M D C B - 2

MIDI / Juno-60 Interface

Model 8-422
ver. 2.0
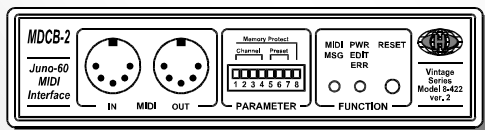
MIDI SYSTEM EXCLUSIVE COMMUNICATION

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1. SYSTEM EXCLUSIVE COMMUNICATION

MDCB-2 disposes of quite large system of System Exclusive communication. It enables to receive and to transmit a SysEx Messages for remote setting of all parameters in edit buffers (Data Load messages). Some parameters are available only by this way. Also, it is possible to list actual values of parameters or memory banks content (Data Request / Data Save messages). These data can be archived in PC for example.

System and testing functions can be launched via SysEx commands too.

Software generator for simple creation of SysEx messages for control and programming of MDCB-2 is available. with help of Any message described below can be created with the help of this generator.

2. SYSEX MESSAGES STRUCTURE

MDCB-2 receives and transmits two types of SysEx Msg – universal „Identify Request / Reply" for device identification and its own specific messages for changes of parameters setting etc. These two types have very different structure.

3. UNIVERSAL SYSEX MESSAGES

Structure of received universal SysEx Msg „Identify Request" is always :

F0h 7Eh id 06h 01h F7h

where „**id**" is Device ID (00h to 0Fh – the same as number of selected MIDI channel, or universal ID 7Fh can be used – all devices will recognize universal ID number independently on setting of MIDI channel number).

MDCB-2 reply by "Identify Reply" message immediately after "Identify Request" is received. Form of "Identify Reply" message is :

F0h 7Eh id 06h 02h	
00h 20h 21h	Manufacturer ID
00h 08h	Device Family (i.e. 8)
03h 26h	Device Type (i.e. 422)
00h 02h 00h 00h	Device Version (i.e. 2.0)
F7h	

where „**id**" is valid Device ID (00h to 0Fh – the same as selected MIDI channel number).

4. OWN SYSEX MESSAGES

Structure of own SysEx Msg is always :

F0h	Start SysEx	
00h 20h 21h	Manufacturer ID	
ii	Device ID	(00h a 0Fh – the same as number of selected MIDI channel or universal 7Fh)
2Fh	Model ID	(valid only for MDCB-2 ver. 2.x)
cc	Command	(type of command)
aa	Address	(address of memory area / type of function)
bb	Subaddress	(address of parameter / function)
dd … dd	Data	(data of parameter / function)
xx	Checksum	(seven-bit checksum of bytes from Model ID to Checksum)
F7h	End SysEx	

Length of "**dd … dd**" datablock is variable in dependence on type of SysEx Msg, number of databytes in block can be 0 bytes (some SysEx Msg do not include any databyte) to 20 bytes. Checksum "**xx**" is created by standard method – seven-bit sum of bytes from "Model ID" to "Checksum" must be equal to zero. SysEx Msg is invalid and it is ignored by devise if this condition isn't satisfied.

4.1. COMMAND TYPES OVERVIEW

Command "**cc**" gives MDCB-2 activity after whole message is received. Valid values of "**cc**" are :

"**cc**"=10h -   **Parameter Data Request** – inquiry for actual value of one parameter in temporary edit buffers
"**cc**"=20h -   **Parameter Data Save / Load** – response to "Parameter Data Request" or change of value of one parameter in temporary edit buffers

"**cc**"=30h - **Bulk Dump Data Request** - inquiry for content of part or whole user memory bank in internal memory

"**cc**"=40h - **Bulk Dump Data Save / Load** – response to "Bulk Dump Data Request" or change of content of part or whole user memory bank in internal memory

"**cc**"=50h - **Utility** – system and testing functions

Next specification of device activity is given by values of "Address" and "Subaddress" bytes - see tables 6 and 7 for more info.

