

BITSTREAM[®] PRO

THE HIGH-PERFORMANCE UNIVERSAL MIDI CONTROLLER

OWNER'S MANUAL

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Rev 3.1 : April 2003

The logo for Wave Idea Audio Solutions, featuring a stylized orange wave graphic to the left of the text "Wave Idea" and "AUDIO SOLUTIONS" below it.

Wave Idea
AUDIO SOLUTIONS

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Introduction

BitStream pro is a universal hardware MIDI controller, fully programmable, that allows to control all software, and Hardware devices that respond to MIDI events & messages. These MIDI messages can be all defined by the norm, such as Control changes, NRPNs, RPNs, or Exclusives Systems that are specified for a dedicated device.

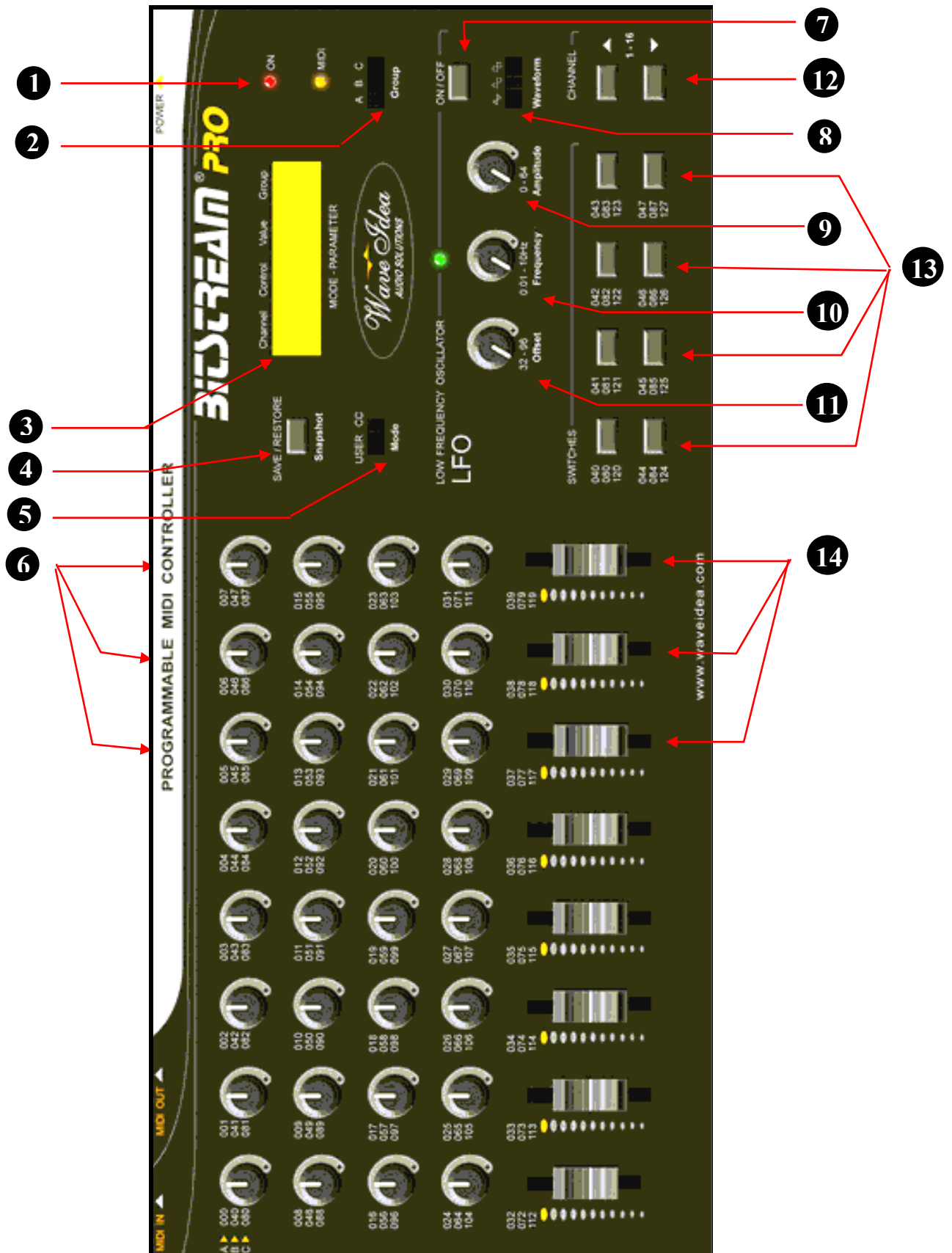
BitStream pro features two operating modes (Control Change / User defined) respectively used to control all devices that use standard MIDI messages (Control Change), and devices that use specific MIDI messages. In this case (Specific messages), BitStream Pro is fully programmable with the help of a delivered software for Windows 9x and 2K platforms. This software allows to assign any MIDI message (up to 24 bytes per message) to any potentiometer, switch or LFO that features BitStream. This makes BitStream a Universal MIDI controller able to control ALL soft, gears that respond to MIDI, usable without PC as soon as it has been configured.

```
BITSTREAM PRO
> WAVEIDEA 99 <
```

BitStream Pro features

- ✓ 32 rotary programmable potentiometers (Hook / Jump)
- ✓ 8 programmable slider potentiometers – 30mm
- ✓ 8 on/off programmable switches (Toggle / Pushbutton)
- ✓ LCD screen 2 lines of 16 chars with backlight
- ✓ Snapshot scene memory
- ✓ 16 MIDI Channels
- ✓ Intelligent and programmable built-in MIDI thru and Merge
- ✓ Controller fully programmable via a delivered software
- ✓ 2 Operating Modes :
 - Mode 1: universal MIDI messages (Control Change)
 - Mode 2: user defined MIDI messages
- ✓ 3 groups
 - Mode 1: Group A: Control Change 0 - 31 Assigned to 32 potentiometers
Control Change 32 - 39 Assigned to 8 slider potentiometers
Control Change 40 - 47 Assigned to 8 on/off switches
 - Mode 1: Group B: Control Change 40 - 71 Assigned to 32 potentiometers
Control Change 72 - 79 Assigned to 8 slider potentiometers
Control Change 80 - 87 Assigned to 8 on/off switches
 - Mode 1: Group C: Control Change 80 - 111 Assigned to 32 potentiometers
Control Change 112 - 119 Assigned to 8 slider potentiometers
Control Change 120 - 127 Assigned to 8 on/off switches
 - Mode 2: Group A: Programmable MIDI Messages (up to 24 bytes per message)
 - Group B: Programmable MIDI Messages (up to 24 bytes per message)
 - Group C: Programmable MIDI Messages (up to 24 bytes per message)
- ✓ Built-in LFO (Sine / Square / Triangle) with Offset / Amplitude / frequency adjustable with 3 additional potentiometers, assignable to any user defined MIDI event, internally or externally synchronized
- ✓ Dimensions: 19 Inches metallic rack enclosure 4U height.
- ✓ Delivered with the unit : External European DC power supply , CDROM
- ✓ 1 year warranty

