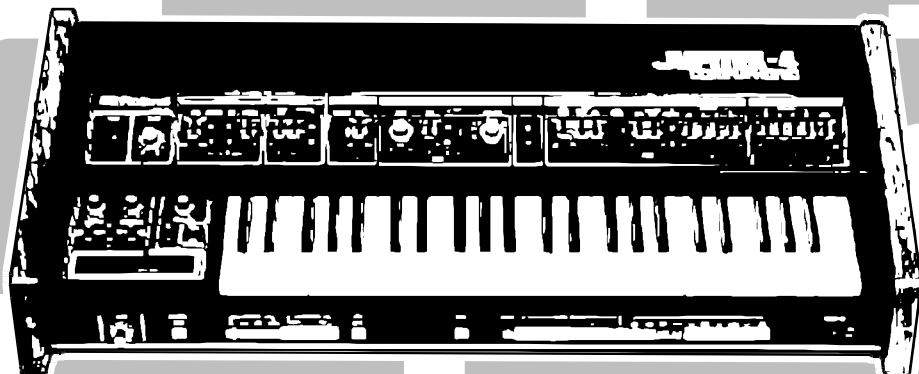


JP4-KBD

MIDI Interface for Roland Jupiter – 4 Keyboard

Model 8-432
Version 2.0



Owner's Manual

Rev. 2



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1 DEVICE DESCRIPTION

JP4-KBD is a MIDI retrofit for Roland Jupiter-4 synthesizer. The device enables the instrument to be controlled via MIDI as a MIDI expander. JP4-KBD enables to control the instrument's **keyboard** and it also can synchronize the **arpeggiator** speed with MIDI Clock. **No other** instrument's functions and circuits are controlled!

For control of the instrument via the JP4-KBD, standard MIDI Note On/Off and Control Changes (CCs) commands are used.

The interface works in one direction only – it **only receives** MIDI data.. The Jupiter-4's keyboard, control panel sliders and switches **are not transmitted** as a MIDI data!

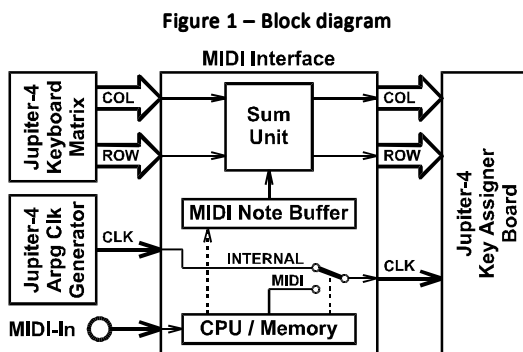
All JP4-KBD functions are controlled via parameters adjusted by user. Standard channel and system MIDI commands or System Exclusive messages are used for setting of all parameters. The interface has own internal memory bank for saving of user setting.

1.1 INTERFACE FUNCTIONS

Functional diagram of the interface is shown on fig. 1.

The interface controls the keyboard in a parallel manner with own keyboard of the instrument - the instrument's keyboard can be used at the same time as it is controlled by MIDI.

The interface controls also tempo of instrument's arpeggiator. The tempo is driven by internal instrument's clock generator (as in original instrument) or it is derived from external MIDI Clock.



2 INTERFACE BASIC OPERATION

There are no control elements or indicators on the interface. All parameters are adjusted via MIDI commands from an external MIDI data source (PC, DAW) only.

2.1 CONNECTION TO MIDI SYSTEM

The interface only receives MIDI data so it is equipped only by MIDI input. Interface's MIDI input have to be connected to MIDI output of MIDI host system (PC, DAW, master keyboard, etc.). Standard MIDI cable with DIN 41524 connector (5 pins / 180°) is used for connection.

