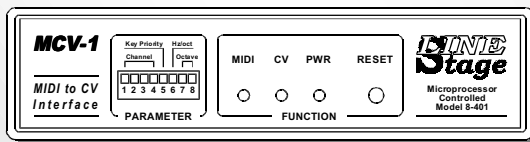


# M C V - 1

## MIDI to CV/Trig Converter

Model 8-401  
Ver. 2.1



## OWNER'S MANUAL





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### 1. DEVICE DESCRIPTION

MCV-1 enables older monophonic analog synthesizers to be connected to MIDI systems as well as to new digital synthesizers and samplers. MCV-1 enables to control their basic functions via MIDI commands, although MIDI specification did not exist at the time of these analog synthesizers design and thus they don't have direct input and output for MIDI bus.

The device converts MIDI commands "Note On", "Note Off" and some others to control voltage signal (CV) and trigger signal (Trigger, Gate) for controlling VCO analogue synthesizers. Several variants of control signals are available so it is possible to control all types of monophonic analogue synthesizers (Moog, ARP, Roland, Yamaha and others) by proper parameter settings.

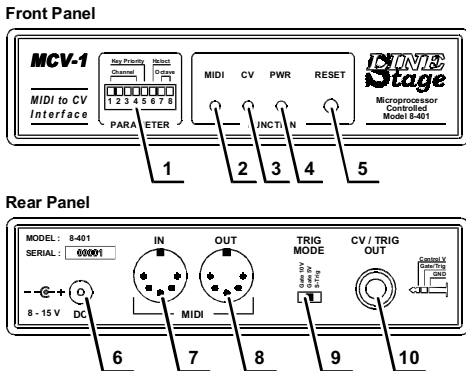
MCV-1 has internal software generator for "vibrato" function creation, special CV output for controlling the LFO of analogue synthesizer is not needed. It is also possible to bend the VCO of analogue synthesizer via MIDI command "Pitch Wheel". MCV-1 enables usage of functions that are not available directly from the synths keyboards - ie. key priority selection, Legato function etc.

Standard MIDI channel commands or System Exclusive Messages can be used for MIDI bus communication (MIDI communication channel can be chosen freely).

### 1.1. CONTROLLERS AND INDICATORS, CONNECTORS

Connectors are placed on rear panel of the device, indicator LEDs are placed on front panel of the device and manual controllers are placed on both panels. Placement of all controllers, indicators and connectors is illustrated on fig. 1:

Fig. 1 - Panels of MCV-1



1. Parameter selection
2. MIDI bus activity indicator
3. Trigger output activity indicator
4. Power-on status indicator
5. Reset button
6. External supply adapter
7. Input MIDI-IN
8. Output MIDI-OUT
9. Trigger mode selection
10. Combined CV / Trig output

### 1.2. DEVICE FUNCTION

Block function diagram of MCV-1 is illustrated on fig. 2. Signal from MIDI bus coming to input MIDI-IN [7] is isolated by optocoupler and brought to CPU. CPU selects data for MCV-1 and controls 12-bit DA converter and trigger switch according to parameter settings.

MCV-1 operates in one direction only - MIDI commands are converted to CV / Trig signals. Output MIDI-OUT [8] is set only for SysEx communication of MCV-1 with host system. No



information from analogue synthesizer (which is connected to CV/TRIG-OUT [10]) is transferred to output MIDI-OUT [8]!

## 2. INSTALLATION OF DEVICE

### 2.1. CONNECTION TO MIDI SYSTEM

MCV-1 is connected to MIDI buses via standard MIDI cables. Data from host system are brought to input MIDI-IN [7]; output data are available on output MIDI-OUT [8]. It is not needed to connect output MIDI-OUT [8] if you don't want to retroactively read the values of parameters from MCV-1 (SysEx Data Save).

Fig. 2 - Functional block diagram

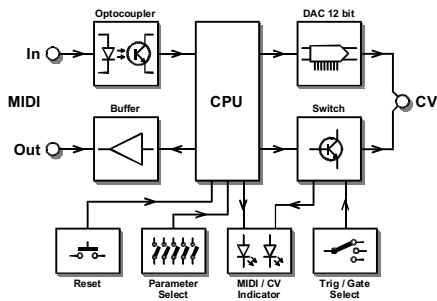
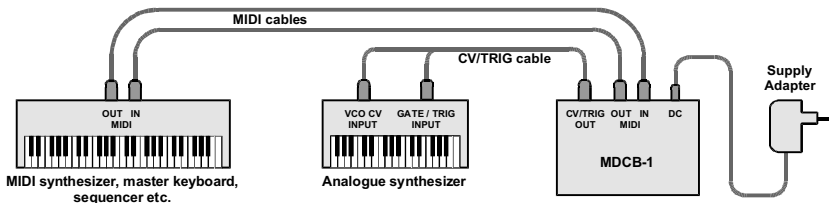


Fig. 3 - Typical using

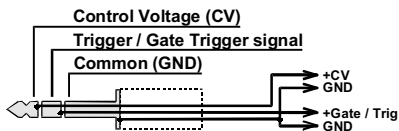


### 2.2. CONNECTION TO ANALOGUE SYNTHESIZER

MCV-1 is connected to analogue synthesizer via CV/TRIG-OUT [10] connector. Connector is stereo Jack 1/4" (6,3 mm). Both control voltage (CV) and trigger ("Trigger", "Gate") signals are available on this connector, diagram of the connector is illustrated on fig. 4 (it is also illustrated on the rear panel of the device).

Control voltage (CV) and "Gate" signals are always positive polarity in relation to common ground. In case of "Trigger" signal being used, it is switched to common ground.

Fig. 4 - Connection of CV / TRIG output

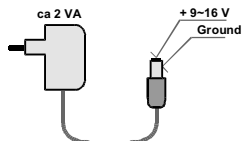


### 2.3. CONNECTION TO POWER SUPPLY

MCV-1 is powered from external DC power supply (e.g. the power network adapter) connected to the DC [6] connector. This connector is of standard design (diameter of central pin is 2.1 mm). External DC adapter must be able to continuously supply current up to approximately 120 mA, allowed range of power supply voltage is 9 to 16 volts.

