SAVY

Tone Parameters
Editor & Controller

Manual Supplement
Yamaha DX21, DX27, DX27S, DX100
OS 008 ver. 2.0

Contents:

1   FEATURES

Supported instruments: Yamaha DX21, DX27, DX27S, DX100.

Number of tone memories: 512 (four memory banks).

Individual tone parameters (80x[1]): all Yamaha DX21 tone parameters assigned to MIDI CCs.

Modifiers (6x): MOD RATE, MOD DEPTH, BRILLIANCE, MODULATOR KBD SCALING LEVEL, CARRIER ENV TIME, MODULATOR ENV TIME

Macro (5x): ENV ATTACK TIME, ENV DECAY TIME, ENV SUSTAIN LEVEL, ENV RELEASE TIME, PITCH ENV TIME[2]

Random functions (14x): CARRIER – Light / Full, MODULATOR – Light / Full, OPERATOR 1 ~ 4, PITCH EG[2], ENV CARRIER / MODULATOR, FX, MODE, ALL

2   PREPARE THE INSTRUMENT

To use the SAVVY with your Yamaha **DX** instrument, you have to set following MIDI functions. There are different settings for the individual supported instruments:

For Yamaha **DX21** instrument:

1) Press the **FUNCTION** button on the instrument front panel. Display shows "f" on left side.
2) Press the **MIDI: ON-OFF** button. Display shows "Midi" function and its value.
3) Set "**on**" value of the function by **DATA ENTRY** slider or by "**-1**" and "**+1**" buttons.
4) Press the **MIDI: CHANNEL** button. The display shows "Omni" function and its value.
5) Set "**off**" value of the function by **DATA ENTRY** slider or by "**-1**" and "**+1**" buttons.
6) Press the **MIDI: CHANNEL** button again. The display shows "Midi R Ch" function and its value.
7) Set "**1**" value[3] of the function by **DATA ENTRY** slider or by "**-1**" and "**+1**" buttons.
8) Press the **MIDI: CHANNEL** button again. The display shows "Midi T Ch" function and its value.
9) Set "**1**" value[4] of the function by **DATA ENTRY** slider or by "**-1**" and "**+1**" buttons.
10) Press the **MIDI: CH INFO** button. The display shows "Ch. Info" function and its value.
11) Set "**on**" value of the function by **DATA ENTRY** slider or by "**-1**" and "**+1**" buttons.
12) Press the **MIDI: SYS INFO** button. The display shows "Sys. Info" function and its value.
13) Set "**on**" value of the function by **DATA ENTRY** slider or by "**-1**" and "**+1**" buttons.

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[1] For DX21 only. DX27 and DX100 use 73 parameters, DX27S uses 74 parameters.
[2] Available only for DX21.
[3] SAVVY uses MIDI channel Nr. 1 as a default for data receiving after factory reset (see System Parameters table). It can be changed by the user anytime.
[4] SAVVY uses MIDI channel Nr. 1 as a default for data transmitting after factory reset (see System Parameters table). It can be changed by the user anytime.

For Yamaha **DX27**, **DX27S** and **DX100** instruments:

1) Press the **FUNCTION** button on the instrument front panel. Display shows "FUNCTION CONTROL".
2) Press the **MIDI: ON-OFF** button. Display shows "Midi Switch" function and its value.
3) Set "**ON**" value of the function by **DATA ENTRY** "**-1**" and "**+1**" buttons.
4) Press the **MIDI: RECV CH** button. The display shows "Midi Omni" or a "Midi Recv Ch" number.
5) Set "**1**" value[5] of the function by **DATA ENTRY** slider or by "**-1**" and "**+1**" buttons.
6) Press the **MIDI: TRNS CH** button. The display shows "Midi Trns Ch" and a channel number.
7) Set "**1**" value[6] of the function by **DATA ENTRY** slider or by "**-1**" and "**+1**" buttons.
8) Press the **MIDI: CH INFO** button. The display shows "Midi Ch Info" function and its value.
9) Set "**ON**" value of the function by **DATA ENTRY** "**-1**" and "**+1**" buttons.
10) Press the **MIDI: SYS INFO** button. The display shows "Midi SY Info" function and its value.
11) Set "**ON**" value of the function by **DATA ENTRY** "**-1**" and "**+1**" buttons.

The values of the functions are stored in instrument's memory if set as described above.

SAVVY always uses the edit buffer of the Yamaha DX instrument, so no tone in instrument's internal memory is rewritten during the SAVVY operation. The MEMORY PROTECT function of the instrument does not need to be deactivated during the SAVVY operation thus.

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[5] SAVVY uses MIDI channel Nr. 1 as a default for data receiving after factory reset (see System Parameters table). It can be changed by the user anytime.
[6] SAVVY uses MIDI channel Nr. 1 as a default for data transmitting after factory reset (see System Parameters table). It can be changed by the user anytime.

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3 INSTRUMENT PARAMETERS – MIDI CC ASSIGNMENT

- **Individual tone parameters -** MIDI CCs assigned to individual tone parameters control.
- **Modifiers**[7] - MIDI CCs assigned to tone modifications controls (+/- offsets), that affect more tone parameters simultaneously accordingly to the fixed algorithms. In the middle position (i.e. value 64), the tone is not affected
- **Macros** – MIDI CCs assigned to macro functions that simplify control of more tone parameters simultaneously (e.g simplified ADSR envelope, etc.).
- **Random functions** - MIDI CC assigned to intelligent random functions set random values of selected tone parameters.

All changes of individual tone parameters, Modifiers and results of Macro and Random functions can be saved in SAVVY´s tone memories.

The following table shows factory assigned MIDI CCs numbers, however the assigned MIDI CCs are user definable[8] and can be changed by user.

