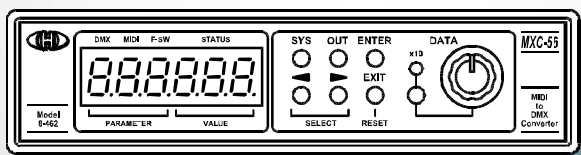


MXC-56

MIDI to DMX-512 Converter

**Model 8-462
ver. 1.0**



SYSTEM EXCLUSIVE COMMUNICATION



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1. SYSTEM EXCLUSIVE COMMUNICATION

TR808-M interface disposes of system of System Exclusive communication which enables to receive and to transmit SysEx Messages for remote setting of all parameters. Also, it is possible to list actual values of parameters. These data can be archived in PC for example.

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

Structure of SysEx Msg is always :

F0h	Start SysEx
00h 20h 21h	Manufacturer ID
ii	Device ID (00h to 0Fh – corresponds to Nr. of selected MIDI channel, or universal 7Fh)
14h	Model ID
cc	Command (command type)
aa	Address (address of memory area)
dd...dd	Data (data of parameters)
xx	Checksum (seven-bit checksum of bytes from Model ID to Checksum)
F7h	End SysEx

Length of datablock "**dd...dd**" is variable in dependence on SysEx Msg type. Number of databytes in block can be 0 (SysEx Msg "Data Request" contain no databyte), 4 or 8 byte (for SysEx Msg "Data Save / Load"). Checksum "**xx**" is created by standard method – seven-bit sum of bytes from "Model ID" to "Checksum" must be equal to zero. SysEx Msg is invalid and it is ignored by the device if this condition isn't satisfied.

3. COMMAND TYPES

Command "**cc**" specifies device activity after whole message is received. Valid values of "**cc**" are :

"**cc**" = 10h - Data Request – inquiry for actual values of parameters

"**cc**" = 20h - Data Save / Load – reply for "Data Request" or changes of parameters values

"**cc**" = 30h - Change Parameter – change of value of one system parameter

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

4. "DATA REQUEST" COMMAND

Form : **F0 00 20 21 ii 14 10 aa xx F7 [hex]**

Actual values of parameters in internal device's memory can be checked by "Data Request" command ("**cc**"=10h). Memory area is given by "**aa**" Address byte. Valid range is from 00h to 38h. "**dd**" databyte is not used in this type of SysEx Msg.

Immediately after "Data Request" message is received, MXC-56 transmits "Data Save / Load" message. Value of requested parameter is included in that message.

4.1. INQUIRY FOR SYSTEM PARAMETERS

Form : **F0 00 20 21 ii 14 10 38 xx F7 [hex]**

(where "ii" = Device ID, "xx" = Checksum)

If address "**aa**" = 38h, the message is inquiry for values of system parameters.

Immediately after valid message is received, MXC-56 transmits "Data Save / Load" message immediately. Values of system parameters are included in that message.



4.2. INQUIRY FOR OUTPUT PARAMETERS

Form : **F0 00 20 21 ii 14 10 aa xx F7 [hex]**
(where "ii" = Device ID, "aa" = Address, "xx" = Checksum)

If address "aa" is from 00h to 37h, the message is inquiry for values of parameters of some output. Address then specifies number of requested output. "aa" = 00h represents output 1, "aa" = 01h represents output 2 etc. up to "aa" = 37h for output 56.

Immediately after valid message is received, MXC-56 transmits "Data Save / Load" message immediately. Values of parameters of requested output are included in that message.

5. "DATA SAVE /LOAD" COMMAND

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

By transmitting of "Data Save / Load" message to MXC-56, it is allowed to change values of system parameters or parameters of some of outputs in dependence on "aa" Address byte. Also, this SysExMsg message is transmitted from MXC-56 as reply to "Data Request" message. Valid range of "aa" is from 00h to 38h. Values of all system parameters or values of all parameters of one output are always transferred in datablock "dd...dd".

5.1. LIST OF SYSTEM PARAMETERS

Form : **F0 00 20 21 ii 14 20 38 d1 d2 d3 d4 d5 d6 d7 d8 xx F7 [hex]**
(where "ii" = Device ID, "dx" = databyte, "xx" = Checksum)

If Address "aa" = 38h, the message contains values of all system parameters. Values of parameters are given by datablock "d1...d8" :

d1 + d2 → parameter "DMX Shift"

Databytes include 7-bit coded value of the parameter (**d1** is LSB, **d2** is MSB). Valid range is from 01h (LSB) / 00h (MSB) to 49h (LSB) / 03h (MSB).

d3 → parameter "MIDI Channel"

Value of databyte can be in range from 00h to 0Fh only. It correspond to parameter value from 1 to 16. Mathematic expression for databyte value is:

$$d3 = (\text{parameter}) - 1$$

d4 → parameter "MIDI Mode"

Value of databyte can be only 00h or 01h. Value 00h corresponds to parameter setting "Note", value 01h corresponds to parameter setting "Controller".

d5 → parameter "MIDI Shift"

Databyte includes value of parameter directly. Valid range is from 00h to 48h.

d6 → parameter "Master CC Nr."

