JU6-KBD

MIDI Interface for ROLAND JUNO-6 Keyboard

Model 8-429
ver. 1.0

MIDI SYSTEM EXCLUSIVE COMMUNICATION
Rev. 2

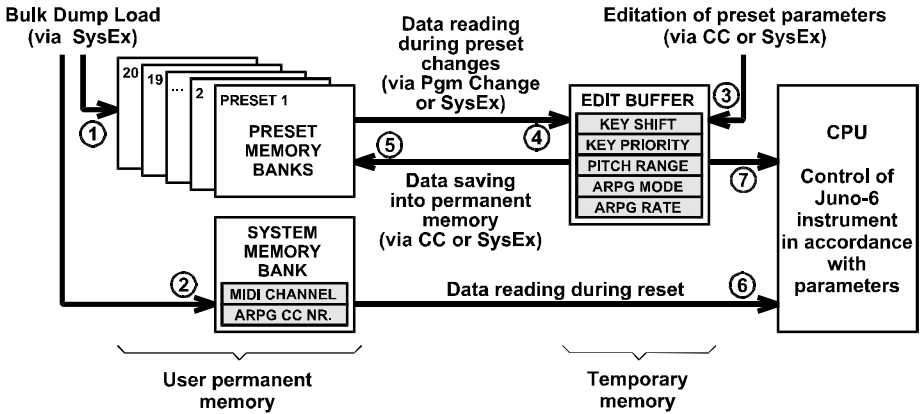Contents   page

1   SYSTEM EXCLUSIVE COMMUNICATION

JU6-KBD interface disposes of system of System Exclusive communication which enables to receive a SysEx Messages for changes of all parameters in edit buffer and in memory banks (see pic. 1). Also, System Exclusive command allow to work with preset memory (change preset, save preset, etc.).

Pic. 1 – Structure of interface's memory

2   SYSEX MESSAGES STRUCTURE

JU6-KBD recognizes own specific messages for changes of parameters setting etc. with this structure:

[hex]	[bin]	byte
F0	11110000	Start SysEx
00	00000000	Manufacturer ID (always 3 bytes)
20	00100000	
21	00100001	
ii	0iiiiiii	Device ID
53	01010011	Model ID
cc	0ccccccc	Command [1]
aa	0aaaaaaa	Address [2]
dd	0ddddddd	Data [3]
..	....	
dd	0ddddddd	
xx	0xxxxxxx	Checksum
F7	11110111	End SysEx

2.1   "DEVICE ID" BYTE

Device ID byte is equal to number of just active MIDI channel (00h for channel Nr. 1, 01h for channel Nr. 2 etc.).

Any of value from 00h to 0Fh of the Device ID is accepted if OMNI mode is active.

Next possible value of the Device ID is 7Fh - universal Device ID recognized whenever independently on just active MIDI channel number or OMNI mode.

For all others values of Device ID (from 10h to 7Eh), the message is evaluated as invalid and it is ignored by the interface.

2.2   "CHECKSUM" BYTE

Checksum byte "**xx**" confirms validity of System Exclusive message. It must be calculated so that seven-bit sum of bytes from "Model ID" to "Checksum" is equal to zero [4] (i.e. checksum is 7-bit complement of sum from "Model ID" to "Datablock" bytes). If checksum byte is invalid, whole message is invalid too and it is ignored by the interface.

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[1] Command "**cc**" byte specifies interface function type after whole SysEx Msg is received – see chapter 3.
[2] Address "**aa**" specifies parameter or memory area in dependence on type of SysEx Msg – see below.
[3] Block of "**dd…dd**"data bytes contents values of parameters or functions of the SysEx Msg. Number of bytes in the datablock is different in dependence on type of SysEx message - 1 or 5 data bytes.
[4] See chapter 4.3 for easy calculation of the Checksum byte.

3   COMMAND TYPES OVERVIEW

Command "**cc**" byte gives the interface activity after whole valid message is received. Valid values of "**cc**" are:

"**cc**"=10h - **System Parameter Change** – permanent change of one system parameter value
"**cc**"=20h - **Preset Parameter Change** – temporary change of one preset parameter
"**cc**"=30h - **Bulk Dump Data Load** – permanent change of all parameters in a preset memory bank
"**cc**"=40h - **Preset Processing** – work with preset memory banks

3.1   "SYSTEM PARAMETER CHANGE" COMMAND

"System Parameter Change" command ("**cc**"=10h) changes value of one particular system parameter stored in system memory bank of the interface (see ② on pic. 1).

Performed changes of parameter values become evident **till after next turning-on of the instrument** (i.e. during the interface reset – see ⑥ on pic. 1).