INDIVIDUAL TONE PARAMETERS			
Parameter Name	**CC Nr.**	**Parameter Name**	**CC Nr.**
OP1: ATTACK RATE	21	OP3: DECAY 1 LEVEL	53
OP1: DECAY 1 RATE	22	OP3: KEYBOARD SCALING LEVEL	54
OP1: DECAY 2 RATE	23	OP3: KEYBOARD SCALING RATE	55
OP1: RELEASE RATE	24	OP3: EG BIAS SENS	none
OP1: DECAY 1 LEVEL	25	OP3: AMPLITUDE MOD ENABLE	56
OP1: KEYBOARD SCALING LEVEL	26	OP3: KEY VELOCITY	57
OP1: KEYBOARD SCALING RATE	27	OP3: OUTPUT LEVEL	58
OP1: EG BIAS SENS	none	OP3: OSC FREQUENCY	59
OP1: AMPLITUDE MOD ENABLE	28	OP3: DETUNE	60
OP1: KEY VELOCITY	29	OP4: ATTACK RATE	62
OP1: OUTPUT LEVEL	30	OP4: DECAY 1 RATE	63
OP1: OSC FREQUENCY	31	OP4: DECAY 2 RATE	67
OP1: DETUNE	33	OP4: RELEASE RATE	68
OP2: ATTACK RATE	35	OP4: DECAY 1 LEVEL	69
OP2: DECAY 1 RATE	36	OP4: KEYBOARD SCALING LEVEL	70
OP2: DECAY 2 RATE	37	OP4: KEYBOARD SCALING RATE	71
OP2: RELEASE RATE	39	OP4: EG BIAS SENS	none
OP2: DECAY 1 LEVEL	40	OP4: AMPLITUDE MOD ENABLE	72
OP2: KEYBOARD SCALING LEVEL	41	OP4: KEY VELOCITY	73
OP2: KEYBOARD SCALING RATE	42	OP4: OUTPUT LEVEL	74
OP2: EG BIAS SENS	none	OP4: OSC FREQUENCY	75
OP2: AMPLITUDE MOD ENABLE	43	OP4: DETUNE	76
OP2: KEY VELOCITY	44	ALGORITHM	78
OP2: OUTPUT LEVEL	45	FEEDBACK LEVEL	79
OP2: OSC FREQUENCY	46	LFO SPEED	13
OP2: DETUNE	47	LFO DELAY	14
OP3: ATTACK RATE	49	LFO PITCH MODULATION DEPTH	18
OP3: DECAY 1 RATE	50	LFO AMPLITUDE MODULATION	19
OP3: DECAY 2 RATE	51	LFO SYNC	15
OP3: RELEASE RATE	52	LFO WAVE	12

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[7] Please keep in mind that FM synthesis is not an analog systems and some audible "steps" might occur during the operation. Nevertheless we have optimized the firmware to avoid any unwanted MIDI errors or instrument crashes.
[8] To see how to change the assigned MIDI CCs or make new user map see chapter 5.

INDIVIDUAL TONE PARAMETERS - CONTINUE			
Parameter Name	**CC Nr.**	**Parameter Name**	**CC Nr.**
PITCH MOD SENSITIVITY	80	BREATH CTRL PITCH MOD RNG	none
AMPLITUDE MOD SENSITIVITY	81	BREATH CTRL AMPLIT MOD RNG	none
TRANSPOSE	82	BREATH CTRL PITCH BIAS RNG	none
PLAY MODE POLY / MONO	83	BREATH CTRL EG BIAS RNG	none
PITCH BEND RANGE	9	PITCH EG RATE 1 [9]	106
PORTAMENTO MODE	84	PITCH EG RATE 2 [9]	107
PORTAMENTO TIME	85	PITCH EG RATE 3 [9]	108
CHORUS SWITCH[10]	66	PITCH EG LEVEL 1 [9]	109
MOD WHEEL PITCH MOD RANGE	86	PITCH EG LEVEL 2 [9]	110
MOD WHEEL AMPLITUDE MOD RANGE	87	PITCH EG LEVEL 3 [9]	111

MODIFIERS			
Modifier Name	**CC Nr.**	**Modifier Name**	**CC Nr.**
MODULATION RATE	95	MODULATOR KEYFOLLOW [11]	91
MODULATION DEPTH	94	CARRIER ENV TIME	90
BRILLIANCE [11]	92	MODULATOR ENV TIME [11]	89

MACROS			
Macro Name	**CC Nr.**	**Macro Name**	**CC Nr.**
ENV ATTACK TIME	112	ENV RELEASE TIME	115
ENV DECAY TIME	113	PITCH ENV TIME[12]	116
ENV SUSTAIN LEVEL	114		

RANDOM FUNCTIONS	
Random Setting Name	**CC Nr.**
CARRIERS / MODULATORS / ENV / FX / MODE ...	3

3.1 MODIFIERS

MOD RATE

MOD RATE is a new performance parameter. This modifier changes the rate of the **vibrato**, **tremolo**, **growl**, and **LFO delay** effects.
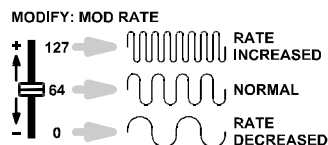
MOD DEPTH

MOD DEPTH is a new performance parameter. This modifier changes the depth of the **vibrato**, **tremolo** or **growl** effects. Also **modulation wheel** range is affected.
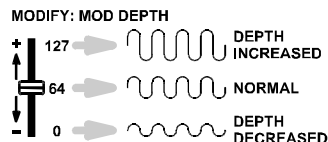
BRILLIANCE

BRILLIANCE is a new performance parameter. This modifier affects all modulators (in dependence on detected algorithm) – it changes the **brilliance / sharpness** of the tone.

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[9] For DX21 only. All PITCH EG parameters are not used for DX27, DX27S and Dx100.
[10] For DX21 and DX27S only. Not used for DX27 and DX100.
[11] These modifiers do not work if ALGORITHM tone paramete is 8.
[12] For DX21 only. Not used for DX27, DX27S and DX100.

MODULATOR KEYFOLLOW

MODULATOR KEYFOLLOW is a new performance parameter. This modifier adjusts the **keyboard scaling** level for all **modulators** (in dependence on detected algorithm).

MODIFY: MODULATOR KEYFOLLOW
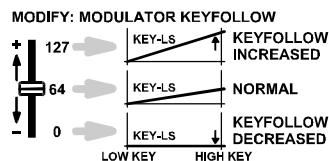
CARRIER ENV TIME

ENV TIME is a new performance parameter. This modifier offsets all **time segments** of all **carriers Envelope Generators** with single MIDI CC, while preserving all other tone settings (see picture below). The original tone color can be used with various lengths of envelopes from short percussive to long evolving pad.

MODIFY: CARRIER ENV TIME
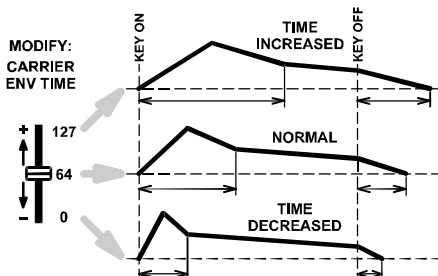
MODULATOR ENV TIME

ENV TIME is a new performance parameter. This modifier offsets all **time segments** of all **modulators Envelope Generators** with single MIDI CC, while preserving all other tone settings (see picture below). The original tone color can be used with various lengths of envelopes from short percussive to long evolving pad.