Connector of adapter must have positive polarity on middle pin and negative polarity on jacket (see fig. 5). Polarity is illustrated on the rear panel of the device. MCV-1 has built-in protection from supply voltage polarity reversal. If this happens, the device will not function, but won't be damaged in any way.

Fig. 5 - Supply adapter



### 3. ATTENDANCE OF DEVICE

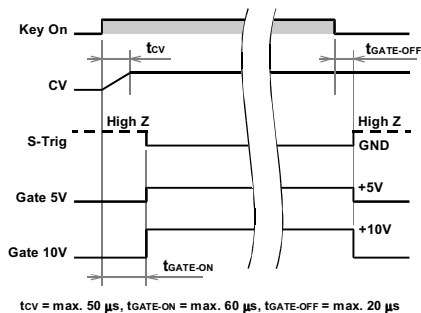
#### 3.1. TRIGGER MODE SELECTION

MCV-1 enables selection of one of three types of trigger signals for analogue synthesizer. Type of signal is selected by three-position slider selector TRIG MODE [9] on rear panel. Attention: follow the specifications of your analogue synthesizer – specific trigger signals have very diverse characteristics and your synthesizer or MCV-1 could be damaged, in case of incorrect trigger signal selection.

All trigger signals courses and their timings are illustrated on fig. 6.

- S-Trig** (right position of TRIG MODE [9] selector) - output with open collector. Non-active output is in high-impedance state, active output is connected to GND.
- Gate 5V** Gate 5V (center position of TRIG MODE [9] selector, is sometimes also called "V-Trig") - voltage signal with positive logic (on = 1, off = 0); voltage level of logical zero is 0V, voltage level of logical one is +5V, in relation towards GND.
- Gate 10V** Gate 10V (left position of TRIG MODE [9] selector) - same as in previous case, but the level of logical one is +10V.

Fig. 6 - Control Voltage and Trigger / Gate output signals



#### 3.2. INITIALIZATION SEQUENCE

Initialization sequence (hardware reset) automatically starts after connecting the device to power supply voltage. Also, hardware reset can be initialized manually by pressing RESET [5] button or by system MIDI command System reset (FFh).

During the initialization sequence, all MCV-1 functions are put into primary still states and internal caching data buffers are cleared. At the same time, actual state of system switch



PARAMETER [1] is read and all other parameters are reset to initial values, described in chapter 4. Voltage corresponding to the basic tone of analogue synthesizer (0 V for "V/Octave" curve or 0,3125 V for "V/Hz" curve) is sent to CV/TRIG-OUT [10] output and the trigger signal is turned off.

Manual initialization can be used for requested changes in parameter settings via PARAMETER [1] switch during performance (without supply voltage disconnecting) or in case of software system crash (when some tones "hang" etc.). Reset is similar to the "Panic" function known from MIDI keyboards, but it is not exact equivalent of this function.

### **3.3. EQUIPMENT OPERATING STATUS INDICATION**

Device operating statuses are indicated by three light-emitting diodes (LEDs) on front panel:

- a) Connection to supply voltage (i.e. the ON state) is indicated by permanent light of red LED PWR [1].
- b) Yellow LED CV [3] indicates the activity of CV/TRIG-OUT [10]. LED is lit during the VCO of analogue synthesizer being active - when the "Gate" signal is in high logical level or when the "S-Trig" signal is on GND level.
- c) In case of MIDI input or MIDI output bus being active, green LED MIDI [2] is shortly blinking. If data flow is denser (data is transferred frequently than every approximately 100 ms), it can be permanently on. Only MIDI commands implemented in MCV-1 are indicated on input. For example: commands like "Key / Channel Aftertouch", data belonging to different MIDI channels (other than the device is set for), SysEx commands set for other device etc., are not indicated.

### **4. PARAMETERS**

Parameters settings determine how MCV-1 works during MIDI data processing. Several basic parameters settings are set via eightfold switch PARAMETER [1]. Other parameters can be set by MIDI bus via Control Changes or SysEx Messages.

State of PARAMETER [1] switch is read always immediately after device reset (see above). Changes in settings of PARAMETER [1] switch during operation of device have no effect whatsoever on MCV-1 functionality. It is necessary to confirm these changes by pressing RESET [5] button or disconnecting and then reconnecting external power supply into DC [6] connector.

ATTENTION! Resetting also changes all parameters available only by Control Changes and SysEx Messages to their respective initial values. Therefore, these settings need to be reestablished after resetting the device.

Parameters, which can be set by several ways, are always kept at the last setting made, regardless of by which mean the setting was made.

Valid values of all parameters can be found out during operation of the device by SysEx Messages "Data Request", MCV-1 then returns these values as SysEx Messages "Data Save / Load".

#### **4.1. MIDI CHANNEL SETTINGS AND "DEVICE ID" SETTING**

MIDI channel, used by MCV-1 for receiving channel signals, is set by sections 1 to 4 ("Channel") of PARAMETER [1] switch. Chosen MIDI channel number is at the same time used as device identification number (Device ID) for SysEx communication.

The procedure of setting is shown in Table 1.

The setting of current MIDI channel is made exclusively this way. This setting cannot be changed by MIDI commands!



Table 1. - MIDI channel and Device ID setting									
Touchpart of switch [1]				MIDI chnl (Device ID)	Touchpart of switch [1]				MIDI chnl (Device ID)
1	2	3	4		1	2	3	4	
off	off	off	off	1 (00h)	off	off	off	on	9 (08h)
on	off	off	off	2 (01h)	on	off	off	on	10 (09h)
off	on	off	off	3 (02h)	off	on	off	on	11 (0Ah)
on	on	off	off	4 (03h)	on	on	off	on	12 (0Bh)
off	off	on	off	5 (04h)	off	off	on	on	13 (0Ch)
on	off	on	off	6 (05h)	on	off	on	on	14 (0Dh)
off	on	on	off	7 (06h)	off	on	on	on	15 (0Eh)
on	on	on	off	8 (07h)	on	on	on	on	16 (0Fh)

off = touchpart in upper position, on = touchpart in lower position

## 4.2. CONTROL VOLTAGE CURVE SELECTION (CV Curve parameter)

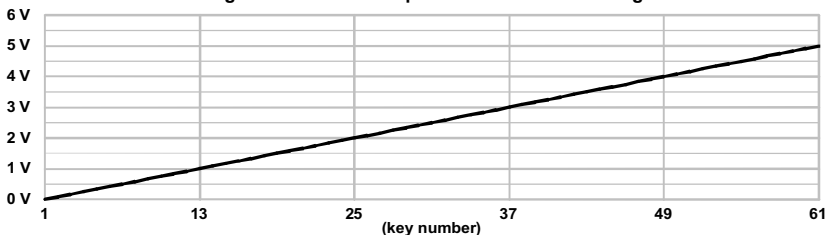
By this parameter, the dependence of control voltage on the requested tone of VCO of analogue synthesizer can be selected. It is possible to select linear curve (named "V/Octave") or exponential curve (named "V/Hz") of control voltage. Both curves are illustrated in diagrams on fig. 7. Relative key position is on horizontal axis of diagrams (1 is the basic tone of VCO of analogue synthesizer); control voltage is on vertical axis of diagrams. Range of diagrams corresponds to five-octave range of keyboard of analogue synthesizer.

