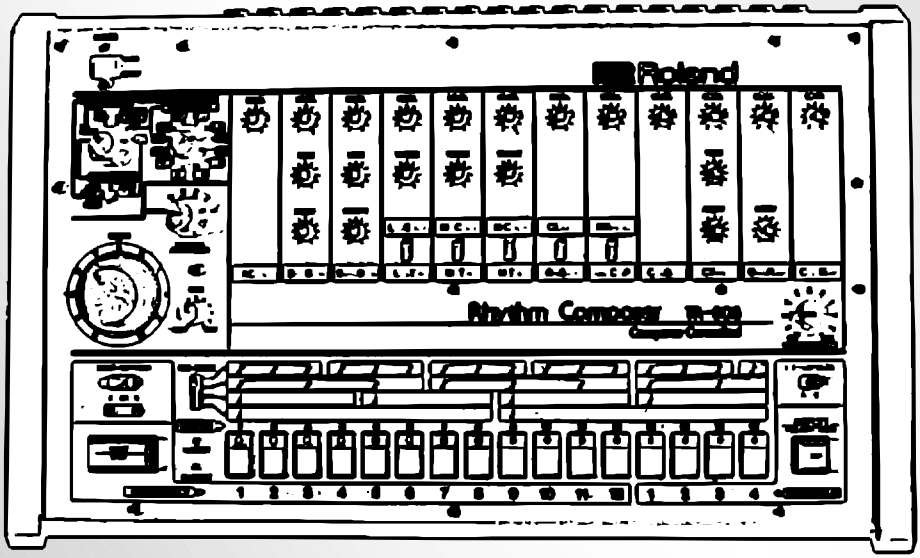
TR808-M

Roland TR-808 Rhythm Composer MIDI Interface



Model 8-448 ver. 3.30

MIDI SYSTEM EXCLUSIVE COMMUNICATION

Contents

This manual in PDF form is available on supplemental CD-ROM or on manufacturer's web-pages.
The CD-ROM includes also interactive generator of SysEx messages and checksum calculator.

Manufacturer :
CHD Elektroservis
9.května 78/35, 198 00 Praha 9, Czech Republic
www.chd-el.cz
info@chd-el.cz

1. SYSTEM EXCLUSIVE COMMUNICATION

TR808-M interface disposes of system of System Exclusive communication what enables to receive a SysEx Messages for changes of global parameters (MIDI channel setting, default program number setting, enabling or disabling of MIDI message indicator and its brightness), to define own assigning of instruments and their dynamic range to received MIDI notes (own drum-map definition) and to define own map of program numbers. Special functions for testing and direct control of the interface hardware can be launched too.

Software generator for simple creation of SysEx messages for control and programming of TR808-M is available. Any message for the interface programming described below can be created with help of this generator. The generator is available on supplemental CD-ROM.

2. SYSEX MESSAGES STRUCTURE

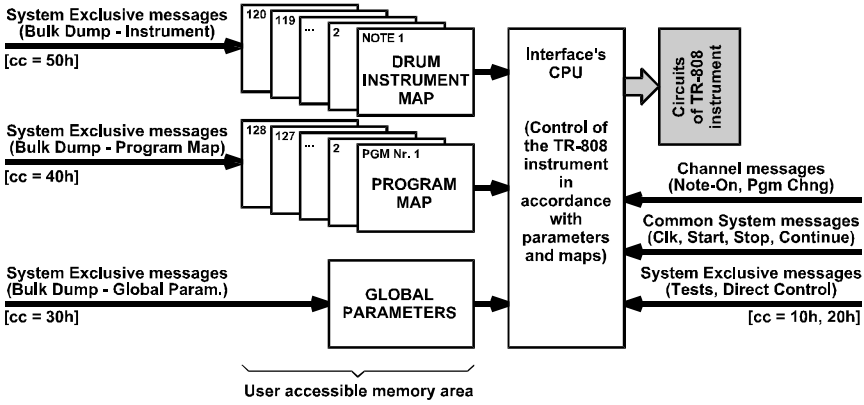
TR808-M receives own specific messages for changes of parameters setting etc. with this structure:

