

# MIDI AGENT SYSTEM 3.0 MANUAL

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## 1. Introduction

MIDI Agent System (MAS) uses the interaction between different agents to generate MIDI notes. It is designed primarily for live use and it enables the performer to change the parameters of the agents that are generating the music in real time. For example, one agent can generate random bar markings, a second can add sequences of notes to these bars, a third can change the velocities of the notes and a fourth can shift the pitches up or down. Many agents have knobs that can be set to respond to MIDI controllers and by varying the parameters of the agents it is possible to have real time control over very complex music. This software is written in Java and should run on any operating system.

I have created this software for my own use and it has not been systematically tested. The core features should work. Other features, such as MIDI synchronization with external devices and OSC (see sections 5 and 6), might not work.

Feel free to contact me at [www.davidgamez.eu/contact](http://www.davidgamez.eu/contact) if you have any questions about this software.

## 2. Installation

MAS can be installed on Windows by downloading and running the file **mas\_setup-3.0.exe**. This has the option of installing a local copy of the Java Runtime environment in the MAS program directory, which will only be used by MAS. The safest choice is to leave this option selected. When you have run the installer, double click on the icon to launch MAS in Windows. You will be presented with the screen shown in Figure 1.

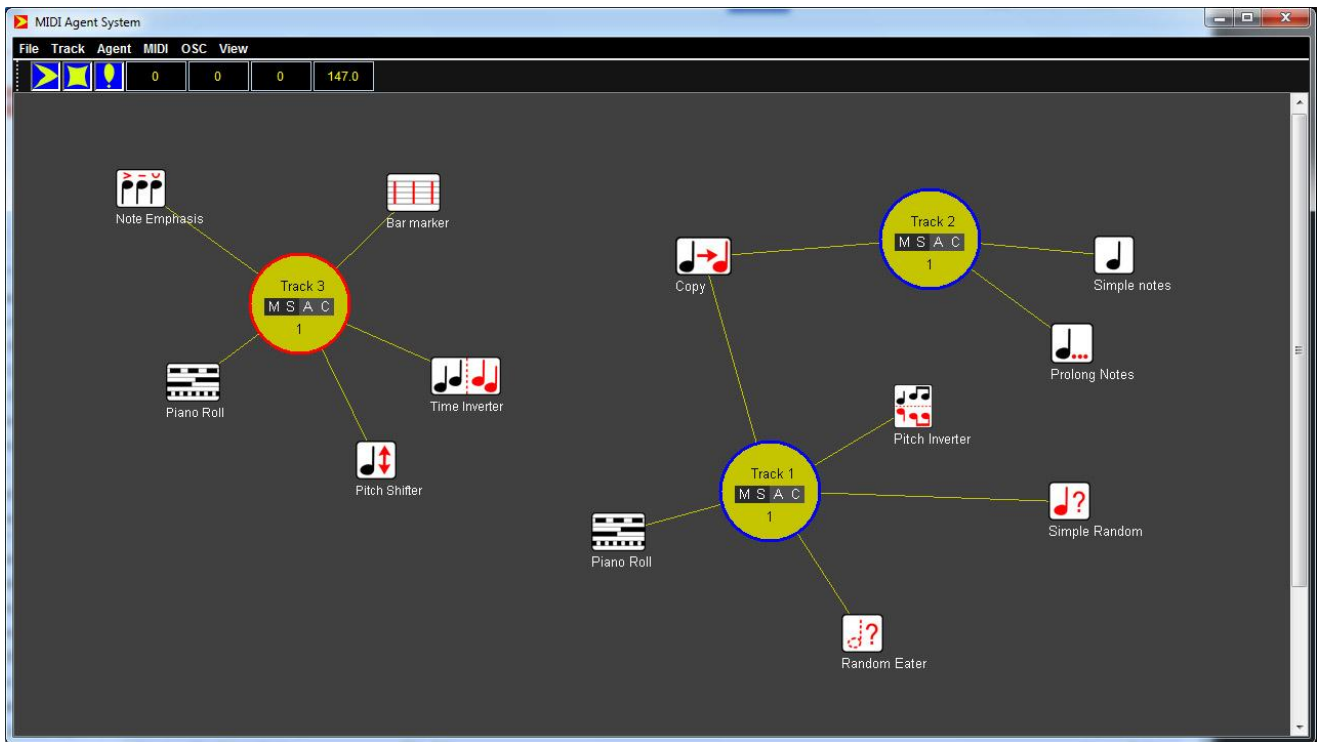


Figure 1. MAS graphical interface

MAS is written in Java, so it should be relatively straightforward to run it on other operating systems. All of the source code is available in the file **mas\_src\_3.0.zip**.