4.2. "PARAMETER DATA REQUEST" COMMAND

Form : **F0 00 20 21 ii 2F 10 aa bb xx F7 [hex]**

Actual values of parameters in temporary edit buffers (with which is the device actually working) can be checked by "Parameter Data Request" command ("**cc**"=10h). Request is valid for the only one parameter. Values of preset parameters are taken from preset edit buffer, values of system parameters are taken from temporary buffer of system parameters, chord definition is taken from preset edit buffer. Buffer and parameter number are given by "**aa**" (Address – memory area) and "**bb**" (Subaddress – parameter number) databytes. "**dd**" databyte is not used in this type of SysEx Msg.

4.2.1. TEMPORARY BUFFER OF SYSTEM PARAMETERS

Form : **F0 00 20 21 ii 2F 10 00 bb xx F7 [hex]**
(where "**ii**" = Device ID, "**bb**" = Subaddress, "**xx**" = Checksum)

If address "**aa**" = 00h, the message is inquiry for value of some system parameter from temporary buffer of system parameters. Subaddress "**bb**" then determines parameter number (by another name – the sequence of parameter in temporary buffer). Valid values of "**bb**" are 00h to 0Bh – see table 1. Immediately after "Parameter Data Request" message is received, MDCB-2 transmits "Parameter Data Save / Load" message immediately. Value of requested parameter is included in that message.

4.2.2. EDIT BUFFER OF PRESET PARAMETERS

Form : **F0 00 20 21 ii 2F 10 01 bb xx F7 [hex]**
(where "**ii**" = Device ID, "**bb**" = Subaddress, "**xx**" = Checksum)

If address "**aa**" = 01h, the message is inquiry for value of some parameter from preset edit buffer. Subaddress "**bb**" then determines parameter number (by another name – the sequence of parameter in edit buffer). Valid values of "**bb**" are 00h to 13h – see table 2. Immediately after "Parameter Data Request" message is received, MDCB-2 transmits "Parameter Data Save / Load" message immediately. Value of requested parameter is included in that message.

4.2.3. TEMPORARY BUFFER OF "CHORD" WORKING MODE

Form : **F0 00 20 21 ii 2F 10 02 bb xx F7 [hex]**
(where "**ii**" = Device ID, "**bb**" = Subaddress, "**xx**" = Checksum)

If address "**aa**" = 02h, the message is inquiry for value of some parameter from preset edit buffer. Subaddress "**bb**" then determines parameter number (by another name – the sequence of parameter in edit buffer). Valid values of "**bb**" are 00h to 05h – see table 3. Immediately after "Parameter Data Request" message is received, MDCB-2 transmits "Parameter Data Save / Load" message immediately. Value of requested parameter is included in that message.

4.3. "PARAMETER DATA SAVE / LOAD" COMMAND

Form : **F0 00 20 21 ii 2F 20 aa bb dd xx F7 [hex]**

By transmitting of "Parameter Data Save / Load" command to MDCB-2, it is allowed to change actual parameters values according to which the device is just working. Also, this SysEx Msg message is sent from MDCB-2 as reply to "Parameter Data Request" message. Value of only the one parameter is transferred.

Preset parameter values are saved into preset edit buffer. System parameter values are saved into temporary bufer of system parameters. are saved into temporary buffer of "Chord" mode. Buffer type and number of parameter are set by next databytes in SysEx Msg: "**aa**" address determines buffer type, "**bb**" subaddress determines number of parameter. The only one "**dd**" databyte includes value of selected parameter.

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4.3.1. DATA OF TEMPORARY SYSTEM BUFFER

Form : **F0 00 20 21 ii 2F 20 00 bb dd xx F7 [hex]**
(where "**ii**" = Device ID, "**bb**" = Subaddress, "**dd**"= Databyte, "**xx**" = Checksum)

If address "**aa**" = 00h, one parameter in temporary system buffer will be changed. "**bb**" subaddress determines number of parameter (by another name – the sequence of parameter in temporary buffer). Valid values of "**bb**" are 00h to 0Bh. "**dd**" databyte must include new value of selected parameter. The device will work with new value of a parameter immediately after the message is received. Numbers of parameters ("**bb**" subaddress) and valid range of parameters values shows table 1.

