

DARK TIME

Owners Manual

V1.1



DOEPFER MUSIKELEKTRONIK GMBH

Safety Instructions

Please follow the instructions for use of the instrument carefully because this will guarantee proper operation of the instrument. Due to the fact that these instructions touch on Product Liability, it is absolutely imperative that they be read carefully. Any claim for defect will be rejected if one or more of the items has not been observed.

Disregard of the instructions can void the two years covered by warranty.

The instrument may only be operated at the voltage stated on the power input on the rear panel. Before opening the case, disconnect both power plug and power adaptor.

All eventual modifications are to be performed by a qualified person only in accordance with valid safety instructions. With the introduction of a third person, the warranty will be void. In case of a destroyed warranty seal, any warranty claim will be rejected.

The instrument must never be operated outdoors but solely in dry rooms. Never use the instrument in a humid or wet environment, nor near flammable goods.

No liquids or conducting substances must get into the instrument. Should this be the case, the instrument is to be disconnected from mains power immediately and examined, cleaned and possibly repaired by a qualified technician.

Never expose the instrument to temperatures above +50° C or below -10° C. Before operation, the instrument should have a temperature of at least 10°C. Do not expose the instrument to direct sunlight. Do not install the instrument near heat sources like heaters, open fire places, central heating etc. Keep the top of the instrument clear in order to allow proper ventilation, otherwise the instrument could eventually overheat.

Never place heavy objects on the instrument.

Transport the instrument carefully, never let it drop or fall over. Make sure that during transport and in use the instrument is supported properly and cannot drop, slip or fall over because people might get injured.

Never use the instrument in the immediate proximity of electronic devices (e.g. monitors, power supplies, computers) as these interferences could cause malfunctions within Dark Time and corrupt memory data.

The instrument is to be shipped in the original packaging only. Any instrument shipped to us for return, exchange, warranty repair, update or examination has to be in its original packaging! All other deliveries will be rejected. Therefore, make sure you keep the original packaging and technical documentation.

The instrument may only be used for the purpose described in this operating manual. Due to safety reasons, the instrument must never be used for other purposes.

When using the instrument in Germany, the appropriate VDE standards are to be followed. The following standards are of special importance: DIN VDE 0100 (Teil 300/11.85, Teil 410/11.83, Teil 481/10.87), DIN VDE 0532 (Teil 1/03.82), DIN VDE 0550 (Teil 1/12.69), DIN VDE 0551 (05.72), DIN VDE 0551e (06.75), DIN VDE 0700 (Teil 1/02.81, Teil 207/10.82), DIN VDE 0711 (Teil 500/10.89), DIN VDE 0860 (05.89), DIN VDE 0869 (01.85). VDE papers can be obtained from the VDE-Verlag GmbH, Berlin.

DDEPFER

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1. Introduction

1.1. Preface

Doepfer thanks you!

First of all we would like to thank you for having purchased Doepfer Dark Time! We really appreciate your choice and promise you an extraordinary support throughout, including useful information, easy service, and innovative product development.

May your Dark Time be an important source of creative power for ages to come.

What time is it?

Dark Time is a sequencer in the tradition of an analog step sequencer. Even though Dark Time's circuitry is almost entirely digital, its user interface and operation are perfectly in line with a classic analog machine of yesteryear. Because of this, we chose to refer to Dark Time as an "analog sequencer" in this manual.

Dark Time sports a USB port, MIDI sockets, and connectors for analog control voltages and gate signals. Yet, Dark Time is a modern tool for sound creation and can easily be connected not only to our Dark Energy analog synthesizer (hint, hint), but also to all sorts of other analog and digital gear which is suitably equipped with a MIDI/USB port and/or CV/Gate connectors. Dark Time can easily be connected to every modern computer-based studio or live-setup. Hooking up Dark Time to classic vintage analog equipment or a Doepfer A-100 modular system is also easy. In addition to this, Dark Time interfaces the digital world of MIDI with the analog world of control voltages.

Dark Time is housed in a rugged black sheet metal case with wooden side panels. Sturdy high-quality potentiometers (often referred to as "pot", in case you are wondering where the "weed" is hidden...) with metal shafts have been used throughout. Each pot has been mounted firmly to the chassis. We also made use of knob caps which have a classy vintage look and feel to them.

R.t.f.m.!

We knew it: User manuals are your first and only choice in literature. Hey, that's great – we're talking the same language here!

If you are doubting the entertaining qualities of this manual – how dare you! –, please bear in mind that its thorough study will eventually turn out to be quite useful as it will highly increase the inspirational value of your new analog sequencer. So please do yourself - and us - a big favor: Read (and, if possible, understand) this frigging manual! Thanks for your time, and bless you for your efforts!

In the first section you will find all info needed to successfully hook up Dark Time to your setup.

After that, you will find a brief overview of its functions. Sequencer experts may use this as a quickstart guide. You should not skip the complete description of the entire "Functions" section in the next chapter, though – Dark Time hides some interesting features under its hood. If sequencer technology – especially the secrets of analog sequencing – are totally new to you, please refer to "Nuts and Bolts of analog Sequencing" later on in this manual.

Enough babble - here we go...

1.2. Getting started

When lifting Dark Time out of its box for the first time, please make sure that everything is in its right place. You will find the following component parts in the box:

- Dark Time sequencer
- wall-wart (12V AC / 400mA)
- USB cable (A-B type)
- two A-100 patch cables
- this owners' manual

You will also need:

A suitable sound generation device with MIDI- and/or CV/gate connectors (e.g. Doepfer Dark Energy synthesizer).

To run Dark Time via its MIDI-DIN socket, you will also need:

- A MIDI cable to control a suitable MIDI-synthesizer from Dark Time.

To run Dark Time via its CV/Gate inputs, you will also need:

- At least two 1/8" plug patch cables – the more, the better – and a suitable equipped analogue synthesizer (e.g. the Doepfer Dark Energy or a Doepfer modular synthesizer model A-100).

1.2.1. Setup:

Use Dark Time in a flat or upright position. Please use a suitable support. Used pizza cartons or beer crates should not be your first choice. Don't say we didn't warn you.

1.2.2. Connections:

You do not necessarily need all its built-in sockets to get Dark Time going. For a simple setup, you will need just the ones pictured below. Make use of the additional terminals and you will tremendously expand Dark Time's potential. These connectors will be described along with the corresponding modules later on in this manual.

- Power supply:
Connect the included power adaptor ("wall wart") to the 12V AC socket on the rear panel of Dark Time.

Important: Use this power adaptor only or an equivalent one with exactly the same specs!

Powering Dark Time via USB is not possible since the internal analog circuitry of Dark Time runs at +/-12V.

- USB:
First, power up Dark Time. Second, connect Dark Time's USB socket with your suitably equipped synthesizer or computer. Any configuration or driver installation work is not required on your computer.
- MIDI:
Connect Dark Time's MIDI-out socket with the MIDI-in socket of your MIDI synthesizer to run Dark Time in a conventional MIDI setup without USB.
The default setting of Dark Time's MIDI channel is Channel 1. How to change this setting is described on page 16 in chapter 3.2.1, "USB/MIDI interface".

If so desired, please also connect Dark Time's MIDI-in socket with the MIDI-out socket of e.g. a suitably equipped computer or drum machine in order to synchronize both machines via MIDI clock. Please refer to chapter 3.1.4. "Tempo and Timing" on page 12, and chapter 3.2. "Synchronization and remote control of Dark Time" on page 15.

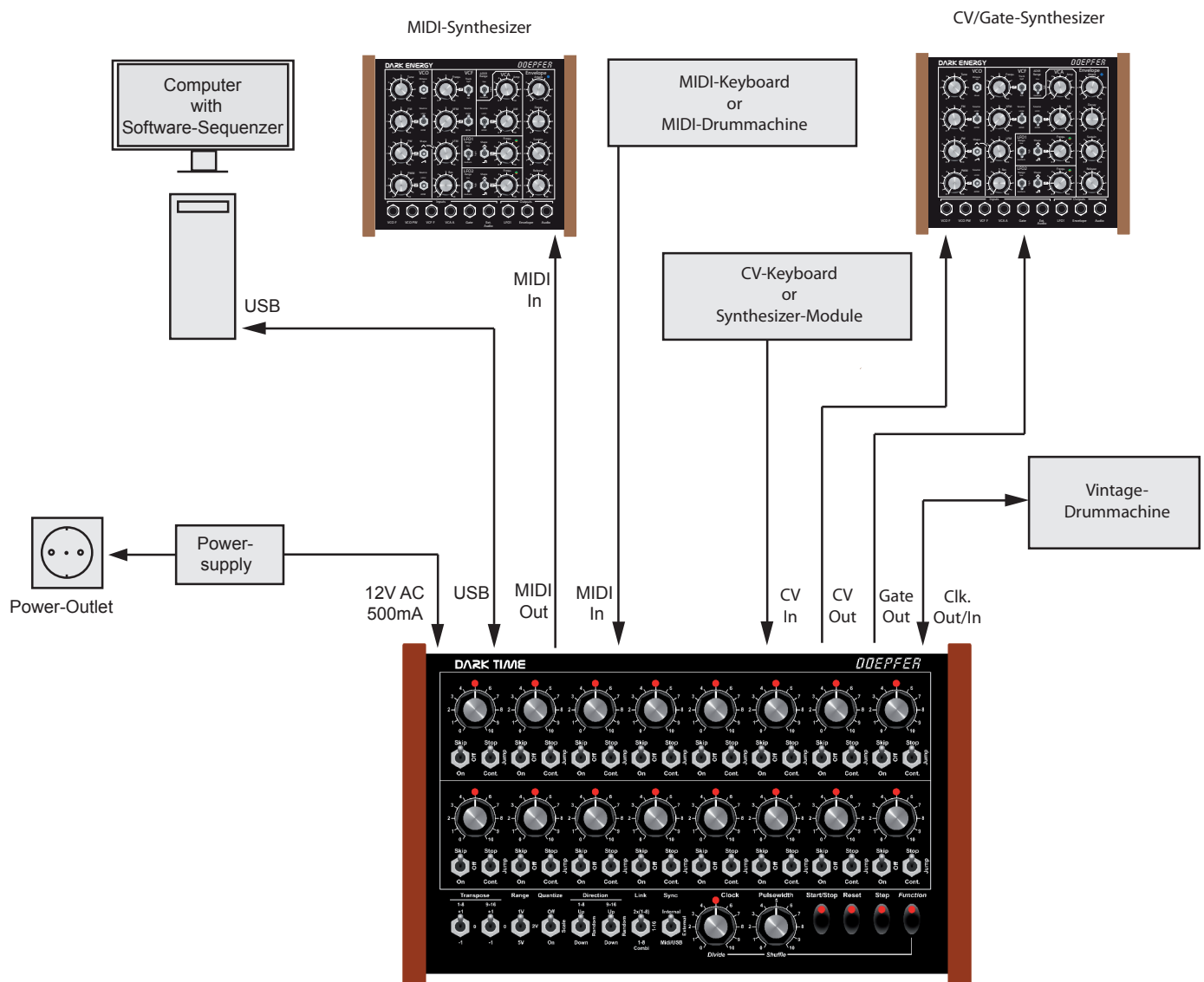
- CV/Gate:

You only need to connect at least Gate 1 out and CV1 out jacks to run Dark Time with a CV/Gate-based synthesizer. Gate triggers the synthesizer envelopes (which, in turn, normally control the VCF and output VCA), CV1 determines the pitch of the VCO(s).

The Clk In/Out jacks make synchronization with vintage drum machines or sequencers possible that have not been MIDIed.

Using additional connections, Dark Time will become capable of controlling two analog synthesizers (or their parameters) in parallel. Also, some of Dark Time's functions can be remote-controlled by analog control signals. More about this topic later on in this manual.

The following pictures shows the most important connections to and from Dark Time:



2. Function overview

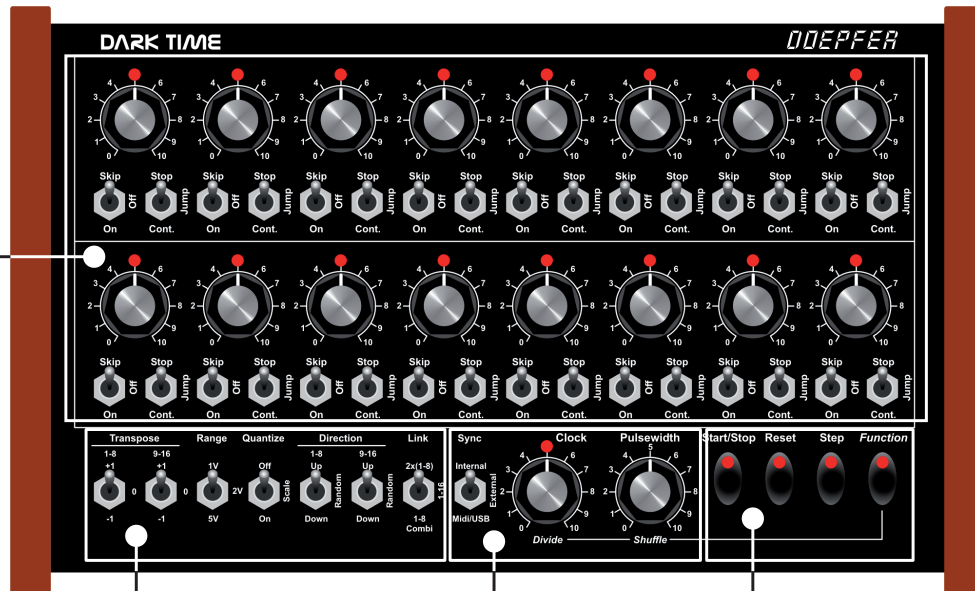
Dark Time's layout is in line with classic analog sequencers. It gives you direct access to all sequencer stages and their crucial parameters. Almost all functions to control the sequence with (like direction, transpose etc.) are also directly accessible to the user. So Dark Time can be very easily tweaked and interacted with "live" and on-the-fly. Forget about confusing menus and tiny displays.

All control voltages and gate signals generated by Dark Time can be tapped from the sockets on the rear analog interface panel. The sequence can be controlled in various ways via analog control voltage inputs (e.g. transpose, reset etc.) while in progress. Clock input and output makes synchronization with external analog gear easy.

Thanks to the built-in MIDI interface, Dark Time can easily be tied into a MIDI setup via DIN sockets or USB port.

Step Input

- 16 Steps in two rows of 8 steps each step with:
 - knob for pitch or gate-length (depending on mode)
 - two switches for step-status



Sequence Control

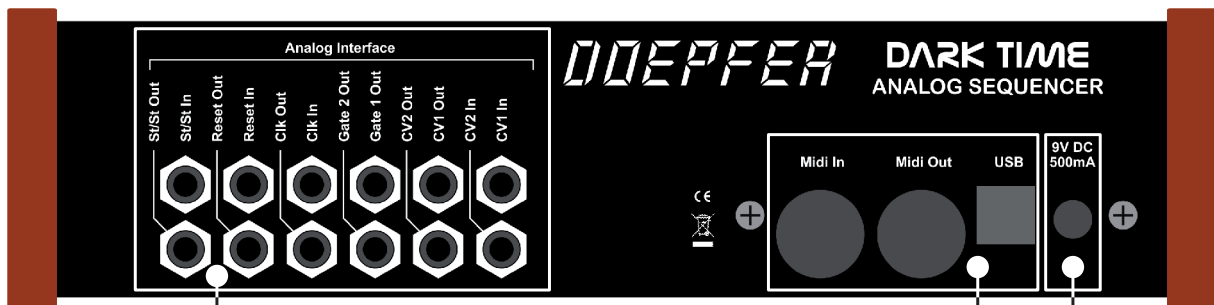
- Transpose: +/- one octave, independently for steps 1 – 8 and 9 – 16
- CV-Range for step-knobs
- Scaling of step-knobs (Quantize) on, off
- Direction: Independently for steps 1 – 8 and 9 – 16; up, down, random
- Linking of the two rows: 2 x 8 steps in parallel, 1 x 16 steps in serial, 1 x 8 plus gate-length (Custom)

Control Buttons

- Transport-buttons
- Start/Stop
- Reset (to step 1)
- Step (next step manually)
- Function (access to 2nd functions)

Tempo / Timing

- Clock-knob controls tempo or clock-divider setting
- Pulswidth-knob controls gate-length or shuffle-amount
- Sync (clock-source): internal, external (analog), MIDI/USB (MIDI-clock)



Analog Interface

- St/St Out: Provides +5V/+12V* voltage while sequence is running
- St/St In: Starts resp. keeps sequence running while +5V/+12V* voltage is received
- Reset Out: Provides +5V/+12V* trigger when sequence is resetted
- Reset In: Resets sequence when +5V/+12V* trigger is received
- Clk Out: Provides internal clock-signal
- Clk In: Receives external analogue clock-signal
- Gate 1 Out: Provides gate-signals of steps 1 – 8 (+5V/+12V*)
- Gate 2 Out: Provides gate-signals of steps 9 – 16 (+5V/+12V*)
- CV 1 Out: Provides control-voltage of steps 1 – 8 (0V to +1V / +2V / +5V)
- CV 2 Out: Provides control-voltage of steps 9 – 16 (0V to +1V / +2V / +5V)
- CV 1 In: Receives external control-voltage to control steps 1 – 8 (0V to +5V)
- CV 2 In: Receives external control-voltage to control steps 9 – 16 (0V to +5V)

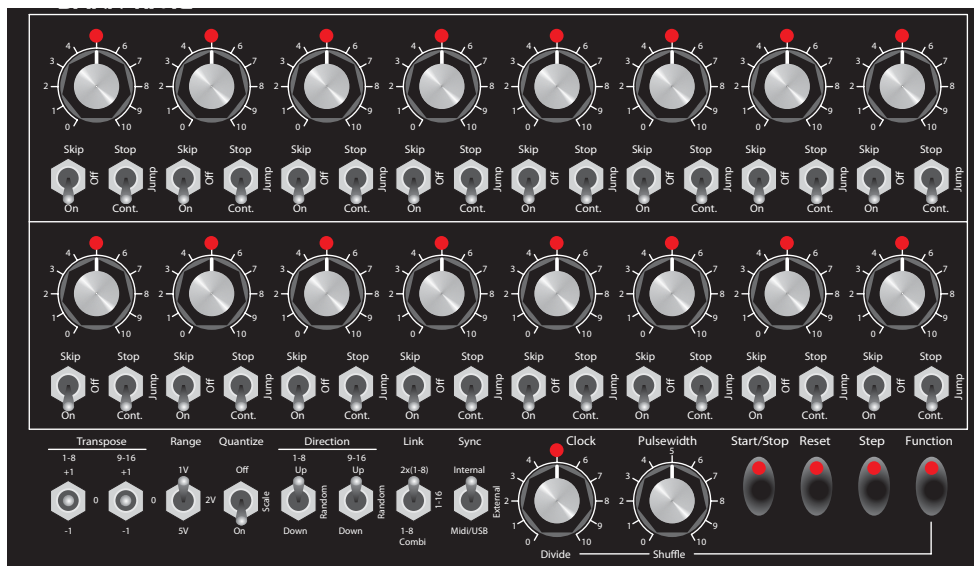
(* By setting an internal jumper, the voltages for start/stop, reset and gate can be set from +5V (default value) to +12V. Please refer to page 21, section 3.4.)