### 3. Operation

Each track in MAS is associated with a MIDI channel and has its own buffer. The track buffers are advanced ahead of the notes being played. Each time the buffers are advanced the system asks each agent to fill the buffers of the tracks that they are connected to. The order in which the agents are queried is set in the *Agent Order Dialog* (see Section 8). The buffers are advanced when all of the agents have finished. Agents can write notes to the buffer, they can edit notes in the buffer, they can delete notes from the buffer and they can add messages to the buffer that can be read by other agents. The operation of the buffer is illustrated in Figure 2.

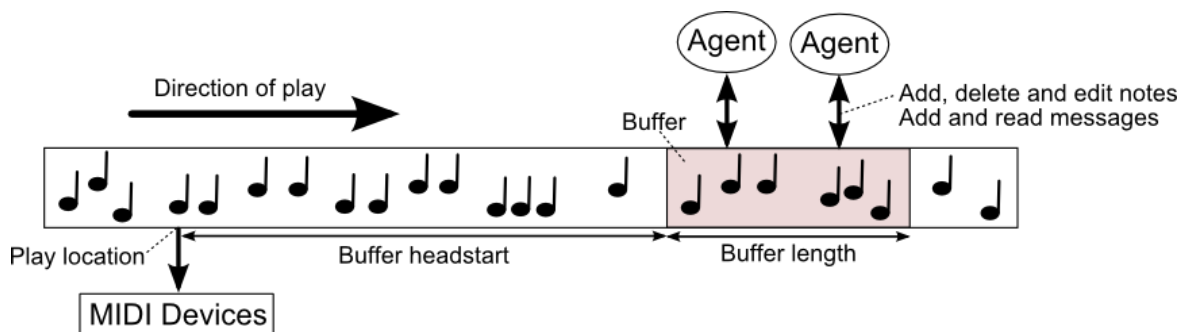


Figure 2. Operation of MAS

The properties of the buffer can be set using the *Buffer Properties Dialog* shown in Figure 3, which you can launch by selecting **MIDI->Buffer Properties**. The length of the buffer can be changed. If you have problems with playback you can increase the headstart of the buffer. The current position of the playback as well as the buffer that is being loaded and played is displayed in the *Transport Toolbar* (see Figure 4).

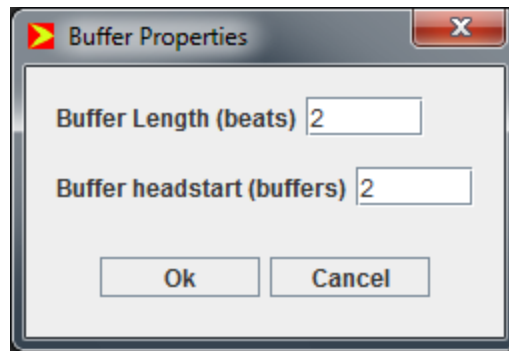





Figure 3. Buffer Properties Dialog.

## 4. Transport Controls

The *Transport Toolbar* is illustrated in Figure 4. It has the following controls:

-  *Play*.
-  *Stop*.
-  *Kill all notes*. Sends a Note Off message to all notes on all channels. Some of the agents are a bit buggy and don't terminate their notes when their parameters are being changed. This silences any hanging notes.
- *Track counter*. Displays the number of beats that have been played.
- *Load buffer counter*. Displays the buffer that is being loaded.
- *Play buffer counter*. Displays the buffer whose notes are being played.
- *Tempo*. Displays the tempo.