Front panel Description



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- 1 Control LEDs:**
 - MIDI Led: On when MIDI data are generated by the controller
 - On/Off LED: On when controller is turned ON
- 2 Group selector**

Current group can be changed using the 3 positions of the slider button
- 3 LCD display:**

First line indicates: Current MIDI channel / Controller number / Controller Level / Group
Second line indicates "Control Change" in Mode 1, or a "user defined alphanumeric string" assigned to each potentiometer / switch / LFO for the user defined mode.
- 4 Snapshot button:**

Allows saving / restoring values of all 40 potentiometers and Switches in non-volatile memory.
- 5 Mode Button:**

Used to change the current operating mode:
Mode 1: Control Change
Mode 2: User defined MIDI messages
- 6 Potentiometers:**

32 rotary potentiometers independently configurable : Hook / Jump behavior
- 7 LFO on/off button:**

Allows to turn ON/OFF the LFO, a LED is associated to this button
- 8 LFO Waveform Selection type:**

Used to select waveform type generated by the LFO.
Sine / Square / Triangle
- 9 LFO Waveform Amplitude:**

Used to adjust waveform amplitude (0 < Amplitude < 64)
- 10 LFO Waveform frequency**

Used to adjust waveform frequency (0.01 Hz < Frequency < 10 Hz)
- 11 LFO Waveform Offset**

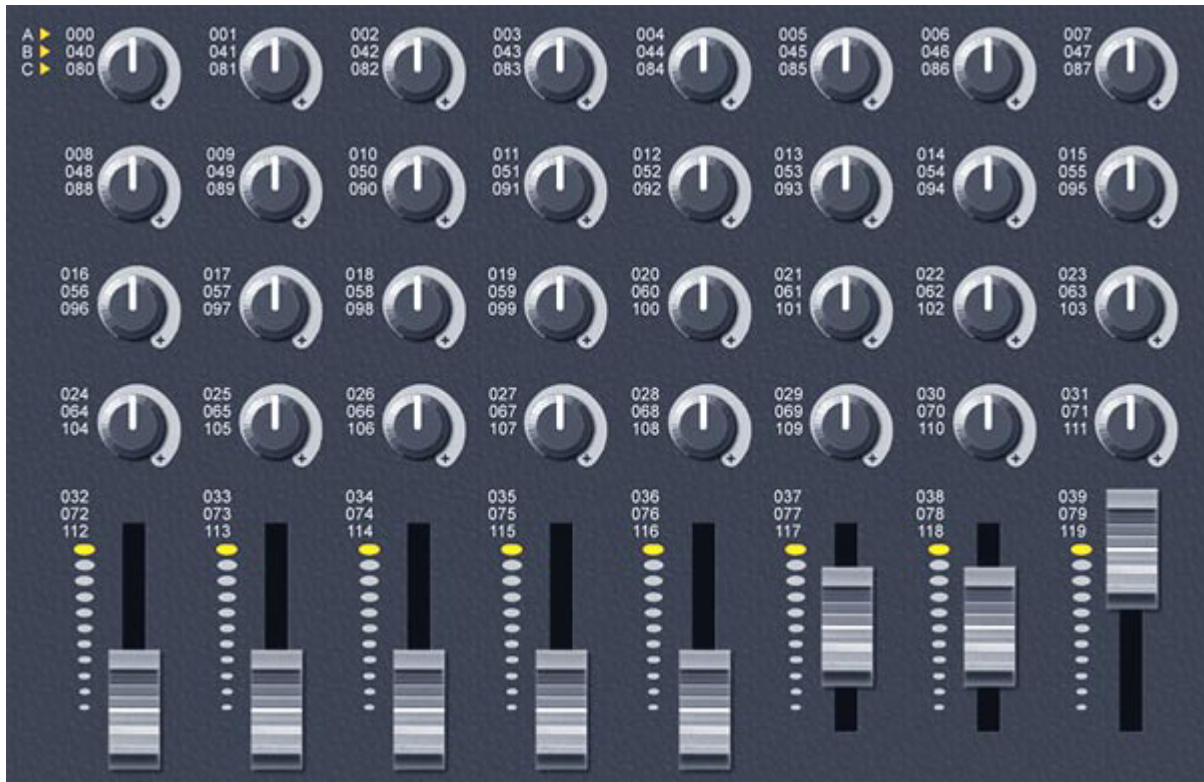
Used to adjust waveform offset (31 < Offset < 95)
- 12 Current MIDI Channel Selection:**

Used to Select MIDI Channel from 1 to 16:
UP switch allows increasing MIDI Channel
DOWN switch allows decreasing MIDI Channel
When simultaneously pressed, these buttons perform a SHIFT function
When SHIFT active, LCD shows all 8 switches state (from ROM V2.0)
- 13 ON/OFF Buttons**

These buttons play the same role as all potentiometers; they are used to control soft / devices, with ON/OFF MIDI messages.
All the 8 buttons can be independently configured: Toggle / Pushbutton behavior
- 14 Slider Potentiometers:**

8 programmable 30mm Slider potentiometers

Potentiometers / Switches Numbering



The 3 groups (A, B, C) are shown at the top left of the above window

The 3 numbers indicated on each control correspond to the control number (CC#) sent by each potentiometer or switch, depending on the selected group. These numbers are very useful for mode 1 (described in the next chapter), since the user is able to instantly know the controller sent.

