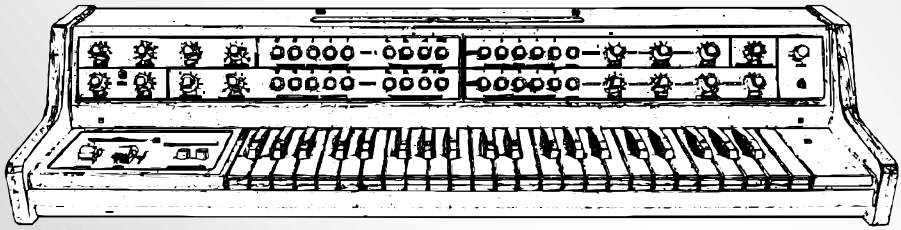
VS-MIDI

MIDI Interface for Vermona Synthesizer

Model 8-434
ver. 1.0



USER MANUAL

Content

		page
1.	Interface description	3
1.1.	Interface functions	3
2.	Interface operation	3
2.1.	MIDI system integration / connection	3
2.2.	Operating mode indication	4
2.3.	Initialization sequence	4
3.	Parameters	4
3.1.	System parameters	5
3.1.1.	“MIDI Channel“ parameter	5
3.1.2.	“VCF CC Nr.“ parameter	5
3.1.3.	“VCA CC Nr.“ parameter	5
3.1.4.	“EG Break Pulse“ parameter	6
3.1.5.	“VCO Calibration“ parameter	6
3.2.	Preset parameters	7
3.2.1.	“VCO Key Shift“ parameter	9
3.2.2.	“VCO Pitch Bend Range“ parameter	9
3.2.3.	“VCF Mode“ parameter	9
3.2.4.	“VCF Key Follow“ parameter	10
3.2.5.	“VCF Velocity Amount“ parameter	10
3.2.6.	“VCF Chnl Aftertouch Amount“ parameter	10
3.2.7.	“VCA Mode“ parameter	10
3.2.8.	“VCA Key Follow“ parameter	11
3.2.9.	“VCA Velocity Amount“ parameter	11
3.2.10.	“VCA Chnl Aftertouch Amount“ parameter	11
3.2.11.	“EG Retrigger Mode“ parameter	11
3.2.12.	“EG Retrigger Rate“ parameter	13
3.2.13.	“Indicator Mode“ parameter	14
4.	MIDI implementation	15
4.1.	Channel commands	15
4.1.1.	Note On/Off	15
4.1.2.	Control Changes	15
4.1.3.	Program Change	20
4.1.5.	Channel Aftertouch	20
4.1.6.	Pitch Bend	20
4.2.	System commands	20
4.2.1.	MIDI Clock	20
4.2.2.	Reset	20
4.3.	System exclusive communication	21
5.	Technical specification	21
6.	Warranty conditions	21

Appendices

A.	MIDI implementation chart	22
B.	Error indication	23
C.	MIDI loopback	23

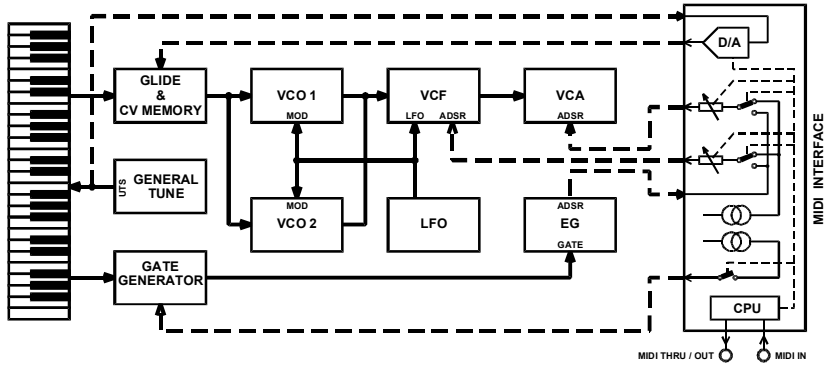
1. INTERFACE DESCRITPION

VS-MIDI Interface is dedicated for the MIDIfication of the Vermona Synthesizer. The interface can not only control VCO over MIDI but also, VCF, VCA and EG of the instrument.

1.1. INTERFACE FUNCTIONS

Interface controls the keyboard and GATE signal generator in parallel manner. The interface circuits are also inserted between envelope generator (EG) of the instrument and its VCF and VCA. The interface integration schematics is shown on the pic. 1.

Pic. 1 – Block schematics



2. INTERFACE OPERATION

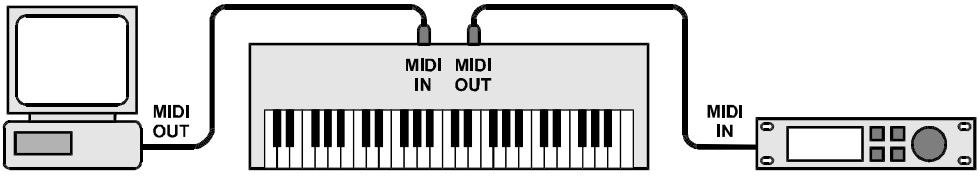
Interface does not have any control switches/pots. All functions are controlled by MIDI parameters (see chapter 4.). Parameters can be adjusted/set by MIDI commands sent from the host MIDI system to the MIDI IN of the interface.

2.1. MIDI SYSTEM INTEGRATION / CONNECTION

Interface has MIDI In and OUT connectors. To connect the instrument to the MIDI system use standard MIDI cables with DIN 41524 connectors (5 pins 180°).

The MIDI data from the master system (PC, sequencer, keyboard controller, etc) used to control the Vermona Synthesizer are receiving at MIDI-IN input. If there are no other devices controlled from the MIDI system and/or the data transfer from the interface to the host MIDI system is not required, only MIDI-IN cable is necessary.

Pic. 2 MIDI system integration



All MIDI data incoming at MIDI-IN input are transmitted unchanged to MIDI-THRU/OUT output (THRU function). Own SysEx messages that answers the requests from MIDI host system are sent to MIDI-THRU/OUT output simultaneously (OUT function).

2.2. OPERATING MODE INDICATION

The user is informed about the actual interface status by the dual color indication LED under the "MAINS" switch on the instrument's front panel. Indication LED lights red in quiescent condition – it indicates on-status of the Vermona Synthesizer instrument. The interface activity is indicated by the yellow light of the indication LED. The type of the LED indication can be user adjusted by the preset parameter "Indicator Mode" (see further in the manual).

If there is an error occurred, the indication LED starts to blink with the period of 0,5 second (see appendices).

