Footswitch Controller

OPERATING INSTRUCTIONS
INTRODUCTION
Thank you for purchasing the MIDI Solutions Footswitch Controller.
The MIDI Solutions Footswitch Controller can be programmed to generate a variety of MIDI messages in response to a contact closure between the tip and sleeve of its 1/4” phone jack input. It is also possible to program the Footswitch Controller to perform a variety of other functions, such as Rechannelize, Transpose, and Tap Tempo. All programmed settings are retained even after power is removed from the unit. The MIDI Solutions Footswitch Controller is MIDI-powered and requires no batteries or power supply to operate.

CONNECTIONS
To program the Footswitch Controller connect the MIDI Out from your MIDI interface to the MIDI In of the Footswitch Controller. The MIDI Out and footswitch input can be left disconnected during programming.
Once the Footswitch Controller has been programmed it can be inserted wherever it is required in your MIDI setup. Connect the footswitch (or any contact closure from tip to sleeve of a 1/4” phone jack) to the Footswitch Controller’s footswitch input (Fsw). Connect the MIDI Out or Thru of the sending device to the MIDI In of the Footswitch Controller. The Footswitch Controller draws power from the device that is connected to its MIDI input, so even if the Footswitch Controller does not need to receive MIDI messages from this device the connection is still required in order for the Footswitch Controller to draw power (the Footswitch Controller’s Echo parameter can be programmed to OFF to prevent any unwanted incoming MIDI messages from being echoed to the Footswitch Controller’s MIDI Out). Connect the MIDI Out of the Footswitch Controller to the MIDI In of the receiving MIDI device. It is recommended that the number of MIDI Solutions products powered by a single MIDI Out or Thru be limited to four.

PROGRAMMING
The Footswitch Controller is programmed by sending it MIDI System Exclusive programming commands from a computer with a MIDI interface. These commands are described in detail on the following pages, however the Programming Tools software creates these commands automatically (see www.midisolutions.com/support.htm).
Upon receipt of a programming command, the Footswitch Controller’s MIDI indicator LED flashes rapidly for about one second to indicate that the setting has been stored. Settings are retained after power is removed, and the unit can then be inserted wherever it is required in your MIDI setup.

OPERATION
Ensure that the footswitch is connected to the Footswitch Controller before it is powered up as its polarity is stored at this time (if auto-polarity is selected). The Footswitch Controller’s MIDI Indicator LED will light as soon as the sending device is turned on, and flashes whenever MIDI data passes through the unit. Depressing the footswitch causes the Footswitch Controller to perform its programmed function.
PROGRAMMING COMMANDS

CLEAR SETTINGS AND SET DEVICE PARAMETERS

The following Device Parameters are in effect regardless of the functions that the Footswitch Controller has been programmed to perform.

**Echo:** When Echo is ON, all incoming MIDI messages received by the Footswitch Controller are echoed to its MIDI output. When Echo is OFF, only the messages generated by the Footswitch Controller are sent to its MIDI output.

**Toggle:** When the Toggle parameter is OFF, the Footswitch Controller performs the *depress operation* when it is depressed, and the *release operation* when it is released. When Toggle is ON, the Footswitch Controller toggles between the *depress operation* and the *release operation* each time the footswitch is depressed (nothing is done on release of the footswitch).

**Footswitch Polarity:** When Polarity is set to OPEN, closing the contact initiates the depress operation, and opening the contact initiates the release operation. When Polarity is set to CLOSED, opening the contact initiates the depress operation, and closing the contact initiates the release operation. When Polarity is set to AUTO, the Footswitch Controller determines the polarity of the footswitch based on its power-up state.

**Send State on Power-up:** The Footswitch Controller can be programmed to send the state of the footswitch input on power-up.

**Wait for Next Bar:** The Footswitch Controller can be programmed to wait until the beginning of the next bar to perform the footswitch action.

**Debounce Time:** The Debounce Time specifies the length of time after a footswitch changes state before a new change of state is allowed to occur.

