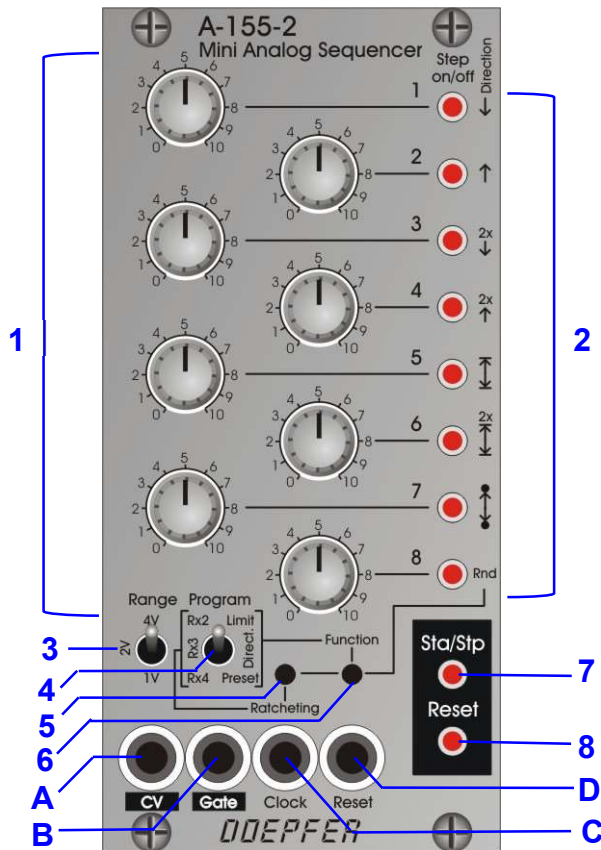


1. Introduction

Module **A-155-2** is a small, very compact designed analog sequencer with a lot of features:

- 8 steps
- Each step is equipped with a control for the adjustment of the control voltage for this step and an illuminated momentary switch (button)
- In the standard running mode the buttons are used in the standard running mode to turn on/off the gate of the step in question
- In combination with two toggle switches and two momentary switches without LEDs a lot of additional functions are available:
- Limiting the length of the sequence by programming first and last step
- Defining one of 8 running directions
 - Down
 - Up
 - 2 x Down
 - 2 x Up
 - Pendulum 1
 - Pendulum 2
 - 2 x Pendulum
 - Random)
- Ratcheting (2x, 3x or 4x) for each step
- Preset management (8 user definable presets)
- CV range 1, 2 or 4V
- Start/Stop button
- Reset button
- Clock Input (min. 3V level)
- Reset input (min. 3V level)
- CV output (0...+1V, 0...+2V, 0...+4V), not quantized
- Gate output (0/+10V)
- max. Clock frequency > 10kHz
- internal midi output connection (e.g. for quantized CV output in combination with module A-190-9)
- 12 HP front panel width (60.6 mm)
- 45 mm module depth
- current consumption: +50mA (+12V) / -20mA (-12V)

2. Overview



Controls and Display:

1. **Control 1-8:** Controls for voltage adjustment for each of the 8 steps
2. **Button 1-8:** Momentary switches with LEDs for each of the 8 steps
3. **Range:** Range switch for CV output voltage range (0...1V, 0...2V, 0...4V)
4. **Program:** Program switch for Ratcheting and Function programming
5. **Ratcheting:** Momentary switch for Ratcheting programming
6. **Function:** Momentary switch for programming of first/last step (Limit), running direction (Direct.) and Preset management
7. **Sta/Stp:** Momentary switch for start/stop
8. **Reset:** Momentary switch for reset

Inputs and Outputs:

- A. **CV:** CV output
- B. **Gate:** Gate output
- C. **Clock:** Clock input
- D. **Reset:** Reset input

Module width: 12 HP / 60.6 mm
 Module depth: 45 mm
 Current: +50mA (+12V) / -20mA (-12V)

3. Getting started

Module A-155-2 generates a sequence of CV and Gate signals with up to 8 steps. Each step has available a manual control (1) for the adjustment of the control voltage for this step and an illuminated momentary switch (button) (2).