2.2 INITIALIZATION SEQUENCE

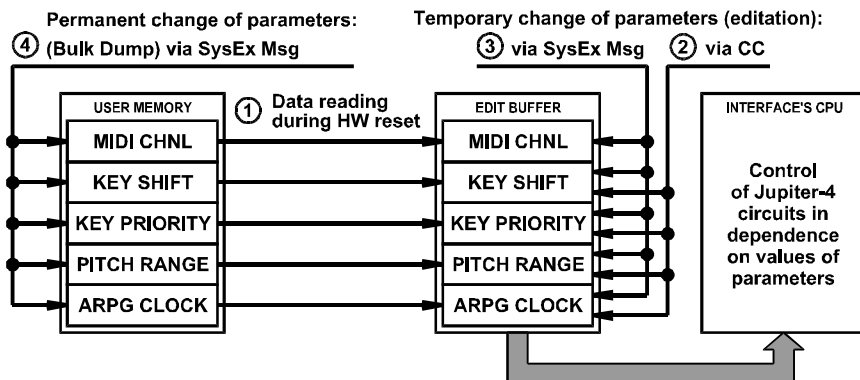
Initialization sequence of interface's CPU is launched after every start-up of the instrument. Default status of system functions is set during initialization sequence and values of parameters stored in user memory are read into edit buffer – see fig. 2.

Then the interface works in dependence on values of the parameters automatically. No next attendance of user is necessary.

3 INTERFACE PARAMETERS

The interface's parameters settings affects significantly the incoming MIDI commands processing and the Jupiter-4 circuits operation.

Figure. 2 – Structure of interface's memory



All parameters are stored in user memory of the interface (fig. 2).

During initialization sequence (after the instrument is switched on), parameters stored in permanent user memory are copied to edit buffer ① and they control the all interface's functions from there.

The content of the user memory can be changed by the "Bulk Dump Data Load" SysEx message anytime ④. Factory setting of all parameters shows table 1.

Table 1 – "Factory Reset" settings of the interface parameters (functions)

Function	Setting	Value of corresponding parameter [dec]	Remarks
MIDI channel choice	12 th MIDI channel	MIDI Channel : 11	Chapter 3.1
Keyboard shift setting (transpose)	+48 semitones	Key Shift : 48	Chapter 3.2
Key priority setting	Last key priority	Key Priority : 0	Chapter 3.3
Pitch bend range setting	±12 semitones	Pitch Bend Range : 12	Chapter 3.4
Arpeggio clock source / rate setting	Instrument's generator	Arpeggio Clock Rate : 0	Chapter 3.5

During the interface operation, parameters in edit buffer (that affect the interface directly) can be changed via MIDI CCs ② (see chapter 4.1.2) or via SysEx messages ③ (see chapter 4.3). All these changes are temporary only – they are lost when the instrument is switched off!

