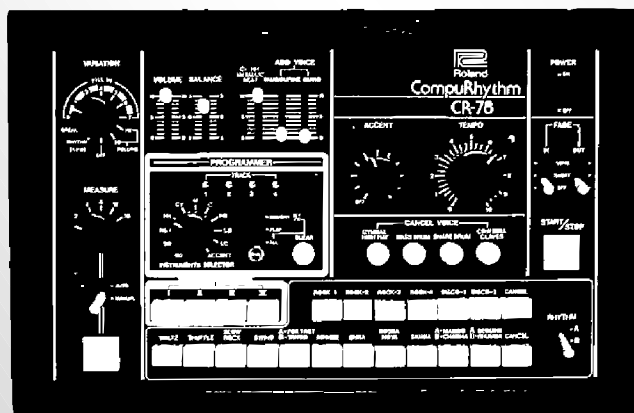


CRX8-M

MIDI Interface for Roland CR-68 / CR-78

Model 8-449
ver. 1.0



OWNER'S MANUAL





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This manual in PDF form is available on supplemental CD-ROM or on manufacturer's web-pages.

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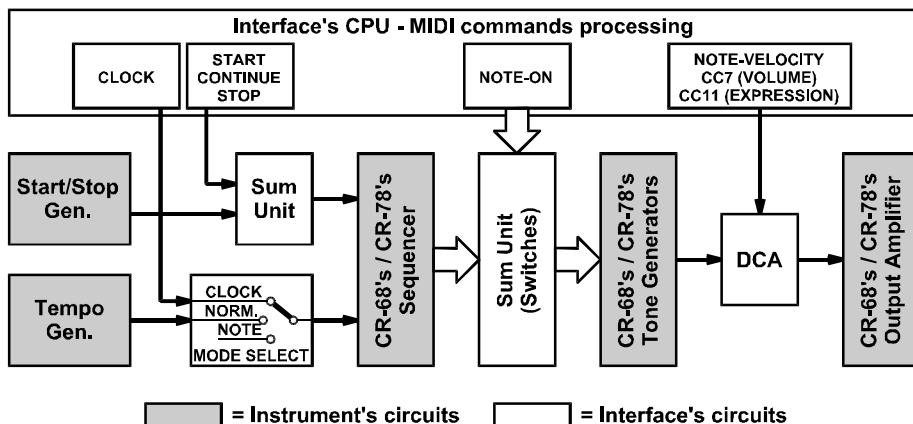
1. DEVICE DESCRIPTION

CRX8-M interface is retrofit for Roland CR-68 and CR-78 drum machines. It enables the Roland CR-68 or CR-78 instrument to be inserted to MIDI system. With a help of the interface, you can control the internal sequencer of the instrument (synchronization of tempo with MIDI clock, start and stop of run of sequencer with MIDI commands) or you can launch instrument's sound generators individually including continuous dynamics of volume level. Your instrument then works like polyphonic velocity sensitive MIDI drum expander.

1.1. FUNCTION OF INTERFACE

Functional block schematics of the interface is on pic. 1. The interface controls tempo of instrument's sequencer, circuits for start and stop of the sequencer, instrument's sound generators and it drives the level of acoustic signal with a help of DCA (Digital Controlled Amplifier).

Pic. 1 – Function diagram



2. CONNECTION OF CRX8-M TO MIDI SYSTEM

The interface has connectors for both MIDI data input and output. Standard MIDI cables with DIN 41524 connector (5 pins / 180°) are used for interconnection with other MIDI devices.

2.1. CONNECTION FOR STANDARD OPERATION

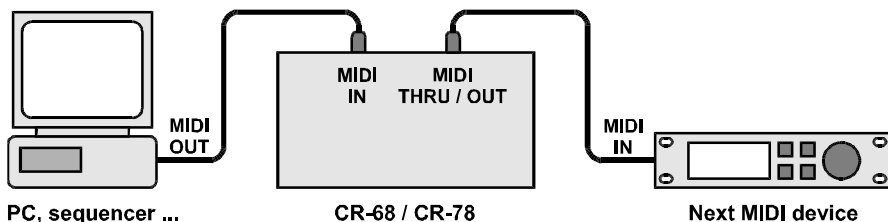
Data from host MIDI system (PC, sequencer, master keyboard etc.) for control of CR-68 / CR-78 instrument are incoming to MIDI-IN input of the interface.

All MIDI data incoming to MIDI input of the interface are transferred to MIDI-THRU/OUT output of the interface without any changes (THRU function). This enables connection of next MIDI devices to host system without an additional Thru-Box etc. MIDI input of next MIDI device will be simply interconnected with MIDI-THRU/OUT output of the interface (see pic. 2).

If there are no other devices controlled from the MIDI host system, only MIDI-IN cable is necessary (from host system to MIDI-IN input of the interface). MIDI-THRU/OUT output of the interface stays unconnected.



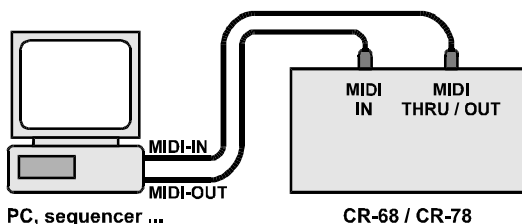
Pic. 2 – Connection to MIDI system for standard working mode



2.2. CONNECTION FOR MEMORY CONTENT TRANSFER

Except data from input MIDI-IN, own interface's System Exclusive messages are transmitted to output MIDI-THRU/OUT. These messages are transmitted as a response of the interface to requests for memory banks content listing from host system. If that function is used, MIDI output MIDI-THRU/OUT of the interface must be connected to MIDI input of host system (PC, sequencer...) in which data from interface's memory will be archived (see pic. 3).

Pic. 3 – Connection to MIDI system for memory content transfer



Attention! If this way of connection is used, data throughout (function named MIDI ECHO, THRU etc.) must be disabled in sequencer. In other case, communication loop can occur and whole MIDI system “freezes”!