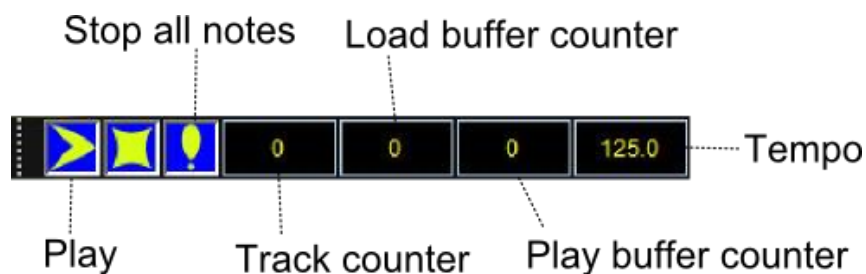


Figure 4. Transport Toolbar

Double clicking on the tempo display launches the *Tempo Dialog* shown in Figure 5. The tempo is set using the text box at the top. The tempo can be shifted using the knob and the range of shift is set by the combo box at the bottom.

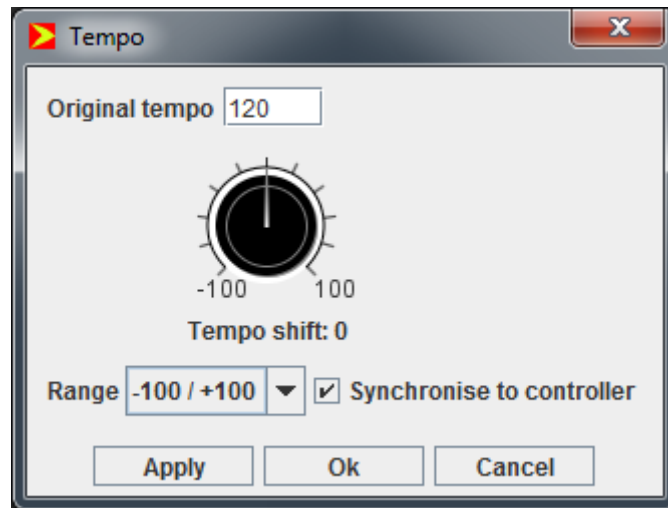


Figure 5. *Tempo Dialog*

## 5. MIDI

MIDI input devices that send controller messages to the agents and MIDI output devices can be set using the *MIDI Device Dialog* shown in Figure 6, which can be launched by selecting **MIDI->MIDI Devices**. Highlight the devices that you want to use for input and output and click Ok.

