

**MTG**



## **MIDI Patch Changer User Guide**

**v2.79**

**December 2011**

Subject to change without notice

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# 1: Introduction

*This document assumes you have converted a 900-RJ serial keypad into a MIDI Patch Changer keypad using the MTG conversion kit.*

The MIDI Patch Changer is the perfect solution when you need to control MIDI presets for one or more devices, but a giant keyboard controller or a MIDI footswitch/pedalboard just won't do.

The MIDI Patch Changer has all the features you'd expect in a full-featured patch-changing controller.

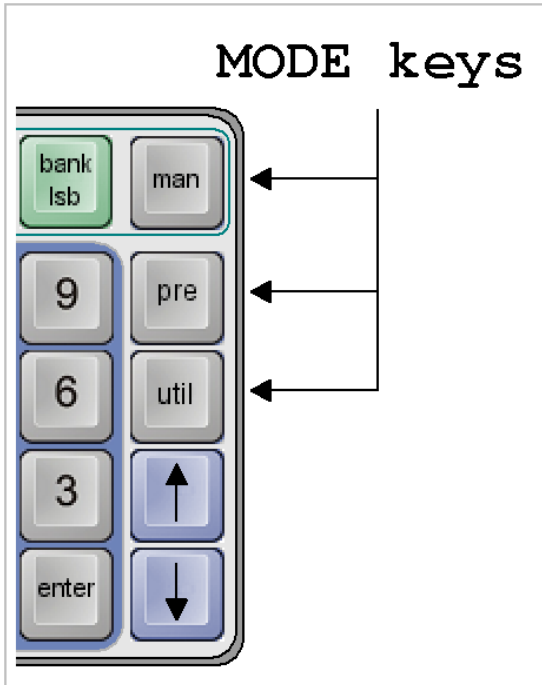
- **Manual Operation.** Manual Mode is used to key-in or scroll-through Program Change messages with or without MIDI Bank Select messages.
- **Preset Operation.** Preset mode is for live or studio performance situations. The unit can send a complete set of 16 patch and bank select changes *for every Preset*.
- **Expandable and upgradeable.** The MIDI Patch Changer is programmable including re-flashing the firmware.
- **Durable.** Made with high-quality switches (50 million+ operations) on a metal sub-frame.

The standard unit includes:

- 20-key keypad with 16-character **backlit** liquid crystal display (LCD).
- Power adapter (110-240v AC input to 5v DC output).
- Rear-panel RJ connector supports multiple cable types.
- RJ-to-USB cable for USB-MIDI connection (using OS built-in driver).
- RJ (Cat-5) cable for 5-pin DIN MIDI In and Out (on small external box).
- System Exclusive implementation for reading/storing the Presets.

## Understanding the Keypad

### The Mode Keys:



The MIDI Patch Changer has three major function groups (modes).

- Manual Mode is for sending patch changes by hand “on-the-fly”.
- Preset Mode is for sending pre-arranged patch changes and MIDI data during live performance.
- Finally there is a Utility Menu for changing the keypad preferences.

The three MODE keys indicated by the arrows (see diagram left) are used to change the operating mode of the keypad.

### The Numeric Key Section:

The numeric key section is used for manually entering Patch Change and Bank Select numbers (in decimal). In each case the number range can be 0 to 127 or 1 to 128 to match the receiving MIDI device. Future updates may allow for alphabetic patch numbers (some vintage synths collect patch sets of 8 or 16 into “banks” called A, B, C, D, etc.).



### The Arrow Keys:

The up and down keys are active in all three operating modes. They are used to manually scroll through banks and patches in Manual Mode, to manually scroll through presets in Preset Mode, and to navigate the Utility Menus.



## The Other Keys



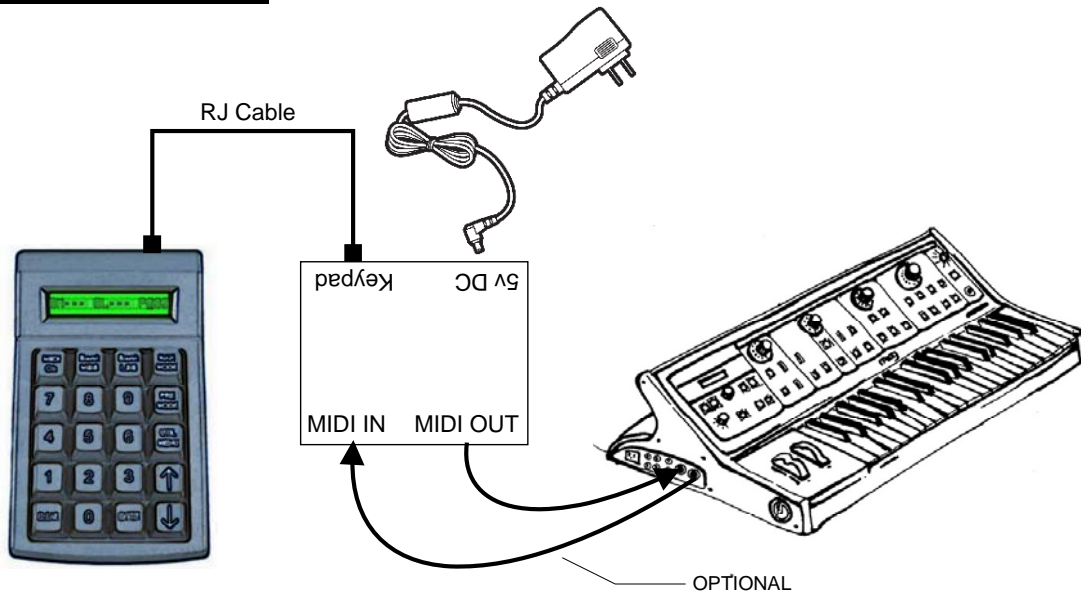
The MIDI Channel key is used to change the transmit channel for patches in Manual Mode as well as to view the settings for each MIDI channel in a Preset.

The Bank MSB and Bank LSB are used to select/enable/disable the sending of Banks Select messages in Manual Mode. In this mode they act like a mute button.

## Hooking Up

There are several ways to connect the MIDI Patch Changer to your gear and/or PC.

### 5-Pin DIN MIDI Gear

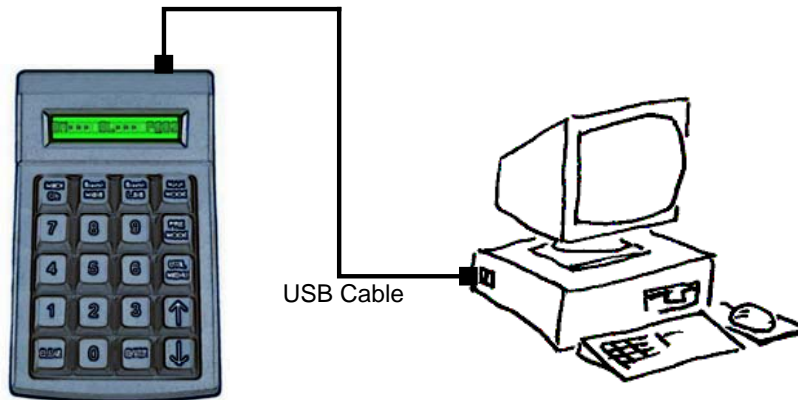


If you need to connect to **5-pin DIN MIDI** gear, then use the supplied Cat5 cable and supplied MIDI adapter box.

- Plug the short Cat5 cable into the back of the keypad and into the RS232 MIDI adapter box.
- Plug the supplied DC power adapter into the wall socket and then into MIDI adapter box.
- Then hook your MIDI gear into the IN and OUT jacks on the MIDI adapter box.



## USB to PC (Sequencer, Soft Synth, etc.)



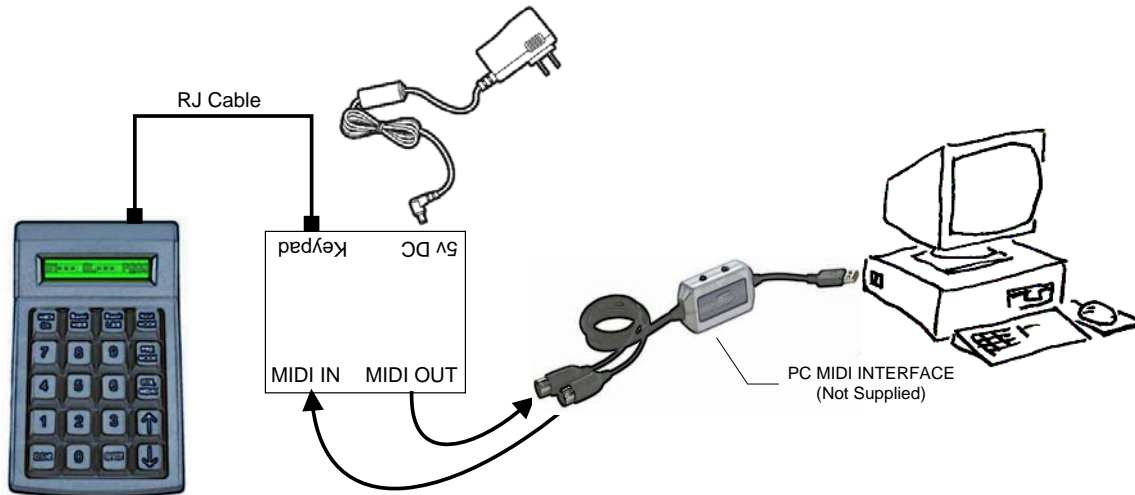
If you are hooking the MIDI Patch Changer keypad to a **PC that has USB**, then you can use the supplied RJ-to-USB cable:

- Connect the RJ end into the back of the keypad
- Then connect the USB connector into your PC or USB hub



The PC (Mac or Windows) will use the basic class drivers supplied with the OS. No additional driver is needed.

