CV1, CV2) and two gate signals (Gate 1, Gate 2). CV1 and Gate 1 are controlled by the position of the finger on the manual. CV2 and Gate 2 are controlled by the pressure applied to the manual. These signals are used to control other modules. CV1 (position) is typically used to control the CV of one or more VCOs. Gate 1 (position) is typically patched to the gate input of an envelope generator. CV2 (pressure) can be used to control the frequency of a filter or the loudness of a VCA. Gate 2 can be used to trigger another event as soon as the pressure is beyond a certain value.

The manual is made of a position sensor and a pressure sensor underneath the position sensor. Both sensors are located in a separate black coated metal case. The connection between module and manual is made by a special cable (same as used for USB, but it's not allowed to connect USB devices to these sockets!).

As soon as the position sensor is touched by the finger the control voltage CV1 is generated. The value of CV1 is proportional to the position of the finger on the manual. The voltage range of CV1 can be adjusted in several steps.

Simultaneously Gate signal 1 is generated. For CV1 one can choose between continuous (non-quantized, like the Trautonium) and quantized (like a keyboard) voltage output. Nine user-programmable quantizations are available. The quantizations are displayed as a one octave keyboard with active/non active notes/keys. The quantizations are programmed in the config mode very easily with the help of the manual.

The desired quantization is selected by one of the 9 buttons in the performance mode. The button of the currently selected quantization is illuminated and the corresponding quantization keyboard is shown in the display. Operating the illuminated button again turns the quantization off and an empty keyboard is shown in the display. Alternatively the quantization can be turned on/off using the Qnt input socket.

In quantized modes retrigger can be turned on or off. With retrigger **off** no new Gate 1 signal is generated when the finger moves over the manual to the next quantized CV. To generate a new Gate 1 signal the finger has to be removed short-time from the manual. With retrigger **on** the Gate 1 signal is turned off for a few milliseconds when the finger reaches next quantized CV. This causes an envelope generator connected to Gate 1 to trigger again.

Alternatively the retrigger can be turned on/off using the Rtr input socket.

Underneath the position sensor the pressure sensor is located. This sensor is used to generate a second control voltage CV2 which rises with the pressure applied to the manual. The output voltage range of CV2 is adjustable in several steps. In addition a second gate signal (Gate 2) is generated that turns high as soon as a certain (programmable) threshold is reached.

For both CV1 and CV2 an offset voltage can be added to the values generated by the sensors.

Internally the sensor data are also converted into midi (position = note on/off + pitch bend in non-quantized mode, pressure = control change number #1 = modulation). If midi is required socket Rtr has to be sacrificed. For this jumper and cables have to be reconfigured on the pc board. Alternatively a passive breakout module (nothing but a midi socket) is imaginable. The external midi socket simply has to be wired to two pins of a pin header on the pc board.

4. Getting Started

- Before installing the module in the case check if the supply currents delivered by your case are sufficient to power all installed modules including the new A-198-2.
- Turn off the power supply of your case before you install the new module.
- Connect the bus connection cable that came with the module to the bus board with the correct orientation:
- Red stripe down at the bus board (marks -12V)
- Red stripe left at the module (marked with a white rectangle and the words "RED STRIPE")
- Mount the module into the case with the two screws that came with the module
- Connect the manual via the USB cable (A-A type), that came with the module
- **Attention! Do not connect USB devices to the USB sockets of the module or the manual!**
- Turn on the power supply of your case.
- After a short message showing the installed firmware the LEDs flash and the start message appears in the display:

PERFORMANCE

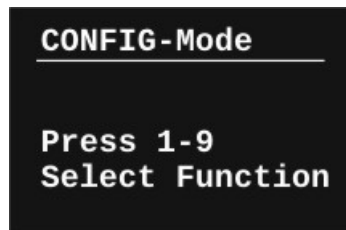
-Press 1-9
-Press 8&9

5. Operation

The module has two basic operation modes:

- **Performance** mode
- **Configuration** mode (abbreviation Config)

To switch between the two modes the buttons **Quant.8** and **Quant.9** have to be pressed simultaneously. When Config mode is selected the display message changes:

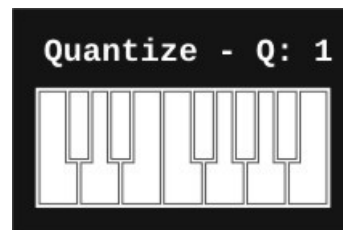


5.1. Performance Mode

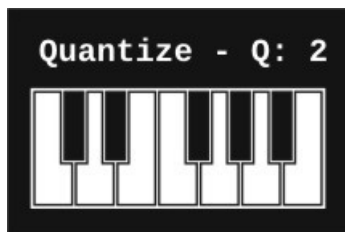
This mode is used during the performance while the user is playing on the manual. The control voltages CV1 and CV2 as well as the gate signals Gate 1 and Gate 2 are generated according to the settings in the **Config** mode (e.g. manual range, manual orientation, threshold for Gate 2, retrigger on or off).

By means of the 9 illuminated buttons one of the 9 quantizations is selected. When a quantization is selected the button in question lights up and the quantization is shown in the form of an one octave keyboard in the display. Active notes are displayed as white keys, non-active notes as black keys.

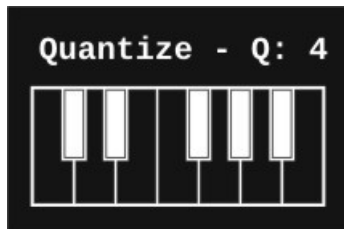
Some examples:



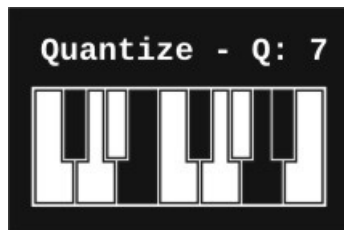
all notes/keys (all semitones)



white keys only

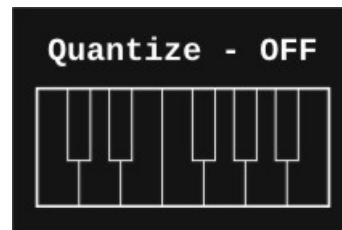


black keys only



mixed white and black keys

Operating the button of the currently selected quantization again turns the quantization off and the control voltage CV1 is output continuously. The illumination of the button turns off and in the display this message is shown:



The quantization can be turned off and on also with an external control voltage applied to the socket **Qnt**.

The module features also the **Retrigger** feature when one of the 9 quantizations is active. With Retrigger **on** Gate 1 is turned off for a few milliseconds when the finger reaches next quantized CV. With retrigger **off** no new Gate 1 is generated when the finger moves over the manual. To generate a new Gate 1 signal the finger has to be removed short-time from the manual in this case. In the Config mode one can select if Retrigger is on or off. The Retrigger can be turned off and on also with an external control voltage applied to the socket **Rtr**.

The control inputs **Qnt** and **Rtr** can be controlled by two voltages generated by a double footswitch (VFP2) connected to the interface module A-177-2.

That way the functions quantize on/off and retrigger on/off can be changed dynamically while playing on the manual without the need to switch these functions by hand on the module.

How to switch Retrigger on/off, how to program the 9 quantizations and the polarities of the **Qnt** and **Rtr** inputs is described in the next chapter 5.2 Config mode.

