MDCB-2

MIDI / Juno-60 Interface

Model 8-422
ver. 2.0
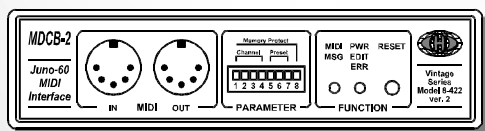
OWNER´S MANUAL
rev. 2.02

Table of contents:

Manufacturer :

CHD Elektroservis, s.r.o.
9. května 78/35, 198 00 Praha 9
Czech Republic

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

1. PRODUCT DESCRIPTION

MDCB-2 allows to connect analogue synthesizer Roland Juno-60 in MIDI setups and to control some of its functions. Since the MIDI norm did not even exist in its production, Roland Juno-60 does not have any MIDI output for MIDI bus.

There are standard channel commands (MIDI channel can be chosen optionally), system command as well as System Exclusive Messages used for the MIDI communication with MDCB-2.

The communication between MDCB-2 and Juno-60 is provided not only through the digital interface but also via analogue signals (control voltage, trigger and switch). These signals allow the control of Juno-60´s filter cutoff frequency, arpeggiator speed, "Hold" and "Patch Shift" functions.

Since the DCB communication is bidirectional, all pressed keys on the keyboard are transmitted back to DCB interface and converted in MDCB-2 to MIDI data afterwards. These MIDI data can be out to external MIDI sequencer for example..

All functions of MDCB-2 are controlled by user programmable parameters. Various combinations of parameter settings can be saved in one of the 64 user memories.

1.1. DCB COMMUNICATION

Roland produced various products with DCB interface in the end of the 70´s and beginning of 80´s. The most important were the Jupiter-8 and Juno-60 synthesizers that are still used by many studios and musicians thanks to their specific "analogue" sound. Since each of the instruments communicates slightly different way, it is not possible to use Jupiter-8 with MDCB-2 interface (it is designed for Juno-60 only). The MDCB-2 interface enables to transmit and receive commands for six tone generators only.

1.2. CONTROLLERS AND INDICATORS, CONNECTORS

The figure 1 shows the connectors, controllers and indicators on the front and rear panels of MDCB-2:

Fig.1 - Front and rear panels

Front Panel

1. MIDI bus input
2. MIDI bus output
3. MIDI channel choice switch, the default preset and memory protection numbers
4. MIDI bus activity indicator
5. Power ON indicator
6. Reset button
7. External power supply connector
8. CV Output for VCF
9. Output for HOLD
10. Output for PATCH SHIFT
11. Output for ARPG clock
12. DCB input / output

Rear Panel
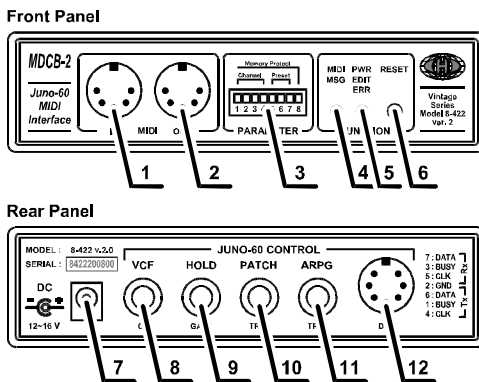
1.3. FUNCTIONS OF THE DEVICE

Figure 2 describes the block function chart of MDCB-2. Signal from MIDI bus coming to MIDI Input: MIDI-IN [1] is isolated by optocoupler and conducted to CPU. The data for MDCB-2 are selected and converted to the Juno-60 command signals.
- The "Note On / Off – Note Nr." commands are converted to the data for Juno-60 DCB interface,
- "Note On – Velocity", "Key Aftertouch", "Channel Aftertouch", "Control Changes – Nr. 1" commands are converted to the data for DA converter generating the control voltage (CV) for the VCF CONTROL input of Juno-60,
- "Control Change – Nr. 64" is used for Juno-60 PEDAL HOLD switch input,
- "Program Change" commands are converted to the trigger impulses for Juno-60 PATCH SHIFT input or they change presets of MDCB-2,
- "MIDI Clock" commands are converted to Juno-60 ARPEGGO CLOCK IN impulses.

The data from DCB IN/OUT [12] connector are processed by CPU and send In the opposite direction in MIDI format to MIDI-OUT [2] output. MIDI-OUT [2] output is used for SysEx communication of the MDCB-2 with master system.

Fig. 2 – Block scheme
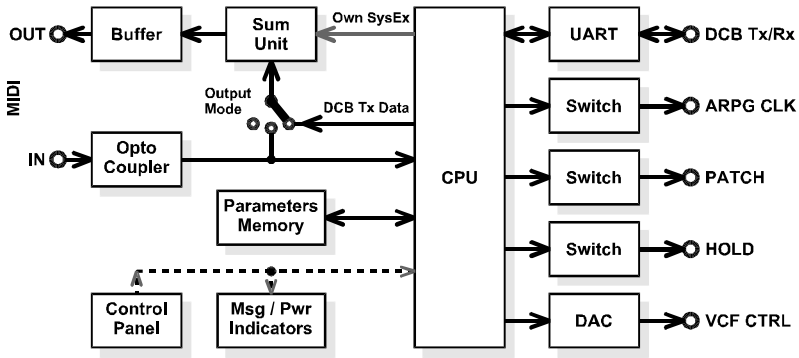
2. DEVICE SET-UP

Connection of the MDCB-2 to the Juno-60 synthesizer and MIDI system is described on Fig.3. It is not necessary to use all cables between MDCB-2 and Juno-60. It depends on user's requirements which blocks and circuits of Juno-60 will be controlled by MIDI commands and which cables are connected.

Fig. 3 – System set-up
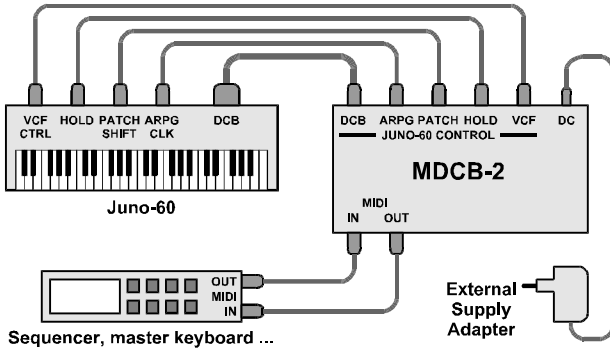
MDCB-2 can control two or more Juno-60 synthesizers. For detailed description see the notes on the supplied CD-ROM or at: http://www.chd-el.cz website.

2.1. POWER SUPPLY

The power is supplied to the connector DC [7]. The connector is standard type (6 / 2,1 mm). External power supply must be able to provide at least 100 mA at 12 - 15 volt. (recommended type – MW1203GS).

The positive pole is on inner pin, the negative on the external pin – see Fig.4. The polarity is also depicted on the rear panel of the device. MDCB-2 is protected against wrong polarity. The device does not work in such case, but it will not be damaged.

Fig. 4 – Supply adapter

5
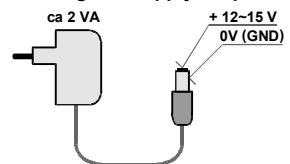
2.2. CONNECTION TO MIDI SYSTEM

MDCB-2 is connected to the MIDI system with standard MIDI cables with DIN 41524 connectors (5 pins 180°). The data from the master system (PC, sequencer, master keyboard) are coming at MIDI-IN [1], output data from MDCB-2 are sent to MIDI-OUT [2]. To control the Juno-60 from the MIDI system only one MIDI cable connected to the MDCB-2 MIDI input is needed.

2.3. CONNECTING THE MDCB-2 WITH JUNO-60

MDCB-2 enables to control more functions of the Juno-60 synthesizer than those supported by DCB. There are also another cables necessary to do so. Four standard mono jack cables are needed for maximal configuration, plus the special DCB cable. See the Fig. 5 for detailed description of the connection of cables.

Fig. 5 – Cables
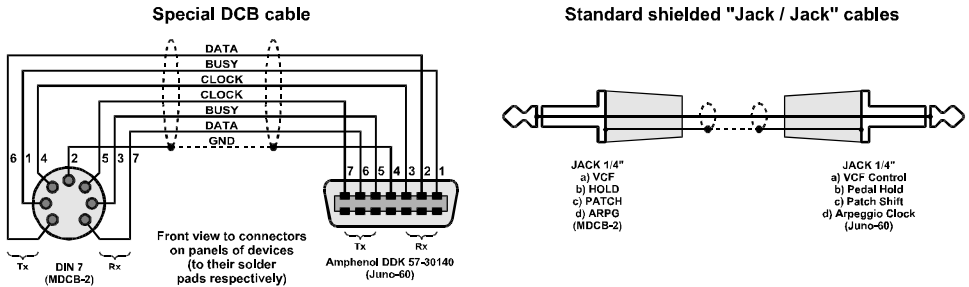
2.3.1. DCB INTERFACE CONNECTION

DCB IN/OUT [12] connector on the rear panel is used to connect MDCB-2 with Juno-60. The connector is DIN7 type. Standard DCB interface uses Amphenol DDK 57-30140 connector. A special cable is needed to connect MDCB-2 and Juno-60 thus. See Fig. 5. for the connection details. The special cable is supplied with MDCB-2.

2.3.2. "ARPG", "HOLD", "PATCH" OUTPUTS CONNECTION

These three outputs of the MDCB-2 are connected to Juno-60 inputs with usual Jack 1/4" mono audio cables. (see Fig.5)

For the "Hold" function connect the MDCB-2 HOLD [9] output with the PEDAL HOLD input on he Juno-60. To use the patch shift function connect MDCB-2 output PATCH [10] with the PATCH SHIFT on the Juno-60. For the arpeggio MIDI clock synchronization connect the MDCB-2 ARPG [11] output with ARPEGGIO CLOCK IN on Juno-60.

2.3.3. "VCF" OUTPUT CONNECTION

If the filter (VCF) control is required, VCF [8] output on MDCB-2 must be connected with the VCF CONTROL input on Juno-60. To connect the VCF [8] output with Juno 60 use usual Jack/Jack cable with Jack 1/4" mono connectors (see Fig. 5).

To use the maximal range of the Juno 60 VCF with MDCB-2 adjust the VCF panel sliders on the Juno 60 as displayed on the picture. The "FREQ" slider in middle position enables MDCB-2 to control the VCF cutoff in full range.

Since MDCB-2 uses it is own internal LFO for VCF modulation it is recommended to set the "LFO" slider on Juno-60 to its zero position. But for special sounds and effects both LFOs (Juno 60s and MDCB-2) can be used simultaneously.
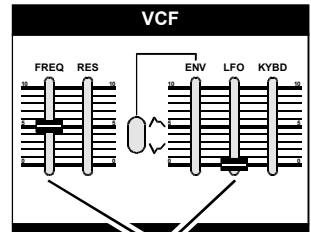
The best position of controllers for using Juno-60 with MDCB-2

6

3. BASIC SETTINGS AND OPERATION

There are only few hardware buttons/switches on the MDCB-2 for manual control. Most of the functions are controlled by the MIDI commands from MIDI master system (master keyboard, PC, sequencer etc.). These commands are either channel, common system and System Exclusive MIDI messages. These commands control the parameters of the MDCB-2. All settings made by these MIDI messages can be saved in memory for future use.

Few basic functions are set by PARAMETER [3] multi-switch. The sections 1 – 7 of the PARAMETER [3] switch become active after the device reset, any changes made during the MDCB-2 operation take no effect. It is necessary to reset the device by pressing RESET [6] button to confirm these changes.

3.1. MIDI CHANNEL AND "DEVICE ID" SELECTION

Table 1 – Select the basic MIDI channel and "Device ID" by DIL switch											
PARAMETER switch section				MIDI channel	Device ID	PARAMETER switch section				MIDI channel	Device ID
1	2	3	4			1	2	3	4		
Off	off	off	off	1	00 hex	off	off	off	on	9	08 hex
On	off	off	off	2	01 hex	on	off	off	on	10	09 hex
Off	on	off	off	3	02 hex	off	on	off	on	11	0A hex
On	on	off	off	4	03 hex	on	on	off	on	12	0B hex
Off	off	on	off	5	04 hex	off	off	on	on	13	0C hex
On	off	on	off	6	05 hex	on	off	on	on	14	0D hex
Off	on	on	off	7	06 hex	off	on	on	on	15	0E hex
On	on	on	off	8	07 hex	on	on	on	on	16	0F hex
Notes : ON → manual in lower position, OFF → manual in upper position											

Basic MIDI channel for data receiving and transmitting is set by the sections 1 – 4 ("Channel") of the PARAMETER [3] switch. Selected number of the MIDI channel works also as a Device ID for SysEx communication.