## Alternate USB to PC (Firmware Upgrade, etc.)



## 2: Manual Mode

In Manual Mode you can send one, two or all three of the following standard MIDI messages on the MIDI channel of your choosing:

Program Change (always transmitted)

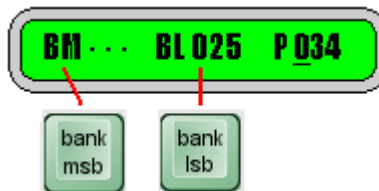
CnH	1100nnnn	0pppppppp	Program Change pppppppp: program number (0-127) nnnn: <b>MIDI Channel number (1-16)</b>
-----	----------	-----------	---

Bank Select MSB - Controller number 0 (optionally transmitted)

Bank Select LSB - Controller number 32 (optionally transmitted)

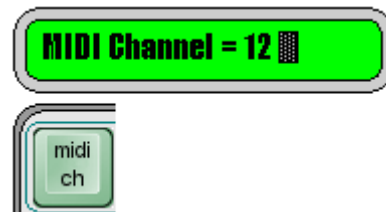
BnH	1011nnnn	0ccccccc 0vvvvvvvv	Control Change ccccccc: control # vvvvvvvv: control value
-----	----------	-----------------------	---

The LCD will show what the current patch value is and what components are enabled or disabled. If one or both of the Bank Selects is disabled (muted), then the LCD will show "...“ next to the name on the LCD. For instance, on the LCD shown below, the Bank MSB is not enabled, the Bank LSB value is 25 and the Program Change value is 34<sup>1</sup>.



### MIDI Channel

Once you have your cables hooked up, the first thing you should do is set the MIDI channel used for manual mode. This is done by pressing the **MIDI CH** key and using the **Up** or **Down** arrow keys to scroll to the channel you want (1 to 16). Alternatively you can erase the displayed value using the **CLEAR** key and then type in the



<sup>1</sup> There is a Utility Menu item for setting the number range to either 0-127 or 1-128 for both Program Change and Bank Select but it is recommended at this time to stay with the defaults.

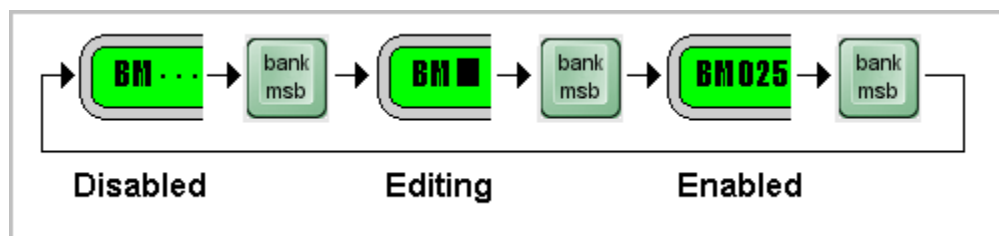


channel you want and then press **ENTER**.

Press **ENTER** to save your new MIDI channel number. You can abandon your changes by pressing **MIDI CH** a second time. The MIDI Channel value will be retained even if power is lost.

### Enable/Disable Banks Select(s)

The Bank Select MSB and Bank Select LSB can be enabled and disabled by repeated depressing of their respective keys.



When the Bank Select is disabled (muted), the three dots appear: "...". When the value is being edited the cursor is flashing over the value being edited. When the value is solid then the value is enabled for transmitting. Normally, when not editing a bank value, the cursor is flashing over the program change value at the far right of the LCD since this is the value you will be changing most often.

### To Change a Bank Value Without Sending

This allows you to establish what patch you want to send, but not send it yet. Press one of the **Bank Select** keys until you are in the edit mode (cursor flashing on the bank value). Enter the new value for the Bank Select using the number keys. Press the same **Bank Select** key again (do NOT press Enter). This changes the value on the display but does not transmit anything.

### To Change a Bank Value With Sending

To Edit a Bank Select and send it immediately (along with the current Patch value), press one of the **Bank Select** keys until you are in the edit mode (cursor flashing on the bank value). Enter the new value for the Bank Select using the number keys. Press **Enter**.

## To Send the Bank and Patch Values

While in Manual Mode, pressing **Enter** at any time causes all of the displayed (enabled) data to be transmitted.

## Scrolling through Patches

With the cursor flashing on the Patch value, pressing an **Up** or **Down** arrow key causes the displayed patch value to be incremented or decremented by one, and the new displayed (enabled) data to be transmitted.

If the Patch value overflows or underflows, then the Bank Value (if enabled), is modified by one also. This allows you to scroll seamlessly over bank boundaries in both the forward or reverse direction.

## Using the Arrow Key on a Bank Select

To quickly change to the next or previous bank, put one of the Bank Select value in edit mode and press the desired **Up** or **Down** arrow key. This will cause the Bank Select value to change by one, followed by transmission of enabled data.

### 3: Preset Mode

Preset mode allows you to pre-configure the keypad for performance situations where you need to change patches on a lot of gear with minimum fuss. In this mode you can set up to 16 patch/bank changes per preset (one per MIDI channel). Of course you will need to set these values up ahead of time. This is normally accomplished by using the Librarian Software or by manually sending System Exclusive dumps (see Appendix A for a description of the System Exclusive implementation).

There are 100 presets (01-100) and you can move through them using the number pad or with the arrow keys<sup>2</sup>.



The number on the left indicates the preset number. The user name for the patch is shown on the right. It consists of (up to) thirteen ASCII characters.

Each time a new preset is selected the keypad can transmit any or all of the following information:

**Blank Preset Sheet**

MIDI Channel	Bank Select MSB	Bank Select LSB	Program Change
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
<b>Arbitrary MIDI Data (pre or post):</b>			

<sup>2</sup> As of v0.76 Preset Browse mode allows for scrolling through the presets with the arrow keys without transmitting. Use Enter to transmit the preset you browsed to.

Each component (blank square above) can contain a value (0-127 or 1-128) or it may be disabled. Disabled values actually contain the number 255. See the System Exclusive implementation in Appendix A for more information.

## Changing Presets By Number

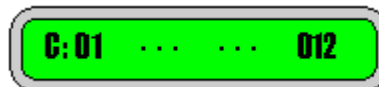
When you begin to type in a number on the **0 through 9** number pad, the display briefly changes to show only the number being entered in.



When you have completed typing in the Preset number you want, press the **ENTER** key. The complete Preset will be transmitted and the display will return to the standard screen. While entering the number, you can also edit the value using the **CLEAR** key.

## The MIDI Channel Key

In this mode, the MIDI Channel key is used to browse through the table values shown on the previous page. Select a preset using the number pad or the arrow keys. Press **MIDI CH**. The display will show, for each MIDI channel, what elements are being transmitted. Again, values that are disabled are shown with three dots: "...".



The LCD elements shown from left to right are:

- The **C** indicates that you are browsing the data for each MIDI channel.
- MIDI channel (1 to 16).
- Bank Select MSB (user settable).
- Bank Select LSB (user settable).
- Program Change (user settable).

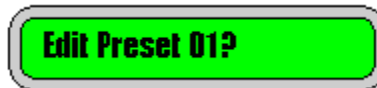
You can then use MIDI CH to scroll through the MIDI channels and see what you have previously programmed into the device. Any other key exits this browse mode (acts as an Escape key).

## Arbitrary MIDI Data

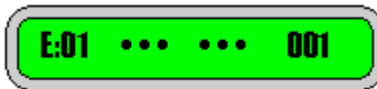
Each Preset can also send up to 16 bytes of arbitrary MIDI data **before or after** the patch change data. This data cannot be edited on the device at this time. Use the Librarian Software (PC Editor) to configure this data.

## 4: Editing Presets (on the keypad)


You can edit the individual Presets on the device or by sending new values using System Exclusive. To edit a preset on the device, while in Preset Mode, press **PRE MODE** (again). You will be asked to verify that you want to edit the current preset:



Press **ENTER** to confirm or **CLEAR** to go back to the previous Preset. In Edit Preset mode the LCD screen information starts with the letter **E**.



You can cycle through the various edit screens using the **PRE MODE** key.

Sub-menu	Navigation
Edit Patch Change Data	<small>PRE Mode Key</small> 
Edit Name	
View Arbitrary MIDI Data	
Save Preset Confirm	

### Modifying the Preset <sup>3</sup>

In Preset Edit mode, the editing is similar to the Manual Mode.

**MIDI CH** lets you scroll through the list of 16 MIDI channels and on each one you can assign a Bank Select MSB and/or a Bank Select LSB and/or a Patch Change value.

**Bank MSB** moves the cursor to the Bank Select MSB if the cursor is not there already. If it is, then it enables/disables it. If the Bank Select MSB is enabled and the cursor is flashing on its position, then you can modify the value using either the arrow keys or typing a new value on the keypad.

**Bank LSB** moves the cursor to the Bank Select LSB if the cursor is not there already. If it is, then it enables/disables it. If the Bank Select LSB is enabled and

<sup>3</sup> There is no method currently to modify the arbitrary MIDI data field on the keypad.

the cursor is flashing on it's position, then you can modify the value using either the arrow keys or typing a new value on the keypad.

**MAN MODE** takes on the role of PATCH CHANGE. It moves the cursor to the Patch Change value if the cursor is not there already. If it is, then MAN MODE enables/disables it. If the Patch Change is enabled and the cursor is flashing on it's position, then you can modify the value using either the arrow keys or typing a new value on the keypad.

### Editing the Name

Press **PRE MODE** again and you will be prompted for the name you wish to assign to the Preset. The LCD screen shows  $\text{N?}$ : to indicate that it is in name editing mode.

Use the **UP** and **DOWN** arrow keys to change each character value (see table). **ENTER** moves the cursor to the right and **CLEAR** moves it to the left.