The CV signal is typically used to control the pitch of one or more VCOs. The Gate signal is typically used to control the Gate input of one or more envelope generators. The CV voltages of the sequence are controlled by the 8 manual controls (1). The range of the CV outputs can be switched between 3 different ranges by means of the **Range** toggle switch (3): 0...+1V, 0...+2V and 0...+4V.

Note: The CV output is not quantized. But there is an internal pin header available that outputs the data via Midi (note on/off from Midi note 36 on Midi channel 1). It can be used to control a Midi-to-CV interface if quantized control voltages are required, e.g. the Micro-CV-Interface A-190-9 or any other Midi-to-CV interface. Another solution is the usage of an external quantizer module (e.g. A-156-1, A-156-3). More details about the Midi functions are mentioned in the appendix.

The Gate function is controlled by the 8 illuminated buttons (2). The Gate for each step is turned on/off alternately by operating the illuminated button in question. In the standard running mode the buttons are used to turn on/off the gate of the corresponding step (button illuminated = gate on, not illuminated = gate off).

The Gate signal appears at socket **Gate**. The pulsewidth of the gate signal is defined by the pulsewidth of the clock signal - provided that ratcheting is not active at the step in question.

The module does not feature built in clock generator. Rather an external **Clock** signal is used. The tempo of the sequence is defined by the frequency of the signal applied to the **Clock** input socket (C). Typically a rectangle output of an LFO is used as clock source.

But any other rectangle signal may be used as clock source, e.g. a midi controlled clock signal coming from a midi-to-clock converter like A-190-4 or A-190-8. The positive edge of the incoming clock signal triggers the advance of the sequence to the next step.

The **Start/Stop** button (7) is used to start or stop the sequence. The function is alternating.

The sequence can be reset to step 1 manually by means of the **Reset** button (8) or by an external reset signal applied to the **Reset** socket (D). The operating mode of the Reset socket depends upon the settings of the corresponding jumper (see appendix for details).

The momentary switches **Function** (6) and **Ratcheting** (5) are used for additional functions together with the toggle switch **Program** (4).

Meaning of the Function switch (6)

The momentary switch **Function** (6) is used to program additional features of the module depending on the position of the toggle switch **Program** (4):

- First/Last step of the sequence (Limit)
- Running direction
- Preset management

To call up the function in question one has to push and hold the **Function** switch (6).

First/Last step (Limit)

While the **Function** switch (6) is held down and the **Program** switch (4) is in the upper position (**Limit**) the LEDs (2) show the currently selected first and last step of the sequence. At the beginning these are usually the steps 1 and 8 (i.e. complete 8 steps sequence). By operating two of the illuminated buttons one after another the first and last step can be adjusted to other values (e.g. steps 2-6). When a button is operated twice the sequence is only one step long.

The new values of first and last step can be stored into one the the 8 Presets (see below).

Direction

While the **Function** switch (6) is held down and the **Program** switch (4) is in the middle position (**Direction**) the LEDs (2) show the currently selected running direction. At the beginning this is usually "down".

These running modes are available:

- Down (↓)
- Up (↑)
- 2 x Down (2 x ↓)
note: each step is played twice with the normal tempo, not to be confused with Ratcheting x2, see below
- 2 x Up (2 x ↑)
note: each step is played twice with the normal tempo, not to be confused with Ratcheting x2, see below
- Pendulum type 1 (↕)
note: start and end step are played twice
- 2 x Pendulum type 1 (2 x ↕)
note: each step is played twice with the normal tempo, start and end step are played 4x
- Pendulum type 2 (⋈)
note: start and end step are played once
- Random (Rnd)

By operating one of the illuminated buttons the running direction can be adjusted to another value.

Preset

While the **Function** switch (6) is held down and the **Program** switch (4) is in the lower position the **Preset** management is selected.

