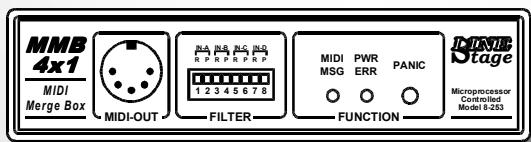


MMB 4x1

MIDI Merge Box

Model 8-253
ver. 1.1



INSTALLATION MANUAL AND USER'S GUIDE





Content

	page
1. Device description	3
1.1. Controllers and indicators, connectors	3
1.2. Device function description	3
1.3. Usage of device	4
2 Installation of device	4
2.1. Connection to MIDI system	4
2.2. Connection to power supply	4
3 Attendance of device	4
3.1. Initialization sequence	4
3.2. System parameters	4
3.2.1. "Message Indicator" parameter	5
3.2.2. "Auto-Panic" parameter	5
3.2.3. "Reset" parameter	5
3.2.4. "SysEx Data Pause" parameter	5
3.3. Data filtration	6
3.3.1. Filters setting by switch	6
3.3.2. Filters setting by SysEx communication	7
3.4. Operating status indication	7
3.4.1. Indication of power-on state	7
3.4.2. Indication of MIDI inputs and output activity	7
3.4.3. Indication of error states	7
4. "Panic" function	7
4.1. Manual activation of "Panic" function	8
4.2. Automatic activation of "Panic" function	8
5. System Exclusive communication	8
5.1. Data Request	9
5.2. Data Save / Load	9
5.3. Test / Service	10
6. Technical specifications	10
7. Warranty conditions	11

Appendices

FAQ	11
---------------	----

Manufacturer :

CHD Elektroservis, s.r.o.

9. května 78/35, 198 00 Praha 9
Czech Republic

info@chd-el.cz

www.chd-el.cz



1. DEVICE DESCRIPTION

MMB 4x1 is device that merges MIDI data from four MIDI transceivers. Algorithm of internal operating system and size of data buffers are chosen so that while merging data, all regulations „MIDI Specification“ given by MMA (MIDI Manufacturers Association) are adhered and that device can process commands and messages of all MIDI standards.

During data merging, priority of different data types is taken into consideration, duplicate data and all disallowed data (e.g. undefined state bytes, data bytes without state byte, etc.) is eliminated. Operating system of MMB 4x1 fully respects communication regime „Running Status“ – duplicate state bytes are omitted from MIDI messages and conversely, state bytes are inserted to MIDI messages on required positions. All above stated operations are carried out by MMB 4x1 automatically, interference of attendance is not needed.

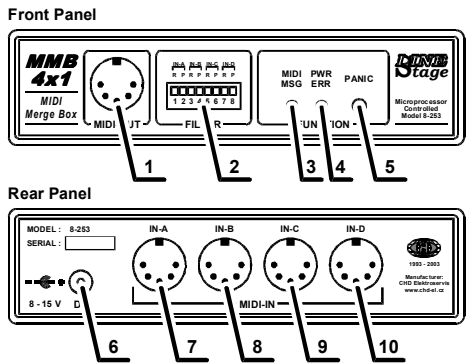
For increasing the utility value, device is complemented by user adjustable filters of MIDI data and "Panic" function is also implemented.

1.1. CONTROLLERS AND INDICATORS, CONNECTORS

Input connectors and connector for external power adapter are on rear panel of the device. Output connector, LED indicators (diodes) and manual controllers are on front panel of the device. Placement and titles of all components are shown on fig. 1.