		HIGHER 4BIT (D4 TO D7)of Character Code(Hexadecimal)																	
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F		
HIGHER 4BIT (D0 TO D3)of Character Code(Hexadecimal)	0			sp	0	Q	P	`	P					一	夕	ミ	α	ρ	
	1			!	1	A	Q	a	q					。	ア	チ	△	ä	q
	2			"	2	B	R	b	r					「	イ	ツ	×	β	θ
	3			#	3	C	S	c	s					」	ウ	テ	ε	ε	ω
	4			\$	4	D	T	d	t					、	エ	ト	†	μ	Ω
	5			%	5	E	U	e	u					・	オ	ナ	1	σ	Ü
	6			&	6	F	V	f	v					ヲ	カ	ニ	ヨ	ρ	Σ
	7			'	7	G	W	g	w					ア	キ	ヲ	ウ	g	π
	8			(	8	H	X	h	x					ィ	ク	ネ	リ	フ	又
	9			)	9	I	Y	i	y					ウ	ク	ル	†	γ	
	A			*	:	J	Z	j	z					エ	コ	ハ	レ	j	キ
	B			+	:	K	[	k	[					オ	サ	ヒ	ロ	*	万
	C			,	<	L	¥	l	l					カ	シ	フ	フ	φ	円
	D			-	=	M	]	m	)					ユ	ズ	ハ	ン	も	÷
	E			.	>	N	^	n	→					ヨ	セ	ホ	°	ñ	
	F			/	?	O	_	o	€					ッ	ツ	マ	°	ö	

LCD character table

## Arbitrary MIDI Data

Press PRE MODE one more time to take you to the screen that shows the first 6 bytes of Arbitrary MIDI Data (if used). The LCD shows **Pre:** if the data is to be transmitted before the patch change. The LCD shows **Pst:** if the data is to be transmitted after the patch change data.

## Saving

To save the Preset, press **PRE MODE** one more time and you will be prompted to save the changes. Here you can also edit the Preset number. This allows you to save the Preset to the same location or you can copy the Preset to a new location. Once you set the number of the Preset location you want to save to, Press **ENTER** to confirm the save. Alternatively, pressing **PRE** again takes you back to editing without saving.

## Back to Editing



From the `Save Preset?` prompt, Pressing **PRE MODE** again takes you back to the editing screen. See the menu structure table on the next page.

If you want to abandon the changes, press the **UTIL** button.



## 5: Utility Menu

The menu structure for the MIDI Patch Changer keypad looks like this:

Operating Mode	Sub-menu	Navigation
<b>Manual Mode</b>		
<b>Preset Mode</b>	Edit Patch Change Data	PRE 
	Edit Name	
	View Arbitrary MIDI Data	
	Save Preset Confirm	
<b>Utility Menu</b>	Preset Mode (norm/browse)	UP/DN 
	Receive Program Change	
	Send a Preset (via Sys Ex)	
	Patch Range	
	Bank Select Range	
	Sys Ex Manufacturer ID	
	MIDI Monitor	
	Restore Factory Defaults	
	Show Version Info	
	Download New Firmware	

To view the Utility Menu, press the **UTIL** key, then navigate the menu using the **Up** and **Down** arrow keys. The vertical line at the far right of the LCD is meant to mimic a window scroll bar on a PC. As you move up and down the menu the scroll bar indicates your relative position in the menu tree.

Press **ENTER** on the item you wish to view/modify. From within a menu item you can press **CLEAR** to abandon a change and return to the menu list.

### Preset Mode (v0.76+)

With Preset Mode set to NORMAL, using the arrows keys (or ENTER or typing a preset number in) causes a Preset data transmit. With Preset Mode set to BROWSE, the arrow keys do NOT cause a data transmit. Therefore in browse mode you can scroll through your list of presets until you find the one you like, then send it using the ENTER key.

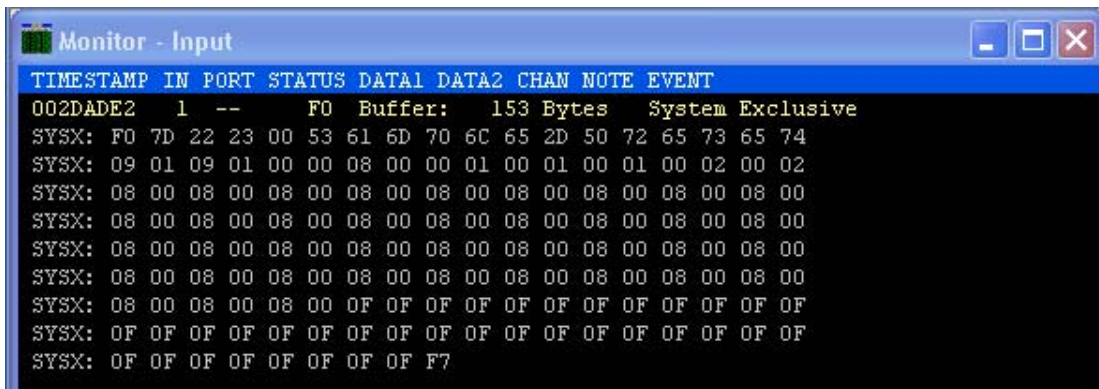
## Receive Program Changes (v0.77+)

The unit can be set to accept program change commands on its MIDI IN. This allows an external device to send a patch change command to the MIDI Patch Changer, thus triggering a specific Preset. Beware of MIDI loops if you use this! This parameter can be turned OFF or set to a single MIDI channel (1 to 16) on which to receive the program change commands.

## Send a Preset (via System Exclusive)

You can send one Preset manually to a host PC using this menu. Type in the number of the Preset you wish to transmit (1 to 100) and press **ENTER**. The keypad will send 153 bytes of Sys Ex data (as described in the appendix).

*Make sure your PC is set to NOT echo the data back out again to the Keypad!*



```
Monitor - Input
TIMESTAMP IN PORT STATUS DATA1 DATA2 CHAN NOTE EVENT
002DADE2 1 -- F0 Buffer: 153 Bytes System Exclusive
SYSX: F0 7D 22 23 00 53 61 6D 70 6C 65 2D 50 72 65 73 65 74
SYSX: 09 01 09 01 00 00 08 00 00 01 00 01 00 01 00 02 00 02
SYSX: 08 00 08 00 08 00 08 00 08 00 08 00 08 00 08 00
SYSX: 08 00 08 00 08 00 08 00 08 00 08 00 08 00 08 00
SYSX: 08 00 08 00 08 00 08 00 08 00 08 00 08 00 08 00
SYSX: 08 00 08 00 08 00 08 00 08 00 08 00 08 00 08 00
SYSX: 08 00 08 00 08 00 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F
SYSX: 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F
SYSX: 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F 0F
```

In order to send a Preset to the keypad, simply send it at any time from your PC. The keypad is always ready to receive Sys Ex. It does not have to be configured to receive Sys Ex (make sure you are using the correct device ID).

## Set Patch Range

You can set the range for the Patch Change values to be 1-128 or 0-127. Underneath, the firmware always transmits the hex values according to the MIDI Spec. (0x00 to 0x7F), but most MIDI gear uses 1 to 128 for patches.

Patch Range = 0 - 127

Patch Range = 1 - 128

You can modify the value using the Up and Down arrow keys or the 0 and 1 keys. Press Enter once you have made your selection.

NOTE: The editor/librarian only supports program change numbers 1 to 128.

## Set Bank Select Range

You can set the range for the Bank Select MSB and LSB values to be 1-128 or 0-127. Underneath, the firmware always transmits the hex values according to the MIDI Spec (0x00 to 0x7F), but most MIDI gear uses 0 to 127 for bank selects.



You can modify the value using the Up and Down arrow keys or the 0 and 1 keys. Press Enter once you have made your selection.

*NOTE: The editor/librarian only supports bank select numbers 0 to 127.*

## System Exclusive Mfg ID

The System Exclusive Manufacturing ID is used to uniquely identify a specific MIDI device while doing Sys Ex dumps from a host PC. You can adjust the Sys Ex ID of the MIDI Patch Changer keypad so that it does not conflict with any of your other MIDI gear.

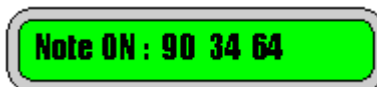


The displayed value is in hexadecimal (since that is the most common format for these IDs). You modify the value using the Up and Down arrow keys. Press Enter once you have made your selection. Remember to use the value you set when doing System Exclusive communications with the keypad.

*NOTE: The editor/librarian does not yet support alternate Mfg IDs.*

## MIDI Monitor

You can set the MIDI Monitor ON or OFF. This is a very simple one-line display showing the last MIDI command received. When enabled, the monitor data is overlaid live on the MIDI Patch Changer LCD regardless of mode or menu. Press any keypad key to temporarily regain control of the LCD. This setting is not retained in non-volatile memory.



## Restore Factory Defaults

This utility function allows you to restore the whole MIDI Patch Changer keypad to the default factory settings.

NOTE: After the erase/rebuild operation the keypad will automatically reboot, so if you are connected via USB MIDI, any applications talking to the MIDI keypad will be “orphaned”. This is the nature of USB. Therefore it is recommended that you close any open MIDI applications BEFORE you perform the reset (otherwise you may need to restart any application that is talking to the keypad).

## Show Version (v0.77+)

Displays the firmware version number (the “OS” version number) of the keypad.

## Download New Firmware

The MIDI Patch Changer will accept .SYX firmware upgrades over 5-pin DIN MIDI (not USB) from a PC. Download the latest firmware executable from the website and follow the instructions included with it or Appendix B.

## 6: Using the Windows Editor

*Please Note: If anyone wants to craft a new/better editor, please refer to the system exclusive implementation in the appendix.*

You can edit the individual Presets on the device or by sending new values from a PC using the free editor/librarian (or manually using hand-crafted System Exclusive data).

The new Preset data can be sent directly from the editor application or transported via MIDIOX (or similar) if you prefer.

To edit a preset on a Windows PC, install the free MIDIPatchChanger.exe librarian utility.

If you choose to use MIDIOX to transport the “Sys Ex” files, download it at <http://www.midiox.com> .

