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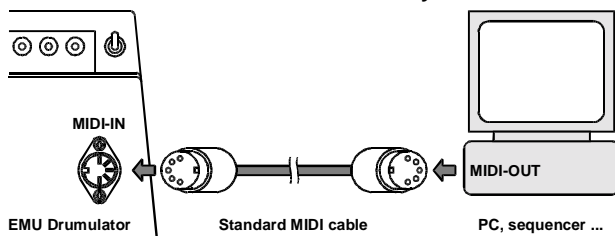
## 1. DEVICE DESCRIPTION

EDRM-M interface is retrofit for EMU-DRUMULATOR drum machine. It enables the EMU-DRUMULATOR 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.

## 2. CONNECTION OF THE INTERFACE TO MIDI SYSTEM

Standard MIDI cable with DIN 41524 connector (5 pins / 180°) is used for connection to other MIDI devices. With a help of that cable, MIDI input of the instrument (newly installed DIN socket) and MIDI output of driving device (sequencer, master keyboard etc.) are interconnected – see pic. 1.

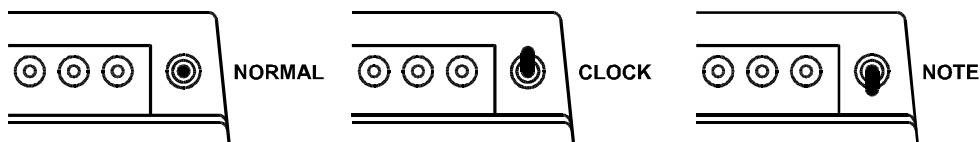
**Pic. 1 – Connection to MIDI system**



## 3. INTERFACE OPERATION

Function of MIDI interface is given by lever switch for working mode selection installed on the rear panel of the instrument. One of three working modes can be chosen: NORMAL, CLOCK and NOTE.

**Pic. 2 – Working mode selection**



### 3.1. "NORMAL" WORKING MODE

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

#### 3.1.1. MIDI COMMUNICATION IN "NORMAL" MODE

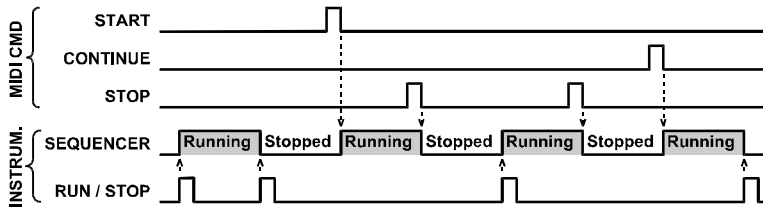
In working mode NORMAL, the interface doesn't receive any common system and channel MIDI commands. Only MIDI System Exclusive Messages are accepted – the interface can be programmed (see description of MIDI System Exclusive communication).

### 3.2. “CLOCK“ WORKING MODE – SYNCHRONIZATION OF INSTRUMENT WITH MIDI SYSTEM

In working mode CLOCK (working mode switch in upper position), internal tempo generator of the instrument is turned off and it is replaced with MIDI clock (MIDI Clock commands). So TEMPO slider on instrument’s front panel has no influence for function of the instrument. Also the input for external analog clock pulses CLK/CAS-IN (RCA socket on instrument’s rear panel) is locked in CLOCK working mode. So eventual external analog clock pulses are ignored by the instrument.

Run and stop of internal instrument’s sequencer are still controlled by RUN/STOP button on instrument’s front panel and eventually by external RUN/STOP pedal (Jack socket on instrument’s rear panel) but it is possible to initialize and to stop the sequencer with a help of Start / Stop / Continue synchronizing MIDI commands simultaneously (see pic. 3).

**Pic. 3 – Example of response of interface and instrument to synchronization MIDI commands**



#### 3.2.1. “CLOCK“ WORKING MODE SETTING

Connect EMU-DRUMULATOR to MIDI system and turn lever switch of the interface to CLOCK position. Now it is necessary to switch the EMU-DRUMULATOR instrument to correct mode so that it is able to accept synchronization MIDI commands (see user manual of the instrument, chapter 5G – Using the Drumulator with 24 Pulses Per Quarter Note Clocks): Push EXTERNAL CLOCK button on instrument’s front panel and hold it. Instrument’s display shows “EC xx”. Set value “EC 01” on the display with a help of “<” and “>” buttons. Then release EXTERNAL CLOCK button – red LED over the button lights. Now, the instrument is prepared for receiving of Clock, Start, Stop and Continue MIDI commands.