See the table 1 for the settings. The basic channel is selected only this way. It is not possible to change basic MIDI channel by any MIDI command.

The state of the sections 1 - 4 of the PARAMETER switch is actualized upon device reset. (RESET [6] button or MIDI SysEx Msg). Any changes made during the MDCB-2 operation take no effect.
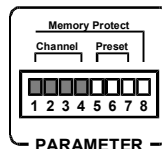
3.2. DEFAULT PRESET

Table 2 – Default preset selection by DIL switch							
PARAMETER switch section			Default preset	PARAMETER switch section			Default preset
5	6	7		5	6	7	
Off	off	off	1	off	off	on	5
On	off	off	2	on	off	on	6
Off	on	off	3	off	on	on	7
On	on	off	4	on	on	on	8
Notes : ON → manual in lower position, OFF → manual in upper position							

The number of the default preset selected automatically after the device reset is set the sections 5 - 7 ("Preset") of the PARAMETER [3] switch as described in table 2. The state of the sections 5 - 7 of the PARAMETER switch is actualized upon device reset. (RESET [6] button or MIDI SysEx Msg). Any changes made during the MDCB-2 operation take no effect. Only presets Nr.1 – 8 can be selected as default by the PARAMETER [3] switch.

Changing the preset during the operation of the MDCB-2 can be done by MIDI command. All presets Nr. 1 to Nr. 64 are available this way. For the preset change procedure see chapter MIDI communication.

7
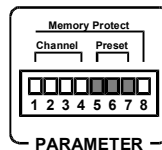
3.3. MEMORY PROTECTION

Parameter memory is protected by section 8 ("Memory Protect") of PARAMETER [3] switch against deleting and rewriting. If the switch number 8 is in lower position (= On) protection is set ON. It is not allowed to save data in memory. In the upper position (= Off) protection is set off, the data can be saved. The memory protection can be used during the MDCB-2 operation. It is not needed to restart the device.
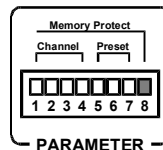
3.4. INITIALIZATION SEQUENCE

Initialization sequence (hardware reset) of the device is executed automatically after the MDCB-2 is switched or manually by pressing the RESET [6] button or by SysEx Msg. During the initialization sequence, all functions of the MDCB-2 are reset to default values and the internal memory buffers are erased. The actual state of the system PARAMETER [3] switch is refreshed accordingly to the selected preset (section 5 - 7 of the switch). The selected preset parameters are recalled to the editing buffer. Also the values of the system parameters are copied form the memory in temporary system parameter buffer.
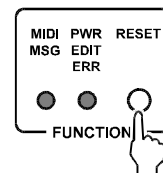
Manual initialization can be used after th PARAMETER [3] switch adjustments, during a performance or after software sequencer collapse etc. Reset is not an equivalent of the "PANIC" function known from MIDI master keyboards! The note off command is not transmitted during the reset procedure.

3.5. OPERATION MODE INDICATION

Operation modes of the MDCB-2 are indicated by two LED diodes on the front panel:

The green LED MSG [4] indicates the activity of the MIDI bus on the input and output, accordingly to the "MIDI Message Indicator" system parameter setting

The red LED PWR [5] indicates the power on state. If this LED does not light after power on the device there is probably a power supply defect.

During the chord editing in CHORD mode, the red LED PWR [5] blinks periodically each 0,2 second.

If the fatal error occurs during the MDCB-2 operation the red LED PWR [5] starts to blink not periodically the number of the blinks indicates the number of the error (see appendices).
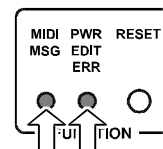
4. PARAMETERS

Fig. 6 – Structure of the MDCB-2 Internal memory
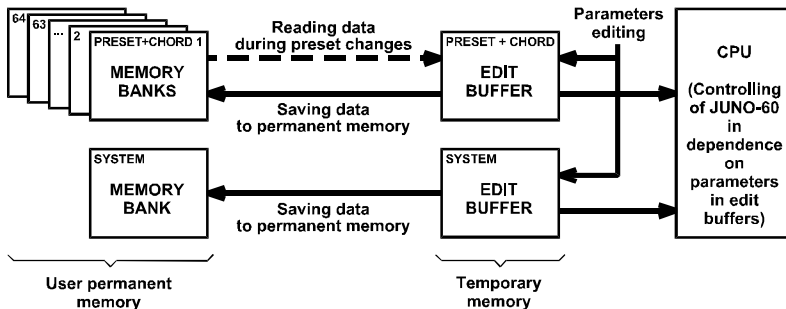
There are two basic groups of the parameters that determine the MDCB-2 processing of the MIDI and DCB data – system parameters and preset parameters.

All parameters are user editable. The temporary settings in editing buffers can be saved in memory. There is one memory bank for system parameters and 64 banks for preset parameters. Parameters can be edited and saved in memory by MIDI Control Changes or SysEx Messages – see Fig. 6.

The last entered value of the parameter is valid for both editing ways. If the device is switched off with edited parameters in the editing buffer, all these parameter values are lost. It is necessary to save edited values in the memory before switching off the device.

8

4.1. SYSTEM PARAMETERS

The system parameters control the hardware circuits of the MDCB-2. System parameters are independent on the actual preset. Any change of the system parameters will influence all presets the same way.

System parameter values can be adjusted and saved in memory by MIDI Control Changes or by SysEx Messages.

For the system parameters "Factory Reset" values see Tab. 3 ("Factory Reset" details in MIDI SysEx communication description.

Table 3 – Range of values and default values of system parameters						
Parameter name	Available range		"Factory Reset" values		MIDI CC Nr. for settings	
	[dec]	[hex]	[dec]	[hex]	[dec]	[hex]
MIDI Message Indicator	0 ~ 3	00 ~ 03	3	03	110	6E
MIDI Clock Indicator	0 ~ 1	00 ~ 01	0	00	111	6F
Rx Multi-Channel	0 ~ 1	00 ~ 01	0	00	112	70
MIDI Out Mode	0 ~ 2	00 ~ 02	2	02	113	71
Auto-Reset	0 ~ 1	00 ~ 01	1	01	114	72
Pgm Change Mode	0 ~ 3	00 ~ 01	3	03	115	73
Tx Channel Shift	0 ~ 15	00 ~ 0F	0	00	116	74
Tx Note-Off Mode	0 ~ 1	00 ~ 01	0	00	117	75
VCF Controller	0 ~ 119	00 ~ 77	6	06	-	-
Arpeggio Controller	0 ~ 119	00 ~ 77	96	60	-	-
Arpg Pulse Duration	2 ~ 50	02 ~ 32	5	05	-	-
Patch Shift Pulse Duration	2 ~ 50	02 ~ 32	5	05	-	-

The new values of the parameters are during the editing saved in temporary editing buffer only. To save the values for the future work, after the restart of the MDCB-2, it is necessary to save the setting in the user memory. This can be done by MIDI commands too.

4.1.1. MIDI MESSAGE INDICATOR

Parameter determines the function of the green LED MIDI-MSG, indicating the processed MIDI in MDCB-2 (MIDI data at the input and the output).

Parameter can be set in the range of 0 (00h) to 3 (03h), the individual values of the parameter are described bellow :

▪ 0 (00h) → "NONE" No MIDI data indicated (both for input and output).
▪ 1 (01h) → "IN" Only data received at MIDI-IN [1] are identified
▪ 2 (02h) → "OUT" Only data transmitted at MIDI-OUT [2] are identified.
▪ 3 (03h) → "BOTH" Both MIDI-IN [1] and MIDI-OUT [2] data are indicated.

The value of the parameter can be set by MIDI Control Change Nr. 110 or by SysEx Msg (see MIDI SysEx communication description).

4.1.2. MIDI CLOCK INDICATOR

Parameter enables or disables the indication of the MIDI Clock data at the MIDI-IN [1] input by the MSG LED [4].

There are only two values for this parameter available, 0 (00h) or 1 (01h). The 0 (00h) value disables the MIDI Clock indication, 1 (01h) enables MIDI Clock indication. To enable the MIDI Clock indication, the indication of the MIDI data at the MIDI input must be enabled by the system parameter "MIDI Message Indicator" too.

The value of the parameter can be set by MIDI Control Change Nr. 111 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.1.3. RX MULTI-CHANNEL

Parameter selects one of the two MDCB-2 MIDI modes.

(00h) value of the parameter is for the normal mode. In this mode all accepted channel MIDI commands are received on the basic MIDI channel selected by the sections 1 - 4 ("Channel") of the PARAMETER [3] switch. If the parameter value is 1 (01h), the "Multi-Channel" mode is active. The commands are received on two MIDI channels in this mode. Only "Note On", "Note Off", "Key Aftertouch", "Channel Aftertouch" are received on the basic MIDI channel. "Control Changes", "Pitch Wheel" and "Program Change" commands are received on the MIDI chanel higher by 1. If the basic channel is Nr. 16, the control channel is Nr. 1.

The value of the parameter can be set by MIDI Control Change Nr. 112 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.1.4. MIDI OUT MODE

Parameter determines the MIDI-OUT [2] functions.0 Own MIDI SysEx Messages for the communication with the MIDI master system (PC, Sequencer, etc.) are always transmitted at the MIDI-OUT [2] output independently on the selected function. Parameter can be set in the range of 0 (00h) - 2 (02h), with the following functions:

- 0 (00h) → "OFF"   Only own MIDI SysEx Messages are transmitted at the MIDI-OUT [2] output.
- 1 (01h) → "THRU"   MIDI-OUT [2] output is configured for the "Thru" function. All date from the MIDI-IN [1] input; are merged with own MIDI SysEx Messages.
- 2 (02h) → "DCB"   Incoming data from the DCB output of the juno-60 (converted into MIDI commands) are merged with own MIDI SysEx Messages and transmitted at the MIDI-OUT [2].

The value of the parameter can be set by MIDI Control Change Nr. 113 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.1.5. AUTO-RESET

The parameter switches on (value 1) or off (value 0) the function that automatically resets the MDCB-2 during the fatal error (see chapter 3.6.). If the function is off, the MDCB-2 is stopped when fatal error occurs, it is necessary to press the RESET [6] button manually. If the function is on, there is only short gap and the device continues to work – no user action is necessary.

The value of the parameter can set by MIDI Control Change Nr. 114 or by MIDI SysEx Msg (see SysEx communication description).

4.1.6. PGM CHANGE MODE

Parameter determines the reaction of the MDCB-2 to MIDI "Program Change" command. This command can be used for "Patch Shift" signal for Juno-60 and for changing the MDCB-2 own presets.

Parameter can be set in the range of 0 (00h) - 3 (03h) the following way :

- 0 (00h) → "OFF"   MIDI "Program Change" commands are ignored.
- 1 (01h) → "PRESET" „Program Change" commands with the values 0 - 63 select the MDCB-2 presets (presets 1 - 64), values 64 - 127 are ignored.
- 2 (02h) → "PATCH"   All "Program Change" commands with any program numbers generate impulses for the PATCH SHIFT output of the MDCB-2.
- 3 (03h) → "BOTH"   „Program Change" commands 0 - 63 select MDCB-2 own presets (presets 1 - 64), "Program Change" commands 64 - 127 generate impulses at the MDCB-2 PATCH SHIFT output.

The value of the parameter can be set by MIDI Control Change Nr. 115 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.1.7. TX CHANNEL SHIFT

This parameter works only for the "DCB" MIDI Out Mode, when incoming data from the DCB output of the Juno-60 (converted into MIDI commands) are transmitted at the MIDI-OUT [2]. These data are by default transmitted at the same channel as those that are received. This channel offset function is provided to choose different transmitting and receiving channels. Allowed value range is 0 (00h) - 15 (0Fh). The value of the parameter determines the number of the transmitting channel offset value. For the 0 (00h) is the number of the transmitting

channel same as the receiving MIDI channel. 1 (01h) value offsets the transmitting MIDI channel by 1 compared to the receiving channel etc.