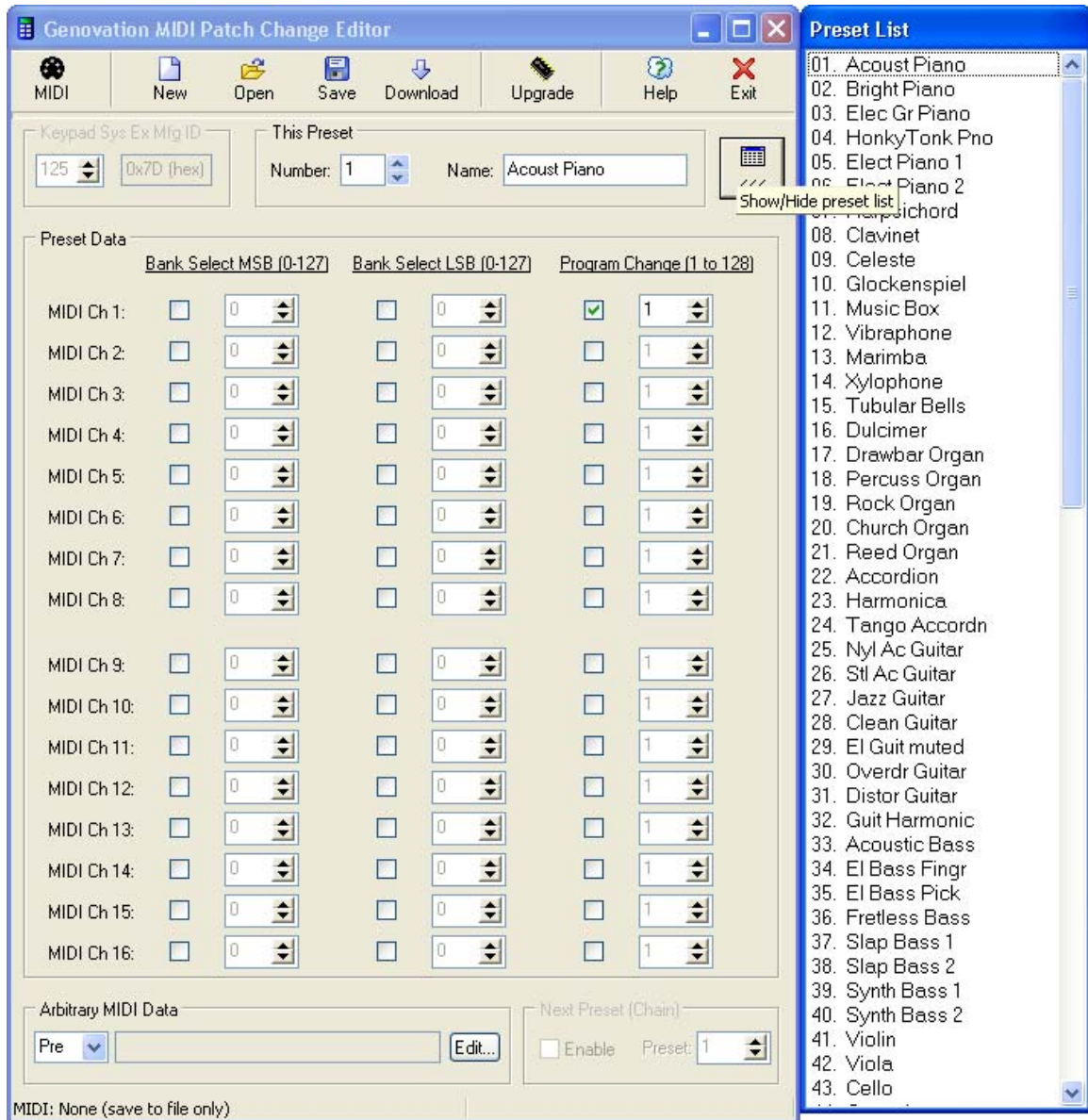
### Installation

MIDIPatchChanger.exe is a standalone program. There are two ways to install and use it. The first (recommended) way is to use the installation program. This will install the application in

```
C:\Program Files\MidiPatcher
```

Alternatively you can download and unzip just the exe file and place it where you like, for instance in the main MIDIOX directory.

## Editor Features



For each Preset, 1 to 100, you can setup the Bank Select and Program Change data for any or all of the 16 MIDI channels. In addition you can name each Preset (13 characters maximum) and setup the arbitrary MIDI data for the Preset. Each time you click on Preset Number **up** or **down**, you will be viewing/editing one of the 100 Presets.

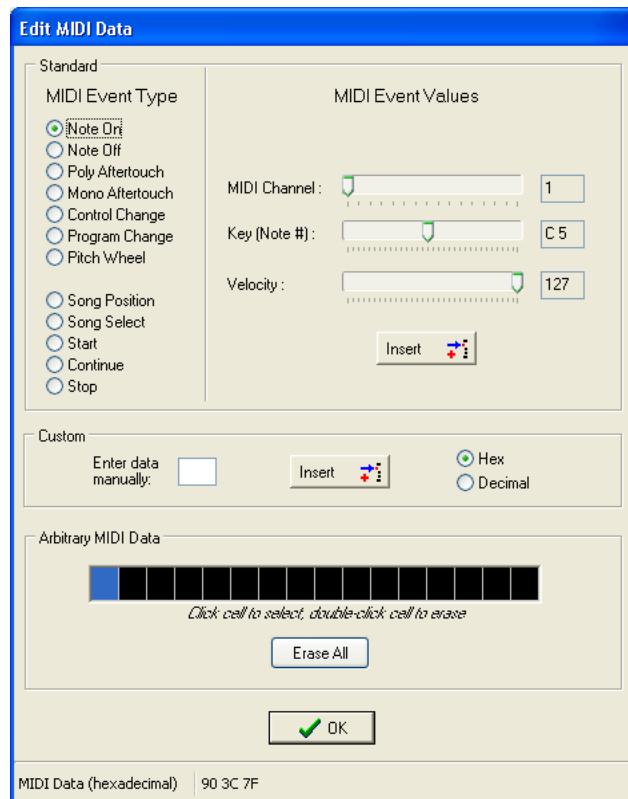
**NOTE:** At this time the editor only supports the default Mfg ID. In addition, the editor supports Bank Select numbering 0-127 and Program Change numbering 1-128 only. The keypad itself supports flexible numbering so you can account for the difference manually if you wish (for instance by editing the .Syx files by hand).

By default all of the Bank Select and Program Change values are disabled. Click on the checkbox next to the item you wish to enable/disable.



## Edit MIDI Data

Click on the Edit button in the Arbitrary MIDI Data box at the bottom of the screen. This will open up the MIDI Data editor.



The keypad allows you to send **any** MIDI data either before **or** after the MIDI Patch Change and Bank Selects. This might consist of controller changes or Sys Ex commands.

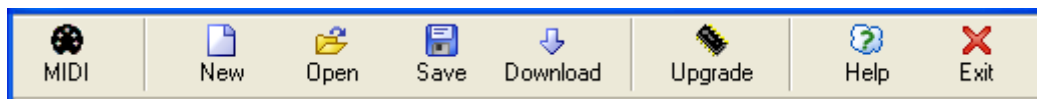
The top box, marked **Standard**, allows you to insert data using one of the predefined types.

The center box, marked **Custom**, lets you enter any data of your choosing. The value 255 (0xFF) is reserved and cannot be used.

## File Operations

All of the files used by the editor/librarian are .SYX System Exclusive files. A file may be a single Preset file, a 100 Preset file or a firmware upgrade. You should use descriptive names to differentiate between the file types or it will be confusing later on when you work with your files.

The Presets can be stored individually or as a bulk set of 100 in .Syx (raw System Exclusive) file format. These files can be loaded into any software that operates directly on such files (e.g. MIDIOX). Single Preset .Syx files contain the target preset # (see Appendix A for more information) and are formatted as a Set One Preset command. Thus any sequencer or software or device that can load this data can be used for programming a Preset into the keypad.

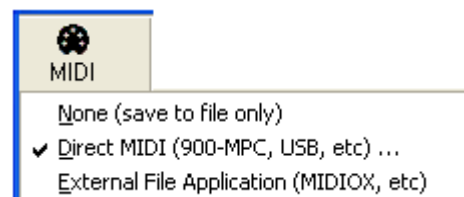


From the File menu you can perform the following actions:

- **MIDI** – Allows you to choose which MIDI connection/method is used to talk to the keypad.
- **New** – Erases all the current data and starts with the default settings (same as exiting the program and restarting it again).
- **Open** – Read 1 or 100 Presets from a .Syx file into the program.
- **Save** – Saves 1 or 100 Presets into a .Syx file.
- **Download** – Downloads 1 or 100 Presets either directly to the keypad or via the external MIDI transport application.
- **Help** – Access to the PDF manual and various web resources.
- **Exit** – Closes the application.

## MIDI

There are several ways to manage and send the data to the keypad. These methods differ more in the way the file is managed rather than how the cabling is hooked up.



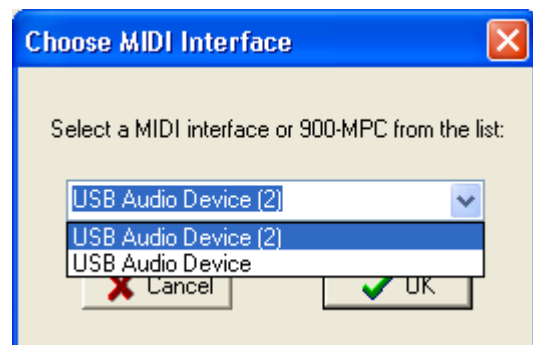


1. **None.** In this case you don't update the keypad. You only work with files. Later on you can download your files to the keypad.
2. **Direct.** Directly from within the editor/librarian to the keypad. In this case the keypad is either connected using its USB cable or it is connected through your existing MIDI interface (5 pin DIN MIDI). This is the most common setting. You will need to choose your USB connection from the list of available interfaces.
3. **External.** In this case files created by the editor/librarian are passed to an intermediate 3<sup>rd</sup> party application (such as MIDIOX) for transport. You would choose this method if you prefer to work at a low level with your MIDI data.

### MIDI Port Selection

Click on "Direct MIDI..." and choose the MIDI interface you want to work with.