2.3. INITIALIZATION SEQUENCE

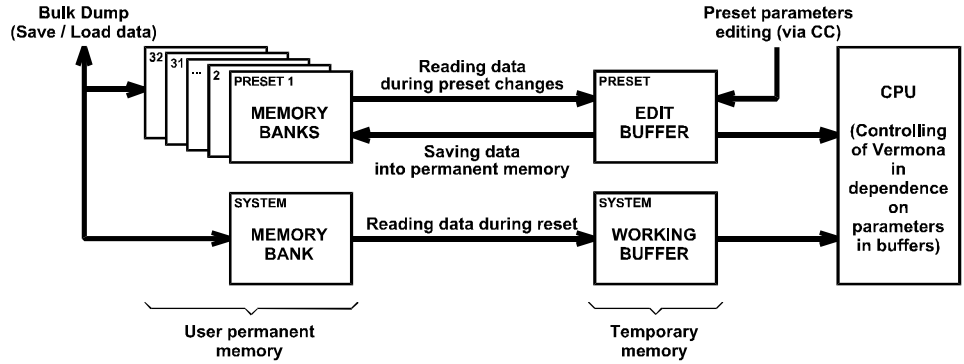
Always when the instrument is switched on, automatic reset sequence is executed. **Immediately when the instrument is switched on it works standard way, like no MIDI interface is installed.** If there are any MIDI commands/notes received, the interface take over the control of the VCO, VCF and VCA circuits of the instrument and **the instrument's own keyboard can not be used yet!** Together with the MIDI control all knobs and switches of the instrument work the standard way.

It is necessary to reset the interface to use the instrument's keyboard again. It might be done by switching the instrument off and on. Interface reset can be executed by the MIDI common system command "Reset" or by System Exclusive message "HW Reset" (see System Exclusive communication).

3. PARAMETERS

The parameters settings affects significantly the incoming MIDI commands processing and the Vermona Synthesizer circuits operation. Parameters are divided in to basic groups – system parameters and preset parameters – see pic. 3.

Pic. 3 – Internal memory structure



All parameters are stored in internal memory of the interface – there is one bank for system parameters and 32 banks for preset parameters. The content of the memory banks can be read or changed by the Bulk Dump SysEx Messages (see description of the System Exclusive communication).

Preset parameters, that directly controls the sound of the instruments, can be individually adjusted in the editing buffer by the MIDI Control Changes commands. All changes can be saved in one of the preset parameter memory (by the MIDI System Exclusive command).

3.1. SYSTEM PARAMETERS

The system parameters control the basic function of the interface. System parameters are always valid independently on the actual preset settings – the change of the system parameters take effect the same way in all user presets.

The values of system parameters, that are saved in factory or if "Factory Reset" is executed (see description of the System Exclusive communication), shows table 1.

Table 1 – Range of the allowed values and default values of the system parameters

Parameter name	Value range		„Factory Reset" values	
	[dec]	[hex]	[dec]	[hex]
MIDI Channel	0 ~ 15	00 ~ 0F	0	00
VCF CC Nr.	0 ~ 119	00 ~ 77	29	1D
VCA CC Nr.	0 ~ 119	00 ~ 77	30	1E
EG Break Pulse Duration	0 ~ 58	00 ~ 3A	6	06
VCO Calibration	0 ~ 127	00 ~ 7F	64	40

System parameters can be changed only by Bulk Dump SysEx Messages (see System Exclusive communication). All changes are activated after the interface reset – when the instrument is switched on next time!

3.1.1. MIDI CHANNEL

Parameter selects the MIDI channel for the communication of the interface with the MIDI system. It is possible to choose any of the 1-16 channels.

The parameter values are 0 - 15. Value 0 is for MIDI channel Nr.1, value 1 selects Nr. 2 etc. up to value 15 which selects MIDI channel Nr. 16

3.1.2. VCF CC Nr.

Control voltage for VCF of the instrument can be used from own envelope generator (EG) of the instrument or just one MIDI controller can be used (see preset parameter "VCF Mode"). Number of the controller, which values are directly converted to Control voltage for VCF of the instrument, is user definable by the system parameter **VCF CC Nr.** The value of this parameter (0 - 119) directly defines the MIDI controller number (Control Changes Nr.) selected for VCF control of the instrument.

ATTENTION ! If the selected controller is used for a different purpose already (e.g. CC64 – Hold, CC68 – Legato, CC 16~28 – preset parameters setting), the previously used function of the controller is disabled and the controller controls only VCF of the instrument!

3.1.3. VCA CC Nr.

Control voltage for VCA of the instrument can be used from own envelope generator (EG) of the instrument or just one MIDI controller can be used (see preset parameter "VCA Mode"). Number of the controller, which values are directly converted to Control voltage for VCA of the instrument, is user definable by the system parameter **VCA CC Nr.** The value of this parameter (0 - 119) directly defines the MIDI controller number (Control Changes Nr.) selected for VCA control of the instrument.

ATTENTION ! If the selected controller is used for a different purpose already (e.g. CC64 – Hold, CC68 – Legato, CC 16~28 – preset parameters setting), the previously used function of the controller is disabled and the controller controls only VCA of the instrument!

3.1.4. EG BREAK PULSE

Parameter sets the length of the break impulses (Break) for the EG circuits of the instrument if the interface is in EG mode – Retrigger (see preset parameter "EG Mode").

The length of the break impulses is defined by the following formula:

EG BREAK PULSE = (PARAMETER VALUE + 2) / 2 [in milliseconds]

The parameter values range is 0 - 58, corresponding to the length of the break impulses 1 ms - 30 ms. Default value is 6 (e.g. impulse with the length of approx. 4 ms). It is suitable for the most situations, only in the exceptional situations the value of the parameter can be adjusted to to provide reliable reaction of the Vermona Synthesizer EG circuits. (see pic. 5).

3.1.5. VCO CALIBRATION

Table 2 - Values of the calibration constant for VCO fine tune

Calibr. constant	Tune shift	Calibr. constant	Tune shift	Calibr. constant	Tune shift	Calibr. constant	Tune shift	Calibr. constant	Tune shift
[dec]	[cent]	[dec]	[cent]	[dec]	[cent]	[dec]	[cent]	[dec]	[cent]
0	-101,59	26	-60,32	52	-19,05	78	+22,22	104	+63,49
1	-100,00	27	-58,73	53	-17,46	79	+23,81	105	+65,08
2	-98,41	28	-57,14	54	-15,87	80	+25,40	106	+66,67
3	-96,83	29	-55,56	55	-14,29	81	+26,98	107	+68,25
4	-95,24	30	-53,97	56	-12,70	82	+28,57	108	+69,84
5	-93,65	31	-52,38	57	-11,11	83	+30,16	109	+71,43
6	-92,06	32	-50,79	58	-9,52	84	+31,75	110	+73,02
7	-90,48	33	-49,21	59	-7,94	85	+33,33	111	+74,60
8	-88,89	34	-47,62	60	-6,35	86	+34,92	112	+76,19
9	-87,30	35	-46,03	61	-4,76	87	+36,51	113	+77,78
10	-85,71	36	-44,44	62	-3,17	88	+38,10	114	+79,37
11	-84,13	37	-42,86	63	-1,59	89	+39,68	115	+80,95
12	-82,54	38	-41,27	64	±0,00	90	+41,27	116	+82,54
13	-80,95	39	-39,68	65	+1,59	91	+42,86	117	+84,13
14	-79,37	40	-38,10	66	+3,17	92	+44,44	118	+85,71
15	-77,78	41	-36,51	67	+4,76	93	+46,03	119	+87,30
16	-76,19	42	-34,92	68	+6,35	94	+47,62	120	+88,89
17	-74,60	43	-33,33	69	+7,94	95	+49,21	121	+90,48
18	-73,02	44	-31,75	70	+9,52	96	+50,79	122	+92,06
19	-71,43	45	-30,16	71	+11,11	97	+52,38	123	+93,65
20	-69,84	46	-28,57	72	+12,70	98	+53,97	124	+95,24
21	-68,25	47	-26,98	73	+14,29	99	+55,56	125	+96,83
22	-66,67	48	-25,40	74	+15,87	100	+57,14	126	+98,41
23	-65,08	49	-23,81	75	+17,46	101	+58,73	127	+100,00
24	-63,49	50	-22,22	76	+19,05	102	+60,32		
25	-61,90	51	-20,63	77	+20,63	103	+61,90		

Parameter sets the calibration constant of the D/A converter controlling the VCO of the instrument when the exact tuning of the instrument keyboard and master MIDI keyboard is required. Parameter provides fine tune of the VCO of the instrument for the MIDI control.