MODIFY: MODULATOR ENV TIME
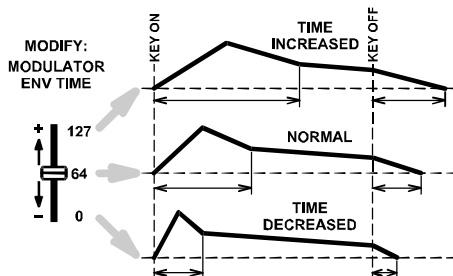
3.2 MACROS

ENV ATTACK TIME

Yamaha DX series instruments use atypical (AR, D1R, D1L, D2R, RR) envelope generators for operators. The ENV ATTACK TIME macro emulates **Attack segment** of traditional 4-segment (ADSR) envelope. Original tone parameters ATTACK RATE of all operators are simultaneously controlled by one CC as a common ATTACK TIME parameter.

MACROS: ATTACK, DECAY, SUSTAIN, RELEASE

ENV DECAY TIME

The ENV DECAY TIME macro emulates **Decay segment** of traditional 4-segment (ADSR) envelope. Original tone parameters DECAY 1 RATE of all operators are simultaneously controlled by one CC as a common DECAY TIME parameter.
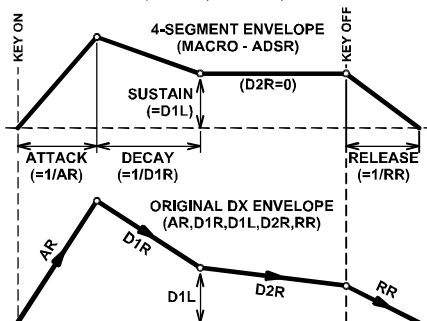
ENV SUSTAIN LEVEL

The ENV SUSTAIN LEVEL macro emulates **Sustain segment** of traditional 4-segment (ADSR) envelope. Original tone parameters DECAY 1 LEVEL of all operators are simultaneously controlled by one CC as a common SUSTAIN LEVEL parameter and original tone parameters DECAY 2 RATE of all operators are set to zero (i.e. SUSTAIN LEVEL is constant).

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ENV RELEASE TIME

The ENV RELEASE TIME macro emulates **Release segment** of traditional 4-segment (ADSR) envelope. Original tone parameters RELEASE RATE of all operators are simultaneously controlled by one CC as a common RELEASE time parameter.

PITCH ENV TIME

PITCH ENV TIME is a new performance parameter. This modifier changes all **time segments** of the Pitch Envelope Generator. The modifier works only with DX21. It does not affect DX27, DX27S and DX100 (since these instruments do not have the Pitch Envelope Genetator).
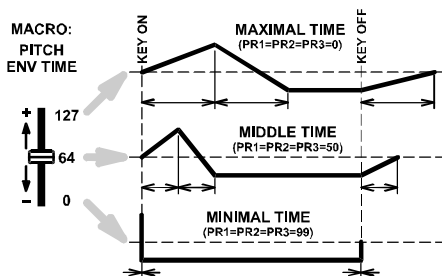
3.3   RANDOM FUNCTIONS

The random functions or "Intelligent random generator" use MIDI CC #3[13]. There are different random algorithms available as described in the table bellow:

VALUES OF CC ASSIGNED TO RANDOM SETTING FUNCTION CONTROL		
CC Value	**Function**	**Description**
0 ~ 7	n/a	Not used
8 ~ 15	CARRIER(s) light	Limited number and range of all carriers parameters without pitch / amplitude modulation effects for more predictable results
16 ~ 23	CARRIER(s) full	All available carriers parameters in full range, including modulation for more excentric tones and sound effect
24 ~ 31	MODULATOR(s) light	Limited number and range of all modulators parameters without pitch / amplitude modulation effects for more predictable results
32 ~ 39	MODULATOR(s) full	All available modulators parameters in full range, including modulation for more excentric tones and sound effect
40 ~ 47	OPERATOR 1	All parameters of the operator Nr. 1 random setting
48 ~ 55	OPERATOR 2	All parameters of the operator Nr. 2 random setting
56 ~ 63	OPERATOR 3	All parameters of the operator Nr. 3 random setting
64 ~ 71	OPERATOR 4	All parameters of the operator Nr. 4 random setting
72 ~ 79	PITCH EG	Pitch encelope generator random setting[14]
80 ~ 87	ENV CARRIER(s)	All carriers envelopes (all parameters) random)
88 ~ 95	ENV MODULATOR(s)	All modulator envelopes (all parameters) random)[15]
96 ~ 103	n/a	Not used
104 ~ 111	FX	LFO ,CHORUS[16] and PORTAMENTO random
112 ~ 119	MODE	Algorithm, Feedback
120 ~ 127	ALL	Full tone random for sound experimenting

It is recommended to assign push buttons on your hardware MIDI controller with the different MIDI CC #3 values as described in the table above.

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[13] Factory preset value. To see how to change number of assigned MIDI CC see chapter 5.2.
[14] For DX21 only. Not used for DX27, DX27S and DX100.
[15] These random setting does not work if ALGORITHM tone paramete is 8.
[16] For DX21 and DX27S only. Not used for DX27 and Dx100.

4 SYSTEM PARAMETERS

System Parameters define basic functions of SAVVY (MIDI channel for communication, MIDI data flow processing, tone number display format, display brightness, etc.).

SYSTEM PARAMETERS				
Parameter			**Factory Default**[17]	
Name	**Range**	**Description**	**Value**	**Description**
Global Parameters				
MIDI Channel	0 ~ 15	0: Chnl 1 ... 15: Chnl 16	0	MIDI Channel Nr. 1
Use Bank Select Command	0 ~ 1	0: No / 1: Yes	1	Yes
MIDI Errors Auto Reset	0 ~ 1	0: Off / 1: On	1	On
Remember last tone	0 ~ 1	0: No / 1: Yes	1	Yes
Tone Number Format	0 ~ 1	0: 0 to 511 / 1: 1 to 512	1	Numbers 1 to 512
Display Brightness	0 ~ 15	0: min ... 15: max	15	Maximal brightness
Inst → Ctrl Data Transfer				
Select Device ID for Bulk Dump	0 ~ 1	0: Universal / 1:MIDI Chnl Nr.	0	Universal ID Number
Send All CCs (Tone Change)	0 ~ 1	0: No / 1: Yes	1	Yes
Send One CC (Parameter Change)	0 ~ 1	0: No / 1: Yes	1	Yes
Send Manual Tone Slct as Pgm Chng	0 ~ 1	0: No / 1: Yes	1	Yes
Ctrl → Inst Data Transfer				
Cache Modifications in Edit Buffer	0 ~ 1	0: No / 1: Yes	1	Yes
Cache Macro Settings in Edit Buffer	0 ~ 1	0: No / 1: Yes	1	Yes
Cache Random Setting in Edit Buffer	0 ~ 1	0: No / 1: Yes	1	Yes
Accept Pgm Chng from Ctrl	0 ~ 1	0: No / 1: Yes	1	Yes

4.1 GLOBAL PARAMETERS

4.1.1 MIDI Channel

This parameter sets MIDI channel used for the instrument control (**0 for channel 1, 1 for channel 2, etc. up to 15 for channel 16**). All MIDI Channel messages are received and transmitted on selected MIDI channel only. MIDI channel for the SAVVY editor must be the same as selected MIDI channel of the controlled instrument!