1. Data output MIDI-OUT
2. Data filters selection switch
3. Indicator of MIDI data on output
4. Power-on state and error indicator
5. "PANIC" function button
6. Supply voltage input
7. Data input MIDI-IN-A
8. Data input MIDI-IN-B
9. Data input MIDI-IN-C
10. Data input MIDI-IN-D

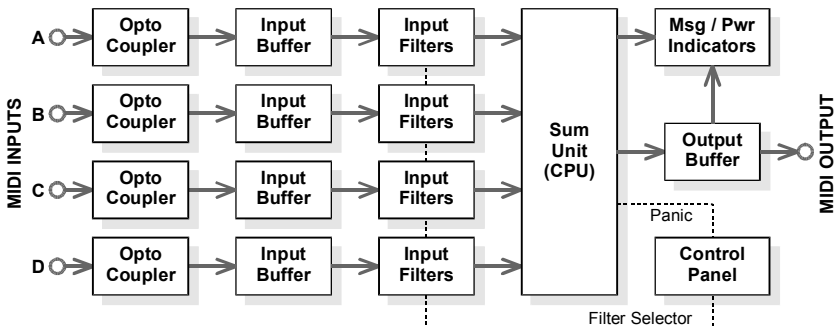
Fig. 1 - Panels of MMB 4x1



1.2. DEVICE FUNCTION DESCRIPTION

Device processes data in four identical and independent input circuits. Signals from MIDI buses coming to inputs MIDI-IN-A [7] to MIDI-IN-D [10] are galvanically isolated by optocouplers and input data are stored in caching FIFO buffers of size of 6144 byte. Blocks of input filters come after caching buffers and from here data is continuously drawn by controlling processor (CPU) and processed (merged) according to system parameters settings. After merge, data is stored into output caching buffer of size of 8192 byte and from there gradually sent to output MIDI-OUT [1]. Function block diagram of MMB 4x1 is shown on fig.2.

Fig. 2 – Function Block Diagram





1.3. USAGE OF DEVICE

Typical usage of Merge Box is shown on fig. 3. In this case, the device mixes data from three master keyboards and a sequencer. Resulting signal is brought to multitimbral (multi-voice) sound expander. Each of master keyboards and sequencer can independently control one or more voices of expander. Any different transceiver of MIDI data (additional sequencers, guitar converters, PC, rhythm, etc.) can be obviously connected instead of master keyboards and sequencer.

In case only one transceiver of MIDI data is connected, MMB 4x1 will function as MIDI data filter. Type of filtered data can be chosen by user.

2. INSTALLATION OF DEVICE

2.1. CONNECTION TO MIDI SYSTEM

MMB 4x1 is connected to MIDI buses by standard MIDI cables terminated by DIN 41524 connector (5 pins 180°). Data from transceivers is brought to inputs MIDI-IN-A [8] to MIDI-IN-D [10], output data for MIDI receiver are brought to connector MIDI-OUT [1] (see also fig. 3).

2.2. CONNECTION TO POWER SUPPLY

Device is powered from external DC power supply (e.g. power network adapter) connected to the DC [6] connector. Connector is of standard design (diameter of central pin is 2.1 mm). External DC adapter must be able to continuously supply current up to approximately 100 mA, allowed range of power supply voltage is 8 to 15 volts.

The connector of adapter must have + polarity on middle pin and – polarity on jacket (see fig. 4). The polarity of power supply connector is graphically illustrated on rear panel of the device. MDBC-1 has built-in protection against supply voltage polarity reversal. If this happens, the device does not function, but it does not lead to any damage of the device.

We recommend to use power supply adapter MW-1203SG, which is supplied as non standard accessory of the device.

3. ATTENDANCE OF DEVICE

3.1. INITIALIZATION SEQUENCE

Initialization sequence (hardware reset) of the device takes place automatically - always after connection of power supply voltage. During initialization sequence, all functions of MMB 4x1 are set to initial still states and all internal caching data buffers are cleared. At the same time, new current state of controller FILTER [2] is read and according to its value, data filters no. 1 and no. 2 (see chapter 3.3) are set. Other filters or system parameters (which can be set only by SysEx communication) are always turned off (set to initial still states).

Cleanup of caching data buffers and reading of current state of controller FILTER [2] also always takes place when the "Panic" function is activated, regardless whether the activation was automatic or manual (pressing the PANIC [5] button). Manual initialization (as part of "Panic" function) can be used when changes in settings of filters no. 1 and no. 2 by controller FILTER [2] are required to take place during production - without the need of disconnecting from power supply adapter and then reconnecting the device - or in case of caching data buffers overflow. Current settings of filters no. 3 and no. 4 and system parameters are not influenced by "Panic" function.