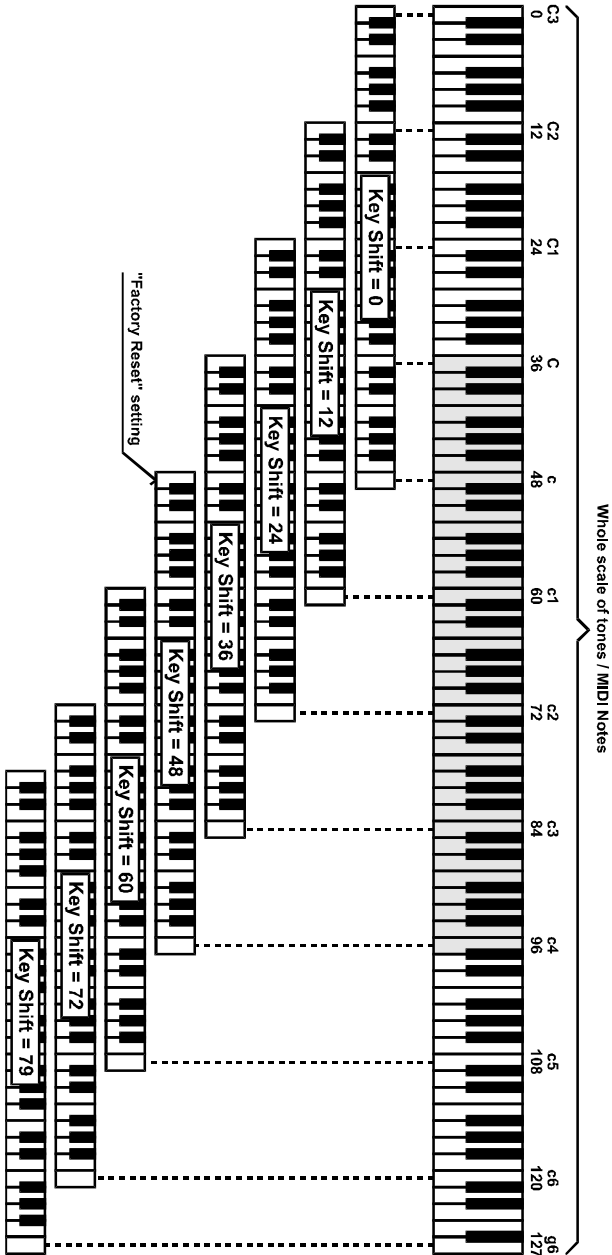
3.1 MIDI CHANNEL

This parameter sets the basic MIDI channel for communication with MIDI master system. Any of the 16 available MIDI channels can be set as MIDI OMNI mode as well. OMNI mode enables the instrument to receive data on all 16 MIDI channels simultaneously.

The parameter values are 0 to 16. Values 0 to 15 represent MIDI channels 1 to 16. Value 16 is for OMNI mode. Value of this parameter can be adjusted **only** by MIDI System Exclusive Message - see chapter 4.3.



Figure. 3 – "Key Shift" parameter



3.2 KEY SHIFT

Key Shift parameter transposes the numbers of received MIDI Notes. The parameter value specifies exactly the number of MIDI Note which is assigned to the lowest key of the instrument's keyboard.

Values of the "Key Shift" parameter can be from 0 to 79. If value 0 is set (transposition is 0), the lowest key of the keyboard corresponds to MIDI Note Nr. 0 and the highest key corresponds to MIDI Note Nr. 48. If value 1 of the parameter is set, (transposition is +1), the lowest key of the keyboard corresponds to MIDI Note Nr. 1 and the highest key corresponds to MIDI Note Nr. 49. Etc. up to value 79 of the parameter (transposition is +79) when the lowest key of the keyboard corresponds to MIDI Note Nr. 79 and the highest key corresponds to MIDI Note Nr. 127. See fig. 3 for more details.

The temporary parameter value can be adjusted simply by MIDI CC #16 (see chapter 4.1.2).

3.3 KEY PRIORITY

The value of the parameter adjusts the incoming MIDI Note On/Off commands processing in case when all four tone generators of the instrument are already used (four tones is already sounding). The parameter value is from 0 to 3:

- 0 → **LAST**: Last key priority – the last pressed key always replaces the first key pressed.
- 1 → **HIGHER**: Higher key priority – if the last pressed key is of the higher tone than any of the previously pressed keys, the lowest tone key is replaced.
- 2 → **LOWER**: Lower key priority – if the last pressed key is of the lower tone than any of the previously pressed keys, the highest tone key is replaced.
- 3 → **NONE**: No priority – if all four tone generators are used, all next Note On commands are ignored at the MIDI input.

The temporary parameter value can be adjusted simply by MIDI CC #17 (see chapter 4.1.2).

3.4 PITCH BEND RANGE

The parameter adjusts the maximum range of the pitch bend controlled by the "Pitch Bend" MIDI command¹.

The parameter values are 0 to 24. The 0 value switches the pitch bend off - MIDI command "Pitch Bend" is ignored. The values of 1 to 24 are equal to bending the pitch in semitones. Bending up to ± 2 octave is available thus.

The temporary parameter value can be adjusted simply by MIDI CC #18 – see chapter 4.1.2).

3.5 ARPEGGIO CLOCK RATE

The parameter selects source of clock pulses for instrument's arpeggiator and adjusts arpeggio rate if the source is MIDI Clock.

The parameter values are 0 to 127.

Value of 0 switches instrument's internal clock generator on. (Arpeggio speed is adjusted by the TRIGGER - RATE slider on the instrument's panel or by external clock impulses form the EXT CLOCK IN connector on the rear panel).