F0h	Start SysEx	
00h 20h 21h	Manufacturer ID	
7Fh	Device ID	
62h	Model ID	(valid only for TR808-M ver. 3.x)
cc	Command	(command type)
aa	Address	(address of memory area / type of function)
dd … dd	Data	(data of parameter / function)
xx	Checksum	(seven-bit checksum of Model ID to Checksum bytes)
F7h	End SysEx	

Length of the "**dd … dd**" datablock is variable in dependence on type of SysEx Msg. Number of databytes in block can be one or three bytes. The checksum "**xx**" confirms validity of System Exclusive message. It has to be calculated as 7-bit complement of sum from Model ID to Data bytes:

xx = 00h - (62h + cc + aa + dd) → for msg with one databyte
xx = 00h - (62h + cc + aa + dd1 + dd2 + dd3) → for msg with three databytes

By other words, seven-bit sum of bytes from "Model ID" to "Checksum" must be equal to zero. SysEx Msg is invalid and it is ignored by the device if this condition isn't satisfied.



3. COMMAND TYPES OVERVIEW

Command "**cc**" gives type of SysEx Msg – i.e. the interface activity after whole message is received. Valid values of "**cc**" are :

"**cc**"=10h - **Tests** – launching of special functions for tests of own hardware
"**cc**"=20h - **Direct Control** – commands for direct control of the interface
"**cc**"=30h - **Bulk Dump – Global Parameters** – programming of global parameters of the interface
"**cc**"=40h - **Bulk Dump – Program Map** – program numbers map definition
"**cc**"=50h - **Bulk Dump – Instrument Assign** – assigning of instruments and their dynamic range to particular MIDI notes

Next specification of device activity is given by value of "Address" byte - see below.

3.1. "TESTS" COMMANDS

Form : **F0 00 20 21 7F 62 10 aa dd xx F7 [hex]**

"Tests" commands enable to launch testing functions for checking and functionality verification of own hardware of the interface. Type of function is specified by values of "**aa**" (Address) and "**dd**" (Data) bytes.

Valid values of "**aa**" are from 00h to 16h. Datablock "**dd**" contents always the only one databyte.

After valid "Test" message is received, particular test is launched in dependence on "**aa**" address:

- "**aa**" = 00h → Null all test functions
- "**aa**" = 01h to 0Bh → Launching of particular sound generator
- "**aa**" = 0Ch → Control of TRIG-OFF signal
- "**aa**" = 0Dh → Control of TRIG-LOCK signal
- "**aa**" = 0Eh → Control of DIN-SYNC - RUN signal
- "**aa**" = 0Fh → Control of DIN-SYNC - CLOCK signal
- "**aa**" = 10h → Control of DIN-SYNC - FILL-IN signal
- "**aa**" = 11h → Control of DIN-SYNC - RESET signal
- "**aa**" = 12h → Checking of internal clock generator of TR-808
- "**aa**" = 13h → Checking of internal Start/Stop generator of TR-808
- "**aa**" = 14h → Control of D/A converter
- "**aa**" = 15h → Control of LED indicator
- "**aa**" = 16h → HW reset of the interface

Testing functions are for debugging and for service only. Using of these functions in normal device operation is not assumed. Launching of testing functions without interconnection of the interface with special measuring set has no signification.

3.2. "DIRECT CONTROL" COMMANDS

Form : **F0 00 20 21 7F 62 20 aa dd xx F7 [hex]**

The commands enable direct control of the interface with help of SysEx Msg. It is possible to change programs, to launch TR-808's sound generators, to control LED indicator and to execute reset or factory reset of the interface. "**aa**" (Address) byte selects required function, "**dd**" (Data) byte specifies activity of the function.

Valid values of "**aa**" are from 00h to 0Dh. For values from 0Eh to 7Fh, the message is evaluated as invalid and the interface ignores it.

Datablock "**dd**" always includes just only one databyte.