The value of the parameter can be set by MIDI Control Change Nr. 116 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.1.8. TX NOTE OFF MODE

This parameter works only for the "DCB" MIDI Out Mode, when incoming data from the DCB output of the juno-60 (converted into MIDI commands) are transmitted at the MIDI-OUT [2]. Parameter determines the type of the MIDI commands transmitted by the MDCB-2 during the Juno-60 key release.

- 0 (00h) → "NOTE-OFF"   The key release is transmitted as a "Note-Off" command with the velocity 64.
- 1 (01h) → "NOTE-ON"   The key release is transmitted as a "Note-On" command with the velocity 0.

The value of the parameter can be set by MIDI Control Change Nr. 117 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.1.9. VCF CONTROLLER

Control voltage (CV) for Juno-60 VCF can be generated by various MIDI commands or can be controlled by one MIDI Control Change only. The number of the controller for the VCF modulation is user definable by the VCF Controller parameter. The value of this parameter (0 - 127) determines the MIDI Control Change Nr. Selected for the Juno-60 VCF modulation.

The value of the parameter can be changed and saved in the system parameter memory only by MIDI SysEx Msg (see MIDI SysEx communication description).

ATTENTION ! For the controllers already used by the MDCB-2 for different purposes (CC1 – Modulation, CC64 – Hold, CC 70~89 – preset parameter controllers, CC 105~119 – system parameter and functions controller, CC 120, 121, 123 – mode commands), the original controller function is omitted and the controller is used for the VCF modulation only.

4.1.10. ARPEGGIO CONTROLLER

Synchronization clock impulses for JUNO-60 arpeggiator can be derived from the free running generator or from the MIDI oar can be generated upon receiving one MIDI controller. The number of the controller that is converted directly to the clock impulses for the Juno-60 arpeggiator is user definable by the Arpeggio Controller system parameter. The value of this parameter (0 - 127) determines the MIDI Control Change Nr. Selected for the Juno-60 arpeggiator.

The value of the parameter can be changed and saved in the system parameter memory only by MIDI SysEx Msg (see MIDI SysEx communication description).

ATTENTION ! For the controllers already used by the MDCB-2 for different purposes (CC1 – Modulation, CC64 – Hold, CC 70~89 – preset parameter controllers, CC 105~119 – system parameter and functions controller, CC 120, 121, 123 – mode commands), the original controller function is omitted and the controller is used for the arpeggiator only.

.
4.1.11. ARPEGGIO CLOCK PULSE DURATION

Parameter determines the length of the trigger impulses at the outputs PATCH [9] and ARPG [9]. The value of the parameter multiplied by 0,384 determines the length of the trigger impulse in milliseconds. Parameter can be set in the range of 2 - 127, equal to the impulse lengths approx. 0,8 ms - 49 ms. Factory predefined value 5 (approx. 2 ms) is suitable for the most of the situations. Higher times can be used for extremely long or low quality cables..

The value of the parameter can be changed and saved in the system parameter memory only by MIDI SysEx Msg (see MIDI SysEx communication description).

4.1.12. PATCH SHIFT PULSE DURATION

Parameter determines the length of the trigger impulses at the outputs PATCH [9] and ARPG [9]. The value of the parameter multiplied by 0,384 determines the length of the trigger impulse in milliseconds. Parameter can be set in the range of 2 - 127, equal to the impulse lengths approx. 0,8 ms - 49 ms. Factory predefined value 25 (approx. 10 ms) is suitable for the most of the situations. Higher times can be used for extremely long or low quality cables..

The value of the parameter can be changed and saved in the system parameter memory only by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2. PRESET PARAMETERS

Preset parameter determines the MDCB-2 functions, directly involving the Juno-60 tone creation. Preset parameters determine the MIDI commands and their influence on the Juno-60 circuits.

The preset parameter values are set and saved in user memory by MIDI Control Change or by MIDI SysEx Messages. The "Factory Reset" preset parameter values (see MIDI SysEx communication description), are described in Tab. 4 (default values are valid for all user presets).

Tab. 4 – Preset parameter ranges and "Factory Reset" values						
Parameter name	Available range		"Factory Reset" values		MIDI CC Nr. for settings	
	[dec]	[hex]	[dec]	[hex]	[dec]	[hex]
DCO Key Shift	28 ~ 95	1C ~ 5F	64	40	70	46
DCO Mode	0 ~ 1	00 ~ 01	0	00	71	47
LFO Sync [1]	0 ~ 1	00 ~ 01	0	00	72	48
LFO Wave [1]	0 ~ 63	00 ~ 3F	47	2F	73	49
LFO Rate [1]	0 ~ 127	00 ~ 7F	64	40	74	4A
LFO Delay [1]	0 ~ 127	00 ~ 7F	0	00	75	4B
LFO Retrigger [1]	0 ~ 1	00 ~ 01	0	00	76	4C
VCF Control Mode	0 ~ 2	00 ~ 02	0	00	77	4D
VCF Pitch Wheel Range [2]	0 ~ 127	00 ~ 7F	127	7F	78	4E
VCF Cutoff [3]	0 ~ 127	00 ~ 7F	64	40	79	4F
VCF LFO Amount [1]	0 ~ 127	00 ~ 7F	64	40	80	50
VCF MOD Amount [1]	0 ~ 127	00 ~ 7F	64	40	81	51
VCF Velocity Polarity [1]	0 ~ 3	00 ~ 03	2	02	82	52
VCF Velocity Amount [1]	0 ~ 127	00 ~ 7F	64	40	83	53
VCF Aftertouch Polarity [1]	0 ~ 3	00 ~ 03	2	02	84	54
VCF Key After Amount [1]	0 ~ 127	00 ~ 7F	64	10	85	55
VCF Channel After Amount [1]	0 ~ 127	00 ~ 7F	64	40	86	56
ARPG Sync	0 ~ 2	00 ~ 02	1	01	87	57
ARPG Rate	0 ~ 127	00 ~ 7F	120	78	88	58
ARPG Key Chase	0 ~ 1	00 ~ 01	1	01	89	59

Note.:
[1] Parameter active only in mode VCF "Normal" (VCF Control Mode = 0)
[2] Parameter active only in mode VCF "Pitch Wheel" (VCF Control Mode = 2)
[3] Parameter active only in mode s VCF "Normal" and "Pitch Wheel" (VCF Control Mode = 0 or 2)

All edited values are saved in temporary edit buffer only. The edit buffer is deleted after the preset change, reset or switch off the MDCB-2. To save the edited values use one of the 64 user memories. The data from the edit buffer is saved by the MIDI command.

4.2.1. DCO KEY SHIFT (TRANSPOSE)

The parameter transposes the keyboard range of the Juno-60 in semitones in the range of minus three and plus two octaves. If there is not chosen any other shift, the lowest key of the Juno-60 keyboard is equal to the MIDI note number 36, for the transposition of -3 octaves MIDI note number 0, for +2 octaves MIDI note number 60. For detailed settings see Fig. 7. The parameter determines the keyboard transpose not only from the MIDI side, but also transposes the data coming from the DCB output of the Juno-60.

Parameter can be set in the range of 28 (1Ch) to 88 (58h). There is no transpose for the middle value of 64 (40h). Decreasing the value shifts the keyboard to the left, increasing shifts the keyboard to the right.

The value of the parameter can be set by MIDI Control Change Nr. 70 or by MIDI SysEx Msg (see MIDI SysEx communication description). If the MDCB-2 is in chord edit mode the parameter can not be adjusted. All attempts to do so are ignored.

Fig. 7 - Juno-60 keyboard position in dependence on "Key Shift" parameter

Range of standard keyboards

88 keys

76 keys

61 keys (Juno-60)

Key Shift = -36
Key Shift = -24
Key Shift = -12
Key Shift = ±0
Key Shift = +12
Key Shift = +24

Basic position

Tone :
MIDI code :
DCB code :
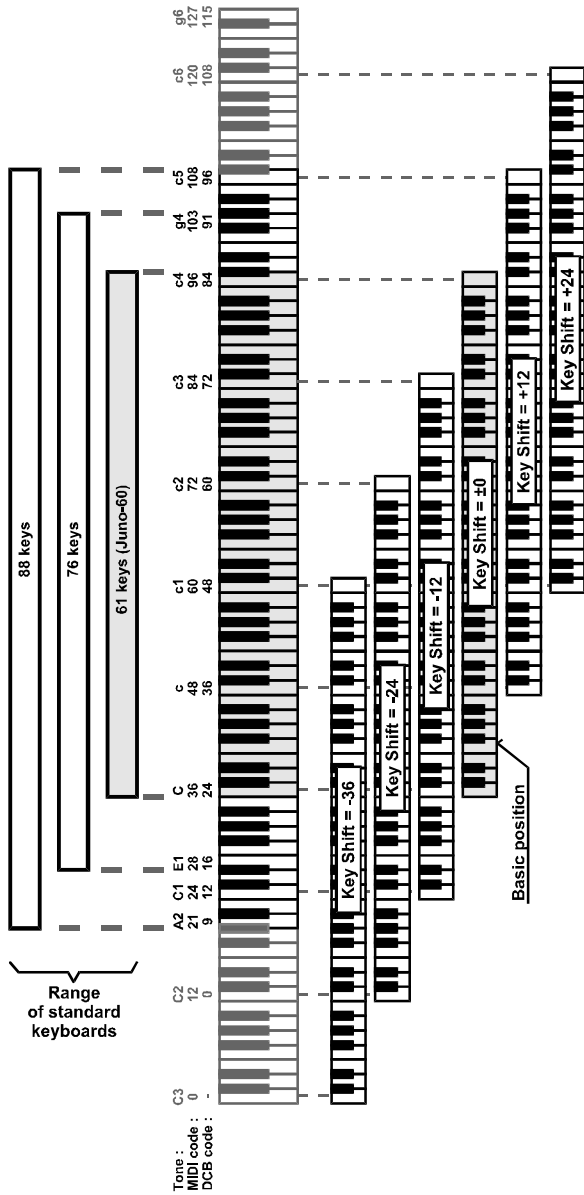
4.2.2. DCO MODE

Parameter selects the tone generators play priority modes. There are two modes available, POLY and CHORD.

The POLY mode is standard working mode. Each MIDI note (pressed key) uses one tone generator. The polyphony is 6 voices.

CHORD mode is a special mode generated by MDCB-2. There are no such mode available on Juno.60 from its own panel or keyboard. This mode os monophonic – only one MIDI note is accepted. The last note priority rule is used. The predefined chord is assigned to the active note. The chord can include up to 6 tones in the range ±1 octave form the active note.

0 (00h) value of the parameter sets the POLY mode, 1 (01h) CHORD mode. The value of the parameter can be set by MIDI Control Change Nr. 71 or by MIDI SysEx Msg (see MIDI SysEx communication description). If the MDCB-2 is in chord edit mode the parameter can not be adjusted. All attempts to do so are ignored.

4.2.3. LFO SYNC

MDCB-2 contains internal LFO, that can be used for modulation of the instrument´s VCF. There are two modes of the internal LFO synchronization available: **Free"** (the value of the parameter is equal 0) and **"MIDI Sync"** (the value of the parameter is equal 1).

„Free" mode

Internal LFO runs freely. Its speed is defined by the preset parameter "LFO Rate" in absolute values [Hz] only. Also the "LFO Delay" preset parameter is manually set in seconds.

"MIDI Sync" mode

The speed of the internal LFO is besides the "LFO Rate" parameter determined by the MIDI Clock synchronization impulses (BPM tempo of the sequencer track). "LFO Delay" is also derived form the MIDI tempo of the sequencer track. "LFO Rate" and "LFO Delay" preset parameters are set in relative 1/32 note values in this case. The value of the parameter can be adjusted by MIDI Control Change Nr. 72 or by MIDI SysEx Msg (see SysEx communication description).

13

4.2.4. LFO WAVEFORM

Parameter selects the required waveform the internal LFO for the modulation of the Juno-60. Table 5 shows the values of the parameter with the respective waveforms. The parameter range is 0 (00h) to 89 (59h), value of the parameter can be adjusted by MIDI controller (Control Changes) Nr. 73 or by SysEx Message (see SysEx communication).