4.3.2. DATA OF PRESET EDIT BUFFER

Form : **F0 00 20 21 ii 2F 20 01 bb dd xx F7 [hex]**
(where "**ii**" = Device ID, "**bb**" = Subaddress, "**dd**"= Databyte, "**xx**" = Checksum)

If address "**aa**" = 01h, one parameter in edit preset buffer will be changed. "**bb**" subaddress determines number of parameter (by another name – the sequence of parameter in temporary buffer). Valid values of "**bb**" are 00h to 13h. "**dd**" databyte must include new value of selected parameter. The device will work with new value of a parameter immediately after the message is received. Numbers of parameters ("**bb**" subaddress) and valid range of parameters values shows table 2.

4.3.3. DATA OF TEMPORARY BUFFER OF "CHORD" WORKING MODE

Form : **F0 00 20 21 ii 2F 20 02 bb dd xx F7 [hex]**
(where "**ii**" = Device ID, "**bb**" = Subaddress, "**dd**"= Databyte, "**xx**" = Checksum)

If address "**aa**" = 02h, one parameter in edit buffer of CHORD working mode will be changed. "**bb**" subaddress determines number of parameter (by another name – the sequence of parameter in temporary buffer). Valid values of "**bb**" are 00h to 05h. "**dd**" databyte must include new value of selected parameter. The device will work with new value of a parameter immediately after the message is received. Numbers of parameters ("**bb**" subaddress) and valid range of parameters values shows table 3.

4.4. "BULK DUMP DATA REQUEST" COMMAND

Form : **F0 00 20 21 ii 2F 30 aa bb xx F7 [hex]**

With help of "Bulk Dump Data Request" command, it is possible to launch listing of data from preset and system memory banks stored in user memory. Type and number of memory bank are given by "**aa**" address (memory area) and "**bb**" subaddress (bank number). Databyte "**dd**" is not used in that SysEx message at all.

4.4.1. SYSTEM MEMORY BANK

Form : **F0 00 20 21 ii 2F 30 00 00 xx F7 [hex]**
(where "**ii**" = Device ID, "**xx**" = Checksum)

If address "**aa**" = 00h, the message is inquiry for content of system memory bank. "**bb**" subaddress must be always 00h in this case. After "Bulk Dump Data Request" message receiving, MDCB-2 sends "Bulk Dump Data Save / Load" message as reply immediately. All data of system memory bank are included in that message.

4.4.2. PRESET MEMORY BANKS

Form : **F0 00 20 21 ii 2F 30 01 bb xx F7 [hex]**
(where "**ii**" = Device ID, "**bb**" = Subaddress, "**xx**" = Checksum)

If address "**aa**" = 01h, the message is inquiry for content of a preset memory bank (values of parameters). "**bb**" subaddress determines number of preset bank (preset number). Valid value of "**bb**" is from 00h to 3Fh. It corresponds to number from 1 to 64 of requested preset. After "Bulk Dump Data Request" message receiving, MDCB-2 sends "Bulk Dump Data Save / Load" message as reply immediately. All data of parameters of requested preset memory bank are included in that message.

4.4.3. MEMORY BANKS OF "CHORD" WORKING MODE

Form : **F0 00 20 21 ii 2F 30 02 bb xx F7 [hex]**
(where "**ii**" = Device ID, "**xx**" = Checksum)

If address "**aa**" = 02h, the message is inquiry for content of a preset memory bank (values of CHORD working mode). "**bb**" subaddress determines number of preset bank (preset number). Valid value of "**bb**" is from 00h to 3Fh. It corresponds to number from 1 to 64 of requested preset. After "Bulk Dump Data Request" message receiving, MDCB-2 sends "Bulk Dump Data Save / Load" message as reply immediately. All data of CHORD working mode of requested preset memory bank are included in that message.

4.5. "BULK DUMP DATA SAVE / LOAD" COMMAND

Form : **F0 00 20 21 ii 2F 40 aa bb dd…dd xx F7 [hex]**

By transmitting of "Bulk Dump Data Save / Load" message to MDCB-2, it is allowed to change content of presets memory bank and system memory bank saved in user memory. Also, this SysEx Msg message is sent from MDCB-2 as reply to "Bulk Dump Data Request" message. Data from the only one bank are transferred at a time. Type and number of memory bank is determined in next databytes of SysEx Msg.

If memory protection is active while command receiving, received data are not saved and system error occurs.

