A-161
Clock
Sequencer

1

2

3

4

5

6

7

8

1. Introduction

Module **A-161** is an **eight-step Clock Sequencer** which is internally connected to the **Clock Divider (A-160)**. **Eight outputs** are sequentially switched by the clock signals from the A-160 (see Fig. 1) and can act, for instance, as sequential rhythmic triggers for an envelope. The **reset** on the A-160 also works on the A-161 (instant return to Step 1).

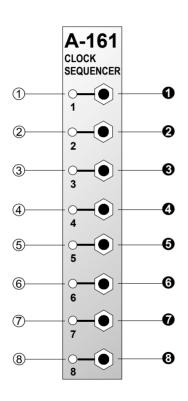⚠ **Installation in the rack system:**

   The A-161 must be positioned **directly to the right of the A-160.**

Join the two modules with the supplied 10-way ribbon cable. Use the **upper** 10-way socket on each module.

Make sure that the ribbon cable isn't twisted, and that the colour-coded section is oriented the same on both modules.

Only join the **A-160** to the **system bus**! Leave the lower 10-way socket on the A-161 unused.

2. Overview

A-161

CLOCK SEQUENCER

① ─── ○─⬡ ❶
　　　　1

② ─── ○─⬡ ❷
　　　　2

③ ─── ○─⬡ ❸
　　　　3

④ ─── ○─⬡ ❹
　　　　4

⑤ ─── ○─⬡ ❺
　　　　5

⑥ ─── ○─⬡ ❻
　　　　6

⑦ ─── ○─⬡ ❼
　　　　7

⑧ ─── ○─⬡ ❽
　　　　8

Indicators:

① **LED** ... ⑧ **LED** : Status indicators for each output

Outputs:

❶ **1** ... ❽ **8** :   Outputs

3. Indicators

① **LED ... ⑧ LED**

LEDs ① to ⑧ are the status indicators for outputs ❶ to ❽.

4. Outputs

❶ **1 ... ❽ 8**

Outputs ❶ to ❽ are the source of the sequential triggers that the A-161 puts out (see Fig. 1).
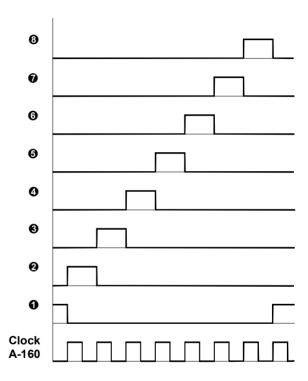
Fig. 1: How the A-161 puts out its signals

5. User examples

"Rhythmatising" notes

In the example in Fig. 2 (see next page) notes played on the keyboard are 'rhythmatised': ie. they're converted into a rhythmical tonal sequence by a combination of four envelopes and the A-161.

The frequency of the LFO's square wave determines the speed of the resulting rhythmical pattern, and the note length as well - in this case, eighth notes.

As soon as a key is played on the keyboard, the gate signal resets the A-160, and the A-161 ❶ output triggers ADSR 1.

While the note is held down, all the outputs give out trigger signals in turn, at eighth-note intervals. In this example, ADSR 2 is triggered by the fifth output, ADSR 3 by the sixth, and ADSR 4 by the eighth. (If a key is held down longer than one whole note, the sequence starts again from the beginning.) The result is a rhythmic pattern, whose pitch is determined by the CV. It's important to turn the VCA gain to zero for maximum effect.

A new note played on the keyboard starts a new pattern.

By altering parameters on the ADSRs, you can change respective note lengths and create syncopations or accents.

As alternatives to ADSRs, you could use Slew Limiters (A-170).

Patch a filter into the VCO signal path, controlled either by the same envelopes, or by another group of four, also triggered by the A-161.

Patch a filter into the VCO signal path, controlled by the four envelopes. Control the VCA with another final ADSR, triggered by the LFO. The result would be an eighth-note pattern with each note equally loud - but in this example, notes 1,5, 6 and 8 are being processed by their respective filter curves, and will have a different sound.
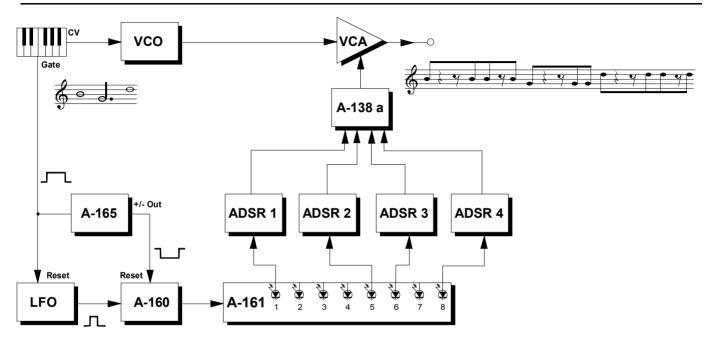
Abb. 2: "Rhythmatising" notes

Instead of an LFO, you can also use **MIDI-clock** signals from a MIDI/CV interface (such as the A-190) to produce MIDI - synchronised patterns.