3.2. SYSTEM PARAMETERS

The way of operation of MMB 4x1 during MIDI data processing is determined by parameters settings. Setting is done exclusively by MIDI System Exclusive Messages, there is no other way of choosing the below described functions - see chapter 5.

Fig. 3 - Typical using

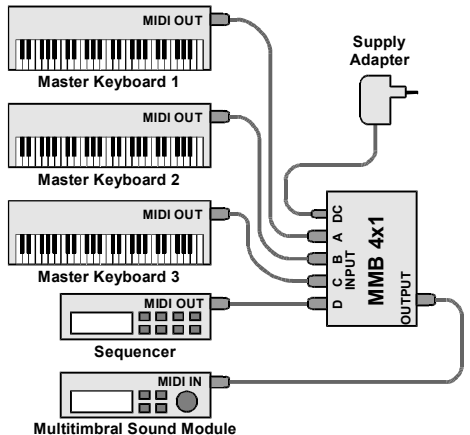
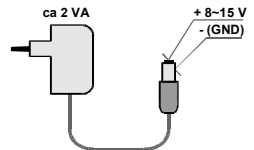


Fig. 4 - Supply adapter





3.2.1. "MESSAGE INDICATOR" PARAMETER

Type of indication by LED MIDI-MSG [3] of MIDI data transferred through the device is set by this parameter. It is possible to set indication of presence of data independently for each MIDI input [7] to [10] and MIDI output [1]. Parameter's values range from 0 to 31. Dependency of type of indication on set value of parameter is shown in table 1.

Indication of presence of data on MIDI output only is always set after resetting the device (i.e. after power supply voltage connection) – value of parameter is set to 16.

Table 1. – Selection of indication of transferred MIDI data

Parameter value		Indicated data					Out	Parameter value		Indicated data					Out
[dec]	[hex]	A	B	C	D	[dec]		[hex]	A	B	C	D			
0	00	-	-	-	-	-	16	10	-	-	-	-	o		
1	01	o	-	-	-	-	17	11	o	-	-	-	o		
2	02	-	o	-	-	-	18	12	-	o	-	-	o		
3	03	o	o	-	-	-	19	13	o	o	-	-	o		
4	04	-	-	o	-	-	20	14	-	-	o	-	o		
5	05	o	-	o	-	-	21	15	o	-	o	-	o		
6	06	-	o	o	-	-	22	16	-	o	o	-	o		
7	07	o	o	o	-	-	23	17	o	o	o	-	o		
8	08	-	-	-	o	-	24	18	-	-	-	o	o		
9	09	o	-	-	o	-	25	19	o	-	-	o	o		
10	0A	-	o	-	o	-	26	1A	-	o	-	o	o		
11	0B	o	o	-	o	-	27	1B	o	o	-	o	o		
12	0C	-	-	o	o	-	28	1C	-	-	o	o	o		
13	0D	o	-	o	o	-	29	1D	o	-	o	o	o		
14	0E	-	o	o	o	-	30	1E	-	o	o	o	o		
15	0F	o	o	o	o	-	31	1F	o	o	o	o	o		

Note: - = without indication, o = indicated

3.2.2. "AUTO-PANIC" PARAMETER

This parameter enables or disables "Auto-Panic" function. This function executes automatic device initialization in case of overflow of any of internal caching data buffers. Function "Auto-Panic" is enabled if value of the parameter is 1. Function "Auto-Panic" is disabled if value of the parameter is 0. When "Auto-Panic" function is disabled, in case of overflow of caching data buffers the initialization of the device has to be carried out manually.

Parameter is set to 0 after resetting the device (i.e. after power supply voltage connection) – "Auto-Panic" function is disabled.