4.5.1. DATA OF SYSTEM MEMORY BANK

Form : **F0 00 20 21 ii 2F 40 00 00 dd…dd xx F7 [hex]**
(where "**ii**" = Device ID, " **dd…dd**"= Datablock, "**xx**" = Checksum)

If address "**aa**" = 00h, content of system memory bank is included in the message . "**bb**" subaddress is always 00h in this case. Datablock "**dd ... dd**" contains always 12 bytes. Their meanings shows table 1.

4.5.2. DATA OF PRESETS MEMORY BANKS

Form : **F0 00 20 21 ii 2F 40 01 bb dd…dd xx F7 [hex]**
(where "**ii**" = Device ID, "**bb**" = Subaddress, " **dd…dd**"= Datablock, "**xx**" = Checksum)

If address "**aa**" = 01h, content of a preset memory bank (values of parameters) is included in the message. "**bb**" subaddress determines number of requested memory bank (preset number). Valid value of "**bb**" is from 00h to 3Fh. It corresponds to number of requested preset bank from 1 to 64. Datablock "**dd ... dd**" contains always 20 bytes. Their meanings shows table 2.

4.5.3. DATA OF MEMORY BANKS OF "CHORD" WORKING MODE

Form : **F0 00 20 21 ii 2F 40 02 bb dd…dd xx F7 [hex]**
(where "**ii**" = Device ID, " **dd…dd**"= Datablock, "**xx**" = Checksum)

If address "**aa**" = 02h, content of a preset memory bank (values of CHORD working mode) is included in the message. "**bb**" subaddress determines number of requested memory bank (preset number). Valid value of "**bb**" is from 00h to 3Fh. It corresponds to number of requested preset bank from 1 to 64. Datablock "**dd ... dd**" contains always 6 bytes. Their meanings shows table 3.

4.6. "UTILITY" COMMANDS

"Utility" commands allows to show extract of information about device, execute system commands and launch service and test functions. Type of function is determined by values of "**aa**" (Address), "**bb**" (Subaddress) and "**dd**" (Data) bytes.

4.6.1. WORKING WITH MEMORY BANKS

Form : **F0 00 20 21 ii 2F 50 00 bb dd xx F7 [hex]**

If address "**aa**" = 00h, the message is a direct command for working with memory banks in user memory.
Here is possible to activate any preset bank (to change active preset), to store data from temporary edit buffers into permanent memory, to initialize (to clear) any memory bank and to change data of CHORD working mode.
The function is given by "**bb**" subaddress, "**dd**" databyte states the function more precise.

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4.6.1.1. CHANGE OVER PRESET

Form : **F0 00 20 21 ii 2F 50 00 00 dd xx F7 [hex]**
(where "**ii**" = Device ID, "**dd**"= Databyte, "**xx**" = Checksum)

If subaddress "**bb**" = 00h, the message is command for user preset change. Value of "**dd**" databyte can be from 00h to 7Fh.
If value of "**dd**" databyte is from 00h to 3Fh, actual preset (1~64) is changed immediately after the command receiving. The command is equivalent to preset changes done with help of section 5 to 7 of PARAMETER switch on front panel of MDCB-2 but no manual reset is necessary in this case. So contents of temporary system buffer and edit buffer of chord working mode are not changed. The command has higher priority than PARAMETER switch.
If value of "**dd**" databyte is from 40h to 7Fh, the SysEx Msg is inquiry for number of actually selected preset. No change of preset is done in this case, MDCB-2 only sends information about actually selected preset.
Following SysEx Msg is always sent to MIDI output after command execution :

F0 00 20 21 ii 2F 50 00 00 dd xx F7 [hex],

where "**dd**" databyte is from 00h to 3Fh – it corresponds with number of actual selected preset (1~64).

