MIDI Files, MIDI Mapper and Windows
Yes, your PAS16 can play 'Stairway to Heaven'

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With acknowledgments to many folks on the MIDIMUSIC forum

This is an attempt to answer some of the most common questions about the MIDI Mapper and MIDI under Windows. Much of the information in this file was gathered from several different places, but I have tried to "bring it all together" here. If you've got questions that aren't covered here, please let me know and I'll try to put them and (hopefully) the answers into the next version of this file.

Q. What's the MIDI Mapper for anyway?

A. The MIDI Mapper's purpose is to provide device independence to MIDI devices. It attempts to do that same thing that the printer drivers do for instance - a Windows program doesn't have to know how to deal with your specific printer type, it just deals with a generic printer. Then Windows and the printer driver figure out how to make the printed output appear.

Q. Okay, how does it provide this independence?

A. Technically, what the MIDI Mapper does, is remap patches, notes, channels and adjust velocities. It uses the Patch Map, Key Map and Setup to determine how to do this. You can create or adjust these yourself.

Q. Huh? What's a patch, channel and velocity?

A. These are all part of the MIDI lingo. A Patch is used to determine the sound to be used - examples would be Pianos, Strings or Guitars. Patches are used to select which instrument is used. Channels are used to separate songs to allow more than one instrument to sound at the same time. There are 16 MIDI channels, and each channel can use a single instrument or patch at a time. All notes are played on a MIDI channel. Velocity is a measure of how hard a note is pressed, and is used to specify how loud a particular note is.

Q. Will it work with all MIDI files?

A. Well, yes and no. Until recently, there wasn't any standard for patch numbers, or note numbers. It was up to the manufacturer to determine what patch number to use for a Piano sound for instance. Now there is a General MIDI specification, which does identify which instrument is to be used for each patch number. However, there are a large number of songs out there that are not General MIDI. Now this doesn't mean that you shouldn't try to play non-General MIDI files with the MIDI Mapper. The worst that can happen is it'll sound bad. See the end of this file for the patch list for General MIDI and for the Roland MT-32. If you compare the lists you will see that some instruments are on different channels. Each manufacturer has their own patch list. The result is that you may get a file that was created for Acoustic Piano, Violin and Cello, but when you play it back you hear Calliope, Tympani and Bagpipe (hardly a pleasing combination).

Q. What's General MIDI?

A. This is an official specification from the International MIDI Association (the MIDI standards committee). Microsoft has used a subset of the specification for their own purposes. Microsoft has adopted the General MIDI patch numbers and drum key numbers, however they have not taken the complete specification.

Q. What are the differences between Microsoft's way and the real General MIDI Specification?

A. The General MIDI Specification requires much more capable MIDI equipment than Microsoft. A real General MIDI device supports 32 note polyphony (that's 32 notes sounding at the same time), and uses all 16 MIDI channels. This is more than Microsoft's target device can handle, so Microsoft has defined two less capable devices - a "Basic" device, and an "Extended" one. They've also defined a set of "Authoring Guidelines" for MIDI files.

Q. What are the capabilities of a Basic device.

A. A Basic device must be capable of playing 6 melodic notes, in at least three different instruments, as well as 5 percussion notes. All sound cards are capable of this - in fact, most can only do this. Basic devices are supposed to listen to MIDI channels 13 through 15 for the melodic instruments, with the drums on channel 16. The Adlib, Sound Blaster, Sound Blaster Pro and Pro Audio Spectrum are all Basic devices, as are most sound cards. Each note requires a "voice" for it's entire duration and each instrument requires an "operator" to begin each note. Voices and operators are terms used to describe the simultaneous production of sound by a FM (Frequency Modulator) chip. For example, the Yamaha OPL3 is capable of two modes of operation - 4 operator and 2 operator. In 2 operator mode it can support upto 16 melodic voices and 6 percussive and in 4 operator mode, upto 6 melodic voices and 5 percussive voices. However, the total number of voices at any given moment is 18. The Basic MIDI spec requires at least 11 voices (6 melodic plus 5 percussive).

Q. Okay, what about Extended devices?

A. Extended devices must be capable of 16 melodic notes, using 9 instruments, plus 16 note, 8 instrument percussive. Extended devices are supposed to listen to MIDI channels 1 through 9 for melodic sounds, with the drum track on channel 10. Examples of Extended devices include the Roland MT-32/LAPC, Roland Sound Canvas series (including the SCC-1), and Turtle Beach's MultiSound card or a Sound Blaster 16 ASP with the Wave Blaster add-on. The OPL-3 in 2 operator mode is almost capable of Extended MIDI, falling short by 2 percussive voices. Playing a MIDI composition that requires full Extended device support on an OPL-3 device will result in inaccurate reproduction of the rhythm section. Depending on the driver used this will be in the form of missed notes or pops and clicks as a voice is shut off and reused after only playing a few milliseconds.