3.2.3. "RESET" PARAMETER

Parameter defines reaction of the device to receiving system MIDI command RESET (status FFh) on any of MIDI inputs [7] to [10]. MIDI commands RESET received on any of inputs [7] to [10] are normally processed and transferred to MIDI output [1] if value of the parameter is 0. MIDI command RESET is not transferred to output if value of the parameter is 1. In this case, when MIDI command RESET is received on any of inputs [7] to [10] function „Panic“ is activated.

Parameter is set to 0 after resetting the device (i.e. after power supply voltage connection) – command RESET is transferred to output.

3.2.4. "SYSEX DATA PAUSE" PARAMETER

Maximum length of allowed delay between data bytes of all SysEx messages coming to any input of the device is set by "SysEx Data Pause" parameter. Value of the parameter multiplied by five directly determines maximum length of pause in milliseconds. Allowed range for values of parameter is 2 to 100 (i.e. 10 to 600 ms). Value of the parameter is set to 10 after resetting the device – delay between databytes of SysEx messages can be max. 50 ms.

Optimum value of parameter suitable for absolute majority of connected devices is up to 50 milliseconds. However it is necessary to choose 100 and more milliseconds for some MIDI data transceivers (e.g. Yamaha MDF-2,



MDF-3). It is recommended to progress empirically when setting value of the parameter for particular device. Start by setting lower value and test data transmission. If error in transmission occurs, increase value of the parameter and test again, until data transmission is faultless.

3.3. DATA FILTRATION

Table 2. – MIDI Data Filters

Filter No.	Mode of control		Filtered MIDI commands		Default Value
	FILTER Switch	SysEX Msg	Command Name	Data [hex]	
1	yes	yes	MIDI Clock Start Continue Stop MTC Qtr. Frame Real-Time SysEx	F8 FA FB FC F1 dd F0 7F dd ... dd F7	in dependence on DIL switch
2	yes	yes	Control Changes – Bank Select MSB Control Changes – Bank Select LSB Program Change	Bn 00 dd Bn 20 dd Cn dd	in dependence on DIL switch
3	no	yes	Key Aftertouch Channel Aftertouch	An dd dd Dn dd	off
4	no	yes	Manufacturer SysEx Messages	F0 mm dd ... dd F7	off

Note: n = No. of MIDI channel, dd = databyte, mm = 00h to 7Dh

In some cases, it is suitable to use MIDI data filtration. For example device, which does not work with data in real time, does not have to receive such data. Or if MIDI bus is already heavily loaded, it can be lightened by filtering data pressure sensitivity (Aftertouch), and the like. MMB 4x1 enables to filter four types of data. These filters can be combined, in extreme cases no filter can be turned on or all four filters can work at the same time.

Implemented filters are shown in table 2. For filters of canal data (i.e. no. 2 and no. 3) applies, that while the filter is active, data on all six MIDI channels are filtered on given input.

3.3.1. SETTING OF FILTERS BY SWITCH

Table 3. – Control of MIDI data filters by FILTER switch

Section of switch								Meaning
1	2	3	4	5	6	7	8	
on	x	x	x	X	x	x	x	Filter No. 1 on MIDI input A turned on
off	x	x	x	X	x	x	x	Filter No. 1 on MIDI input A turned off
x	on	x	x	X	x	x	x	Filter No. 2 on MIDI input A turned on
x	off	x	x	X	x	x	x	Filter No. 2 on MIDI input A turned off
x	x	on	x	x	x	x	x	Filter No. 1 on MIDI input B turned on
x	x	off	x	x	x	x	x	Filter No. 1 on MIDI input B turned off
x	x	x	on	x	x	x	x	Filter No. 2 on MIDI input B turned on
x	x	x	off	x	x	x	x	Filter No. 2 on MIDI input B turned off
x	x	x	x	on	x	x	x	Filter No. 1 on MIDI input C turned on
x	x	x	x	off	x	x	x	Filter No. 1 on MIDI input C turned off
x	x	x	x	x	on	x	x	Filter No. 2 on MIDI input C turned on
x	x	x	x	x	off	x	x	Filter No. 2 on MIDI input C turned off
x	x	x	x	x	x	on	x	Filter No. 1 on MIDI input D turned on
x	x	x	x	x	x	off	x	Filter No. 1 on MIDI input D turned off
x	x	x	x	x	x	x	on	Filter No. 2 on MIDI input D turned on
x	x	x	x	x	x	x	off	Filter No. 2 on MIDI input D turned off