Parameter values from 1 to 127 synchronize arpeggiator speed according to incoming MIDI Clock data. Higher value of the parameter corresponds to higher arpeggiator speed: Value 1 represents 127 MIDI ticks between clock pulses, value 2 represents 126 MIDI ticks, etc. The highest value of 127 represents one MIDI tick between

¹ Pitch Bend MIDI command affects only tones launched by MIDI Notes. Own instrument's keyboard is not affected.

clock pulses. For conversion rates see table 2 – the table contains only selected values of the parameter for frequently used arpeggiator tempos.

The temporary parameter value can be adjusted simply by MIDI CC #19 (see chapter 4.1.2).

Table 2 – Conversion of parameter value to length of arpeggiator interval

Parameter value	Interval between clock pulses in partial notes										
	1/2	1/2 triplet	1/4	1/4 triplet	1/8	1/8 triplet	1/16	1/16 triplet	1/32	1/32 triplet	1/64 triplet
0	*)	*)	*)	*)	*)	*)	*)	*)	*)	*)	*)
32	2	3	4	6	8	12	16	24	32	48	96
64	-	2	-	4	-	8	-	16	-	32	64
80	1	-	2	3	4	6	8	12	16	24	48
96	-	1	-	2	-	4	-	8	-	16	32
104	-	-	1	-	2	3	4	6	8	12	24
112	-	-	-	1	-	2	-	4	-	8	16
116	-	-	-	-	1	-	2	3	4	6	12
120	-	-	-	-	-	1	-	2	-	4	8
122	-	-	-	-	-	-	1	-	2	3	6
124	-	-	-	-	-	-	-	1	-	2	4
125	-	-	-	-	-	-	-	-	1	-	3
126	-	-	-	-	-	-	-	-	-	1	2
127	-	-	-	-	-	-	-	-	-	-	1

Note.: *) tempo of arpeggiator is controlled by internal clock generator

4 MIDI IMPLEMENTATION

The interface has only MIDI input - therefore it **only receives** MIDI commands. The interface recognizes MIDI channel commands, common system commands and System Exclusive messages.

4.1 CHANNEL COMMANDS

The interface receives Channel commands on the MIDI channel defined by the system parameter "MIDI Channel" (see chapter 3.1). In OMNI mode, interface receives data on all 16 MIDI channels simultaneously.

4.1.1 NOTE ON/OFF

Interface receives Note On/Off in range of 49 MIDI Notes (four octaves). It recognizes only MIDI Note numbers, velocity data are ignored since the instrument circuits do not work with dynamics.

The "Key Shift" parameter defines assignment of acceptable MIDI Notes numbers to instrument's keys (see chapter 3.2).

When four valid MIDI notes are received (all four instrument's tone generators are sounding), all following received MIDI Note commands are processed according to "Key Priority" parameter setting (see chapter 3.3).

4.1.2 CONTROL CHANGES (CCs)

The interface recognizes standard MIDI Control Changes Nr. 64, 120, 121, 123. Some other CCs are used for temporary adjusting the interface's parameters (CCs Nr. 16 - 19).

Overview of functions and values of all used CCs shows table 3.

Table 3 – Acceptable CCs overview			
CC Nr.	Name	Function	Valid value
CC #16 ¹⁾	Key Shift	Controls "Key Shift" interface's parameter (See chapter 3.2)	0 ~ 127 (See table 4)
CC #17 ¹⁾	Key Priority	Controls "Key Priority" interface's parameter (See chapter 3.3)	0 ~ 31 = Last 32 ~ 63 = Higher 64 ~ 95 = Lower 96 ~ 127 = None
CC #18 ¹⁾	Pitch Bend Range	Controls "Pitch Bend Range" interface's parameter (See chapter 3.4)	0 ~ 127
CC #19	Arpg Clock Rate	Controls "Arpg Clock Rate" preset parameter (See chapter 3.5)	0 = Internal 1 ~ 127 = MIDI Clock
CC #64 ¹⁾	Hold	Standard MIDI function	0 ~ 63 = Off 64 ~ 127 = On
CC #120 ¹⁾	All Sound Off	Standard MIDI function	0
CC #121	Reset All Controllers	Standard MIDI function	0
CC #123 ¹⁾	All Notes Off	Standard MIDI function	0
Remark:			
¹⁾ The CC is only relevant for received MIDI notes, not for own instrument's keyboard			