Power Supply
(12V AC, 500 mA)

MIDI Interface

- MIDI-In
- MIDI-Out
- USB (for MIDI via USB)

The following picture shows some kind of **"basic setting"**. When the panel functions are set to this, Dark Time will play two parallel 8-note sequences with all steps at equal pitch and length. Control voltages of 1V/octave scaling (the common standard) are putted out, the step-knobs are quantised which means their range is divided into discrete half-tone steps. Dark Times tempo is internally controlled resp. controlled by the clock-knob. Step length is equal for all steps. You may use this setting as a starting point to program your sequences.



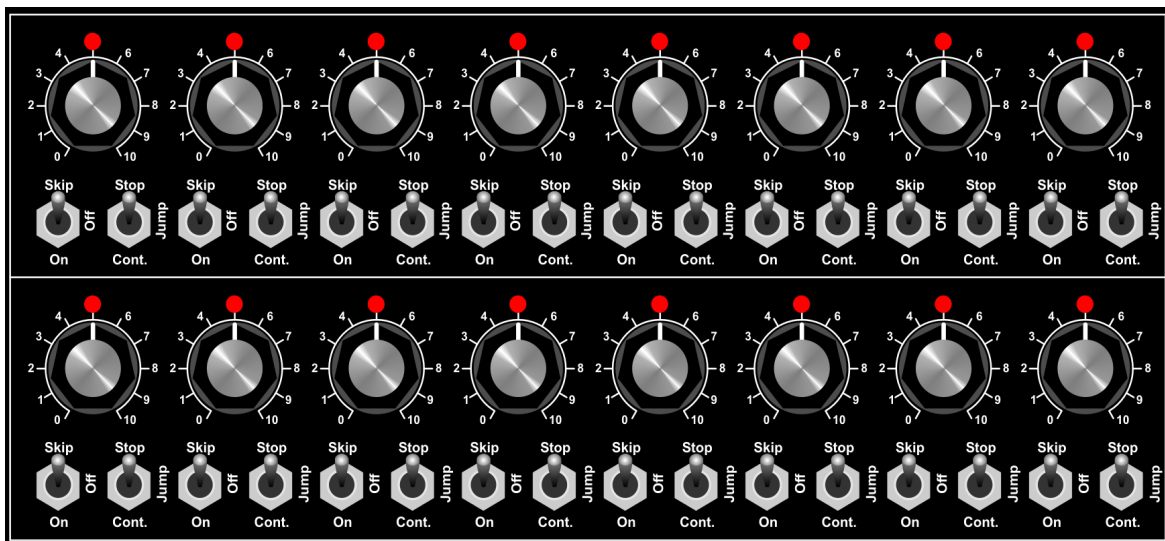
3. Functions

In this section we will explore all functions of Dark Time in detail. We will also have a closer look at the way the functions interact, and finally we will briefly deal with the MIDI and analog interfacing section.

3.1. The Controls

3.1.1. Step Input Panel

The step input panel is used to program a sequence into Dark Time. That means notes, their respective pitches and rests as well as points where the sequence circle starts and ends can be determined here. The step input panel features the controls necessary for each of the 2 x 8 or 16 stages respectively. They are the same for each step and can be found replicated sixteen times.



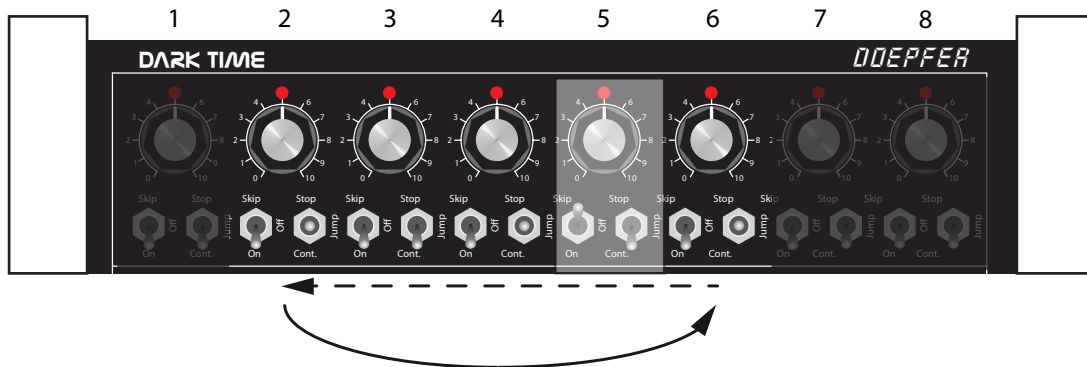
Each stage provides the following four control elements:

- Two step status switches:
The step status switches determine the behaviour of a sequence stage as soon as it is active:



- Switch On / Off / Skip
 - On = The step is part of the sequence and generates a trigger signal, i.e. it is active.
 - Off = The step is "muted" or, in other words, becomes a rest. The step will not put out a trigger signal.
 - Skip = The step is not part of the sequence. It is skipped and will not generate a trigger signal.
- Switch Stop / Continue / Jump
 - Cont(inue) = The sequence will continue like nothing happened.
 - Stop = The sequence stops on this stage.
 - Jump = As long as only one of these 16 switches is set to "Jump", the particular step performs a reset (that is, the sequence will return to step 1 and start from there again).
If two steps are set to "Jump", the first one will determine the starting point of the sequence, the second will become the final step of the circle. The sequence will cycle only between these two steps set to "Jump" position as they will determine the margins of the sequence. If you set more stages to "Jump"

position other than the previously selected ones, these steps will become the new start and end points. If you set steps to "Jump" within the previously selected range, they will not affect the sequence in any way. Confusing, eh? Not really, go ahead, and with a little practice you will see how useful this little feature is:



The sequence is running from step 2 to step 6 (first and last steps on "Jump"-position). Step 5 will not generate a trigger-signal ("Skip"). Step 4 (also on "Jump"-position) does not affect the sequence.

Using these pretty simple settings, you may create quite interesting and ever-changing complex musical patterns. You may completely "reprogram" the sequence by just the flick of a switch or two. Give it a try and you will get an idea why analog sequencers enjoy great popularity, especially within live electronic music contexts. Once you have got the hang of it, you will get great results and endless hours of sequencing excitement.

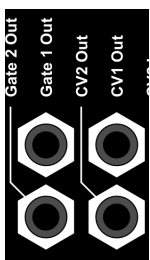
Oops – here's a hidden function: Setting both **step status switches** of steps **1** and **9** on "Jump" resp. "Skip" will entirely disable their corresponding row.



- LED
The status LED will light up when the corresponding step has been reached and show the current **position** of the sequence.
- Step-knob
 - This control determines the pitch of the respective step. The behavior of this pot (and all other step controls) depends on the settings of the "Range" and "Quantize" switches. More about this in chapter 3.1.3., "Sequence Control" on page 11.
 - In **Custom** mode, the lower eight step controls determine the **individual gate time** for the corresponding upper eight steps. You will find a description in chapter 3.1.5., "Individual Gate Time for Steps 1 – 8" on page 14.

3.1.2. CV/Gate output sockets

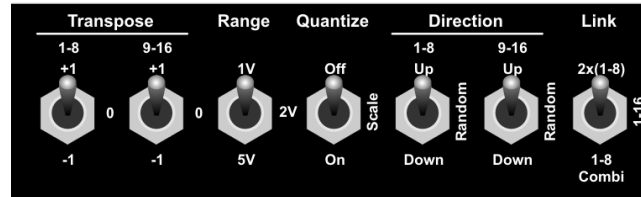
Each step set to "on" will generate several signals at a time when active. These can be tapped from the sockets on the rear interface panel of Dark Time. They can be used to control other sound sources connected.



- Gate 1 / 2 Out
 - Gate 1 Out delivers gate signals of steps 1 – 8 (+5V/+12V).
 - Gate 2 Out delivers gate signals of steps 9 – 16 (+5V/+12V).
 (An internal jumper-setting determines a gate signal voltage of +5V or +12V. Please refer to page 21, section 3.4.)
- CV 1 Out / CV 2 Out
 - CV 1 Out delivers control voltage of steps 1 – 8.
 - CV 2 Out delivers control voltage of steps 9 – 16.

3.1.3. Sequence Control

The sequence control functions allow control over the previously programmed sequence. They determine or alter pitch and / or the playback order of the step registers.

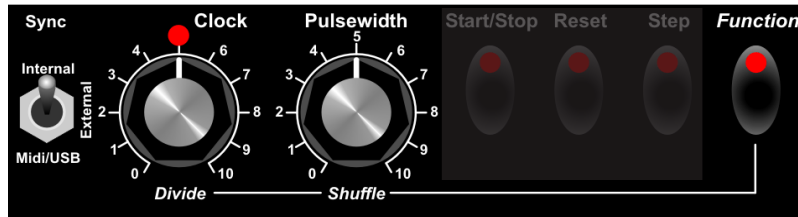


- **Transpose**
With these switches you can transpose both registers of the sequence up or down by one octave. The switch on the left addresses steps 1 – 8, the switch on the right addresses steps 9 – 16.
 - **Range**
This switch determines the control voltage range and thus the pitch range that is covered by one entire turn of a step control. You may select between 1 Volt, 2 Volts and 5 Volts. If the synthesizer connected works with a control scaling of 1V/octave, these voltages are equivalent to a range of one, two, or five octaves.
 - **Quantize**
When this switch is set to "Off", the step controls will be almost continuously variable within the range determined by the "Range" switch. We use the term 'almost' since it is still stepped digitally, but into 1024 very small increments which are – in effect – continuous and barely noticeable. Set to "On", the control voltage range gets scaled. That means, it is sliced into discrete steps that are equivalents of musical semitones. The number of chromatic steps, i. e. semitones that are covered by one entire turn of a step control is again determined by the setting of the "Range" switch. When set to "1V", the step controls are quantized into 13 discrete semitones (one octave, or – to be more precise – a "ninth" interval; e.g. "c" to "C"). "2V" means 25 semitones (two octaves) and "5V" means 61 semitones (five octaves).
"Scale" will be used for future updates. Stay tuned.
- You will find some information and additional ideas dealing with this topic in chapter 4, "Nuts and bolts of analog sequencing", and in section 4.2.2., "Programming melodies into the step sequencer" on page 24.
- **Direction**
Use these switches to determine the playback order for both step registers independently. The left-hand switch addresses steps 1 – 8, the right-hand switch addresses steps 9 – 16. In "Up" position, the respective register will run forward, in "Down" position backward. "Random" will address steps in random order (would you have guessed?).
 - **Link**
Use these switches to run both step registers in parallel ("2x(1-8)") or serial ("1-16") mode. "2x(1-8)" will generate two sequences of eight steps maximum, running in parallel, "1-16" will generate one sequence of 16 steps maximum.
"Custom" allows the programming of individual gate time settings for each of the steps of the upper register.