Form of the message:

[hex]	[bin]	byte
F0	11110000	Start SysEx
00	00000000	Manufacturer ID (always 3 bytes)
20	00100000	
21	00100001	
ii	0iiiiiii	Device ID
53	01010011	Model ID
10	00010000	Command
aa	0aaaaaaa	Address (system parameter number 0 to 1 – see table 1)
dd	0ddddddd	Data (system parameter value – see table 1)
xx	0xxxxxxx	Checksum
F7	11110111	End SysEx

Table 1 – System parameters		
Parameter Number ("**aa**" address)	Parameter Name	Valid range of the parameter value
00h	MIDI Channel	00h ~ 0Fh – MIDI channels 1 to 16 10h – OMNI mode
01h	Arpg CC Nr.	00h ~ 76h

3.2   "PRESET PARAMETER CHANGE" COMMAND

"Preset Parameter Change" command ("**cc**"=20h) changes value of one particular preset parameter in edit buffer (see ③ on pic. 1).

Performed changes of parameter values become evident immediately (see ⑦ on pic. 1). The changes are temporary only. New values are valid till preset change or the instrument switch-off.

Form of the message:

[hex]	[bin]	byte
F0	11110000	Start SysEx
00	00000000	Manufacturer ID (always 3 bytes)
20	00100000	
21	00100001	
ii	0iiiiiii	Device ID
53	01010011	Model ID
20	00100000	Command
aa	0aaaaaaa	Address (preset parameter number 00h to 04h – see table 2)
dd	0ddddddd	Data (preset parameter value – see table 2)
xx	0xxxxxxx	Checksum
F7	11110111	End SysEx

Table 2 – Preset parameters		
Parameter Number ("**aa**" address)	Parameter Name	Valid range of the parameter value
00h	Key Shift	00h ~ 43h
01h	Key Priority	00h ~ 03h
02h	Pitch Bend Range	00h ~ 18h
03h	Arpg Clock Mode	00h ~ 03h
04h	Arpg Clock Rate	00h ~ 7Fh

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3.3 "BULK DUMP DATA LOAD" COMMAND

"Bulk Dump Data Load " command ("**cc**"=30h), changes values of all preset parameters of a preset stored in preset memory bank of the interface (see ① on pic. 1).

Address "**aa**" byte specifies number of preset whom content will be changed. Valid range is from 00h to 13h for preset numbers from 1 to 20.

"**dd ... dd**" datablock contains always 5 bytes whose represent values of preset parameters (see table 2).

Performed changes become evident after activation of preset whom memory bank was changed.

Form of the message:

[hex]	[bin]	byte
F0	11110000	Start SysEx
00	00000000	Manufacturer ID (always 3 bytes)
20	00100000	
21	00100001	
ii	0iiiiiii	Device ID
53	01010011	Model ID
30	00110000	Command (Bulk Dump Data Load)
aa	0aaaaaaa	Address (preset number – 00h to 13h)
dd 0	0ddddddd	Data 0 ("Key Shift" parameter value)
dd 1	0ddddddd	Data 1 ("Key Priority" parameter value)
dd 2	0ddddddd	Data 2 ("Pitch Bend Range" parameter value)
dd 3	0ddddddd	Data 3 ("Arpg Clock Mode" parameter value)
dd 4	0ddddddd	Data 4 ("Arpg Clock Rate" parameter value)
xx	0xxxxxxx	Checksum
F7	11110111	End SysEx

3.4   "PRESET PROCESSING" COMMANDS

These commands ("**cc**"=40h) allow operations with preset memory banks. It is possible to change actual preset, to store data from edit buffer to preset memory banks and to initialize interface's memory.

3.4.1   CHANGE PRESET

The message changes just active preset number of the interface. This message is equivalent to MIDI command "Program Change (see ④ on pic. 1).

"**dd**" data byte specifies preset number which will be set as active. Valid range is from 00h to 13h for preset numbers from 1 to 20.

Form of the message:

[hex]	[bin]	byte
F0	11110000	Start SysEx
00	00000000	Manufacturer ID (always 3 bytes)
20	00100000	
21	00100001	
ii	0iiiiiii	Device ID
53	01010011	Model ID
40	01000000	Command (Preset Processing)
00	00000000	Address (Change Preset)
dd	0ddddddd	Data (new preset number – 00h to 13h)
xx	0xxxxxxx	Checksum
F7	11110111	End SysEx

3.4.2   STORE PRESET

The message transfers data from temporary edit buffer to permanent preset memory bank in interface's user memory (see ⑤ on pic. 1).

"**dd**" data byte specifies preset number to which the data will be stored. Valid range is from 00h to 13h for preset numbers from 1 to 20.