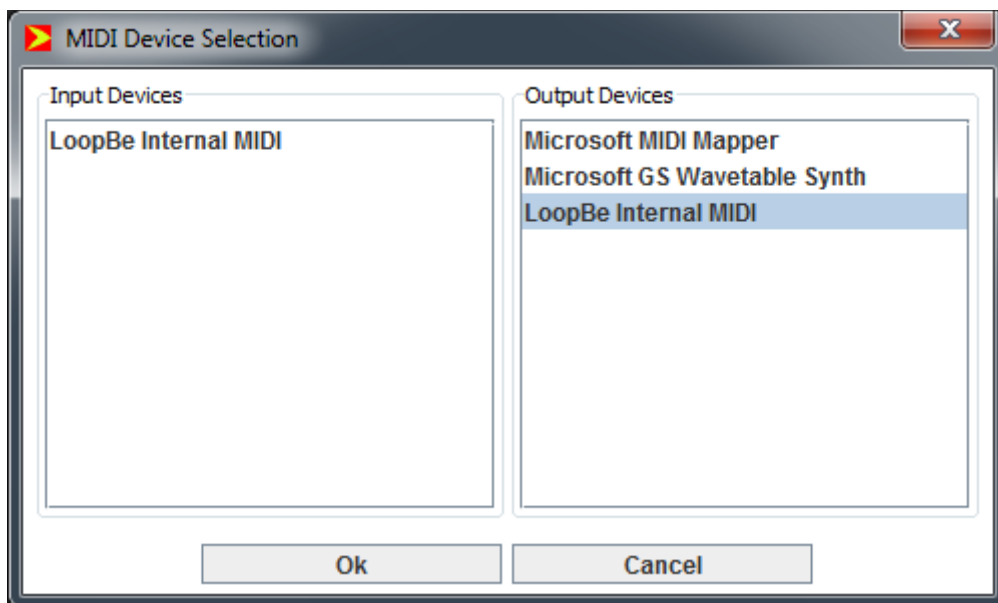


Figure 6. *MIDI Device Dialog*

MIDI playback can be synchronized with other MIDI devices.<sup>1</sup> This can be enabled using the *MIDI Synchronization Dialog* shown in Figure 7, which can be launched by selecting **MIDI->MIDI Synchronization**. A list of MIDI output events can be viewed using the *MIDI Event Dialog* shown in Figure 8.

<sup>1</sup> I am not completely confident that this feature is working.

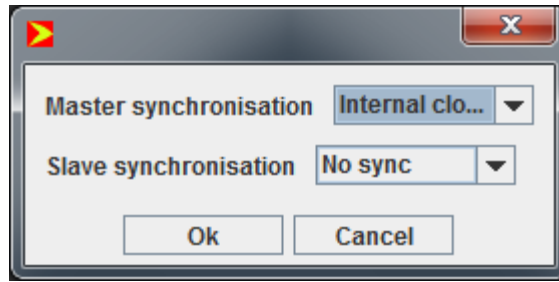


Figure 7. MIDI Synchronization Dialog

Time(ms)	Time(ticks)	Command	Data 1	Data 2	Channel
5	10	144	60	80	0
245	490	128	60	80	0
485	970	144	60	80	0
725	1450	128	60	80	0
964	1928	144	60	80	0
1204	2408	128	60	80	0
1444	2888	144	60	80	0
1684	3368	128	60	80	0
1924	3848	144	60	80	0
2164	4328	128	60	80	0
2404	4808	144	60	80	0
2644	5288	128	60	80	0
2884	5768	144	60	80	0
3124	6248	128	60	80	0
3364	6728	144	60	80	0

Figure 8. MIDI Event Dialog

## 6. OSC

MAS should be able output OSC messages.<sup>2</sup> The details about the OSC devices are entered using the *OSC Devices Dialog*, which is launched by selecting **OSC->OSC Devices**. This should enable you to add OSC devices by entering their name, IP Address and Port (see Figure 9).