3. INTERFACE OPERATION

Function of MIDI interface is given by lever switch for working mode selection on the rear panel of the instrument. One of three working modes can be chosen: NORMAL, CLOCK and NOTE. After requested working mode is set, the interface works quite automatically in accordance with interface's parameters setting and with received MIDI commands. No next attendance of user is necessary.

3.1. “NORMAL“ WORKING MODE

In working mode NORMAL (working mode switch in middle position), MIDI interface doesn't affect function of CR-68 / 78 instrument at all. The instrument works completely the same way as original instrument without installed MIDI interface.

All MIDI data coming to MIDI-IN input are transferred to MIDI-OUT output – MIDI-THRU function.

Own MIDI System Exclusive Messages are accepted in NORMAL working mode – interface can be programmed (see description of MIDI System Exclusive communication).

Function of indication LED on instrument's front panel stays the same too – the LED blinks in dependence on set tempo if internal sequencer of the instrument is running and the LED lights permanently in red if the sequencer is stopped.



3.2. "CLOCK" WORKING MODE

In working mode CLOCK (working mode switch in left position), internal tempo generator of the instrument is turned off and it is replaced with MIDI clock. So TEMPO knob on instrument's front panel has no influence to function of the instrument. All other control elements on instrument's panel stay fully functional as on original instrument without installed MIDI interface.

Run and stop of internal instrument's sequencer are still controlled by START/STOP button on instrument's front panel but it is possible to initialize and to stop the sequencer with a help of Start / Stop / Continue synchronizing MIDI commands simultaneously.

Function of indication LED on instrument's front panel is similar as in working mode NORMAL – the LED blinks in dependence on MIDI clock frequency if internal sequencer of the instrument is running and the LED lights permanently if the sequencer is stopped. However, the LED blinks / lights in green in this case.

3.3. "NOTE" WORKING MODE

In working mode NOTE (working mode switch in right position), internal sequencer of CR-68 / 78 instrument is turned off permanently – internal tempo generator and START/STOP button of the instrument are turned off and synchronizing MIDI commands (Clock / Start / Stop / Continue) are not accepted at all. Due to this fact, all control elements on instrument's front panel that are used for control of internal sequencer are nonfunctional – see pic. 4 (we recommend to set ACCENT knob on front panel of CR-68 instrument to middle position).

Pic. 4 – Nonfunctional control elements of instrument in "Note" mode



In this working mode, the instrument works only as MIDI controlled sound expander. Individual sound generators of the instrument are launched via Note-On MIDI commands. The interface recognizes Velocity value of Note-On commands too so it enables usage of dynamics of instrument's volume (similarity of ACCENT function in original instrument).

In NOTE working mode, function of indication LED on instrument's front panel is different from previous modes. In quiescent state, the LED lights in green permanently. If an acceptable MIDI command is received, the LED blinks in red shortly.

4. SYSTEM PARAMETERS

System parameters affect functions of the interface and method of received MIDI command processing in working modes CLOCK and NOTE. Default values of system parameters are stored in internal memory bank of the interface and they are fully programmable by user with a help of MIDI System Exclusive Messages (see pic. 5). Details are listed in description of MIDI System Exclusive communication. Values of the parameters stored to memory during "Factory Reset" are in table 1.

Always after reset (when CR-68 / 78 is switched on), the interface reads default setting of parameters from its internal memory and the parameters then control interface's function during operation.

Setting of momentary values of system parameters (except "MIDI Channel" parameter) can be changed with a help of MIDI Control Changes). These changes are valid only temporary – new values are not stored to permanent interface's memory but only to temporary edit buffer. They are valid only till to instrument is switched off (see pic. 5). However, actual values of the parameters can be transferred from edit buffer to system memory bank with a help of MIDI System Exclusive Message or MIDI Control Changes (CC119 – see below).

Pic. 5 – Parameters of interface

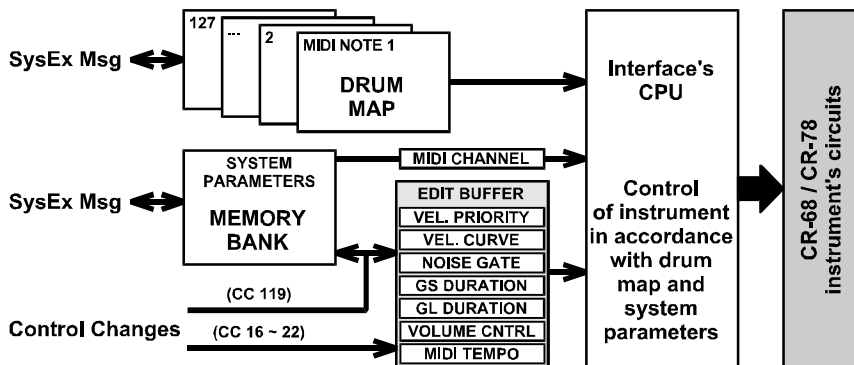


Table 1 – Range of valid values and „Factory Reset“ parameters values

Parameter name	CC number		Value range		„Factory Reset“ values		
	[dec]	[hex]	[dec]	[hex]	[dec]	[hex]	Meaning
MIDI Channel	-	-	0 ~ 15	00 ~ 0F	9	09	MIDI Cannel Nr. 10
Velocity Priority	16	10	0 ~ 3	00 ~ 02	0	00	Average
Velocity Curve	17	11	0 ~ 4	00 ~ 04	0	00	Linear
Noise Gate Delay	18	12	0 ~ 63	00 ~ 3F	15	0F	Delay 400 ms
Guiro Short Duration	19	13	0 ~ 63	00 ~ 3F	12	0C	Duration 92 ms
Guiro Long Duration	20	14	0 ~ 63	00 ~ 3F	18	12	Duration 410 ms
Volume Control Mode	21	15	0 ~ 3	00 ~ 03	1	01	CC7 - Volume
MIDI Tempo Multiplier	22	16	0 ~ 1	00 ~ 01	0	00	Tempo x1

4.1. "MIDI CHANNEL" PARAMETER

The parameter asserts oneself only in NOTE working mode.

"MIDI Channel" parameter selects number of MIDI channel on which the interface will receive acceptable MIDI commands (i.e. Note-On, Control Changes). Any of MIDI channels can be chosen.