4.1.2 Use Bank Select (CC #32)

If the parameter is 1 (i.e. "**YES**"), SAVVY uses the **CC #32** as the **Bank Select LSB** command for communication between the controller / PC and SAVVY. The CC #32 then defines number of active tone memory bank (0 to 3).

If the parameter is 0 (i.e. "**NO**"), the CC #32 can be used as universal CC for setting of a tone parameter (see chapter 3).

4.1.3 MIDI Errors Auto Reset

If the parameter is 1 (i.e. "**ON**") and an error in MIDI communication occurs, the **communication is reset** and the device continues normal operation.

If the parameter is 0 (i.e. "**OFF**") and an error in MIDI communication occurs, the **device stops operation** and the error status it indicated.

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[17] Factory preset values are user editable. See chapter 5 for details..

4.1.4 Remember Last Tone

If the parameter is 1 (i.e. "**YES**"), SAVVY **remembers last selected tone number** after switching off (for next session).

If the parameter is 0 (i.e. "**NO**"), SAVVY always **starts with the first tone** number.

4.1.5 Tone Number Format

This parameter sets the displayed tone number format. It can be either **0** to **511** (parameter value is 0) or **1** to **512** (parameter value is 1).

4.1.6 Display Brightness

The parameter sets the display brightness (**0 for minimum, 15 for maximum**).

4.2 INST → CTRL DATA TRANSFER PARAMETERS

4.2.1 Select Device ID for Bulk Dump

The parameter selects identification number of the SAVVY editor for both transmitted and received MIDI Bulk Dump SysEx Messages.

If the parameter is 1 (i.e. "**MIDI Channel**"), the Device ID number is the same as number of MIDI channel chosen for MIDI communication with the instrument (i.e. global parameter MIDI Channel).

If the parameter is 0 (i.e. "**Universal ID Number**"), the Device ID number is equal to 127. SysEx messages will be in such setting recognized by any SAVVY editor independently on selected MIDI channel number.

4.2.2 Send All CCs (Tone Change)

If the parameter is 1 (i.e. "**YES**"), the SAVVY editor **transmits all CCs** assigned to tone parameters **when tone number is selected / changed** (manually by button on front panel or by APR SysEx message or Program Change command from the instrument).

If the parameter is 0 (i.e. "**NO**"), **no CCs are transmitted after tone select** / change.

4.2.3 Send One CC (Parameter Change)

If the parameter is 1 (i.e. "**YES**"), the SAVVY editor **transmits MIDI CC** assigned to a tone parameter each time the **parameter is changed on the instrument** (by IPR SysEx message).

If the parameter is 0 (i.e. "**NO**"), assigned **CC is not transmitted** after the parameter change.

4.2.4 Send Manual Tone Slct as Pgm Chng

If the parameter is 1 (i.e. "**YES**"), **Program Change** command is **sent to the controller / PC** each time the tone is changed manually (by buttons on SAVVY´s front panel). If "Use Bank Select Command" parameter (see chapter 0) is "YES", the Bank Select LSB command (i.e. CC #32) is also sent.

If the parameter is 0 (i.e. "**NO**"), **Program Change** command is **not transmitted**.

4.3   CTRL → INST DATA TRANSFER PARAMETERS

4.3.1 Cache Modifications in Edit Buffer

If the parameter is 1 (i.e. "**YES**"), any **change of tone** parameters made by a "Modifier" CCs are **sent to the instrument and remain in edit buffer** (so they can be saved together with the tone parameters in SAVVY´s memory).

If the parameter is 0 (i.e. "**NO**"), the **changes** are only **sent to the instrument and not cached** in edit buffer.

4.3.2 Cache Macro Settings in Edit Buffer

If the parameter is 1 (i.e. "**YES**"), any **change of tone parameters** made by a "Macro" CC are **sent to the instrument and remain in edit buffer** (so they can be saved as a new tone parameters values in SAVVY´s memory).

If the parameter is 0 (i.e. "**NO**"), the **changes are only sent** to the instrument and they are **not cached** in edit buffer.

4.3.3 Cache Random Setting in Edit Buffer

If the parameter is 1 (i.e. "**YES**"), **changes** of tone parameters generated by the "Random" CC are sent to the instrument and **remain in edit buffer** (so they can be saved as a new tone parameters values in SAVVY´s memory).

If the parameter is 0 (i.e. "**NO**"), the **changes** are only sent to the instrument and they are **not cached**.

4.3.4 Accept Pgm Chng from Ctrl

If the parameter is 1 (i.e. "**YES**"), the editor **changes its tone** each time a **Program Change** command **is received** from the connected controller / PC. Number of newly selected tone bank conforms to value of the received Program Change command. If "Use Bank Select Command" parameter (see chapter 0) is "YES", the Bank Select LSB command (i.e. CC #32) is also accepted and active tone bank is also changed.

If the parameter is 0 (i.e. "**NO**"), **Program Change** command is **ignored** by the SAVVY.

5   SYSEX MESSAGES GENERATOR

As a support for the users we have made software generator to create System Exclusive messages to control the SAVVY editor. Any necessary SysEx message can be created with this generator without difficult calculating of binary or hexadecimal numbers.

The generator is based on Java scripts so it can run on any computer with web browser (Windows, OSX, etc.)[18]. To send the generated commands you will also need a **utility to send the generated text**[19] **as a MIDI SysEx dump** (see chapter 6 for recommended software[20]).

Visit our website and download the "**syxgen_008-20_Yamaha-DX21.zip**" archive for Yamaha DX21 instrument. Expand the archive to a selected folder on your computer's hard drive (i.e. "**index.html**", "**00820_general.html**", "**00820_instrument.html**", "**00820_tone.html**" and "**00820_help.html**" files and "**media**" sub-folder).