For termination of working in CLOCK mode, push EXTERNAL CLOCK button on instrument’s front panel (LED over the button turns off) and turn lever switch of the interface to middle position NORMAL.

#### 3.2.2. MIDI COMMUNICATION IN “CLOCK“ MODE

In working mode CLOCK, the interface accepts common system MIDI commands Clock, Start, Stop and Continue. Another common system and all channel MIDI commands are ignored. The interface also receives MIDI System Exclusive Messages – the interface can be programmed (see description of MIDI System Exclusive communication).

### 3.3. “NOTE“ WORKING MODE – LAUNCHING OF INSTRUMENT’S SOUNDS BY MIDI NOTES

In working mode NOTE (working mode switch in lower position), all functions of the instrument are locked except direct launching of sound of particular drum instruments. However, input for external communication CLK/CAS-IN (RCA socket on instrument’s rear panel) is locked too and digital data necessary for the instrument control are derived from MIDI commands.



### 3.3.1. “NOTE“ WORKING MODE SETTING

Connect EMU-DRUMULATOR to MIDI system and turn lever switch of the interface to NOTE position. Now it is necessary to switch the EMU-DRUMULATOR instrument to correct mode so that it is able to accept necessary MIDI commands (see user manual of the instrument, chapter 5J – External Computer Interface): Push EXTERNAL CLOCK button on instrument’s front panel and hold it. Instrument’s display shows “EC xx”. Then push RUN/STOP button. Now, all displays and LEDs on the instrument’s panel turn off (the instrument seems as switched-out totally) and EMU-DRUMULATOR is prepared for receiving of Note-On MIDI commands for launching of individual drum instruments.

**Remark:** First byte sent to the instrument can cause undefined or none sound. This is given by property of the instrument and there is no possibility to eliminate this (see user manual of the instrument).

For termination of working in NOTE mode, push ENTER button on instrument’s front panel (instrument’s display and LEDs will light again) and turn lever switch of the interface to the middle position NORMAL.

### 3.3.2. MIDI COMMUNICATION IN “NOTE“ MODE

In working mode NOTE, the interface accepts channel MIDI commands Note-On and some Control Changes. Another channel and all common system MIDI commands are ignored. The interface also receives MIDI System Exclusive Messages – the interface can be programmed (see the description of MIDI System Exclusive communication).

#### 3.3.2.1. SETTING OF RECEIVING MIDI CHANNEL

All acceptable channel MIDI commands are received on MIDI channel chosen by “MIDI Channel“ parameter. Setting of this parameter is stored in internal interface’s memory. Value of the parameter (i.e. method of receiving MIDI channel choice) can be changed only with MIDI System Exclusive Message (see the description of MIDI System Exclusive communication).

In default status (after Factory Reset), the parameter chooses setting of MIDI channel with a help four-segment DIL switch on the interface’s board as shows table 1. Number of MIDI channel is set in binary code – low significant bit designates segment 1 of the switch. Status of DIL switch is read only on reset of the interface i.e. after the instrument is switched on. Any changes made during the interface operation are ignored and they become evident till on next turning-on of the instrument!

**Table 1 – Choice of receiving MIDI channel with DIL switch**

Channel Nr.	Switch	Channel Nr.	Switch	Channel Nr.	Switch	Channel Nr.	Switch
1		5		9		13	
2		6		10		14	
3		7		11		15	
4		8		12		16	