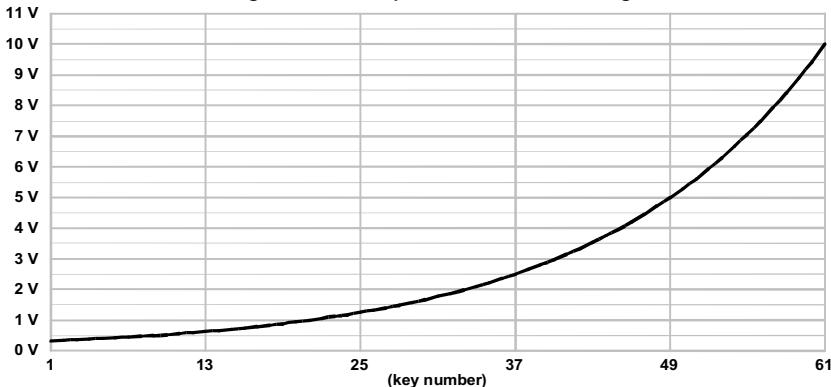
Value of this parameter can be set in these ways:

- By section 6 (Hz/oct) of PARAMETER [1] switch - if the fingerboard switch of section switch is in upper position (ie. off), the curve "V/Octave" (linear dependency) is set; if the fingerboard switch of section switch is in lower position (ie. on), the curve "V/Hz" (exponential dependency) is set.
- By Control Change no. 79 - see chapter 5.
- By SysEx Message - see chapter 6.

After MCV-1 reset, the value according to section 6 of PARAMETER [1] switch is set.

**Fig. 7a - "V/octave" dependence of control voltage**



**Fig. 7b - "V/Hz" dependence of control voltage****4.3. OCTAVE TRANSPOSE (Octave Shift parameter)**

By this parameter, the tone range (keyboard) of analogue synthesizer can be shifted on values scale of MIDI commands "Note On" in the range of minus two octaves to plus one octave. If there is no shift chosen, the lowest key and the lowest tone of analogue synthesizer corresponds to MIDI key number 36, at -2 octave transpose it corresponds to MIDI key number 12 etc. The effect of parameter is illustrated on fig. 8.

The value can be set in these ways:

- By sections 7 and 8 (Octave) of PARAMETER [1] switch - the switch setting for required shift is shown on table 2.
- By Control Change no. 81 - see chapter 5.
- By SysEx Message - see chapter 6.

After MCV-1 reset, the value according to section 7 and 8 of PARAMETER [1] switch is always set.

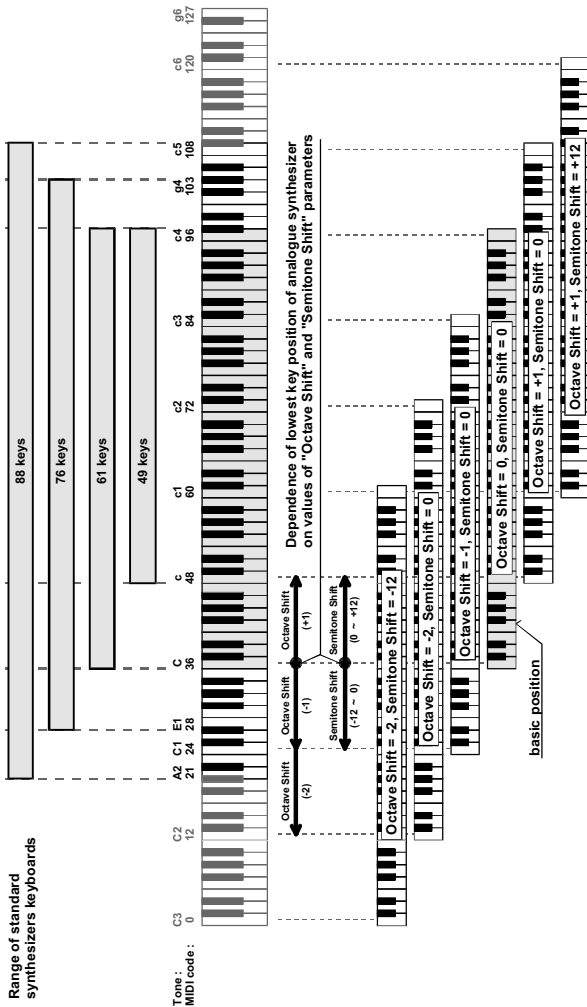
Table 2. - Octave transpose			
Touchpart of switch [1]		Shift of basic tone	Number of lowest MIDI note
7	8		
off	off	-2 octaves	12 (0Ch)
on	off	-1 octave	24 (18h)
off	on	no shift	36 (24h)
on	on	+1 octave	48 (30h)
<b>off = touchpart in upper position on = touchpart in lower position</b>			

**4.4. SEMITONE TRANSPOSE (Semitone Shift parameter)**

By this parameter, the tone range (keyboard) of analogue synthesizer can be shifted on values scale of MIDI commands "Note On" in the range of minus twelve semitones to plus twelve semitones. Semitone shift is added to octave shift. For example: if octave transpose -2 is chosen and at the same time semitone transpose -12 is chosen, the final shift is  $(-2 \times 12) - 12 = -36$  semitones, that is three octave down shift. In this case, the lowest key of analogue synthesizer corresponds to MIDI key number 0. The effect of parameter is illustrated on fig. 8.