To launch the SysEx messages generator, simply open the "**index.html**" file in your web browser (e.g. by clicking on the file icon). The generator type selector window opens.

Click on "**Go**" button to request either **System Parameters** ①, **Instrument Parameters** ② or **Tone Data** ③ SysEx message generator windows.
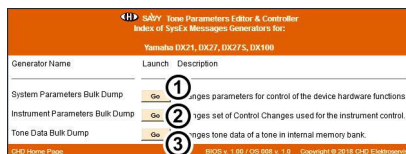
5.1   SYSTEM PARAMETERS WINDOW

5.1.1 Change the system parameters

To change / adjust the system parameters:

1. Select "**Load**" message type ①.

2. Select the "**Device ID**" ② (It is either the same number as active MIDI Channel Nr. or "**Universal**"[21]).

3. Select / adjust requested values of System parameters to be changed ③.

4. Click the "**Generate**" button ④.

5. The hexadecimal MIDI SysEx message is generated as a text in the "**SysEx Message**" field ⑤.

6. **Copy** the text in clipboard (CTRL+C) and **paste** (CTRL+V) to a MIDI Sysex software[22].

7. Send the message to SAVVY[23].

8. SAVVY starts operation with the new system parameters settings immediately, no reset is necessary.

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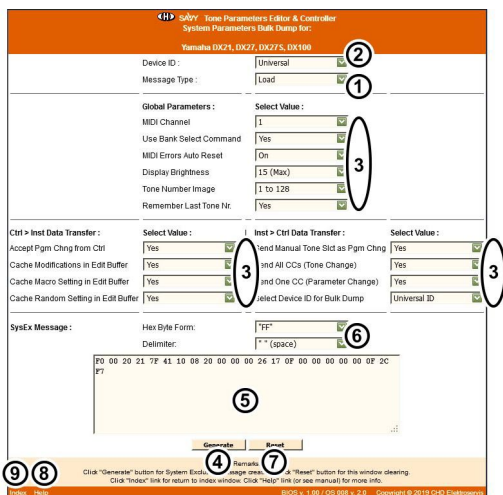
[18] Note that scripts and ActiveX elements must be enabled in web browser for proper function of the generator.
[19] The generated format of the message is **text**. The text can not be saved as a *.syx or *.mid file directly, hence a text to SysEx utility is needed.
[20] It is not necessary to use the recommended utility. The same function is provided by various DAW and MIDI SysEx softwares. For required text format and instructions check the documentation of your DAW/software.
[21] "Universal" ID will be recognized by any SAVY editor.
[22] See Chapter 6.1.2 for recommended MIDI SysEx software.
[23] SAVVY must be set in "**CTRL→INST**" communication direction.

5.1.2 Request the contents of system memory

To request the contents of System paramters memory for backup in your computer:

1. Select "**Request**" message type ①.
2. Select the "**Device ID**" ② (It is either the same number as active MIDI Channel Nr. or "**Universal**"[24]).
3. Click the "**Generate**" button ④.
4. The hexadecimal MIDI SysEx message is generated as a text in the "**SysEx Message**" field ⑤.
5. **Copy** the text in clipboard (CTRL+C) and **paste** (CTRL+V) in a MIDI Sysex software[25].
6. Send the message to SAVVY[26].
7. SAVVY responds immediately – it sends the System parameter settings as "**Load**" type SysEx message[27].
8. Now you can save the received message in your computer for further use.

5.1.3 Initialize data

To initialize the System data to factory default values:

1. Select "**Initialize**" message type ①.
2. Select the "**Device ID**" ② (It is either the same number as active MIDI Channel Nr. or "**Universal**"[28]).
3. Click the "**Generate**" button ④.
4. The hexadecimal MIDI SysEx message is generated as a text in the "**SysEx Message**" field ⑤.
5. **Copy** the text in clipboard (CTR+C) and **paste** (CTRL+V) in a MIDI Sysex software[29].
6. Send the message to SAVVY[30].
7. SAVVY starts operation with the initialized system settings immediately, no reset is necessary.

5.1.4 Other functions

Select "**Hex Byte Form**" and "**Delimiter**" character ⑥ as required for your MIDI SysEx software[31]. Default setting of the generator is optimized for the recommended **Pocket MIDI** utility[32] (see Chapter 6). However some DAW or MIDI SysEx utilities require different format of the generated text message.

To clear the text field and return all values to their defaults, click the "**Reset**" button ⑦.

"**Help**" link ⑧ opens new window with brief help.

"**Index**" link ⑨ closes this window and returns to initial generator type selection window.

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[24] "Universal" ID will be recognized by any SAVVY editor.
[25] See Chapter 6.1.3 for recommended MIDI SysEx software.
[26] SAVVY must be set in "CTRL→INST" communication direction and your computer must be connected bi-directonally (both MIDI IN and OUT cables) with SAVVY.
[27] If you are using the recommended MIDI SysEx software, the message should be visible in the "MIDI In Monitor" window - see Chapter 6.1.3.
[28] "Universal" ID will be recognized by any SAVVY editor.
[29] See Chapter 6.1.2 for recommended MIDI SysEx software.
[30] SAVVY must be set in "CTRL→INST" communication direction.
[31] See the documentation of your DAW for required format.
[32] The default format is also compatible with Bome SendSX and various other softwares.

5.2 INSTRUMENT PARAMETERS WINDOW

5.2.1 Create / adjust the MIDI CC map

You can **create** your own user **MIDI CC map** in this generator window (e.g. to use your modern Virtual analogue synthesizer as a controller for your vintage instrument).

To create your own MIDI CC map:

1. Select "**Load**" message type ①.

2. Select the "**Device ID**" ② (It is either the same number as active MIDI Channel Nr. or "**Universal**"[33]).

3. For each of tone parameter and functions, select / change the respective MIDI CC[34] Nr. as you need ③.

4. Click the "**Generate**" button ④.

5. The hexadecimal MIDI SysEx message is generated as a text in the "**SysEx Message**" field ⑤.

6. **Copy** the text in clipboard (CTRL+C) and **paste** (CTRL+V) to a MIDI Sysex software[35].

7. Send the message to SAVVY[36].

8. SAVVY starts operation with the new user MIDI CC mapping immediately, no reset is necessary.

5.2.2 Request MIDI CC map

Actual **MIDI CC map** can be **saved** in your computer for backup. To request the MIDI CC map:

1. Select "**Request**" message type ①.

2. Select the "**Device ID**" ② (It is either the same number as active MIDI Channel Nr. or "**Universal**"[37]).

3. Click the "**Generate**" button ④.

4. The hexadecimal MIDI SysEx message is generated as a text in the "**SysEx Message**" field ⑤.

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[33] "Universal" ID will be recognized by any SAVVY editor.
[34] You can assign more than one parameter to a single MIDI CC Nr.
[35] See Chapter 6.1.2 for recommended MIDI SysEx software.
[36] SAVVY must be set in "CTRL→INST" communication direction.
[37] "Universal" ID will be recognized by any SAVVY editor.