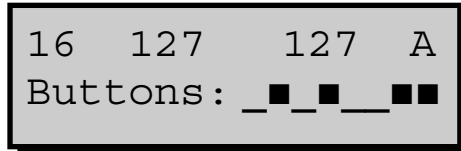
All four bottom switches are pushbuttons type. They can be easily programmed as transport functions (play, stop, forward, record) to externally control sequencers such as cubase, or other. On the other hand, the four top switches latching type, they can be used with any ON/OFF function, ie mute, etc.

SHIFT Function

When simultaneously pushing MIDI channel UP & DOWN, the SHIFT function is active until one of the two MIDI channel pushbuttons is released.

Displaying switches state

Once the shift function is active, all the 8 switches state are displayed on LCD, as follow:



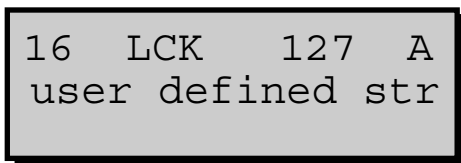
The 8 switches state are shown in a set of 8 characters (4 top switches followed by all 4 bottom switches):

- . _ means the switch is pushed (or toggled to ON)
- . ■ means the switch is relaxed (or toggled to OFF)

Locking MIDI out

Once a control (potentiometer, switch or LFO) has to send MIDI data, if SHIFT function is active, then assigned MIDI events are not sent to the Bitstream MIDI output.

Bitstream behavior stays unchanged, apart from the LCD which indicates locked MIDI data, as follow:



Potentiometers & switches behavior

From ROM V2.0, all the 40 potentiometers and all the 8 switches have two behavior options, described below. All can be independently programmed via the configuration software (> V3.1), available for both mode 1 and user defined modes.

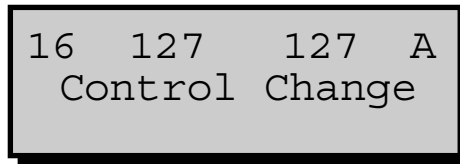
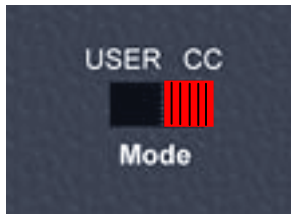
Potentiometers configuration: Hook / Jump

This allows to set the selected potentiometer behavior as Hook or jump mode, hook is used to avoid jumps when switching from one group to another. The MIDI events are not sent until the potentiometer physical value is equal to the current group value. Jump is the common behavior, the Bitstream doesn't care about physical and group mismatches, and send MIDI once the potentiometer tweaked.

Switches configuration: Toggle / Push

This allows to set the selected programmable switch behavior as toggle or push mode. When a switch is configured as toggle, a single push/release toggle the actual switch value between Min to Max values, this mode is mainly used to program on/off functions as mutes, as opposed to the push mode that has for effect to send Max value once pushed, then Min value once released, this mode is mainly used to program momentary functions as transport.

Using BitStream Pro in Mode 1: Control Change

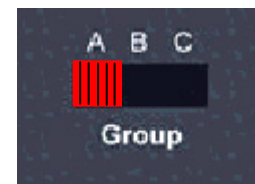


This mode is a universal MIDI mode that allows to control all soft synths (Reason, Live, ...) / gears with very simple MIDI messages called "Control Change". BitStream can generate all 128 possible Control Change, on all 16 MIDI channels.

This mode is the non-programmable mode, all the MIDI events described below are built-in the Bitstream Pro.

Using the 3 groups allows to cover all 128 controllers as follow:

Group A: Potentiometers 0-39 send **controllers 0-39**
Switches 40-47 send **controllers 40-47**



Group B: Potentiometers 0-39 send **controllers 40-79**
Switches 40-47 send **controllers 80-87**



Group C: Potentiometers 0-39 send **controllers 80-119**
Switches 40-47 send **controllers 120-127**



Each potentiometer / Switch is able to send 3 different controllers depending on the current group. All controllers are sent on the selected MIDI Channel that can be changed with the help of MIDI Channel UP-DOWN pushbuttons



Description of "Control Change" MIDI Messages

"Control Change" MIDI Messages are 3 bytes length, defined as follow:

Bn CC VV

n = MIDI Channel
(0x00 to 0x0F hexa)
or
(00 to 15 decimal)

*Note: MIDI channel 1 corresponds to n = 0
MIDI channel N corresponds to n = N-1*

CC = Controller Number (0 to 127)

VV = Controller Value (0 to 127)

Control Change Examples

Generating controller 66 on MIDI Channel 7

Control Change number 66 is obtained with potentiometer 26, when group B is selected. MIDI Channel 7 is obtained when LCD indicates 7 for the MIDI channel
Corresponding MIDI message is :

B6 42 VV

B6 indicates that a control change is sent on MIDI Channel 7
42 indicates that controller 42 (Hexadecimal or 66 decimal) is sent
VV Indicates potentiometer value

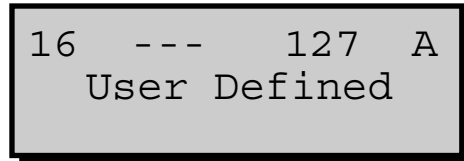
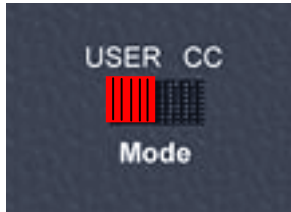
Generating controller 00 on MIDI Channel 16

Control Change number 00 is obtained with potentiometer 00, when group A is selected. MIDI Channel 16 is obtained when LCD indicates 16 for the MIDI channel
Corresponding MIDI message is:

BF 00 VV

BF indicates that a control change is sent on MIDI Channel 16
00 indicates that controller 00 (Hexadecimal or 00 decimal) is sent
VV Indicates potentiometer value

Using BitStream in mode 2: User defined MIDI Messages



This mode is used when the soft/device to control doesn't accept standard MIDI messages specified by the Norm.