Fig. 8 - Examples of "MIDI Note" number and analogue synthesizer VCO range relation



The value of parameter can be set in these ways:

- By Control Change no. 82 - see chapter 5.
- By SysEx Message - see chapter 6.

After MCV-1 reset, the parameter value is always set to 64, semitone transpose does not apply.

### 4.5. KEYBOARD RANGE SELECTION (Key Range parameter)

The parameter value should correspond to keyboard range of analogue synthesizer, or to the maximal tone range of VCO of analogue synthesizer respectively (see appendix A). MIDI notes below or above this range are then ignored and they do not load the VCO of synthesizer. Valid range of parameter value is 1 to 61 (1 to 61 keys - five octaves).

The value of parameter can be set in these ways:

- By Control Change no. 83 - see chapter 5.
- By SysEx Message - see chapter 6.

After MCV-1 reset, the parameter value is always set to 61 (maximum value).

### 4.6. KEY PRIORITY SELECTION (Key Priority parameter)

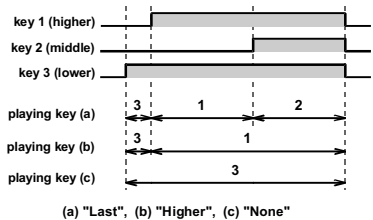
This parameter controls MCV-1 function during conversion of commands "Note On" of multi-voice part to single-voice mode of analogue synthesizer. Following priorities can be selected: priority of last-pressed keys (Last Key), priority of key corresponding to higher tone (Higher Key). The priority can be also disabled (None), which means that in case the VCO of analogue synthesizer being already active, all subsequent commands "Note On" will be ignored. The dependence between "Key Priority" setting and the function of analogue synthesizer is illustrated on fig. 9.

Parameter value can be set in these ways:

- By section 5 (Key Priority) of PARAMETER [1] switch - if the fingerboard switch of section switch is in upper position (ie. off), key priority is set to last-pressed keys (Last Key); if the fingerboard switch of section switch is in lower position (ie. on), key priority is set to keys belonging to higher tones (Higher Key). Disabling the priority (None) cannot be done by PARAMETER [1] switch!
- By Control Change no. 80 - see chapter 5.
- By SysEx Message - see chapter 6.

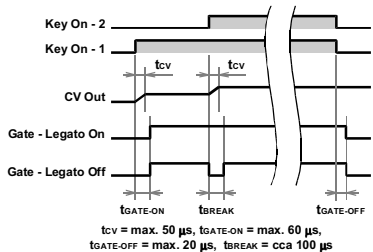
After MCV-1 reset, the value according to section 5 of PARAMETER [1] switch is always set.

Fig. 9 - Key priority



(a) "Last", (b) "Higher", (c) "None"

Fig. 10 - Trigger / Gate signal affected by "Legato" parameter value



tcv = max. 50  $\mu$ s, tGATE-ON = max. 60  $\mu$ s,  
tGATE-OFF = max. 20  $\mu$ s, tBREAK = cca 100  $\mu$ s



#### **4.7. TRIGGER METHOD SELECTION (Legato Enable parameter)**

This parameter is applied commonly with the previous parameter (Key Priority) if more keys are pressed at once. If the parameter is active, only the control voltage on CV output is changed and the trigger signal stays active continuously when the key with higher priority is pressed (before the previous key is released). This means that the VCO tone frequency is changed without envelope generator retrigger - the sound color stays unaffected (on EG-Sustain level for example).

Activation of this parameter enables to play "Legato". Signal timing on CV/TRIG-OUT output in dependence on parameter setting are illustrated on fig. 10.

Parameter can be set in these ways:

- a) By Control Change no. 68 - see chapter 5.
- b) By SysEx Message - see chapter 6.

After MCV-1 reset, the parameter value is always set to 0 (off).

#### **4.8. BREAK PULSE WIDTH SETTING (Legato Break parameter)**

By this parameter, the width of tBREAK pulse for envelope generator (EG) of analogue synthesizer can be set - see fig. 10. Parameter is used only if non-legato play mode is set (Legato Enable parameter must be off). The width of break pulse can be changed from 140 ms to 640 ms, which corresponds to values of parameter in range from 0 to 127.

It is impossible to give any general instructions for break pulse width settings. Pulse width must be selected individually for each of analogue synthesizers, so that EG of synthesizer works reliably.

Parameter value can be set in these ways:

- a) By Control Change no. 74 - see chapter 5.
- b) By SysEx Message - see chapter 6.

After MCV-1 reset, the parameter value is always set to 49 - this corresponds to 330 ms pulse width.

#### **4.9. PITCH BEND RANGE SETTING (Pitch Sensitivity parameter)**

This parameter sets maximal range of VCO frequency bend by MIDI command "Pitch Wheel". Valid range is 0 to 12, which corresponds to  $\pm 0$  to  $\pm 12$  semitones frequency bend in marginal positions of "Pitch Wheel" controller. The step of frequency change is 12,5 cents. MCV-1 automatically jumps one octave up or down in case of available tone range of VCO of analogue synthesizer being overflowed - this happens when chosen control voltage is out of selected range (0 to 5 V or 0,3125 to 10 V respectively).

Parameter value can be set in these ways:

- a) By Control Change no. 78 - see chapter 5.
- b) By SysEx Message - see chapter 6.

After MCV-1 reset, the parameter value is always set to 12 - this corresponds to maximum available bend ( $\pm 12$  semitones).

#### **4.10. MODULATION RATE SETTING (Modulation Rate parameter)**

By this parameter, the frequency of internal LFO for vibrato effect can be set. The value of parameter can be in range from 0 to 127, this range corresponds to LFO frequencies described in table 3.





#### 4.13. MUTING (Mute parameter)

By activating this parameter, the VCO of analogue synthesizer is immediately silenced. "Note On/Off" commands are normally received, but their data are not being passed onto CV/TRIG-OUT output and are stored in internal buffers of MCV-1. By deactivating this parameter, the data transmission is freed and data from "Note On/Off" commands are being sent normally onto CV/TRIG-OUT output.

Parameter value can be set in these ways:

- a) By Control Change no. 119 - see chapter 5.
- b) By SysEx Message - see chapter 6.

After MCV-1 reset, muting is always disabled - analogue synthesizer plays normally.