To clear the Footswitch Controller’s settings and set the device parameters, send it the following System Exclusive programming commands:

- **F0 00 00 50 04 00 aa bb (cc) (dd) (ee) F7**  
  (cc, dd, and ee are optional)
  
<table>
<thead>
<tr>
<th>aa</th>
<th>bb</th>
<th>cc</th>
<th>dd</th>
<th>ee</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>00</td>
</tr>
</tbody>
</table>
  
  - **F0 00 00 50 04 00 00 03 (00) tt F7**  
  (00 is optional)
  
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  
<table>
<thead>
<tr>
<th>tt</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
</tr>
</tbody>
</table>

**Examples**

To program the Footswitch Controller to echo incoming MIDI messages to the MIDI output, set the toggle parameter to OFF, force the polarity to NORMALLY OPEN, and send nothing on power-up, send it the following System Exclusive programming command:

F0 00 00 50 04 00 01 00 00 F7

To program the footswitch debounce time to 100 ms send the Footswitch Controller the following System Exclusive programming command:

F0 00 00 50 04 00 03 64 F7
FOOTSWITCH CONTROLLER FUNCTIONS
The Footswitch Controller can be programmed with one of the functions on the following pages.

NOTE-ON
To program the Footswitch Controller to send out up to eight Note-On messages when the footswitch is depressed, send it the following System Exclusive programming command:

- **F0 00 00 50 04 aa (tt) nn vv cc (nn vv) F7**  (tt and nn vv are optional)

  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  - **aa** specifies mode of transmission as follows:
    - 01: Send Note-On(s) on depression of footswitch, Note-Off(s) on release
    - 11: Send Note-On(s) on depression of footswitch, nothing on release
    - 21: Send Note-On(s) on depression of footswitch, Note-Off(s) after the duration specified by tt (see below)
    - 31: Send Note-On(s) on depression of footswitch, Note-Off(s) when the footswitch is released after the minimum duration tt (see below)
    - 41: Send Note-On(s) on depression of footswitch, Note-Off(s) when the footswitch is released up to the maximum duration tt (see below)
    - 51: Cycle through each Note-On on depression of footswitch, send the corresponding Note-Off on release
  - **tt** = Duration in 8 ms increments, or 1 s increments if preceded by 00.  (tt is only included if aa = 21, 31, or 41)
  - **nn** = Note number
  - **vv** = Note-On velocity
  - **cc** = MIDI channel (see MIDI channel table at end)
  - **nn vv** = Additional notes and velocities (up to eight notes total)

Example
To program the Footswitch Controller to send out a middle C of velocity of 64 on MIDI channel 5 when the footswitch is depressed, and send the corresponding Note-Off after 7 seconds, set **aa = 21** (Send Note-On on depression of footswitch, Note-Off after the duration specified by tt), **tt = 00 07** (insert 00 prior to 07 to specify 1s increments), **nn = 3C** (middle C is Note number 60, 3C is the hexadecimal value for 60), **vv = 40** (40 is the hexadecimal value for 64), and **cc = 04** (04 specifies MIDI channel 5). These values result in the following System Exclusive programming command:

- **F0 00 00 50 04 21 00 07 3C 40 04 F7**
CONTROL CHANGE
To program the Footswitch Controller to send out up to eight Control Change (CC) messages when the footswitch is depressed, send it the following System Exclusive programming command:

- \textbf{F0 00 00 50 04 aa (tt) nn vv cc (nn vv) F7} \quad (tt and nn vv are optional)

All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

- aa specifies mode of transmission as follows:
  
  - 02: Send CC(s) on depression of footswitch, CC(s) of value 0 on release
  - 12: Send CC(s) on depression of footswitch, nothing on release
  - 22: Send CC(s) on depression of footswitch, CC(s) of value 0 after the duration specified by tt (see below)
  - 32: Send CC(s) on depression of footswitch, CC(s) of value 0 when the footswitch is released after the minimum duration tt (see below)
  - 42: Send CC(s) on depression of footswitch, CC(s) of value 0 when the footswitch is released up to the maximum duration tt (see below)
  - 52: Cycle through each CC on depression of footswitch, send the corresponding CC of value 0 on release
  - 62: Cycle through each CC on depression of footswitch, send nothing on release
  - tt = Duration in 8 ms increments, or 1 s increments if preceded by 00. (tt is only included if aa = 22, 32, or 42)
  - nn = Control Change number
  - vv = Control Change value (sent on depression of footswitch)
  - cc = MIDI channel (see MIDI channel table at end)
  - nn vv = Additional CC numbers and values (up to eight CCs total)