4.6.1.2. DATA WRITING INTO MEMORY BANK IN USER MEMORY

Form : **F0 00 20 21 ii 2F 50 00 01 dd xx F7 [hex]**

If subaddress "**bb**" = 01h, the message is command for saving of data from temporary edit buffers into permanent memory. The command is equivalent to MIDI control changes (CC) Nr. 119 (see user manual) – value of CC corresponds to value of "**dd**" databyte. The value can be 00h to 40h.
If value of "**dd**" databyte is from 00h to 3Fh, content of preset edit buffer (actual values of preset parameters and data for CHORD mode) will be stored to a preset memory bank. Bank numbers 1 to 64 correspond to "**dd**" databyte values 00h to 3Fh.
If value of "**dd**" databyte is 40h, content of system edit buffer (actual values of system parameters) will be stored to the system memory bank.
Following SysEx Msg is always sent to MIDI output after command execution :

F0 00 20 21 ii 2F 50 00 01 dd xx F7 [hex]

If value of "**dd**" databyte is from 00h to 3Fh, data was successfully stored to requested preset memory bank (from 1 to 64). If value of "**dd**" databyte is 40h, data was successfully stored to system memory bank. If value of "**dd**" databyte is 7Eh, the command can't be executed due to invalid number of memory bank in request message. If value of "**dd**" databyte is 7Fh, the command can't be executed due to memory protection activity.

4.6.1.3. INITIALIZATION OF MEMORY BANK IN USER MEMORY

Form : **F0 00 20 21 ii 2F 50 00 02 dd xx F7 [hex]**
(where "**ii**" = Device ID, "**dd**"= Databyte, "**xx**" = Checksum)

If subaddress "**bb**" = 02h, the message is command for initializing of a memory bank. Databyte "**dd**" determines the memory bank for initializing (it means default data will be written to the bank – see tables 1 to 3).
For "**dd**" = 00h to 3Fh, preset memory bank will be initialized ("**dd**" determines the bank number 1 to 64).
For "**dd**" = 40h, system memory bank will be initialized.
WARNING - All data stored by user in selected memory bank are erased during command execution. It is recommended to make a back up of user data by "BULK DUMP DATA SAVE / LOAD" command before. Initialization of memory bank does not affect data in temporary edit buffers. Following SysEx Msg is always sent to MIDI output after command execution :

F0 00 20 21 ii 2F 50 00 02 dd xx F7 [hex]

If value of "**dd**" databyte is from 00h to 3Fh, requested preset memory bank (from 1 to 64) was initialized successfully. If value of "**dd**" databyte is 40h, system memory bank was initialized successfully. If value of "**dd**" databyte is 7Eh, the command can't be executed due to invalid number of memory bank in request message. If value of "**dd**" databyte is 7Fh, the command can't be executed due to memory protection activity.

4.6.1.4. EDITING OF CHORD VIA MIDI NOTES

Form : **F0 00 20 21 ii 2F 50 00 03 dd xx F7 [hex]**
(where "**ii**" = Device ID, "**dd**"= Databyte, "**xx**" = Checksum)

      Command with subaddress "**bb**" = 03h controls mode for chord editing via MIDI notes. This function is equivalent to MIDI Control Change Nr. 118 (see user manual) – Value of CC 118 corresponds to "**dd**" databyte in SysEx Msg. The value can be 00h to 7Fh.

      If value of "**dd**" databyte is 7Fh (EDIT), MDCB-2 goes into chord editing mode (red LED on panel blinks) immediately after SysEx Msg receiving. In that mode, chord (from one voice to six voices) can be defined by Note On commands. Repeated SysEx Msg with databyte "**dd**" = 7Fh (CLEAR) clears previously defined tones and choice of chord tones can be done again.

      Next SysEx Msg with "**dd**" databyte value from 40h to 7Eh (OK) stores newly defined chord into edit buffer of CHORD working mode and then edit mode is finished.

      If value of "**dd**" databyte is from 01h to 3Fh (CANCEL), edit mode is interrupted without saving of newly defined chord – previously defined chord stays in edit buffer.

      If value of "**dd**" databyte is 00h (REFRESH), the editing is interrupted too but original tones from actual preset memory bank are returned into edit buffer.

4.6.2. SYSTÉM FUNCTIONS

Form : **F0 00 20 21 ii 2F 50 01 bb 00 xx F7 [hex]**

      If address "**aa**" = 01h, the message is a command for a system function executing. Requested function is determined by "**bb**" subaddress. Databyte "**dd**" is always 00h in this type of SysEx Msg.