### 5. MIDI IMPLEMENTATION

#### 5.1. CHANNEL COMMANDS

MCV-1 recognizes channel MIDI commands "Note Off", "Note On", "Control Change" and "Pitch Wheel". These work while fully respecting regime of ongoing status byte (Running Status).

##### Note On/Off

While receiving "Note Off" and "Note On" commands from MIDI, only the "note" number (Note No.) is accepted, velocity sensitivity is ignored. For VCO of analogue synthesizer activating, incoming note number (including any Octave Shift and Semitone Shift parameters) must be inside valid range according to value of Key Range parameter.

##### Control Changes

MBCB-1 recognizes normalized controllers no. 1, 64, 68, 119, 120, and 123 and besides these, it has defined several of its own - no. 74 to 83.

##### - Modulation (No. 1)

Input value of controller (its second databyte) determines relative modulation depth of vibrato effect in relation to maximum available value given by "Modulation Depth" parameter. Vibrato effect is turned off if the value of controller is 0; if the value is 64, half modulation depth (in relation to maximum possible) is used; if the value is 127, full modulation depth is used.

##### - Hold (No. 64)

Controller works normally - holds VCO of analogue synthesizer in active state during the time period of continuance of "Hold" command. Input values (second databyte) 64 to 127 are processed as controller switch-on, values 0 to 63 are processed as controller switch-off.

##### - Legato (No. 68)

Controller works normally - in case of its activation, the tone height (frequency) of VCO is changed without envelope generators (EG) retrigger (see Legato parameter description). Input values (second databyte) 64 to 127 are processed as controller switch-on, values 0 to 63 are processed as controller switch-off.



- Legato Break (No. 74)

Input value (second databyte) controls width of break pulse in case of Legato parameter being off (see Legato Break parameter description). Controller value is equivalent to value of Legato Break parameter.

- Fine Tune (No. 75)

Input value (second databyte) of controller determines the shift of base CV curve (see Fine Tune parameter description). Controller value is equivalent to value of Fine Tune parameter.

- Modulation Rate (No. 76)

Input value (second databyte) of controller determines the frequency of internal LFO for vibrato effect (see Modulation Rate parameter description). The relation between Controller value and LFO frequency is described in table 3.

- Modulation Depth (No. 77)

Input value (second databyte) of controller determines maximal allowed modulation depth of vibrato effect; fine tuning of modulation depth is done by controller no. 1 (see Modulation Depth parameter description). Vibrato effect is off if the value of controller is 0. Values 1 to 4 determine maximum double amplitude  $\pm 1$  to  $\pm 4$  semitones. Values higher than 4 are processed as 4.

- Pitch Sensitivity (No. 78)

Input value (second databyte) of controller determines maximum allowed range of double amplitude of VCO bend if MIDI command "Pitch Wheel" is used (see Pitch Sensitivity parameter description). The command "Pitch Wheel" is ignored, if the value of controller is 0. Values 1 to 12 determine maximum double amplitude of VCO bend  $\pm 1$  to  $\pm 12$  semitones. Values higher than 12 are processed as 12.

- CV Curve (No. 79)

Controller enables to change the curve of control voltage in relation to desired height of VCO tone (see CV Curve parameter description). Input values (second databyte) 0 to 63 select linear dependence of CV ("V/Octave"), values 64 to 127 select exponential dependence of CV ("V/Hz").

- Key Priority (No. 80)

Controller determines the priority of "Note On" commands. If the value on input (second databyte) is in the range of 0 to 41, the last-pressed key (Last Key) has higher priority. If the value on input is in the range of 42 to 85, key belonging to higher tone (Higher Key) has higher priority. If the value on input is in the range of 86 to 127, priority is disabled (None). That is, if VCO of analogue synthesizer is already active, subsequent "Note On" commands are ignored.

- Octave Shift (No. 81)

Controller value (second databyte) on input is offset-determined. Zero-shift corresponds to value 64. Value 65 shifts keyboard and sounding range of analogue synthesizer one octave higher. Values 63 and 62 shift keyboard and sounding range of analogue synthesizer one and two octaves lower, respectively. Other values are processed as 64 - without octave shift. Controller function is illustrated on fig. 8.



## - Semitone Shift (No. 82)

The function of controller is similar to function of "Octave Shift" controller, but this controller shifts keyboard of analogue synthesizer only by semitones. Its value (second databyte) on input is also offset-determined. Zero-shift corresponds to value of 64. Values 65 to 76 shift keyboard and sounding range of analogue synthesizer by one to twelve semitones higher. Values 63 to 52 shift keyboard and sounding range of analogue synthesizer by one to twelve semitones lower. Other values are processed as 64 - without octave shift. Controller function is illustrated on fig. 8.

## - Key Range (No. 83)

Input value (second databyte) of controller determines allowed keyboard range (or VCO tone range) of analogue synthesizer (see Key Range parameter description). The values 1 to 61 can be inserted, all other values are processed as 61.

## - Mute (No. 119)

By activating this controller, that is if the value on input (second databyte) is in the range of 64 to 127, the VCO of analogue synthesizer is immediately silenced. "Note On/Off" commands are normally received, but their data are not passed onto CV/TRIG-OUT [10] output. By activating this controller with the value in the range of 0 to 63, transmission is freed and data "Note On/Off" are being normally sent to CV/TRIG-OUT [10] output.

## - All Sound Off (No. 120)

After receiving this controller (second databyte must have value of 0), the VCO of analogue synthesizer is immediately silenced, regardless of commands "Note On" or controller "Hold" being in active state.

## - All Notes Off (No. 123)

Similar to controller "All Sound Off", immediately after receiving this controller (second databyte must have value of 0), the VCO of analogue synthesizer is immediately silenced. However, this applies only if "Hold" controller is not currently active. If "Hold" controller is active, "All Notes Off" command is executed after the "Hold" command is released.

## Pitch Wheel (Pitch Bend)

This command works in standard way - it changes the frequency of current tone of VCO of analogue synthesizer. Both databytes (MSB and LSB) of command are accepted, MCV-1 operates with 14-bit value.

## 5.2. SYSTEM COMMANDS

Besides SysEx communication described below, MCV-1 knows system command "Reset" (FFh). Immediately after receiving this command, CV/TRIG-OUT [10] is turned off and software reset of device is executed.