Calling up a Preset

Push and hold the **Function** switch (6) while the **Program** switch (4) is in the lower position (**Preset**). All LEDs of the 8 illuminated buttons turn off. To call up one of the 8 presets one has to press the corresponding button. The 8 LEDs start to flash slowly in which the 8 LEDs display the selected preset by changing between inverted and non-inverted states. As soon as the **Function** switch is released the selected preset is called up.

*Note: While the **Function** switch is held down one can choose any of the 8 presets. The preset is called up not before the **Function** switch is released.*

Storing a Preset

Push and hold the **Function** switch (6) while the **Program** switch (4) is in the lower position (**Preset**). All LEDs of the 8 illuminated buttons turn off. To store the current settings to one of the 8 presets one has to press the corresponding button **twice**. The 8 LEDs start to flash **fast** in which the 8 LEDs display the selected preset by changing between inverted and non-inverted states. As soon as the **Function** switch is released the current settings are stored in the selected preset.

*Note: The preset is not stored before the **Function** switch is released.*

*Note: When the Preset function has been selected by mistake it can be cancelled by changing the position of the **Program** switch to middle (Direction) or upper position (Limit) while the **Function** switch is held down. This works also when one of the 8 buttons has been pressed already.*

Meaning of the Ratcheting switch (5)

The momentary switch **Ratcheting** (5) is used to program the optional ratcheting function for each step. Ratcheting means that 2, 3 or 4 trigger signals (instead of one only) appear at the Gate output when the corresponding step addressed. Three types of Ratcheting can be programmed:

- x2 (2 triggers are generated at the step in question)
- x3 (3 triggers are generated at the step in question)
- x4 (4 triggers are generated at the step in question)

To program the Ratcheting one has to push and hold the **Ratcheting** switch (5).

While the **Program** switch (4) is in the upper position (**Rx2**) the LEDs show the **x2** Ratchetings for each step of the sequence. At the beginning these are usually all off. By operating one of the illuminated buttons the **x2** Ratcheting can be programmed for each step individually. The Ratcheting for each step is turned on/off alternately by operating the illuminated button in question.

While the **Program** switch (4) is in the middle position (**Rx3**) or in the lower position (**Rx4**) the programming process is equivalent to the **Rx2** programming.

When Ratcheting is programmed at a step, other Ratcheting settings at the same step are overwritten (e.g. programming Rx3 at step 5 overwrites a possibly programmed R2x or Rx4 at the same step).

The new Ratcheting values can be stored into one the the 8 Presets.