Note:

on = fingerboard in lower position, off = fingerboard in upper position, x = undefined position

Filters no. 1 and no. 2 (see table 1) can be placed on each of MIDI inputs by switch FILTER [2]. Setting of filters for MIDI input A [7] is done by sections 1 and 2 of switch FILTER [2]. Setting of filters for MIDI input B [8] is done by sections 3 and 4 of switch FILTER [2]. Setting of filters for MIDI input C [9] is done by sections 5 and 6 of



switch FILTER [2]. Setting of filters for MIDI input D [10] is done by sections 7 and 8 of switch FILTER [2]. Required setting of switch FILTER [2] can be seen in table 3.

For fast orientation functions of all different sections of switch FILTER [2] are also graphically illustrated on panel of the device: **IN-A** to **IN-D** denotes inputs A to D, **R** is symbol for filter no. 1 (Real Time), **P** is symbol for filter no. 2 (Program).

Setting of switch FILTER [2] is read always after resetting the device – when power supply voltage is connected to connector DC [6] or when „Panic“ function is activated. Changes in setting of switch FILTER [2] made during operation of the device have no effect on operation of MMB 4x1. It is necessary to confirm changes by pressing PANIC [5] button or by disconnecting and reconnecting external power supply adapter to connector DC [6].

3.3.2. SETTING OF FILTERS BY SYSEX COMMUNICATION

All types of filters can be set by SysEx Messages, i.e. aside from above stated filters also two other types (no. 3 and no. 4). All filters can be set independently for each of MIDI inputs. Setting of filters no. 1 and no.2 by SysEx Messages has higher priority than setting by FILTER [2] switch. Method of turning on and turning off of filters of data by SysEx Messages is described in detail in chapter 5.

3.4. OPERATING STATUS INDICATION

Two indicating luminous LED diodes are placed on front panel of MMB 4x1. Attendants are continuously informed about current state of the device during operation by these diodes.

3.4.1. INDICATION OF POWER-ON STATE

Red LED PWR-ERR [4] is on constantly when the device runs normally (after connecting power supply voltage) – it indicates power-on state and serviceability of the device. If this LED is not on after connecting power supply adapter, the adapter is probably malfunctioning.

3.4.2. INDICATION OF MIDI INPUTS AND OUTPUT ACTIVITY

Green LED MIDI-MSG [3] indicates activity of inputs MIDI-IN [7] to [10] and of output MIDI-OUT [1] in dependence on setting of system parameter “Message Indicator” by short blinking (i.e. fact that there are currently data being transferred through inputs or output.). Green LED MIDI-MSG [3] blinks shortly always during transition of MIDI byte. Individual blinks can blend in case of dense flow of data (more often than approx. every 50 ms), so LED MIDI-MSG [3] can be continuously on.

3.4.3. INDICATION OF ERROR STATES

Error states which disallow the device to function correctly are indicated by blinking of red LED PWR-ERR [4]. If the LED PWR-ERR [4] is blinking regularly after the device is turned on, operating memory of the device is defective. This malfunction cannot be solved by user.

Overflow of any of internal caching data buffers during operation of the device is indicated by irregular blinking. In this case MMB 4x1 is not able to further correctly process passing data and all activities of the device are stopped. Number of blinks of LED PWR-ERR [4] denotes buffer, which was overfilled: 1x = buffer of input A, 2x = buffer of input B, 3x = buffer of input C, 4x = buffer of input D, 5x = buffer of output. It is necessary to be aware of the fact that in case of overflow of any buffer all data stored in all caching buffers are inevitably lost. It is necessary to carry out initialization of the device in order to return it to normal operating state, i.e. disconnect and then reconnect external adapter to connector DC [6] or simply press PANIC [5] button.