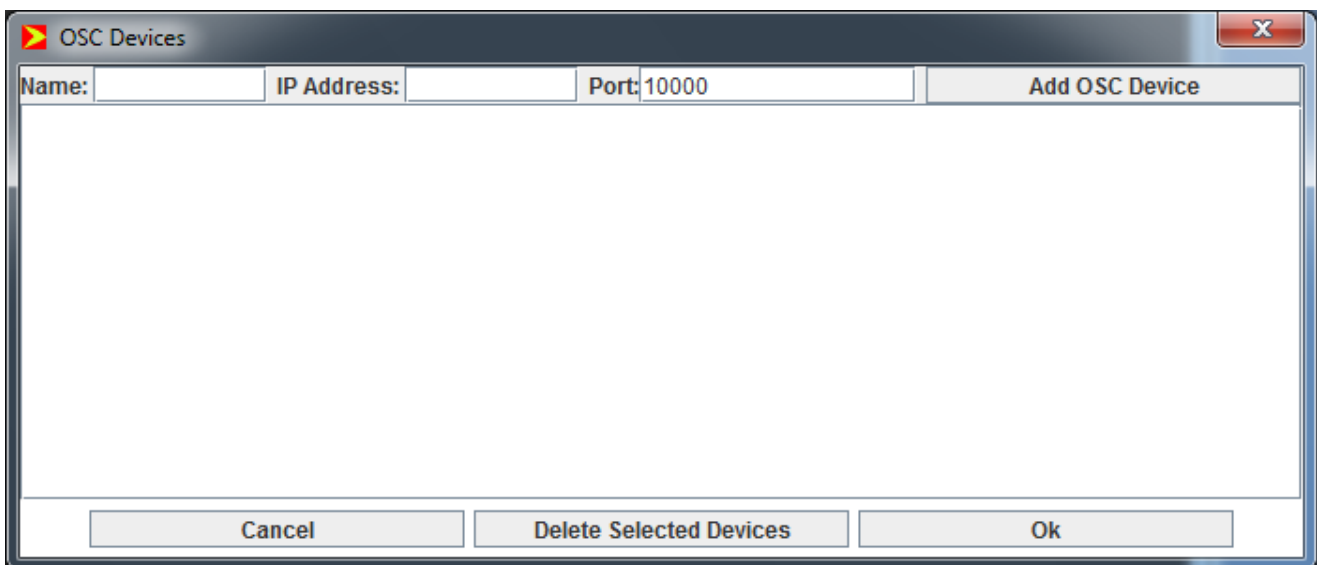


Figure 9. OSC Devices Dialog

<sup>2</sup> This feature was implemented a long time ago and I am not certain that it is working.

## 7. Tracks

To add a track select **Track->Add Track** or use the shortcut **CTRL+T**. To delete a track click on the track to select it and then select **Track->Delete Track** or use the shortcut **SHIFT+T**. Double click on a track to launch the *Track Properties Dialog*, which enables you to set the track's name and MIDI channel.

Left click and drag on a track to move it independently of the agents that are connected to it. Right click and drag on a track to move it together with its connected agents. Agents that are connected to two tracks will not be moved when left clicking and dragging a track.

Each track has four buttons:

- **M.** Mutes the track
- **S.** Solos the track.
- **A.** Hides and shows the agents and connections that are associated with the track.
- **C.** Hides and shows the connections to the track.

## 8. Agents

To add an agent select **Agent->Add Agent** or use the shortcut **CTRL+G**. This will launch the *Add Agent Dialog* shown in Figure 10. At the top of the dialog is a drop down combo box that enables you to select the type of agent. The agents are dynamically loaded from the plugins folder. Select the type of agent that you want to add, give it a name if you want and click Ok. To delete an agent, select the agent by clicking on it and then select **Agent->Delete Agent(s)** or use the shortcut **SHIFT+G**.