4.6.2.1. HARDWARE RESET

Form : **F0 00 20 21 ii 2F 50 01 00 00 xx F7 [hex]**
(where "**ii**" = Device ID, "**xx**" = Checksum)

      This command is equivalent to pressing of RESET button on front panel of device. After the command is executed, default status of the device is set (the same status as after connection the device to supply adapter). Following SysEx Msg is sent to MIDI output after end of procedure :

F0 00 20 21 ii 2F 50 01 00 00 xx F7 [hex]

4.6.2.2. LISTING OF VERSION NUMBER OF INSTALLED SOFTWARE

Form : **F0 00 20 21 ii 2F 50 01 01 00 xx F7 [hex]**
(where "**ii**" = Device ID, "**xx**" = Checksum)

      Following message is sent to MIDI output immediately after the command receiving :

F0 00 20 21 ii 2F 50 01 01 dd xx F7 [hex],

where "**dd**" databyte determines number of version of CPU software. For example: software version is "2.0" if "**dd**" = 20h.

4.6.2.3. COMPLETE INITIALIZATION (FACTORY RESET)

Form : **F0 00 20 21 ii 2F 50 01 02 00 xx F7 [hex]**
(where "**ii**" = Device ID, "**xx**" = Checksum)

      Communication through MIDI and DCB ports is stopped immediately after the message receiving and the device is initialized to factory status (all parameters are set to default values). **WARNING - All data stored by user in memory are erased during command execution.** It is recommended to make a back up of all user data by "BULK DUMP DATA SAVE / LOAD" command before. After Factory Reset procedure, hardware reset is done automatically and MDCB-2 returns into normal working mode. The procedure takes approx. 6 seconds. Following SysEx Msg is sent to MIDI output after end of procedure :

F0 00 20 21 ii 2F 50 01 02 dd xx F7 [hex]

      The command was executed successfully if value of "**dd**" databyte is 00h. If value of "**dd**" databyte is 7Fh, the command can't be executed due to memory protection activity.

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4.6.2.4. TEST OF INTERNAL PARAMETERS MEMORY

Form : **F0 00 20 21 ii 2F 50 01 03 00 xx F7 [hex]**
(where "**ii**" = Device ID, "**xx**" = Checksum)

Test of internal memory of parameters is launched after this message is received. Ability for data writing and reading is tested for each of memory cell. Original content is handed back to memory after procedure ending. So no user data are lost during the test. Testing procedure takes approx. 30 seconds. Following SysEx Msg is sent to MIDI output after end of procedure :

F0 00 20 21 ii 2F 50 01 03 dd xx F7 [hex]

Value of "**dd**" databyte has following meaning :
- "**dd**" = 00h → no error occurs during test, memory OK
- "**dd**" = 01h → memory does not communicate with CPU
- "**dd**" = 02h → memory too slow
- "**dd**" = 03h → faulty cell found in memory
- "**dd**" = 7Fh → test cannot be executed, memory protection is on

4.6.3. SERVICE FUNCTIONS

Form : **F0 00 20 21 ii 2F 50 02 bb dd xx F7 [hex]**

If address "**aa**" = 02h, the message is direct command for executing of service function. The function is determined by subaddress "**bb**" and databyte "**dd**".

- "**bb**" = 00h to 05h → Operations with internal DCB registers
- "**bb**" = 06h to 07h → Operations with D/A converter - VCF output
- "**bb**" = 08h to 0Ah → Operations with ARPG, HOLD, PATCH outputs

Service functions are for debugging and for service only. Using of these functions in normal device operation is not assumed.

4.7. STRUCTURE OF DATABLOCKS

Structures of datablocks and the sequence of databytes in datablocks for all SysEx commands acceptable by MDCB-2 are described in tables below. "Default value" column includes values of parameters stored into memory during "Factory reset" procedure.