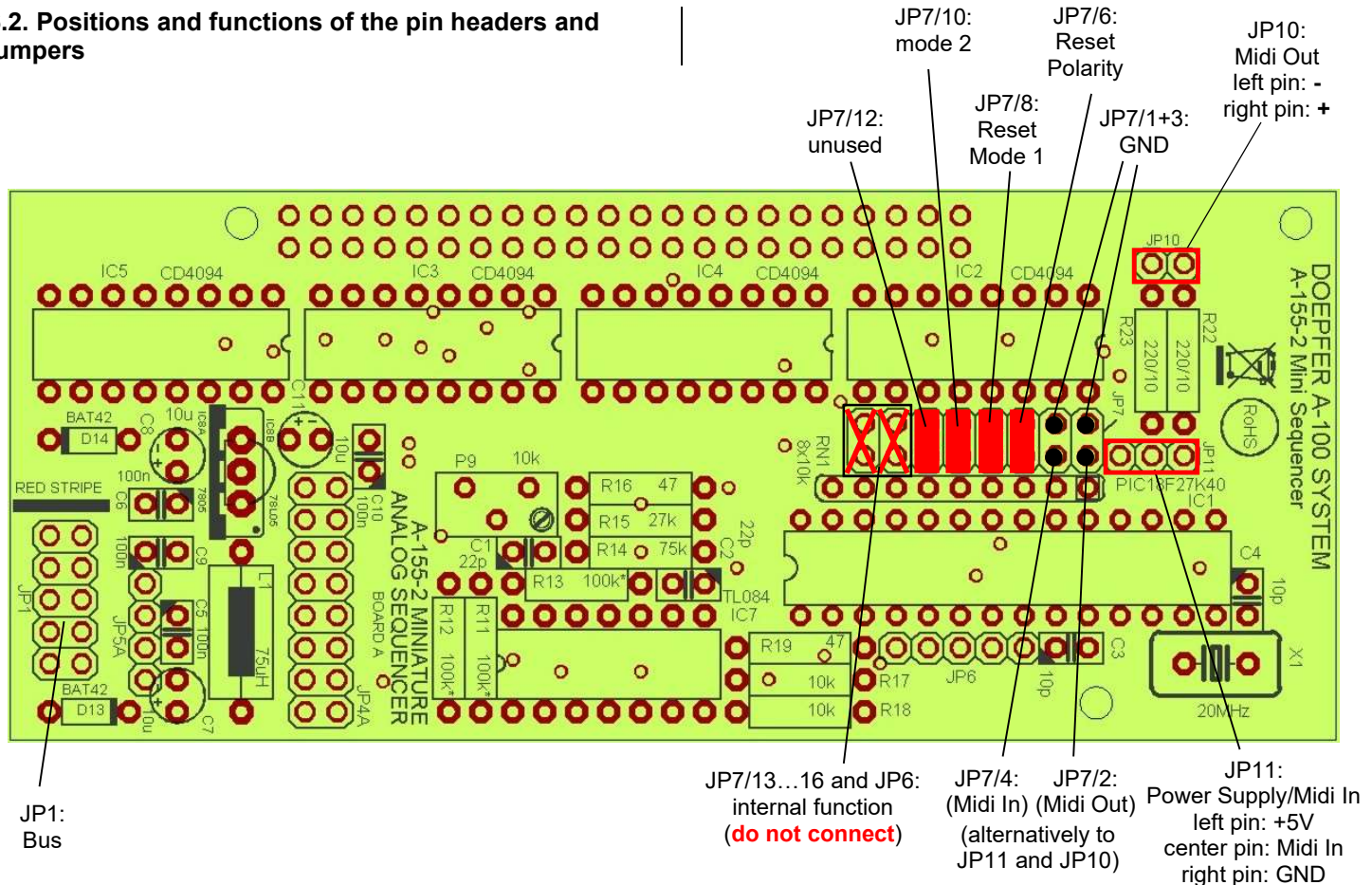
Details about the ratcheting function are explained at the module [A-160-5](#).

6. Appendix

6.1. Technical details:

- Module width: 12 HP / 60.6 mm
- Module depth: 45 mm
- Supply Currents: +50mA (+12V) / -20mA (-12V)
- Gate output voltage: 0V/+10V
- CV output voltage: 0...+1V, 0...+2V, 0...+4V (non quantized)
- required clock input level: min. +3V
- required reset input level: min. +3V
- max. clock frequency: >10kHz (e.g. for graphic VCO application)
- internal Midi output: Midi channel 1, Midi note range 36-48, 36-60 or 36-84 according to the setting of the range switch
- the Midi output works only up to about 100 Hz clock frequency because of the limited midi data rate. For higher clock frequencies no Midi output occurs

6.2. Positions and functions of the pin headers and jumpers



Meaning of the jumpers:

- JP6: *reserved* (do not connect)
- JP7/6: Reset Polarity
 - jumper installed: positive (factory setting)
 - jumper removed: negative
- JP7/8: Reset Mode 1
 - jumper installed: edge (factory setting)
 - jumper removed: level
- JP7/10: Reset Mode 2
 - jumper installed: reset/clock step 2 (factory setting)
 - jumper removed: reset/clock step 1
- JP7/12: not used (default = installed)
- JP7/13...16: *reserved* (do not connect)
- JP10: Midi out
- JP11: (Midi In and) power supply (GND, +5V)

Explanation:

Reset Polarity **positive** = positive edge (↑) or high level at the Reset socket (D) triggers the reset

