DOEPFER

MIDI TO CV/GATE INTERFACE

MCV4

Bedienungsanleitung (deutsch)
User's Guide (English)

INTRODUCTION

MCV4 is a MIDI-to-CV/GATE-Interface to control vintage analog synthesizers equipped with CV and Gate/Trigger inputs via MIDI. MCV4 is suitable for synthesizers using voltage control characteristics of 1V/Octave and gate voltages from +5V to +12V or switched trigger (S-Trig). MCV4 is eqipped with a standard control voltage output (CV1) to control the VCO's (Voltage Controlled Oscillator) and a Gate/Trigger output to control the Envelope Generators (e.g. of ADSR type). On top of it MCV4 is equipped with additional 3 control voltage outputs (CV2...4) to control other parameters of the synthesizer connected to MCV4 (like VCF frequency, loudness, modulation depth and so on) provided that it the regarding control voltage inputs are available. The 3 additional CV's are controlled with the MIDI events After-Touch, Volume (Ctr. #7) and a free adjustable MIDI controller. In addition the MIDI velocity can be used as a factor to multiply the values of the CV's controlled by Volume and the selectable controller. The MIDI channel, the reference note for 0V CV1 and the MIDI controller for CV4 can be adjusted.

If you want to control more than one synthesizer or syntesizer module or if you need more control voltages we recommend the MCV24. The MCV24 is equipped with 24 CV/Gate outputs and additional SYNC/Clock/Start/Stop outputs. The MCV24 will be probably available end of 97.

CONNECTIONS

The MCV4 does not have a built-in power supply. Instead it uses a plug-in type EXTERNAL POWER SUPPLY (AC adapter). The power supply is NOT included with the MCV4 and must be purchased locally by the user.
We recommend a VDE approved AC adapter but MCV4 will work with every AC adapter beeing in accordance with the following specifications. The adapter must be able to deliver 7-12 V DC unstabilized or stabilized voltage, as well as a minimum current of 100 mA. The POLARITY of the low voltage plug connected to the MCV4 must be pin = +7...12V and ring = GND. If the polarity is incorrect, MCV4 will not function. However, there is no danger of damage to the circuitry since it is protected by a diode. If the MCV4 is used in Germany the external power supply must be VDE approved due to security and product liability reasons.

The MCV4 is turned on by plugging the AC adapter into a wall outlet and connecting it to the appropriate jack "9V DC" on the MCV4. There is no separate ON/OFF switch.

Connect MIDI IN of the MCV4 to MIDI OUT of the MIDI transmitter (MIDI sequencer, synthesizer, masterkeyboard,....). The MIDI THRU of the MCV4 may be connected to the MIDI IN of other MIDI devices (optional). If this is not required the MIDI THRU connector remains not connected.

The GATE output of the MCV4 is a monophonic 1/4" jack socket. The Gate/Trigger signal appears at the top of a jack plug connected to the Gate output of the MCV4. If your synthesizers uses a 1/4" jack socket for Gate/Trigger input a monophonic 1/4" cable can be used for the Gate connection between MCV4 and your synthesizer.

The CV outputs of the MCV4 are stereophonic 1/4" jack socket. The CV's of each jack are available at the tip and the ring. At the socket located near the Gate output the control voltages CV1 (MIDI note controlled) and CV2 (MIDI after touch controlled) are available. At the other CV socket CV3 (MIDI volume controlled) and CV4 (controlled by an adjustable MIDI controller) are available. The sketches at the top of the MCV4 housing show the connections.

If you want to use both CV's of one connector you probably need a special cable with one 1/4" stereo jack plug on one side (MCV4) and two 1/4" mono jack plugs on the other (synthesizer). We offer such a special cable for the MCV4 and you should order it together with the MCV4 because of the additional shipment and money transfer costs. But you may

get such a cable from your local dealer as well. Of course you may use special adapters (1/4" stereo to 2x1/4" mono) too.