CC #16 – Key Shift parameter control

The received value 0 to 127 of the CC #16 adjusts the "Key Shift" parameter temporarily (see chapter 3.2). Since the "Key Shift" parameter can be only form 0 to 79, value of the CC #16 is converted to this range – see table 4.

Table 4 – Conversion of CC #16 value to "Key Shift" parameter value (in semitones)

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

CC #17 – Key Priority parameter control

The received value 0 to 127 of the CC #17 adjusts the "Key Priority" parameter temporarily (see chapter 3.3). Since the "Key Priority" parameter can be only form 0 to 3, value of the CC #17 is converted to this range – see table 5.

Table 5 – Conversion of CC #17 value to "Key Priority" parameter value

CC #17	Priority	CC #17	Priority
0 ~ 31	Last	64 ~ 95	Lower
32 ~ 63	Higher	96 ~ 127	None

CC #18 – Pitch Bend Range parameter control

The received value 0 to 127 of the CC #18 adjusts the "Pitch Wheel Range" parameter temporarily (see chapter 3.4). Since the "Key Priority" parameter can be only form 0 to 24, value of the CC #18 is converted to this range – see table 6.

Table 6 – Conversion of CC #18 value to "Pitch Wheel Range" parameter value (in semitones)

CC #18	Range	CC #18	Range	CC #18	Range	CC #18	Range	CC #18	Range
0 ~ 4	±0	25 ~ 29	±5	50 ~ 54	±10	75 ~ 79	±15	100 ~ 104	±20
5 ~ 9	±1	30 ~ 34	±6	55 ~ 59	±11	80 ~ 84	±16	105 ~ 109	±21
10 ~ 14	±2	35 ~ 39	±7	60 ~ 64	±12	85 ~ 89	±17	110 ~ 114	±22
15 ~ 19	±3	40 ~ 44	±8	65 ~ 69	±13	90 ~ 94	±18	115 ~ 119	±23
20 ~ 24	±4	45 ~ 49	±9	70 ~ 74	±14	95 ~ 99	±19	120 ~ 127	±24

CC #19 – Arpeg Clock Rate parameter control

The received value 0 to 127 of the CC #19 adjusts the "Arpeggio Clock Rate" parameter temporarily (see chapter 3.5). The received value of the CC #19 corresponds to the "Arpeggio Clock Rate" parameter value directly. Value 0 selects instrument's internal clock generator and values 1 to 127 select MIDI Clock as source for the arpeggiator speed.

CC #64 – Standard controller: Hold

The CC #64 works in a standard way: Holds the tone generators sounding² when the "Hold" pedal is pressed³. Values 64 to 127 of the CC #64 are recognized as ON (pedal pressed), values 0 to 63 are recognized as OFF (pedal released).

CC #120 – Standard controller: All Sound Off

When CC #120 is received, all tone generators are muted independently if they are active by "Note On" command or the "Hold" controller⁴.

CC #121 – Standard controller: Reset All Controllers

When this controller is received, the CC #64 "Hold" is switched off and the "Pitch Bend" controller is set to the center position.

CC #123 – Standard controller: All Notes Off

When CC #123 is received, all tone generators are muted if the "Hold" controller is inactive. If the "Hold" is active "All Notes Off" command is executed after the "Hold" pedal release⁵.

4.1.3 PITCH BEND

"Pitch Bend" ("Pitch Wheel") command has a standard function - it changes the tune⁶ of the notes played⁷. The minimal / maximal range of bend is adjusted by the "Pitch Bend Range" parameter (see chapter 3.4) and it can be from ± 0 to ± 24 semitones.

4.2 COMMON SYSTEM COMMANDS

The interface uses only "MIDI Clock" synchronization pulses and "System Reset". All other Common System commands are ignored.