Databyte includes value of parameter directly, i.e. 00h to 7Fh.

d7 → parameter "Blackout CC Nr."

Databyte includes value of parameter directly, i.e. 00h to 7Fh.

d8 → parameter "Foot Switch Function"

Value of databyte can be only 00h or 01h. Value 00h corresponds to parameter setting "Blackout", value 01h corresponds to parameter setting "Master".



5.2. LIST OF OUTPUT PARAMETERS

Form : **F0 00 20 21 ii 14 20 aa d1 d2 d3 d4 xx F7 [hex]**
(where "ii" = Device ID, "aa" = Address, "dx" = databyte, "xx" = Checksum)

If address "aa" is from 00h to 37h, the message includes values of all parameters of output specified by Address "aa": "aa" = 00h for output 1, "aa" = 01h for output 2 etc. up to "aa" = 37h for output 56. Values of parameters are given by datablock "d1...d4":

d1 → parameter "Default Value"

Databyte includes value of parameter directly, i.e. 00h to 7Fh.

d2 → parameters "Conversion Curve", "Accept Master" and "Accept Blackout"

Databyte has form: **0mbccccc** [bin].

Five least significant bits (**ccccc**) represent value of "Conversion Curve" parameter. Valid range is from 00000 [bin] to 10111 [bin], i.e. 00h to 17h. These values define conversion curves:

- 00000 [bin] = 00h → linear conversion
- 00001 [bin] = 01h → bi-stable conversion (0-1)
- 00010 [bin] = 02h → logarithmic curve 1
- 00011 [bin] = 03h → logarithmic curve 2
- 00100 [bin] = 04h → logarithmic curve 3
- 00101 [bin] = 05h → logarithmic curve 4
- 00110 [bin] = 06h → logarithmic curve 5
- 00111 [bin] = 07h → logarithmic curve 6
- 01000 [bin] = 08h → exponential curve 1
- 01001 [bin] = 09h → exponential curve 2
- 01010 [bin] = 0Ah → exponential curve 3
- 01011 [bin] = 0Bh → exponential curve 4
- 01100 [bin] = 0Ch → exponential curve 5
- 01101 [bin] = 0Dh → exponential curve 6
- 01110 [bin] = 0Eh → "S"curve 1
- 01111 [bin] = 0Fh → "S"curve 2
- 10000 [bin] = 10h → "S"curve 3
- 10001 [bin] = 11h → "S"curve 4
- 10010 [bin] = 12h → "S"curve 5
- 10011 [bin] = 13h → "Z"curve 1
- 10100 [bin] = 14h → "Z"curve 2
- 10101 [bin] = 15h → "Z"curve 3
- 10110 [bin] = 16h → "Z"curve 4
- 10111 [bin] = 17h → "Z"curve 5

Bit **m** represents value of "Accept Master" parameter. **m** = 0 is "No", **m** = 1 is "Yes"

Bit **b** represents value of "Accept Blackout" parameter. **b** = 0 is "No", **b** = 1 is "Yes"

d3 → parameter "Preheat"

Databyte includes value of parameter directly, i.e. 00h to 7Fh.

d4 → parameter "Limit"

Databyte value from 00h to 7Fh corresponds to parameter value from 255 to 128. Mathematic expression for databyte value is:

$$d4 = 255 - (\text{parameter})$$

6. "CHANGE SYSTEM PARAMETER" COMMAND

Form : **F0 00 20 21 ii 14 30 aa dd...dd xx F7 [hex]**
(where "ii" = Device ID, "aa" = Address, "dd...dd" = datablock, "xx" = Checksum)



By transmitting of "Change System Parameter" command ("cc" = 30h) to MXC-56, it is allowed to change actual value of one system parameter. Parameter is selected by "aa" Address. Newly engaged value isn't stored in permanent device's memory in this case. MXC-56 works with it only temporary (until the next device restart). Valid range of "aa" Address is from 00h to 06h. Datablok "dd...dd" includes two bytes (for "DMX Shift" parameter) or one byte (for all other parameters). The same conditions are valid for values of parameters as described in chapter 5.1.

aa = 00h → parameter "DMX Shift"

Two databytes in dd...dd block include 7-bit coded value of the parameter (order is LSB / MSB). Valid range is from 01h (LSB) / 00h (MSB) to 49h (LSB) / 03h (MSB).

aa = 01h → parameter "MIDI Channel"

One databyte dd includes value of parameter. Valid range is from 00h to 0Fh.

aa = 02h → parameter "MIDI Mode"

One databyte dd includes value of parameter. Valid range is from 00h to 01h.

aa = 03h → parameter "MIDI Shift"

One databyte dd includes value of parameter. Valid range is from 00h to 48h.

aa = 04h → parameter "Master CC Nr."