The user can assign up to 3 MIDI strings to each potentiometer / Switch, in order to control his device(s) with BitStream pro. Since Bitstream Pro front panel features 49 controls (32 knobs / 8 sliders / 1 LFO), this makes an amount of 147 programmable MIDI events.

For each one of these events, all the following parameters can be programmed:

- Control Min & Max values
- Control value position
- MIDI channel Position
- Checksum Position, checksum range (for SYSEX events)
- Delay to insert after MIDI event (from 0 to 90ms)
- Chained control, including Crossfaders
- 16 characters MIDI string (displayed on LCD)

A software delivered with BitStream Pro allows to configure these MIDI strings, for additional information, refer to the "Software user's guide" available on Waveidea website.

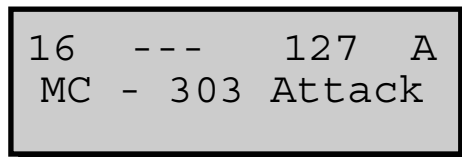
User defined MIDI strings are described in the manual of the device to control (MIDI Implementation part). In the case of popular devices, such as Roland MC-303, Quasimidi 309, etc, several library files are available on the Waveidea website. They can be downloaded for free, and used with the "BitStream Configuration software".

These library files are downloadable from:

<http://www.waveidea.com>

The user has also the possibility to assign to each potentiometer or switch an alphanumeric string of 16 chars max, that will be displayed on the second line of the LCD display in order to indicate what is the parameter controlled.

Example:



This screen allows the user to know that the controller parameter is the filter Attack of his Roland MC-303, on the MIDI Channel 16, with a value of 127 on the group A.

Waveidea highly recommends to use the dedicated configuration software to program Bitstream Pro. For additional information about Bitstream Pro User defined mode, please refer to the configuration software user guide, available on Waveidea website

Using the Waveform Generator (LFO)



LFO (Low Frequency Oscillator) allows to generate sinusoidal, square, or triangle waveforms. With 3 additional potentiometers, Frequency, Offset and Amplitude of the generated waveform are adjustable in real-time. The generated waveform can be considered as a potentiometer, then inserted in any user defined MIDI string.

This feature of BitStream Pro allows to automate a control without modifying it by hand

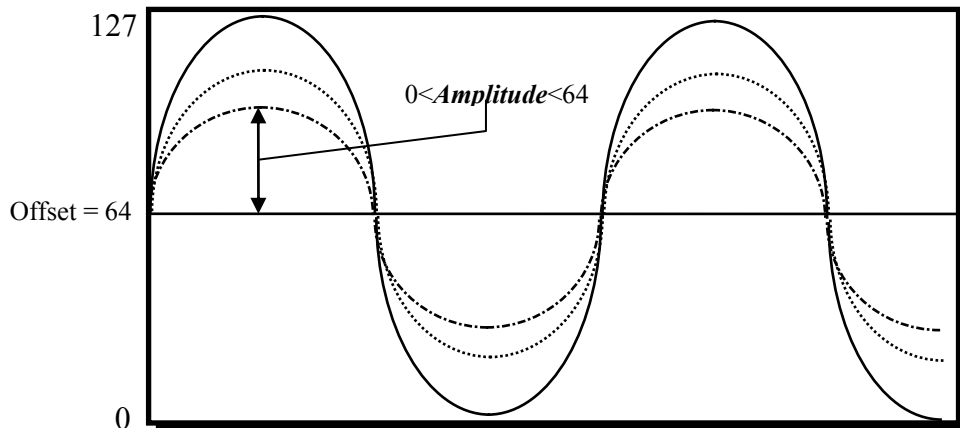
A LED associated to the LFO is used to verify if the LFO is turned ON or OFF.

From ROM V1.2 and higher, the LFO can be synchronized to an external MIDI clock

Amplitude Adjustment

A potentiometer is dedicated to the amplitude of the generated wave. It allows to modify this amplitude from 0 to 63, and can be tweaked dynamically, in order to produce real-time MIDI effects.

The following figure shows how the amplitude adjustment is performed on a sinusoidal waveform, when Offset value is fixed to its middle value, 64.

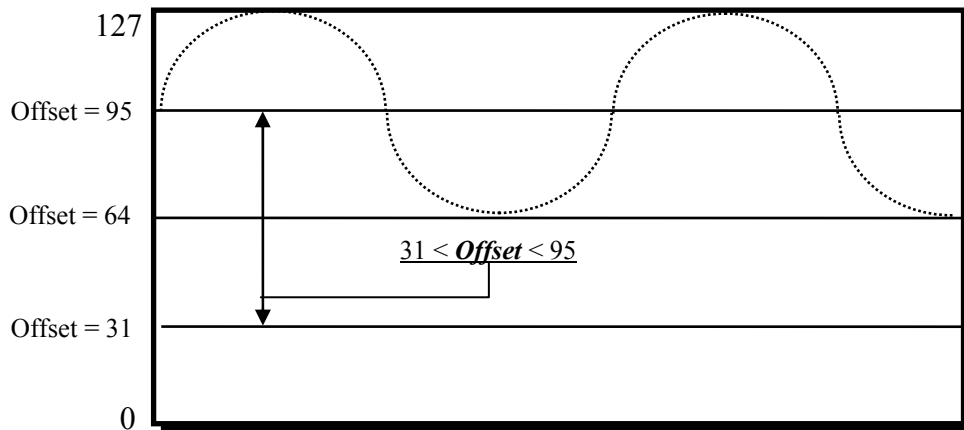


When amplitude + Offset is higher than 127 (The maximum MIDI value over 7 bits), then the generated wave is digitally clipped to its maximum value 127. On the other hand, when amplitude + Offset is lower than 0 (The minimum MIDI value over 7 bits), then the generated wave is digitally clipped to its minimum value 0.

Offset Adjustment

A potentiometer is dedicated to the Offset (DC value) of the generated wave. It allows to modify this value from 32 to 96, and can be tweaked dynamically, in order to produce real-time MIDI effects.

The following figure illustrates Offset adjustment on a sinusoidal wave.