Q. What are Microsoft's Authoring Guidelines?

A. The purpose of the guidelines is to allow people to build a single MIDI file that will play on either a Basic device or an Extended one. To do this, you put two versions of the same song in the file - one on channels 13 through 16, and another on channels 1 through 10. Each copy of the song is must meet the rules for Basic and Extended devices, with higher priority sounds on the lower channel numbers. The guidelines also include specific setting for volume and such. In addition, the instruments that are sequenced on a Basic channel should be preceded by a 'b' and the instruments on an Extended channel should be preceded by an 'x'.

Q. Are there a lot of files done Microsoft's way?

A. Yes and no. Here on CompuServe, we don't have many that meet the Microsoft rules. However, the CANYON.MID file included with Windows does, and there are a number of CD-ROMs out there that include Microsoft format files. More and more MIDI files are appearing that are encoded to Microsoft's spec. The only way to be sure is to load the file into a sequencer and see what MIDI channels are used. If you see several tracks on some

low channel numbers and a few tracks on channel numbers 13 through 16 then you probably have a Microsoft format file.

Q. How do I know whether a song is General MIDI?

A. Here on CompuServe, files in the MIDI Music Forum are marked with a keyword of GM. Windows has a warning message that you'll get if a song isn't marked as General MIDI - most people turn this off, because not all files that are General MIDI are marked as such.

Q. Okay, enough background - How do I get this thing to play?

A. Getting MIDI working under Windows requires two steps - installing the required drivers for your sound equipment, and configuring the MIDI Mapper.

Q. Where do I install the Sound Drivers?

A. All sound drivers are installed using the Window Control Panel application (in your Main program group). Once started, Control Panel shows a set of icons - choose the one labeled Drivers to install, remove or configure sound drivers. Now a list of the currently installed drivers will be shown - press Add to add a new driver. Most sound cards come with drivers for them - follow the manufacturer's directions to install the drivers. This is also fairly well documented in your Windows manuals.

Q. Okay, how do I configure the MIDI Mapper?

A. Most sound cards come with new setups for the MIDI Mapper. There are often three setups that'll use the internal sounds of the sound card - one labeled "Basic", one labeled "Extended" and one labeled "All". The differences between these three setups are the channels used. A Basic setup will ignore anything on channels 1 to 12, and an extended setup will ignore anything on channels 11 through 16. The All setup will listen to all 16 MIDI channels. When you first install a set of drivers, select a BASIC setup (channels 13-16) and then play CANYON.MID with the Windows Media Player. If that works, you are correctly installed. If not, you will need to debug your installation - see your sound equipment docs, and several other information files available here on Compuserve.

Q. When do I use All?

A. For General MIDI songs, All is the best setting. However, Canyon won't sound very good with this setting, because it contains two copies of the song as discussed before. Unless you've got a large collection of songs done Microsoft's way, it's probably best to stick with All, and use a sequencer to edit Canyon if you want to hear it.

Q. What's this setting called MIDI?

A. Most sound cards include an optional MIDI connection. Often this is an add on. You'd use this to connect an external MIDI device, such as a keyboard. Unless you've got an external MIDI device, you can ignore anything like "Sound Blaster 1.0 MIDI" - if you use this, you won't hear anything.

Q. What are the MIDI Mapper Setups?

A. A Setup in the MIDI Mapper connects a key map and patch map to a set of drivers. A Key map is used to remap drum notes, and the patch map is used to remap patches. The setup ties all of these together, and assigns a patch map, key map and device to each MIDI channel.

Q. When would I have to edit or create a MIDI Mapper Setup?

A. If you've got a MIDI device that isn't supported in the list of available setups, you'll have to edit the setup. For instance, someone with a Roland Sound Canvas is probably using the Windows MPU-401 driver. The Sound Canvas is a real General MIDI device - it doesn't need any patch or key maps. You can easily create a setup for this - just assign "MPU-401" as the driver for each channel, and save the setup.

Q. I've set everything up and I'm getting sound, but the music sounds off, and I get lots of noise (pops and clicks) during playback.