One databyte dd includes value of parameter. Valid range is from 00h to 7Fh.

aa = 05h → parameter "Blackout CC Nr."

One databyte dd includes value of parameter. Valid range is from 00h to 7Fh.

aa = 06h → parameter "Foot Switch Function"

One databyte dd includes value of parameter. Valid range is from 00h to 0Fh.

6. EXAMPLES

1) Requested setting of system parameters is:

- DMX Shift - usage of DMX channels from 257 to 312
- MIDI Channel - 1st MIDI channel
- MIDI Mode - Note (control via Note On/Off and Key Aftertouch MIDI commands)
- MIDI Shift - Usage of MIDI notes Nr. 48 to 103
- Master CC Nr. - CC 17
- Blackout CC Nr. - CC 18
- Foot Switch Function - Master

SysEx Msg creating (all data are in hexadecimal form):

- Head of message (with universal Device ID usage) will be: **F0 00 20 21 7F 14 20**
- Address of memory area for system parameters (aa byte) will be: **38**
- Parametr "DMX Shift" has value 257, it is 02h (MSB) / 01h (LSB) after conversion to seven-bit bytes, databytes **d1,d2** will be: **01 02**
- Parameter "MIDI Channel" has value 1, databyte **d3** will be: **00**
- Parameter "MIDI Mode" has value "Note", databyte **d4** will be: **00**
- Parameter "MIDI Shift" has value 48, databyte **d5** will be: **30**
- Parameter "Master CC Nr." has value 17, databyte **d6** will be: **11**
- Parameter "Blackout CC Nr." has value 18, databyte **d7** will be: **12**
- Parameter "Foot Switch Function" has value "Master", databyte **d8** will be: **01**
- Whole datablock will be then: **01 02 00 00 30 11 12 01**
- seven-bit sum of bytes Model ID, Command, Address, Data is: **14+20+38+01+02+00+00+30+11+12+01 = 43**
Seven-bit complement of that sum is **80-43 = 3D** and this is value of Checksum byte.
- End-SysEx status byte will be: **F7**

Whole SysEx message will have form: **F0 00 20 21 7F 14 20 38 01 02 00 00 30 11 12 01 3D F7**



2) Requested setting of parameters of output Nr. 12 is:

- Default Value - default output value - 64
- Conversion Curve - conversion in accordance with „S“-5 curve
- Preheat - minimal transmitted DMX value - 16
- Limit - maximal transmitted DMX value - 240
- Accept Master - „No“- ignore Master controller
- Accept Blackout - „No“ - ignore Blackout controller

SysEx Msg creating (all data are in hexadecimal form):

- Head of message (with universal Device ID usage) will be: **F0 00 20 21 7F 14 20**
- Address of memory area for parameters of output Nr. 12 (**aa** byte) will be: **0B**
- Parameter "Default Value" has value 64, databyte **d1** will be: **40**
- Databyte **d2** will content values of three parameters:
 - Parameter "Conversion Curve" has value 10010 [bin], it is five least significant bits of **d2** (see chapter 5.2.)
 - Parameter "Accept Master" has value "No" so zero will be on position of bit .6
 - Parameter "Accept Blackout" has value "No" so zero will be on position of bit .5Resulting databyte **d2** will be: **00010010 [bin] = 12**
- Parameter "Preheat" has value 16, databyte **d3** will be: **10**
- Parameter "Limit" has value 240, databyte **d4** will be: **FF-F0 = 0F**
- Whole datablock will be then: **40 12 10 0F**
- Seven-bit sum of bytes Model ID, Command, Address, Data is: **14+20+0B+40+12+10+0F = 30**
Seven-bit complement of that sum is **80-30 = 50** and this is value of Checksum byte.
- End-SysEx status byte will be: **F7**

Whole SysEx message will have form: **F0 00 20 21 7F 14 20 0B 40 12 10 0F 50 F7**

3) Temporary change of system parameter "MIDI Shift" to value 0 is required.

SysEx Msg creating (all data are in hexadecimal form):

- Head of message (with universal Device ID usage) will be: **F0 00 20 21 7F 14 30**
- Parameter address (**aa** byte) will be: **03**
- Datablock will content the only one byte with value **00**
- Seven-bit sum of bytes Model ID, Command, Address, Data is: **14+30+03+00 = 47**
Seven-bit complement of that sum is **80-47 = 39** and this is value of Checksum byte.
- End-SysEx status byte will be: **F7**

Whole SysEx message will have form: **F0 00 20 21 7F 14 30 03 00 39 F7**