If the keypad is connected you will see its version information displayed on the status bar at the bottom of the program.



MIDI: USB Audio Device [MIDI Patch v0.79]

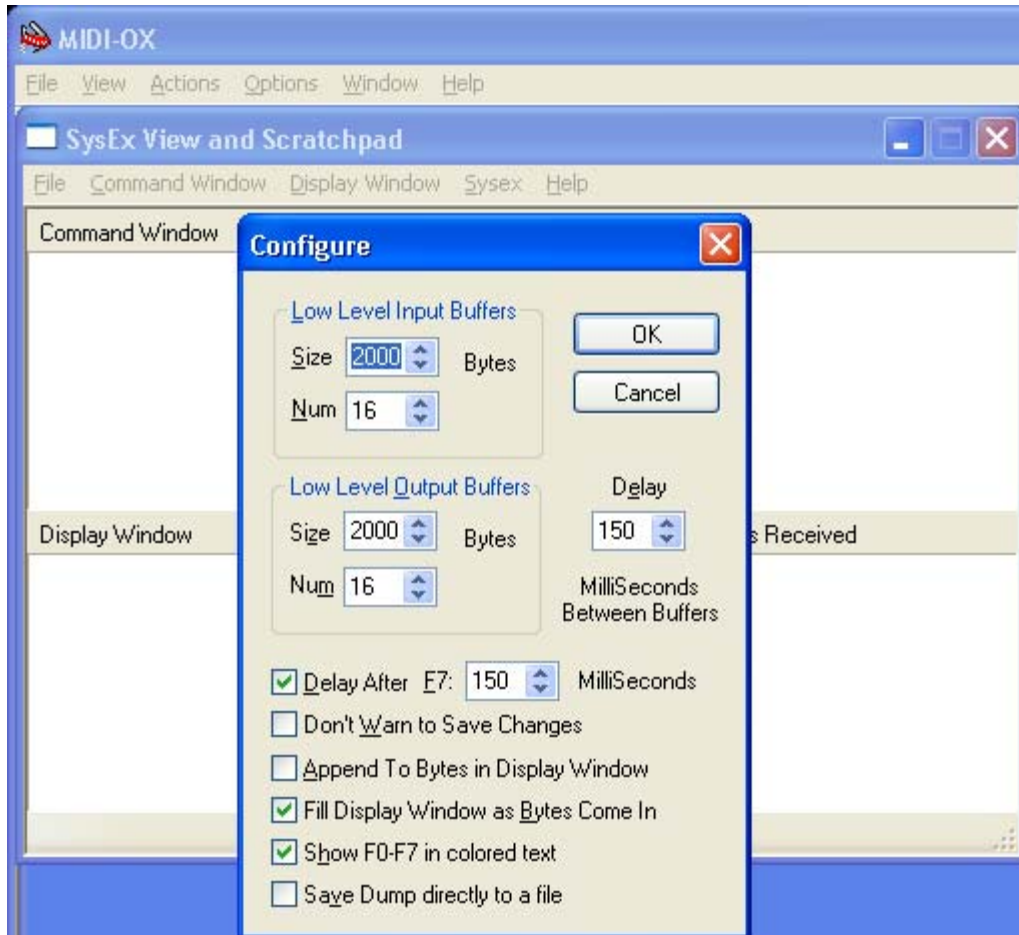
### External Application Selection

If you prefer that your MIDI files are transported to the keypad using a 3<sup>rd</sup> party application, choose "External File Application". The editor/librarian will then open the default application the OS has configured for the .SYX file type. Your 3<sup>rd</sup> party application will then need to choose which MIDI interface to use.

### Notes for MIDIOX

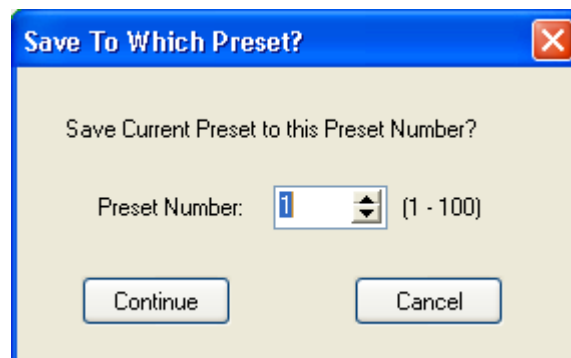
If you are using MIDIOX, you should set up MIDIOX's SysEx configuration. The following recommended settings can be entered by clicking:

View -> SysEx... then SysEx->Configure .

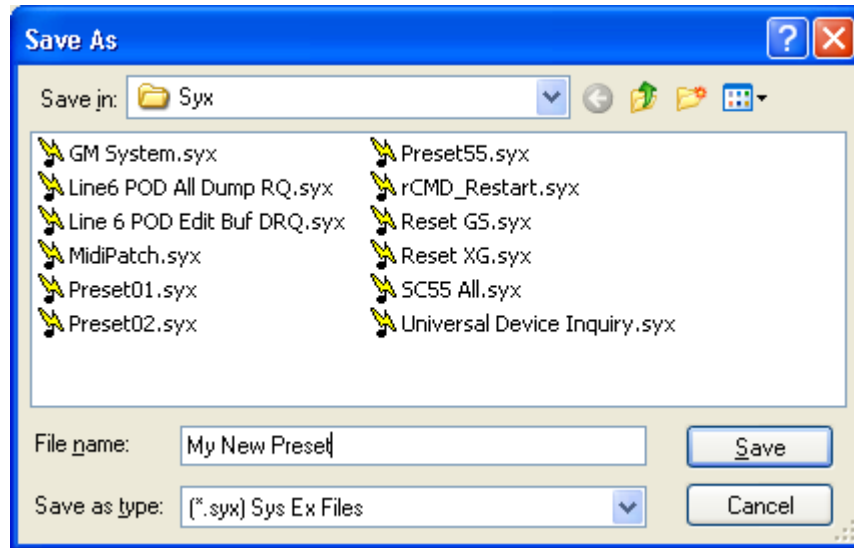


Once MIDIOX is configured and you have a Preset edited to your liking, you can download it to the keypad by following these steps:

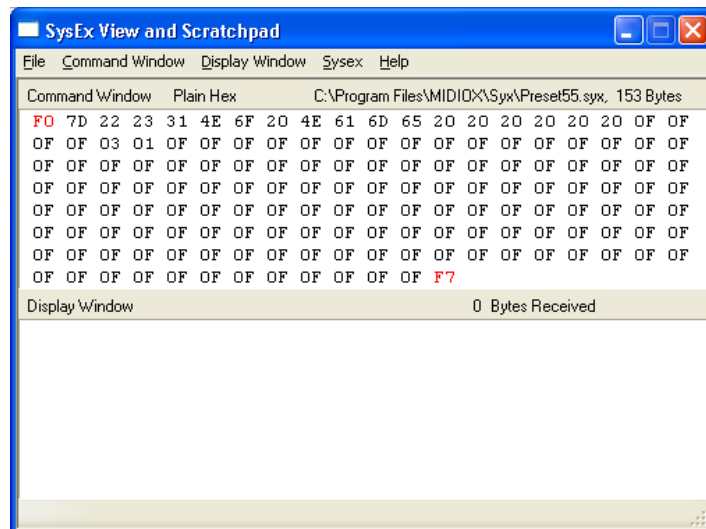
- Click on **Download**. Then choose whether you want to send one or all.
- If you choose one, then you must choose which Preset slot you wish to save it to (this value is embedded into the .SYX file) and then click on **Continue**. The data will be written to an intermediate .SYX file.



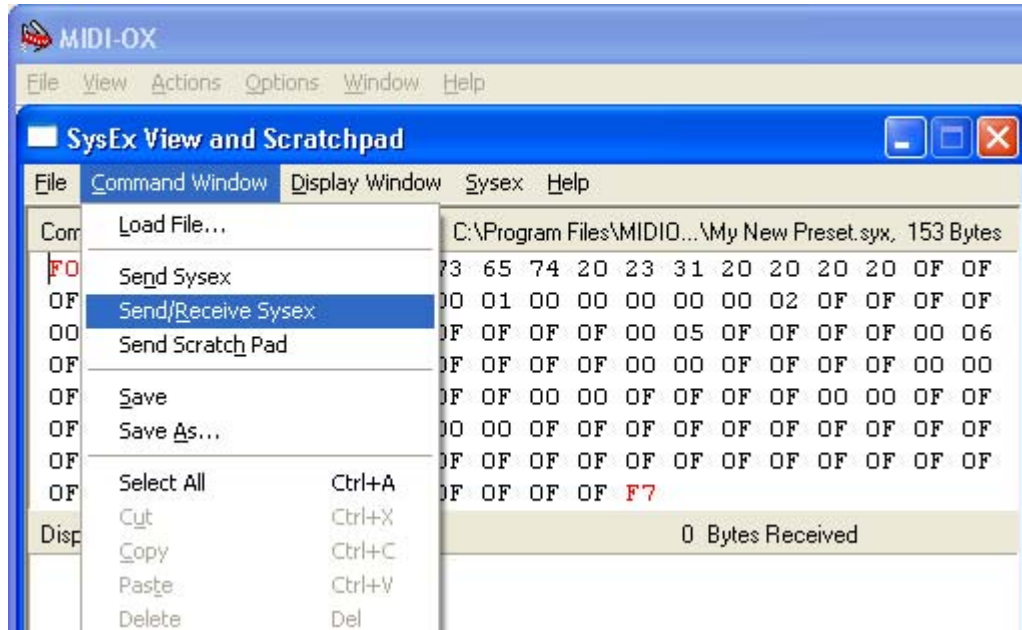
- o Enter a name for the Preset. You may wish to use the same name as the keypad shows on it's LCD. Then click on **Save**.



- o The preset file will be saved to disk and then opened in the MIDIOX Sys Ex window.



- o At this point you simply click on Command Window -> Send/Receive SysEx.