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5. **Copy** the text in clipboard (CTRL+C) and **paste** (CTRL+V) in a MIDI Sysex software[38].

6. Send the message to SAVVY[39].

7. SAVVY responds immediately – it sends the MIDI CC map as "**Load**" type SysEx message[40].

8. Now you can save the received message in your computer for further use.

5.2.3 Initialize MIDI CC map

To **Initialize** the MIDI CC map **to factory default** values:

1. Select "**Initialize**" message type ①.

2. Select the "**Device ID**" ② (It is either the same number as active MIDI Channel Nr. or "**Universal**"[41]).

3. Click the "**Generate**" button ④.

4. The hexadecimal MIDI SysEx message is generated as a text in the "**SysEx Message**" field ⑤.

5. **Copy** the text in clipboard (CTR+C) and **paste** (CTRL+V) in a MIDI Sysex software[42].

6. Send the message to SAVVY[43].

7. SAVVY starts operation with the initialized MIDI CC map immediately, no reset is necessary.

5.2.4 Other functions

Select "**Hex Byte Form**" and "**Delimiter**" character ⑥ as required for your MIDI SysEx software[44]. Default setting of the generator is optimized for the recommended **Pocket MIDI** utility[45] (see Chapter 6). However some DAW or MIDI SysEx utilities require different format of the generated text message.

To clear the text field and return all values to their defaults, click the "**Reset**" button ⑦.

"**Help**" link ⑧ opens new window with brief help.

"**Index**" link ⑨ closes this window and returns to initial generator type selection window.

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[38] See Chapter 6.1.3 for recommended MIDI SysEx software.
[39] SAVVY must be set in "CTRL→INST" communication direction and your computer must be connected bi-directonally (both MIDI IN and OUT cables) with SAVVY.
[40] If you are using the recommended MIDI SysEx software, the message should be visible in the "MIDI In Monitor" window - see Chapter 6.1.3.
[41] "Universal" ID will be recognized by any SAVY editor.
[42] See Chapter 6.1.2 for recommended MIDI SysEx software.
[43] SAVVY must be set in "CTRL→INST" communication direction.
[44] See the documentation of your DAW for required format.
[45] The default format is also compatible with Bome SendSX and various other softwares.

5.3 TONE DATA WINDOW

5.3.1 Create single user tone

A **single tone** can be **created** by entering the individual tone parameter values (e.g. to create tone from a Magazine paper sheets, Video tutorials or advices from other users).

To create your own user tone:

1. Select "**Load**" message type ①**.**
2. Select the "**Device ID**" ② (It is either the same number as active MIDI Channel Nr. or "**Universal**"[46]).
3. Select the "**Tone Nr.**" you want to create ③.
4. Select / change the respective value for each of tone parameters ④.
5. Click the "**Generate**" button ⑤.
6. The hexadecimal MIDI SysEx message is generated as a text in the "**SysEx Message**" field ⑥.
7. **Copy** the text in clipboard (CTRL+C) and **paste** (CTRL+V) to a MIDI Sysex software[47].
8. Send the message to SAVVY[48].
9. SAVVY saves the new tone to selected "**Tone Nr.**" for immediate use.

Remark:

The window offers three parameters: FOOT VOLUME RANGE, SUSTAIN FOOT SWITCH and PORTAMENTO FOOT SWITCH. These three parameters are not available in instrument's parameters menu (editing buttons) but their actual status is stored in tone memory together with other sound parameters.

5.3.2 Request single tone

A **single tone** can be **backed up** (e.g. to share your sounds with other users).

To request single tone data:

1. Select "**Request**" message type ①.
2. Select the "**Device ID**" ② (It is either the same number as active MIDI Channel Nr. or "**Universal**"[49]).

Tone Parameters Editor & Controller
Tone Data Bulk Dump for:

Yamaha DX21, DX27, DX27S, DX100

Tone Parameter Name :	Select Value :		Tone Parameter Name :	Select Value :
			Device ID :	Universal ②
			Message Type :	Load ①
			Tone Nr :	1 ③
OP4: ATTACK RATE	24		P1: AMPLITUDE MOD ENABLE	Off
OP4: DECAY 1 RATE	1		P1: KEY VELOCITY	0
OP4: DECAY 2 RATE	1		P1: OUTPUT LEVEL	92
OP4: RELEASE RATE	3		P1: OSC FREQUENCY	1.00
OP4: DECAY 1 LEVEL	0		P1: DETUNE	0
OP4: KEYBOARD SCALING LEVEL	52		.GORITHM	2
OP4: KEYBOARD SCALING RATE	1		EEDBACK LEVEL	6
OP4: EG BIAS SENS	0		O SPEED	35
OP4: AMPLITUDE MOD ENABLE	Off		O DELAY	0
OP4: KEY VELOCITY	0		O PITCH MOD DEPTH	0
OP4: OUTPUT LEVEL	65		O AMPLITUDE MOD DEPTH	0
OP4: OSC FREQUENCY	1.00		O SYNC	Off
OP4: DETUNE	2		O WAVE	Triangle
OP2: ATTACK RATE	22		CH MOD SENS	0
OP2: DECAY 1 RATE	1		PLITUDE MOD SENS	0
OP2: DECAY 2 RATE	1		ANSPOSE	0
OP2: RELEASE RATE	4		Y MODE POLY / MONO	Poly
OP2: DECAY 1 LEVEL	12		CH BEND RANGE	0
OP2: KEYBOARD SCALING LEVEL	99		RTAMENTO MODE	Full Time
OP2: KEYBOARD SCALING RATE	1		RTAMENTO TIME	0
OP2: EG BIAS SENS	0		OT VOLUME RANGE	99
OP2: AMPLITUDE MOD ENABLE	Off		STAIN FOOT SWITCH	On
OP2: KEY VELOCITY	0		RTAMENTO FOOT SWITCH	Off
OP2: OUTPUT LEVEL	75		ORUS SWITCH	Off
OP2: OSC FREQUENCY	1.00		D WHL PITCH MOD RANGE	50
OP2: DETUNE	0		D WHL AMPLITUDE MOD RNG	0
OP3: ATTACK RATE	24		CTRL PITCH MOD RNG	0
OP3: DECAY 1 RATE	5		CTRL AMPLITUDE MOD RNG	0
OP3: DECAY 2 RATE	1		CTRL PITCH BIAS RNG	50
OP3: RELEASE RATE	3		CTRL EG BIAS RNG	0
OP3: DECAY 1 LEVEL	1		CH EG RATE 1	99
OP3: KEYBOARD SCALING LEVEL	99		CH EG RATE 2	99
OP3: KEYBOARD SCALING RATE	2		CH EG RATE 3	99
OP3: EG BIAS SENS	0		CH EG LEVEL 1	50
OP3: AMPLITUDE MOD ENABLE	Off		CH EG LEVEL 2	50
OP3: KEY VELOCITY	0		CH EG LEVEL 3	50
OP3: OUTPUT LEVEL	50		ICE NAME 1 (ASCII)	80
OP3: OSC FREQUENCY	1.00		ICE NAME 2 (ASCII)	105
OP3: DETUNE	-3		ICE NAME 3 (ASCII)	97
OP1: ATTACK RATE	20		ICE NAME 4 (ASCII)	110
OP1: DECAY 1 RATE	8		ICE NAME 5 (ASCII)	111
OP1: DECAY 2 RATE	1		ICE NAME 6 (ASCII)	32
OP1: RELEASE RATE	6		ICE NAME 7 (ASCII)	45
OP1: DECAY 1 LEVEL	12		ICE NAME 8 (ASCII)	32
OP1: KEYBOARD SCALING LEVEL	0		ICE NAME 9 (ASCII)	48
OP1: KEYBOARD SCALING RATE	2		ICE NAME 10 (ASCII)	49
OP1: EG BIAS SENS	0			