Tab 5. – LFO modulation waveforms					
Param. value	Name	Waveform	Param. value	Name	Waveform
0	Triangle 0% / 0°		27	Trapezoid 62,5%	
1	Triangle 0% / 180°		28	Trapezoid 75%	
2	Triangle 12,5% / 0°		29	Trapezoid 87,5%	
3	Triangle 12,5% / 180°		30	Pulse 12,5%	
4	Triangle 25% / 0°		31	Pulse 25%	
5	Triangle 25% / 180°		32	Pulse 37,5%	
6	Triangle 37,5% / 0°		33	Pulse 50%	
7	Triangle 37,5% / 180°		34	Pulse 62,5%	
8	Triangle 50% / 0°		35	Pulse 75%	
9	Triangle 50% / 180°		36	Pulse 87,5%	
10	Triangle 62,5% / 0°		37	Peak 25%	
11	Triangle 62,5% / 180°		38	Peak 37,5%	
12	Triangle 75% / 0°		39	Peak 50%	
13	Triangle 75% / 180°		40	Peak 62,5%	
14	Triangle 87,5% / 0°		41	Peak 75%	
15	Triangle 87,5% / 180°		42	Sink 25%	
16	Triangle 100% / 0°		43	Sink 37,5%	
17	Triangle 100% / 180°		44	Sink 50%	
18	Square 12,5%		45	Sink 62,5%	
19	Square 25%		46	Sink 75%	
20	Square 37,5%		47	Sine / 0°	
21	Square 50%		48	Sine / 180°	
22	Square 62,5%		49	Double Sine / 0°	
23	Square 75%		50	Double Sine / 180°	
24	Square 87,5%		51	Exp	
25	Trapezoid 37,5%		52	Inverted Exp	
26	Trapezoid 50%		53	Log	

14

Param. value	Name	Waveform	Param. value	Name	Waveform
		Tab 5. – LFO modulation waveforms (continued)			
54	Inverted Log		72	Groove 9	
55	4 Stairs Up		73	Groove 10	
56	4 Stairs Down		74	Groove 11	
57	3 Stairs Up		75	Groove 12	
58	3 Stairs Down		76	Groove 13	
59	Noise A		77	Groove 14	
60	Noise B		78	Groove 15	
61	Noise C		79	Groove 16	
62	Noise D		80	Groove 17	
63	Noise E		81	Groove 18	
64	Groove 1		82	Groove 19	
65	Groove 2		83	Groove 20	
66	Groove 3		84	Groove 21	
67	Groove 4		85	Groove 22	
68	Groove 5		86	Groove 23	
69	Groove 6		87	Groove 24	
70	Groove 7		88	Groove 25	
71	Groove 8		89	Groove 26	

The waveforms of the same name distinguished by 0° resp. 180° are the same, they differs only in the starting polarity (0° or 180° means the phase shift of the signal). Waveforms Nr. 64 to 89 (Groove) can be used for rhythmic sequences with lower LFO speeds.

4.2.5. LFO RATE

Parameter defines the speed of internal LFO. The adjustment of the LFO speed depends on the LFO synchronization mode (see "LFO Sync" parameter):

Free running LFO - **Free**
The speed of the LFO is done only by "LFO Rate" parameter value and is set in absolute values [Hz] see Fig. 8. The frequency range of the LFO is approx. 0,2 Hz - 10 Hz.

Synchronized LFO - **MIDI Sync**
The speed of the LFO is derived form the MIDI Clock synchronization impulses, (BPM of the sequencer track). One pulse of the LFO is set in relative values (1/32 note). The range of the LFO pulse period length (one pulse) is 1 to 64 1/32 notes, the step is 1/32 – see Fig. 9. Allowed track speed (number of MIDI Clock impulses) is limited. The slowest tempo is 13 BPM. The highest possible tempo is 360 BPM for the parameter values of 0 - 123, 305 BPM for 124 - 125 and 152 BPM for 126 - 127.

If the frequency of the MIDI Clock synchronization impulses (track BPM) is out of the allowed range, MDCB-2 ignores such tempo and operates at last previously valid tempo.

Parameter value can be set in the range of 0 (00h) to 127 (7Fh), the selected values are equal to internal LFO speed as described on Fig. 8 and 9 and table 9 (see appendices). The value of the parameter can be set by MIDI Control Change Nr. 74 or by MIDI SysEx Msg (see MIDI SysEx communication description).

15

Fig. 8 – Speed of the "Free running" internal LFO
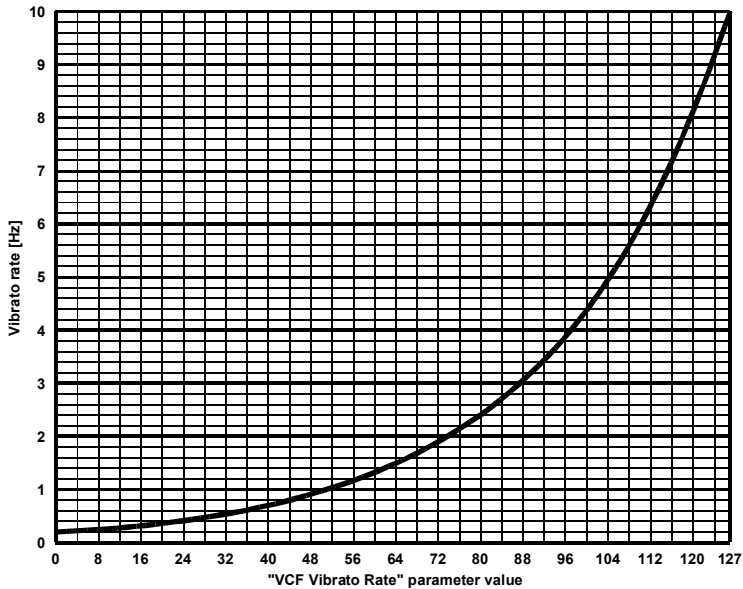
Fig. 9 – Speed of the "MIDI synchronized" internal LFO
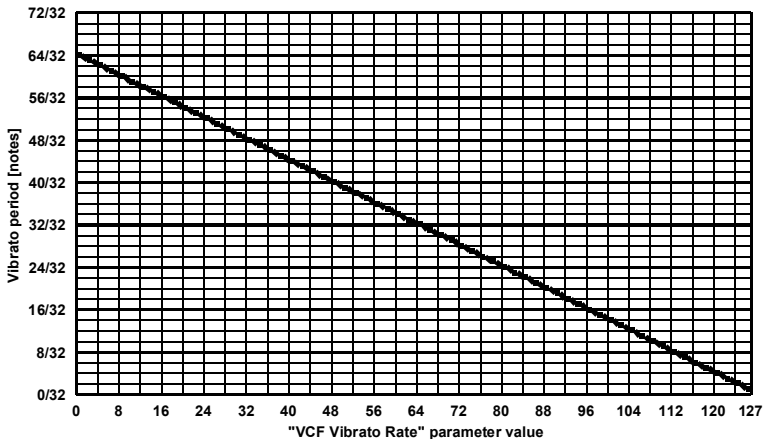
Note: The maximum of valid tempo of song is : 152 BPM for parameter values 126 and 127,
305 BPM for parameter values 124 and 125,
360 BPM for values 0 to 123

4.2.6. LFO DELAY

Parameter determines the delay time of the internal LFO start (delayed attack of the vibrato effect) after the key press. The LFO delay settings depends on the synchronization mode (see preset parameter "LFO Sync") :

16

Fig. 10 – Delay of free running internal LFO
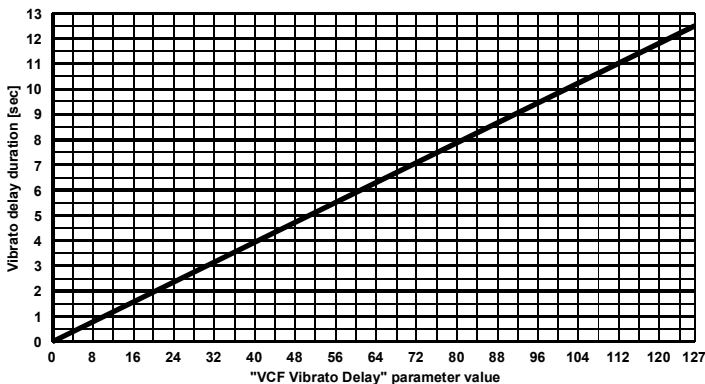
Fig. 11 – Delay of the "MIDI synchronized" internal LFO
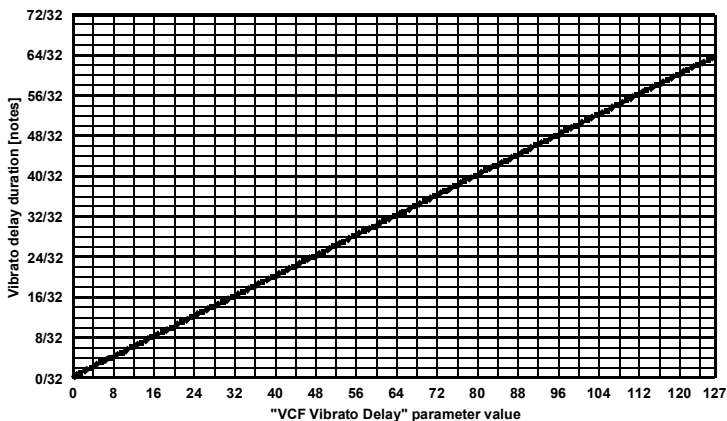
Free running LFO – **Free**

The delay time is defined by the "LFO Delay" parameter only. It is set in absolute values [sec] accordingly to the Fig. 10. The delay time range is 0 (the vibrato effect is activated immediately after the key is pressed) to approx. 12,5 seconds.

Synchronized LFO - **MIDI Sync**

The delay time is defined by the MIDI Clock synchronization impulses (BPM of the MIDI track). It is inserted in the relative values (1/32 notes) accordingly to the Fig. 11. The allowed tempo range is 13 BPM to 360 BPM. The range of the delay time is 0/32 (the vibrato effect is active immediately after the key is pressed) to 64/32 (delay of 1,6 seconds) at 360 BPM to 48 seconds at 13 BPM

Parameter value can be set in the range of 0 (00h) to 127 (7Fh). For the LFO delay times see the Fig. 9 and 10 and table 10 (see appendices). The value of the parameter can be set by MIDI Control Change Nr. 75 or by MIDI SysEx Msg (see MIDI SysEx communication description).

17

4.2.7. LFO RETRIGGER

The parameter switches on or off the LFO retrigger function after each key is pressed (after MIDI note On command).

If the parameter is set to 0 (Retrigger = Off), the LFO retriggering is switched off and start of the internal LFO (including the "LFO Delay" parameter) is executed only after first valid "Note On" MIDI command after deactivation of all tone generators (first key pressing after releasing of all keys).

If the parameter is set to 1 (Retrigger = On), the LFO retriggering is switched on and start of the internal LFO is executed after each valid "Note On" MIDI command, i.e. after each key pressing.

The value of the parameter can be set by MIDI Control Change Nr. 76 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.8. VCF CONTROL MODE

Parameter determines the Juno-60 VCF control. There are three modes available : "**Normal**" (parameter value 0), "**Controller**" (parameter value 1) and "**Pitch Wheel**" (parameter value 2).

"Normal" mode

Normal control of the VCF. The VCF control voltage (CV) setting is defined by the preset parameters (see Tab. 4) and by the received "Note On - Velocity", "Key Aftertouch", "Channel Aftertouch", "Control Change Nr. 1 – Modulation" MIDI commands. In this case the control voltage (CV) modulation for the Juno-60 VCF by the internal LFO is allowed, (i.e. vibrato effect).

"Controller" mode

Special mode – VCF is adjusted by one MIDI controller. The number of this controllers defined by the "VCF Controller" system parameter. The control voltage (CV) for the VCF modulation is controlled by the selected controller. Other preset parameters do not affect the VCF at all – they are ignored by the device. The internal LFO is switched off in "Controller" mode, so it is not possible to activate the vibrato effect. This mode can be used for atypical sound effects or irregular VCF modulations etc.

"Pitch Wheel" mode

Special mode – VCF is controlled by Pitch Wheel (Pitch Bend) MIDI commands. The control voltage (CV) for VCF control is derived from the Pitch Wheel MIDI command and the value of the "VCF Cutoff" parameter. The depth of the Pitch Wheel VCF modulation can be set by the "VCF Pitch Wheel Range" parameter. Other preset parameters do not affect the VCF at all – they are ignored by the device as well as in "Controller" mode. The internal LFO is switched off, so it is not possible to activate the vibrato effect. This mode can be used fir manual control from an external master keyboard.