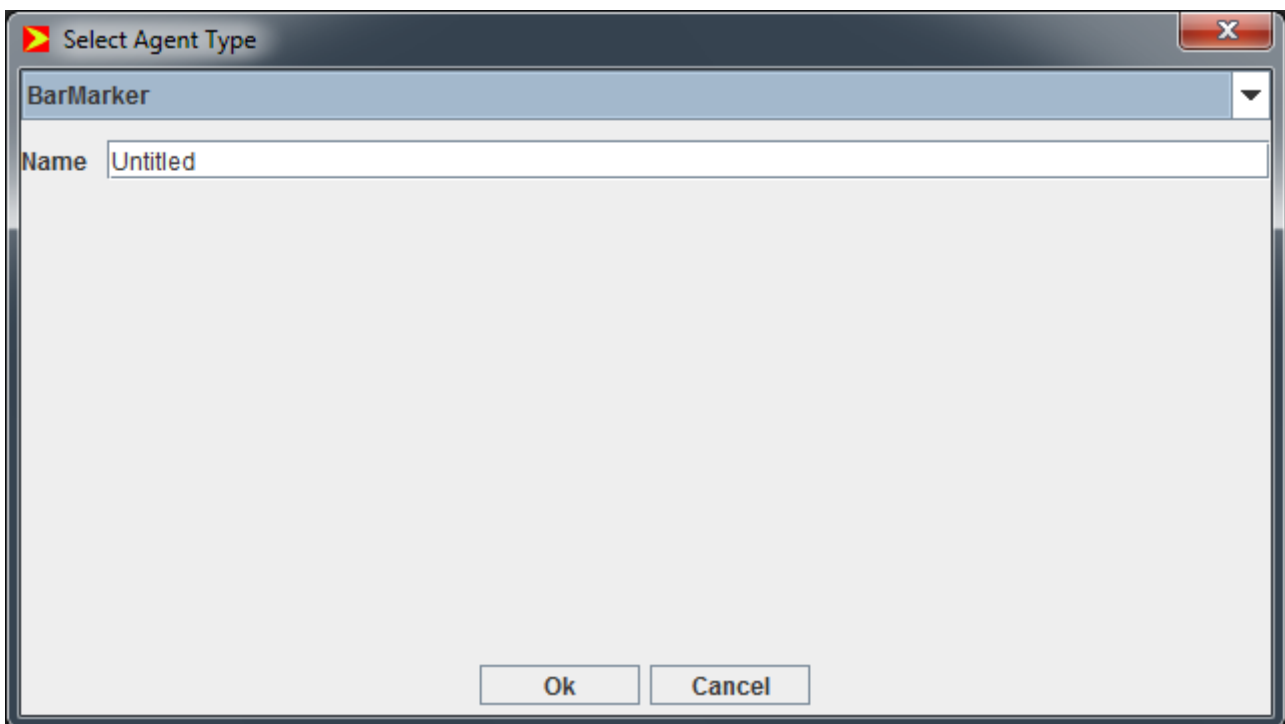














Figure 10. Add Agent Dialog

Agents can be enabled and disabled by clicking them with the middle mouse button. Agents are greyed out when they are disabled. To move an agent, left click it with the mouse and drag it to the desired location. To connect an agent to a track **CTRL+click+drag** the left mouse button on the agent. This should generate a line. Drag this line over the track that you want to connect the agent to. Release the mouse button and the line should remain between the agent and track to indicate that they are connected. To delete a connection, right click on it and select 'Delete' from the popup menu.

The available agents are summarized in Table 1.

Icon	Name	Description
	Bar Marker	Writes agent messages that mark the beginning and end of bars. This agent can generate sequences of bars of different lengths - for example 3/4, 4/4, 2/4 etc. - or random bar lengths. A MIDI controllable knob can be used to vary the maximum bar length.
	Basic Notes	Generates sequences of notes with different positions and lengths. Can be set to restart its sequence at the beginning of each bar.
	Copy	Copies notes from one track to another with an optional delay.
	Note Emphasis	Increases or decreases the velocity of notes at set positions. Can be set to restart at the beginning of each bar.
	Piano Roll	Traditional piano roll that enables the user to enter and edit notes.
	Pitch Inverter	Inverts the notes around the specified pitch.
	Pitch Shifter	Shifts the pitch of notes up or down by a fixed amount set by a MIDI-controllable knob or continuously increases or decreases the pitch.
	Prolong Notes	Stores note-off messages when the button is pressed, so that all notes are prolonged until the button is pressed again.
	Random Eater	Randomly deletes notes. The probability of this happening is set by a MIDI controllable knob.
	Simple Notes	Generates a sequence of notes repeating at a particular frequency and pitch without any control from the Bar Marker agent.
	Simple Random	Randomly generates notes with a specified frequency, pitch range and note length range. The probability of a note being generated is set by a MIDI-controllable knob.
	Time Inverter	Creates a mirror image of the notes in the buffer. Can be set to mirror alternate buffers.

**Table 1.** The agents in MAS 3.0

Each agent has a *Properties Dialog* associated with it. For example the *Bar Marker Properties Dialog* is shown in Figure 11. Double clicking on an agent launches its associated dialog.