The CV1 output of the MCV4 is connected to the control voltage input of the synthesizer which controls the pitch (labeled e.g. as CV, tune, pitch, VCO, Osc. or similiar). Pay attention that the MCV4 can be used only for synthesizers using the 1V/Oct. characteristic for CV and not for those using Hz/V. Most of the vintage synthesizers use 1V/Oct (e.g. Moog, Roland, Sequential Circuits, Doepfer) but some manufacturers used Hz/V (e.g. Yamaha, Korg) or completely other control characteristics (e.g. EMS Synthi A: 0.32V/Oct or 0.26V/Oct). But for some synthesizers with V/Oct. there is a solution to control it via V/Oct. (e.g. the Korg MS10/MS20, see below).

The GATE output of the MCV4 is connected to Gate or trigger input of the synthesizer (labeled e.g. Gate, Trigger, Trig., S-Trig. or similiar). Please check which type of Gate/Trigger is used with your synthesizer: Voltage Trigger or S-Trigger/Switched Trigger.

Please refer to the manual of your synthesizer which types of CV control characteristics and Gate/Trigger are used and how the connectors are wired.

E.g. the Mini Moog uses a very unique connector for the S-Trigger input. You will have problems to find this type of connector today. You could solve the problem by replacing the unique connector by a 1/4" jack socket.

E.g. if you want to control a MOOG Rogue or MOOG Source with the MCV4 pay attention to the unusual assignement of the Moog jack sockets! You have to use stereo jack plugs on the Moog side in this special case (Rogue/Source CV socket: ring = CV Input / Rogue/Source GATE socket: ring = voltage trigger input or tip = s-trigger input). You may find details in the user's guide of your synthesizer.

E.g. many Roland synthesizers use 3.5mm miniature jack sockets. Here you need special cables or adapters with 1/4" jack plugs on one side (MCV4 side) and 3.5mm jack plugs on the other (synthesizer side).

The Korg Synthesizers MS10 and MS20 e.g. are equipped with an external control input labeled "TOTAL" that can be adjusted to 1V/Octave with the control knob labeled "MG/T.EXT.". Using this input the MS10/MS20 can be controlled with 1V/Oct. control voltages.

The factory adjustment of the **CV1 output** is 1.00V/Octave. The voltage range of the CV1 output is 0...+5V, i.e. 5 octaves.To change or re-adjust the scale you have to open the MCV4 case and adjust the scale with the trimming potentiometer located behind the power supply connector to the desired value. Incoming MIDI pitch bend events affect the CV1 voltage. The maximum pitch bend voltage travel is +/-1 V corresponding to +/-1 octave. You have to pay a little attention when using the pitch bend function. If you play a note on your keyboard which corresponds to a CV voltage below +1 V or above +4 V not the entire pitch travel is available as the possible output voltage ranges only from 0 to +5V. If you want to use the pitch bend function you should play in the mid range to have enough voltage travel for the pitch bend function.

The **CV2 output** is controlled via (monophonic) After Touch messages on the MIDI channel of the MCV4. The voltage range is about 0...+5V.

The **CV3 output** is controlled via Volume messages (= Ctrl. #7) on the MIDI channel of the MCV4. The voltage range is about 0...+5V. It is possible to tie up the CV3 additionally with velocity (see chapter *Operation* for details).

The **CV4 output** is controlled via any MIDI controller on the MIDI channel of the MCV4. The voltage range is about 0...+5V. It is possible to tie up the CV4 additionally with velocity (see chapter *Operation* for details).