Form of the message:

[hex]	[bin]	byte
F0	11110000	Start SysEx
00	00000000	Manufacturer ID (always 3 bytes)
20	00100000	
21	00100001	
ii	0iiiiiii	Device ID
53	01010011	Model ID
40	01000000	Command (Preset Processing)
01	00000001	Address (Store Preset)
dd	0ddddddd	Data (preset number – 00h to 13h)
xx	0xxxxxxx	Checksum
F7	11110111	End SysEx

3.4.3   INTERFACE RESET

The message executes reset of the interface in dependence on "**dd**" data byte:

- For value "**dd**" = 00h, hardware reset is executed – the interface is set to the same status as after the Juno-6 instrument is switched on - preset Nr. 1 is activated (see ⑥ on pic. 1).

- For value "**dd**" = 7Fh, complete "Factory Reset" is executed – the interface is initialized to factory status (all parameters are set to default values).

   WARNING - All data stored by user in internal memory are erased during "Factory Reset" command execution.

Form of the message:

[hex]	[bin]	byte
F0	11110000	Start SysEx
00	00000000	Manufacturer ID (always 3 bytes)
20	00100000	
21	00100001	
ii	0iiiiiii	Device ID
53	01010011	Model ID
40	00010000	Command (Preset Processing)
02	00000010	Address (Interface Reset)
dd	0ddddddd	Data (00h / 7Fh)
xx	0xxxxxxx	Checksum
F7	11110111	End SysEx

4   SYSEX MESSAGE CREATION

4.1   EXAMPLE 1

Task: Set receiving MIDI channel to channel Nr. 2

Solution:

- We don't know what number of MIDI channel is just active so universal Device ID (**7Fh**) will be used,
- Necessary command is "System Parameter Change", 'Command' byte will be **10h**
- Data will be stored to system parameter "MIDI Channel", 'Address' byte is **00h**
- MIDI channel Nr. 2 is required, message will content one data byte with value **01h**

Start of SysEx Msg will be then :

Start SysEx :	**F0h**
Mfr ID :	**00h 20h 21h**
Device ID :	**7Fh**
Model ID :	**53h**
Command :	**10h**
Address :	**00h**
Data byte :	**01h**

- Now, checksum must be calculated as 7-bit complement of sum of bytes from 'Model ID' to 'Data', i.e.:

   00h − (53h + 10h + 00h + 01h) = 1Ch

- Form of whole required System Exclusive message is after checksum and 'End SysEx' byte refilling:

   F0h 00h 20h 21h 7Fh 53h 10h 00h 01h 1Ch F7h

After that message is received, receiving MIDI channel will be set to Nr. 2. But the interface will start working with newly stored value till next reset.

4.2   EXAMPLE 2

Task: Set parameters of preset Nr. 20 to these values:
- KEY SHIFT :   24h
- KEY PRIORITY :   01h
- PITCH BEND RANGE :   18h
- ARPG CLOCK MODE :   02h
- ARPG CLOCK RATE :   64h

Solution:

- We don't know what number of MIDI channel is just active so universal Device ID (**7Fh**) will be used,

- Necessary command is "Bulk Dump Data Load", 'Command' byte will be **30h**

- Data will be stored to preset Nr. 20, 'Address' byte is **13h**

Start of SysEx Msg will be then :

Start SysEx :   **F0h**
Mfr ID :   **00h 20h 21h**
Device ID :   **7Fh**
Model ID :   **53h**
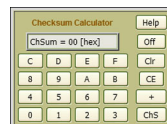Command :   **30h**
Address :   **13h**

• Datablock (5 bytes) will content values of parameters given by task

  24h 01h 18h 02h 64h

• Now, checksum must be calculated as 7-bit complement of sum of bytes from 'Model ID' to 'Data', i.e.:

  00h − (53h + 30h + 13h + 24h + 01h + 18h + 02h + 64h) = 47h

• Form of whole required System Exclusive message is after checksum and 'End SysEx' byte refilling:

  F0h 00h 20h 21h 7Fh 53h 30h 13h 24h 01h 18h 02h 64h 47h F7h

After that message is received, engaged values of parameters will be stored to preset memory bank Nr. 20. But the interface will start working with newly stored data till consecutive switching to preset Nr. 20.

4.3   CHECKSUM CALCULATOR

If you want to create a SysEx message yourself, you need to calculate the 'Checksum' byte. This is difficult for most musicians because calculation with hexadecimal / binary numbers is necessary. For easy calculation of the checksum, special software **Checksum Calculator** is prepared.

The Checksum Calculator is based on Java scripts so it can run on any computer with web browser (Windows, OSX, etc.). Note that scripts and ActiveX elements must be enabled in the web browser for proper function of the calculator.

The Checksum Calculator is available at our website (http://www.chd-el.cz) on Support page.

The Checksum Calculator works on-line or it can be downloaded to your computer and then launched from it.

4.4   SYSEX MESSAGES GENERATOR

As a support for the users we have made special software generators to create any SysEx messages to control the interface editor. Usage of this generator is very easy for any user. Please see Owner's Manual of the interface for detailed description of SysEx Messages Generator.

The SysEx Messages Generator is available at our website (http://www.chd-el.cz).