You will find a detailed description in section 3.1.5. "Individual Gate LengthTime for Steps 1 – 8" on page 14.

3.1.4. Tempo / Timing

The following controls give access to tempo and timing of the sequence. You will find a shuffle function and the option to program individual gate time settings for the upper register.



- Sync switch

The sync switch determines the clock source for Dark Time's tempo control. Set to "**Internal**", Dark Time will internally generate a clock signal of its own. The Clock pot controls the clock rate, the gate time can be varied using the Pulsewidth control (see below). The Transport keys of Dark Time are also active.

Set to "**External**", the tempo is controlled by an external clock signal coming in via the Clk-In socket. Dark Time's Clock and Pulsewidth controls as well as Divide and Shuffle functions will not be active in this case. The Transport keys will still be active, though.

Set to "**MIDI/USB**", the tempo is controlled by a MIDI clock signal coming in via the MIDI-In socket or the USB-port. The Clock control of Dark Time will not be active in this case. The Pulsewidth control will remain active and allow to set the gate time as well as the shuffle amount (see below). The Transport buttons will also remain active.

You will find more details concerning the synchronization of Dark Times in section 3.2., "Synchronization and remote control of Dark Time" on page 15.

- Clock control/ Function key

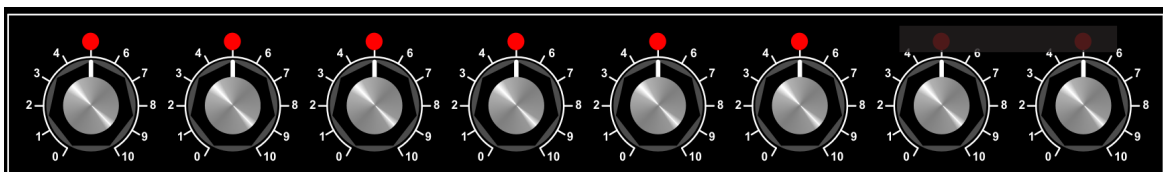
Clock:

This control determines the **speed** of the sequence when the Sync switch is set to "**Internal**" position. When set to "External" or "MIDI/USB", the Clock control will not be active.

Divide:

As a second function, the Clock control allows to set the **clock divider**. To determine a specific clock divider ratio, keep the **Function key** pressed and turn the **Clock control**. You will notice the **Step status LEDs 1 to 14** light up one by one. The highest number lit up corresponds to the clock divider ratio, listed in the chart on the following page.

Please bear in mind that the clock divider is only available when the Sync switch is in "Internal" or "Midi//USB" position.



Clock-divider:
1/8 Note

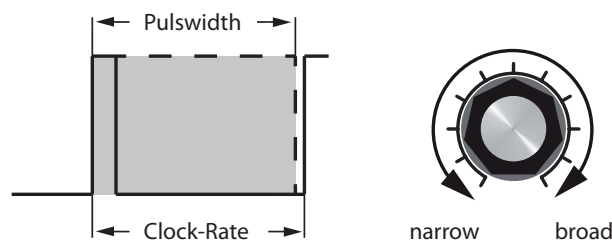
Clock-divider note-value	Number of lighted Step-LEDs
1/2	2
1/4.	3
1/4	4
1/8.	5
1/8	6
1/16.	7
1/4T	8
1/16	9
1/8T	10
1/32	11
1/16T	12
1/64	13
1/128	14

- Pulswidth-control / Function-key

Pulswidth:

This control determines the **duration of gate signals**, generated by all active steps resp. their note values. Turned fully counter-clockwise, the single steps will appear as short pulses. Turned fully clockwise, they will be played almost in "legato" fashion.

The duration of the gate signals is also dependent on the settings of the clock divider (please refer to the chart above).



The audible result of the different gate lengths depends a lot on the setting of the relevant parameters on the synthesizer connected: A short and percussive sound with a percussive envelope setting will still produce a short and percussive sound, even at high gate length settings. In contrast, a sustained sound with long decay and release settings will not be interrupted by a short gate length or a low pulse width value respectively. In any case the pulse width value can be an important part of the sound of the sequence. Feel free to experiment!

Shuffle:

As well as the Clock control, the **Pulswidth pot** yields control over a second function: Connected to the **Function key**, it is used to set the amount of the **shuffle function**. This function will delay some steps a bit by a certain factor in order to add more "groove" or "swing" to the sequence.

To set the Shuffle amount, keep the **Function key** pressed and turn the **Pulswidth control**. The more you turn the Pulswidth control clockwise, the more the sequence will get shuffled. You will hear the increasing shift in the timing of the rhythm easily.

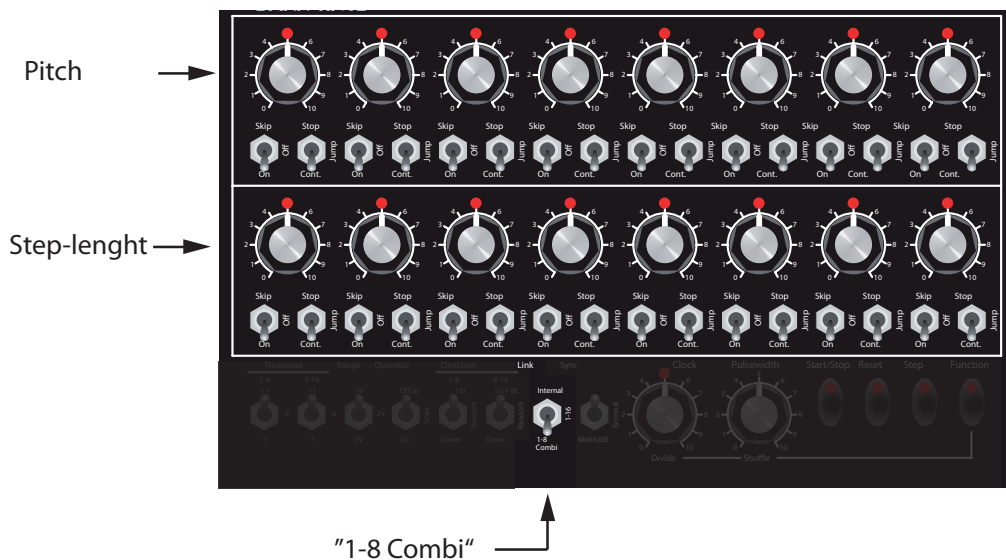
Please bear in mind that the Pulswidth and Shuffle functions are only available when the Sync switch is in "Internal" or "MIDI/USB"-position.

3.1.5. Individual gate length for steps 1 to 8:

As you already know, the **Pulsewidth control** sets the gate time. This setting affects all steps by the same factor. Now you will learn how to program individual gate time settings for each of the steps 1 to 8 (upper register).

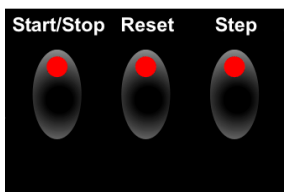
This function is enabled by the "Custom" setting of the Link switch.

- Set the **Link switch** to "**Custom**" position.
- Simply turn the **step controls** of the lower register to program individual gate time settings for the corresponding steps of the upper register, e.g. use step pot 9 to adjust the gate time of step 1 and so on. In this mode, the setting of the gate time is continuously variable, i. e. it is not dependent on the clock divider settings.



3.1.6. Transport keys

These three keys control the so-called transport functions of Dark Time.



- **Start/Stop key**
Hitting the Start/Stop key once will get the sequencer going. Hitting it once again, the sequencer will stop. The next hit will restart the sequence and play back will continue from where it was stopped. In other words: If the sequence was stopped on step 8, the sequence will continue from step 9 when hitting Start/Stop.
- **Reset key**
Hitting the Reset key will reset the sequence to the first active step. This can be step 1 (1-16 mode), step 1 and 9 (2x(1-8) mode) or any step in "jump" position which determines the current starting point of the sequence.
- **Step key**
The first hit will activate the Step key function. Each new hit on this key will make the register skip one step forward to the next step available. This way you can step through the sequence manually. Hitting the Stop key will quit this function.

3.2. Synchronization and remote control of Dark Time

Dark Time offers a bunch of useful interfacing options to communicate with external gear. You are not only restricted to playing MIDI and/or CV/gate-based synthesizers connected to Dark Time, you may also synchronize it to other external instruments and even remote-control some of its functions. This will be achieved through the MIDI and analog interfaces of Dark Time.

All functions covering this topic will be discussed in this chapter and you will finally find detailed explanations of functions that have only been discussed briefly so far. Here we will quench your thirst for more.