"Direct Control" commands			
Command	"**aa**" Address	"**dd**" Databyte value range	Remarks
Program (Patch) Change	00h	00h to 7Fh	For programs 1 to 128
Play Instrument	01h to 0Bh	00h to 7Fh	
LED Control	0Ch	00h to 7Fh	00h = 2 ms … 7Fh = 510 ms
Reset	0Dh	00h / 7Fh	00h = HW reset / 7Fh = factory reset

3.2.1. DIRECT CONTROL – PROGRAM (PATCH) CHANGE

Form : **F0 00 20 21 7F 62 20 00 dd xx F7 [hex]**

If address "**aa**" = 00h, the message is command for actual program change. This command is equivalent to channel MIDI command "Program Change" (see user manual of the interface). Value of "**dd**" databyte specifies number of new program. Program number can be in full range from 00h to 7Fh for programs from 1 to 128.

3.2.2. DIRECT CONTROL – PLAY INSTRUMENT

Form : **F0 00 20 21 7F 62 20 aa dd xx F7 [hex]**

If address "**aa**" is from 01h to 0Bh, the message is command for immediate launching of a sound generator (instrument) of TR-808. Address "**aa**" selects generator to launching (see below). This command is equivalent to channel MIDI command "Note On " (see user manual of the interface). Value of "**dd**" databyte specifies dynamics of launched generator - Velocity. Value of "**dd**" databyte can be from 00h to 7Fh.

- "**aa**" = 01h → "BD" - Bass Drum
- "**aa**" = 02h → "SD" - Snare Drum
- "**aa**" = 03h → "LT / LC" - Low Tom / Low Conga (in dependence on switch on TR-808's panel)
- "**aa**" = 04h → "MT / MC" - Mid Tom / Mid Conga (in dependence on switch on TR-808's panel)
- "**aa**" = 05h → "HT / HC" - High Tom / High Conga (in dependence on switch on TR-808's panel)
- "**aa**" = 06h → "RS / CL" - Rim Shot / Claves (in dependence on switch on TR-808's panel)
- "**aa**" = 07h → "CP / MA" - Hand Clap / Maracas (in dependence on switch on TR-808's panel)
- "**aa**" = 08h → "CB" - Cow Bell
- "**aa**" = 09h → "CY" - Cymbal
- "**aa**" = 0Ah → "OH" - Open Hi-Hat
- "**aa**" = 0Bh → "CH" - Closed Hi-Hat

Note: When a sound generator is launched by this SysEx command, LED indicator under Start / Stop button on TR-808's panel does not blink at all - even if MIDI Msg Indicator parameter is on.

3.2.3. DIRECT CONTROL – LED CONTROL

Form : **F0 00 20 21 7F 62 20 0C dd xx F7 [hex]**

If address "**aa**" = 0Ch, the message is command for direct control of LED indicator under Start / Stop button on TR-808's panel. After the message receiving, the LED indicator is blinking. Value of "**dd**" databyte controls duration of indication interval. "**dd**" databyte can be from 00h or 7Fh. It conforms to interval from 2 to 510 ms. Formula for the interval calculation is:

T = 4 * dd + 2 [ms], where "**T**" is the interval and "**dd**" is the databyte value.

3.2.4. DIRECT CONTROL – RESET

Form : **F0 00 20 21 7F 62 20 0D dd xx F7 [hex]**

If address "**aa**" = 0Dh, the message is command for reset of the interface. Value of "**dd**" databyte can be only 00h or 7Fh. For values of "**dd**" from 01h to 7Eh, the message is evaluated as invalid and the interface ignores it.

For "**dd**" = 00h, only hardware reset is done – the interface is set to the same status as after TR-808 is turned on.

For "**dd**" = 7Fh, total factory reset of the interface is done – TR808-M is completely reprogrammed to the same status as delivered from production. After "Factory Reset" is done successfully, LED indicator under Start / Stop button on TR-808's panel blinks three times.