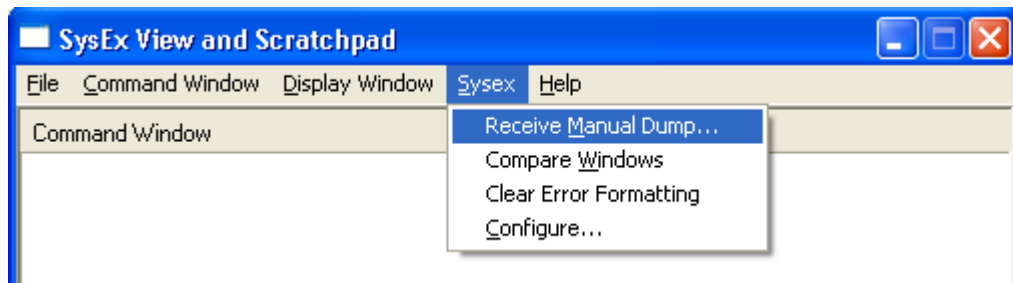
- After a moment you should receive a 7-byte ACKnowledge packet (F0 7D 22 24 00 41 F7 or similar). Click on **Done**. Downloading occurs in the background on the keypad so even though the keypad has been programmed, the LCD display is not automatically updated until you do something on the keypad that requires the LCD to be refreshed (E.g. change modes or presets).

Close the SysEx window in MIDIOX and when prompted to save the received data, click on **No**.

## Uploading

This is not a function you would normally need to perform. Uploading is most easily accomplished using the keypad **UTIL MENU** key. Close and Open a fresh MIDIOX SysEx window and then click on

SysEx -> Receive Manual Dump...

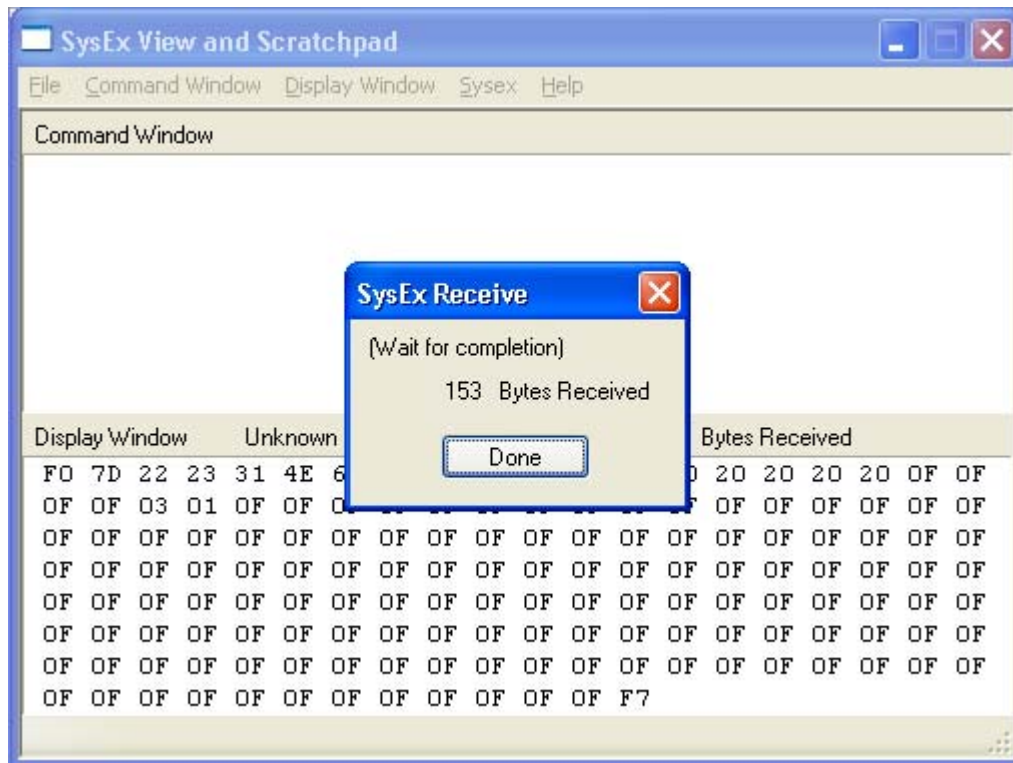


MIDI0X then waits for the data from the keypad.

Next, on the keypad, from the **UTIL** menu, choose the keypad menu item **Send a Preset** and enter a number (1 to 100):



When you press **ENTER** on the keypad the data will be sent to MIDI0X.



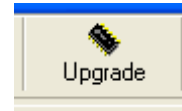
Click **Done** and then save the data by clicking on

Display Window -> Save As...

Choose a suitable file name (using the default extension of .SYX). By default the file will be saved in the Syx subdirectory of MIDI0X. You can load that file into MIDIPatchChanger.exe if you wish to edit it.

## Firmware Upgrade

New operating system code is made available on the website. This code can be used to “reflash” the firmware in the keypad. These files can be sent to the keypad using the editor/librarian or MIDIOX (or similar). Either way, the keypad must be connected to the PC using its 5-pin DIN interface box (not via USB).



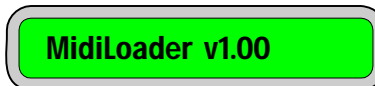
To perform the upgrade from within the editor/librarian, simply choose your (Direct) MIDI connection, click the Upgrade button, set the keypad to upgrade mode (see below) and select the file to download.

There are two ways to set the keypad in a mode that accepts new firmware.

1. The first method is using the UTIL menu. Press the **UTIL** button and then press the **down** arrow key repeatedly until you see the menu item:



Press **ENTER** and when prompted to confirm (`ENTER to upgrade`), then press **ENTER** again. At this point the MIDI Patch Changer passes control to the internal MIDI Loader.



2. The other method can be used even in the unlikely event that you “brick” the firmware (cause the device to malfunction due to improper reprogramming). In this case unplug the keypad. Press and hold down **CLEAR** and **ENTER**. With these two keys down, plug in the powered 5-pin DIN cable/box. Once power has been applied through the box to the keypad, release the keys. You should see:



To perform the upgrade using MIDIOX, see Appendix C.

# Appendix A: System Exclusive Implementation

## Command Types

The table below shows the system exclusive commands supported by the MIDI Patch Changer. The keypad also responds to a Universal Device Inquiry system exclusive command.

Command (hex)	Description	Size (# bytes)
04	Restart	5
05	Get Port	5
21	Get Global Parameter	8
22	Set Global Parameter	8
23	Get One Preset	153
24	Set One Preset	7 to 153

## General Format

(hex)	F0	System Exclusive
	<id>	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	<cmd>	Command type byte from table above.
	<addr>	Parameter # (0x08 to 0x0E) or Preset # (0x00 to 0x63).
	(data)	Data (if any). The data format is described below.
	F7	End of System Exclusive

## Default Responses

Some commands or queries to the MIDI Patch Changer keypad return standard “yes” (**ACK**nowledge) or “no” (**Not ACK**nowledge) responses. Here is the general form of those responses.

### ACK:

(hex)	F0	System Exclusive
	<id>	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	<cmd>	Echo of whatever the command was.
	<addr>	Echo of whatever the parameter or preset # was.
	41	ACK – ACKnowledge (parameter or value accepted)
	F7	End of System Exclusive

## NACK:

(hex)	F0	System Exclusive
	<id>	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	<cmd>	Echo of whatever the command was.
	<addr>	Echo of whatever the parameter or preset # was.
	4E	NACK – Not ACKnowledge (parameter or value was out of range, or error)
	F7	End of System Exclusive

## Restart Command

You can command the keypad to reboot by issuing this command. If you are connected using USB, then you may need to close and reopen the ports in your MIDI software.

### Transmitted:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	04	Command type.
	F7	End of System Exclusive

Received: ACK packet (then the keypad reboots)

## Get Port Command

You can query the keypad to determine if the keypad is connected using it's 5-pin DIN cable/box or it's USB cable using this command.

### Transmitted:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	05	Command type.
	F7	End of System Exclusive

### Received:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	4D or 55	4D = 'M' = MIDI 55 = 'U' = USB
	05	Command type.
	F7	End of System Exclusive



## Get/Set Global Parameter List

The following table describes the address and data elements that are valid for the Get/Set Global Parameter commands.

Parameter # (hex)	Value (binary)	Description
08	0000 nnnn	n = MIDI Channel for manual mode 0 to 15
09	0000 000x	x = Program Change number range 0 is 0-127 1 is 1-128
0A	0000 000x	x = Bank Select number range 0 is 0-127 1 is 1-128
0C	0ddd dddd	d = Sys Ex Mfg ID (default is 7D) 01 to 7D (7E and 7F are reserved)
0E	0000 000m	m = 0 = Preset Mode NORMAL m = 1 = Preset Mode BROWSE

Using other parameter numbers is undefined.

## Get Global Parameter Command

By sending a Get Global Parameter Sys Ex command from a host device, the user can query the settings that normally require the use of the Utility menu. In this implementation one parameter byte is read at a time from the table listed above. Byte addresses outside of the parameter list range are ignored.

The command reads writes a single byte from the keypad, but the data value is received as two bytes over MIDI. The first byte is the most significant nibble of the data. The second byte is the least significant nibble of the data.

### Received:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	21	Command type.
	<addr>	Parameter # from parameter list table.
	<msn>	Most significant nibble of the received value.
	<lsn>	Least significant nibble of the received value.
	F7	End of System Exclusive

### **Example:** Read the Manufacturer ID

#### Transmitted:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	21	Command type.
	0C	Parameter # from parameter list table.
	F7	End of System Exclusive

#### Received:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	21	Command type.
	0C	Parameter # from parameter list table.
	07	Most significant nibble of the value 7D.
	0D	Least significant nibble of the value 7D.
	F7	End of System Exclusive

## Set Global Parameter Command

By sending a Set Global Parameter Sys Ex command from a host device, the user can change the settings that normally require the use of the Utility menu. In this implementation one parameter byte is changed at a time from the parameter list table. Byte addresses outside of the parameter list range are ignored.

