

# Output Modes

For convenience here, a PC-based DMX output utility was used to generate various DMX channel:value pairs.

Using the built-in LCD, set the operating mode and DMX start address for the system. Different modes require varying quantities of DMX data, as described below. In the charts below, 'Channel 1' means 'system start address'. So if the DecaBox is set to start address 10, channel 1 means channel 10. Make sense?

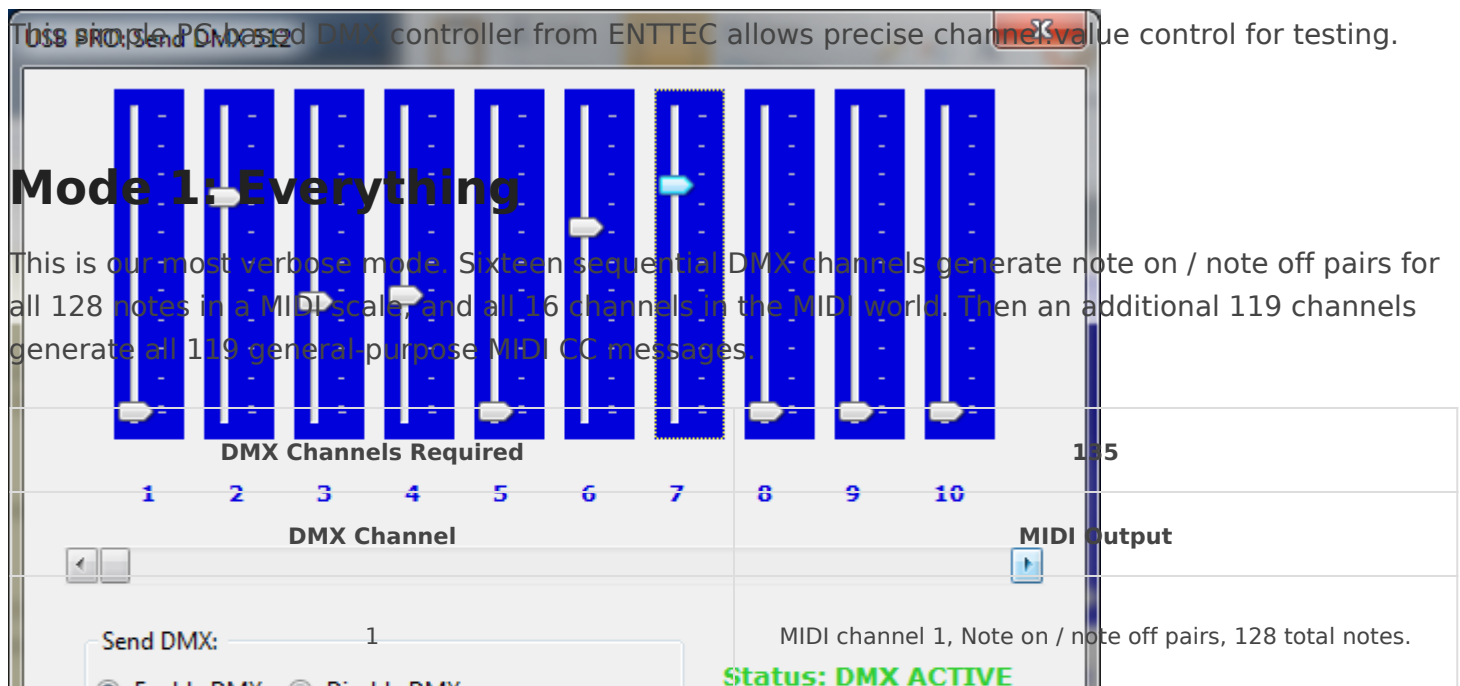
The word **channel** means something different in the MIDI and DMX worlds. A MIDI channel is most easily compared to a DMX universe. Messages in a single MIDI channel can contain note on / note off information, continuous controller data, patch change messages, etc. However, a single MIDI cable can contain data for all 16 MIDI channels while a DMX cable only controls a single universe [512 DMX channels] of data.

Also, MIDI is a **zero-based** system. That is, the first MIDI channel is '0' and the last is 15, or 'F' in hex code. Note values and velocities vary between [0 127] or [0x0 0x7F] in hex. In the screen captures below, hex, zero-based data is displayed.

This simple PC-based DMX controller from ENTTEC allows precise channel:value control for testing.