Important warning: All data previously stored by user into interface's memory are lost during "factory reset" process. Global parameters values, program map and map of instrument assigning are reprogrammed back to default values (see tables below):

"Factory Reset" values of global parameters		
Parameter name	Setting	Parameter value [hex]
MIDI Channel	MIDI channel Nr. 10	09h
Default Program	Program Nr. 1	00h
MIDI Msg Indicator	Indicator turned off	00h
DAC Calibration	Amplitude 4 to 12 V	7Fh
LED Brightness	Full	3Fh

"Factory Reset" program map				
Program Nr.	Control function			Remarks
	Sound generators launching	Tempo of sequencer	Start / Stop commands	
1	sequencer or MIDI notes	only internal	internal or MIDI cmd	[1])
2	sequencer or MIDI notes	only MIDI clock	internal or MIDI cmd	[1])
3	sequencer or MIDI notes	only internal	only internal	[1])
4	sequencer or MIDI notes	only MIDI clock	only internal	[1])
5	sequencer or MIDI notes	only internal	only MIDI commands	[1])
6	sequencer or MIDI notes	only MIDI clock	only MIDI commands	
7	Sequencer	only internal	internal or MIDI cmd	[1])
8	Sequencer	only MIDI clock	internal or MIDI cmd	[1])
9	Sequencer	only internal	only internal	[1]) [2])
10	sequencer	only MIDI clock	only internal	[1])
11	sequencer	only internal	only MIDI commands	[1])
12	sequencer	only MIDI clock	only MIDI commands	
13	MIDI notes	sequencer disabled	None	[3])
14	none	sequencer disabled	None	[4])
15 to 128	no changes	no changes	no changes	[5])

[1]) Internal means that TR-808 can be control by controllers on device's panel.
[2]) MIDI interface disabled – TR-808 is controlled only by its own controllers.
[3]) TR-808 works as MIDI sound expander. Its own controllers are disabled.
[4]) Both TR-808 and MIDI interface are disabled.
[5]) Ignored program numbers – no changes occur after their receiving.

"Factory Reset" instrument map											
Note Nr.		Assigned sound generator				Note Nr.		Assigned sound generator			
dec	hex	Nr.	Instrument name	Dynamics		dec	hex	Nr.	Instrument name	Dynamics	
				From	To					From	To
0 to 30	00 to 1E	0	None	0	127	57	39	9	Cymbal	0	127
						58	3A	0	None	0	127
						59	3B	9	Cymbal	0	96
31	1F	2	Snare Drum	0	64	60	3C	3	Lo Tom / Lo Conga	0	127
32	20	6	Rim Shot / Claves	0	64	61	3D	4	Mid Tom / Mid Conga	0	127
33	21	1	Bass Drum	0	64	62	3E	5	Hi Tom / Hi Conga	0	127
34	22	6	Rim Shot / Claves	0	127	63	3F	4	Mid Tom / Mid Conga	0	127
35	23	1	Bass Drum	0	127	64	40	5	Hi Tom / Hi Conga	0	127
36	24	1	Bass Drum	0	127	65	41	0	None	0	127
37	25	6	Rim Shot / Claves	0	127	66	42	0	None	0	127
38	26	2	Snare Drum	0	127	67	43	0	None	0	127
39	27	7	Hand Clap / Maracas	0	127	68	44	0	None	0	127
40	28	2	Snare Drum	0	127	69	45	7	Hand Clap / Maracas	0	96
41	29	3	Lo Tom / Lo Conga	0	127	70	46	7	Hand Clap / Maracas	0	127
42	2A	11	Closed Hi-Hat	0	127	71	47	0	None	0	127
43	2B	3	Lo Tom / Lo Conga	0	127	72	48	0	None	0	127
44	2C	10	Open Hi-Hat	0	127	73	49	0	None	0	127
45	2D	4	Mid Tom / Mid Conga	0	127	74	4A	0	None	0	127
46	2E	10	Open Hi-Hat	0	127	75	4B	6	Rim Shot / Claves	0	127
47	2F	4	Mid Tom / Mid Conga	0	127	76	4C	0	None	0	127
48	30	5	Hi Tom / Hi Conga	0	127	77	4D	0	None	0	127
49	31	9	Cymbal	0	127	78	4E	0	None	0	127
50	32	5	Hi Tom / Hi Conga	0	127	79	4F	0	None	0	127
51	33	9	Cymbal	0	96	80	50	0	None	0	127
52	34	0	None	0	127	81	51	0	None	0	127
53	35	10	Open Hi-Hat	0	32	82	52	7	Hand Clap / Maracas	0	64
54	36	7	Hand Clap / Maracas	0	127	83 to 120	53 to 78	0	None	0	127
55	37	9	Cymbal	0	96						
56	38	8	Cow Bell	0	127						

3.3. "BULK DUMP – GLOBAL PARAMETERS" COMMANDS

Form : **F0 00 20 21 7F 62 30 aa dd xx F7 [hex]**

"Bulk Dump – Global Parameters" commands enable user programming of the interface's global parameters including calibration of D/A converter (see installation manual). Individual parameter is specified by "**aa**" (Address) byte, new value of the parameter is given by "**dd**" (Data) byte.