SysEx Message :   Hex Byte Form : "FF" ⑦
Delimiter : " " (space)

```
F0 00 20 21 7F 41 30 08 10 00 18 01 03 00 34 01 00 00 00 41 04
05 16 01 01 04 0C 63 01 00 00 04 08 01 00 01 08 00 00 00 22 03
00 00 00 02 00 00 14 00 01 01 04 16 01 00 00 30 02 00 50 01 00
00 00 00 00 02 00 00 00 04 00 04 00 00 00 41 00 40 04 00 40 40
63 61 6E 6F 20 20 20 30 31 63 32 32 32 40 40 40 40 00 40 40 40
40 40 40 1C F7
```
⑥

Click "Generate" button for System Exclusive message creating. Click "Reset" button for this window clearing.
Click "Index" link for return to index window. Click "Help" link for see manual) for more info.

⑩ ⑨   ⑤ Generate   ⑧ Reset

BIOS v. 1.00 / OS 008 v. 1.0   Copyright © 2018 CHD Elektroservis

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[46] "Universal" ID will be recognized by any SAVY editor.
[47] See Chapter 6.1.2 for recommended MIDI SysEx software.
[48] SAVVY must be set in "CTRL→INST" communication direction.
[49] "Universal" ID will be recognized by any SAVY editor.

3. Select the "**Tone Nr.**" you want to request / backed-up ③.

4. Click the "**Generate**" button ⑤.

5. The hexadecimal MIDI SysEx message is generated as a text in the "**SysEx Message**" field ⑥.

6. **Copy** the text in clipboard (CTRL+C) and **paste** (CTRL+V) in a MIDI Sysex software[50].

7. Send the message to SAVVY[51].

8. SAVVY responds immediately – it sends the MIDI CC map as "**Load**" type SysEx message[52].

9. Now you can save the received message in your computer for further use.

5.3.3 Initialize single tone

To **Initialize** a single tone **to factory default** values:

1. Select "**Initialize**" message type ①.

2. Select the "**Device ID**" ② (It is either the same number as active MIDI Channel Nr. or "**Universal**"[53]).

3. Select the "**Tone Nr.**" you want to initialize ③

4. Click the "**Generate**" button ④.

5. The hexadecimal MIDI SysEx message is generated as a text in the "**SysEx Message**" field ⑤.

6. **Copy** the text in clipboard (CTR+C) and **paste** (CTRL+V) in a MIDI Sysex software[54].

7. Send the message to SAVVY[55].

8. SAVVY initializes and saves the selected tone immediately, no reset is necessary.

5.3.4 Other functions

Select "**Hex Byte Form**" and "**Delimiter**" character ⑥ as required for your MIDI SysEx software[56]. Default setting of the generator is optimized for the recommended **Pocket MIDI** utility[57] (see Chapter 6). However some DAW or MIDI SysEx utilities require different format of the generated text message.

To clear the text field and return all values to their defaults, click the "**Reset**" button ⑦.

"**Help**" link ⑧ opens new window with brief help.

"**Index**" link ⑨ closes this window and returns to initial generator type selection window.

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[50] See Chapter 6.1.3 for recommended MIDI SysEx software.
[51] SAVVY must be set in "CTRL→INST" communication direction and your computer must be connected bi-directionally (both MIDI IN and OUT cables) with SAVVY.
[52] If you are using the recommended MIDI SysEx software, the message should be visible in the "MIDI In Monitor" window - see Chapter 6.1.3.
[53] "Universal" ID will be recognized by any SAVY editor.
[54] See Chapter 6.1.2 for recommended MIDI SysEx software.
[55] SAVVY must be set in "CTRL→INST" communication direction.
[56] See the documentation of your DAW for required format.
[57] The default format is also compatible with Bome SendSX and various other softwares.
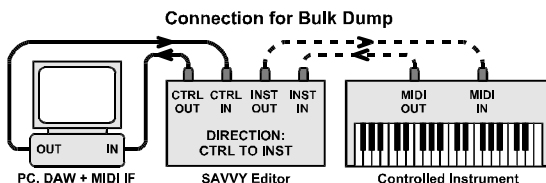
6   RECOMMENDED MIDI SOFTWARE

The hexadecimal MIDI SysEx messages created in the Generators (as described in chapter 5) are in **plain text format.** The text can not be saved as a *.syx or *.mid file directly, hence a text to SysEx capable utility or DAW is needed.

6.1   POCKET MIDI

Pocket MIDI[58] is a utility that can be used to send the text as a SysEx message. It is a simple MIDI monitoring tool for both Windows and Mac OSX platforms. **Pocket MIDI** is a **freeware** for commercial, non-profit or private use.

6.1.1 Setting up the computer[59] and software

1. **Download** the **Pocket MIDI** utility at **https://www.morson.jp/pocketmidi-webpage/**

2. **Install** the utility in your computer.