The factory setting for the **GATE output** is +5V voltage gate. If you want to change the setting you have to open the MCV4 case. Before opening the case disconnect the MCV4 from the AC adapter and remove all connections. Open the case of the MCV4 by removing the 4 screws using a suitable tool. Inside you see the pc board with a jumper located near the Gate jack socket. The jumper can be set in one of 3 different ways:

- +5V Voltage Gate: jumper set away from the pc board edge (factory setting)
- +U Voltage Gate: jumper set to the pc board edge
- S-Trigger: jumper removed (e.g. for most of the Moog synthesizers)

To select S-trigger you have to remove the jumper. +U means that the gate voltage is equal to the output voltage of the AC adapter used. As the admitted voltage range of the AC adapter is +7...+12V the gate voltage has the same range when the jumper is set to +U. E.g. if your synthesizer requires a gate voltage of +10 V or more you should use the +U setting of the jumper and an AC adapter with about 12V output voltage.
Which type of CV characteristics and Gate is required for your synthesizer you may find in the manual of your synthesizer.

Pay attention if you open and close the MCV4 case (e.g. for adjusting the scale or changing the Gate/Trigger setting). Use only a suitable screw driver and open/close the case very carefully.. We cannot take back units if the case or LEDs or the switch are damaged and the warranty will be lost during such manipulations. If you are not sure whether your are able to do the modification send the unit to your local dealer or to Doepfer Musikelektronik, Graefelfing (Germany).

OPERATION

When using an external power supply the MCV4 is SWITCHED ON

The MCV4 is SWITCHED ON by plugging the AC adapter into a wall outlet and connecting it to the power supply jack labeled "9V DC" of the MCV4. There is no separate ON/OFF switch. After power on the LED on the MCV4 will light up for a short time. Otherwise the AC adapter used is not suitable or does not work.

The external power supply (AC adapter) is NOT included with the MCV4 and must be purchased locally by the user. We recommend an VDE approved AC adapter but MCV4 will work with every AC adapter being in accordance with the following specifications. The adapter must be able to deliver 7-12 V DC unstabilized or stabilized voltage, as well as a minimum current of 100 mA. The POLARITY of the low voltage plug connected to the MCV4 must be pin = +7...12V and ring = GND (see sketch on the MCV4 housing). If the polarity is incorrect, MCV4 will not function. However, there is no danger of damage to the circuitry since it is protected by a diode. If the MCV4 is used in Germany the external power supply must be VDE approved.

In the normal mode (i.e. not in the learn mode) the LED displays the state of the Gate output. You may use the LED to control the correct MCV4 function without having a synthesizer connected to the MCV4.

When turning on the MCV4 the last configuration before the unit was turned off is called up, i.e. the parameters for MIDI channel, reference note, gate polarity, retrigger and so on.

To adjust the MCV4 parameters (like MIDI channel or gate polarity) you have to enter the MCV4 *learn mode* and send the regarding MIDI messages to the MCV4 from your MIDI controlling while the MCV4 is in learn mode. To enter the learn mode one has to press the learn button and hold it pressed down for about one second. The one-second-delay was programmed to prevent the unintentional release of the learn mode. Whenever the LED is flashing without incoming MIDI messages the learn mode is active. In this mode the MCV4 is looking forward to an incoming MIDI note on, program change or controller event (see table

below). If you have entered the learn mode by mistake you can leave it by pressing the learn button again. The learn mode will also be terminated if one of the MIDI events in the table below is received.

While the MCV4 is in learn mode the following parameters can be adjusted via incoming MIDI messages:

Function	MIDI message	Rem	Comment
MIDI channel/reference for CV1=0V	Note on	(1)	
CV3 velocity off	Program Change #1	(2)	CV3=volume
CV3 velocity on	Program Change #2	(2)	CV3=volume*velocity
CV4 velocity off	Program Change #3	(2)	CV4=Ctr.#X
CV4 velocity on	Program Change #4	(2)	CV4=Ctr.#X*velocity
Retrigger: off	Program Change #5	(3)	
Retrigger: on	Program Change #6	(3)	
Trigger polarity: normal	Program Change #7	(4)	
Trigger polarity: invertet	Program Change #8	(4)	
CV3 velocity mode 127 steps	Program Change #11	(5)	velocity resolution 0-127
CV3 velocity mode 2 steps	Program Change #12	(5)	velocity 2 steps (</>100)
CV4 velocity mode 127 steps	Program Change #13	(5)	velocity resolution 0-127
CV4 velocity mode 2 steps	Program Change #14	(5)	velocity 2 steps (</>100)
Key assign mode: highest note	Program Change #15	(6)	
Key assign mode: last note	Program Change #16	(6)	
Key assign mode: reference note	Program Change #17	(6)	
Key assign mode: stack note	Program Change #18	(6)	
Characteristics: V/Octave	Program Change #19	(7)	
Characteristics: Hz/V	Program Change #20	(7)	
Controller for CV4	any MIDI-Controller(except Bank-Controller 0/32)	(8)	