Valid values of "**aa**" are from 00h to 04h. For values from 05h to 7Fh, the message is evaluated as invalid and the interface ignores it.

Datablock "**dd**" always includes just only one databyte. Immediately after valid message is received, the interface will work in accordance with new value ("**dd**") of parameter specified by "**aa**" address. New value of the parameter is stored into interface's internal memory simultaneously.

"Bulk Dump – Global Parameters " commands			
Parameter name	"**aa**" Address	"**dd**" Databyte value range	Remarks
MIDI Channel	00h	00h to 0Fh	For MIDI channels from 1 to 16
Default Program	01h	00h to 7Fh	For programs from 1 to 128
MIDI Msg Indicator	02h	00h to 01h	00h = disabled / 01h = enabled
DAC Calibration	03h	00h to 7Fh	For max amplitude from 8 V to 12 V
LED Brightness	04h	00h to 3Fh	00h = min … 3Fh = max

3.3.1. GLOBAL PARAMETER – MIDI CHANNEL

Form: **F0 00 20 21 7F 62 30 00 dd xx F7 [hex]**

If address "**aa**" = 00h, MIDI channel for communication with host system will be programmed. Value of "**dd**" databyte specifies number of required channel. It can be in range from 00h (for MIDI channel Nr. 1) to 0Fh (for MIDI channel Nr. 16). For invalid values from 10h to 7Fh, the invalid value is replaced with 09h (i.e. MIDI channel Nr. 10) and corrected value is then stored into interface's memory.

3.3.2. GLOBAL PARAMETER – MIDI MSG INDICATOR

Form: **F0 00 20 21 7F 62 30 01 dd xx F7 [hex]**

If address "**aa**" = 01h, function of LED indicator (under Start / Stop button on TR-808's panel) in MIDI mode will be programmed. Value of "**dd**" databyte can be only 00h or 01h. For "**dd**" = 00h, indication of incoming MIDI messages is disabled – the LED lights continuously in MIDI mode. For "**dd**" = 01h, indication of incoming MIDI messages is enabled – LED blinks every time after a MIDI message receiving. The command uses only least significant bit of the "**dd**" databyte - all other bits of the "**dd**" databyte have no meaning.

3.3.3. GLOBAL PARAMETER – DEFAULT PROGRAM

Form: **F0 00 20 21 7F 62 30 02 dd xx F7 [hex]**

If address "**aa**" = 02h, defaulf program number will be programmed (i.e. number of program which will be active after TR-808 is turned on). Value of "**dd**" databyte specifies required default program number. It can be in whole range from 00h (for program Nr. 1) to 7Fh (for program Nr. 128).

3.3.4. GLOBAL PARAMETER – DAC CALIBRATION

Form: **F0 00 20 21 7F 62 30 03 dd xx F7 [hex]**

If address "**aa**" = 03h, calibration constant (for amplitude of trigger pulses of sound generators) will be programmed. Value of "**dd**" databyte can be in whole range from 00h to 7Fh. For "**dd**" = 00h, pulse amplitude is from 4 to 8 volts, for "**dd**" = 7Fh, pulse amplitude is from 4 to 12 volts - in dependence on Velocity of MIDI note. See installation manual for more info about setting of this parameter.

3.3.5. GLOBAL PARAMETER – LED BRIGHTNESS

Form: **F0 00 20 21 7F 62 30 04 dd xx F7 [hex]**

If address "**aa**" = 04h, brightness of LED indicator (under Start / Stop button on TR-808's panel) will be programmed. Value of "**dd**" databyte can be in range from 00h to 3Fh. For "**dd**" = 00h, the brightness is minimal, for "**dd**" = 3Fh, the brightness is maximal. For invalid values from 40h to 7Fh,

the invalid value is replaced with nearest possible valid value 3Fh (i.e. maximal brightness) and corrected value is then stored into interface's memory.