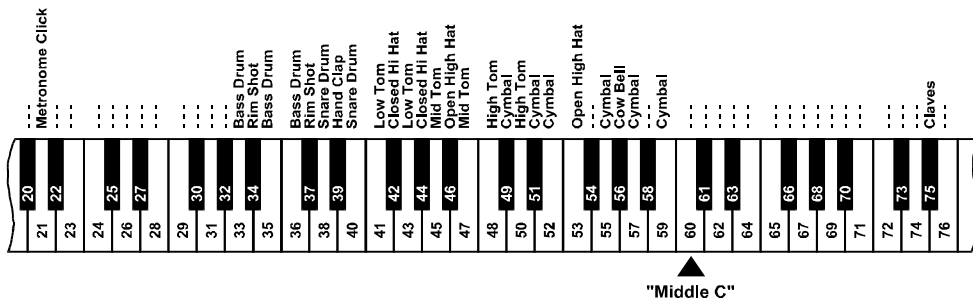
#### 3.3.2.2. NOTE-ON COMMANDS

The interface accepts numbers of MIDI notes in range 0 to 127. Any of the instrument’s sound generators can be assigned to any of MIDI notes. Also, none generator can be assigned – that MIDI note is then ignored. Assignment of sound generators to individual numbers of MIDI notes can be



programmed by user (see the description of MIDI System Exclusive communication), i.e. it is possible to create own map of drum instruments. In the default setting (Factory Reset), assignment according to table 2 is set (also see pic. 4). This setting approximately conforms to usually used C/M, GM, GS, XG standards.

**Pic. 4 – MIDI notes assignment after Factory Reset**



**Table 2 – Assignment of drums (instrument map) after Factory Reset**

Note Nr.	Assigned sound generator			Note Nr.	Assigned sound generator		
	Instrument name	Dynamics			Instrument name	Dynamics	
		Min.	Max.			Min.	Max.
0 to 20	-	-	-	47	Mid Tom	0	127
21	Metronome Click	0	127	48	High Tom	0	127
22 to 32	-	-	-	49	Cymbal	0	127
33	Bass Drum	0	127	50	High Tom	0	127
34	Rim Shot	0	127	51	Cymbal	0	127
35	Bass Drum	0	127	52	Cymbal	0	127
36	Bass Drum	0	127	53	Open Hi Hat	0	127
37	Rim Shot	0	127	54	-	-	-
38	Snare Drum	0	127	55	Cymbal	0	127
39	Hand Clap	0	127	56	Cow Bell	0	127
40	Snare Drum	0	127	57	Cymbal	0	127
41	Low Tom	0	127	58	-	-	-
42	Closed Hi Hat	0	127	59	Cymbal	0	127
43	Low Tom	0	127	60 to 74	-	-	-
44	Closed Hi Hat	0	127	75	Claves	0	127
45	Mid Tom	0	127	76 to 127	-	-	-
46	Open Hi Hat	0	127				

EDRM-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. This can be done within the scope of drum instrument map definition by System Exclusive Messages (see the description of MIDI System Exclusive communication). In default setting (Factory Reset), maximal possible dynamic range is set (see table 2).

**Remark:** 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.



### 3.3.2.3. CONTROL CHANGES COMMANDS

The interface accepts standard MIDI controllers for control of volume and own MIDI controllers for setting of actual values of parameters in edit buffer.

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 a new parameters values to permanent memory, you can do it with a help of MIDI controller Nr. 119 (see below) or with a help of MIDI System Exclusive Message (see description of MIDI System Exclusive communication).

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

Interface recognizes MIDI controllers for volume setting “Volume“ (CC7) and “Expression“ (CC11). Influence of these controllers to volume of EMU-DRUMULATOR instrument is given by setting of “Volume Control“ parameter (see below). Independently on setting of “Volume“ and “Expression“ controllers and “Volume Control“ parameter, VOLUME knob on instrument’s panel is always functional.

#### Standard controller **RAC (Reset All Controllers)**

Immediately after RAC (CC121) is received, standard controllers CC7 and CC11 are set to maximum (value 127) and own controllers CC16 and CC17 are set to default values stored in the internal memory of thee interface.

#### Own controller **CC16**

CC16 sets actual value of “Velocity Curve“ parameter in edit buffer of the interface. Valid values range is from 0 to 4. For all other values, the controller is ignored.