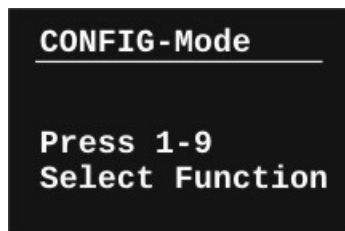
5.2. Config Mode

This mode is used to program basic parameters which are not changed during the performance while playing on the manual:

- **Sensor:** selects one of the two sensors for the following adjustments
- **Range:** adjusting the CV range of position or pressure sensor
- **Direction:** adjusting the direction of position or pressure sensor
- **Quantize:** programming of the 9 quantizations and the polarity of the **Qnt** input
- **Offset:** adjusting DC offset voltages of position or pressure sensor
- **Threshold:** adjusting threshold for Gate 2
- **Retrig:** switching retrigger on/off manually and programming the polarity of the **Rtr** input
- **Store:** saving all parameters non-volatile in the memory
- **Midi:** adjusting midi parameters

The **inverted** labels below the buttons indicate the functions in Config mode.

When in Performance mode one has to operate the buttons **Quant.8** and **Quant.9** simultaneously to change to the Config mode. After this the display shows:



Config Mode Screen

To select one of the functions the button in question has to be operated:

5.2.1. Sensor

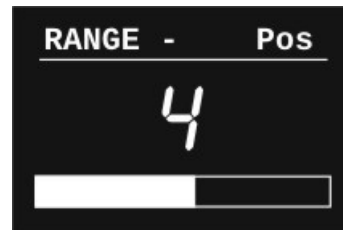
Operating this button selects one of the two sensors:

- Position
- Pressure

The sensor is changed by repeated operation of this button. The selected sensor is used in the following menus.

5.2.2. Range

The range of the sensor selected in menu 5.2.1. is adjusted by repeated operation of this button. The currently selected sensor is shown on the right side of the first line. The length of the bar and the number tells the selected range:



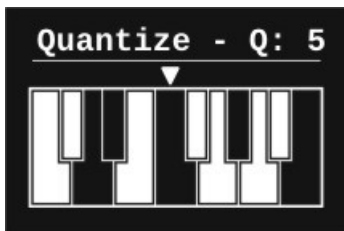
When sensor **position** is selected the digit tells the number of octaves. When sensor **pressure** is selected the number tells the approximate maximal output voltage in Volts ($\sim 7V$).

5.2.3. Direction

The direction of the sensor selected in menu 5.2.1. is adjusted by repeated operation of this button. The display changes between "up" and "down" at each operation. The currently selected sensor is shown on the right side of the first line.

5.2.4. Quantize

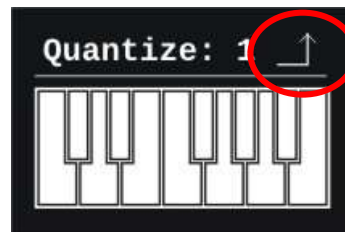
This menu is used to program the 9 different quantizations. The display shows the quantization as an one octave keyboard. Active notes are displayed as white keys, non-active notes as black keys:



A cursor appears above the keyboard. It is moved left/right by the finger on the manual. To change the activity of the selected key one has to press to the manual at this position, i.e. the pressure sensor is used to change the setting of the selected key.

To move to the next quantization the button has to be operated again. That way all 9 quantizations are programmed and displayed.

This menu is also used to program the polarity of the Qnt input socket. For this a foot switch has to be connected to the Qnt socket while the Config mode is active and the Quantize menu is selected. The arrow at the top right position shows the currently selectet polarity. When the foot switch is operated the arrow toggles between up and down. The Store function (5.2.8.) has to be executed to store this parameter permanently.



5.2.5. Offset

The offset voltage of the sensor selected in menu 5.2.1. is adjusted by repeated operation of this button. The length of the bar and the number tells the offset value. The currently selected sensor is shown on the right side of the first line:



5.2.6. Threshold

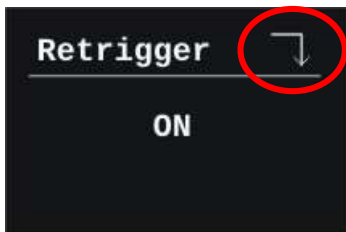
In this menu the threshold value for the generation of the pressure controlled Gate 2 is adjusted. The value is adjusted by repeated operation of the button.