The command writes a single byte into the keypad, but the new data value is transmitted as two bytes. The first byte is the most significant nibble of the data. The second byte is the least significant nibble of the data.

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	22	Command type.
	<addr>	Parameter # from parameter list table.
	<msn>	Most significant nibble of the value.
	<lsn>	Least significant nibble of the value.
	F7	End of System Exclusive

**Example:** Set the MIDI Channel for manual mode to channel 2 (value = 0x01).

Transmitted:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	22	Command type.
	08	Parameter # from parameter list table.
	00	Most significant nibble of the value 01.
	01	Least significant nibble of the value 01.
	F7	End of System Exclusive

Received: ACK packet

## Get One Preset Command

By sending a Get Preset Sys Ex command from a host device, the user can query and save the settings for a single Preset. A Preset consists of the following data:

- o 13 character ASCII name
- o 16 MIDI channels worth of Bank MSB/Bank LSB/Patch Change. The values for these bytes are 0x00 to 0x7F regardless of user preferences. Disabled (unused) values will be 0x80 or 0xFF. These values are transmitted as most significant/least significant byte pairs; therefore this section of the data will be  $16 \times 3 \times 2 = 96$  bytes.
- o Sixteen bytes of arbitrary MIDI data. This data can contain any MIDI data. Unused data elements contain 0xFF. Again it is transmitted at msn/lsn byte pairs; therefore this section of data will be  $16 \times 2 = 32$  bytes.
- o Three bytes of configuration data (see blow)  $3 \times 2 = 6$  bytes.

A total received packet then includes all of the above plus the system exclusive packet header and EOX byte. A total received preset is 153 bytes.

Command:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	23	Command type.
	<pre>	Preset # 0x00 to 0x63 (0 to 99 decimal).
	F7	End of System Exclusive

**Example:** Read the last Preset data

Transmitted:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	23	Command type.
	63	Get the last preset
	F7	End of System Exclusive

Received:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	24	Command type (ready for re-transmission).
	63	Preset number.
	<	
	:	13 bytes of ASCII data for the Preset Name
	>	
	<	
	:	16 sets of (3 bytes x 16 MIDI channels)
	:	Bank Select MSB/Bank Select LSB/Patch Change
	:	bytes sent as msn/lsn byte pairs. 96 bytes total
	>	
	<	
	:	
	:	16 byte pairs of arbitrary MIDI data.
	:	
	>	
	00	Pre/Post byte most significant nibble (always 0)
P/P LSN		Pre/Post byte least sig nibble
		(00 = Pre, 01 = Post)
	00	Reserved
	00	Reserved
	00	Reserved
	00	Reserved
	F7	End of System Exclusive

## Set One Preset Command

The Set Preset Sys Ex command allows you to write one preset to the MIDI Patch Changer keypad. This command is variable length in that you don't need to send the entire 153 bytes. You can just send what you want and terminate with an EOX byte. The remainder of the preset you are modifying will be "disabled" (all values set to 0xFF). Therefore you can set the name and only a couple of patch change sets if that is all you need.

A Preset consists of the following data:

- 13 character ASCII name. Use space characters to pad if necessary.
- Up to 16 MIDI channels worth of Bank MSB/Bank LSB/Patch Change. The values for these bytes are 0x00 to 0x7F regardless of user preferences. Disabled (unused) values should be 0xFF. These values are transmitted as most significant/least significant byte pairs; therefore this section of the data will be up to  $16 \times 3 \times 2 = 96$  bytes.
- Up to 19 bytes of (optional) arbitrary MIDI data. This data can contain any MIDI data. Unused data elements should contain 0xFF. Again it is transmitted at msn/lsn byte pairs; therefore this section of data will be up to  $19 \times 2 = 38$  bytes.

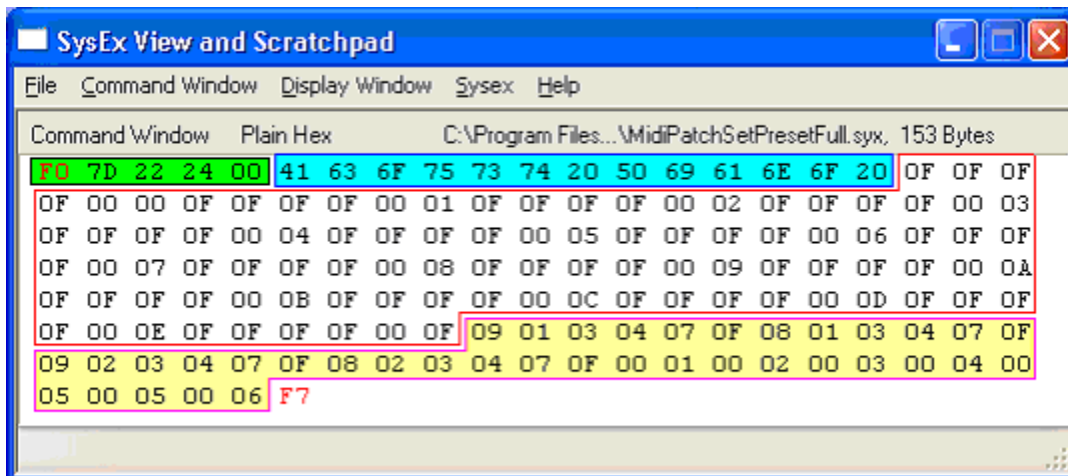
Transmitted:

(hex)	F0	System Exclusive
	7D	Manufacturer ID. User settable – default is 7D.
	22	Device ID for the MIDI Patch Changer.
	24	Command type.
	<pre>	Preset # 0x00 to 0x63 (0 to 99 decimal).
	<	
	:	13 bytes of ASCII data for the Preset Name
	>	
	<	
	:	Up to 16 sets of (3 bytes x 16 MIDI channels)
	:	Bank Select MSB/Bank Select LSB/Patch Change
	:	bytes sent as msn/lsn byte pairs. 96 bytes max.
	>	
	<	
	:	
	:	16 byte pairs of arbitrary MIDI data
	:	
	>	

00	Pre/Post byte most significant nibble (always 0)
P/P LSN	Pre/Post byte least sig nibble (00 = Pre, 01 = Post)
00	Reserved
00	Reserved
00	Reserved
00	Reserved
F7	End of System Exclusive

Received: ACK packet

Example:



In the data captured above you can see the following elements (in order):

- The green portion represents the Sys Ex header [F0 ... 00].
- The blue portion represents the ASCII patch name [41 ... 20].
- The white portion represents the MSB/LSB/Pgm Chg data (16 of). Remember that the bytes are split into MSN/LSN pairs.
- The yellow portion represents the arbitrary MIDI data section. In this case we have the following MIDI data (again in MSN/LSN pairs):
  - 09 01 03 04 07 0F = 91 34 7F (note on)
  - 08 01 03 04 07 0F = 81 34 7F (note off for above)
  - 09 02 03 04 07 0F = 92 34 7F (note on, different channel)
  - 08 02 03 04 07 0F = 82 34 7F (note off for above)
  - 00 01 00 02 03 00 04 00 05 00 05 00 06 (sample MIDI gibberish)
- The red F7 is the End-of-Exclusive.

## Universal Device Inquiry

In response to the Universal Device Inquiry command (F0 7E 7F 06 01 F7), the keypad responds with a 16-character ASCII string indicating the product name and version. For example, "MIDIPatch v0.79".

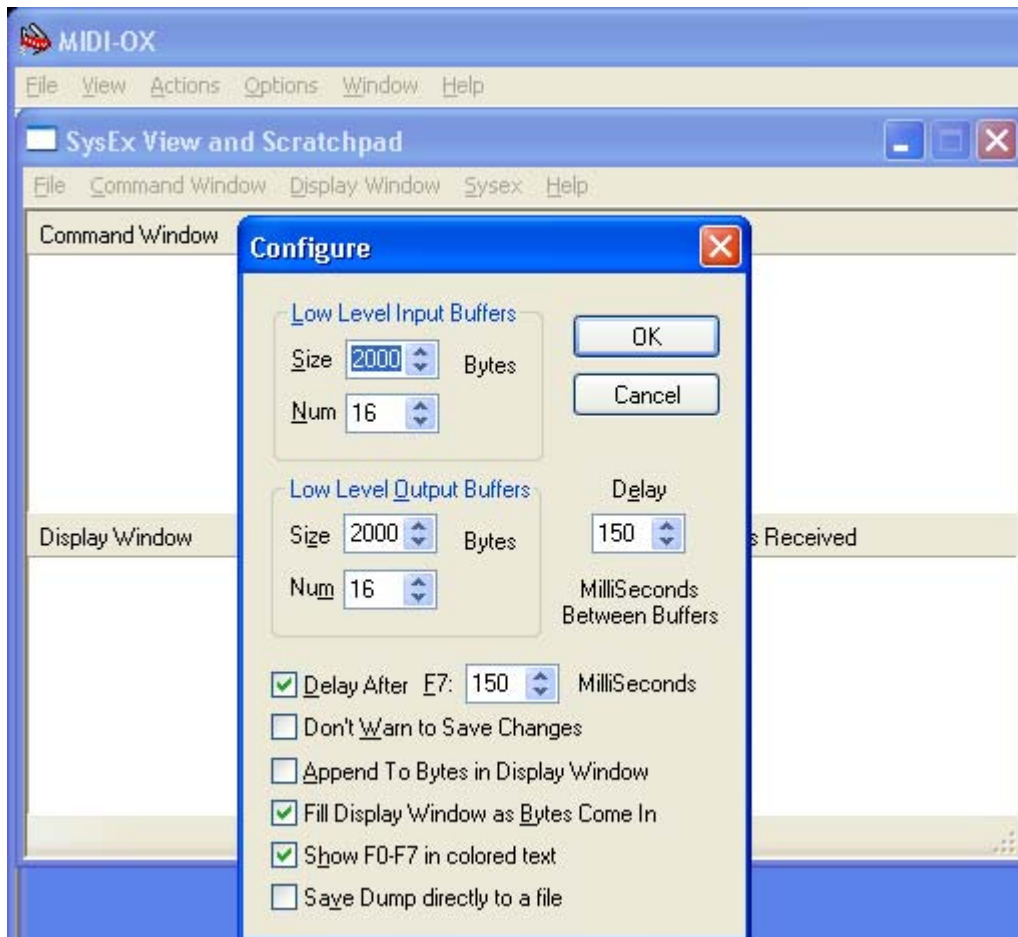
## Appendix B: Sys Ex Firmware Update via MIDIOX

You can “reflash” the firmware in the MIDI Patch Changer by carefully following the procedure outlined in this section. Obtain the latest firmware in .SYX format from the website. Again we show the process using MIDIOX, but you should be able to use any similar program (and of course the editor/librarian on a Windows PC).