Creating complex envelopes

A small modification to the previous patch is shown in Fig. 3. Here, the Clock Sequencer outputs are connected to a series of Slew Limiters (A-170), to create one very complex envelope.

The Clock Sequencer triggers the Slew Limiters in sequence, and their various envelopes are mixed in a linear mixer A-138a. The result is a complex envelope which can be patched from the mixer output to anywhere.

☞   You can elaborate on this patch further, by adding other control voltages to the slew limiters' envelopes - for instance:

   • an ADSR with a long envelope, triggered by output ❶ on the A-161;

   • an LFO output, with or without reset;

   • the random output from an A-118;

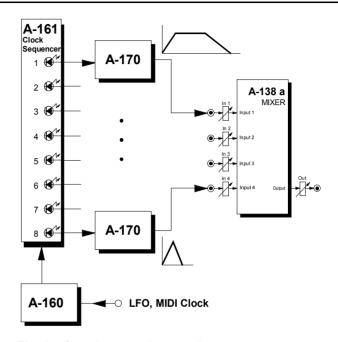   • an audio signal via an envelope follower (A-119).

Fig. 3: Creating complex envelopes

☞   If you use more than four modulation sources (Slew Limiter, ADSR, etc.), you'll need two mixers.

Different envelopes with each note played

With the patch in Fig. 4, every time a new note is played, a different envelope will control the VCF.

Each gate signal from the keyboard moves the A-161 another step forward, and so triggers the next enve-lope. The envelopes obviously need to have different settings for the effect to be noticeable.

The outputs from the envelopes are patched into an A-138a (linear) mixer. At its output, the envelope is available to be patched into the CV input of, most commonly, a VCF or VCA.

After four steps, output ❺ on the A-161 resets the A-160, so that the first envelope is triggered again.

However many (n) envelopes you use (up to a maxi-mum of seven), you must patch the next output on the A-161 (n+1) to the reset input on the A-160. With more than four envelopes, two A-138a mixers will be needed.
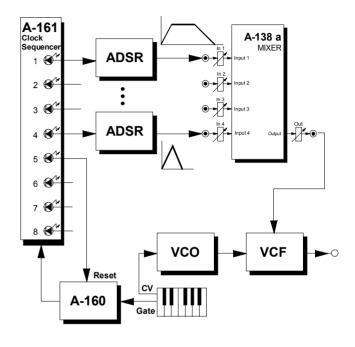
Fig. 4: Different envelopes with each note played

Mini analog sequencer

The patch in Fig. 5 produces a four-step mini analog sequencer.

A clock signal either from an LFO, or a MIDI-CV interface (A-190) sequentially steps through the A-161's outputs. These are fed into the inputs of an A-138a linear mixer.

Whan an A-161 is active, it puts out a +5 V signal. Use the input attenuators on the A-138 to set each of the voltages in the sequence.

The mixer output then sends out a sequence of control voltages, which can be patched to one or more VCOs. The clock signal can be patched to one or more ADSR CV inputs.

After four clock pulses, output ❺ on the A-161 resets A-160, and the sequence begins again from step 1.

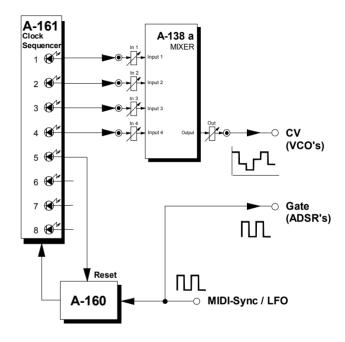By adding another A-138a you can extend the sequence up to eight notes.

Fig. 5: Mini analog sequencer

6. Patch-Sheet

The following diagrams of the module can help you recall your own **Patches**. They're designed so that a complete 19" rack of modules will fit onto an A4 sheet of paper.

Photocopy this page, and cut out the pictures of this and your other modules. You can then stick them onto another piece of paper, and create a diagram of your own system.

Make multiple copies of your composite diagram, and use them for remembering good patches and set-ups.

• Draw in patchleads with colored pens.