Value of the parameter can be in range from 0 to 15. This corresponds to selection of MIDI channels from 1 to 16 (value 0 for channel Nr. 1, value 1 for channel Nr. 2, etc. up to value 15 for channel Nr. 16).

The parameter value (i.e. MIDI channel Nr.) can be changed only with a help of System Exclusive Message (see description of MIDI System Exclusive communication).

4.2. "VELOCITY PRIORITY" PARAMETER

The parameter asserts oneself only in NOTE working mode.

CR-68 / 78 instrument can't control dynamics of individual sound generators but it uses only one common controlled amplifier of acoustic signal level. Due to this fact, simultaneously sounding generators can't have individual output levels given by different Velocities of particular MIDI notes.

"Velocity Priority" parameter selects processing method of Velocity value of Note-On MIDI commands if two or more sound generators are launched simultaneously (i.e. if two or more MIDI notes are active simultaneously). One of four modes can be selected: „**Average**“ (parameter value equal to 0), „**Highest**“ (parameter value equal to 1), „**Lowest**“ (parameter value equal to 2) and „**Last**“ (parameter value equal to 3).

"Average" mode

If more sound generators are launched simultaneously, average value calculated from Velocities of all active MIDI notes will be used for setting of output level of acoustic signal.

"Highest" mode

If more sound generators are launched simultaneously, the highest value from Velocities of all active MIDI notes will be used for setting of output level of acoustic signal.

"Lowest" mode

If more sound generators are launched simultaneously, the lowest value from Velocities of all active MIDI notes will be used for setting of output level of acoustic signal.

"Last" mode

If more sound generators are launched simultaneously, Velocity of last received MIDI note will be used for setting of output level of acoustic signal.

The parameter value can be changed with help of MIDI Control Changes Nr. 16 during the device operation - see chapter 5.3.3.

4.3. "VELOCITY CURVE" PARAMETER

The parameter asserts oneself only in NOTE working mode.

"Velocity Curve" parameter selects conversion curve of active MIDI note's Velocity to level of acoustic signal. One of four curves can be chosen (see pic. 6):

„**Lin**“ (parameter value equal to 0),

„**Exp1**“ (parameter value equal to 1),

„**Exp2**“ (parameter value equal to 2),

„**Log1**“ (parameter value equal to 3) a

„**Log2**“ (parameter value equal to 4).

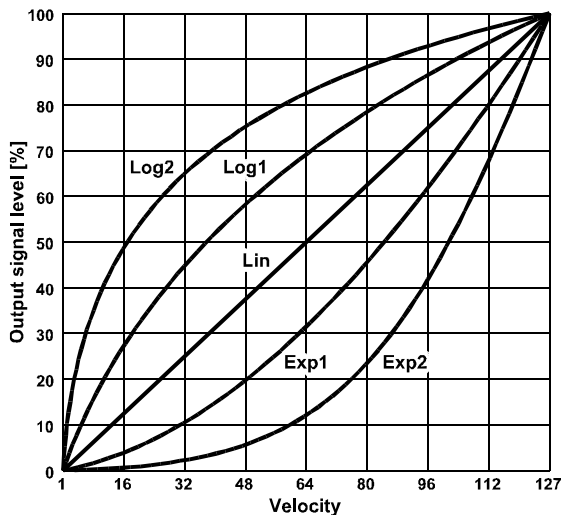
"Lin" curve

Conversion is linear. Level of acoustic signal is directly proportional to Velocity value, accrual of signal level is equable.

"Exp1" curve

Conversion is exponential. Signal level accrues slowly for lower Velocity values, signal level accrues more quickly for higher Velocity values.

Pic. 6 – Conversion curves of Velocity





“Exp2“ curve

Conversion is exponential too but slope of conversion curve is sharper than in “Exp1“ mode.

“Log1“ curve

Conversion is logarithmic. Signal level accrues more quickly for lower Velocity values, signal level accrues slowly for higher Velocity values.

“Log2“ curve

Conversion is logarithmic too but slope of conversion curve is sharper than in “Log1“ mode.

The parameter value can be changed with a help of MIDI Control Changes Nr. 17 during the device operation - see chapter 5.3.3.

4.4. PARAMETR „NOISE GATE DELAY“

The parameter asserts oneself only in NOTE working mode.

The interface is equipped with noise gate function which eliminates transfer of disturbing signals nascent in sound generators circuits to output of the instrument. This noise gate replaces original hardware control of instrument's output level which is dysfunctional in NOTE working mode. Immediately after activation of any of instrument's sound generators, the noise gate is turned off and it is activated again after specific time-out expiry (after drum instrument is sounding). Delay before noise gate retroactivity gives “Noise Gate Delay“ parameter.

Value of the parameter can be in range from 0 to 63. This corresponds to delay from 100 to 1360 milliseconds, step is 20 milliseconds.

The parameter value can be changed with a help of MIDI Control Changes Nr. 18 during the device operation - see chapter 5.3.3.

4.5. PARAMETR „GUIRO SHORT DURATION“

The parameter asserts oneself only in NOTE working mode. It is valid only on CR-78 instrument.

“GS Duration“ parameter allows to set period when Guiro Short sound generator is sounding.

Value of the parameter can be in range from 0 to 63. This corresponds to duration from 20 to 398 milliseconds, step is 6 milliseconds.

The parameter value can be changed with a help of MIDI Control Changes Nr. 19 during the device operation - see chapter 5.3.3.

4.6. PARAMETR „GUIRO LONG DURATION“

The parameter asserts oneself only in NOTE working mode. It is valid only on CR-78 instrument.

“GL Duration“ parameter allows to set period when Guiro Long sound generator is sounding.

Value of the parameter can be in range from 0 to 63. This corresponds to duration from 50 to 1310 milliseconds, step is 20 milliseconds.

The parameter value can be changed with help of MIDI Control Changes Nr. 20 during the device operation - see chapter 5.3.3.

4.7. PARAMETR „VOLUME CONTROL MODE“

The parameter asserts oneself only in NOTE working mode.