The parameter values range is from 0 to 127. It corresponds to the fine tune of approx. ±100 cents, tuning step is 1, 5873 cent (see table 2).

3.2. PRESET PARAMETERS

The preset parameters set function of the interface whose influence sound of the instrument. The preset parameters sets, which MIDI commands are going to control VCO, VCF, VCA and EG circuits of the Vermona Synthesizer.

Table 3 – Range of the allowed values and default values of the preset parameters

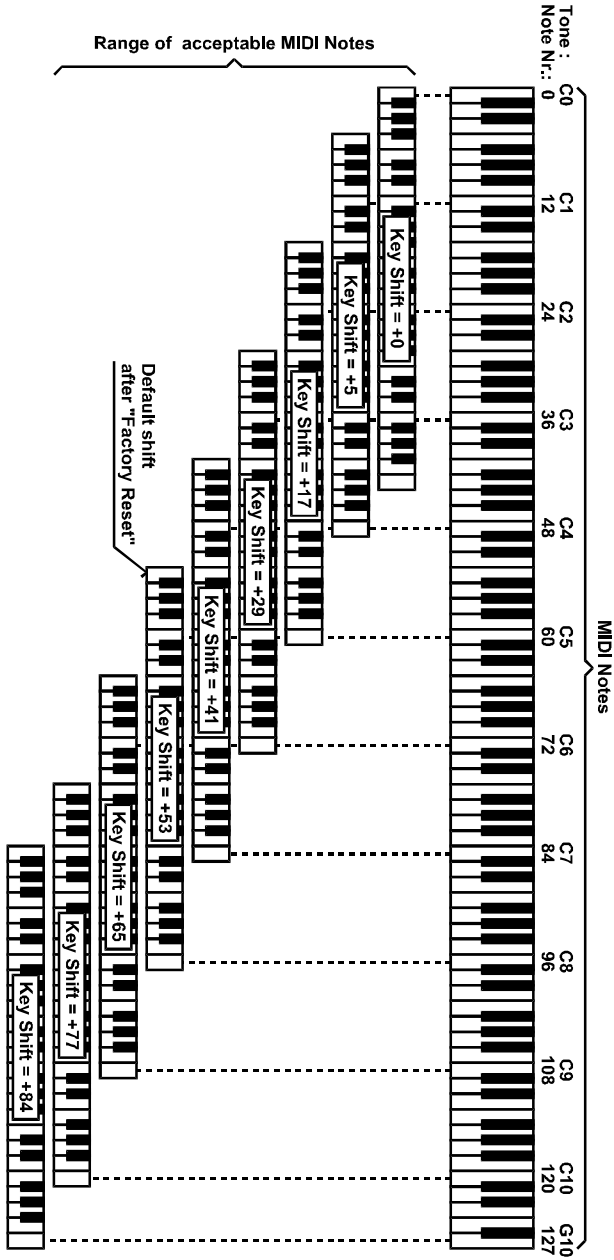
Parameter name	Value range		"Factory Reset" values		Setting with MIDI CC Nr.	
	[dec]	[hex]	[dec]	[hex]	[dec]	[hex]
VCO Key Shift	0 ~ 84	00 ~ 54	53	35	16	10
VCO Pitch Bend Range	0 ~ 12	00 ~ 0C	12	0C	17	11
VCF Control Mode	0 ~ 2	00 ~ 02	0	00	18	12
VCF Key Follow [1])	0 ~ 127	00 ~ 7F	64	40	19	13
VCF Velocity Amount [1])	0 ~ 127	00 ~ 7F	0	00	20	14
VCF Chnl Aftertouch Amt [1])	0 ~ 127	00 ~ 7F	0	00	21	15
VCA Control Mode	0 ~ 2	00 ~ 02	0	00	22	16
VCA Key Follow [2])	0 ~ 127	00 ~ 7F	64	40	23	17
VCA Velocity Amount [2])	0 ~ 127	00 ~ 7F	0	00	24	18
VCA Chnl Aftertouch Amt [2])	0 ~ 127	00 ~ 7F	0	00	25	19
EG Retrigger Mode	0 ~ 2	00 ~ 02	0	00	26	1A
EG Retrigger Rate	0 ~ 127	00 ~ 7F	100	64	27	1B
Indicator Mode	0 ~ 3	00 ~ 03	0	00	28	1C

Remarks:
[1]) Parameter is not active in VCF mode "Controller" (VCF Control Mode = 2)
[2]) Parameter is not active in VCA mode "Controller" (VCA Control Mode = 2)

Values of the preset parameters in editing buffer (see pic. 3) are set by the MIDI controllers (Control Changes) - it is possible to change them during the playing the instrument thus. Default values of the preset parameters factory stored in the interface memory or after "Factory Reset" procedure (see SysEx communication), are shown in table 3 (the default values are valid for all user presets).

Edited values of the parameters are stored in the editing buffer only. The content of the buffer is saved temporarily only, till the preset change or instrument switch off or hardware reset. To save the edited parameters it is necessary to save them as a memory preset. There are 32 available preset spaces. Saving the values in preset memories is done by the MIDI System Exclusive command (see SysEx communication).

Pic. 4 – "VCO Key Shift" parameter influence



3.2.1. VCO KEY SHIFT

This parameter shifts the keyboard range of the instrument in semitones in the range of 0 up to +84 semitones. If there is no shift selected, the lowest key corresponds to the MIDI note Nr. 0 and the highest Nr. 43. When the transposition +1 semitone is set, the lowest note corresponds to the MIDI note Nr. 1 and the highest Nr.. 44 etc. When +84 semitones transposition is set the lowest key corresponds to the MIDI note Nr. 84 and the highest to Nr. 127. See Pic. 2.

Value of the parameter can be in the range from 0 to 84; The value of the parameter can be set by MIDI controller (Control Changes) Nr. 16 – see chapter 4.1.2.

3.2.2. VCO PITCH BEND RANGE

Parameter sets the maximum range of the MIDI command “Pitch Bend“ (“Pitch Wheel“).

Parameter can have the values from 0 up to 12. If the 0 value is set, the pitch bend is switched off and ignored. Values 1 - 12 sets the maximum detune range in semitones. With the value 12 the pitch bend detunes the oscillators ±1 octave.

The detune range of the VCO upwards can be limited for the highest octave and detune range higher that approximately 4 semitones. This limitation is done by the construction of the Vermona Synthesizer and it can’t be removed.

The value of the parameter can be set by the MIDI controller (Control Changes) Nr. 17 – see chapter 4.1.2.

3.2.3. VCF CONTROL MODE

Parameter sets the way of VCF control. There are three modes available: **”EG”** (value of the parameter equal 0), **”Gate**“ (value of the parameter equal 1) and **”Controller**“ (value of the parameter equal 2). Value of the parameter can be set by MIDI controller (Control Changes) Nr. 18 - see chapter 4.1.2.