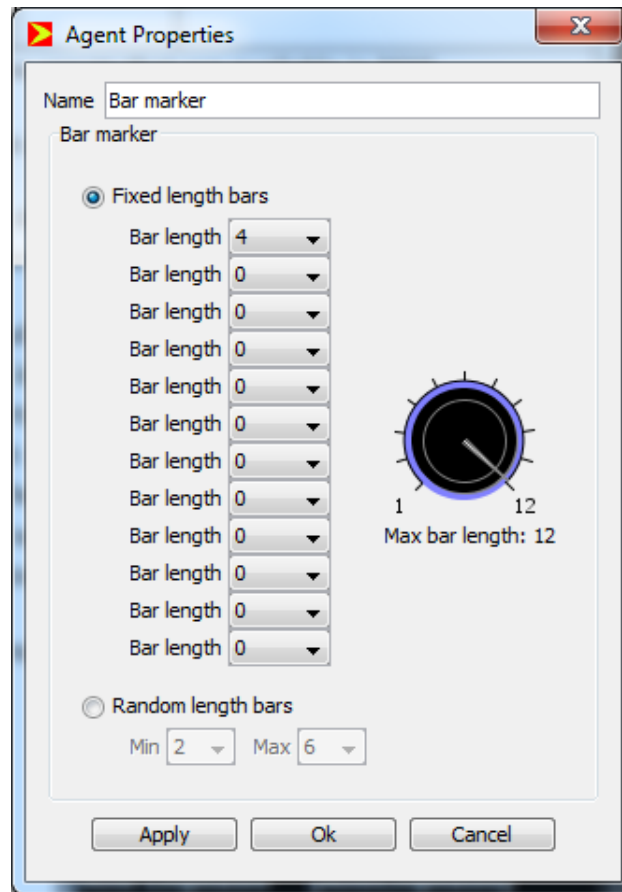


Figure 11. Bar Marker Properties Dialog.

It is relatively straightforward to add your own agents by adapting the code for one of the existing agents.

The order in which the agents are called to load the track buffers with MIDI data is set using the *Agent Order Dialog* shown in Figure 12. To launch the *Agent Order Dialog* select **Agent->Set Agent Order** or use the shortcut **CTRL+L**. The first agent to be invoked is the one at the top of the list, followed by the second, and so on. To change the position of an agent on the list, click and drag it to the desired location.

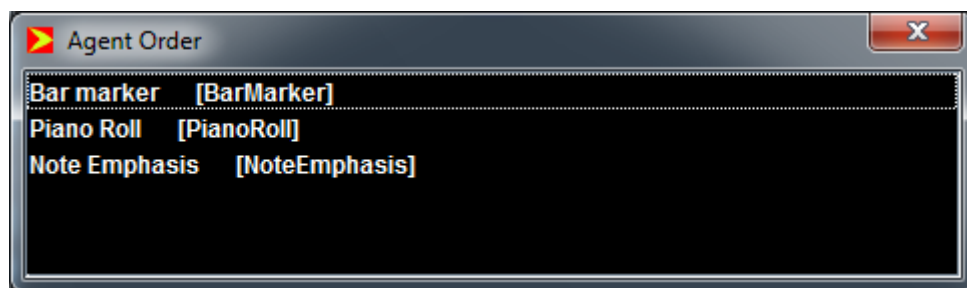


Figure 12. Agent Order Dialog

Many agents have a knob in their *Properties Dialog* that can be linked to a MIDI controller. Double click on the knob to launch the *MIDI Controller Dialog* shown in Figure 13. Checking the MIDI control box enables you to set the controller number that you want the knob to respond to. If the MIDI Device has been selected correctly (see Section 5), you should be able to move the knob by sending the appropriate controller message from your hardware or software device.



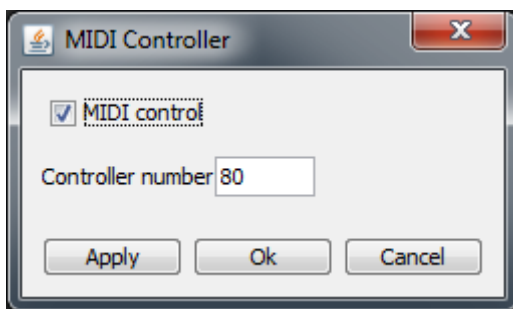


Figure 13. MIDI Controller Dialog

## 9. Saving and Loading Projects

The loading and saving commands are as follows:

- To create a new project click on **File->New Project** or use the shortcut **CTRL+N**.
- To save a project click on **File->Save Project** or use the shortcut **CTRL+S**. You will be presented with the file dialog.
- You can save an existing project with a new filename by clicking on **File->Save Project As**.
- To open an existing project click on **File->Open** or use the shortcut **CTRL+O**.

Projects are stored in XML format.

## 10. Settings

Some basic settings for MAS can be made by editing the mas.conf file in the installation directory. This allows you to set the project directory, default tempo and the width and height of the work area.