“Volume Control“ parameter allows to select method of instrument's volume control via standard MIDI controllers Volume (CC7) and Expression (CC11). One of four modes can be selected: „Off“ (parameter value equal to 0), „Volume“ (parameter value equal to 1), „Expression“ (parameter value equal to 2) and „Both“ (parameter value equal to 3).

“Off“ mode

Instrument's volume control via MIDI controllers Volume (CC7) and Expression (CC11) is turned off. Both (CC7) and (CC11) controllers are ignored.

**”Volume“ mode**

Only MIDI controller Volume (CC7) is used for volume control, Expression controller (CC11) is ignored.

”Expression“ mode

Only MIDI controller Expression (CC11) is used for volume control, Volume controller (CC7) is ignored.

”Both“ mode

Both Volume (CC7) and Expression (CC11) controllers are used simultaneously for instrument's volume control.

Note that manual controller (VOLUME knob) on instrument's panel stays fully functional in all modes.

The parameter value can be changed with a help of MIDI Control Changes Nr. 21 during the device operation - see chapter 5.3.3.

4.8. ”MIDI TEMPO MULTIPLIER“ PARAMETER

The parameter asserts oneself only in CLOCK working mode.

Internal tempo generator of CR-68 / 78 instrument works in range from 25 to 500 BPM. However, many MIDI sequencers can't work it that range – upper border of tempo is mostly limited to value about 250 BPM. In order to usage of maximal possible instrument's tempo, speed of playback can be doubled. In that case, patterns of internal instrument's sequencer will be played with tempo 240 BPM for example if MIDI tempo is 120 BPM.

”MIDI Tempo Multiplier“ parameter selects modes ”x1“ (parameter value equal to 0) or ”x2“ (parameter value equal to 1).

”x1“ mode

Speed of instrument's internal sequencer (tempo) corresponds directly to tempo received from MIDI system.

”x2“ mode

Rate of clock pulses is multiplied by 2 – instrument's internal sequencer runs two times faster than corresponds to tempo received from MIDI system.

The parameter value can be changed with a help of MIDI Control Changes Nr. 22 during the device operation - see chapter 5.3.3.

5. MIDI IMPLEMENTATION

CRX8-M recognizes the channel MIDI commands, common system commands and System Exclusive Messages. However, different MIDI commands are accepted in each of working modes.

5.1. MIDI COMMUNICATION IN ”NORMAL“ MODE

In NORMAL working mode, the interface accepts only own System Exclusive Messages (see description of MIDI System Exclusive communication). All other MIDI commands are ignored but they are transferred to MIDI-THRU/OUT output without any changes (THRU function).

5.2. MIDI COMMUNICATION IN ”CLOCK“ MODE

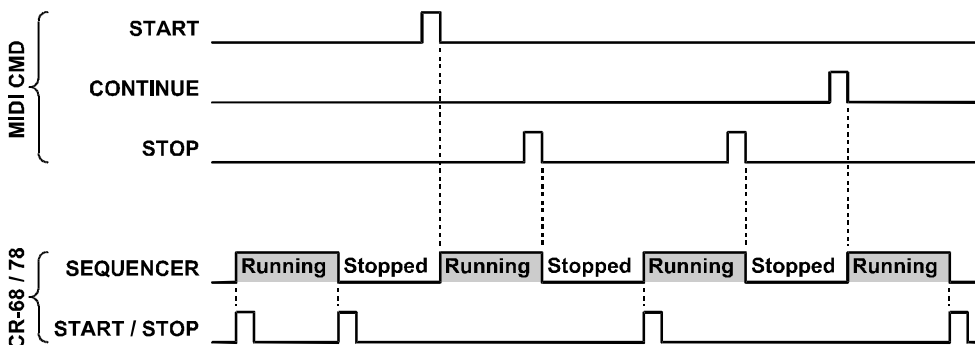
In CLOCK working mode, the interface receives Real Time common system commands (synchronization – see pic. 7) and common system command Reset. Also some Control Changes MIDI commands are accepted. All these commands are transferred to MIDI-THRU/OUT output simultaneously. The interface accepts own System Exclusive Messages too (see description of MIDI



System Exclusive communication). Other common system and channel MIDI commands are ignored but they are transferred to MIDI-THRU/OUT output without any changes (THRU function).

All acceptable channel MIDI commands are received on MIDI channel selected by "MIDI Channel" system parameter (see chapter 4.1).

Pic. 7 – Example of response of interface and instrument to synchronization MIDI commands



5.2.1. COMMON SYSTEM COMMANDS

Synchronization commands **Clock**

From synchronization commands Clock, analog clock pulses for control of tempo of internal instrument's sequencer are derived. Tempo of internal instrument's sequencer can be doubled by setting of "MIDI Tempo Multiplier" system parameter to value "x2" (see chapter 4.8). "MIDI Tempo Multiplier" parameter can be set with help of MIDI CC Nr. 22 during operation (see below).

Synchronization commands **Start / Continue / Stop**

Start and Continue commands launch run of internal instrument's sequencer; Stop command stops run of internal instrument's sequencer. These commands controls instrument's sequencer simultaneously with manual START/STOP button on instrument's panel (see pic. 7).

Command **Reset**

System command Reset executes hardware reset of the interface. Immediately after the command receiving, the interface stops all activities and it returns to the same state as when the instrument is switched on.

5.2.2. CONTROL CHANGES COMMANDS (MIDI CONTROLLERS)

In CLOCK working mode, the interface recognizes own MIDI controllers for setting of actual (temporary) values of system parameters values of interface in edit buffer (see pic. 5).

Changes of parameters values processed this way are temporary only – they are valid only till the instrument is switched off. If you want to store new parameters values to permanent memory, it can be done with a help of MIDI controller Nr. 119 (see below).

Own controller **CC22**

CC Nr. 22 sets value of "MIDI Tempo Multiplier" parameter for control of tempo of internal instrument's sequencer (see chapter 4.6). The parameter is set to "x1" for value of CC equal to 0. For all other values (i.e. 1 to 127), the parameter is set to "x2".

**Own controller CC119**

With a help of CC119, it is possible to store actual value of system parameter (set by CC22) as default value. Value of CC119 must be always equal to 127. For all other values, CC119 is ignored. Immediately after receiving of valid CC119, actual value of "MIDI Tempo Multiplier" parameter (i.e. value just used for the interface operation) is transferred from edit buffer to permanent system memory bank and it will be used as default since this moment.