Table 1 – System parameters in SysEx Msg				
Parameter name	Byte	Value range	Default value	Meaning
Indicator – MIDI Msg	00h	00h ~ 03h	03h	00h = None 01h = Input 02h = Output 03h = Both
Indicator – MIDI Clock	01h	00h ~ 01h	00h	00h = Off 01h = On
Rx Multi-channel	02h	00h ~ 01h	00h	00h = Off 01h = On
MIDI Output Mode	03h	00h ~ 02h	02h	00h = Off 01h = MIDI Thru 02h = DCB-Tx
Auto-reset Mode	04h	00h ~ 01h	01h	00h = Off 01h = On
Program Change Mode	05h	00h ~ 03h	03h	00h = Pgm 0~127: bez funkce 01h = Pgm 0~127: Patch Shft 02h = Pgm 0~99: Preset Chng / Pgm 100~127: no function 03h = Pgm 0~99: Preset Chng / Pgm 100~127: Patch Shft
Tx Channel Shift	06h	00h ~ 0Fh	00h	shift of transmitting MIDI channel with regard to receiving MIDI channel
Tx Note Off Mode	07h	00h ~ 01h	00h	00h = Note Off (Velocity = 64) 01h = Note On (Velocity = 0)

Table 1 – System parameters in SysEx Msg (continued)				
Parameter name	Byte	Value range	Default value	Meaning
VCF Controller Select	08h	00h ~ 7Fh	10h	selection of Control Change number for direct VCF control
ARPG Controller Select	09h	00h ~ 7Fh	11h	selection of Control Change number for direct arpeggiator control
Arpg Pulse Length	0Ah	02h ~ 7Fh	05h	duration of clock pulses = 0,384 x "dd" [ms]
Patch Pulse Length	0Bh	02h ~ 7Fh	19h	duration of hradlovacích pulses = 1,92 x "dd" [ms]

Remarks :
Byte =
　Subaddress in "Parameter Data Save / Load" command
　Position of databyte in datablock of "Bulk Dump Data Save / Load" command
Value range =
　Value of databyte in "Parameter Data Save / Load" command
　Value of databyte in datablock of "Bulk Dump Data Save / Load" command, the databyte is on "Byte" position

Table 2 – Preset parameters in SysEx Msg				
Parameter name	Byte	Value range	Default value	Meaning
DCO Key Shift	00h	1Ch ~ 58h	40h	1Ch = -36 … 40h = ±0 … 58h = +24 semitones
DCO Mode	01h	00h ~ 02h	00h	00h = Poly 01h = Unison 02h = Chord
LFO Sync	02h	00h ~ 01h	00h	00h = Free 01h = MIDI Clock
LFO Vawe	03h	00h ~ 59h	2Fh	00h ~ 11h = Triangle and Saw 12h ~ 18h = Square 19h ~ 1Dh = Trapezoid 1Eh ~ 24h = Pulse 25h ~ 29h = Peak 2Ah ~ 2Eh = Sink 2Fh ~ 32h = Sine 33h ~ 36h = Exp and Log 37h ~ 3Ah = Stairs 3Bh ~ 3Fh = Noise 40h ~ 59h = Groove
LFO Rate	04h	00h ~ 7Fh	40h	speed of internal LFO
LFO Delay	05h	00h ~ 7Fh	00h	delay of internal LFO
LFO Retrigger	06h	00h ~ 01h	00h	retriggering of LFO by „Note-On" commands OFF / ON
VCF Control Mode	07h	00h ~ 02h	00h	00h = Normal – standard control 01h = Controller – direct control by selected MIDI controller 02h = Pitch Wheel - direct control by Pitch Wheel command
VCF Pitch Wheel Range	08h	00h ~ 7Fh	7Fh	affecting of VCF by „Pitch Wheel" command
VCF Cuttoff	09h	00h ~ 7Fh	40h	basic level of VCF frequency
VCF LFO Amount	0Ah	00h ~ 7Fh	40h	sweep level of VCF by internal LFO
VCF MOD Amount	0Bh	00h ~ 7Fh	40h	affecting of VCF by „Modulation" (CC 1) command
VCF Velocity Polarity	0Ch	00h ~ 03h	02h	00h = Positive Last 01h = Negative Last 02h = Positive Average 03h = Negative Average
VCF Velocity Amount	0Dh	00h ~ 7Fh	40h	affecting of VCF by „Velocity" value of „Note-On" commands
VCF Key + Chnl Aftertouch Polarity	0Eh	00h ~ 03h	00h	00h = Positive Last 01h = Negative Last 02h = Positive Average (for „Key Aftertouch" only) 03h = Negative Average (for „Key Aftertouch" only)
VCF Key Aftertouch Amount	0Fh	00h ~ 7Fh	40h	affecting of VCF by „Key Aftertouch" commands
VCF Chnl Aftertouch Amount	10h	00h ~ 7Fh	40h	affecting of VCF by „Channel Aftertouch" command
ARPG Sync	11h	00h ~ 02h	01h	00h = Free 01h = MIDI Clock 02h = MIDI Controller