Parameter can be set in the range of 0 (00h) to 2 (01h), The value of the parameter can be set by MIDI Control Change Nr. 77 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.9. VCF PITCH WHEEL RANGE

Parameter determines the Pitch Wheel VCF modulation, for VCF Pitch Wheel mode (VCF Control Mode = 2).

Parameter value can be set in the range of 0 (00h) to 127 (7Fh), the lower value the less effect of the Pitch Wheel on VCF is achieved a vice versa. The value of the parameter can be set by MIDI Control Change Nr. 78 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.10. VCF CUTOFF

Parameter determines the basic frequency of the Juno-60 VCF, the function of the parameter is equal to the "FREQ" slider on the Juno-60 panel. Parameter is active only if the VCF is in Normal mode (VCF Control Mode = 0) or in Pitch Wheel mode (VCF Control Mode = 2).

Parameter value can be set in the range of 0 (00h) to 127 (7Fh) The lower parameter value the lower VCF frequency a vice versa. The value of the parameter can be set by MIDI Control Change Nr. 79 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.11. VCF LFO AMOUNT

Parameter determines the depth of the VCF modulation by internal LFO, the depth of the vibrato effect. Parameter value can be set in the range of 0 (00h) to 127 (7Fh), for the zero the vibrato effect is switched off, 127 enables the maximal VCF modulation depth by the internal LFO. Parameter is active only if the VCF is in Normal mode (VCF Control Mode = 0).

18

The value of the parameter can be set by MIDI Control Change Nr. 80 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.12. VCF MOD AMOUNT

Parameter determines the vibrato effect depth of the standard MIDI controller Nr. 1 "Modulation". Parameter value can be set in the range of 0 (00h) to 127 (7Fh), for the zero the "Modulation" controller does not affect the VCF modulation at all, 127 states for maximal vibrato effect controlled by "Modulation" controller.

The value of the parameter can be set by MIDI Control Change Nr. 81 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.13. VCF VELOCITY POLARITY

Parameter determines VCF modulation the polarity by the velocity values of the MIDI "Note On". Parameter can be set in the range of 0 - 3:

- 0 (00h) → "LAST POSITIVE"   The maximum frequency of the VCF is directly proportional to the value of the last MIDI "Note-On Velocity" command. Faster keypress create brighter tones..
- 1 (01h) → "LAST NEGATIVE"   The maximum frequency of the VCF is inversely proportional to the value of the last MIDI "Note-On Velocity" command. Faster keypress create darker tones.
- 2 (02h) → "AVERAGE POSITIVE"   The maximum frequency of the VCF is directly proportional to the average value of the "Velocity" of all active "Note-On".
- 3 (03h) → "AVERAGE NEGATIVE"   The maximum frequency of the VCF is inversely proportional to the average value of the "Velocity" of all active "Note-On".

The value of the parameter can be set by MIDI Control Change Nr. 82 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.14. VCF VELOCITY AMOUNT

Parameter determines the level of VCF modulation by the MIDI "Note On Velocity". Parameter value can be set in the range of 0 (00h) to 127 (7Fh). VCF is not modulated by the "Velocity" when the value of the parameter is equal to 0, 127 is for maximum depth of the modulation. The way of the VCF modulation by the "Velocity" command is defined by the "VCF Velocity Polarity" preset parameter – see above.

The value of the parameter can be set by MIDI Control Change Nr. 83 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.15. VCF KEY + CHANNEL AFTERTOUCH POLARITY

Parameter determines the polarity of VCF changes by the received "Key Aftertouch" a "Channel Aftertouch" MIDI commands. Parameter can be set in the range of 0 – 3:

- 0 (00h) → "LAST POSITIVE"   The maximum frequency of the VCF is directly proportional to the value of last received "Key Aftertouch" or "Channel Aftertouch" MIDI commands, i.e. harder keypress makes "brighter" tones.
- 1 (01h) → "LAST NEGATIVE"   The maximum frequency of the VCF is inversely proportional to the value of last received "Key Aftertouch" or "Channel Aftertouch" MIDI command, i.e. harder keypress makes "darker" tones.
- 2 (02h) → "AVERAGE POSITIVE"   The maximum frequency of the VCF is directly proportional to the average values of the "Key Aftertouch" of all active notes or last received "Channel Aftertouch".
- 3 (03h) → "AVERAGE NEGATIVE"   The maximum frequency of the VCF is inversely proportional to average value of the "Key Aftertouch" of all active notes or last received "Channel Aftertouch".

The value of the parameter can be set by MIDI Control Change Nr. 84 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.16. VCF KEY AFTERTOUCH AMOUNT

Parameter determines modulation depth of the Juno-60 VCF by the value of the last received MIDI "Key Aftertouch" command. Parameter value can be set in the range of 0 (00h) to 127 (7Fh). VCF is not modulated by the "Key Aftertouch" when the value of the parameter is equal 0, 127 is for maximum depth of the modulation. The way of the VCF modulation by the "Key Aftertouch" command is defined by the "VCF Key + Channel Aftertouch Polarity" preset parameters – see above. – see above.

The value of the parameter can be set by MIDI Control Change Nr. 85 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.17. VCF CHANNEL AFTERTOUCH AMOUNT

Parameter determines modulation depth of the Juno-60 VCF by the value of the last received MIDI "Channel Aftertouch" command. Parameter value can be set in the range of 0 (00h) to 127 (7Fh). VCF is not modulated by the "Channel Aftertouch" command when the value of the parameter is equal 0, 127 is for maximum depth of the modulation. The way of the VCF modulation by the "Channel Aftertouch" command is defined by the "VCF Key + Channel Aftertouch Polarity" preset parameters – see above.

The value of the parameter can be set by MIDI Control Change Nr. 86 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.18. ARPG SYNC

Parameter determines the Juno-60 arpeggiator synchronization mode. There are three modes available : "**Free**" (parameter= 0), "**MIDI Sync**" (parameter= 1) and "**Controller**" (parameter= 2).

"Free" mode
Clock impulses for the arpeggiator synchronization are generated by the freely running internal generator. Its speed is defined by the "ARPG Rate" preset parameter in absolute units [Hz].

"MIDI Sync" mode
The frequency for the arpeggiator clock impulses besides "ARPG Rate" parameter is also affected by the MIDI clock synchronization impulses (BPM of the rack). "ARPG Rate" preset parameter values are entered in relative units (1/32 notes).

"Controller" mode
Special mode – arpeggiator is controlled by single MIDI controller. The number of this MIDI controller is selected by the "ARPG Controller" system parameter. Clock impulses for the arpeggiator are created by the received MIDI controller. After each receive of the controller the synchronization impulse is generated with the length given by the "Pulse Duration" parameter. All other preset parameters for the arpeggiator control are ignored by the device in this case.

Allowed range of this parameter is 0 (00h) - 2 (01h), The value of the parameter can be set by MIDI Control Change Nr. 87 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.2.19. ARPG RATE

Parameter adjusts the speed of the arpeggiator. The arpeggiator speed control depends on the way of the synchronization (see the preset parameter "ARPG Sync") :

Free running arpeggiator - **Free**
The speed of the arpeggiator is defined by the "ARPG Rate" parameter only in absolute values [Hz] - see Fig. 11. The range of the arpeggiator speed is approximately 0,4 Hz to 20 Hz.

Synchronized arpeggiator - **MIDI Clk**
The arpeggiator speed is controlled by the MIDI Clock synchronization impulses (BPM of the MIDI track). The period of one clock impulse of the arpeggiator is inserted in the relative numbers (1/32 notes). The period length range (one impulse) of the arpeggiator is 1 to 64 1/32 notes, step is 1/32 – see the chart on Fig. 12. Allowed tempo of the MIDI song is limited. The slowest tempo is 13 BPM, the highest 360 BPM.

Parameter value can be set in the range of 0 (00h) to 127 (7Fh). For the particular speeds equal to the parameter values see Fig. 11 and 12 in the table 9 (see Appendices). The value of the parameter can be set by MIDI Control Change Nr. 88 or by MIDI SysEx Msg (see MIDI SysEx communication description).

Fig. 12 – Arpeggiator speed for free running generator
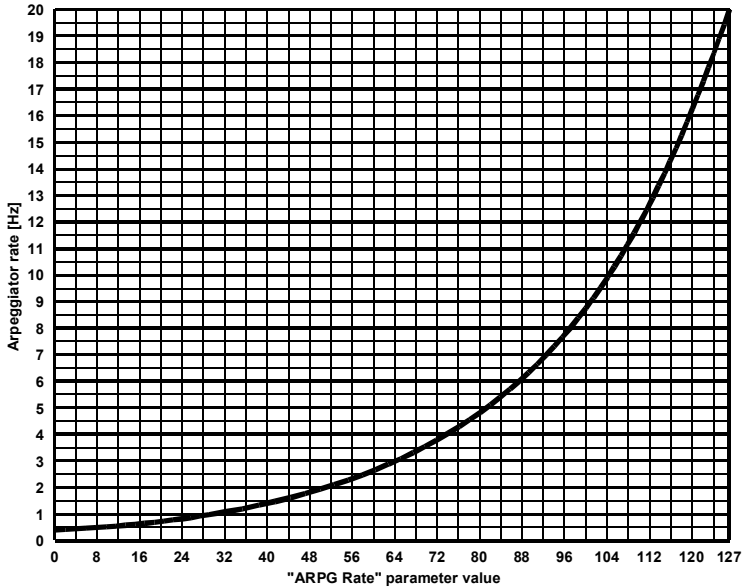
Fig. 13 – Arpeggiator speed for MIDI synchronization
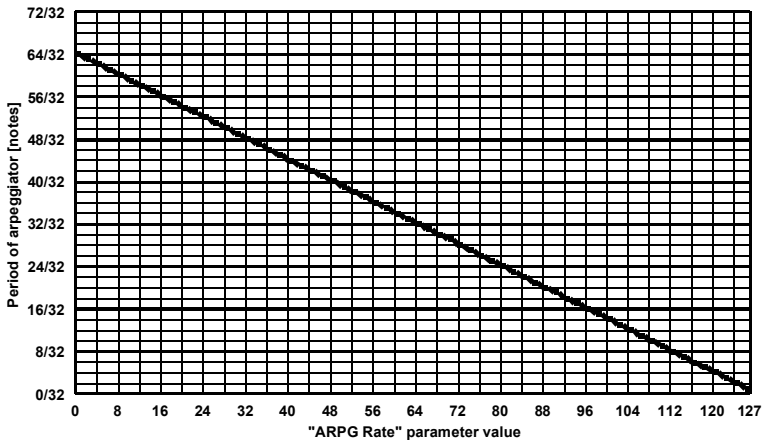
4.2.20. ARPG KEY CHASE

Parameter defines the arpeggiator start by the MIDI "Note On" command.

If the parameter is equal 0 (= Off), the start of the arpeggiator clock repeating period is synchronized to first valid MIDI "Note On" command after previous deactivation of all DCO tone generators, i.e. first keypress after all key release (after pause).

21

If the parameter is equal 1 (= On), the start of the arpeggiator clock repeating period is synchronized to each valid MIDI "Note On" command, i.e. to each pressed key.

Parameter value can be set 0 (00h) or 1 (01h),The value of the parameter can be set by MIDI Control Change Nr. 89 or by MIDI SysEx Msg (see MIDI SysEx communication description).

4.3. CHORD PARAMETERS FOR CHORD MODE

These parameters define tones of the chord in the CHORD mode. Parameter values can be adjusted or saved in user memory by the MIDI controllers (Control Changes) or by MIDI SysEx Messages. "Factory Reset" parameter values are shown in Tab. 6 (see MIDI SysEx communication description).