4.2.1 CLOCK

If "Arpeggio Clock Rate" parameter (see chapter 3.5) is 0, MIDI Clock commands are ignored.

If "Arpeggio Clock Rate" parameter is from 1 to 127, the interface receives MIDI Clock commands and it derives synchronization pulses for arpeggiator from them - the arpeggiator is synchronized with tempo of played song. Speed of the arpeggiator is then controlled by "Arpeg Clock Rate" parameter (see chapter 3.5 and table 2).

² Hold MIDI command affects only tones launched by MIDI Notes. Own instrument's keyboard is not affected.

³ If the CC #64 is active (ON) and the Note On command for an already playing note is received, the envelope generator is **not triggered** again - percussive sounds **will not be played** this way.

⁴ All Sound Off MIDI command affects only tones launched by MIDI Notes. Own instrument's keyboard is not affected.

⁵ All Notes Off MIDI command affects only tones launched by MIDI Notes. Own instrument's keyboard is not affected.

⁶ Since the interface does not have direct access to the control voltage (CV) of the tone generators, the tone is **not detuned continuously** but in semitone steps. Together with the tuning changes, the envelope generators are triggered.

⁷ The Pitch Bend command is valid only for tones activated by MIDI Notes. It doesn't work with tones activated from own keyboard of the instrument.

Maximal speed of arpeggiator is limited by the hardware construction of the instrument. This may also cause that when the MIDI song has very high tempo, the synchronized arpeggio tones might be irregular or some tones might be omitted.

4.2.2 SYSTEM RESET

The complete interface reset is done after receiving "Reset" command - all functions are adjusted to their default values – the interface goes to the same status as after the instrument is switched on.

4.3 SYSTEM EXCLUSIVE MESSAGES

The System Exclusive communication enables user to adjust the values of all parameters in edit buffer and in permanent user memory of the interface.

As a support for the users we have made software generator to create System Exclusive messages to control the interface – see chapter 5.

System Exclusive communication protocol is described in detail in standalone manual available at our website.

5 SYSEX MESSAGES GENERATOR

5.1 USAGE OF SYSEX MESSAGES GENERATOR

As a support for the users we have made software generator to create System Exclusive messages to control the interface. Any necessary SysEx message can be created with this generator without difficult calculating of binary or hexadecimal numbers.

The generator is based on Java scripts so it can run on any computer with web browser (Windows, OSX, etc.)⁸. To send the generated commands you will also need an utility to send the generated text⁹ as a MIDI SysEx dump (see chapter 5.2 for recommended software¹⁰).

Visit our website and download the “JP4kbd_syxgen.zip” archive. Expand the archive to a selected folder on your computer's hard drive (i.e. “jp4kbd.html” and “jp4kbd_help.html” files and “media” sub-folder).

To launch the SysEx messages generator, simply open the “jp4kbd.html” file in your web browser (e.g. by clicking on the file icon). The generator window opens.

⁸ Note that scripts and ActiveX elements must be enabled in web browser for proper function of the generator.

⁹ The generated format of the message is **text**. The text can not be saved as a *.syx or *.mid file directly, hence a text to SysEx utility is needed.

¹⁰ It is not necessary to use the recommended utility. The same function is provided by various DAW and MIDI SysEx softwares. For required text format and instructions check the documentation of your DAW/software.

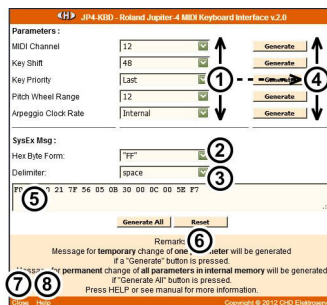
5.1.1 INDIVIDUAL PARAMETER TEMPORARY SETTING

To change / adjust one parameter in edit buffer (temporarily):

1. Select value of **one** requested parameter ①.
1. Select requested "Hex Byte Form" ② and "Delimiter" ③ for generated data¹¹.
2. Click the corresponding "Generate" button (the button in the same row) ④.
3. The hexadecimal MIDI SysEx message is generated as a text in text field on bottom of the window ⑤.
4. **Copy** the text in clipboard (CTRL+C) and **paste** (CTRL+V) to a MIDI Sysex software¹².
5. Send the message to the interface.
6. The interface works with new parameter value immediately – no reset is necessary.