## Mode 1: Everything

This is our most verbose mode. Sixteen sequential DMX channels generate note on / note off pairs for all 128 notes in a MIDI scale, and all 16 channels in the MIDI world. Then an additional 119 channels generate all 119 general-purpose MIDI CC messages.



2	MIDI channel 2, Note on / note off pairs, 128 total notes.
...	
16	MIDI channel 16, Note on / note off pairs, 128 total notes.
17	MIDI CC #0, values [0 127].
...	...
Channel 136	MIDI CC #128, values [0 127].

Monitor - Input									
TIMESTAMP	IN	PORT	STATUS	DATA1	DATA2	CHAN	NOTE	EVENT	
0011FD8D	1	--	80	00	7F	1	C -1	Note	Off
0011FEB6	1	--	90	01	7F	1	C#-1	Note	On
0011FFB4	1	--	80	01	7F	1	C#-1	Note	Off
00120016	1	--	90	02	7F	1	D -1	Note	On
001200AD	1	--	80	02	7F	1	D -1	Note	Off
0012010F	1	--	90	03	7F	1	Eb-1	Note	On
00120208	1	--	80	03	7F	1	Eb-1	Note	Off
00120270	1	--	90	04	7F	1	E -1	Note	On
00120306	1	--	80	04	7F	1	E -1	Note	Off
001203FF	1	--	90	05	7F	1	F -1	Note	On
00120461	1	--	80	05	7F	1	F -1	Note	Off
001204C9	1	--	90	06	7F	1	F#-1	Note	On
0012055E	1	--	80	06	7F	1	F#-1	Note	Off
00120656	1	--	90	07	7F	1	G -1	Note	On
001206B9	1	--	80	07	7F	1	G -1	Note	Off
001207B2	1	--	90	08	7F	1	G#-1	Note	On
0012081A	1	--	80	08	7F	1	G#-1	Note	Off
001208B0	1	--	90	09	7F	1	A -1	Note	On
00120975	1	--	80	09	7F	1	A -1	Note	Off
00121115	1	--	90	12	7F	1	F# 0	Note	On
0012117D	1	--	80	3A	7F	1	Bb 3	Note	Off
00121213	1	--	90	3E	7F	1	D 4	Note	On
00121276	1	--	80	48	7F	1	C 5	Note	Off
0012130C	1	--	90	4B	7F	1	Eb 5	Note	On
001215C7	1	--	80	4B	7F	1	Eb 5	Note	Off
001216C0	1	--	90	4C	7F	1	E 5	Note	On
00121728	1	--	80	4C	7F	1	E 5	Note	Off
001217BE	1	--	90	4D	7F	1	F 5	Note	On
001218B7	1	--	80	4D	7F	1	F 5	Note	Off
0012191A	1	--	90	4E	7F	1	F# 5	Note	On
00121982	1	--	80	4E	7F	1	F# 5	Note	Off
00121A7A	1	--	90	4F	7F	1	G 5	Note	On
00121B11	1	--	80	4F	7F	1	G 5	Note	Off
00121B73	1	--	90	50	7F	1	G# 5	Note	On
00121C6C	1	--	80	50	7F	1	G# 5	Note	Off
00121CD4	1	--	90	51	7F	1	A 5	Note	On
00121D6A	1	--	80	51	7F	1	A 5	Note	Off
00122A1D	1	--	90	57	7F	1	Eb 6	Note	On
00122A7F	1	--	90	6A	7F	1	Bb 7	Note	On
00122B16	1	--	80	6E	7F	1	D 8	Note	Off
00122B7E	1	--	90	6F	7F	1	Eb 8	Note	On
00122C14	1	--	90	77	7F	1	B 8	Note	On
00122C77	1	--	80	77	7F	1	B 8	Note	Off
00122DD7	1	--	90	78	7F	1	C 9	Note	On
00122ED0	1	--	80	78	7F	1	C 9	Note	Off
00122F32	1	--	90	79	7F	1	C# 9	Note	On
00122FC8	1	--	80	79	7F	1	C# 9	Note	Off
001230C1	1	--	90	7A	7F	1	D 9	Note	On

Here DMX channel 1 fader was run somewhat smoothly from 0 to 100%. The entire MIDI scale, with some skipping due to how quickly the fader moved, is represented.