Frequency Adjustment

A potentiometer is dedicated to the Frequency of the generated wave. This potentiometer has a double function:

External LFO synchronization

The left part of the potentiometer is used to sync LFO from the external MIDI clock on MIDI IN connector.

External LFO sync features 8 modes as follow:

LFO SYNC FROM EXTERNAL MIDI CLOCK (24 ppqn)		
Mode	Description	Example @ 120 BPM - 4/4
EX0	1/64 period / mesure	About tbd Hz
EX1	1/32 period / mesure	About tbd Hz
EX2	1/16 period / mesure	About tbd Hz
EX3	1/8 period / mesure	About tbd Hz
EX4	1/4 period / mesure	About tbd Hz
EX5	1/2 period / mesure	About tbd Hz
EX6	1 period / mesure	About tbd Hz
EX7	1 sample each MIDI clock	About tbd Hz

LCD Example

```
LFO: SIN Amp: 63
FRQ: EX4 OfS: 95
```

When configured as an externally synchronized LFO, if no external MIDI clock is detected, then the following LCD screen should appear:

```
NO MIDI CLOCK
LFO NOT TRIGGERED!
```

The above screen indicates that the LFO doesn't generate data until a valid MIDI clock is detected.

Internal LFO synchronization

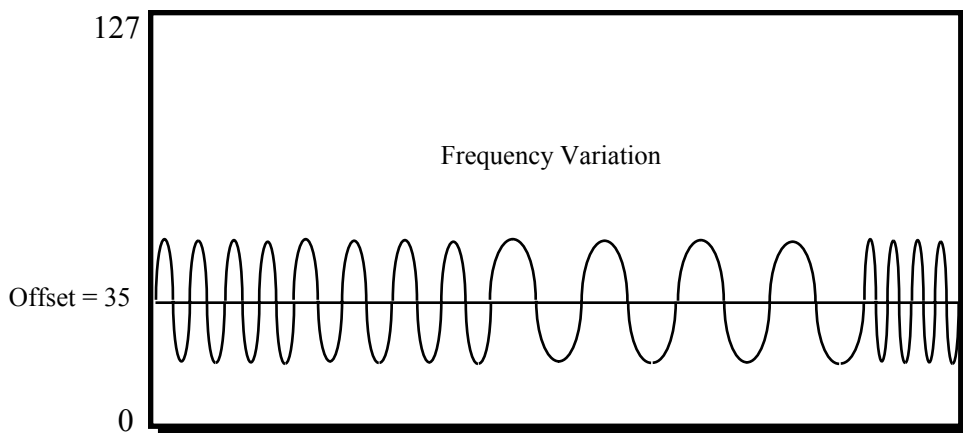
The right part of the potentiometer is used to sync LFO from Bitstream Pro internal time base.

It allows to modify this Frequency from 0.01 Hertz a 10 Hertz, and can be tweaked dynamically, in order to produce real-time MIDI effects. On LCD, frequency range from 0 to 63, 0 means that LFO is stopped, 1 means that a frequency of about 0.01 Hertz is generated, while 63 corresponds to a frequency of about 10 Hz. Internal frequency can range from about 0.01 to about 10 Hz, according to a 64 steps logarithmic scale.

LCD Example

```
LFO: SIN Amp: 27
FRQ: I60 OfS: 35
```

The following graph illustrates frequency variation, with a fixed offset to 35.



Using the Snapshot Scene Memory



This button is used to Save / restore value of all 48 controls (40 potentiometers + 8 Switches) to / from memory.

Pushing this button during 3 seconds allows to save the state of all 48 controls in memory depending on the selected group

```
* Saving Scene *
SNAPSHOT GRP X
```

Pushing this button one time and releasing it immediately send to MIDI OUT the value of all potentiometers and switches that have been saved into Memory. All these controls are sent according to the selected group.

```
* Scene Memory *
SNAPSHOT GRP X
```

This feature is used for live representations. There is one scene memory per group and all controls are saved / restored according to the selected group.

All the controls are saved to a non-volatile memory; this means they can be retrieved even if the controller has been turned off.

Note: This functions is available for the two operating modes (Control change & User defined)

Using SYSEX to Save-Restore SNAPSHOT scene memory

The following table illustrates the SYSEXs that must be sent to BitStream to save and restore snapshot scene memory, this feature is available from ROM V1.1

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
6N	N=0 : Save Scene memory N=1 : Restore Scene memory
F7	End Of Sysex

*Saving & restoring scene memory
(Message recognized by BitStream Pro)*

Using Exclusive Systems to configure BitStream Pro

BitStream Pro can be configured by using the delivered software, as well as the help of a sequencer such as Cubase, Cakewalk, or other that is able to send Exclusive Systems to BitStream. This feature allows to re-configure BitStream dynamically, while playing music, by simply inserting SYSEXs into the sequencer tracks.

Important note about Wave Idea Sysexs

Wave Idea Sysexs IDs have changed from January 2003. The 5 bytes located after the FO (start of sysex) are now **00 20 4F 00 00**, instead of **10 20 30 00 00**.

If your Bitstream Pro is older than January 2003, older bytes have to be used in order to communicate with the unit.

All the Wave Idea tools, programming software, ... are obviously compatible with all Bistream pro regardless of the purchase date.

Wave Idea Sysex IDs before January 2003 : F0 10 20 30 00 00 ...
Wave Idea Sysex IDs from January 2003 : F0 00 20 4F 00 00 ...

Control Definition (Potentiometer / Switch / LFO)

Each one of the 48 controls can be defined separately, by sending the appropriate SYSEX to BitStream.

A 75 bytes length SYSEX must be sent to BitStream in order to define the MIDI message that will be sent by the configured control.

A 43 bytes length SYSEX must be sent to BitStream in order to define the alphanumeric string that will be displayed on LCD when tweaking the configured control. These two exclusive systems are dedicated to Waveidea. The 3 following tables illustrate their definition.