Optional:

- To clear the text field and return all values to their defaults, click the "Reset" button ⑥.
- "Help" link ⑦ opens new window with brief help.
- "Close" link ⑧ closes this window.



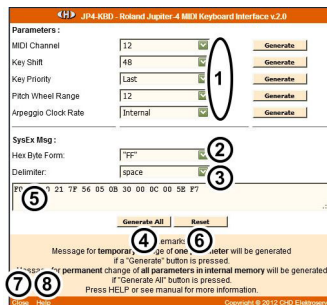
5.1.2 BULK DUMP ALL PARAMETERS

To change / adjust all parameters in permanent memory bank:

7. Select values of **all** parameters ①.
2. Select requested "Hex Byte Form" ② and "Delimiter" ③ for generated data¹³.
8. Click the "Generate All" button ④.
9. The hexadecimal MIDI SysEx message is generated as a text in text field on bottom of the window ⑤.
10. **Copy** the text in clipboard (CTRL+C) and **paste** (CTRL+V) to a MIDI Sysex software¹⁴.
11. Send the message to the interface.
12. Switch the Jupiter-4 instrument off and then on again after a moment. Now the interface starts operation with the new setting of the parameters.

Optional:

- To clear the text field and return all values to their defaults, click the "Reset" button ⑥.
- "Help" link ⑦ opens new window with brief help.
- "Close" link ⑧ closes this window.



¹¹ The "FF" Hex Byte Form and " " (space)" for Delimiter are the initial values after the generator is launched. They conform to recommended MIDI SysEx software (see chapter 5.2).

¹² See chapter 5.2 for recommended MIDI SysEx software.

¹³ The "FF" Hex Byte Form and " " (space)" for Delimiter are the initial values after the generator is launched. They conform to recommended MIDI SysEx software (see chapter 5.2).

¹⁴ See chapter 5.2 for recommended MIDI SysEx software.

6 MIDI IMPLEMENTATION CHART

 Device : **JP4-KBD**

 Date : **2 / 2008**

 Model : **8-432**

 Version : **2.0**

Function		Transmission	Reception	Remarks
Basic Channel	Default	X	1~16	¹⁾
	Changed	X	1~16	
Mode	Default	X	Mode 3	²⁾
	Messages		X	
Note Number		X	0~127	³⁾
Velocity	Note ON	X	X	
	Note OFF	X	X	
After Touch	Key's	X	X	
	Channel's	X	X	
Pitch Bender		X	O	
Control Changes	16	X	O	Own CC – Key Shift
	17	X	O	Own CC – Key Priority
	18	X	O	Own CC – Pitch Bend Range
	19	X	O	Own CC – Arpg Clock Rate
	64	X	O	Hold
	120	X	O	All Sound Off
	121	X	O	Reset All Controllers
Program Change		X	X	0~19
System Exclusive		X	O	See description
System Common	Song Position	X	X	
	Song Select	X	X	
	Tune	X	X	
System Real Time	Clock	X	O	
	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 SysEx Msg

²⁾ Can be changed to Mode 1 by SysEx Msg

³⁾ Only 49 Notes can be accepted at a time - range depends on "Key Shift" parameter 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

7 ERROR STATUS INDICATION

If any fatal errors occur during the interface operation (eg. error in MIDI communication), the software stops automatically the device and the user is informed by the permanently sounding tone generators C2 + D#2 + F#2.

In that case, it is necessary to reset the interface for proper operation refresh - it is necessary turn the instrument off and turn it on repeatedly after a moment.

8 WARRANTY CONDITIONS

The equipment is provided with **thirty-months 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.



MIDI Interface for Roland Jupiter-4
Model JP4-KBD, Nr. 8-433, ver. 2.00
Document: 843220_manual_rev2

Manufacturer:

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