## 6. SYSTEM EXCLUSIVE COMMUNICATION

MCV-1 allows receiving and sending of SysEx Messages. By means of SysEx Messages, it is possible to remotely set most parameters (Data Load). Some of the parameters are available only this way. It is also possible to regressively write out actual parameter values (Data Request /



Data Save). Meanings of respective parameters and their influence on device functions are explained in chapter 4. Additionally, it is possible to execute testing and service functions via SysEx Messages.

Examples of SysEx Messages are available on supplemental floppy disk.

## 6.1. DATA REQUEST

Request for current parameter value (from master keyboard, sequencer etc.) must have following format:

<b>F0h</b>	Start SysEx
<b>00h 20h 21h</b>	Manufacturer ID
<b>ii</b>	Device ID
<b>23h</b>	Model ID
<b>10h</b>	Command - REQUEST
<b>aa</b>	Address
<b>xx</b>	Checksum
<b>F7h</b>	End SysEx

**ii** : Identification number of specific MCV-1, is equal to number of valid MIDI channel. This number is set by sections 1 to 4 of PARAMETER [1] switch. Possible value is 00h to 0Fh.

**aa** : Parameter number, allowed range is 00h to 0Ch :

00h = **CV Curve** - selection of control voltage curve

01h = **Key Priority** - selection of key priority

02h = **Octave Shift** - selection of octave transpose

03h = **Semitone Shift** - selection of semitone transpose

04h = **Key Range** - selection of VCO range (number of keys) of analogue synthesizer

05h = **Mute** - analogue synthesizer silencing

06h = **Hold** - holds VCO in active state (sustain)

07h = **Legato Enable** - selection of Trigger/Gate signals

08h = **Legato Break** - break pulse width setting

09h = **Pitch Sensitivity** - allowed pitch bend range setting

0Ah = **Modulation Rate** - internal LFO rate setting

0Bh = **Modulation Depth** - selection of LFO maximum modulation depth

0Ch = **Fine Tune** - fine tuning of control voltage

**xx** : seven-bit checksum of bytes Model ID to Checksum

After error free reception of this SysEx Message, MCV-1 immediately starts to send back information about requested parameter value. If the message contains errors (such as number of parameter out of allowed bounds, invalid checksum, missing byte "End SysEx", etc.), it is ignored and its reception is not even indicated by MIDI [2] LED.

## 6.2. DATA SAVE / LOAD

This system message is either sent by MCV-1 as reply to "Data Request" request (saving value of "Save" parameter), or by sending this message back to MCV-1 ("Load"), it is possible to change value settings of requested parameters. The message always has this format:





<b>F0h</b>	Start SysEx
<b>00h 20h 21h</b>	Manufacturer ID
<b>ii</b>	Device ID
<b>23h</b>	Model ID
<b>20h</b>	Command - SAVE / LOAD
<b>aa</b>	Address
<b>dd</b>	Value
<b>xx</b>	Checksum
<b>F7h</b>	End SysEx

ii, aa, xx : have same meaning as in preceding section

dd : is the value of parameter chosen by number aa (parameter address), allowed range of values for respective parameters is:

**CV Curve** : 00h = linear dependence (V/octave), 01h = exponential dependence (V/Hz)

**Key Priority** : 00h = last key, 01h = higher key, 02h = none

**Octave Shift** : 3Eh = -2 octaves, 3Fh = -1 octave, 40h = without shift, 41h = +1 octave

**Semitone Shift** : 34h = -12 semitones ... 40h = without shift ... 4Ch = +12 semitones

**Key Range** : 01h = 1 key (basic tone only) ... 3Dh = 61 keys (five-octave keyboard)

**Mute** : 00h = off, 01h = on

**Hold** : 00h = off, 01h = on

**Legato Enable** : 00h = off, 01h = on

**Legato Break** : 00h = 0,14 ms ... 7Fh = 0,64 ms

**Pitch Sensitivity** : 00h = without bend, 01h =  $\pm 1$  semitone ... 0Ch =  $\pm 12$  semitones

**Modulation Rate** : 0,2 Hz ... 7Fh = 10 Hz (see table 3)

**Modulation Depth** : without modulation, 01h =  $\pm 1$  semitone ... 04h =  $\pm 4$  semitones

**Fine Tune** :  $\pm 0$  mV ... 7Fh =  $\pm 310$  mV

Same as in situation concerning "Data Request" command, MCV-1 does not respond to message containing any error(s). Reception of such message is not indicated by any LED.

### 6.3. SERVICE AND TESTING FUNCTIONS

These functions serve for immediate stating of internal caching data registry contents, for direct management of analogue synthesizer tone generators, etc. SysEx messages must have following format:

<b>F0h</b>	Start SysEx
<b>00h 20h 21h</b>	Manufacturer ID
<b>ii</b>	Device ID
<b>23h</b>	Model ID
<b>7Fh</b>	Command - TEST / SERVICE
<b>aa</b>	Address
<b>dd</b>	Value
<b>xx</b>	Checksum
<b>F7h</b>	End SysEx

ii, xx : have same meaning as in preceding sections



**aa** : selects type of test or function  
**dd** : are data of test or function

These functions are made specifically for service needs; their usage in normal operation is not anticipated. Testing functions description is shown in service manual.

## 7. TECHNICAL SPECIFICATIONS

### Supply

Supply voltage : external - DC 8 to 15 V  
Current power consumption : max 120 mA / 9 V, max 90 mA / 16 V  
Protection : protected against reversal of supply voltage polarity  
Supply connector : standard, diameter 6 / 2,1 mm

### Outputs

Control voltage : V / octave : 0 to 5V, linear dependence  
V / Hz : 0,3125 to 10V, exponential dependence  
Control voltage range : max 5 octaves (61 keys)  
Trigger signal : S-Trig / Gate 5V / Gate 10V  
Load impedance : CV-Out : min. 5 kOhm ( $I_{MAX} = 2$  mA)  
S-Trig :  $I_{MAX} = 50$  mA,  $U_{MAX} = 30$  V  
Gate 5V : min 100 Ohm ( $I_{MAX} = 50$  mA)  
Gate 10V : min 200 Ohm ( $I_{MAX} = 50$  mA)  
Output connector : Jack 1/4" stereo

### General

Dimensions : 140 mm (width) x 35 mm (height) x 105 mm (depth)  
Weight : approx. 200 g  
Electrical design : under the regulations of the ČSN EN 60335-1+A55,  
ČSN EN 60335-2-45  
EMC : under the regulations of the ČSN EN 55014  
Operating environment : standard according to the ČSN 33 0300 regulation  
Range of operating temperature : +10 to +35 °C  
Relative environmental humidity : up to 85 %  
Accessories : owner's manual, supplemental floppy disk  
Recommended accessories : supply adapter MW-1203GS

## 8. WARRANTY CONDITIONS

The equipment is provided with thirty-month warranty starting from the date of the equipment take-over by the customer. This date must be specified on warranty list together with dealer's confirmation.