Definition of a new MIDI Message Assigned to a control

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
03 or 13	MIDI Message configuration request MIDI Message configuration request with acknowledge from BitStream
GG	Group (00:A 01:B 02:C)
NN	Control to configure 0x00 - 0x27 potentiometers (0 - 39) 0x28 - 0x2F Switches (40 - 47) 0x30 LFO (48)
64 Nibbles	32 bytes (64 nibbles) to define the new MIDI message (Cf. following table)
CS	Checksum Sum of the 64 preceding Nibbles modulo 128
F7	End Of SYSEX

Definition of a MIDI string assigned to a BitStream Control
(Message recognized by BitStream Pro)

Organization of the 64 nibbles to include into the sysex:

Byte	00	01	02	03	04	05	06	07	08-31
Nibble	00-01	02-03	04-05	06-07	08-09	10-11	12-13	14-15	16-63
Description	Delay + MIDI Message Length (Hexa.)	Chained Control + MIDI Channel Position N (Hexa.)	Chained Control + Control Position VV (Hexa.)	Chained Control + Checksum Position CS (Hexa.)	Crossfader + Checksum Start byte (Hexa.)	Checksum End byte (Hexa.)	Controller Min Value (Hexa.)	Controller Max Value (Hexa.)	MIDI Message (Hexa.)
Bits	bits 6-5 midi Delay (0-3) + bits 4-0 MIDI mess. Length	bits 6-5 chained control (Bits 5-4) + bits 4-0 MIDI channel Pos	bits 6-5 chained control (Bits 3-2) + bits 4-0 control value Pos	bits 6-5 chained control (Bits 1-0) + bits 4-0 MIDI checksum Pos	bit 6 crossfader enable + bits 4-0 checksum start Pos	bit 6 Mode + bit 5 Autoselect + bits 4-0 checksum end Pos			48 Nibble Max of MIDI Message (can be less) with 1 byte is 2 nibble (MSB first)
Bits used	2+5	2+5	2+5	2+5	1+5	1+1+5	7	7	7 x 48
Range	(1-24) (00 = none)	(1-24) (00 = none)	(1-24) (00 = none)	(1-24) (00 = none)	(1-24) (00 = none)	(1-24) (00 = none)	00 - 127 00h-7Fh	00 - 127 00h-7Fh	24 bytes
Example	3D (1)	09 (2)	0B (2)	0C (2)	07 (2)	0B (3)	0E	72	F0411000 .03120040. 10340000F7

(1) Delay + MIDI message length

Byte	Description
2 MSBs (Delay configuration)	00 : no delay. 01 : delay = 30ms 10 : delay = 60ms 11 : delay = 90ms
5 LSBs (MIDI string length)	01 - 24 decimal 01h - 18h hexa

(2) Example of grouped controls

The control to chain can range from 0 to 39 (32 knobs + 8 sliders), 0 means that no control has to be grouped.

In the case of there is a control to group, the chained control number (1-40, 6 bits wide) is divided into 3 times 2 bits, respectively sent with MIDI channel position (bits 5-4 of the control to chain), control value position (bits 3-2 of control to chain), and checksum position (bits 1-0 of the control to chain) Since 0 means no control to group, the number of the control to chain is increased by 1, for example, chaining control 0 means that the grouped control number is 1.

control to chain : # 38 control + 1 = 39d = "00100111"	MIDI channel position 09h	control value position 0Bh	checksum position 0Ch	checksum start position 04h
bits 7-6 = always '00'	-	-	-	-
bits 5-4 = '10'	09h + '01000000' = 49h to send	-	-	-
bits 3-2 = '01'	-	0Bh + '00100000' = 2Bh to send	-	-
bits 1-0 = '11'	-	-	0Ch + '01100000' = 6Ch to send	-
crossfader OFF	-	-	-	04h + '00000000' = 04h to send
crossfader ON	-	-	-	04h + '01000000' = 44h to send

(3) Bitstream Pro Mode & Autosend

Mode	Potentiometer Slider	Switch	Note
0	Jump	Push	-
1	Hook	Toggle	From ROM V2.0

Mode (potentiometer configuration): Hook/Jump: This allows to set the selected potentiometer behaviour as Hook or jump mode, hook is used to avoid jumps when switching from one group to another. The MIDI events are not sent until the potentiometer physical value is equal to the current group value. Jump is the common behaviour, the Bitstream don't care about physical and group mismatches, and send MIDI once the potentiometer tweaked.

Mode (Switch configuration): Toggle/Push: This allows to set the selected programmable switch behaviour as toggle or push mode. When a switch is configured as toggle, a single push/release toggle the actual switch value between Min to Max values, this mode is mainly used to program on/off functions as mutes, as opposed to the push mode that has for effect to send Max value once pushed, then Min value once released, this mode is mainly used to program momentary functions as transport controls.

Autosend at startup: Once checked, the MIDI event assigned to the current control will be automatically send at the Bitstream Pro startup. This function is useful to configure the controlled gear/soft with the Bitstream default values.

Definition of a new Alphanumeric String assigned to a control

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
09 or 19	Alphanumeric string configuration request Alphanumeric string configuration request with acknowledge from BitStream
GG	Group (00:A 01:B 02:C)
NN	Control to configure 0x00 - 0x27 potentiometers (0 - 39) 0x28 - 0x2F Switches (40 - 47) 0x30 LFO (48)
32 nibbles	16 bytes (32 nibbles) to define the new Alphanumeric string
CS	Checksum Sum of the 32 preceding Nibbles modulo 128
F7	End Of SYSEX

*Definition of an alphanumeric string assigned to a BitStream Control
(Message recognized by BitStream Pro)*

The 32 nibbles to include on the above sysex are coding all string (2 nibbles per character, MSB first)

Definition of the Acknowledge SYSEX sent by BitStream

The following table illustrates the SYSEX returned by BitStream when a control configuration has been sent with an acknowledge request (Codes 0x12 and 0x19)

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
02	Acknowledge
TT	Acknowledge on : TT = 00 : MIDI string TT = 01 : Alphanumeric String
GG	Group (00:A 01:B 02:C)
NN	Acknowledge on : 0x00 - 0x27 potentiometers (0 - 39) 0x28 - 0x2F Switches (40 - 47) 0x30 LFO (48)
ACK	00 : Successful Configuration 01 : Configuration Error
F7	End Of SYSEX