### Configure MIDIOX

The configuration is the same as described in the Download Preset section of this manual. It is repeated here for convenience. Set the Sys Ex properties of MIDIOX by clicking:

View -> SysEx... then SysEx->Configure.



Use the recommended setting shown in the above Configure panel.



## Prepare the Keypad for Download

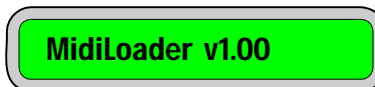
**You must use the 5-pin DIN cable/box for firmware upgrades. You cannot upgrade using the provided MiniTerm USB cable.** The firmware upgrade will not affect your stored presets (unless the firmware upgrade is designed to add new features that make the old preset data invalid).

There are two ways to set the keypad in a mode that accepts new firmware.

3. The first method is using the UTIL menu. Press the **UTIL** button and then press the **down** arrow key repeatedly until you see the menu item:



Press **ENTER** and when prompted to confirm (`ENTER to upgrade`), then press **ENTER** again. At this point the MIDI Patch Changer passes control to the internal MIDI Loader.



4. The other method can be used even in the unlikely event that you “brick” the firmware (cause the device to malfunction due to improper reprogramming). In this case unplug the keypad. Press and hold down **CLEAR** and **ENTER**. With these two keys down, plug in the powered 5-pin DIN cable/box. Once power has been applied through the box to the keypad, release the keys. You should see:



## Test the Communication

If you send a Universal Device Inquiry system exclusive packet to the keypad, it will respond with the MidiLoader version packet. In MIDIOX, click:

View -> SysEx...

Then from the SysEx menu click

Command Window -> Load File...

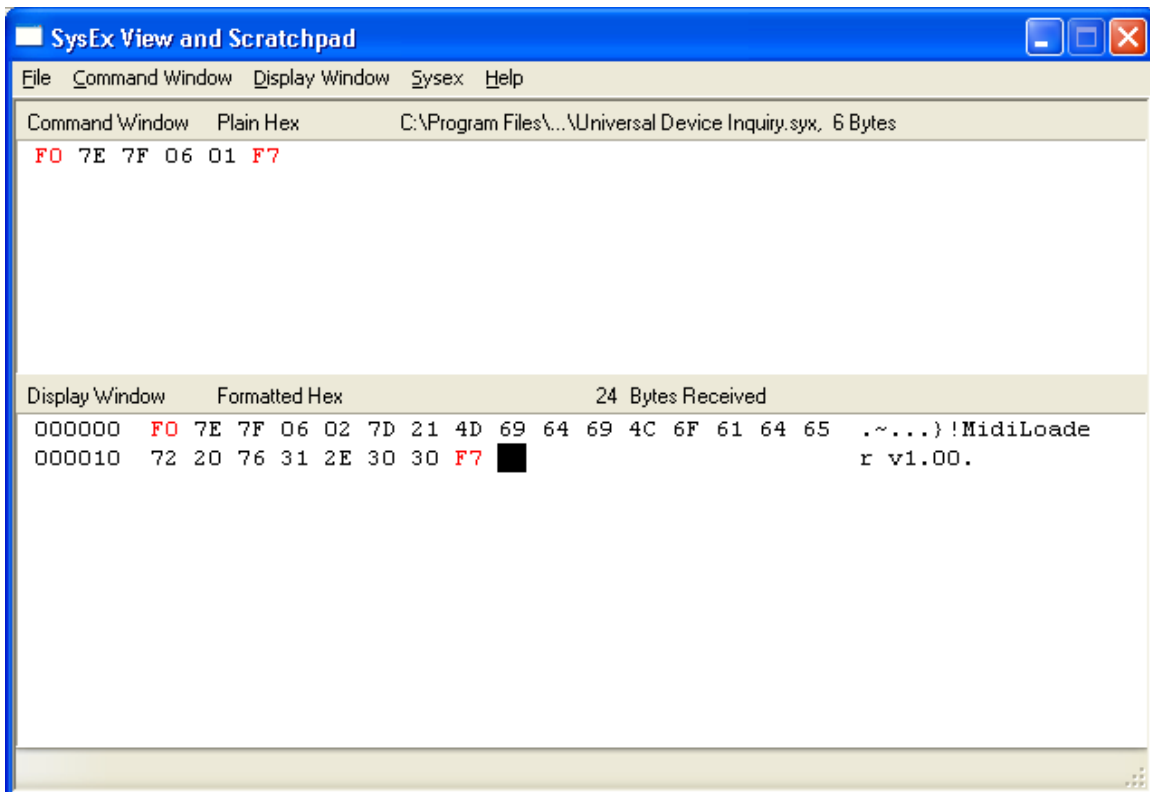
Choose the file **Universal Device Inquiry.syx** and click **open**. Click

Command Window -> Send/Receive Sysex

The keypad will respond with 24 bytes. Click on **Done**. Next click on

Display Window -> Hex View Swap

You may have to enlarge the window a little, but you should see something like this:



Now you can proceed with the firmware upgrade.

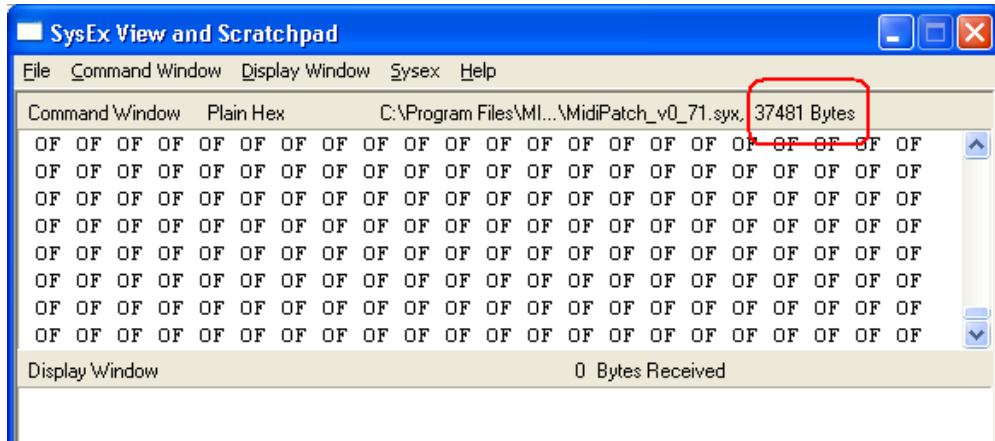
## Firmware Upgrade

Close the SysEx View window and open it again to get an empty window. If you are prompted to save anything, click **No**.

Open the new firmware file by clicking

Command Window -> Load File...

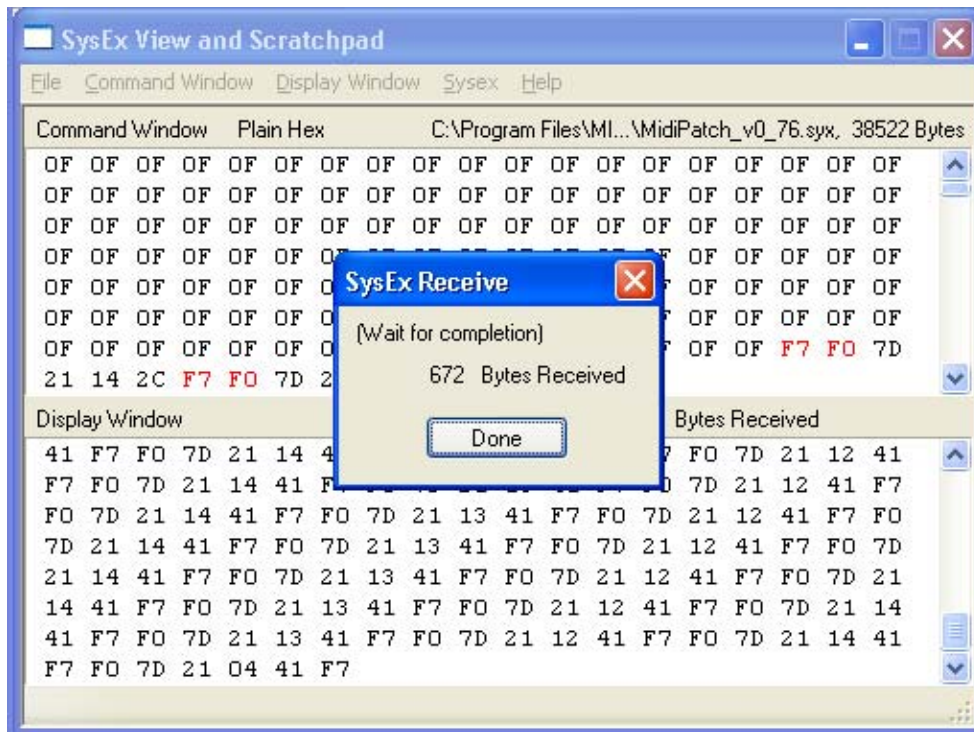
Choose the file required for the upgrade (E.g. MidiPatch\_v1\_00.syx). You should see that a fairly large file is opened.



Click on

Command Window -> Send/Receive Sysex

The upgrade takes approximately 30 seconds. Do not touch the computer or keypad during this time. At the end of the upgrade the keypad will reboot. Also the MIDIOX screen will show a fairly large number of transactions.



You can close MIDIOX (don't save anything) and begin using the updated keypad.