Note: Brightness of the LED is not controlled for indication of "Factory Reset" and for error indication. In that cases, the LED lights fully.

3.4. "BULK DUMP – PROGRAM MAP" COMMANDS

"Bulk Dump – Program Map" commands allow user definition of program map, i.e. assigning of the interface's and TR-808's functions to particular program numbers of Program Change MIDI commands:

- enabling / disabling of program changes acceptation
- method of TR-808's internal sequencer control
- method of time synchronization of TR-808's internal sequencer
- enabling of direct launching of TR-808's sound generators via Note On MIDI commands

Form: **F0 00 20 21 7F 62 40 aa dd xx F7 [hex]**

Address "**aa**" specifies program number. It can be in whole range from 00h (for program Nr. 1) to 7Fh (for program Nr. 128). Datablock "**dd**" always includes just only one databyte. Its bit value then enables or disables particular functions.

Immediately after the message is received, new setting is stored into interface's internal memory. The interface will work in accordance with new setting after switching to newly defined program number.

Bit form of "**dd**" databyte is: **[0 a i i t t c c]** - note that the most significant bit is always zero!

Bit **[a]** enables (=1) or disables (=0) program acceptation:

- **[a]** = 0 → program number accepted – TR-808 will be control in accordance with next bits
- **[a]** = 1 → program number not accepted – the Program Change command is ignored

Bits **[ii]** specify method of TR-808's sound generators launching:

- **[ii]** = 01 → generators are launched only by internal sequencer of TR-808
- **[ii]** = 10 → generators are launched only by MIDI notes
- **[ii]** = 11 → generators are launched by both methods simultaneously

Bits **[tt]** specify method of TR-808's internal sequencer run (start and stop):

- **[tt]** = 01 → sequencer is controlled only by Start/Stop button on TR-808's panel
- **[tt]** = 10 → sequencer is controlled only by "Transport" (Start, Stop, Continue) MIDI commands
- **[tt]** = 11 → sequencer is controlled by both methods simultaneously

Bits **[cc]** specify method of time synchronization of internal sequencer of TR-808:

- **[cc]** = 00 → sequencer disabled
- **[cc]** = 01 → tempo of sequencer is controlled by internal generator in TR-808
- **[cc]** = 10 → tempo of sequencer is controlled by MIDI Clock commands

SysEx Message must not include invalid values of bits – i.e. **[ii]** = 00, **[tt]** = 00 or **[cc]** = 11! If any SysEx Message with any invalid value is received, the message is evaluated as invalid and "**dd**" databyte **[0 a i i t t c c]** is changed to value **[0 0 1 1 1 1 0 1]** automatically (i.e. **[a]** = 1, **[ii]** = 11, **[tt]** = 11 and **[cc]** = 01). This modified value is then stored into internal memory of the interface.

Not all combinations of control function have a meaning. Only fifteen combinations described below are valid:

Possible combinations of function setting				
Control function				Remarks
Accept program bit **[a]**	Generators launching bits **[ii]**	Run of sequencer bits **[tt]**	Tempo of sequencer bits **[cc]**	
0	11	11	01	
0	11	11	10	
0	11	01	01	
0	11	01	10	
0	11	10	01	
0	11	10	10	
0	01	11	01	
0	01	11	10	
0	01	01	01	[1])
0	01	01	10	
0	01	10	01	
0	01	10	10	
0	10 or 11	Value not significant	00	[2])
0	01	Value not significant	00	[3])
1	Value not significant	Value not significant	Value not significant	[4])

[1]) MIDI interface disabled – TR-808 is controlled only by its own controllers.
[2]) TR-808 works as MIDI sound expander. Its own controllers are disabled.
[3]) Both TR-808 and MIDI interface are disabled.
[4]) Ignored program numbers – no changes occur after their receiving.

Each SysEx Msg defines just only one program. All others programs stay unchanged. If there is request for rewriting of more programs definition, corresponding number of SysEx messages must be transmitted to the interface. But these messages **must not** be transmitted consecutive. Time delay 20 ms at least must be inserted before every particular message in order to store previous value into interface's memory safely. If a lot of SysEx messages are transmitted to the interface consecutive, input buffer overflows and an error can occur. The error then disallows correct operating of the interface (see appendix B. in user manual).