5.3. MIDI COMMUNICATION IN "NOTE" MODE

In NOTE working mode, the interface receives common system command Reset, channel commands Note-On and some Control Changes MIDI commands. All these commands are transferred to MIDI-THRU/OUT output simultaneously. The interface accepts own System Exclusive Messages too (see description of MIDI System Exclusive communication). Other common system and channel MIDI commands are ignored but they are transferred to MIDI-THRU/OUT output without any changes (THRU function).

All acceptable channel MIDI commands are received on MIDI channel selected by "MIDI Channel" system parameter (see chapter 4.1).

5.3.1. COMMON SYSTEM COMMANDS**Command Reset**

System command Reset executes hardware reset of the interface. Immediately after the command receiving, the interface stops all activities and it returns to the same state as when the instrument is switched on.

5.3.2. NOTE-ON COMMANDS

The interface accepts numbers of MIDI notes in range from 0 to 127. Any of the instrument's sound generators (see table 2) can be assigned to any of MIDI notes. Also, none generator can be assigned – that MIDI note is then ignored. Drum sets of CR-68 and CR-78 are a little different – CR-78 has more drum instruments (see table 2).

Assignment of sound generators of CR-68 / 78 to individual numbers of MIDI notes can be programmed by user (see description of MIDI System Exclusive communication), i.e. it is possible to create own map of drum instruments. In production, assignment according to table 3 (see pic. 8 too) is set. This setting approximately conforms to usually used C/M, GM, GS, XG standards. Complete drum maps of these standards are listed in table 5 (see appendices).

Table 2 – Drum set

Drum instrument name	Abbrev.	Implementation:		Drum instrument name	Abbrev.	Implementation:	
		CR-68	CR-78			CR-68	CR-78
1 - Bass Drum	BD	Yes	Yes	11 – Claves	CL	Yes	Yes
2 - Snare Drum	SD	Yes	Yes	12 - Tambourine Short	TS	No	Yes
3 - Rim Shot	RS	Yes	Yes	13 - Tambourine Long	TL	No	Yes
4 - High Bonga	HB	Yes	Yes	14 - Guiro Short	GS	No	Yes
5 - Low Bonga	LB	Yes	Yes	15 - Guiro Long	GL	No	Yes
6 - Low Conga	LC	Yes	Yes	16 - Metallic Beat	MB	No	Yes
7 - Cow Bell	CB	Yes	Yes	17- Snare D. + Rim Shot	SD+RS	Yes	Yes
8 - Maracas	MA	Yes	Yes	18 - High Hat + M. Beat	HH+MB	No	Yes
9 - High Hat (Closed)	HH	Yes	Yes	19 - Cymbal + M. Beat	CY+MB	No	Yes
10 - Cymbal	CY	Yes	Yes	20 - Cow Bell + M. Beat	CB+MB	No	Yes

**Table 3 – Assignment of drums (instrument map) after “Factory Reset”**

Note Nr.		Assigned sound generator				Note Nr.		Assigned sound generator			
dec	hex	Instrument		Dynamics		dec	hex	Instrument		Dynamics	
		Nr.	Name	Min.	Max.			Nr.	Name	Min.	Max.
0	00	0	None	0	127	44	2C	9	High Hat	0	127
1	01	0	None	0	127	45	2D	0	None	0	127
2	02	0	None	0	127	46	2E	18	High Hat + Metal.B. *)	0	127
3	03	0	None	0	127	47	2F	0	None	0	127
4	04	0	None	0	127	48	30	0	None	0	127
5	05	0	None	0	127	49	31	10	Cymbal	0	127
6	06	0	None	0	127	50	32	0	None	0	127
7	07	0	None	0	127	51	33	10	Cymbal	0	127
8	08	0	None	0	127	52	34	10	Cymbal	0	127
9	09	0	None	0	127	53	35	12	Tambourine Short *)	0	127
10	0A	0	None	0	127	54	36	13	Tambourine Long *)	0	127
11	0B	0	None	0	127	55	37	19	Cymbal + Metal. B. *)	0	127
12	0C	0	None	0	127	56	38	7	Cow Bell	0	127
13	0D	0	None	0	127	57	39	20	Cow Bell + Metal.B. *)	0	127
14	0E	0	None	0	127	58	3A	0	None	0	127
15	0F	0	None	0	127	59	3B	19	Cymbal + Metal. B. *)	0	127
16	10	0	None	0	127	60	3C	4	High Bonga	0	127
17	11	0	None	0	127	61	3D	5	Low Bonga	0	127
18	12	0	None	0	127	62	3E	6	Low Conga	0	127
19	13	0	None	0	127	63	3F	6	Low Conga	0	127
20	14	0	None	0	127	64	40	6	Low Conga	0	127
21	15	0	None	0	127	65	41	0	None	0	127
22	16	0	None	0	127	66	42	0	None	0	127
23	17	0	None	0	127	67	43	0	None	0	127
24	18	0	None	0	127	68	44	0	None	0	127
25	19	0	None	0	127	69	45	8	Maracas	0	127
26	1A	0	None	0	127	70	46	8	Maracas	0	127
27	1B	0	None	0	127	71	47	0	None	0	127
28	1C	0	None	0	127	72	48	0	None	0	127
29	1D	0	None	0	127	73	49	14	Guiro Short *)	0	127
30	1E	0	None	0	127	74	4A	15	Guiro Long *)	0	127
31	1F	0	None	0	127	75	4B	11	Claves	0	127
32	20	11	Claves	0	127	76	4C	0	None	0	127
33	21	1	Bass Drum	0	127	77	4D	0	None	0	127
34	22	3	Rim Shot	0	127	78	4E	0	None	0	127
35	23	1	Bass Drum	0	127	79	4F	0	None	0	127
36	24	1	Bass Drum	0	127	80	50	16	Metallic Beat *)	0	127
37	25	3	Rim Shot	0	127	81	51	0	None	0	127
38	26	2	Snare Drum	0	127	82	52	8	Maracas	0	127
39	27	0	None	0	127	83	53	0	None	0	127
40	28	17	Snare Drum + Rim S.	0	127	84	54	0	None	0	127
41	29	0	None	0	127	85	55	0	None	0	127
42	2A	9	High Hat	0	127	86	56	0	None	0	127
43	2B	0	None	0	127	87	57	0	None	0	127