”EG“ mode

Standard way of VCF control, where the internal envelope generator (EG) is used as a source of the control voltage for VCF modulation. Accordingly to the settings of preset parameters “VCF Key Follow“, “VCF Velocity Amount“, “VCF Channel Aftertouch“ the control voltage can be affected by the MIDI commands ”Note-On + Velocity” and ”Channel Aftertouch“.

”Gate“ mode

Internal envelope generator (EG) of the instrument is disabled and VCF is controlled by the square gate signal (equivalent of EG setting: ATTACK = 0, DECAY = 0, SUSTAIN = max., RELEASE = 0). Amplitude of the control voltage can be adjusted by the MIDI commands ”Note-On + Velocity” and ”Channel Aftertouch“ accordingly to the preset settings of the “VCF Key Follow“, “VCF Velocity Amount“ and “VCF Channel Aftertouch“ parameters.

”Controller“ mode

Special mode – VCF is controlled by one MIDI controller, selected by the system parameter ”VCF CC Nr.“. In this case the control voltage for VCF modulation is controlled by the values of selected controller only. The preset parameters “VCF Key Follow“, “VCF Velocity Amount“, “VCF Channel Aftertouch“ and MIDI commands “Note-On” and “Channel Aftertouch“ does not affect the VCF modulation – they are ignored. This working mode can be used for creation of special sound effects etc.

3.2.4. VCF KEY FOLLOW

Parameter sets the VCF modulation depth of the key-follow position on the MIDI keyboard.

If the value of the parameter is 64, the VCF of the instrument remains unaffected by the key-follow position. For the parameter values from 65 to 127, cut-off frequency of the filter increases proportionally to the MIDI note number and for the values from 63 to 0, cut-off frequency of the filter decreases proportionally to the MIDI note number.

The value of the parameter can be set by MIDI controller (Control Changes) Nr. 19 - see chapter 4.1.2.

3.2.5. VCF VELOCITY AMOUNT

Parameter sets the depth of the VCF modulation by the MIDI "Velocity" commands of the "Note On" - cut-off frequency of the filter increases proportionally accordingly to the value of "Velocity". Value of the parameter can be in the range from 0 to 127. For the 0 value, VCF is not affected by the "Velocity" command at all, for the value127, the maximal depth of the modulation is allowed..

The value of the parameter can be set by MIDI controller (Control Changes) Nr. 20 - see chapter 4.1.2.

3.2.6. VCF CHANNEL AFTERTOUCH AMOUNT

Parameter sets the depth of the VCF modulation by the value of the last received MIDI "Channel Aftertouch" command - cut-off frequency of the filter increases proportionally accordingly to the value of "Channel Aftertouch". Value of the parameter can be in the range from 0 to 127, for the 0 value, VCF is not affected by the "Channel Aftertouch" command at all, for the value 127, the maximal depth of the modulation is allowed.

The value of the parameter can be set by MIDI controller (Control Changes) Nr. 21 - see chapter 4.1.2.

3.2.7. VCA CONTROL MODE

Parameter sets the way of VCA control. There are three modes available: **„EG"** (value of the parameter equal 0), **„Gate**" (value of the parameter equal 1) and **„Controller**" (value of the parameter equal 2). The value of the parameter can be set by MIDI controller (Control Changes) Nr. 22 - see chapter 4.1.2.

„EG" mode

Standard way of VCA control, where the internal envelope generator (EG) is used as a source of the control voltage for VCA modulation. Accordingly to the settings of preset parameters "VCA Key Follow", "VCA Velocity Amount", "VCA Channel Aftertouch" the control voltage can be affected by the MIDI commands "Note-On + Velocity" and "Channel Aftertouch".

„Gate" mode

Internal envelope generator (EG) of the instrument is disabled and VCA is controlled by the square gate signal (equivalent of EG setting: ATTACK = 0, DECAY = 0, SUSTAIN = max., RELEASE = 0). Amplitude of the control voltage can be adjusted by the MIDI commands "Note-On + Velocity" and "Channel Aftertouch" accordingly to the preset settings of the "VCA Key Follow", "VCA Velocity Amount" and "VCA Channel Aftertouch" parameters.

„Controller" mode

Special mode – VCA is controlled by one MIDI controller, selected by the system parameter "VCA CC Nr.". In this case the control voltage for VCA modulation is controlled by the values of selected controller only. The preset parameters "VCA Key Follow", "VCA Velocity Amount", "VCA Channel Aftertouch" and MIDI commands "Note-On + Velocity" and "Channel Aftertouch" does not affect the VCA modulation – they are ignored. This working mode can be used for creation of special sound effects etc.

3.2.8. VCA KEY FOLLOW

Parameter sets the VCA modulation depth of the key-follow position on the keyboard.

If the value is equal 64, the VCA is not affected by the position of them MIDI note on the keyboard. For the parameter values from 65 to 127, VCA level increases proportionally to the MIDI note number and for the values from 63 to 0, the VCA level decreases proportionally to the MIDI note number.

The value of the parameter can be set by MIDI controller (Control Changes) Nr. 23 - see chapter 4.1.2.

3.2.9. VCA VELOCITY AMOUNT

Parameter sets the depth of the VCA modulation by "Velocity" MIDI commands of "Note On" - VCA gain increases proportionally accordingly to the value of "Velocity". Value of the parameter can be in the range from 0 to 127. For the 0 value, VCA is not affected by the "Velocity" command at all, for the value127, the maximal depth of the modulation is allowed..

The value of the parameter can be set by MIDI controller (Control Changes) Nr. 24 - see chapter 4.1.2.

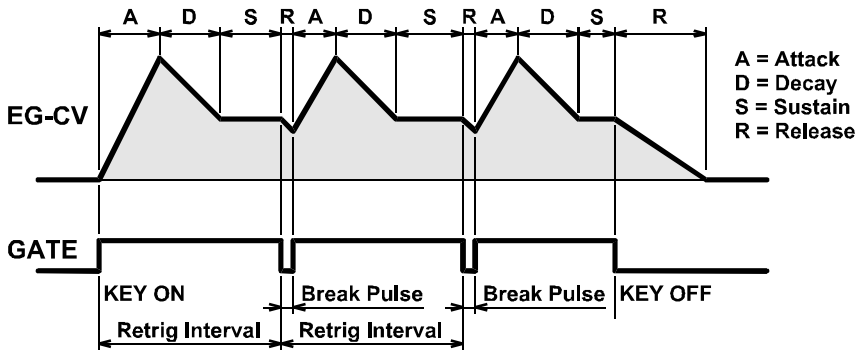
3.2.10. VCA CHANNEL AFTERTOUCH AMOUNT

Parameter sets the depth of the VCA modulation by the by the value of the last received MIDI command "Channel Aftertouch" - VCA level increases proportionally accordingly to the value of "Channel Aftertouch". Value of the parameter can be in the range from 0 to 127, for the 0 value, VCA is not affected by the "Channel Aftertouch" command at all, for the value 127, the maximal depth of the modulation is allowed..

The value of the parameter can be set by MIDI controller (Control Changes) Nr. 25 - see chapter 4.1.2.