If automatic execution of “Panic” function in case of overflow of caching buffers is allowed by “Auto-Panic” parameter, it is not necessary to initialize the device manually. In this case initialization is carried out automatically and MMB 4x1 returns to normal operating state after approx. two seconds – red LED PWR-ERR [4] ceases to blink and starts to be continuously on.

4. “PANIC” FUNCTION

This function is known for example from controlling keyboards. “Panic” function can be used in particular in case of software crash of MIDI system, for example when some tone generators hang. After activation of function receiving of data from all four MIDI inputs is immediately stopped and following string of data is sent to MIDI output (see also table 4):



System commands :

- <Stop>
- <Song Position Pointer> value 0

Channel commands – for all 16 MIDI channels :

- <Note Off> value 64 for all notes - 128x for one MIDI channel
- <Omni Off> / <Poly On>
- <All Sound Off>
- <Reset All Controllers>
- <All Notes Off>
- <Pitch Wheel> value 16384 (center position of controller)

More than four thousand bytes is sent in total, length of transmission is approx. 1.5 seconds. After MIDI commands transmission, all internal caching data buffers are set to zero, setting of switch of FILTER [2] filter and setting of filters no. 1 and no. 2 are read. After that permission of receiving of data from MIDI inputs and return to normal operating state follow.

Caution! With regard to caching data buffers being set to zero, during "Panic" function sequence occurs undoable loss of data stored in buffers, which are not yet processed in the moment of activation of the function! Some data received closely before "Panic" function activation could have been not transferred to MIDI output.

Table 4 - Data transmitted by "Panic" function

Command	
Name	hex value
Stop	FC
Song Position Pointer = 0	F2 00 00
Ch 1 : Note Off	80 00 40 01 40 ... 7F 40
Ch 1: Ctrl Change (Omni Off, Poly On, ANO, ASO, RAC)	B0 7C 00 7F 00 78 00 79 00 7B 00
Ch 1: Pitch Wheel = 16384	E0 00 40
Ch 2: Note Off	81 00 40 01 40 ... 7F 40
Ch 2: Ctrl Change (Omni Off, Poly On, ANO, ASO, RAC)	B1 7C 00 7F 00 78 00 79 00 7B 00
Ch 2: Pitch Wheel = 16384	E1 00 40
↓	...
Ch 15: Note Off	8E 00 40 01 40 ... 7F 40
Ch 15: Ctrl Change (Omni Off, Poly On, ANO, ASO, RAC)	BE 7C 00 7F 00 78 00 79 00 7B 00
Ch 15: Pitch Wheel = 16384	EE 00 40
Ch 15: Note Off	8F 00 40 01 40 ... 7F 40
Ch 16: Ctrl Change (Omni Off, Poly On, ANO, ASO, RAC)	BF 7C 00 7F 00 78 00 79 00 7B 00
Ch 16: Pitch Wheel = 16384	EF 00 40

4.1. MANUAL ACTIVATION OF "PANIC" FUNCTION

"Panic" function is manually activated by PANIC [6] button on front panel of the device. Short press of the button is enough for activation. Function runs automatically after activation, until the whole sequence is terminated. Function can be used in this manner for deblocking the device when caching data buffers overflow or for reading the setting of FILTER [2] switch after changes have been done.

4.2. AUTOMATIC ACTIVATION OF "PANIC" FUNCTION

In case when automatic execution of "Panic" function is enabled (by "Auto-Panic" parameter – see chapter 3.2.1) – sequence of "Panic" function is executed automatically in dependence to overflow of caching data buffers. No intervention from user is needed in this case.

5. SYSTEM EXCLUSIVE COMMUNICATION

MMB 4x1 enables to send and receive SysEx Messages. These can be used to remotely set values of system parameters and data filters (Data Load) – all system parameters and some of data filters are available only in this way. It is also possible to retroactively carry out listing of current values of parameters and filters setting (Data



Request / Data Save). Meaning of individual parameters and their influence on operation of the device is shown in chapter 3.2. SysEx Messages furthermore enable to run some testing and service functions.