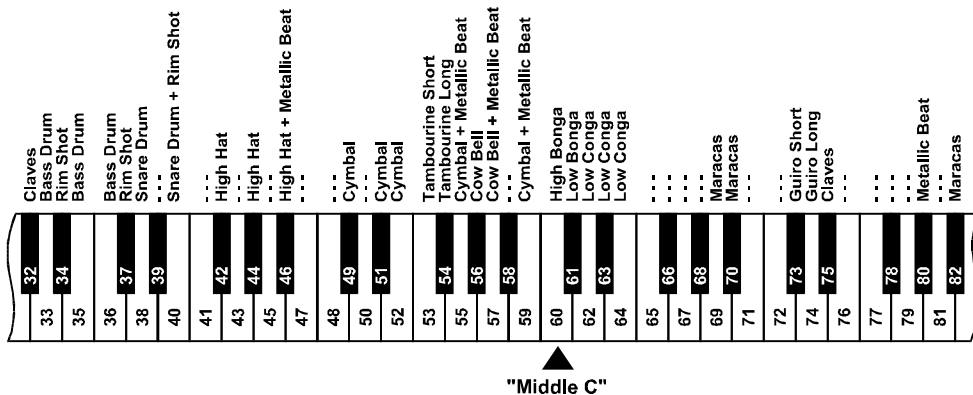


Table 3 – Assignment of drums (instrument map) after “Factory Reset” – continue

Note Nr.		Assigned sound generator				Note Nr.		Assigned sound generator			
dec	hex	Instrument		Dynamics		dec	hex	Instrument		Dynamics	
		Nr.	Name	Min.	Max.			Nr.	Name	Min.	Max.
88	58	0	None	0	127	108	6C	0	None	0	127
89	59	0	None	0	127	109	6D	0	None	0	127
90	5A	0	None	0	127	110	6E	0	None	0	127
91	5B	0	None	0	127	111	6F	0	None	0	127
92	5C	0	None	0	127	112	70	0	None	0	127
93	5D	0	None	0	127	113	71	0	None	0	127
94	5E	0	None	0	127	114	72	0	None	0	127
95	5F	0	None	0	127	115	73	0	None	0	127
96	60	0	None	0	127	116	74	0	None	0	127
97	61	0	None	0	127	117	75	0	None	0	127
98	62	0	None	0	127	118	76	0	None	0	127
99	63	0	None	0	127	119	77	0	None	0	127
100	64	0	None	0	127	120	78	0	None	0	127
101	65	0	None	0	127	121	79	0	None	0	127
102	66	0	None	0	127	122	7A	0	None	0	127
103	67	0	None	0	127	123	7B	0	None	0	127
104	68	0	None	0	127	124	7C	0	None	0	127
105	69	0	None	0	127	125	7D	0	None	0	127
106	6A	0	None	0	127	126	7E	0	None	0	127
107	6B	0	None	0	127	127	7F	0	None	0	127

Remark.: *) these drum instruments are valid only for CR-78

Pic. 8 –MIDI notes assignment after “Factory Reset”



CRX8-M interface accepts statement about dynamics too, i.e. Velocity values of Note-On MIDI commands. Velocity value is converted to volume level of assigned sound generators. Progression of the conversion (i.e. dynamic range of assigned sound generator) can be set independently for each of acceptable MIDI notes (see pic. 9). This can be done within the scope of drum instrument map

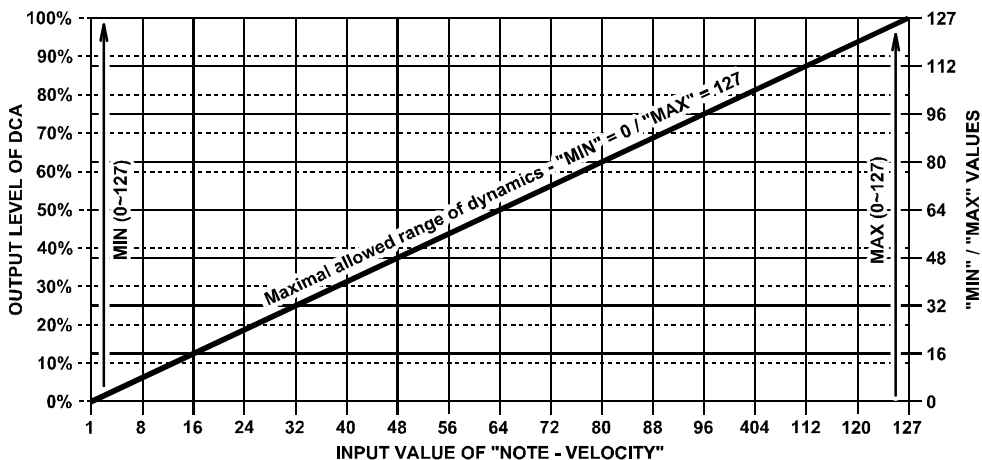


definition by System Exclusive Messages (see description of MIDI System Exclusive communication – “Note Assignment Load” command). In production, dynamic range according to table 3 is set for acceptable MIDI notes.

Requested dynamic range of sound generators is set by values of “Dynamic Range Min” and “Dynamic Range Max”. “Dynamic Range Min” value defines output level of acoustic signal for Velocity = 1 and “Dynamic Range Max” value defines output level of acoustic signal for Velocity = 127. For all others values of Velocity, output level of acoustic signal is linearly interpolated between “Dynamic Range Min” and “Dynamic Range Max” values (see pic. 9). Maximal possible range of dynamics is given by values 0 for “Dynamic Range Min” and 127 for “Dynamic Range Max”.

Remark 1: Dynamic range can be defined independently for each of received MIDI notes. If the same sound generator is assigned to more MIDI notes, it can have a different dynamic range for each of used MIDI notes.