3.2.11. EG RETRIGGER MODE

Pic. 5 – EG Retrigger mode diagram



Parameter enables / disables envelope generator (EG) retrigger function during the lasting MIDI "Note-On" command– see pic. 5. Three modes are available : **„Off"** (value of the parameter equal 0), **„Fix**" (value of the parameter equal 1) and **„MIDI**" (value of the parameter equal 2). The value of the parmater can be set by MIDI controller (Control Changes) Nr. 26 - see chapter 4.1.2.

„Off" mode

Envelope generator (EG) retrigger is disabled, EG works standard way.

"Fix" mode

Envelope generator (EG) retrigger is enabled, the retrigger period is fixed by the value of parameter "EG Retrigger Rate" accordingly to the table 4.

"**MIDI" mode**

Envelope generator (EG) retrigger is enabled, the retrigger period is derived from the frequency of the "MIDI Clock" MIDI synchronization impulses. The synchronization tempo is set by the "EG Retrigger Rate" parameter accordingly to the table 5.

Table 4 - EG retrigger interval – mode "Fix"

CC 26	Retrigger		CC 26	Retrigger		CC 26	Retrigger		CC 26	Retrigger	
	Time	Freq.		Time	Freq.		Time	Freq.		Time	Freq.
[dec]	[sec]	[Hz]	[dec]	[sec]	[Hz]	[dec]	[sec]	[Hz]	[dec]	[sec]	[Hz]
0	2,500	0,400	32	0,933	1,072	64	0,348	2,874	96	0,130	7,692
1	2,424	0,413	33	0,905	1,106	65	0,338	2,963	97	0,126	7,937
2	2,351	0,425	34	0,877	1,140	66	0,328	3,053	98	0,122	8,197
3	2,280	0,439	35	0,851	1,176	67	0,318	3,150	99	0,119	8,439
4	2,210	0,452	36	0,825	1,212	68	0,308	3,247	100	0,115	8,696
5	2,143	0,467	37	0,800	1,250	69	0,299	3,350	101	0,112	8,969
6	2,078	0,481	38	0,776	1,289	70	0,290	3,454	102	0,108	9,259
7	2,015	0,496	39	0,752	1,330	71	0,281	3,565	103	0,105	9,569
8	1,954	0,512	40	0,729	1,372	72	0,272	3,676	104	0,102	9,852
9	1,895	0,528	41	0,707	1,414	73	0,264	3,788	107	0,099	10,152
10	1,837	0,544	42	0,686	1,459	74	0,256	3,906	106	0,096	10,471
11	1,782	0,561	43	0,665	1,504	47	0,248	4,032	107	0,093	10,811
12	1,728	0,579	44	0,645	1,552	76	0,241	4,158	108	0,090	11,111
13	1,675	0,597	45	0,625	1,600	77	0,234	4,283	109	0,087	11,494
14	1,624	0,616	46	0,606	1,650	78	0,226	4,425	110	0,085	11,834
15	1,575	0,635	47	0,588	1,702	79	0,220	4,556	111	0,082	12,195
16	1,527	0,655	48	0,570	1,754	80	0,213	4,706	112	0,080	12,579
17	1,481	0,675	49	0,553	1,810	81	0,206	4,854	113	0,077	12,987
18	1,436	0,696	50	0,536	1,866	82	0,200	5,000	114	0,075	13,423
19	1,393	0,718	51	0,520	1,925	83	0,194	5,155	118	0,073	13,793
20	1,350	0,741	52	0,504	1,984	84	0,188	5,319	116	0,070	14,286
21	1,309	0,764	53	0,489	2,047	58	0,183	5,479	117	0,068	14,706
22	1,270	0,788	54	0,474	2,112	86	0,177	5,650	118	0,066	15,152
23	1,231	0,812	55	0,460	2,176	87	0,172	5,831	119	0,064	15,625
24	1,194	0,838	56	0,446	2,245	88	0,166	6,024	120	0,062	16,129
25	1,158	0,864	57	0,432	2,315	89	0,161	6,211	121	0,060	16,667
26	1,123	0,891	58	0,419	2,387	90	0,157	6,390	122	0,059	17,094
27	1,089	0,919	59	0,406	2,463	91	0,152	6,601	123	0,057	17,699
28	1,056	0,947	60	0,394	2,538	92	0,147	6,803	124	0,055	18,182
29	1,024	0,977	61	0,382	2,618	93	0,143	7,018	125	0,053	18,868
30	0,992	1,008	62	0,371	2,699	94	0,138	7,246	126	0,052	19,417
31	0,962	1,040	63	0,359	2,786	95	0,134	7,463	127	0,050	20,000

Table 5 - EG retrigger interval – mode "MIDI"												
CC 26	Retrigger		CC 26	Retrigger		CC 26	Retrigger		CC 26	Retrigger	
	Time	Beat		Time	Beat		Time	Beat		Time	Beat
[dec]	[ticks]	[-]	[dec]	[ticks]	[-]	[dec]	[ticks]	[-]	[dec]	[ticks]	[-]
0	128	2/1	32	96	1/1	64	64	1/1[3]	96	32	1/2[3]
1	127	-	33	95	-	65	63	-	97	31	-
2	126	-	34	94	-	66	62	-	98	30	-
3	125	-	35	93	-	67	61	-	99	29	-
4	124	-	36	92	-	68	60	-	100	28	-
5	123	-	37	91	-	69	59	-	101	27	-
6	122	-	38	90	-	70	58	-	102	26	-
7	121	-	39	89	-	71	57	-	103	25	-
8	120	-	40	88	-	72	56	-	104	24	1/4
9	119	-	41	87	-	73	55	-	107	23	-
10	118	-	42	86	-	74	54	-	106	22	-
11	117	-	43	85	-	47	53	-	107	21	-
12	116	-	44	84	-	76	52	-	108	20	-
13	115	-	45	83	-	77	51	-	109	19	-
14	114	-	46	82	-	78	50	-	110	18	-
15	113	-	47	81	-	79	49	-	111	17	-
16	112	-	48	80	-	80	48	1/2	112	16	1/4[3]
17	111	-	49	79	-	81	47	-	113	15	-
18	110	-	50	78	-	82	46	-	114	14	-
19	109	-	51	77	-	83	45	-	118	13	-
20	108	-	52	76	-	84	44	-	116	12	1/8
21	107	-	53	75	-	58	43	-	117	11	-
22	106	-	54	74	-	86	42	-	118	10	-
23	105	-	55	73	-	87	41	-	119	9	-
24	104	-	56	72	-	88	40	-	120	8	1/8[3]
25	103	-	57	71	-	89	39	-	121	7	-
26	102	-	58	70	-	90	38	-	122	6	1/16
27	101	-	59	69	-	91	37	-	123	5	-
28	100	-	60	68	-	92	36	-	124	4	1/16[3]
29	99	-	61	67	-	93	35	-	125	3	1/32
30	98	-	62	66	-	94	34	-	126	2	1/32[3]
31	97	-	63	65	-	95	33	-	127	1	1/64[3]

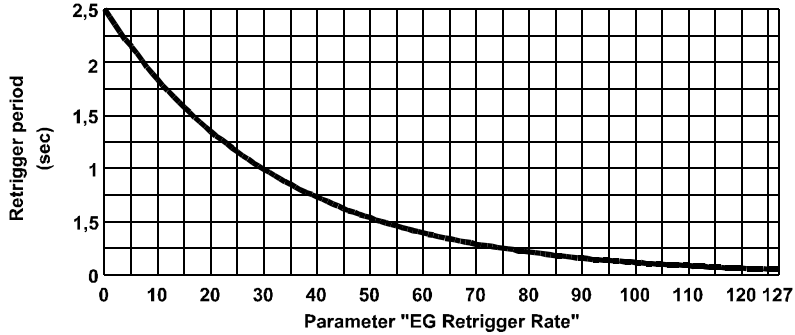
3.2.12. EG RETRIGGER RATE

Parameter sets the frequency of the EG retrigger, if the "EG Retrigger Mode" parameter is in "Fix" or "MIDI" modes.