Tab. 6 – The allowed range of values and "Factory Reset" parameter values in CHORD mode						
Parameter name	Available range		"Factory Reset" values		MIDI CC Nr. for settings	
	[dec]	[hex]	[dec]	[hex]	[dec]	[hex]
DCO Voice 1 Shift	0 / 52~76	00 / 34~4C	64	40	90	5A
DCO Voice 2 Shift	0 / 52~76	00 / 34~4C	68	44	91	5B
DCO Voice 3 Shift	0 / 52~76	00 / 34~4C	71	47	92	5C
DCO Voice 4 Shift	0 / 52~76	00 / 34~4C	76	4C	93	5D
DCO Voice 5 Shift	0 / 52~76	00 / 34~4C	59	3B	94	5E
DCO Voice 6 Shift	0 / 52~76	00 / 34~4C	52	34	95	5F

All edited values of the parameters are saved in temporary preset editing buffers only, they are deleted after MDCB-2 hardware reset or turning off the device. They can be saved in permanent user memory for further use. It can be done by MIDI commands

Parameters take effect only in DCO Chord mode (DCO Mode = 1) and define semitone shift of the individual chord tones. The values can be 0 (00h) or 52 to 76 (34h to 4Ch):

- 0 (00h) → "Off"   Tone generator is switched off.
- 52~63 (34h~3Fh) → "–"   Tone generator is transposed by –12 to –1 semitones.
- 64 (40h) → "0"   Tone generator generates basic tone equal to the active note.
- 65~76 (41h~4Ch) → "+"   Tone generator is transposed by +1 to +12 semitones.

Values of parameters can be adjusted by MIDI Control Changes Nr. 90 - 95 or by MIDI SysEx Msg (see MIDI SysEx communication description).

Another possible way to define the chord for the "Chord" mode is its direct definition by the MIDI notes in soecial working mode (see MIDI implementation description – controllers for chord definition).

5. MIDI IMPLEMENTATION

MDCB-2 is able to communicate all possible way – recognizes channel, common system as well as system exclusive MIDI messages.

5.1. CHANNEL COMMANDS

MDCB-2 recognizes MIDI commands "Note Off", "Note On", "Key Aftertouch", "Control Change", "Channel Aftertouch", "Pitch Wheel" and "Program Change" fully respecting Running Status at MIDI input and output.

5.1.1. NOTE ON/OFF

When the "Note Off" and "Note On" commands are received, note Nr. as well as velocity are accepted and translated from MIDI to DCB. The number of note can be transposed in the range of –36 to +24 semitones as defined by Key Shift parameter. "Note On / Off" commands are always received on the basic MIDI channel defined by the PARAMETER [3] switch.

Velocity level of the "Note On" can modulate the control voltage for the juno-60 VCF accordingly to the Velocity Polarity and Velocity Amount parameters settings. When transmitting to MIDI (DCB → MIDI, if allowed by the system parameter) is Juno-60 keypress transmitted as "Note On", having the "Note Nr." In the range of 18h to 54h transposed by Key Shift parameter, "Velocity" has always the value equal to 40h.

Releasing the key on the Juno-60 is accordingly to the Tx Note-Off Mode system parameter setting transmitted as "Note Off" with the Velocity = 64 or as Note On with Velocity = 0. The number of the note is again in the range of 18h to 54h transposed by Key Shift parameter Transmitting MIDI channel is shifted by the Tx Channel Shift system parameter accordingly to the basic MIDI channel.

5.1.2. KEY AFTERTOUCH

The command is always accepted at the MIDI input on the basic MIDI channel selected b the PARAMETER [3] switch. It is never transmitted to MIDI output. The value of the second databyte of the "Key Aftertouch" commands control the control voltage for the Juno-60 VCF accordingly to the VCF Key Aftertouch Polarity and VCF Key Aftertouch Amount preset parameters settings.

5.1.3. CONTROL CHANGES

MDCB-2 recognizes the normalized controllers Nr. 1, 64, 120, 121, 123. There are also defined own controllers - Nr. 70 to 95, 110 to 119 and two freely programmable controllers. The controllers are received at MIDI input only, there are no MIDI controllers transmitted. Controllers can be received accordingly to the Rx Multichannel parameter setting either on basic MIDI channel selected by PARAMETER [3] switch or on the channel +1.

5.1.3.1. STANDARD CONTROLLERS

Control Change Nr. 1 – **Modulation**

The controller works standard way. It determines the depth of the modulation of the VCF by the internal LFO. The value of the controller (second databyte of the MIDI msg) can be set in the full range of 0 - 127. Modulation depth is minimal when the value of the parameter is equal 0, 127 is for maximum depth of the modulation.

Control Change Nr. 64 – **Hold** (standard controller)

The controller works standard way. It holds tone generators of the analogue synthesizer on during the "Hold" command is active. The value of the controller (second databyte of the MIDI msg) 64 to 127 is recognized as "Hold" on, the value 0 to 63 is recognized as "Hold" off. The HOLD [9] output of the MDCB-2 has to be connected with the PEDAL HOLD input of the Juno-60 to use this controller.

Control Change Nr. 120 - **All Sound Off** (standard controller)

The controller (its second databyte is equal to 0) mutes all active sound generators of the Juno-60.

Control Change Nr. 121 - **Reset All Controllers** (standard controller)

The controller (its second databyte is equal to 0) sets the values of all accepted normalized controllers to the default state – same as after turning on the device.: Modulation = 0 (no modulation), Hold = 0 (switch off), Pitch Wheel = 8192 (middle position)

Control Change Nr. 123 - **All Notes Off** (standard controller)

The controller (its second databyte is equal to 0) mutes all active sound generators of the Juno-60.

5.1.3.2. OWN CONTROLLERS FOR PARAMETER SETTINGS IN PRESET EDITING BUFFER

Control Change Nr. 70 – **DCO Key Shift**

This controller is exceptionally used in both directions (MIDI → DCB and DCB → MIDI) – see also chapter 5.1.1. Controller works as offset. The value of the controller (second databyte of the MIDI msg) directly defines the value of the "DCO Key Shift" preset parameter and can be adjusted in the range of 28 (1Ch) for –36 semitones to 88 (58h) for +24 semitones. Zero shift is (40h) value. Values outside allowed range are converted to the closest valid valie. i.e. 0 to 27 is recognized as 28 and 89 - 127 is recognized as 88.

Control Change Nr. 71 – **DCO Mode**

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 1 and is equal to the exact value of the parameter. Values out of the allowed range are recognized as the closest valid value, eg. 2 to 127 are recognized as 1.

Control Change Nr. 72 – LFO Sync

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 1 and is equal to the exact value of the parameter. Values out of the allowed range are recognized as the closest valid value, eg. 2 to 127 are recognized as 1.

Control Change Nr. 73 – LFO Wave

The controller adjusts the preset parameter. The value of the controller (second databyte MIDI msg), can be used in the range of 0 to 79. Values out of the allowed range are recognized as the closest valid value, eg. 80 to 127 are recognized as 79.

Control Chang Nr. 74 – LFO Rate

The controller adjusts the preset parameter. The value of the controller (second databyte MIDI msg), can be used in full range 0 to 127. Value "0" is for minimal vibrato speed, "127" is for maximal vibrato speed.

Control Change Nr. 75 – LFO Delay

The controller adjusts the preset parameter. The value of the controller (second databyte MIDI msg), can be used in full range 0 to 127. Value "0" is for zero delay, "127" is for maximal delay before the vibrato takes effect.

Control Change Nr. 76 – LFO Retrigger

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 1 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value, values of 2 - 127 are recognized as 1.

Control Change Nr. 77 – VCF Control Mode

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 2 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value, values 3 - 127 are recognized as2.

Control Change Nr. 78 – VCF Pitch Wheel Range

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) is equal to the exact value of the parameter in full range of 0 - 127. The 0 value sets no effect of the Pitch Wheel and the 127 value sets maximal effect of the Pitch Wheel (if VCF is in "Pitch Wheel" control mode).

Control Change Nr. 79 – VCF Cuttoff

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) is equal to the exact value of the parameter in full range of 0 - 127. The 0 value sets the minimal VCF frequency, the 127 sets the maximal VCF frequency.

Control Change Nr. 80 – VCF LFO Amount

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg.) is equal to the exact value of the parameter in full range of 0 - 127. The 0 value switches the vibrato off, the 127 value is the maximal vibrato depth.

Control Change Nr. 81 – VCF MOD Amount

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg.) is equal to the exact value of the parameter in full range of 0 - 127. MIDI controller Nr.1 "Modulation" does not have any affect on the when the value of the parameter is equal 0, 127 is for maximum depth of the vibrato modulation.

Control Change Nr. 82 – VCF Velocity Polarity

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 3 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value, 4 - 127 are recognized as 3.

Control Change Nr. 83 – **VCF Velocity Amount**

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg.) is equal to the exact value of the parameter in full range of 0 - 127. For the zero value MIDI "Velocity" of the "Note On" commands does not take any effect, 127 is for maximum MIDI "Velocity" effect.

Control Change Nr. 84 – **VCF Key + Channel Aftertouch Polarity**

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 3 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value, 4 - 127 is recognized as 3.

Control Change Nr. 85 – **VCF Key Aftertouch Amount**

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg.) is equal to the exact value of the parameter in full range of 0 - 127. "Key Aftertouch" does not take any affect when the value of the parameter is equal 0, 127 is for maximum depth of the modulation by the MIDI "Key Aftertouch".

Control Change Nr. 86 – **VCF Channel Aftertouch Amount**

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg.) is equal to the exact value of the parameter in full range of 0 - 127. "Channel Aftertouch" does not take any affect when the value of the parameter is equal 0, 127 is for maximum depth of the modulation by the MIDI "Channel Aftertouch".

Control Change Nr. 87 – **ARPG Sync**

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 2 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value, 3 - 127 are recognized as 2.

Control Change Nr. 88 – **ARPG Rate**

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg.) is equal to the exact value of the parameter in full range of 0 - 127. The 0 value is for minimal arpeggiator the 127 for maximal.

Control Change Nr. 89 – **ARPG Key Chase**

The controller adjusts the preset parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 1 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value 2 - 127 are recognized as1.

5.1.3.3. OWN CONTROLLERS FOR PARAMETER SETTINGS IN SYSTEM EDITING BUFFER

Control Change Nr. 110 – **MIDI Msg Indicator**

The controller adjusts the system parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 3 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value, 4 - 127 is recognized as 3.

Control Change Nr. 111 – **MIDI Clock Indicator**

The controller adjusts the system parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 1 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value. Values 2 - 127 are recognized as 1.

Control Change Nr. 112 – **Rx Multi-Channel**

The controller adjusts the system parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 1 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value. Values 2 - 127 are recognized as1.

Control Change Nr. 113 – **MIDI Out Mode**

The controller adjust ts the system parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 2 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value. Values 3 - 127 are recognized as 2.

Control Change Nr. 114 – **Auto-Reset**

The controller adjusts the system parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 1 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value. Values 2 - 127 are recognized as1.

Control Change Nr. 115 – **Pgm Change Mode**

The controller adjusts the system parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 3 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value. Values 4 - 127 are recognized as 3.

Control Change Nr. 116 – **Tx Channel Shift**

The controller adjusts the system parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 15 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value. Values 16 - 127 are recognized as15.

Control Change Nr. 117 – **Tx Note Off Mode**

The controller adjusts the system parameter. The value of the controller (second databyte of the MIDI msg) can be set in the range of 0 - 1 and is equal to the exact value of the parameter. The values outside the allowed range are converted to the closest available value. Values 2 - 127 are recognized as1.

5.1.3.4. OWN CONTROLLER FOR DEFINITION OF THE CHORD IN EDITING BUFFER OF THE CHORD MODE

Tab. 7 – MIDI controller for the chord definition			
Parameter name/function	CC Nr. [dec]	[hex]	Values
CHORD – DCO Voice 1	90	5A	0 = Voice Off / 52~76 = shift -12 to +12 semitones
CHORD – DCO Voic7e 2	91	5B	0 = Voice Off / 52~76 = shift -12 to +12 semitones
CHORD – DCO Voice 3	92	5C	0 = Voice Off / 52~76 = shift -12 to +12 semitones
CHORD – DCO Voice 4	93	5D	0 = Voice Off / 52~76 = shift -12 to +12 semitones
CHORD – DCO Voice 5	94	5E	0 = Voice Off / 52~76 = shift -12 to +12 semitones
CHORD – DCO Voice 6	95	5F	0 = Voice Off / 52~76 = shift -12 to +12 semitones
Define CHORD (MIDI notes)	118	76	0 = Refresh / 1~63 = Cancel / 64~126 = OK / 127 = Edit + Clear

Control Change Nr. 90 ~ 95 – **DCO Voice 1 ~ DCO Voice 6**

These six controllers define the chord for CHORD mode. The controller work in offset mode. The values of the controllers (second databyte of the MIDI msg) are equal to the values of the preset parameters for Chord mode. They can be equal to 0 or in the range between 52 and 76. The values outside allowed range are converted to 0.