Pic. 9 – Definition of dynamic range



Remark 2: Sound generators Guiro Short and Guiro Long can't sound simultaneously - Guiro Short has always higher priority. If Guiro Long is sounding and Guiro Short generator is launched, Guiro Long is cancelled immediately and it is replaced with Guiro Short sound. This fact can be applied for creation of interesting sound effects.

5.3.3. CONTROL CHANGES COMMANDS (MIDI CONTROLLERS)

Interface accepts standard MIDI controllers for control of volume and own MIDI controllers for setting of actual values of system parameters in edit buffer (see pic. 5).

Changes of parameters values processed this way are only temporary – they are valid only till the instrument is switched off. If you want to store new parameters values to permanent memory, you can do it with a help of MIDI controller Nr. 119 (see below).

Standard controllers **Volume** and **Expression**

Interface recognizes MDI controllers for volume setting “Volume” (CC7) and “Expression” (CC11). Influence of these controllers to volume of CR-68 / 78 instrument is given by setting of “Volume Control” system parameter (see chapter 4.7). Independently on setting of “Volume” and “Expression” controllers and “Volume Control” parameter, VOLUME slider on instrument’s panel is always functional.

**Own controller CC16**

CC Nr. 16 sets "Velocity Priority" parameter. Value of the controller corresponds to value of the parameter directly. Valid values range is from 0 to 3 (0 for "Average", 1 for "Highest", 2 for "Lowest", 3 for "Last"). For all other values, the controller is ignored.

Own controller CC17

CC Nr. 17 sets "Velocity Curve" parameter. Value of the controller corresponds to value of the parameter directly. Valid values range is from 0 to 4 (0 for "Lin", 1 for "Exp1", 2 for "Exp2", 3 for "Log1", 4 for "Log2"). For all other values, the controller is ignored.

Own controller CC18

CC Nr. 18 sets "Noise Gate Delay" parameter. Value of the controller corresponds to value of the parameter directly. Valid values range is from 0 to 63. For all other values, the controller is ignored.

Own controller CC19

CC Nr. 19 sets "Guiro Short Duration" parameter. Value of the controller corresponds to value of the parameter directly. Valid values range is from 0 to 63. For all other values, the controller is ignored.

Own controller CC20

CC Nr. 20 sets "Guiro Long Duration" parameter. Value of the controller corresponds to value of the parameter directly. Valid values range is from 0 to 63. For all other values, the controller is ignored.

Own controller CC21

CC Nr. 21 sets "Volume Control Mode" parameter. Value of the controller corresponds to value of the parameter directly. Valid values range is from 0 to 3 (0 for "None", 1 for "Volume", 2 for "Expression", 3 for "Both"). For all other values, the controller is ignored.

Own controller CC119

With a help of CC119, it is possible to store actual values of system parameters (set by CC16 to CC22) as default values. Value of CC119 must be always equal to 127. For all other values, CC119 is ignored. Immediately after receiving of valid CC119, actual values of "Velocity Priority", "Velocity Curve", "Noise Gate Delay", "GS Duration", "GL Duration" and "Volume Control" parameters (i.e. values just used for the interface operation) are transferred from edit buffer to permanent system memory bank and they will be used as default since this moment.

5.4. MIDI SYSTEM EXCLUSIVE MESSAGES

The interface disposes with MIDI System Exclusive communication system for changes of default parameters values in the interface's memory and for user definition of drum instruments map including dynamics of individual drums. System Exclusive communication enables direct control of the interface hardware too.

System Exclusive communication is described in standalone publication in detail.



**APPENDICES****A. 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.

B. ERROR INDICATION

If any fatal error occurs rarely during interface operation, the interface stops all processes including MIDI communication and indication LED on instrument's front panel blinks jaggedly. The number of LED blinks is indicating the error number - see table 4.

If a fatal error occurs, it is necessary to reset the interface totally for proper operation refresh - it is necessary turn the CR-68 / 78 instrument off and turn it on repeatedly after a moment.

Table 4 – Error statuses

Error Nr.	Error description	
	Name	Indicated problem
1	EEPROM Malfunction	MIDI interface internal memory does not communicate with CPU - reset the interface by switching the instrument off and on. If the error remains after the reset it is a hardware failure. Please contact the authorized service.
2	EEPROM Busy	MIDI interface internal memory is reacting too slowly to the CPU requirements - reset the interface by switching the instrument off and on. If the error remains after the reset it is a hardware failure. Please contact the authorized service.
3	EEPROM Failed Cell	Invalid data in the internal memory MIDI cell - reset the interface by switching the instrument off and on. If the error remains after the reset it is a hardware failure. Please contact the authorized service.
4	MIDI Buffer Overflow	MIDI data loss at the MIDI input - too much MIDI data has been sent to the instrument together.
5	DCA Malfunction	Internal DCA of the MIDI interface does not communicate with CPU - reset the interface by switching the instrument off and on. If the error remains after the reset it is a hardware failure. Please contact the authorized service.