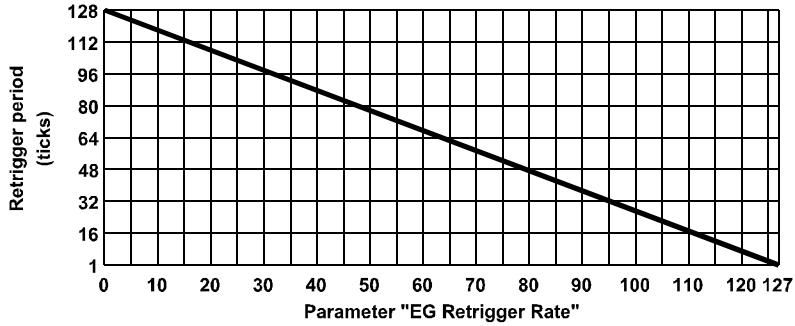
Parameter can have the values from 0 to 127 with corresponding retrigger intervals for "Fix" or "MIDI" modes as described in table 4 and table 5 and in diagrams on pictures 6 and. 7.

The value of the parameter can be adjusted by MIDI controller (Control Changes) Nr. 27 – see chapter 4.1.2.

Pic. 6 – EG retrigger interval accordingly to "EG Retrigger Rate" parameter – "Fix" mode



Pic. 7 – Tempo of EG retrigger accordingly to "EG Retrigger Rate" parameter – "MIDI" mode



3.2.13. LED INDICATOR MODE

Parameter sets the LED indicator function. Four modes are available: **"OFF"** (value of the parameter equal to 0), **"MIDI**" (value of the parameter equal to 1), **"Gate**" (value of the parameter equal to 2) and **"Retrigger**" (value of the parameter equal to 3). The value of the parameter can be set by MIDI controller (Control Changes) Nr. 28 - see chapter 4.1.2.

"OFF" mode

In this mode, the LED indicator is switched off – lights red and indicates that the instrument is turned on.

"MIDI" mode

In this mode the LED indicates incoming MIDI commands acceptable by the interface. MIDI data going thru (function "Thru") are not indicated. Always when acceptable MIDI data is received, the LED blinks yellow. If the data flow is continuous (databyte more frequent than approx. 100 ms) the LED lights constantly.

"Gate" mode

In this mode the indication LED copies the envelope generator (EG - Gate) status.

"Retrigger" mode

LED indicator blinks in the tempo of the envelope generator (EG) retrigger.

4. MIDI IMPLEMENTATION

Interface can communicate by all available methods – it recognizes channel, common system as well as SysEx MIDI commands.

4.1. CHANNEL COMMANDS

Interface recognizes channel MIDI commands "Note Off", "Note On", "Control Changes", "Channel Aftertouch", “Pitch Bend“ and "Program Change". The commands are received on the channel defined by the system parameter “MIDI Channel“.

4.1.1. NOTE ON/OFF

Interface accepts “Note-On“ and “Note-Off“ commands in the range of max. 44 notes. Accepted note numbers are defined by the “VCO Key Shift“ parameter.

Although Vermona Synthesizer is monophonic instrument, the interface memories last six active “Note-On” commands. This is important, when more key are pressed on master keyboard and the last is released. In this case the interface switches back to the last note (key). If there are six notes received the last note received replaces the first note received (last received note has the highest priority).

4.1.2. CONTROL CHANGES

Interface recognizes standard controllers Nr. 64, 68, 120, 121, 123 and other controllers are used for temporary adjusting the parameters in editing buffer of the preset (controllers 16 - 28). Besides this, two controllers are used for direct control of VCF and VCA – numbers of these controllers are user definable (see system parameters “VCF CC Nr.“ and “VCA CC Nr.“

CC 64 – Hold

Controller works standard way: holds tone generator of the instrument playing / active during the time when the "Hold" command is active (hold pedal pressed). Values from 64 to 127 are recognized as “ON”, values from 0 to 63 as “OFF”.

CC 68 – Legato

The controller enables (values from 64 to 127) or disables (values from 0 to 63) Legato play, eg. repeated start of the instrument’s envelope generator (EG) while receiving more MIDI “Note-On“ commands simultaneously. If the Legato is on, the new note only changes the control voltage for VCO and the EG remains unaffected.

If the Legato is on, preset parameter “EG Retrigger Mode“ is ignored – it is always set “Off“. After switching off the Legato, the original “EG Retrigger Mode“ is recalled automatically.

CC 120 – All Sound Off

The VCO is muted and EG is switched off immediately after receiving of this command – independently on MIDI commands “Note-On” received previously.

CC 121 – Reset All Controllers

“Hold“ and “Legato“ controllers are immediately switched off (if active) after receiving of this controller and also the “Pitch Bend“ detune is cancelled.

CC 123 – All Notes Off

Same as with "All Sound Off", the VCO is muted and EG is switched off immediately after the receiving of this command.

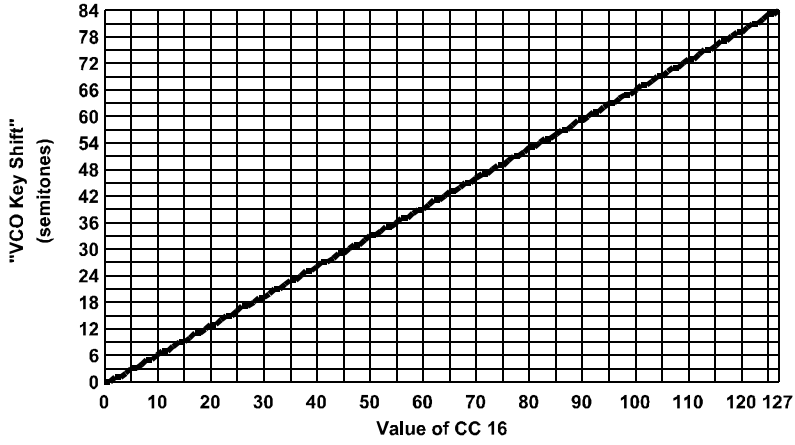
CC 16 – Own controller: VCO Key Shift

Received value of the controller is converted to the value of "Key Shift" parameter accordingly to the pic. 8 and table 6. Value of the "Key Shift" parameter is set temporarily – valid till the next change of the controller or till the instrument switch off. Always when the "Key Shift" parameter is changed, VCO is muted and EG is switched off and the transposition change take affect for the next received MIDI notes.