3. **Connect** SAVVY accordingly to the figure "Connection for Bulk Dump"**.**

4. **Select** the MIDI interface **Input and Outputs** to device where the SAVVY is connected to (drop-down menu **Views → MIDI Settings → Input Port / Outpu Port**).

Connection for Bulk Dump

CTRL OUT CTRL IN INST OUT INST IN
DIRECTION: CTRL TO INST

OUT   IN
PC, DAW + MIDI IF

SAVVY Editor

MIDI OUT   MIDI IN

Controlled Instrument

6.1.2 Send the text SysEx message to SAVVY

Basic procedure to send any SysEx data to SAVVY.

1. Generate required SysEx message in the SysEx Messages Generator (as described in Chapter 5)[60].

2. **Copy** the text in clipboard (CTR+C) and **paste** (CTRL+V) in "**System Exclusive**" window①**.**

3. Click the "↑" ("**Transmit**") arrow ② to send the data to SAVVY.

4. The sent message appears in the "**MIDI Out Monitor**" window ③.

5. Alternatively **you can save the file** for future use (either by the floppy icon ④ as a *.txt file or in the drop-down "**File**" menu ⑤ as a *.pocketmidi file).

---
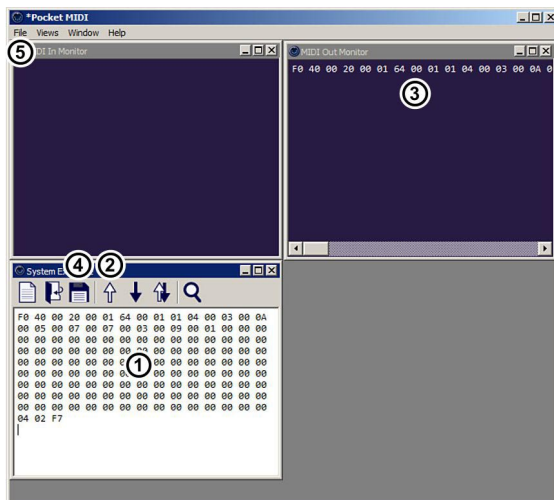
[58] Pocket MIDI is Copyright © MORSON JAPAN Co.,Ltd. All rights reserved.
[59] Computer MIDI interface must be active / switched on and all necessary MIDI drivers correctly installed.
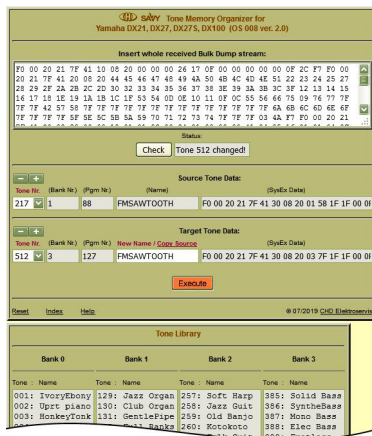[60] The correct "**FF**" Hex Byte Form and "**' (space)**" for Delimiter are the initial values after the generator is launched, so there is no need to change them for Pocket MIDI.

6.1.3 Request the SysEx data from SAVVY

1. **Generate** required ("**Request**" type) SysEx message in the SysEx Messages Generator (as described in Chapter 5)[61].

2. **Copy** the text in clipboard (CTR+C) and **paste** (CTRL+V) in "System Exclusive" window ①.

3. Click the "↑" ("**Transmit**") arrow ② to send the data to SAVVY.

4. The sent message appears in the "**MIDI Out Monitor**" window ③.

5. SAVVY responds with "**Load**" type SysEx message. The received message appears in the "**MIDI In Monitor**" window ④.

6. Click on the "**MIDI In Monitor**" window heading and **Save** the data (File downdrop menu ⑤) as a *.pocketmidi file) for future use.

7. Alternatively **you can copy the data** (CTRL+C) from "**MIDI In Monitor**" window ④ and paste (CTRL+V) to any text editor and **save** as a *.txt or **document file.**
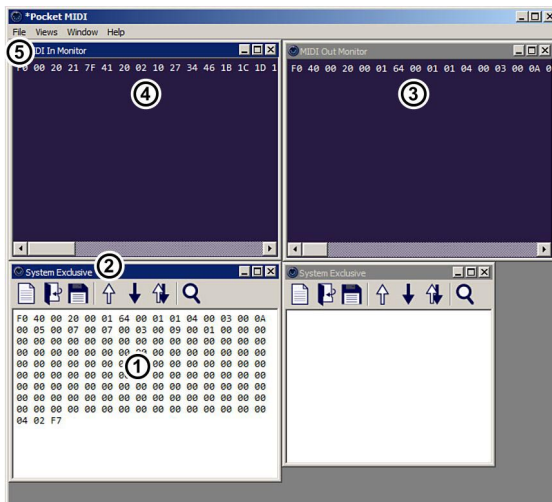
6.2 ALTERNATIVE SOFTWARE SOLUTIONS

There are various DAW and MIDI utilites[62] that can be used for the communication with SAVVY, both commercial and free. Among the others:

MIDI-OX (free for private users, paid for commercial users) – advanced MIDI tool for MS Windows computers: http://www.midiox.com/

Bome SendSX (postcardware for private users, reasonably paid for commercial users) – Simple and effective MS Windows MIDI utility:
https://www.bome.com/products/sendsx

InerziaSysEx (commercial) – advanced MIDI tool for Mac OSX:
available on iTunes

Steinberg Cubase Pro (commercial) - DAW for both MS Windows and Mac OSX computers with full sysex support:
http://www.steinberg.net

Apple Logic Pro (commercial) – Mac OSX DAW with full sysex support (all versions up to Logic Pro X):
https://www.apple.com/logic-pro/

Cakewalk Sonar (commercial) – MS Windows DAW with full sysex support:
http://www.cakewalk.com/

etc.

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[61] The correct "**FF**" Hex Byte Form and "**' (space)**" for Delimiter are the initial values after the generator is launched, so there is no need to change them for Pocket MIDI.
[62] All mentioned products are copyright of their respective owners.

7 TONE MEMORY ORGANIZER

The Tone Memory Organizer is a support software what we have made for the users to rename and relocate individual tones stored in SAVVY's tone memory.

The software and guide how to use it are available for downloading at our website.

⟨HD⟩ SAVY

Tone Parameters Editor & Controller
Model TPE-1 Nr. 8-361 / Bios v. 1.00 / OS Nr. 008 v. 2.0
Document: 8361100-00820_manual

Manufacturer:
CHD Elektroservis, Czech Republic
www.chd-el.cz   info@chd-el.cz

SAVVY

Tone Parameters Editor & Controller