3.2.1. MIDI-Interface



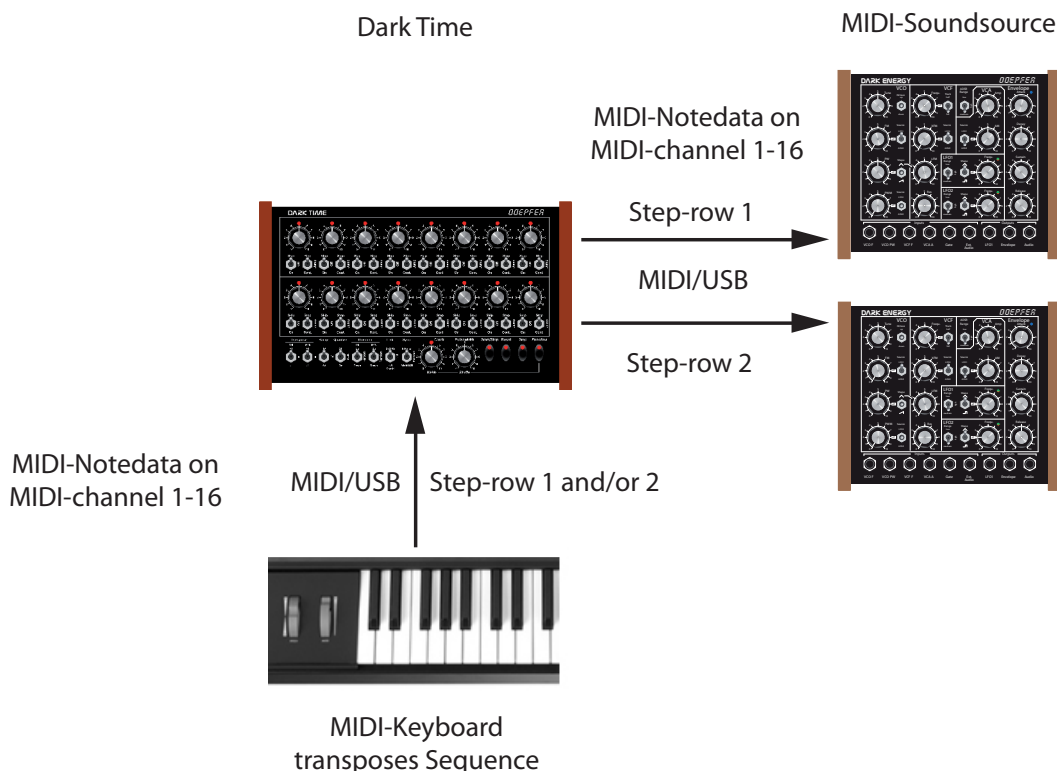
Dark Time sends and receives MIDI data via USB port or DIN sockets. Please do not use both in parallel as unpredictable and undesirable effects may result. Please refer to page 6 in the first chapter of this manual concerning the hook-up of Dark Time's MIDI connections.

Sending and receiving MIDI notes

Each active step of Dark Time generates and sends MIDI note messages. They are made up of a note-on and a note-off command as well as a MIDI note number. They will define pitch (i. e. note name / number) and note length. These data are channel-related, which means that they will be assigned to and transmitted on one (or more) of the 16 existing MIDI channels.

Both step registers of Dark Time independently allow to transmit MIDI data on different MIDI channels. This way you can control two sound generators simultaneously.

Dark Time also receives MIDI data: Connect a MIDI keyboard or a controller to Dark Time's MIDI-In socket (or USB port) and transpose the sequence on the fly while it is chugging away.



Selecting the MIDI channel:

The default setting is MIDI channel 1 for both registers.

- To change the setting of the MIDI channel for the upper step register, please
 - first press and hold the **"Function"** key, then press **"Start/Stop"** key while "Function" is still held down.
 - Select the desired MIDI channel by turning the **Clock control**. The number of step LEDs lit up will indicate the channel-number (1 - 16).
- To change the setting of the MIDI channel for the lower step register, please
 - first press and hold the **"Function"** key, then press **"Reset"** key while "Function" is still held down.
 - Select the desired MIDI channel by turning the **Clock control**. The number of step LEDs lit up will indicate the channel number (1 - 16).

3.2.2. MIDI Clock

You can sync Dark Time with any suitable piece of MIDI gear (e.g. drum machines, software/hardware-based sequencers etc.). To do this, Dark Time sends and receives MIDI clock data. This is a pulse signal of 24 pulses per quarter note (24 ppq) which represents the tempo and additional start-/stop- and continue-commands. These data are not related to a specific MIDI channel but global. Settings of a certain send or receive channel are not required for clock data transmission.

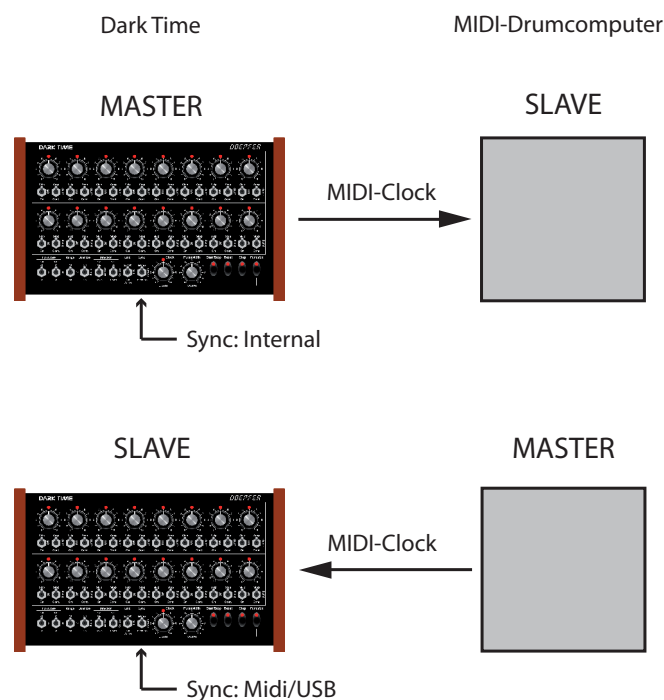
Dark Time as master:

To synchronize an external piece of MIDI gear (e.g. a drum machine) to Dark Time using MIDI clock, simply set the **Sync switch** to **"Internal"** position. No additional settings are required. Set up the external device as a "slave" as described in its own manual. Now Dark Time will control the tempo and start/stop/continue functions of the slaved unit.

Dark Time as slave:

If an external device is to control Dark Time's tempo via MIDI clock, it has to be set up as master, with Dark Time acting as slave. Set Dark Time's **Sync switch** to **"MIDI/USB"**. Dark Time will now obey to incoming MIDI clock data and respond to external start/stop/continue commands.

If you want to run Dark Time at a precisely defined tempo measured in BPM, it is useful to synchronize Dark Time to a device that allows tempo adjustment in BPM values.

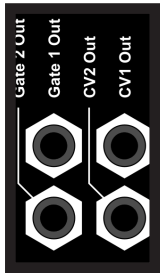


3.2.3. Analog Interface

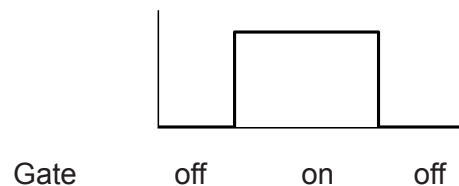
Of course, Dark Time allows interaction with non-MIDled equipment. It will perfectly fit into an analog setup. The necessary connections can be made via the rear analog interface panel of Dark Time. It sports twelve 1/8" sockets with in- and outputs.

CV/gate outputs:

Let's have a closer look at the connectors, shown in the figure below. Here, both step registers send out control voltages and gate signals individually. These signals are necessary to control an external analog synthesizer.



- The voltage levels sent out from the **CV 1 Out** and **CV 2 Out** sockets depend on the setting of the step controls, the transpose and the range switches. The most common use is controlling the pitch of an external synthesizer. The sockets provide a voltage range between -2V and +10V. Of course these voltages cannot only be used for controlling the pitch of a synthesizer, but also for controlling other parameters like e.g. filter cut-off frequency, VCA amplitude, you name it.
- The sockets labeled **Gate 1 Out** and **Gate 2 Out** send out – you have already guessed it – a gate signal, again for each register individually. Active sequencer positions put out a signal of +5V/+12V at these sockets. The duration of a gate signal depends on the setting of the Pulsewidth control (s. page 13).



The gate signal triggers the envelope generator of an external analog synthesizer which, in turn, will generate an audible tone as one envelope generator is commonly used to control the amplitude of a VCA.

Some vintage synthesizers require a gate signal of +10V or higher (e.g. ARP 2600). In order to match also with these machines, Dark Time gate output level can be changed from +5V (default) to +12V by setting of an internal jumper. Please refer to page 21, section 3.4.

Since Dark Time puts out control voltage and gate signal of both registers individually, some interesting tricks can be achieved, e.g.:

- Control two synthesizers in parallel with two eight-step sequences.
- Control two different parameters of one synthesizer at the same time.

CV Inputs:

The inputs **CV 1 In** and **CV 2 In** take external control voltages within the range of 0V and +5V. These voltages will be added to the voltages generated by the step registers. Both registers may be addressed separately, with CV1 In corresponding to the upper register and CV2 In to the lower.



There are many uses for these inputs, especially in combination with a modular synthesizer system, e.g. the Doepfer A-100. You may feed dynamic voltages into these inputs on order to achieve portamento effects or use staircase-type voltages to transpose the step registers automatically.