Reset Polarity **negative** = negative edge (↓) or low level at the Reset socket (D) triggers the reset

Reset Mode 1 **edge** = positive (↑) or negative (↓) edge triggers the reset (depending upon the Reset Polarity jumper)

Reset Mode 1 **level** = high or low level triggers and holds the reset (depending upon the Reset Polarity jumper)

Reset Mode 2 **reset/clock step 2**

an incoming reset signal causes a jump to first step, the next incoming clock signal causes a jump to first step+1 (same behaviour as A-155-1 without A-154)

Reset Mode 2 **reset/clock step 1**

an incoming reset signal triggers a "reset wait state" the next incoming clock signal causes a jump to first step (same behaviour as A-155-1 with A-154)

Midi operation remarks (JP10/JP11):

Pin header JP10 can be used to output the Midi data via the universal Midi expander module A-180-8, or to connect e.g. the Midi-to-CV module A-190-9 to obtain a quantized CV.

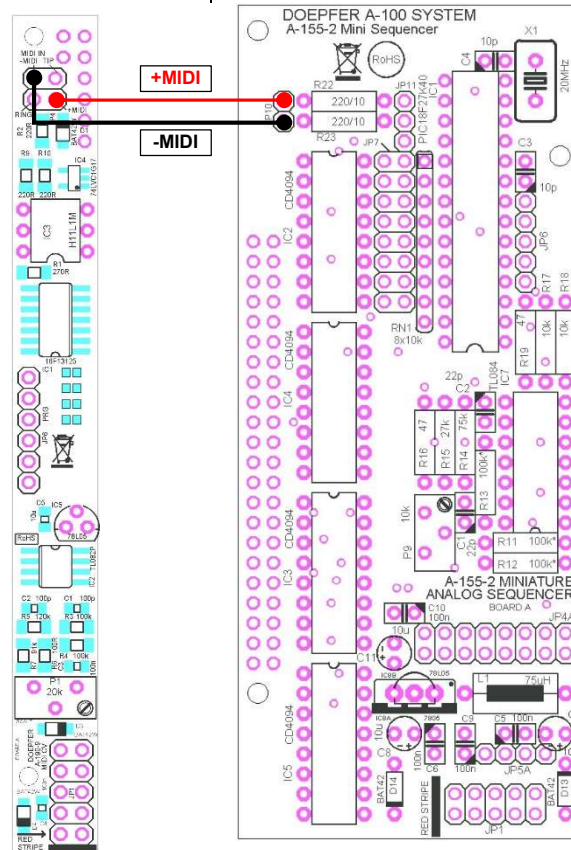
A-180-8 operation requires also the supply terminals GND and +5V of JP11.

Midi In is not supported by the A-155-2 firmware.