Simple software generators of these messages are prepared for easy creation of MIDI System Exclusive Messages needed for controlling our products. Set of programs of generators for creation of SysEx Messages uses Java-scripts, therefore it can be run on PC with any operating system. Only requirement is installed any of internet browsers (MS-Explorer, Netscape and many more), which enable to work with Java-scripts.

Generators of SysEx Messages are available on supplemental CD-ROM. Current version is also available from internet address <http://www.chd-el.cz/sysex>. Documentation, installation guide and user's guide are part of the package.

Users of musical software "Cakewalk™" and "Sonar™" can use Studioware Panel utility for work with link switch (available on supplemental CD-ROM or at internet address <http://www.chd-el.cz>). Direct programming of parameters by MIDI bus is possible after copying this utility to appropriate folder and consecutive opening of panel window.

5.1. DATA REQUEST

Query for current value of parameter / filter (from controlling keyboard, sequencer and the like) has to have following format:

F0h	Start SysEx
00h 20h 21h	Manufacturer ID
ii	Device ID
36h	Model ID
10h	Command - REQUEST
aa	Address
xx	Checksum
F7h	End SysEx

ii : Identification number of device, possible value ranges from 00h to 03h and is dependant on the fact, by which MIDI input was SysEx message received. For input A [7] value has to be **ii** = 00h, for input B [8] value has to be **ii** = 01h, for input C [9] value has to be **ii** = 02h, for input D [10] value has to be **ii** = 03h.

aa : Address for determining type of filter or parameter, allowed range is 00h to 06h :

00h = FILTER No. 1 → address of filters No. 1 (for MIDI inputs A to D)

01h = FILTER No. 2 → address of filters No. 2 (for MIDI inputs A to D)

02h = FILTER No. 3 → address of filters No. 3 (for MIDI inputs A to D)

03h = FILTER No. 4 → address of filters No. 4 (for MIDI inputs A to D)

04h = INDICATOR → address of MIDI data indicators

05h = PARAMETER → address of two-state system parameters

06h = SYSEX PAUSE → address of delay between SysEx Msg databytes

xx : Seven-bit checksum of bytes Model ID to Checksum

After faultless receiving of this SysEx message, MMB 4x1 immediately starts to transmit information concerning filters setting of chosen input or parameters values. "Device ID" in answer is identical to "Device ID" in request, which set up the answer. The message is ignored and its receiving is not indicated by luminous diode MIDI-MSG [3] if it contains errors (for ex. Identification number out of allowed range, invalid checksum, missing byte "End SysEx", etc.).

5.2. DATA SAVE / LOAD

By this system message MMB 4x1 answers to request "Data Request" (saving values of parameters / filters – "Save"), or current settings of values of required parameters / filters can be changed by sending this message to MMB 4x1 ("Load"). Format of message is always as follows:

F0h	Start SysEx
00h 20h 21h	Manufacturer ID
ii	Device ID
36h	Model ID
20h	Command - SAVE / LOAD
aa	Address
dd	Value
xx	Checksum
F7h	End SysEx



ii, aa, xx : have same meaning as in previous paragraph
dd : determines state of filters or parameters chosen by number aa (address), allowed range of values for individual filters or parameters is:

for aa =00h to 03h (filters No. 1 to No. 4) :

dd = 0 d 0 c 0 b 0 a [bin], where

a → on (=1) / off (=0) of filter on input A

b → on (=1) / off (=0) of filter on input B

c → on (=1) / off (=0) of filter on input C

d → on (=1) / off (=0) of filter on input D

for aa =04h (indication of data) :

dd = 0 0 0 e d c b a [bin], where

a → on (=1) / off (=0) of indication on input A

b → on (=1) / off (=0) of indication on input B

c → on (=1) / off (=0) of indication on input C

d → on (=1) / off (=0) of indication on input D

e → on (=1) / off (=0) of indication on output

for aa =05h (system parameters) :

dd = 0 0 0 0 0 0 b a [bin], where

a → on (=1) / off (=0) „Auto-Panic“

b → on (=1) / off (=0) „Reset“

for aa =06h (max delay between SysEx Msg databytes) :

dd = 2 to 120 [dec], multiplying this number by five gives delay in milliseconds

Same as with command "Data Request", MMB 4x1 does not react to message containing any error and receiving of such message is not optically indicated.