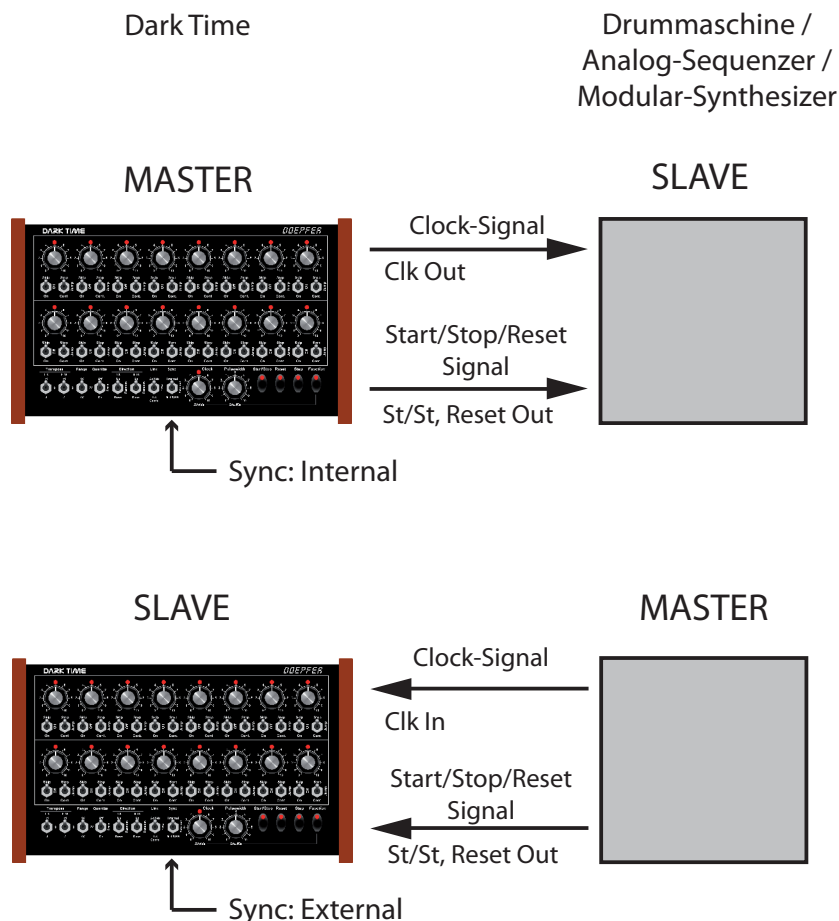
Clock connectors:

To synchronize two instruments in the analog domain – e.g. Dark Time and a non-MIDled vintage drum machine – a clock signal is needed. A clock signal is a pulse wave, its frequency (pulses per time) determines the tempo of the synchronized device. When active, Dark Time will generate such a clock signal and make it available at the Clk Out socket.

Changing the gate output voltage from +5V (default) to +12V by changing an internal jumper (see page 21), will generate a clock signal of +12V.



- **Dark Time as master:**
Connect Dark Time's **Clk-Out** socket to the clock-in socket of the "slave" device (e.g. vintage drum computer or another analog sequencer). You will not need any additional settings. Now set up the external device as a "slave" as described in its manual.
- **Dark Time as slave:**
You can also synchronize Dark Time to the tempo of an external device via the **Clk In** socket. The master device must produce a suitable clock-signal (0/+5V) and has to be connected to Dark Times **Clk In** socket. Set Dark Time's **Sync switch** to **"External"**. Its internal clock will now be disabled and driven by the external clock signal instead.

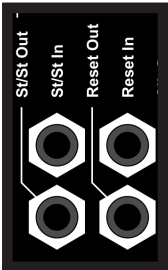


Start/Stop and Reset sockets:

Each time Dark Time is started, the **St/St Out** socket puts out a +5V voltage (default setting). When Dark Time is stopped, this voltage goes down to zero level (0V).

Each time a reset function is performed, Dark Time's **Reset Out** socket will send out a short voltage pulse of +5V.

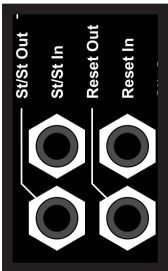
Changing the gate output voltage from +5V (default) to +12V by changing an internal jumper (see page 21), will also generate start/stop- and reset signals of +12V.



There are many uses for these signals, especially in combination with a modular synthesizer system, e.g. the Doepfer A-100. You can trigger envelope generators in time when Dark Time starts, stops or resets (e.g. the Doepfer modules A-140, A-141, A-142), synchronize suitable LFOs (e.g. Doepfer A-145) or start/stop additional sequencers, e.g. another Dark Time. The clock signal described above will ensure the same rate for all units connected, the start/stop/reset-triggers will make sure that both units will perform these actions at exactly the same time.

Running two Dark Times the way we have just mentioned suggests that the slave device can be started, stopped and resetted by means of external signals. You have guessed it again – this exactly is the job of the **St/St In** and **Reset In** sockets. Once the Reset In socket receives a positive voltage (switching from 0V to +5V). Dark Time performs a reset function.

The same goes for the ST/ST In socket: As soon as a positive voltage is received (+5V), Dark Time starts running resp. keeps on running as long as this voltage is received. As soon as this voltage goes down to zero (0V), the sequencer stops.



You are not limited to use start/stop or reset signals of another Dark Time or a drum machine when you use these sockets. You may use every kind of device that is capable of putting out a +5V voltage. This can be a suitable footswitch or – again – specific modules of the Doepfer A-100 modular system (just in case we haven't mentioned this one yet).

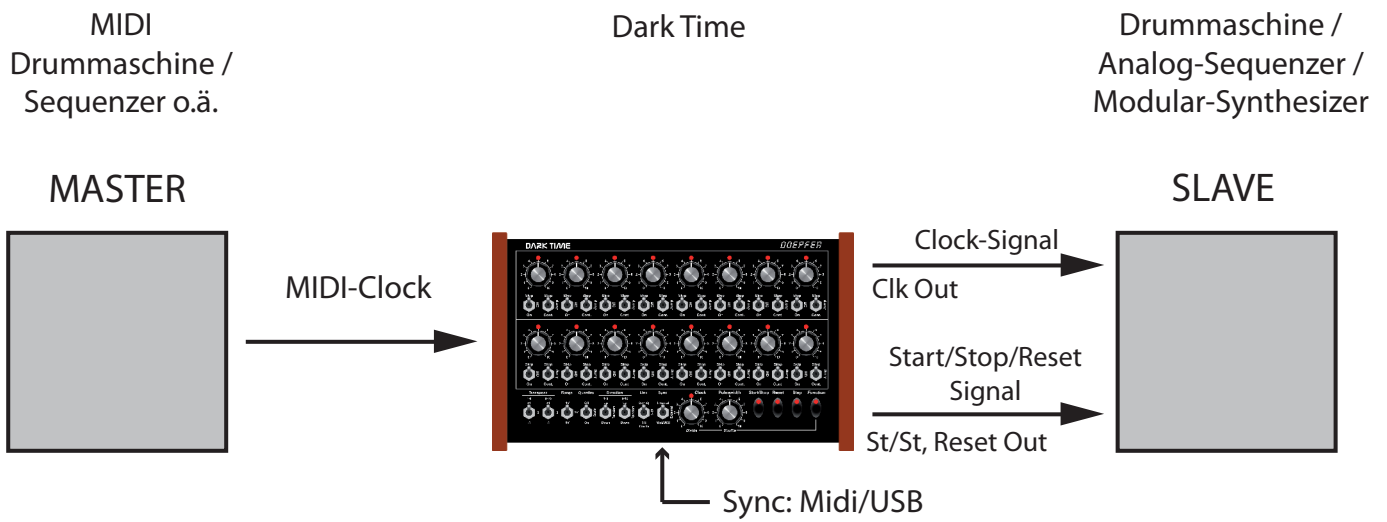
3.2.4. Dark Time as a simple MIDI-Clock-to-Sync interface

You may use Dark Time as a simple MIDI-Clock-to-Sync interface. When running as a slave, synced to an external MIDI-clock (master), Dark Time will send out a clock signal from its Clk-Out socket according to its clock divider setting (please refer to section 3.1.4, page 13). You may route this signal to another, non-MIDled device (e.g. suitably equipped vintage drum machine or sequencer) in order to synchronize it with the master MIDI device.

Start/stop and reset signals coming in through Dark Time's analog interface sockets are also available as MIDI signals at the MIDI-out socket and the USB-port respectively.

The start-/stop-/continue commands of incoming MIDI data are available as +5V (+12V) voltages from the St/St Out and Reset-out sockets of Dark Time. Please refer to the illustration on the following page.

A successful synchronization is only possible when all devices have suitable and matching specifications. Especially in the field of vintage instruments, there are several manufacturer-related characteristics that may cause problems. Please accept our sincere apologies that we at Doepfer cannot provide you with any support if some devices behave unpredictably when hooked up for syncing.