The factory setting of all parameters is described on page 6.

Whenever the MCV4 receives one of the MIDI messages listed in the table above the parameter in question is changed and the MCV4 returns to the normal play mode, i.e. the LED stops flashing. Pay attention that not unintentional MIDI messages appear while beeing in the learn mode (e.g. from a sequencer) as you change the settings of the MCV4 with such MIDI messages. All parameter changes made while beeing in the learn mode are stored non volatile in the MCV4 parameter memory. When the MCV4 is turned on next time the parameter settings are taken from this memory.

Remarks

 (1) MIDI channel/reference for CV1=0V
In case of an incoming note event in the learn mode the note number and the channel of the event are taken over as the new REFERENCE NOTE and MIDI CHANNEL of the MCV4. The reference note is the MIDI note number that belongs to 0V CV1 output. In practice you simply enter the learn mode and press the key on your MIDI keyboard that should belong to 0V CV1. MIDI note events below the reference note or more than 5 octaves above the reference note are ignored as the CV1 voltage range of the MCV4 is 0...+5V. The factory default settings of reference note and MIDI channel are 36 (C) and 1.

 (2)...(6)
For the setting of these parameters **MIDI Program Change** messages coming from your MIDI device are used. Normally you will have to press the program change keys on your MIDI keyboard or MIDI synthesizer while beeing in the learn mode. Pay attention that some manufacturers count the MIDI program change numbers from 0....127 rather than 1...128 as usual and defined in the MIDI standard. If the lowest program change number you can send with your MIDI device is 0 (zero) you have to subtract 1 from the program change numbers in

the table above as in this case the program changes of your device range from 0...127 instead of 1...128. For some devices (especially software sequencers) the type of program change numbering can be selected. In this case you should use the 1...128 range to agree with the numbers in the table above.

The program change messages must be sent on the MCV4 MIDI channel (see remark 1).

(2) Velocity on/off

These program change messages are used to select whether the note on velocity affects the control voltages CV3 resp. CV4. If velocity is "off" only volume (CV3) resp. the free chosen controller (CV4) is used to generate the control voltage. If velocity is "on" the volume or controller value is multiplied with the note on velocity, i.e. the CV value changes with every new note event as the velocity of the note event is used to calculate the control voltage together the volume message (CV3) resp. the free controller (CV4).

(3) Retrigger on/off

With this parameter you may select whether a new gate/trigger pulse is generated when playing LEGATO (i.e. playing a new note on the keyboard while the key of the former note is still pressed). The factory default setting is retrigger off. Additionally the MIDI controllers LEGATO (controller #68) and SUSTAIN (controller #64) affect the gate output in the usual manner.

(4) Trigger polarity

If voltage gate is selected with the jumper inside the MCV4 you may switch between normal gate (i.e. +5V/+U if key is pressed and 0V if key is released) and inverted gate (i.e. 0V if key is pressed and +5V/+U if key is released). In case of S-Trigger (jumper removed) the circumstances are reverse. If the behaviour of your synthesizer is opposite as desired (i.e. the sound appears if the key is released on your MIDI keyboard) you have to change this parameter with program change #7 or #8 in the learn mode. The factory default setting is normal gate.