TIMESTAMP	IN	PORT	STATUS	DATA1	DATA2	CHAN	NOTE	EVENT
0013732C	1	--	B0	00	02	1	---	CC: Bank MSB
0013738F	1	--	B0	00	04	1	---	CC: Bank MSB
0013748D	1	--	B0	00	05	1	---	CC: Bank MSB
00137874	1	--	B0	00	06	1	---	CC: Bank MSB
0013796E	1	--	B0	00	08	1	---	CC: Bank MSB
00137A6C	1	--	B0	00	0D	1	---	CC: Bank MSB
00137ACE	1	--	B0	00	0E	1	---	CC: Bank MSB
00137B65	1	--	B0	00	12	1	---	CC: Bank MSB
00137BC7	1	--	B0	00	14	1	---	CC: Bank MSB
00137C5E	1	--	B0	00	1A	1	---	CC: Bank MSB
00137CC0	1	--	B0	00	1E	1	---	CC: Bank MSB
00137D28	1	--	B0	00	22	1	---	CC: Bank MSB
00137DBE	1	--	B0	00	2A	1	---	CC: Bank MSB
00137E21	1	--	B0	00	2D	1	---	CC: Bank MSB
00137EB7	1	--	B0	00	33	1	---	CC: Bank MSB
00137F1A	1	--	B0	00	39	1	---	CC: Bank MSB
00137FB0	1	--	B0	00	3E	1	---	CC: Bank MSB
00138013	1	--	B0	00	47	1	---	CC: Bank MSB
0013807B	1	--	B0	00	4F	1	---	CC: Bank MSB
0013810F	1	--	B0	00	5B	1	---	CC: Bank MSB
00138171	1	--	B0	00	64	1	---	CC: Bank MSB
00138208	1	--	B0	00	6D	1	---	CC: Bank MSB
0013826A	1	--	B0	00	73	1	---	CC: Bank MSB
00138301	1	--	B0	00	7B	1	---	CC: Bank MSB
00138369	1	--	B0	00	7F	1	---	CC: Bank MSB

Here DMX channel 17 fader was moved. This corresponds to MIDI CC #0, 'Bank Select MSB.'

## Mode 2: Easy Note & CC Messages

Mode 2 is very compact: 2 sequential DMX channels generate all note on / note off pairs for MIDI channel 1 and MIDI CC #0.

DMX Channels Required	2
DMX Channel	MIDI Output
1	MIDI channel 1, Note on / note off pairs, 128 total notes.
2	MIDI CC #0, values [0 127].

TIMESTAMP	IN	PORT	STATUS	DATA1	DATA2	CHAN	NOTE	EVENT
0018A2AB	1	--	80	03	7F	1	Eb-1	Note Off

Again, values are missing because the fader was run quickly between [0 100%]. However, all values are available.

## Mode 3

Mode 3 is a happy medium: Two sequential DMX channels generate note on / note off pairs for all 128 notes in a MIDI scale on MIDI channels 1 & 2. Then an additional 6 channels generate the first 6 general-purpose MIDI CC messages.

DMX Channels Required	8
DMX Channel	MIDI Output
1	MIDI channel 1, Note on / note off pairs, 128 total notes.
2	MIDI channel 2, Note on / note off pairs, 128 total notes.
3	MIDI CC #0, values [0 127].
...	...
8	MIDI CC #6, values [0 127].

## Mode 4: Program Change / Patch Change Messages

Simple, here. 16 DMX channels generate all patch change / program change messages on MIDI channels [1 16]

DMX Channels Required	16
DMX Channel	MIDI Output
1	MIDI program change, MIDI channel 1
...	...
16	MIDI program change, MIDI channel 16