3.3. Firmware Update

Dark Times firmware can easily be updated via USB. In case a new firmware version is available, you can download it from our website (www.doepfer.de). A detailed description of the update process can be found in the additional technical description of Dark Time. You can download this documentation here:

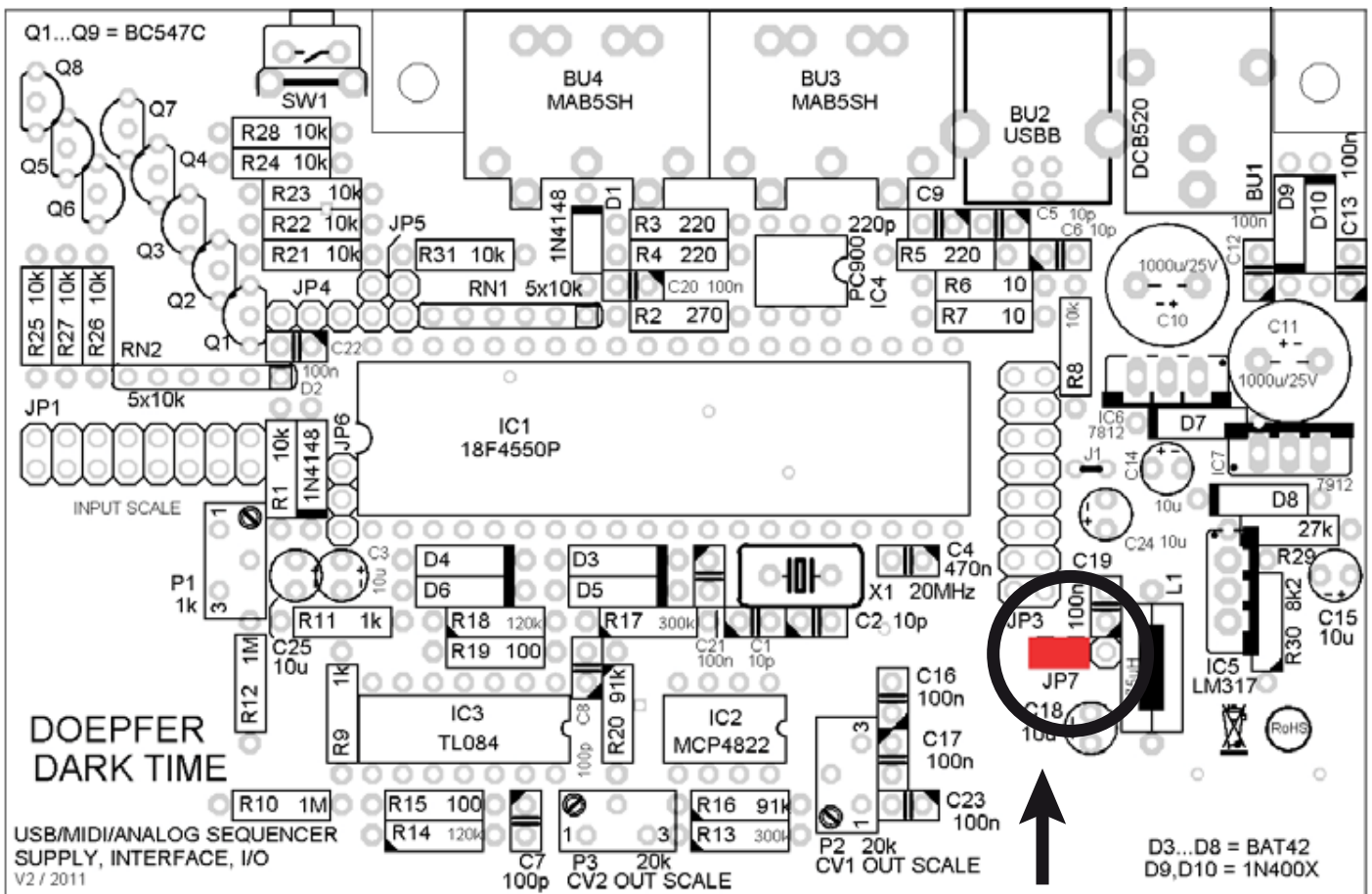
www.doepfer.de -> Products -> Dark Time -> Additional technical documentation

3.4. +12V Modification

As you already know, Dark Time puts out gate-, clock-, start/stop- and reset-voltages via it's analogue interface. By default, these voltage have +5V level. Some vintage synthesizers may require higher voltages. In order to match with these machines, the levels of these signals can be changed from their default setting (+5V) to +12V by changing the position of an internal jumper on one of Dark Times boards.

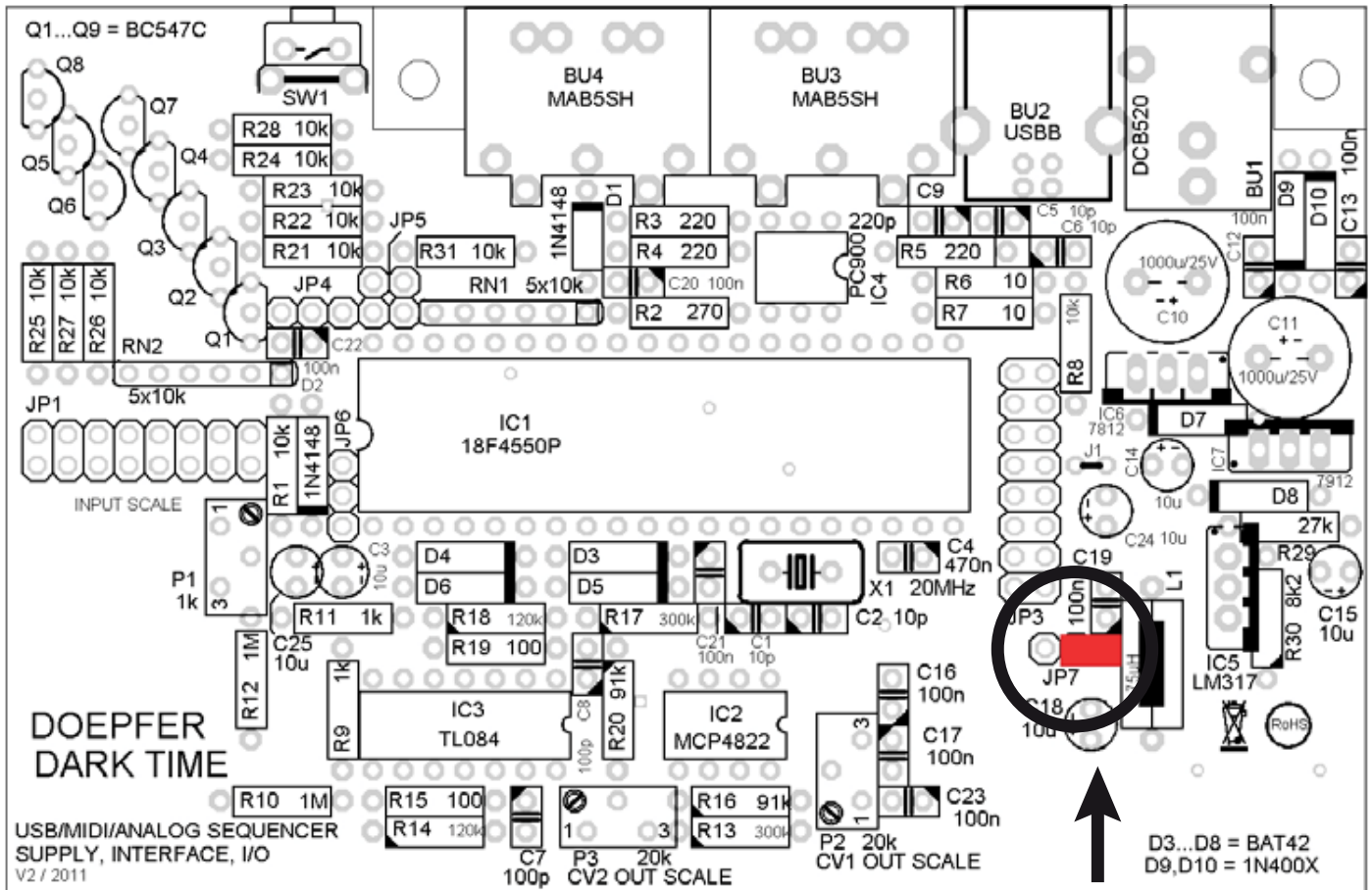
First, get yourself a Philipps screwdriver and loose the four screws on the bottom lid. Remove the bottom lid. Locate the jumper "JP7" on the interface board (the smaller board). It is a 3-pole pin row with the jumper, that can be placed in two positions. In the default setting, the jumper is placed in the middle and left-most pins (please refer to the upper picture). The gate-, clock-, start/stop- and reset-voltages will have +5V.

+5V position of JP7:



+12V position of JP7:

Place the jumper into the middle and rightmost pins (please refer to the lower picture) and the gate-, clock-, start/stop- and reset-voltages will have +12V.



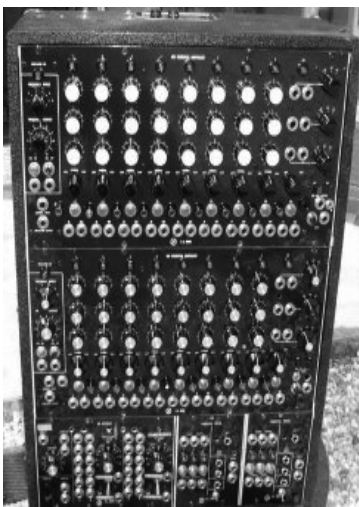
4. The Nuts and Bolts of analog Sequencing

In case step sequencers – or sequencers in general – are new to you, please read this section thoroughly. You will learn about the nuts and bolts of these machines that will help you to grasp Dark Time's nasty (well, sort of...) little secrets fully.

If you are an expert already, the study of the following section is not a must-read, but maybe at least entertaining in some ways (we have tried our best not to bore you to tears, mind you). So please feel free to continue... or not.

4.1. A very brief history of step sequencers

Since the 18th century, mostly clockmakers and makers of mechanical musical instruments have tried to create devices which would generate tonal and musical patterns automatically. The musical boxes of those days of yore could be called the great-grandfathers of modern sequencers. Of course it was not possible to alter an existing pattern and if so, only with a lot of technical effort. Changing the pattern was out of the question once it had been cast in brass cylinders, etched into iron disks, or punched into cards (did we hear you say steam calliope or player piano?). By the mid-20th century, electronics had become widely available for generating sound but were only used by universities, broadcasters, and the military. In the 1960s Robert Moog and Donald Buchla devised the use of voltage-control for sound-generating modules independently of each other, and the situation changed quickly: All important parameters of a sound like pitch, timbre, duration, and level could now be controlled in a relatively easy way by a handful of low voltages and a bunch of cables, knobs and switches. The dream of the automated musical instrument that had been around for centuries suddenly was within an arm's reach. All that was needed was a device that generated a continuous "sequence" of voltages to control a series of pitches. The step sequencer was born.