**C. DRUM SETS OF C/M, GM, GS AND XG STANDARDS**

Table 5 –C/M , GM, GS, XG standards				
Note Nr.	Standard			
	C/M Instruments	GM Instruments	GS Instruments	XG Instruments
13	-	-	-	Muted Surdo
14	-	-	-	Open Surdo
15	-	-	-	High Q
16	-	-	-	Whip Slap
17	-	-	-	Scratch Push
18	-	-	-	Scratch Pull
19	-	-	-	Finger Slap
20	-	-	-	Click Noise
21	-	-	-	Metronome Click
22	-	-	-	Metronome Bell
23	-	-	-	Seq Click Low
24	-	-	-	Seq Click High
25	-	-	Snare Roll	Brush Tap
26	-	-	Finger Slap	Brush Swirl Low
27	-	-	High Q	Brush Slap
28	-	-	Slap	Brush Swirl High
29	-	-	Scratch Push	Snare Roll
30	-	-	Scratch Pull	Castanet
31	-	-	Sticks	Snare Low
32	-	-	Square Click	Sticks
33	-	-	Metronome Click	Bass Drum Low
34	-	-	Metronome Bell	Open Rim Shot
35	Acoustic Bass Drum	Acoustic Bass Drum	Bass Drum 2	Bass Drum Mid
36	Acoustic Bass Drum	Bass Drum 1	Bass Drum 1	Bass Drum High
37	Rim Shot	Side Stick	Side Stick	Side Stick
38	Acoustic Snare Drum	Acoustic Snare Drum	Snare Drum 1	Snare Drum Mid
39	Hand Clap	Hand Clap	Hand Clap	Hand Clap
40	Electric Snare Drum	Electric Snare Drum	Snare Drum 2	Snare Drum High
41	Low Tom	Low Floor Tom	Low Tom 2	Low Floor Tom
42	Closed Hi-Hat	Closed Hi-Hat	Closed Hi-Hat	Closed Hi-Hat
43	Low Tom	High Floor Tom	Low Tom 1	High Floor Tom
44	Open Hi-Hat 2	Pedal Hi-Hat	Pedal Hi-Hat	Pedal Hi-Hat
45	Mid Tom	Low Tom	Mid Tom 2	Low Tom
46	Open Hi-Hat 1	Open Hi-Hat	Open Hi-Hat	Open Hi-Hat
47	Mid Tom	Low-Mid Tom	Mid Tom 1	Low-Mid Tom
48	High Tom	Hi-Mid Tom	High Tom 2	Hi-Mid Tom
49	Crash Cymbal	Crash Cymbal 1	Crash Cymbal 1	Crash Cymbal 1
50	High Tom	High Tom	High Tom 1	High Tom
51	Ride Cymbal	Ride Cymbal 1	Ride Cymbal 1	Ride Cymbal 1
52	-	Chinese Cymbal	Chinese Cymbal	Chinese Cymbal
53	-	Ride Bell	Ride Bell	Ride Cymbal Cup
54	Tambourine	Tambourine	Tambourine	Tambourine

**Table 5 –C/M , GM, GS, XG standards – continue**

Note Nr.	Standard			
	C/M Instruments	GM Instruments	GS Instruments	XG Instruments
55	-	Splash Cymbal	Splash Cymbal	Splash Cymbal
56	Cow Bell	Cow Bell	Cow Bell	Cow Bell
57	-	Crash Cymbal 2	Crash Cymbal 2	Crash Cymbal 2
58	-	Vibraslap	Vibraslap	Vibraslap
59	-	Ride Cymbal 2	Ride Cymbal 2	Ride Cymbal 2
60	High Bongo	High Bongo	High Bongo	High Bongo
61	Low Bongo	Low Bongo	Low Bongo	Low Bongo
62	Muted High Conga	Muted High Conga	Muted High Conga	Muted High Conga
63	Open High Conga	Open High Conga	Open High Conga	Open High Conga
64	Low Conga	Low Conga	Low Conga	Low Conga
65	High Timbale	High Timbale	High Timbale	High Timbale
66	Low Timbale	Low Timbale	Low Timbale	Low Timbale
67	High Agogo	High Agogo	High Agogo	High Agogo
68	Low Agogo	Low Agogo	Low Agogo	Low Agogo
69	Cabasa	Cabasa	Cabasa	Cabasa
70	Maracas	Maracas	Maracas	Maracas
71	Samba Whistle Short	Short Whistle	Short High Whistle	Samba Whistle High
72	Samba Whistle Long	Long Whistle	Long Low Whistle	Samba Whistle Low
73	Quijada	Short Guiro	Short Guiro	Short Guiro
74	-	Long Guiro	Long Guiro	Long Guiro
75	Claves	Claves	Claves	Claves
76	-	High Wood Block	High Wood Block	High Wood Block
77	-	Low Wood Block	Low Wood Block	Low Wood Block
78	-	Muted Cuica	Muted Cuica	Muted Cuica
79	-	Opened Cuica	Open Cuica	Open Cuica
80	-	Muted Triangle	Muted Triangle	Muted Triangle
81	-	Open Triangle	Open Triangle	Open Triangle
82	-	-	Shaker	Shaker
83	-	-	Jingle Bell	Jingle Bell
84	-	-	Bell Tree	Bell Tree
85	-	-	Castanets	-
86	-	-	Muted Surdo	-
87	-	-	Open Surdo	-

**D. MIDI IMPLEMENTATION CHART**Device : **CRX8-M MIDI Interface**

Date : 12 / 2012

Model : **8-449**

Version : 1.0

Function		Transmission	Reception	Remarks
Basic	Default	X	10	
Channel	Changed	X	1~16	¹⁾
Mode	Default	X	Mode 3	Not Altered
	Messages	X	X	
Note Number		X	0~127	²⁾
Velocity	Note ON	X	O	³⁾
	Note OFF	X	X	
After Touch	Key's	X	X	
	Channel's	X	X	
Pitch Bender		X	X	
Control Changes	CC 7	X	O	Volume ³⁾
	CC 11	X	O	Expression ³⁾
	CC 16	X	O	Velocity Priority ³⁾
	CC 17	X	O	Velocity Curve ³⁾
	CC 18	X	O	Noise Gate Delay ³⁾
	CC 19	X	O	Guiro Short Duration ³⁾
	CC 20	X	O	Guiro Long Duration ³⁾
	CC 21	X	O	Volume Control Mode ³⁾
	CC 22	X	O	MIDI Tempo Multiplier ⁴⁾
CC 119	X	O	Save to memory ^{3) 4)}	
Program Change		X	X	
System Exclusive		O	O	See System Exclusive description
System Common	Song Position	X	X	
	Song Select	X	X	
	Tune	X	X	
System Real Time	Clock	X	O	⁴⁾
	Command	X	O	⁴⁾
Others	Local ON/OFF	X	X	
	All Notes Off	X	X	
	Active Sensing	X	X	
	Reset	X	O	^{3) 4)}
Notes : ¹⁾ Can be changed with SysEx Msg				
²⁾ Depends on drum map.				
³⁾ Only in "Note" mode.				
⁴⁾ Only in "Clock" Mode.				

Mode 1 : **OMNI ON, POLY**Mode 2 : **OMNI ON, MONO****O** : YesMode 3 : **OMNI OFF, POLY**Mode 4 : **OMNI OFF, MONO****X** : No