*Acknowledge Sysex sent by BitStream in response of a configuration with acknowledge request
(Message transmitted by BitStream Pro)*

Uploading MIDI configuration from Bitstream

The following table illustrates the SYSEX to send to BitStream in order to request a MIDI configuration upload

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
14	MIDI config upload request
GG	Group (00:A 01:B 02:C)
NN	Control to upload : 0x00 - 0x27 potentiometers (0 - 39) 0x28 - 0x2F Switches (40 - 47) 0x30 LFO (48)
F7	End Of SYSEX

*MIDI configuration upload request
(Message recognized by BitStream Pro)*

Answer to a MIDI configuration upload

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
24	Answer to MIDI configuration upload
GG	Group (00:A 01:B 02:C)
NN	Acknowledge on 0x00 - 0x27 potentiometers (0 - 39) 0x28 - 0x2F Switches (40 - 47) 0x30 LFO (48)
64 Nibbles	32 bytes (64 nibbles) to define the uploaded MIDI message (Cf. following table)
CS	Checksum Sum of the 64 preceding Nibbles modulo 128
F7	End Of SYSEX

*Definition of a MIDI upload request
(Message sent by BitStream Pro)*

Organization of the 64 above nibbles included into the sysex:

Byte	00	01	02	03	04	05	06	07	08-31
Nibble	00-01	02-03	04-05	06-07	08-09	10-11	12-13	14-15	16-63
Description	Delay + MIDI Message Length (Hexa.)	Chained Control + MIDI Channel Position N (Hexa.)	Chained Control + Control Position VV (Hexa.)	Chained Control + Checksum Position CS (Hexa.)	Crossfader + Checksum Start byte (Hexa.)	Checksum End byte (Hexa.)	Controller Min Value (Hexa.)	Controller Max Value (Hexa.)	MIDI Message (Hexa.)
Bits	bits 6-5 midi Delay (0-3) + bits 4-0 MIDI mess. Length	bits 6-5 chained control (Bits 5-4) + bits 4-0 MIDI channel Pos	bits 6-5 chained control (Bits 3-2) + bits 4-0 control value Pos	bits 6-5 chained control (Bits 1-0) + bits 4-0 MIDI checksum Pos	bit 6 crossfader enable + bits 4-0 checksum start Pos	bit 6 Mode + bit 5 Autosend + bits 4-0 checksum end Pos			48 Nibble Max of MIDI Message (can be less) with 1 byte is 2 nibble (MSB first)
Bits used	2+5	2+5	2+5	2+5	1+5	5	7	7	7 x 48
Range	(1-24) (00 = none)	(1-24) (00 = none)	(1-24) (00 = none)	(1-24) (00 = none)	(1-24) (00 = none)	(1-24) (00 = none)	00 - 127 00h-7Fh	00 - 127 00h-7Fh	24 bytes
Example	3D (1)	09 (2)	0B (2)	0C (2)	07 (2)	0B (3)	0E	72	F0411000 .03120040. 10340000F7

(1) Delay + MIDI message length

Byte	Description
2 MSBs (Delay configuration)	00 : no delay. 01 : delay = 30ms 10 : delay = 60ms 11 : delay = 90ms
5 LSBs (MIDI string length)	01 - 24 decimal 01h - 18h hexa

(2) Example of grouped controls

The chained control can range from 0 to 39 (32 knobs + 8 sliders), 0 means that no control has been grouped.

In the case of there is a grouped control, the chained control number (1-40, 6 bits wide) is divided into 3 times 2 bits, respectively sent with MIDI channel position (bits 5-4 of the control to chain), control value position (bits 3-2 of control to chain), and checksum position (bits 1-0 of the control to chain) Since 0 means no control is grouped, the number of the chained control is increased by 1, for example, grouped control 0 means that the grouped control number is 1.

chained control : # 38 control + 1 = 39d = '00100111'	MIDI channel position 09h	control value position 0Bh	checksum position 0Ch	checksum start position 04h
bits 7-6 = always '00'	-	-	-	-
bits 5-4 = '10'	09h + '01000000' = 49h to send	-	-	-
bits 3-2 = '01'	-	0Bh + '00100000' = 2Bh to send	-	-
bits 1-0 = '11'	-	-	0Ch + '01100000' = 6Ch to send	-
crossfader OFF	-	-	-	04h + '00000000' = 04h to send
crossfader ON	-	-	-	04h + '01000000' = 44h to send

(3) Bitstream Pro Mode & Autosend

Mode	Potentiometer Slider	Switch	Note
0	Jump	Push	-
1	Hook	Toggle	From ROM V2.0

Mode (potentiometer configuration): Hook/Jump: This allows to set the selected potentiometer behaviour as Hook or jump mode, hook is used to avoid jumps when switching from one group to another. The MIDI events are not sent until the potentiometer physical value is equal to the current group value. Jump is the common behaviour, the Bitstream don't care about physical and group mismatches, and send MIDI once the potentiometer tweaked.

Mode (Switch configuration): Toggle/Push: This allows to set the selected programmable switch behaviour as toggle or push mode. When a switch is configured as toggle, a single push/release toggle the actual switch value between Min to Max values, this mode is mainly used to program on/off functions as mutes, as opposed to the push mode that has for effect to send Max value once pushed, then Min value once released, this mode is mainly used to program momentary functions as transport controls.

Autosend at startup: Once checked, the MIDI event assigned to the current control will be automatically send at the Bitstream Pro startup. This function is useful to configure the controlled gear/software with the Bitstream default values.