5.2.7. Retrig

This menu is used to turn on/off the retrigger function by repeated operation of this button. The display changes between "on" and "off" at each operation.

This menu is also used to program the polarity of the Rtr input socket. For this a foot switch has to be connected to the Rtr socket while the Config mode is active and the Retrig menu is selected. The arrow at the top right position shows the currently selectet polarity. When the foot switch is operated the arrow toggles between up and down. The Store function (5.2.8.) has to be executed to store this parameter permanently.



5.2.8. Store

This menu is used to store all settings non-volatile in the memory. After the next power on the stored parameters are called up again. The display shows:



To execute the Store function the button has to be operated again.

Do not forget to carry out the store function if you want that all modified settings are stored after power off!

5.2.9. Midi

This menu is used to adjust the midi channel.

The display shows:



The midi channel is adjusted by repeated operation of the button.

When quantization is active midi note on/off messages are transmitted. The reference note for the lowest position on the manual is 36 (C).

When quantization is not active a single midi note on message with note number 36 is transmitted as soon as the manual is touched. It is followed by pitch bend data until the manual is released which causes the transmission of a note off message with note number 36.

The pitch bend range of the midi receiver has to be adjusted so that the pitch corresponds approximately to the notes in quantized mode. The setting depends also upon the octave range of the manual (see chapter 5.2.2).

Please refer to the user manual of your midi receiver how the pitch bend range is adjusted.

Applying pressure to the manual generates control change messages (controller no. #1 = modulation).

6. Appendix

6.1.1. Typical patch 1 (with complete Synth Voice)



Audio Out

The modules included in the A-111- 6 (VCO, VCF, VCA, envelope generator) can be also replaced by corresponding discrete modules, which are patched in a similar way, e.g.

VCO:

A-110-1, A-110-2, A-111-2, A-111-3 ...

VCF:

A-120, A-121-2/3, A-124-1/2, A-105-2, A-106-5 ...