The values of the parameters stands for semitone tone shift of the individual chord voices relative to the active note. For 52 - 63 is the shift -12 to -1 semitone, 64 represents no shift, for 65 - 76 is the shift +1 to +12 semitones. Value 0 switches the voice off.

Control Change Nr. 118 – **Define Chord**

The controller enables editing of the chord in working Chord mode only by MIDI notes (pressing the keys) following way:

After receiving this controller with the value 127 (EDIT) in MDCB-2, all Juno-60 tone generators are turned off, MDCB-2 is switched in editing mode – indicated by blinking LED-PWR on the front panel.

Now Note-On commands defining from one to six notes can be sent to MDCB-2. (i.e. pres 1-6 keys). Reference note is always middle C. Notes in the range of ±12 semitones respective to the reference note can be inserted, all other notes will be transposed to allowed range. All inserted notes (pressed keys) will be playing same way as with the Hold button.

When the required chord is defined send the controller with the value 64 to 126 (OK) to the MDCB-2. The defined chord is saved in temporary editing buffer and MDCB-2 is back in normal mode. When the Chord mode is activated, the defined chord is used.

26

The chord editing is interrupted if MDCB-2 receives the controller with the value of 1 – 63. There are original values of the chord returned in the editing buffer and the editing mode is quit and MDCB-2 is switched back to normal mode.

It is possible to send the controller with the value = 127 (CLEAR), if there is an error occurred during the editing of the chord – all playing tone generators of the Juno-60 are switched off. The editing procedure of the chord can be repeated.

It is possible to retrieve the original data of the actual preset from the permanent user memory into editing buffer if necessary. This is done by sending the controller with the value = 0 (REFRESH). Editing mode is closed and MDCB-2 is back in normal mode.

5.1.3.5. OWN CONTROLLERS WITH SPECIAL FUNCTION

Tab. 8 – Special MIDI controllers			
Function	CC Nr.		Values
	[dec]	[hex]	
Direct VCF Control	@VCF Controller	@VCF Controller	0~127 = Direct VCF Control
Direct ARPG Control	@ARPG Controller	@ARPG Controller	0~127 = ARPG Clock Pulse
Save Parameters	119	77	0~63 = Save Preset 64 = Save System

Control Change Nr. @ VCF Controller – **Direct VCF Control** (Programmable own controller)

Freely definable controller # VCF Controller can directly control VCF control voltage, , having the "VCF Control Mode" of the actual preset set to "Controller". The particular number of the controller (@ VCF Controller) is defined by "VCF Controller" system parameter, The number can be set in the range of 0 - 127.

The value of the controller (second databyte MIDI msg) is directly transmitted to the VCF control voltage. The 0 value is for minimal depth of the modulation, 127 sets the maximal VCF modulation depth.

If this VCF control mode is selected all other MIDI controllers and preset parameters for LFO control are ignored (i.e. Sync, Waveform, Rate, Delay, Retrigger) and VCF (i.e. Cutoff , Pitch Wheel Range, LFO Amount, MOD Amount, Velocity Polarity, Velocity Amount, Key + Channel Aftertouch Polarity, Key Aftertouch Amount, Channel Aftertouch Amount)!

ATTENTION ! If there is a controller that is used for other purposes by the MDCB-2 selected. (ie. CC1 – Modulation, CC64 – Hold, CC 70~95 – preset parameter settings, CC 110~119 – system parameter and functions settings, CC 120, 121, 123 – mode commands), The original function of the controller is ignored. The controller controls only the VCF!

Control Change Nr. @ ARPG Controller - **Direct ARPG Control** (Programmable own controller)

Freely definable controller # ARPG Controller can directly start the arpeggiator, having the "ARPG Sync" parameter of the actual preset set to "Controller". The particular number of the controller (@ ARPG Controller) is defined by "ARPG Controller" system parameter. The number can be set in the range of 0 - 127.

When the defined controller is received by the MDCB-2 (of any value), one arpeggiator synchronization impulse is generated.

All other MIDI controllers for synchronization of the arpeggiator are ignored in this mode. (i.e. Rate, Key Chase) !

ATTENTION ! If there is a controller that is used for other purposes by the MDCB-2 selected. (ie. CC1 – Modulation, CC64 – Hold, CC 70~95 – preset parameter settings, CC 110~119 – system parameter and functions settings, CC 120, 121, 123 – mode commands), The original function of the controller is ignored. The controller controls only the arpeggiator!

Control Change Nr. 119 – **Save Parameters**

This controller saves the data from the temporary editing buffers in the user memory.

Whenever the MDCB-2 receives this controller with the value of 0 - 63, all parameters from the editing buffer will be saved in user memory. The value 0 - 63 defines the preset memory bank 1 - 64, where the data will be saved.

This controller with the value 64 saves all parameters from the editing buffer in permanent user memory of the MDCB-2.

Other values of the controller (65 - 127) are ignored.

The data can be saved in user memory only if it is not write protected (see chapter 3.3).

27

5.1.4. PROGRAM CHANGE

The command is always received at the MIDI input. It is not transmitted at the MIDI output. It can be received either on basic MIDI channel or on MIDI channel higher by one accordingly to the "Rx Multichannel" parameter settings. The function of the command depends on the "Program Change Mode" system parameter setting:

- Pgm Chng Mode = 0 → (OFF) Program Change command is ignored.
- Pgm Chng Mode = 1 → (PRESET) Program Change with the numbers 0 - 63 selects the presets of MDCB-2 (preset Nr. 1 - 64), number of programs 64 - 127 are ignored.
- Pgm Chng Mode = 2 → (PATCH) In any program change (0 - 127) PATCH SHIFT output generates impulse with the length given by Pulse Duration system parameter.
- Pgm Chng Mode = 3 → (BOTH) Program Change with the numbers 0 - 63 selects MDCB-2 presets (preset Nr. 1 - 64), for numbers 64 - 127 PATCH SHIFT output generates impulse with the length given by Pulse Duration system parameter..

5.1.5. CHANNEL AFTERTOUCH

The command is always received at the MIDI input. It is not transmitted at the MIDI output. The databyte value of the "Channel Aftertouch" command controls the level of control voltage for the Juno-60 VCF accordingly to the "VCF Key + Channel Aftertouch Polarity" and "VCF Channel Aftertouch Amount" parameter settings the same way as "Key Aftertouch" MIDI command.

5.1.6. PITCH WHEEL (PITCH BEND)

The command is always received at the MIDI input. It is not transmitted at the MIDI output. It can be received on the basic channel selected by the PARAMETER [3] switch or on the channel higher by one accordingly to the "Rx Multichannel" system parameter settings. The command is accepted if "Pitch Wheel" mode is selected by the VCF Control Mode preset parameter. The control voltage for the VCF is derived only from the value of this command. (eight most significant bits are used) and from the value of the "VCF Cutoff parameter". "VCF Pitch Wheel Range" adjusts the range of the VCF modulation.

All other MIDI controllers and preset parameters for LFO (i.e. Sync, Waveform, Rate, Delay, Retrigger) and VCF (i.e. LFO Amount, MOD Amount, Velocity Polarity, Velocity Amount, Key + Channel Aftertouch Polarity, Key Aftertouch Amount, Channel Aftertouch Amount) are ignored in this VCF control mode!

5.2. SYSTEM COMMANDS

MDCB-2 uses only "MIDI Clock" synchronization impulses (status byte F8h) and system reset (status byte FFh) from the Common System Messages. The command is always received at the MIDI input. It is not transmitted at the MIDI output.

The speed of the internal LFO can be synchronized by the MIDI clock impulses (i.e. VCF modulation speed) and arpeggio speed. To allow the LFO synchronization, the "LFO Sync" parameter of the actual preset must be switched to "MIDI Clock" (= 1). To allow the arpeggiator to be synchronized, the "ARPG Sync" parameter of the actual preset must be switched to "MIDI Clock" (= 1).

The activity of the device after the System Reset command is the same as after manual reset by the RESET button on the front panel.

5.3. SYSTEM EXCLUSIVE COMMUNICATION

MDCB-2 uses a lot of System Exclusive communication features. A complete description of these functions is listed described in special document.

For easier creation of SysEx Messages for parameter adjustments please use the software generator supplied on the factory CD-ROM. This generator generates any of the commands in hexadecimal code.

Cakewalk™ and Sonar™ users can use pre-defined "Studio Ware Panel", to control the MDCB-2. It is supplied on the factory CD-ROM too.
.

6. TECHNICAL SPECIFICATIONS

Supply voltage :	external power supply unit - DC 12 to 16 V
Current power consumption :	max 100 mA
Ext power supply connector :	standard, 6 / 2,1 mm
DCB interface :	signals DATA, CLOCK, BUSY used for Rx and Tx;
	CV for VCO, VCF, VCA not utilized (unconnected pins)
Transit data delay DCB → MIDI :	max 0.1 ms from command receive end to transmission start
Transit data delay MIDI → DCB :	max 0.15 ms from command receive end to transmission start
Output VCF :	control voltage 0 to 5 V, max 8 mA
Output HOLD :	Gate (NC), max 20 mA
Output PATCH :	S-Trig, max 20 mA
Output ARPG :	V-Trig (+5V), max 20 mA
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
Range of operating temperature :	+10 to +35 °C
Relative environmental humidity :	up to 85 % r.h.
Accessories :	DCB connection cable, operation manuals, CD-ROM
Recommended accessories :	power supply adapter MW-0903GS, MW-1205GS (not included)

7. 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.

Appendix A : Tab. 9 – Internal LFO speed for "Free" and "MIDI"synchronization							
„LFO Rate" parameter value	Sync = Free		Sync = MIDI	„LFO Rate" parameter value	Sync = Free		Sync = MIDI
	frequency [Hz]	periode [sec]	frequency [1/32 note]		frequency [Hz]	periode [sec]	frequency [1/32 note]
0	0,200	5,000	64	64	1,436	0,697	32
1	0,206	4,848	64	65	1,481	0,675	32
2	0,213	4,701	63	66	1,527	0,655	31
3	0,219	4,559	63	67	1,575	0,635	31
4	0,226	4,421	62	68	1,624	0,616	30
5	0,233	4,286	62	69	1,675	0,597	30
6	0,241	4,156	61	70	1,727	0,579	29
7	0,248	4,030	61	71	1,781	0,561	29
8	0,256	3,908	60	72	1,837	0,545	28
9	0,264	3,789	60	73	1,895	0,528	28
10	0,272	3,674	59	74	1,954	0,512	27
11	0,281	3,563	59	75	2,015	0,496	27
12	0,289	3,455	58	76	2,078	0,481	26
13	0,298	3,350	58	77	2,143	0,467	26
14	0,308	3,249	57	78	2,210	0,452	25
15	0,317	3,150	57	79	2,279	0,439	25
16	0,327	3,055	56	80	2,350	0,425	24
17	0,338	2,962	56	81	2,424	0,412	24
18	0,348	2,872	55	82	2,500	0,400	23
19	0,359	2,785	55	83	2,578	0,388	23
20	0,370	2,700	54	84	2,659	0,376	22
21	0,382	2,618	54	85	2,742	0,365	22
22	0,394	2,539	53	86	2,828	0,354	21
23	0,406	2,462	53	87	2,916	0,343	21
24	0,419	2,387	52	88	3,007	0,333	20
25	0,432	2,315	52	89	3,101	0,323	20
26	0,445	2,245	51	90	3,198	0,313	19
27	0,459	2,177	51	91	3,298	0,303	19
28	0,474	2,111	50	92	3,402	0,294	18
29	0,489	2,047	50	93	3,508	0,285	18
30	0,504	1,985	49	94	3,618	0,276	17
31	0,520	1,924	49	95	3,731	0,268	17
32	0,536	1,866	48	96	3,848	0,260	16
33	0,553	1,809	48	97	3,968	0,252	16
34	0,570	1,754	47	98	4,092	0,244	15
35	0,588	1,702	47	99	4,220	0,237	15
36	0,606	1,650	46	100	4,352	0,230	14
37	0,625	1,600	46	101	4,488	0,223	14
38	0,645	1,551	45	102	4,629	0,216	13
39	0,665	1,504	45	103	4,773	0,210	13
40	0,686	1,458	44	104	4,923	0,203	12
41	0,707	1,414	44	105	5,077	0,197	12
42	0,729	1,371	43	106	5,235	0,191	11
43	0,752	1,330	43	107	5,399	0,185	11
44	0,776	1,289	42	108	5,568	0,180	10
45	0,800	1,250	42	109	5,742	0,174	10
46	0,825	1,212	41	110	5,922	0,169	9
47	0,851	1,176	41	111	6,107	0,164	9
48	0,877	1,140	40	112	6,298	0,159	8
49	0,905	1,106	40	113	6,495	0,154	8
50	0,933	1,072	39	114	6,698	0,149	7
51	0,962	1,039	39	115	6,908	0,145	7
52	0,992	1,008	38	116	7,124	0,141	6
53	1,023	0,977	38	117	7,347	0,136	6
54	1,055	0,948	37	118	7,576	0,132	5
55	1,088	0,919	37	119	7,813	0,128	5
56	1,122	0,891	36	120	8,058	0,124	4
57	1,157	0,864	36	121	8,310	0,120	4
58	1,194	0,838	35	122	8,570	0,117	3
59	1,231	0,813	35	123	8,838	0,113	3
60	1,269	0,788	34	124	9,114	0,110	2
61	1,309	0,764	34	125	9,399	0,106	2
62	1,350	0,741	33	126	9,694	0,103	1
63	1,392	0,718	33	127	9,997	0,100	1