Table 6 – CC 16 values conversion to "Key Shift" parameter values (in semitones)

CC	Shift	CC	Shift	CC	Shift	CC	Shift	CC	Shift	CC	Shift	CC	Shift	CC	Shift
0	+0	16	+10	32	+21	48	+31	64	+42	80	+53	96	+63	112	+74
1	+0	17	+11	33	+21	49	+32	65	+43	81	+53	97	+64	113	+75
2	+1	18	+11	34	+22	50	+33	66	+43	82	+54	98	+65	114	+75
3	+1	19	+12	35	+23	51	+33	67	+44	83	+55	99	+65	115	+76
4	+2	20	+13	36	+23	52	+34	68	+45	84	+55	100	+66	116	+77
5	+3	21	+13	37	+24	53	+35	69	+45	85	+56	101	+67	117	+77
6	+3	22	+14	38	+25	54	+35	70	+46	86	+57	102	+67	118	+78
7	+4	23	+15	39	+25	55	+36	71	+47	87	+57	103	+68	119	+79
8	+5	24	+15	40	+26	56	+37	72	+47	88	+58	104	+69	120	+79
9	+5	25	+16	41	+27	57	+37	73	+48	89	+59	105	+69	121	+80
10	+6	26	+17	42	+27	58	+38	74	+49	90	+59	106	+70	122	+81
11	+7	27	+17	43	+28	59	+39	75	+49	91	+60	107	+71	123	+81
12	+7	28	+18	44	+29	60	+39	76	+50	92	+61	108	+71	124	+82
13	+8	29	+19	45	+29	61	+40	77	+51	93	+61	109	+72	125	+83
14	+9	30	+19	46	+30	62	+41	78	+51	94	+62	110	+73	126	+83
15	+9	31	+20	47	+31	63	+41	79	+52	95	+63	111	+73	127	+84

Pic. 8 – CC 16 values conversion to "VCO Key Shift" parameter value

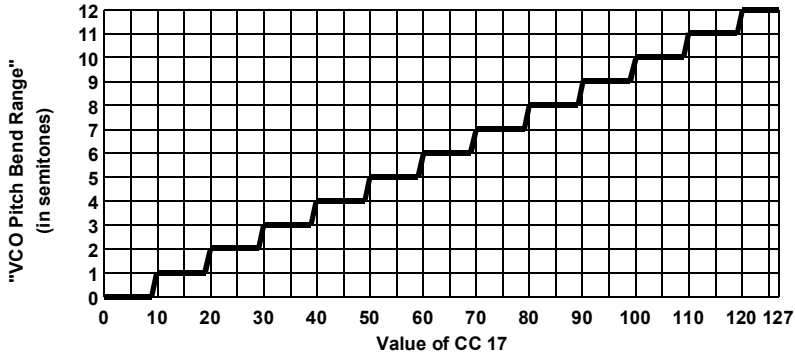


CC 17 – Own controller: VCO Pitch Bend Range

Received value of the controller is converted to the value of the parameter "VCO Pitch Bend Range" accordingly to the pic. 9 and table 7. Value of "Pitch Wheel Range" parameter is set temporarily – valid till the next change of the controller or till the instrument switch off.

Table 7 – CC 17 values conversion to "VCO Pitch Bend Range" parameter							
CC	Range	CC	Range	CC	Range	CC	Range
0 ~ 9	±0	40 ~ 49	±4	70 ~ 79	±7	100 ~ 109	±10
10 ~ 19	±1	50 ~ 59	±5	80 ~ 89	±8	110 ~ 119	±11
20 ~ 29	±2	60 ~ 69	±6	90 ~ 99	±9	120 ~ 127	±12
30 ~ 39	±3						

Pic. 9 – CC 17 value conversion to parameter values "VCO Pitch Bend Range"

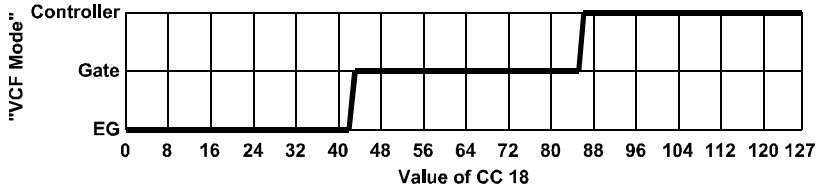


CC 18 – Own controller : VCF Mode

Received value of the controller sets the value of the parameter "VCF Mode" accordingly to the pic. 10 and table 8. "VCF Mode" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

Table 8 – CC 18 values conversion to "VCF Mode" parameter					
CC	Mode	CC	Mode	CC	Mode
0 ~ 42	EG	43 ~ 85	Gate	86~ 127	Controller

Pic. 10 – CC 18 values conversion to the value of the "VCF Mode" parameter



CC 19 – Own controller: VCF Key Follow

Received value of the controller 0 - 127 sets directly the value of the parameter "VCF Key Follow". "VCF Key Follow" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

CC 20 – Own controller: VCF Velocity Amount

Received value of the controller 0 - 127 sets directly the value of the parameter "VCF Velocity Amount". "VCF Velocity Amount" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

CC 21 – Own controller: VCF Chnl Aftertouch Amount

Received value of the controller 0 - 127 sets directly the value of the parameter "VCF Chnl Aftertouch Amount". "VCF Chnl Aftertouch Amount" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

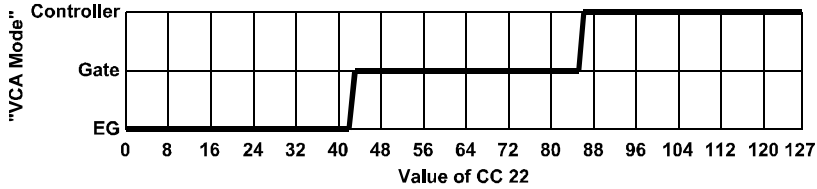
CC 22 – Own controller: VCA Mode

Received value of the controller is converted to the value of the parameter "VCA Mode" accordingly to the pic.11 and table 9. "VCA Mode" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

Table 9 – CC 22 values conversion to "VCA Mode" parameter

CC	Mode	CC	Mode	CC	Mode
0 ~ 42	EG	43 ~ 85	Gate	86~ 127	Controller

Pic. 11 – CC 22 values conversion to the value of "VCA Mode" parameter



CC 23 – Own controller: VCA Key Follow

Received value of the controller 0 - 127 sets directly the value of the parameter "VCA Key Follow". "VCA Key Follow" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

CC 24 – Own controller: VCA Velocity Amount

Received value of the controller 0 - 127 sets directly the value of the parameter "VCA Velocity Amount". "VCA Velocity Amount" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

CC 25 – Own controller: VCA Chnl Aftertouch Amount

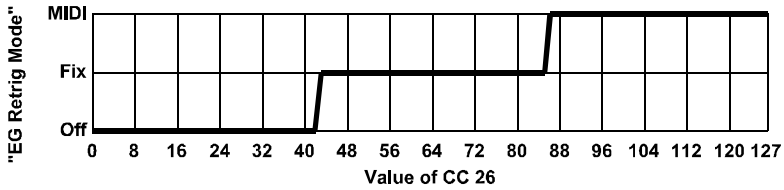
Received value of the controller 0 - 127 sets directly the value of the parameter "VCA Chnl Aftertouch Amount". "VCA Chnl Aftertouch Amount" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

CC 26 – Own controller: EG Retrigger Mode

Received value of the controller is converted to the value of the parameter "EG Retrigger Mode" accordingly to the pic.12 and table 10. "EG Retrigger Mode" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