4.2. „Less is more“, or: Some good reasons for using a step sequencer

Of course we all know that digitalization of musical data is pretty easy and a very common thing to do these days. Storage and retrieval of complex musical literature (no matter whether a pop song or a symphony) is possible by today's technical achievements. Even the performance of a skilled piano player can be recorded and stored in an adequately equipped (software-) sequencer and played back by a computer. So why would we want to mess around with such an anachronistic thing that is just capable of storing sixteen notes at a time by setting a couple of controls manually? Quite simple: The majority of interesting genres of electronic music is still characterized by the minimalist trademark rhythm of step sequences with just a limited number of stages. Think of the "Cosmic Couriers" of the early 1970s, the repetitive "robot"-sound of the proto-techno era, the "acid"-tracks of the 1990s, or the minimal-techno productions of today. The repetitive rhythm of a step sequencer is still an absolutely essential and important stylistic element of many, many genres of electronic music. It lives from the restriction to absolute simplicity and the hypnotic effect of endlessly repeating patterns that were and still are the trademark of this music. Thus the step sequencer is, despite of all its alleged limitations, as important today as it was when it was first introduced.

4.2.1. Squeezing more music out of eight notes

When working with a step sequencer, it would be a wise move to get rid of old-fashioned ways of song-writing and all theory of melody and harmony first. The step sequencer is made for tactile and sensual experience and hands-on experimentation. What might seem to be quite abstract and technical at first sight will soon become very special qualities in their own right – far removed from traditional keys and notes. And that's what it's all about: You will get musical results that would not have been possible by the use of traditional ways of songwriting on a "real" (read: „traditional“) instrument, a piece of sheet music or even a computer. The desired repetitive elements, the subtle evolution within patterns, and finally the equality of melody and timbre will come into being almost automatically.



This opens up one more important perspective – the somewhat "technical" and apparently "unmusical" interface of a step sequencer gives you direct hands-on access to each step of the pattern. A device like Dark Time enables the artist to interact with musical patterns in many ways by just hitting one or two controls or flicking a switch. No need to mess around with a mouse, editing-windows, and QWERTY keyboards. Apart from that, you are always free to record a rocking pattern into your computer sequencer in order to use it as a part of a bigger composition and to free up Dark Time for creating new and even more rocking patterns.

Another interesting aspect is the fact that you cannot only use your step sequencer to control pitch but also the parameters of a sound of an external synthesizer in the same intuitive way– e.g. the cutoff frequency of its filter. Dark Time's "Range" switch produces all voltage ranges that are useful in conjunction with analog synthesizers.

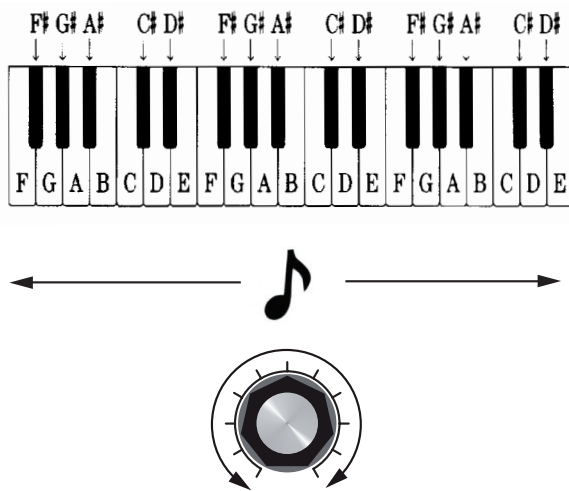
Dark Time is capable of addressing two registers of eight steps each in parallel. So two parameters of a sound can be accessed independently, e.g. pitch and filter frequency, volume and timbre etc. Now let two registers run against each other or one of them controlled randomly, play with the jump function and so on. The sequencer will become a pattern-based sound generator!

4.2.2. Programming melodies into the step sequencer

Of course it is possible to enter tonal melodies into a step sequencer like Dark Time – you should simply bear some conceptual differences in mind when it comes to using a sequencer vs. a traditional keyboard. For the time being we would like to have a closer look at some fundamentals of programming melodies into a step sequencer. Let's keep Dark Time's specifications in mind for this.

When sitting down in front of a keyboard instrument, e.g. a piano, its entire range of notes up to seven octaves is spread out in front of you. You will be able to easily grasp the position of each note at a glimpse. Each key generates one tone with a specific frequency resp. specific pitch at a time which corresponds to a note name, clearly defined in our occidental system of writing music.

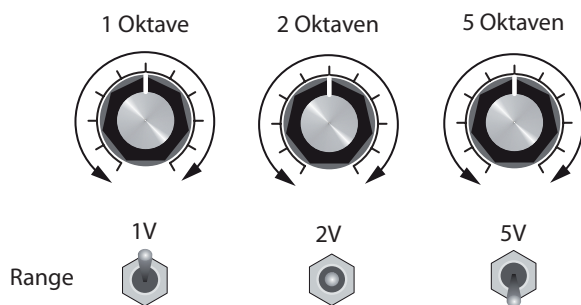
In most cases you will play a synthesizer from a traditional keyboard also – at first sight the outset is the same. But often you have the ability to detune the instrument continuously over a much wider range by just one turn of a knob. If you do so, the pitch of a played key (e.g. "C") will not necessarily correspond to the pitch actually audible.



An electronic instrument – let's say, a synthesizer – is not restricted to keys, organised in semitones when it comes to determining the pitch. You may also use knobs – as your Dark Time does. When turning one of the sixteen step controls on Dark Time's front panel, the control voltage produced by the corresponding step is changed and thus the pitch played by the synthesizer connected. Since the knobs work continuously, the programming of the pitch is not restricted to semitones. You can also obtain all sorts of pitches "in between". So it is very easy to create atonal patterns or microtonal changes.

In most cases, though, you might want to create tonal patterns that are matching our well-known tonal system we have grown accustomed to. If you are lucky to call a sensitive ear and perfect pitch your own, you simply have

to tune your synthesizer correctly and tune the desired pitches "by ear" using the controls. If your ears are only average – nothing to be ashamed of –, an electronic chromatic tuner is a very good tuning aid. Now Dark Time's Range switch comes into play: In 1V position, a full turn of a step control covers a range of twelve semitones, thus one octave. This ratio was determined by the first analog synthesizers on the market. Shifting control voltages by one volt would result in pitch changing by one octave. This ratio, named "scaling", became a standard very soon and it still is today. Exceptions from the rule were some vintage Japanese units (e.g. by Korg and Yamaha) that used an alternative method of scaling and interfacing.



When setting Dark Time's Range switch to another position (like 2V or 5V), a full turn of a step control will yield a wider control voltage range and thus cover a wider range of notes. Finding a desired note will become more difficult then, though. Enjoy finding those you weren't exactly looking for.

Of course you are not restricted to controlling the pitch of an external sound source by Dark Time. Feel free to control all other parameters of your synthesizer that has inputs for control voltages, e.g. filter, volume, envelope settings and many more. Using different voltage ranges is especially useful with this kind of application.

Let's come back to the programming of tonal patterns again. Using a continuously variable control, labeled "1-10", would not seem to be the best tool for determining musical pitch. That is because it would not exactly resemble a specific pitch or note. Dark Time's function named "quantize" is a handy little helper. Set to "on", the step controls won't be continuously variable anymore. The range of control voltages will be "sliced" into semitones. Their number will depend on the setting of the range switch (1V = 13 semitones/1octave – or to be precise, a 'ninth' which is e.g. from "c" to "c'" or 13 semitones respectively; 2V = 25 semitones/2octaves; 5V = 61 semitones/5 octaves). Now it will be relatively easy to distinguish the notes of an octave by ear – at least in the 1V- and 2V-settings.

Dark Time's transpose switches can be used to transpose both step registers up or down by one octave. You may also use an external control voltage, connected to the CV1 In and CV2 In sockets to shift the pitch of both registers independently. A keyboard with discrete semitones will work, as well as another control voltage source, e.g. an LFO, that generates continuous voltages. You may also use a MIDI keyboard or a MIDI controller for this purpose and connect it to Dark Time's MIDI-In socket or the USB port (do not forget to set the MIDI-channel number.... see page 17).

Making music with a step sequencer like Dark Time is much more intuitive and much easier than you might expect after having read the last couple of pages. You will certainly grow comfortable with this very exciting way of musical performance the more you practice. The best way of practising still is having fun and enjoying yourself.

Anyway, we wish you lots of fun and success when exploring your Dark Time!

5. Addendum

Service and terms of warranty.

Concerning service and warranty conditions, please refer to our terms of business.
You will find our terms of business at:

www.doepfer.de

Doepfer Musikelektronik GmbH
Geigerstr. 13
D-82166 Gräfelfing / Deutschland

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EM 50 082-1: 1992, EN 50 081-1 : 1992, EN60065 : 1995

Please refer to our website „terms of business“.

Disposal

This device complies to the EU guidelines and is manufactured RoHS conform without the use of lead, mercury, cadmium and chrome. Still, this device is special waste and disposal in household waste is not permitted.

For disposal, please contact your dealer or :

Doepfer Musikelektronik GmbH, Geigerstr. 13, D-82166 Gräfelfing / Deutschland

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*Owners Manual by Matthias Fuchs / VISOPHON, Berlin, Germany
English version tweaked and adjusted by Stephen Parsick / doombient music, Bielefeld, Germany*

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DARK TIME

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