A. There are two things to check. First, the patch used to create the file may be different than the one you are using for playback. If you are using a sequencer like Midisoft's Recording Session or Big Noise's Cadenza, you can "re-patch" the file by changing the instrument assigned to each track of the file. Hopefully, the author used a meaningful name for each track so you have a clue as to which instrument to choose. Secondly, the pops and clicks are probably caused by the file you are playing needing more voices than your MIDI device can supply. When this happens a note may start playing and after only a few milliseconds it's voice is claimed for a new note. The result is that the velocity of the note is set to zero instantly (which is sometimes done purposely as an effect) - causing the click. Some FM drivers are coded so that if a voice is unavailable the note is skipped. This will often result in a more pleasing, though still inaccurate, playback. The SAPI!OPL driver that Media Vision now supplies tends to clip notes very frequently. The FMSYNTH driver available here on Compuserve is an example of a driver designed to minimize clicks and pops. Also, if your driver supports it, switching to 2 operator mode may eliminate pops and clicks, though at the cost of some richness of sound (since any give instrument may produce only 2 tones at a time).

I hope this has been of some use to you. As mentioned before, please let me know if there's something you think should be covered in a future edition of this file.

General MIDI Instrument List

The General MIDI Instrument List is copied from the Roland MT-32/LAPC patch list. So any MIDI file designed for the MT-32 will play correctly with a General patch.

Piano	Strings	Synth Lead
1. Acoustic Piano	41. Violin	81. Lead 1 Square
2. Brt Acou Piano	42. Viola	82. Lead 2 Sawtooth
3. Elec Grnd Piano	43. Cello	83. Lead 3 Calliope
4. Honky Tonk	44. Contrabass	84. Lead 4 Chiff
5. Elec Piano 1	45. Tremolo Strings	85. Lead 5 Charang
6. Elec Piano 2	46. Pizz. Strings	86. Lead 6 Voice
7. Harpsichord	47. Orch. Strings	87. Lead 7 Fifths
8. Clavichord	48. Timpani	88. Lead 8 Bass+Ld

Chrom. Percussion	Ensemble	Synth Pad
9. Celesta	49. String Ens. 1	89. Pad 1 New Age
10. Glockenspiel	50. String Ens. 2	90. Pad 2 Warm
11. Music box	51. Synth Strings 1	91. Pad 3 Polysynth
12. Vibraphone	52. Synth Strings 2	92. Pad 4 Choir
13. Marimba	53. Choir Aahs	93. Pad 5 Bowed
14. Xylophone	54. Voice Oohs	94. Pad 6 Metallic
15. Tubular Bells	55. Synth Voice	95. Pad 7 Halo
16. Dulcimer	56. Orchestra Hit	96. Pad 8 Sweep

Organ
17. Drawbar Organ
18. Perc. Organ
19. Rock Organ
20. Church Organ
21. Reed Organ
22. Accordian
23. Harmonica
24. Tango Accordian

Brass
57. Trumpet
58. Trombone
59. Tuba
60. Muted Trumpet
61. French Horn
62. Brass Section
63. Synth Brass 1
64. Synth Brass 2

Synth F/X
97. FX1 Rain
98. FX2 Soundtrack
99. FX3 Crystal
100. FX4 Atmosphere
101. FX5 Brightness
102. FX6 Goblins
103. FX7 Echoes
104. FX8 Sci-Fi

Guitar
25. Acoustic Guitar
26. Steel Acou Guit
27. El Guitar Jazz
28. Electric Guitar
29. El Guitar Muted
30. Overdriven Guit
31. Distortion Guit
32. Guitar Harmonic

Reed
65. Soprano Sax
66. Alto Sax
67. Tenor Sax
68. Baritone Sax
69. Oboe
70. English Horn
71. Bassoon
72. Clarinet

Ethnic
105. Sitar
106. Banjo
107. Shamisen
108. Koto
109. Kalimba
110. Bagpipe
111. Fiddle
112. Shanai

Bass
33. Acoustic Bass
34. El Bass Finger
35. El Bass Pick
36. Fretless Bass
37. Slap Bass 1
38. Slap Bass 2
39. Synth Bass 1
40. Synth Bass 2

Pipe
73. Piccolo
74. Flute
75. Recorder
76. Pan Flute
77. Blown Bottle
78. Shakuhachi
79. Whistle
80. Ocarina

Percussive
113. Tinkle Bell
114. Agogo
115. Steel Drums
116. Woodblock
117. Taiko Drum
118. Melodic Tom
119. Synth Drum
120. Reverse Cymbal

Sound F/X
121. Guit Fret Noise
122. Breath Noise
123. Seashore
124. Bird Tweet
125. Telephone Ring
126. Helicopter
127. Applause
128. Gunshot