5.3. TEST / SERVICE

These functions serve for finding immediate content of internal data registries, for direct controlling of hardware, etc. Testing functions are designed solely for service needs, their usage during normal operation is not presumed. More information regarding testing functions can be found in service manual.

6. TECHNICAL SPECIFICATIONS

Supply voltage :	external power supply unit - DC 8 V to 15 V
Consumption :	100 mA max
Protection :	protected against reversal of supply voltage polarity
Connector of supply adapter :	standard, diameter 6 / 2.1 mm
MIDI connectors :	5x DIN 41524 (5 pins / 180°)
Transit data delay :	from 0.3 ms to 0.9 ms in dependence on data type
Buffer registers :	on inputs (4x) – 6144 byte on output (1x) – 8192 byte
Dimensions :	140 mm (width) x 35 mm (height) x 105 mm (depth)
Weight :	approx. 200 g
Electrical design :	under the regulations of the ČSN EN 60335-1+A55, ČSN EN 60335-2-45
EMC :	under the regulations of the ČSN EN 55014
Operating environment :	standard
Range of operating temperature :	+10 to +35 °C
Relative environmental humidity :	up to 85 %
Accessories :	operation manual, supplemental CD-ROM



8. 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.

Relevant legal regulations take effect in case of cancellation of purchase contract.

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 signals source or load source with non-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.

APPENDICES

FAQ

Question : Our arranges are relatively "dense". Will not resulting sound "choke", with regard to stated possible delay of 0.3-0.9 ms?

Answer : This delay is caused by the fact that the device needs to receive complete MIDI message, before it is processed and sent further. Size of messages ranges from one to three bytes, one byte takes 0.32 ms to transfer – this is where the stated delay results from. The delay is absolutely imperceptible by human senses. Interestingly, even synthesizers from higher price categories take approx. 5 to 20 ms to emit sound after receiving "Note On" command. In comparison to this, delay of Merge Box is one rank lower.

Question : I cannot judge how dense the data have to be, in order to overflow buffer (how large it is)? How large is the density of data that can be safely transmitted through the device?

Answer : The principle of merging of data from four serial buses with constant transfer rate into one bus with the same transfer rate implies that in case of data flow on input buses being dense, accumulation of data can take place. Output bus might not be able to handle the transmission in this case. MMB 4x1 is provided with caching data buffers on each MIDI input and on MIDI output for this reason. These buffers capture data from this signal route for the duration of time period when controlling processor of MMB 4x1 processes data from other signal routes. The capacity of these buffers is substantial despite the fact sometimes the data can be delayed. In extreme cases the buffers can be overfilled. In case of one input bus being extremely loaded, it is therefore recommended to load other input buses lightly or not at all. This is of course applicable only for transmissions of extremely large data blocks, which can be for example SysEx memory dumps, transfer of sound samples (SDS) or MIDI files (MFD), and the like. However, caching buffers cannot be realistically overfilled by common musical data.

Let us suppose following example – merging data from four sequencers, all of them broadcast on all 16 channels. Four voiced accords in $\frac{1}{8}$ notes are played on each channel of each sequencer, tempo is 120 BPM. Therefore 1024 tones sound during one second. In this example, Merge Box is used (while in "Running Status" regime) to 55 to 65 % of its capacity. There is still plenty of room for data of commands Pitch Bend, Key / Channel Aftertouch, Control Change, etc.

Question : Is it possible to filter Control Changes 00 and Control Changes 32 information ?

Answer : Filters of controllers 0 and 32 (Bank Select MSB and LSB) are included in filters of program changing (filter No. 2 - Program Change).