(5) Velocity mode

This parameter defines whether the velocity resolution 127 steps (as in MIDI usual) or only 2 steps. The 2-step-mode is similiar to the *accent* used in some vintage equipment (e.g. TB303, TR808) and could make sense to simulate one of these devices.

The velocity threshold value is 100: incoming velocity values of 100 or more are converted into a fixed velocity value 127, incoming velocity values less than 100 are converted into a fixed velocity value 64.

(6) CV1 key assign modes

These program change messages adjust the type of assign modes for CV1. If *highest note* is selected the highest key pressed on the MIDI keyboard is used to calculated CV1 if more than one key is pressed down. In the *last note* mode always the last note (chronological) is taken for CV1. *Reference note* means that only the reference note is accepted. This feature is useful if you want to trigger different devices on the same MIDI channel using two or more MCV4. In this case you have to set the reference notes for the MCV4's to different values. *Stack note* means that the MCV4 is filtering out the note event that is used by the MCV4 to generate CV1. The note event in question is not transmitted to the MIDI Thru output. Stack mode is used to control more than one synthesizer on one MIDI channel and enables polyphonic control of different synthesizers on the same MIDI channel.

(7) CV Characteristics

With programm change #19 and #20 in learn mode you may select between V/Octave and Hz/V characteristics for the CV1 output.

V/Octave is used by most of the synthesizer manufacturers (Moog, ARP, Oberheim, roland, Sequential Circuits, EMS, Doepfer). When V/Octave is chosen incoming MIDI pitch bend events affect the CV1 voltage. If Hz/V is selected incoming MIDI pitch bend events do not affect the CV 1 putput. Because of the non linear voltage range mode the resolution is very poor in the lower voltage range compared to the V/Octave. So the Hz/V mode should be

selected only if there is no other solution. The Korg synthesizer MS20 (MS10) e.g. are equipped with external control inputs taht can be adjusted to V/Octave with the control knob. (Input: TOTAL, (FREQ) knob:, MG/T.EXT, (EG1/EXT)).
Using this input(s) we obtained much better results than with the Hz/V control inputs.
Also the MS20/10 has inverted trigger, so you had to switch to inverte trigger with program change #8.

(8) Controller for CV4
If the MCV4 receives a MIDI controller message (except bank controller 0 & 32) while being in the learn mode the controller no. of these message defines the controller no. for CV4. I.e. the CV4 output of the MCV4 corresponds from now on to these controller no. The controller message must be sent on the MCV4 MIDI channel (see remark 1).

Temporary parameter changes

The program change messages listed in the table can be used to change the settings only temporary. This means that the changes are not stored in the parameter memory. If the MCV4 is turned off and on the previous parameter settings are called up again. This procedure may be used to try out different settings without storing them into the memory or to change the settings temporary from a sequencer (e.g. retrigger on/off, assign mode change).

The program change messages must be sent on the MCV4 MIDI channel (see remark 1).

Resetting the device

To obtain the factory settings for all parameters one has to reset the device. This might be useful if you e.g. do not remember the last parameter settings (e.g. MIDI channel, reference note, controller # for CV4, key assign mode, CV1 characteristics) or if they are misadjusted wrongly. If your MCV4 seems to behave strange and you do not know how to solve the problem resetting the device may help as the values of all parameters are known after the reset. To reset the device one has to operate the learn button while the power supply is plugged in. The LED will turn on and one has to keep down the button a few seconds until the LED starts to flash. Operating the button once again leads to the normal operation mode and the LED will turn off.

After the reset the MCV4 parameters are set to these values:

- MIDI channel 1
- reference note 36 (i.e. the lowest "c" on a standard 5-octave keyboard)
- trigger polarity: normal (non-inverted)
- retrigger: off
- CV3: volume (controller #7)
- CV4: modulation (controller #1)
- CV1 characteristics: V/octave
- key assign mode: highest note

These values are identical to the factory settings.