3.5. "BULK DUMP – INSTRUMENT ASSIGN" COMMANDS

"Bulk Dump – Program Map" commands allow user assigning of TR-808's instruments and their dynamic range (i.e. response to Velocity) to particular MIDI notes. It means that own user's instrument map can be defined.

Immediately after the message is received, the interface will work in accordance with new setting. New setting is stored into interface's internal memory simultaneously.

Form: **F0 00 20 21 7F 62 50 aa dd dd dd xx F7 [hex]**

Address "**aa**" selects number of MIDI note for which instrument assigning will be defined. Valid range is from 00h (for note Nr. 0) to 78h (for note Nr.120). Note numbers from 121 to 127 are always ignored. Datablodk "**dd…dd**" includes three databytes. The databytes define drum instrument and its dynamic range.

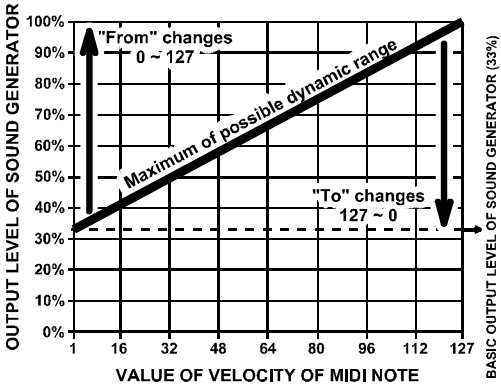
First databyte assigns an instrument from TR-808's set to selected MIDI note. Valid values are from 00h to 0Bh:

- "**dd**" = 00h → "None" – no instrument assigned, MIDI note has no effect on sound
- "**dd**" = 01h → "BD" - Bass Drum
- "**dd**" = 02h → "SD" - Snare Drum
- "**dd**" = 03h → "LT / LC" - Low Tom / Low Conga (in dependence on switch on TR-808's panel)
- "**dd**" = 04h → "MT / MC" - Mid Tom / Mid Conga (in dependence on switch on TR-808's panel)
- "**dd**" = 05h → "HT / HC" - High Tom / High Conga (in dependence on switch on TR-808's panel)
- "**dd**" = 06h → "RS / CL" - Rim Shot / Claves (in dependence on switch on TR-808's panel)
- "**dd**" = 07h → "CP / MA" - Hand Clap / Maracas (in dependence on switch on TR-808's panel)
- "**dd**" = 08h → "CB" - Cow Bell
- "**dd**" = 09h → "CY" - Cymbal
- "**dd**" = 0Ah → "OH" - Open Hi-Hat
- "**dd**" = 0Bh → "CH" - Closed Hi-Hat

If value of first databyte is out of valid range (i.e. from 0Ch to 7Fh), invalid value is replaced with value 00h - "None Instrument".

Second databyte specifies minimal level of output acoustic signal of assigned sound generator. It corresponds to Velocity equal to 1 (see picture). Value of second databyte can be from 00h to 7Fh.

Third databyte specifies maximal level of output acoustic signal of assigned sound generator. It corresponds to Velocity equal to 127 (see picture). Value of third databyte can be from 00h to 7Fh but it must not be less than value of minimal level of assigned sound generator (i.e. less than value of second databyte). If a SysEx Msg with invalid value of third databyte is received, the invalid value is corrected – it is replaced with nearest possible valid value – and corrected value is then stored into interface's memory.



For all others "Velocity" values (from 2 to 126), output level of sound generator is linearly interpolated between minimal and maximal levels (see picture).

Each SysEx Msg defines just only one MIDI note. Definitions of all others notes stay unchanged. If there is request for rewriting of more notes definition, corresponding number of SysEx messages must be transmitted to the interface. But these messages **must not** be transmitted consecutive. Time delay 50 ms at least must be inserted before every particular message in order to store previous value into interface's memory safely. If a lot of SysEx messages are transmitted to the interface consecutive, input buffer overflows and an error can occur. The error then disallows correct operating of the interface (see appendix B. in user manual).