During this period of time, all defects of equipment or its accessories, caused by defective material or faulty manufacturing, will be removed free of charge.

Warranty repair is asserted by the customer against the dealer.



Warranty period is to be extended for the time period, during which the product was under the warranty repair.

The relevant legal regulations take effect in case of cancellation of purchase contract.

The customer will lose the right for free warranty repair, if he will not be able to submit properly filled out warranty list or if the defects of the product had been caused by:

- unavoidable event (natural disaster),
- connecting the device to the incorrect supply voltage,
- inputs or outputs overloading by connecting the signals source or load source with not-corresponding characteristics etc.,
- faulty equipment operation, which is at variance with the instructions referred-to in the operating manual,
- mechanical damage caused by consumer during transportation or usage of equipment,
- unprofessional interference with the equipment or by equipment modification without manufacturer's approval.

## APPENDICES

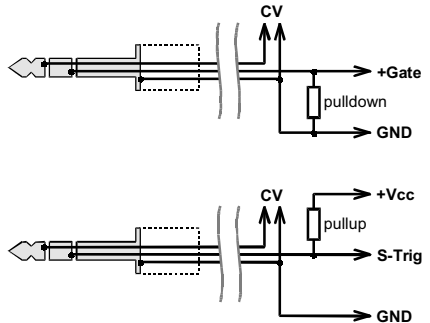
### A. EXPERIENCES FROM OPERATION

During the operation of device, some problems may occur. Below are stated solutions to known problems as well as some other useful information.

Keyboard of smaller analogue synthesizers (keyboard range of 32 keys) begins with F tone, which then corresponds to lowest control voltage (0 – 0.3125V). But MCV-1 has lowest control voltage assigned to tone C. It is therefore necessary to set MCV-1 (by controller or SysEx Message) semitone transpose of -5 or +7 semitones. This causes that reception of note C actually plays tone C. In spite of keyboard range of many analogue synthesizers having only 32 keys (F~C), it is possible to leave MCV-1 set to maximum available range of keyboard (which is 61 keys). VCO of these devices can usually handle full range of control voltage 0 to 5 (0.3125 to 10 V), although their own keyboard generates only limited range. However, this does not apply universally, ability of VCO of analogue synthesizer to process whole voltage range needs to be individually tested.

Some analogue synthesizers (for ex. Moog Prodigy) can produce accidental and undefined tone transposes. This is caused by interesting characteristic of these synthesizers – they "remember" last level of control voltage from both their own keyboard and VCO-CV-IN inputs. Both of these values are added together before input into VCO. Therefore, after connection to MCV-1 and turning on of such synthesizer it is needed not to press (even shortly) any key(s). Otherwise the final tone will be shifted up by interval given by difference between last-pressed key and lowest key on keyboard of synthesizer! In case of this accidentally happening, turning off the instrument is not needed. It is sufficient to reset MCV-1 (by pressing RESET button) and then press (shortly) lowest key of analogue synthesizer.

Unreliable triggering of analogue synthesizer (that is setting off and turning off of its VCO) can be caused by trigger signal from MCV-1 being unadjusted to input circuits of synthesizer. Output Gate/Trig MCV-1 is in still state (that is while VCO does not play) disconnected from all potentials (GND and V+) and therefore on Gate/Trig output there is no logical level defined. If S-Trig or Gate input of connected instrument is not equipped by internal "pullup" or "pulldown" resistor, falling edges of trigger signal are not unambiguously given. In this case small adjustment is needed – additional resistor (with value approx. 1 to 5 kOhm) needs to be installed into instrument (see fig.). Problem with unreliably triggering instrument can be sometimes solved only by mere extending of break impulse for non-legato play by proper setting of Legato-Break parameter.

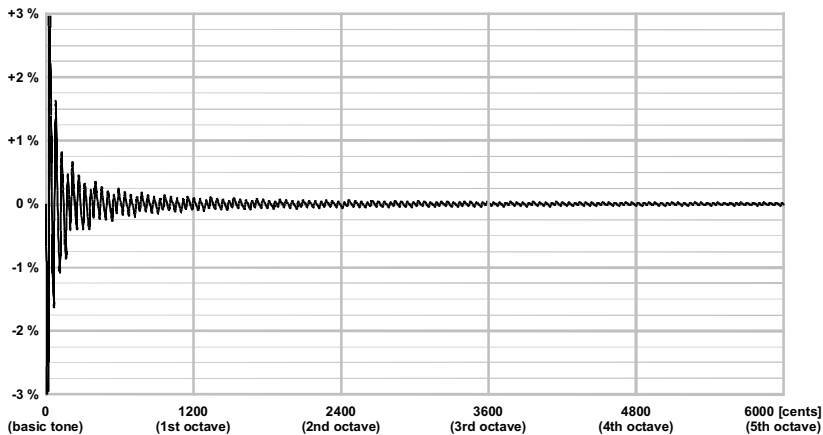


### B. ERRORS OF DA CONVERTER

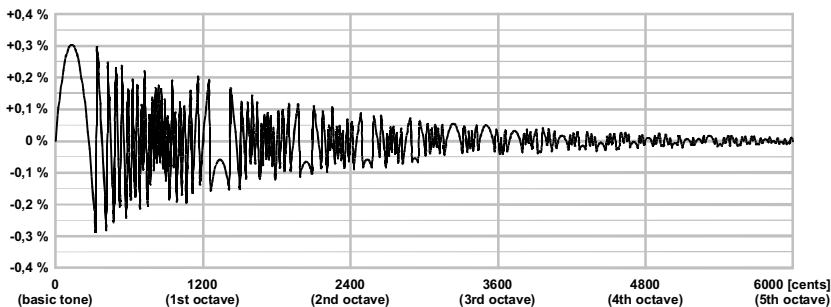
Some little errors arise from conversion of MIDI commands "Note On/Off" to control voltage (CV). These errors are caused by 12-bit resolution of DA converter. Magnitude of these errors is illustrated on the figures below:



Relative error of control voltage for "V / Octave" curve (step 12,5 cents)



Relative error of control voltage for "V / Hz" curve (step 12,5 cents)



C. MIDI IMPLEMENTATION CHART (see page 22)

D. SYSTEM EXCLUSIVE COMMUNICATION CHART (see page 23)

**MIDI IMPLEMENTATION CHART**Device : **MCV-1**  
Model : **8-401**Date : **9 / 2001**  
Version : **2.0**

Function		Transmission	Reception	Remarks
<b>Basic Channel</b>	Default	X	1~16	1)
	Changed	X	1~16	1)
<b>Mode</b>	Default	X	mode 4	Not Altered
	Messages	X	X	
<b>Note Number</b>		X	0~121	2)
<b>Velocity</b>	Note ON	X	X	
	Note OFF	X	X	
<b>After Touch</b>	Key's	X	X	
	Channel's	X	X	
<b>Pitch Bender</b>		X	O	3)
<b>Control Changes</b>	1	X	O	Modulation
	64	X	O	Hold
	68	X	O	Legato Enable
	74	X	O	Legato Break
	75	X	O	Fine Tune
	76	X	O	Modulation Rate
	77	X	O	Modulation Depth
	78	X	O	Pitch Sensitivity
	79	X	O	CV Curve
	80	X	O	Key Priority
	81	X	O	Octave Shift
	82	X	O	Semitone Shift
	83	X	O	Key Range
	119	X	O	Mute Channel 4)
120	X	O	All Sound Off 4)	
<b>Program Change</b>		X	X	
<b>System Exclusive</b>		O	O	5)
<b>System Common</b>	Song Position	X	X	
	Song Select	X	X	
	Tune	X	X	
<b>System Real Time</b>	Clock	X	X	
	Command	X	X	
<b>Others</b>	Local ON/OFF	X	X	4)
	All Notes Off	X	O	
	Active Sensing	X	X	
	Reset	X	O	

**Notes :**

- 1) Can be changed by user from panel.  
 2) Can be changed by SysEx Message.  
 3) Depend on parameter setting.  
 4) Stop Gate/Trigger output.  
 5) See description.

Mode 1 : **OMNI ON, POLY**  
Mode 3 : **OMNI OFF, POLY**Mode 2 : **OMNI ON, MONO**  
Mode 4 : **OMNI OFF, MONO**O : Yes  
X : No

**SYSTEM EXCLUSIVE COMMUNICATION CHART**Device : MCV-1  
Model : 8-401Date : 9 / 2001  
Version : 2.1

<b>Data Request :</b>	
<b>F0h</b> <b>00h 20h 21h</b> <b>ii</b> <b>23h</b> <b>10h</b> <b>aa</b> <b>xx</b> <b>F7h</b>	Start System Exclusive message Manufacturer ID Device / Channel ID Model ID Command "REQUEST" Parameter address Checksum End System Exclusive message
<b>Data Save / Load :</b>	
<b>F0h</b> <b>00h 20h 21h</b> <b>ii</b> <b>23h</b> <b>20h</b> <b>aa</b> <b>dd</b> <b>xx</b> <b>F7h</b>	Start System Exclusive message Manufacturer ID Device / Channel ID Model ID Command "SAVE / LOAD" Parameter address Parameter value Checksum End System Exclusive message
<b>Notes :</b>	
<b>ii</b> - Device / Cannel ID is the same as the number of MIDI channel just selected by system switch (00h-0Fh). <b>xx</b> - Checksum : 7-bit sum from <i>Model ID</i> to <i>Checksum</i> must be zero <b>aa (Address) :</b> / <b>dd (Data - Value) :</b> 00h = CV Curve / 00h = V/oct, 01h = V/Hz 01h = Key priority / 00h = Last Key, 01h = Higher Key, 02h = None 02h = Octave shift / 3Eh = -2 octaves, 3Fh = -1 octave, 40h = no shift, 41h = +1 octave 03h = Semitone shift / 34h = -12 semitones ..... 40h = no shift ..... 4Ch = +12 semitones 04h = Key Range / 01h = 1 key ..... 3Dh = 61 keys 05h = Mute / 00h = Off, 01h = On 06h = Hold / 00h = Off, 01h = On 07h = Legato Enable / 00h = Off, 01h = On 08h = Legato Break / 00h = 0,14 ms ..... 7Fh = 0,64 ms 09h = Pitch Sensitivity / 00h = ±0 semitone ..... 0Ch = ±12 semitones 0Ah = Modulation Rate / 00h = 0,2 Hz ..... 7Fh = 10 Hz 0Bh = Modulation Depth / 00h = ±0 semitone ..... 04h = ±4 semitones 0Ch = Fine Tune / 00h = ±0 mV ..... 7Fh = ±310 mV	
<b>Test / Service :</b>	
<b>F0h</b> <b>00h 20h 21h</b> <b>ii</b> <b>23h</b> <b>7Fh</b> <b>aa</b> <b>dd</b> <b>xx</b> <b>F7h</b>	Start System Exclusive Message Manufacturer ID Device / Channel ID Model ID Command "TEST / SERVICE" Test type (Address) Test value (Data) Checksum End System Exclusive Message
<b>Notes :</b>	
<b>ii</b> - Device / Cannel ID is the same as the number of MIDI channel just selected by system switch (00h-0Fh). <b>xx</b> - Checksum : 7-bit sum from <i>Model ID</i> to <i>Checksum</i> must be zero <b>aa (Address) :</b> / <b>dd (Data) :</b> 7Fh = Test / 00h = Version, 01h = Reset, 02h = DAC buffer, 03 = Trigger buffer 20h = Set Trigger / 00h = Off, 01h = On 000xxxxb = Set DAC / 0yyyyyyb (Note : x = higher bits, y = lower bits of DAC word) Follow service handbook for more about these messages.	

