# Programming Environments - Knowledge Organiser

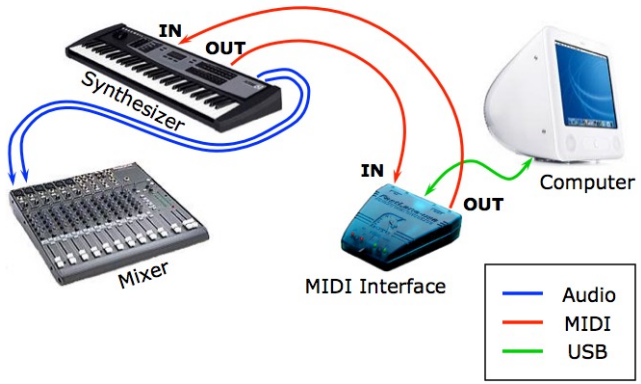
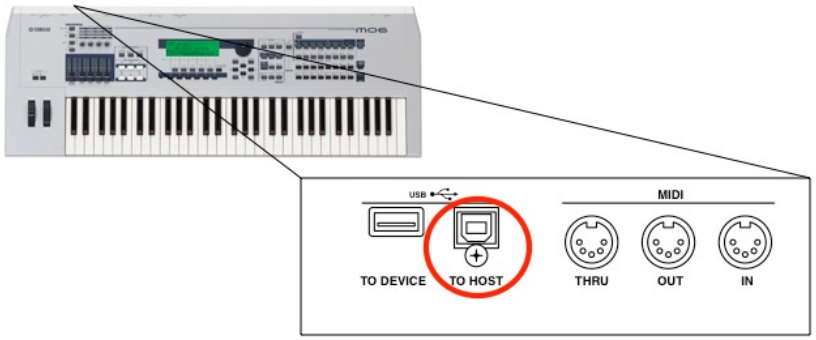
| GLOSSARY | |
|---|---|
| **MIDI** | Musical Instrument Digital Interface |
| **MSB** | Most Significant Bit |
| **LSB** | Least Significant Bit |
| **Status Byte** | Type of MIDI message |
| **Data Byte** | Information about a specific parameter |
| **Switched Controller** | A controller with only two possible values, on or off |
| **Continuous Controller** | A controller with possible values between 0 and 127 |
| **Unidirectional** | A cable that can only transport information in one direction |
| **Bidirectional** | A cable that can both send and receive data |
| **OSC** | Open Sound Control |

**MIDI VS OSC**

| MIDI | OSC |
|---|---|
| • Allows for multiple sounds to be controlled from a **single** device<br>• Allowed for instruments from **different manufactures to become compatible** with one another<br>• Allowed for multiple devices to **sync parameters** (e.g. tempo)<br>• Audio is created using encoded binary messages instead of waveforms so the sound of a **recorded track can be altered after the fact** | • Allows for messages to be transported across **the internet** and **local networks**<br>• Allows for **'bundles'** of messages to be transmitted and to have their **effects occur simultaneously**<br>• Used in more experimental musical controllers to go **beyond the capabilities of MIDI** |

**MIDI MESSAGES**

| | Data Byte Values |
|---|---|
| • 1 **byte** = 8 **bits**<br>• **Status** byte – MSB = **1**<br>• **Data** byte – MSB = **0** | • Data bytes have a maximum of **128** different values **(0-127)**<br>  • **MSB = 0** → 7 bits can be used to store data<br>  • **$2^7$ = 128** |

<table>
<tr><th colspan="3">MIDI CONTROLLER CHANGES (CC)</th></tr>
<tr><th colspan="2">Examples of Switched Controllers</th><th>Examples of Continuous Controllers</th></tr>
<tr><td colspan="2">• Sustain<br>• Glide<br>• Mute</td><td>• Volume<br>• Pan<br>• Modulation</td></tr>
<tr><th colspan="3">MIDI SET-UPS</th></tr>
<tr><td>Traditional</td><td> 
</td><td>• Two MIDI cables are required to connect the synth to the MIDI interface<br>  • One for sending MIDI messages (MIDI OUT)<br>  • One for receiving MIDI messages (MIDI IN)<br>• MIDI cables are unidirectional</td></tr>
<tr><td>Modern</td><td> 
</td><td>• Modern hardware synths usually have a USB port, eliminating the need for a MIDI interface<br>• It is also common for software-based synths to be used in conjunction with MIDI keyboards<br>• USB cables are bidirectional so can both send and receive MIDI messages</td></tr>
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