The parameter selects the curve for conversion of active MIDI note’s Velocity value (1 to 127) to level of acoustic signal of drum instrument (1 to 15 – EMU-DRUMULATOR instrument recognizes only 15 levels of dynamics). One of five curves can be chosen (also see table 3):

#### “Lin“ curve (parameter value equal to 0)

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

#### “Exp1“ curve (parameter value equal to 1)

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

#### “Exp2“ curve (parameter value equal to 2)

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

#### “Log1“ curve (parameter value equal to 3)

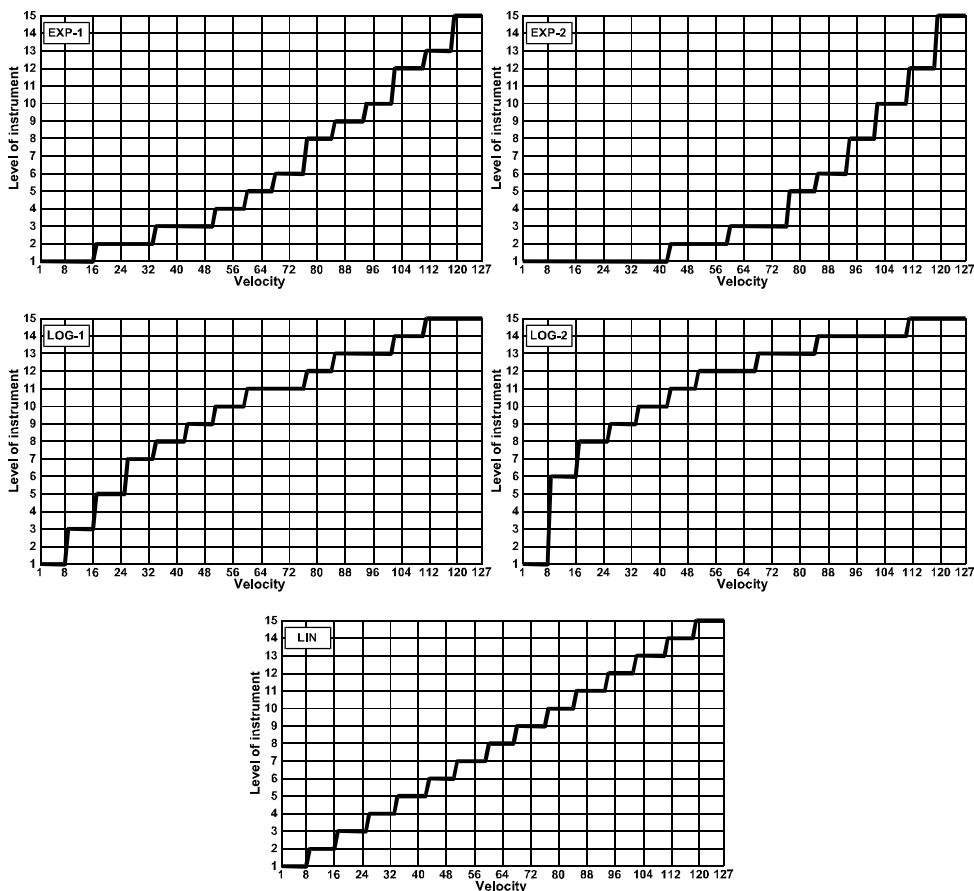
Conversion is logarithmic. Signal level accrues more quickly for lower Velocity values, signal level accrues slowly for higher Velocity values.

#### „Log2“ curve (parameter value equal to 4)

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

Default parameter value (set always after the instrument is switched on) is stored in permanent interface’s memory. It can be changed by user with a help of MIDI System Exclusive Message or by CC119 (see below). “Factory Reset“ setting is linear conversion (i.e. parameter value equal to 0).

Table 3 – Conversion curves of Velocity					
Velocity level	Instrument level for the curves				
	Lin	Exp 1	Exp 2	Log 1	Log 2
1~8	1	1	1	1	1
9~16	2	1	1	3	6
17~25	3	2	1	5	8
26~33	4	2	1	7	9
34~42	5	3	1	8	10
43~50	6	3	2	9	11
51~59	7	4	2	10	12
60~67	8	5	3	11	12
68~76	9	6	3	11	13
77~84	10	8	5	12	13
85~93	11	9	6	13	14
94~101	12	10	8	13	14
102~110	13	12	10	14	14
111~118	14	13	12	15	15
119~127	15	15	15	15	15

**Pic. 5 – Conversion curves****Own controller CC17**

CC16 sets actual value of "Volume Control Mode" parameter in edit buffer of the interface. Valid values range is from 0 to 3. For all other values, the controller is ignored.