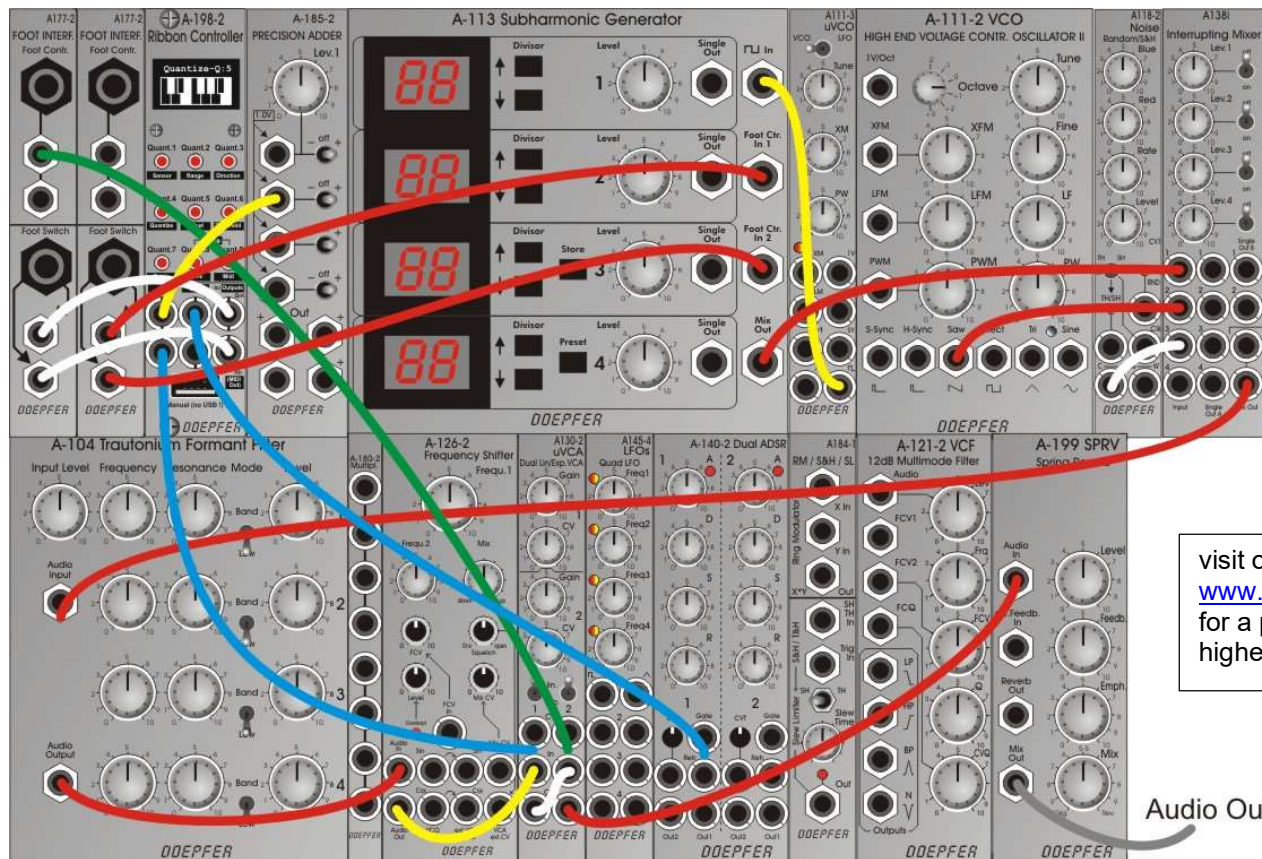
VCA

A-130-1/2, A-132-3 ...

Envelope generator:

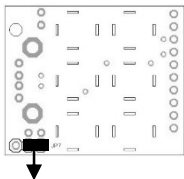
A-140-1/2, A-141-2 ...

6.1.2. Typical patch 2 (complete Trautonium)

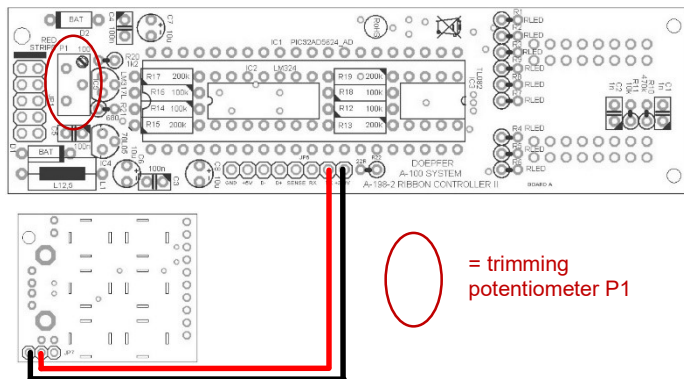


6.2. Modification of Rtr socket for Midi Out

Step 1: Remove jumper from JP7 on board C



Step 2: Install 2-wire cable between JP7 on board C and the two most-left pins of JP6 on board A (labelled TX and +3.3V)



Notes: The colors of the cables in the picture are an example. Other colors may be used.

As there exist two different standards for 3.5 mm midi connectors the two cables may have to be swapped.

6.3. External Midi Out Connection

If the Midi Out connection has to be established via an external socket or breakout board the Midi socket has to be wired to the two leftmost pins of JP6 on board A (labelled TX and +3.3V) via two serial 10 Ohm resistors.

6.4. Adjustment of CV1

If it's necessary to re-adjust the scale of CV1 trimming potentiometer P1 is used for the adjustment. For this we recommend to program a quantization with the lowest key only and set the CV1 range to 4 or 5 octaves. P1 has to be adjusted so that voltages with 1.0V difference appear at the CV1 output when the finger is moved over the manual voltage from left to right. If an offset is programmed (see chapter 5.2.5) it has to be added to the measured voltages.