Appendix B : Tab. 10 – LFO start delay for "Free" and "MIDI" synchronization

"LFO Delay" parameter value	Sync = Free delay [sec]	Sync = MIDI delay [1/32 note]	"LFO Delay" parameter value	Sync = Free delay [sec]	Sync = MIDI delay [1/32 note]
0	0,000	0	64	6,291	32
1	0,098	1	65	6,390	33
2	0,197	1	66	6,488	33
3	0,295	2	67	6,586	34
4	0,393	2	68	6,685	34
5	0,492	3	69	6,783	35
6	0,590	3	70	6,881	35
7	0,688	4	71	6,980	36
8	0,786	4	72	7,078	36
9	0,885	5	73	7,176	37
10	0,983	5	74	7,274	37
11	1,081	6	75	7,373	38
12	1,180	6	76	7,471	38
13	1,278	7	77	7,569	39
14	1,376	7	78	7,668	39
15	1,475	8	79	7,766	40
16	1,573	8	80	7,864	40
17	1,671	9	81	7,963	41
18	1,769	9	82	8,061	41
19	1,868	10	83	8,159	42
20	1,966	10	84	8,258	42
21	2,064	11	85	8,356	43
22	2,163	11	86	8,454	43
23	2,261	12	87	8,552	44
24	2,359	12	88	8,651	44
25	2,458	13	89	8,749	45
26	2,556	13	90	8,847	45
27	2,654	14	91	8,946	46
28	2,753	14	92	9,044	46
29	2,851	15	93	9,142	47
30	2,949	15	94	9,241	47
31	3,047	16	95	9,339	48
32	3,146	16	96	9,437	48
33	3,244	17	97	9,535	49
34	3,342	17	98	9,634	49
35	3,441	18	99	9,732	50
36	3,539	18	100	9,830	50
37	3,637	19	101	9,929	51
38	3,736	19	102	10,027	51
39	3,834	20	103	10,125	52
40	3,932	20	104	10,224	52
41	4,030	21	105	10,322	53
42	4,129	21	106	10,420	53
43	4,227	22	107	10,519	54
44	4,325	22	108	10,617	54
45	4,424	23	109	10,715	55
46	4,522	23	110	10,813	55
47	4,620	24	111	10,912	56
48	4,719	24	112	11,010	56
49	4,817	25	113	11,108	57
50	4,915	25	114	11,207	57
51	5,014	26	115	11,305	58
52	5,112	26	116	11,403	58
53	5,210	27	117	11,502	59
54	5,308	27	118	11,600	59
55	5,407	28	119	11,698	60
56	5,505	28	120	11,796	60
57	5,603	29	121	11,895	61
58	5,702	29	122	11,993	61
59	5,800	30	123	12,091	62
60	5,898	30	124	12,190	62
61	5,997	31	125	12,288	63
62	6,095	31	126	12,386	63
63	6,193	32	127	12,485	64

	Appendix C : Tab. 11 – Arpeggiator speed for "Free" and "MIDI" modes						
„ARPG Rate" value	Sync = Free		Sync = MIDI	„ARPG Rate" value	Sync = Free		Sync = MIDI
	frequency [Hz]	periode [sec]	frequency [1/32 notes]		frequency [Hz]	periode [sec]	frequency [1/32 notes]
0	0,400	2,500	64	64	2,871	0,348	32
1	0,413	2,424	64	65	2,963	0,338	32
2	0,425	2,350	63	66	3,057	0,327	31
3	0,439	2,279	63	67	3,149	0,318	31
4	0,452	2,210	62	68	3,247	0,308	30
5	0,467	2,143	62	69	3,352	0,298	30
6	0,481	2,078	61	70	3,454	0,290	29
7	0,496	2,015	61	71	3,562	0,281	29
8	0,512	1,954	60	72	3,673	0,272	28
9	0,528	1,895	60	73	3,791	0,264	28
10	0,544	1,837	59	74	3,910	0,256	27
11	0,561	1,781	59	75	4,031	0,248	27
12	0,579	1,728	58	76	4,160	0,240	26
13	0,597	1,675	58	77	4,290	0,233	26
14	0,616	1,624	57	78	4,421	0,226	25
15	0,635	1,575	57	79	4,561	0,219	25
16	0,655	1,527	56	80	4,701	0,213	24
17	0,675	1,481	56	81	4,849	0,206	24
18	0,696	1,436	55	82	4,998	0,200	23
19	0,718	1,392	55	83	5,157	0,194	23
20	0,741	1,350	54	84	5,315	0,188	22
21	0,764	1,309	54	85	5,482	0,182	22
22	0,788	1,270	53	86	5,661	0,177	21
23	0,812	1,231	53	87	5,839	0,171	21
24	0,838	1,193	52	88	6,014	0,166	20
25	0,864	1,157	52	89	6,200	0,161	20
26	0,891	1,122	51	90	6,398	0,156	19
27	0,919	1,088	51	91	6,593	0,152	19
28	0,948	1,055	50	92	6,799	0,147	18
29	0,977	1,023	50	93	7,019	0,142	18
30	1,008	0,992	49	94	7,234	0,138	17
31	1,039	0,962	49	95	7,462	0,134	17
32	1,072	0,933	48	96	7,705	0,130	16
33	1,105	0,905	48	97	7,940	0,126	16
34	1,140	0,877	47	98	8,189	0,122	15
35	1,176	0,851	47	99	8,455	0,118	15
36	1,212	0,825	46	100	8,710	0,115	14
37	1,250	0,800	46	101	8,980	0,111	14
38	1,289	0,776	45	102	9,267	0,108	13
39	1,330	0,752	45	103	9,539	0,105	13
40	1,371	0,729	44	104	9,864	0,101	12
41	1,415	0,707	44	105	10,173	0,098	12
42	1,459	0,685	43	106	10,459	0,096	11
43	1,504	0,665	43	107	10,806	0,093	11
44	1,551	0,645	42	108	11,129	0,090	10
45	1,600	0,625	42	109	11,472	0,087	10
46	1,650	0,606	41	110	11,837	0,084	9
47	1,701	0,588	41	111	12,226	0,082	9
48	1,755	0,570	40	112	12,581	0,079	8
49	1,810	0,553	40	113	13,021	0,077	8
50	1,867	0,536	39	114	13,424	0,074	7
51	1,925	0,520	39	115	13,852	0,072	7
52	1,985	0,504	38	116	14,230	0,070	6
53	2,047	0,488	38	117	14,713	0,068	6
54	2,110	0,474	37	118	15,141	0,066	5
55	2,177	0,459	37	119	15,594	0,064	5
56	2,245	0,445	36	120	16,075	0,062	4
57	2,315	0,432	36	121	16,587	0,060	4
58	2,387	0,419	35	122	17,133	0,058	3
59	2,461	0,406	35	123	17,715	0,056	3
60	2,538	0,394	34	124	18,211	0,055	2
61	2,620	0,382	34	125	18,871	0,053	2
62	2,701	0,370	33	126	19,434	0,051	1
63	2,785	0,359	33	127	20,032	0,050	1

32

Appendix D : MIDI implementation chart

MIDI IMPLEMENTATION CHART

Device : **MDCB-2**   Date : 1 / 2008

Model : **8-422**   Version : 2.0

Function		Transmission	Reception	Remarks
Basic	Default	1~16	1~16	[1]
Channel	Changed	1~16	1~16	[1]
Mode	Default	Mode 3	Mode 3	Not Altered
	Messages	X	X	
Note Number		0~120	0~120	[2]
Velocity	Note ON	X	O	
	Note OFF	X	X	
After	Key's	X	O	
Touch	Channel's	X	O	
Pitch Bender		X	O	[3]
Control	1	X	O	Modulation
Changes	64	X	O	Hold
	70 to 95	X	O	Own controllers – see description
	110 to 119	X	O	Own controllers – see description
	120	X	O	All Sound Off
	121	X	O	Reset All Controllers
	selectable 0~127	X	O	VCF Direct Control [3]
	selectable 0~127	X	O	ARPG Direct Control [3]
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	BPM from 13 to 360 only
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] Range depends on Key Shift setting
[3] Function depends on system / preset parametrers 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

33

Appendix E : ERROR INDICATION

If any Errors occure during the MDCB-2 operation (eg. MIDI communicationi), the software stops automatically the device and the user is informed by the blinking red LED PWR [5] about the erro following way:

2x →   Error Nr. 1: Error of the communication between CPU and user memory
3x →   Error Nr. 2: User memory cell defect
4x →   Error Nr. 3: Attempt to write in memory while it is protected
5x →   Error Nr. 4: MIDI buffer data overflow

If the AUTO-RESET function is "On" (see chapter 4.1.5.) an automatic reset is executed when Errors Nr. 3 and 4 occur. If the AUTO-RESET function is "Off" it is necessary to reset the device manually by pressing the Pokud RESET [6] button.

Appendix F : RECOMMENDATION

It is not recommended to use the "KEY TRANSPOSE" function on the panel of the Juno 60 when it is controller from the MDCB-2. In several cases the "KEY TRANSPOSE" can cause indefinable transposition, detuned sound or activation of more sound generators – the synthesizer plays less tones.

Appendix G : MIDI COMMUNICATION LOOPS

If the MDCB-2 is connected with the MIDI system (PC) bi-directionally (both MIDI cables), the communication loop that "freezes" the entire system can be achieved in several situations. This is caused by the re-sending the same MIDI data from the MDCB-2 output via the sequencer back to the MDCB-2 input.

To prevent the MDCB-2 from such problems, please follow the below described steps:
- If the MIDI output of the MCDB-2 is set "Off" or "Thru", it is necessary to disable MIDI thru for System Exclusive data in the master sequencer.
- If the MIDI output of the MDCB-2 is set to "Tx-DCB", it is necessary to disable the MIDI System Exclusive data thru function in the sequencer, and if the transmitting channel of the MDCB-2 is same as receiving channel (system parameter Tx Channel Shift = 0) it is necessary to disable the MIDI thru from the input to the output on the MIDI channel used by MDCB-2.

Appendix H : POWER SUPPLY

Recommended power supply MW1203GS (not supplied with MDCB-2) is a not stabilized 12V, 300 mA DC adapter.

The power supply adapters for non-European customers (with power supplies different from 230 V and different sockets) are not supplied. Any other power supply adapter with DC output (stabilized or non stabilized) in the range of 11 to 16 volts giving at least 100 mA can be used.

Appendix I : UPGRADE OF THE PREVIOUS VERSIONS 1.X

The devices with previous OS versions 1.x can be upgraded just by replacing the CPU without any other hardware changes of the MDCB-2. Replacing the CPU is easy without soldering. It can be done without special technical skills and tools.

The CPU with new OS and all necessary documentation can be ordered from the manufacturer.

Rev. 2.02 – 3rd edition (9/2010)