Table 2 – Preset parameters in SysEx Msg (continued)				
Parameter name	Byte	Value range	Default value	Meaning
ARPG Rate	12h	00h ~ 7Fh	78h	rate of arpeggiator
ARPG Key Chase	13h	00h ~ 01h	00h	arpeggiator triggering by „Note-On" command is off / on

Remarks :
Byte =
   Subaddress in "Parameter Data Save / Load" command
   Position of databyte in datablock of "Bulk Dump Data Save / Load" command
Value range =
   Value of databyte in "Parameter Data Save / Load" command
   Value of databyte in datablock of "Bulk Dump Data Save / Load" command, the databyte is on "Byte" position

Tabule 3 – Preset parameters in SysEx Msg for CHORD working mode				
Parameter name	Byte	Value range	Default value	Meaning
1st Voice Shift	00h	00h ~ 7Fh	40h	00h ~ 33h, 4Dh ~ 7Fh = Voice Off 34h ~ 3Fh = −12 to −1 semitone(s) shift 40h = without shift (basic tone) 41h ~ 4Ch = +1 to +12 semitone(s) shift
2nd Voice Shift	01h	00h ~ 7Fh	44h	00h ~ 33h, 4Dh ~ 7Fh = Voice Off 34h ~ 3Fh = −12 to −1 semitone(s) shift 40h = without shift (basic tone) 41h ~ 4Ch = +1 to +12 semitone(s) shift
3rd Voice Shift	02h	00h ~ 7Fh	47h	00h ~ 33h, 4Dh ~ 7Fh = Voice Off 34h ~ 3Fh = −12 to −1 semitone(s) shift 40h = without shift (basic tone) 41h ~ 4Ch = +1 to +12 semitone(s) shift
4th Voice Shift	03h	00h ~ 7Fh	4Ch	00h ~ 33h, 4Dh ~ 7Fh = Voice Off 34h ~ 3Fh = −12 to −1 semitone(s) shift 40h = without shift (basic tone) 41h ~ 4Ch = +1 to +12 semitone(s) shift
5th Voice Shift	04h	00h ~ 7Fh	3Bh	00h ~ 33h, 4Dh ~ 7Fh = Voice Off 34h ~ 3Fh = −12 to −1 semitone(s) shift 40h = without shift (basic tone) 41h ~ 4Ch = +1 to +12 semitone(s) shift
6th Voice Shift	05h	00h ~ 7Fh	34h	00h ~ 33h, 4Dh ~ 7Fh = Voice Off 34h ~ 3Fh = −12 to −1 semitone(s) shift 40h = without shift (basic tone) 41h ~ 4Ch = +1 to +12 semitone(s) shift

Remarks :
Byte =
   Subaddress in "Parameter Data Save / Load" command
   Position of databyte in datablock of "Bulk Dump Data Save / Load" command
Value range =
   Value of databyte in "Parameter Data Save / Load" command
   Value of databyte in datablock of "Bulk Dump Data Save / Load" command, the databyte is on "Byte" position

Table 4 – SysEx Msg for working with memory banks			
Function name	Subaddress	Databyte	Meaning
Change Preset	00h	00h ~ 7Fh	00h ~ 3Fh = changing of actual preset 40h ~ 7Fh = inquiry for actual preset number
Save Bank	01h	00h ~ 40h	00h ~ 3Fh = saving of parameters into preset bank 40h = saving of parameters into system bank
Initialize Bank	02h	00h ~ 40h	00h ~ 3Fh = preset bank initialization 40h = system bank initialization
Edit Chord	03h	00h ~ 7Fh	00h = REFRESH 01h ~ 3Fh = CANCEL 40h ~ 7Eh = OK 7Fh = EDIT / CLEAR
Remarks : SysEx Msg = **F0 00 20 21 [Device ID] 30 50 00 [Subaddress] [Databyte] [Checksum] F7**			