Table 10 – CC 26 values conversion to "EG Retrigger Mode"					
CC	**Mode**	**CC**	**Mode**	**CC**	**Mode**
0 ~ 42	Off	43 ~ 85	Fix	86~ 127	MIDI

Pic. 12 – CC 26 values conversion to the "EG Retrigger Mode"parameter values



CC 27 – Own controller: EG Retrigger Rate

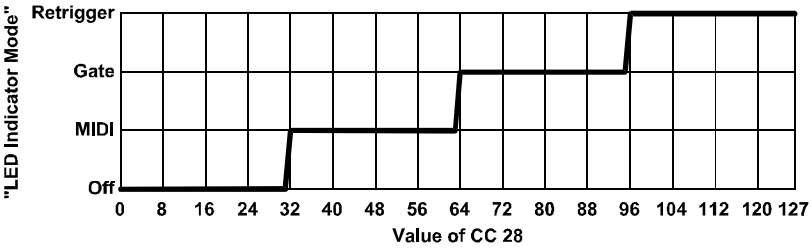
Received value of the controller 0 - 127 sets directly the value of the parameter "EG Retrigger Rate". "EG Retrigger Rate" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

CC 28 – Own controller: Indicator Mode

Received value of the controller is converted to the value of the parameter "Indicator Mode" accordingly to the pic.13 and table 11. "Indicator Mode" parameter value is set temporarily – valid till the next change of the controller or till the instrument switch off.

Table 11 – CC 28 values conversion to "Indicator Mode"							
CC	**Mode**	**CC**	**Mode**	**CC**	**Mode**	**CC**	**Mode**
0 ~ 31	Off	32 ~ 63	MIDI	64 ~ 95	Gate	96~ 127	Retrigger

Pic. 13 – CC 28 values conversion to the "Indicator Mode" parameter values



CC @ VCF CC Nr. – VCF Direct Control

Controller selected by the system parameter "VCF CC Nr." controls VCF of the instrument directly if the VCF works in "Controller" mode (accordingly to the preset parameter "VCF Mode").

CC @ VCA CC Nr. – VCA Direct Control

Controller selected by the system parameter "VCA CC Nr." controls VCA of the instrument directly if the VCA works in "Controller" mode (accordingly to the preset parameter "VCA Mode").

4.1.3. CHANNEL AFTERTOUCH

"Channel Aftertouch" command affects VCF and VCA of the instrument accordingly to the settings of preset parameters "VCF Chnl Aftertouch Amount" and "VCA Chnl Aftertouch Amount". However the command is ignored when VCF and VCA work in "Controller" mode.

4.1.4. PITCH BEND

"Pitch Bend" command has standard function – it detunes the VCO of the instrument. The range of the "Pitch Bend" is defined by the "VCO Pitch Bend Range" parameter and can be in the interval of ±0 to ±12 semitones.

The pitch shift range of the VCO might be limited upwards for the highest octave and the total pitch shift is limited to approx four tones. This limitation is done by the construction of the Vermona Synthesizer and can't be removed.

4.1.5. PROGRAM CHANGE

"Program Change" command switches the user presets of the interface. Numbers from 0 to 31 are accepted and they correspond to presets from Nr. 1 to Nr. 32.

Always when the "Program Change" is accepted, the VCO is muted and envelope generator (EG) is switched off. When the next MIDI "Note-On" command is received the interface starts to work normally accordingly to the parameters of new preset.

4.2. SYSTEM COMMANDS

4.2.1. MIDI CLOCK

"MIDI Clock" commands synchronizes the interval of the EG retrigger of the instrument if it works in "MIDI" mode (see preset parameter "EG Retrigger Mode").

Maximal speed is limited by the hardware construction of the instrument. This may also cause that when the MIDI song has very high tempo, the synchronized EG retrigger might be irregular.

4.2.2. RESET

When the "Reset" command is received, a complete interface hardware reset is executed – all Vermona Synthesizer circuits are set to their default status, same as after instrument switch on.

4.3. SYSTEM EXCLUSIVE MESSAGES

Interface is equipped by the System Exclusive communication protocol, that enables bi-directional data flow of the memory bulk dumps and some system functions. Detailed description of the System Exclusive communication is in separate manual.

Attached CD-ROM contains software generator for the easy creation of SysEx Messages for the communication of the interface and MIDI host system. The software generator can create any kind of message for the control of the interface.

5. TECHNICAL SPECIFICATION

MIDI bus :	according to MIDI Manufacturer Association standards
MIDI connectors :	2x DIN 41524 (5 pins / 180°)
Transit data delay MIDI IN → OUT :	max. 1 ms, typ. 0,32 ms
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
Range of operating temperature :	+10 to +35 °C
Relative environmental humidity :	up to 85 %

6. 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.

Manufacturer :

CHD Elektroservis
Nad kundratkou 27, 19000 Praha 9
Czech Republic

info@chd-el.cz
www.chd-el.cz

APPENDIX A. - MIDI IMPLEMENTATION CHART

MIDI IMPLEMENTATION CHART

Device : **VS-MIDI** Date : 9 / 2009

Model : **8-434** Version : 1.0

Function		Transmission	Reception	Remarks
Basic	Default	**X**	1~16	[1])
Channel	Changed	**X**	1~16	[1])
Mode	Default	**X**	Mode 3	Not Altered [2])
	Messages	**X**	**X**	
Note Number		**X**	0~127	[3])
Velocity	Note ON	**X**	**O**	
	Note OFF	**X**	**X**	
After	Key's	**X**	**X**	
Touch	Channel's	**X**	**O**	
Pitch Bender		**X**	**O**	
Control	16 to 28	**X**	**O**	Own controllers – see description
Changes	64	**X**	**O**	Hold
	68	**X**	**O**	Legato
	120	**X**	**O**	All Sound Off
	121	**X**	**O**	Reset All Controllers
	selectable 0~119	**X**	**O**	VCF Direct Control
	selectable 0~119	**X**	**O**	VCA Direct Control
Program Change		**X**	**O**	Preset Change / Patch Shift
System Exclusive		**O**	**O**	See description
System	Song Position	**X**	**X**	
Common	Song Select	**X**	**X**	
	Tune	**X**	**X**	
System	Clock	**X**	**O**	
Real Time	Command	**X**	**X**	
Others	Local ON/OFF	**X**	**X**	
	All Notes Off	**X**	**O**	
	Active Sensing	**X**	**X**	
	Reset	**X**	**O**	

Notes : [1]) Can be changed by user

[2]) Last six notes are stored in interface's buffer

[3]) Position of 44 acceptable notes depends on Key Shift setting

Mode 1 : **OMNI ON, POLY** Mode 2 : **OMNI ON, MONO** **O** : Yes

Mode 3 : **OMNI OFF, POLY** Mode 4 : **OMNI OFF, MONO** **X** : No

APPENDIX B. – ERROR INDICATION

If there is a fatal error occurred in the very exceptional case (e.g. MIDI communication), user is informed by the blinking of the indication LED. In this case, reset the interface e.g. switch the instrument off, wait for a while and switch the Vermona Synthesizer on again.

APPENDIX C. – MIDI LOOPBACK

If the interface is controlled by the sequencer (HW or SW) and is connected by both MIDI cables, the communication loop might occur and “freezes” the entire MIDI system.

To avoid this situation, turn off internal function named MIDI ECHO (or MIDI THRU) of used sequencer.