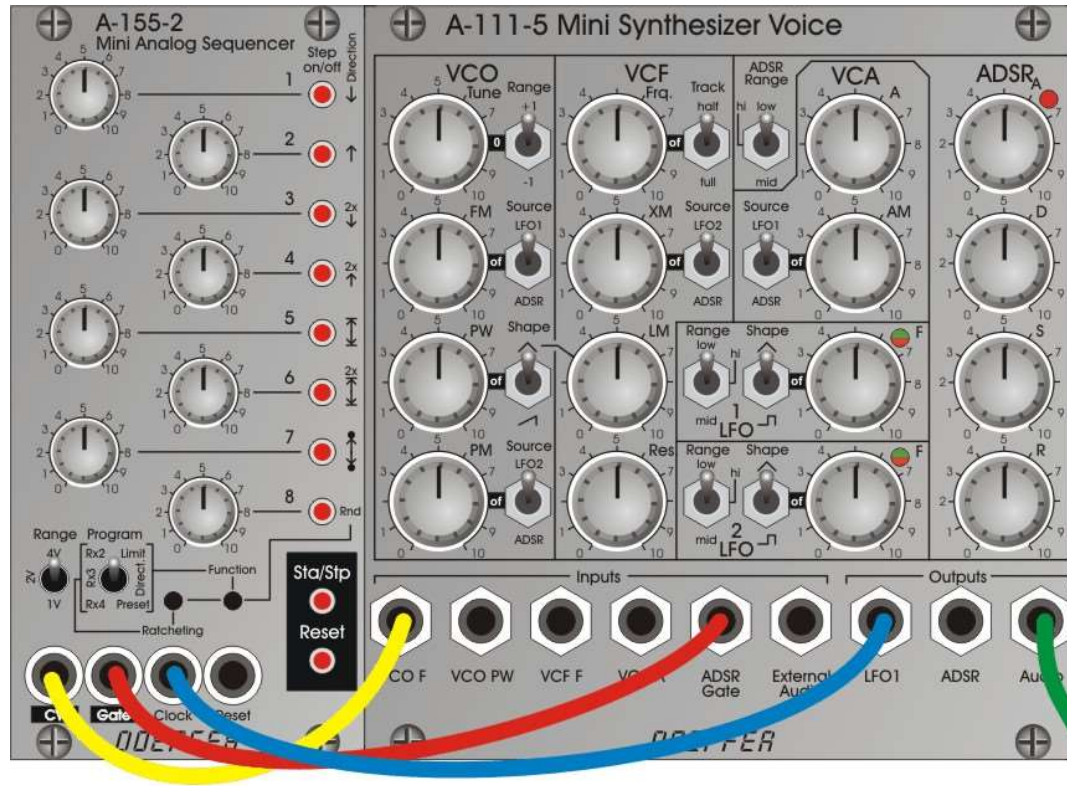
The clock connection (socket C) should not be plugged in/out while the sequence is running. Otherwise disturbances of the Midi signal may occur because of signal bouncing. In such a case one can return to normal function by operating the Start/Stop button.



6.4. Connecting the Midi-CV Interface A-190-9

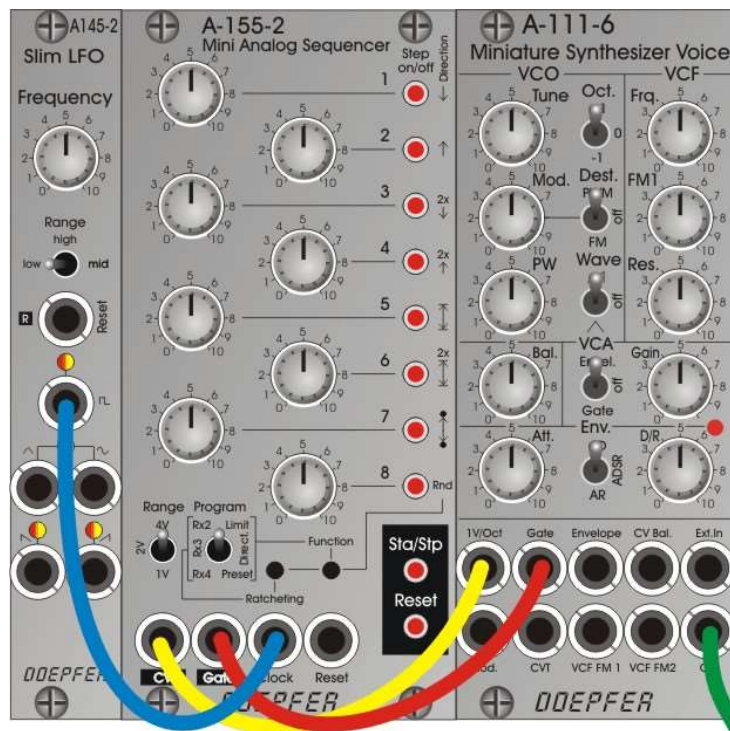


6.5.1. Patch Example 1
Standard Patch with Synthesizer Voice A-111-5



Audio Out

6.5.2. Patch Example 2
Standard Patch with Synthesizer Voice A-111-6 and Clock LFO



Audio Out