Uploading LCD string configuration from Bitstream

The following table illustrates the SYSEX to send to BitStream in order to request an LCD string configuration upload

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
15	LCD string config upload request
GG	Group (00:A 01:B 02:C)
NN	Requested LCD string for control : 0x00 - 0x27 potentiometers (0 - 39) 0x28 - 0x2F Switches (40 - 47) 0x30 LFO (48)
F7	End Of SYSEX

*LCD string configuration upload request
(Message recognized by BitStream Pro)*

Answer to an LCD string configuration upload

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
25	LCD string configuration upload request
GG	Group (00:A 01:B 02:C)
NN	Control to upload 0x00 - 0x27 potentiometers (0 - 39) 0x28 - 0x2F Switches (40 - 47) 0x30 LFO (48)
32 nibbles	16 bytes (32 nibbles) to define the uploaded Alphanumeric string
CS	Checksum Sum of the 32 preceding Nibbles modulo 128
F7	End Of SYSEX

*Definition of an alphanumeric string assigned to a BitStream Control
(Message recognized by BitStream Pro)*

The 32 nibbles are included on the above sysex are coding all string (2 nibbles per character, MSB first)

Identity Request

The following table illustrates the SYSEX that must be sent to BitStream for an identity request.

www.waveidea.com



Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
00	Identity request
F7	End Of SYSEX

Identity Request
(Message recognized by BitStream Pro)

When receiving the above message, BitStream immediately returns the following SYSEX, containing its proper identity information:

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
01	Reply to an Identity Request
RV	ROM Version (R.V)
MT	Month of Manufacturing
YR	Year of Manufacturing
SN1	Serial number
SN2	Serial Number
F7	End Of Sysex

Answer to an Identity request
(Message transmitted by BitStream Pro)

Using SYSEX to change MIDI Channel

The following table illustrates the SYSEX that must be sent to BitStream to change the current MIDI channel

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
4N	N = New MIDI Channel (0x0 - 0xF)
F7	End Of Sysex

MIDI Channel modification (Message recognized by BitStream Pro)

MIDI Input Configuration

The following table illustrates the SYSEX that must be sent to BitStream in order to configure its MIDI input.

MIDI in is used to configure BitStream by SYSEXs, it is also used to chain a MIDI setup where other messages are destined to other Soft / Gears.

MIDI messages incoming from MIDI in are merged with MIDI messages internally generated by BitStream, and retransmitted to the BitStream MIDI output.

BitStream can be configured in order to merge and retransmit ALL incoming MIDI data (Default configuration), or can be configured in order to filter several MIDI messages such as real-time messages (MIDI clock, start, stop, continue). It is also possible to filter all incoming MIDI data; in this case, MIDI output provides only MIDI data generated by BitStream.

These different options of merging / filtering can be configured by the following SYSEX:

Byte (Hexadecimal)	Description
F0	Start of SYSEX
00	Waveidea ID
20	MIDI Controller ID
4F	BitStream Pro ID
00	BitStream Pro ID
00	Reserved
5N	N = 0 : All incoming MIDI data are retransmitted N = 1 : Real-time MIDI data are filtered N = 8 : All incoming MIDI data are filtered
F7	End of SYSEX

*MIDI Input Configuration
(Message recognized by BitStream Pro)*

MIDI Thru : ON
Filter : OFF

MIDI Thru : OFF
Filter : OFF

MIDI Thru : ON
Filter : ON

How to check ROM Version

ROM Version can be checked by proceeding as follow:

- Turn OFF BitStream
- Press simultaneously MIDI channel UP & DOWN switches
- Turn ON BitStream
- The LCD should indicate:

```
ROM V2.0
> WAVEIDEA 99 <
```

List of Screens displayed by BitStream Pro

Normal operating mode

```
BITSTREAM PRO
> WAVEIDEA 99 <
```

Displayed when BitStream is turned on

```
16 127 127 A
Control Change
```

Display during "Normal" operations

- Current MIDI Channel
- Controller number
- Controller value
- Current group
- Current mode or user defined alphanumeric string assigned to the control

```
16 -G- 127 A
user defined str
```

Same screen as above, for user-defined mode II
 --- for normal operations
 -G- for grouped (chained) control

```
16 LCK 127 A
user defined str
```

MIDI channels Up & Down are currently pressed
 To perform a SHIFT function
 LCK indicates that MIDI data are locked

```
ROM V2.0  
> WAVEIDEA 99 <
```

A ROM version has been requested

```
16 127 127 A  
Buttons: _■_■_■_■
```

Shift is active, show all 8 switches state

```
16 127 127 A  
Data corrupted !
```

Concerns only user defined mode:

The MIDI event assigned to the current control has no coherent data, the control need to be re-programmed

Programming mode

```
Program CX GY  
MIDI : OK
```

A MIDI message has been successfully programmed

X = control number

Y = group number

```
Program CX GY  
Strg : OK
```

An Alphanumeric string has been successfully programmed

X = control number

Y = group number

```
Program CX GY  
MIDI : Error
```

A MIDI string has been programmed with error (The received checksum doesn't correspond to the calculated checksum)

X = control number

Y = group number

```
Program CX GY  
Strg : Error
```

An Alphanumeric string has been programmed with error (The received checksum doesn't correspond to the calculated Checksum)

X = control number

Y = group number

Uploading mode

```
Upload   CX GY  
MIDI    :  OK
```

A MIDI message has been successfully uploaded
X = control number
Y = group number

```
Upload   CX GY  
Strg    :  OK
```

An Alphanumeric string has been successfully uploaded
X = control number
Y = group number

Snapshot memories

```
* Saving Scene *  
SNAPSHOT GRP Y
```

The state of all 48 controls is saved in memory (Snapshot button has been pressed more than 3 seconds)
'Y' shows the current group

```
* Scene Memory *  
SNAPSHOT GRP Y
```

The State of all 48 controls is sent to MIDI out at the same time (Snapshot has been pressed then relaxed)
'Y' shows the current group

MIDI thru & filter configuration

```
MIDI Thru : ON  
Filter    : OFF
```

MIDI Input has been configured:
- Merge + retransmission of ALL incoming messages
- Without filtering

```
MIDI Thru : OFF  
Filter    : OFF
```

MIDI Input has been configured:
- Filter ALL incoming messages

```
MIDI Thru : ON  
Filter    : ON
```

MIDI Input has been configured:
- Merge + retransmission of incoming messages
- Real-time messages filtering

LFO configuration

```
LFO: SIN Amp: 63  
FRQ: XXX OfS: 63
```

LFO parameters have been updated
XXX = Inn means Internal LFO sync
XXX = EXn means EXternal LFO sync

```
NO MIDI CLOCK  
LFO NOT TRIGGERED!
```

LFO is synchronized from external MIDI clock
No MIDI clock detected

Retailer