The parameter selects method of instrument's volume control via standard MIDI controllers Volume (CC7) and Expression (CC11). One of four modes can be selected:

Mode „Off“ (parameter value equal to 0)

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

Mode „Volume“ (parameter value equal to 1)

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





Mode „**Expression**“ (parameter value equal to 2)

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

Mode „**Both**“ (parameter value equal to 3)

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

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

Default parameter value (set always after the instrument is switched on) is stored in permanent interface's memory. It can be changed by user with a help of MIDI System Exclusive Message or by CC119 (see below). "Factory Reset" setting is control with CC7 (i.e. parameter value equal to 1).

### Own controller **CC119**

With a help of CC119, it is possible to store actual values of system parameters (set by CC16 and CC17 in edit buffer) to internal interface's memory. These values will be used as default since this moment.

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 Curve" and "Volume Control Mode" parameters (i.e. values just used for the interface operation) are transferred from edit buffer to permanent interface's memory.



**4. MIDI IMPLEMENTATION CHART****MIDI IMPLEMENTATION CHART**Device : **EDRM-M**

Date : 9 / 2013

Model : **8-450**

Version : 1.0

Function		Transmission	Reception	Remarks
<b>Basic Channel</b>	Default	X	1~16	<sup>1)</sup>
	Changed	X	1~16	<sup>1)</sup>
<b>Mode</b>	Default	X	Mode 3	<sup>1)</sup>
	Messages	X	X	
<b>Note Number</b>		X	0~127	<sup>1)</sup> <sup>2)</sup>
<b>Velocity</b>	Note ON	X	O	<sup>1)</sup> <sup>2)</sup>
	Note OFF	X	X	
<b>After Touch</b>	Key's	X	X	
	Channel's	X	X	
<b>Pitch Bender</b>		X	X	
<b>Control Changes</b>	7	X	O	Volume <sup>3)</sup>
	11	X	O	Expression <sup>3)</sup>
	16	X	O	Velocity Curve
	17	X	O	Volume Control Mode
	119	X	O	Save Edit Buffer
	121	X	O	RAC <sup>3)</sup>
<b>Program Change</b>		X	X	
<b>System Exclusive</b>		X	O	
<b>System Common</b>	Song Position	X	X	
	Song Select	X	X	
	Tune	X	X	
<b>System Real Time</b>	Clock Command	X	O	In "Clock" mode only
<b>Others</b>	Local ON/OFF	X	X	
	All Notes Off	X	X	
	Active Sensing	X	X	
	Reset	X	X	
Notes : <sup>1)</sup> Can be changed by user				
<sup>2)</sup> Range depends on instrument map setting				
<sup>3)</sup> Standard CC				

Mode 1 : **OMNI ON, POLY**Mode 2 : **OMNI ON, MONO**

O : Yes

Mode 3 : **OMNI OFF, POLY**Mode 4 : **OMNI OFF, MONO**

X : No



## 5. INDICATION LED ON INTERFACE'S BOARD

Red LED on the interface board indicates status of the interface during operation:

- The LED is permanently off in "Normal" working mode.
- In "Clock" working mode, the LED lights in "Run" status and it is off in "Stop" status.
- In "Note" working mode, the LED indicates receiving of valid MIDI command (i.e. acceptable Note-On and CC).

This LED indicates the error status of the interface too. If any fatal error occurs rarely during interface operation, the interface stops all processes and indication LED blinks jaggedly. The number of LED blinks is indicating the error number:

- 2x: 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.
- 3x: MIDI interface internal memory is reacting too slowly to the CPU requirements - switch the instrument off and on. If the error cit is a hardware failure.
- 4x: Invalid data in the internal memory MIDI cell - switch the instrument off and on and then process Factory Reset. If the error remains, this is a hardware failure.
- 5x: MIDI data loss at the MIDI input - too much MIDI data has been sent to the instrument together - switch the instrument off and on.

If a fatal error remains after reset of the interface is done, it is a hardware failure. Please contact the authorized service in that case.

## 6. "METRONOME CLICK" SOUND GENERATOR

EMU-DRUMULATOR instrument doesn't support dynamics for Metronome Click sound. It is always launched with a maximal level in Note mode and Velocity value of Note-On command is ignored for this sound. Also it is not possible to control volume of this sound by controllers CC7 and CC11. Volume of Metronome Click sound can be set only with a help of METRONOME VOLUME knob on the instrument's panel.

## 7. 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.