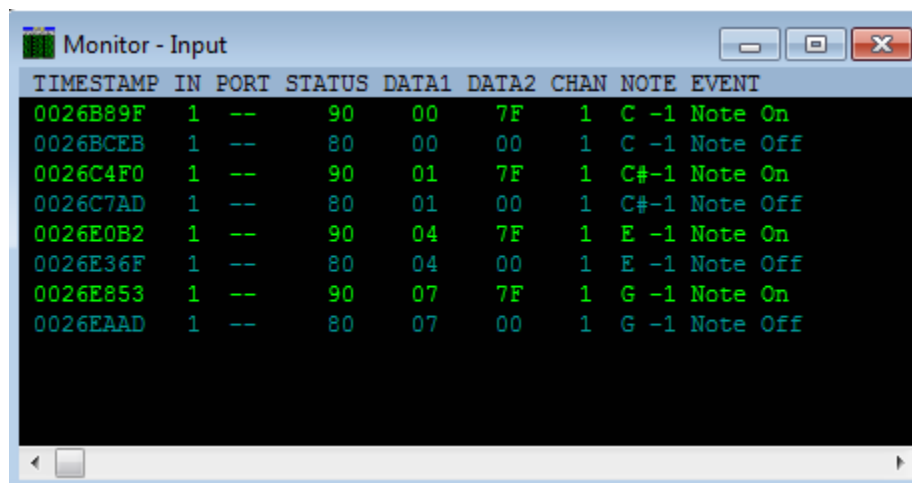
Monitor - Input								
TIMESTAMP	IN	PORT	STATUS	DATA1	DATA2	CHAN	NOTE	EVENT
001DD22B	1	--	C0	00	--	1	---	PC: Acc. Grand Pia
001DD3BA	1	--	C0	01	--	1	---	PC: Brite Acc. Pia
001DD612	1	--	C0	01	--	1	---	PC: Brite Acc. Pia
001DD70D	1	--	C0	02	--	1	---	PC: Elec Grand Pia
001DD86B	1	--	C0	02	--	1	---	PC: Elec Grand Pia
001DD965	1	--	C0	03	--	1	---	PC: Honky-Tonk Pia
001DDAC4	1	--	C0	03	--	1	---	PC: Honky-Tonk Pia
001DDF12	1	--	C1	00	--	2	---	PC: Acc. Grand Pia
001DDFD9	1	--	C1	01	--	2	---	PC: Brite Acc. Pia
001DE0D5	1	--	C1	01	--	2	---	PC: Brite Acc. Pia
001DE16B	1	--	C1	02	--	2	---	PC: Elec Grand Pia
001DE233	1	--	C1	02	--	2	---	PC: Elec Grand Pia
001DE2CA	1	--	C1	03	--	2	---	PC: Honky-Tonk Pia
001DE3C4	1	--	C1	03	--	2	---	PC: Honky-Tonk Pia
001DE8D9	1	--	C2	00	--	3	---	PC: Acc. Grand Pia
001DE9D4	1	--	C2	01	--	3	---	PC: Brite Acc. Pia
001DEACE	1	--	C2	01	--	3	---	PC: Brite Acc. Pia
001DEBC8	1	--	C2	02	--	3	---	PC: Elec Grand Pia
001DEC2C	1	--	C2	02	--	3	---	PC: Elec Grand Pia
001DECF3	1	--	C2	03	--	3	---	PC: Honky-Tonk Pia
001DF461	1	--	C9	00	--	10	---	PC: Drums
001DF55C	1	--	C9	01	--	10	---	PC: Drums
001DF5C0	1	--	C9	01	--	10	---	PC: Drums
001DF6BA	1	--	C9	02	--	10	---	PC: Drums
001DF783	1	--	C9	02	--	10	---	PC: Drums
001DF819	1	--	C9	03	--	10	---	PC: Drums

Mode 4 data, showing PC messages sent on MIDI channels 1, 2, 3 and 10.

## Mode 5: Note On / Note Off With Fixed Velocities

Simple, here. 128 DMX channels generate 'note on' messages when DMX values are 100% and 'note off' messages when values are 0%. A popular TV show requested this mode for triggering sound effects via bump buttons on a console.

DMX Channels Required	128
DMX Channel	MIDI Output
1 @ 100%	MIDI channel 1, MIDI note 1, ON
1 @ 0%	MIDI channel 1, MIDI note 1, OFF
...	...
128 @ 100%	MIDI channel 1, MIDI note 128, On



TIMESTAMP	IN	PORT	STATUS	DATA1	DATA2	CHAN	NOTE	EVENT
0026B89F	1	--	90	00	7F	1	C -1	Note On
0026BCEB	1	--	80	00	00	1	C -1	Note Off
0026C4F0	1	--	90	01	7F	1	C#-1	Note On
0026C7AD	1	--	80	01	00	1	C#-1	Note Off
0026E0B2	1	--	90	04	7F	1	E -1	Note On
0026E36F	1	--	80	04	00	1	E -1	Note Off
0026E853	1	--	90	07	7F	1	G -1	Note On
0026EAAD	1	--	80	07	00	1	G -1	Note Off

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