Example
To program the Footswitch Controller to send maximum volume on all MIDI channels when the footswitch is depressed, set aa = 12 (Send CC on depression of footswitch, nothing on release), nn = 07 (volume is CC#7), vv = 7F (7F is the hexadecimal value for 127, the maximum value), and cc = 7F (7F specifies all MIDI channels). These values result in the following System Exclusive programming command:

\textbf{F0 00 00 50 04 12 07 7F 7F F7}

START/STOP
To program the Footswitch Controller to send MIDI Start and Stop messages, send it the following System Exclusive programming command:

- \textbf{F0 00 00 50 04 05 (ss) F7} \quad (ss is optional)

- ss specifies the mode of transmission as follows:

  - 00: Send Stop on depression of footswitch, nothing on release
  - 01: Send Start on depression of footswitch, nothing on release
  - ss omitted: Send Start on depression of footswitch, Stop on release

Note that the Footswitch Controller can be programmed to toggle between Start and Stop each time the footswitch is depressed by setting the Footswitch Toggle parameter to Toggle ON (see Device Parameters).
**PITCH BEND**
To program the Footswitch Controller to send out a Pitch Bend message when the footswitch is depressed, send it the following System Exclusive programming command:

- **F0 00 00 50 04 aa ll mm cc F7**
  - All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  - **aa** specifies the mode of transmission as follows:
    - 03: Send **ll mm** value on depression of footswitch, reset pitch to zero on release
    - 13: Send **ll mm** value on depression of footswitch, nothing on release
  - **ll** = LSB pitch value
  - **mm** = MSB pitch value
  - **cc** = MIDI channel (see MIDI channel table at end)

**Example**
To program the Footswitch Controller to send out a pitch bend message of +1 semitone (to a device that is set to a full octave pitch bend range) on channel 12 when the footswitch is depressed, set **aa = 03** (send value on depression, reset pitch to zero on release), **ll mm = 2B 45** (2B 45 is the value for +1 semitone bend in a full octave range), and **cc = 0B** (0B specifies MIDI channel 12). These values result in the following System Exclusive programming command:

F0 00 00 50 04 03 2B 45 0B F7

**PROGRAM CHANGE**
To program the Footswitch Controller to send out a Program Change message when the footswitch is depressed, send it the following System Exclusive programming command:

- **F0 00 00 50 04 pp cc (qq) (bb bb) (dd dd) F7**  (qq, bb bb, and dd dd are optional)
  - All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  - **pp** = Program number sent on depression of footswitch
  - **cc** = MIDI channel (see MIDI channel table at end)
  - **qq** is optional, specifies Program number sent on release of footswitch
  - **bb bb** is optional, specifies Bank Select MSB and LSB values to precede **pp** on depression of footswitch
  - **dd dd** is optional, specifies Bank Select MSB and LSB values to precede **qq** on release of footswitch

**Example**
To program the Footswitch Controller to send out Bank Select MSB 3 + Bank Select LSB 6 + Program Change 0 on all MIDI channels when the footswitch is depressed, and nothing when the footswitch is released, set **pp = 00** (Program Change 0), **cc = 7F** (7F specifies all MIDI channels), **omit qq** (nothing sent on release), **bb bb = 03 06** (Bank Select MSB = 3, Bank Select LSB = 6), and **omit dd dd** (nothing sent on release). This results in the following System Exclusive programming command:

F0 00 00 50 04 00 7F 03 06 F7
PROGRAM CHANGE CAPTURE
To program the Footswitch Controller to capture the Program Change and Bank Select messages it receives while the footswitch is depressed, send it the following System Exclusive programming command:

- F0 00 00 50 04 0D F7

Once the Program Change and Bank Select data has been captured, tapping the footswitch causes the Footswitch Controller to resend the captured data. Captured data is retained even after power is removed from the Footswitch Controller.

PROGRAM CHANGE INC/DEC
A single Footswitch Controller may be programmed to provide a Program Change INC function, or two Footswitch Controllers may be chained together to provide a Program Change INC/DEC function, with one unit programmed as an increment unit and the other as a decrement unit. The MIDI Out of the decrement unit must be connected to the MIDI In of the increment unit. To program the units send them the following programming commands:

- INC unit: F0 00 00 50 04 07 01 cc (xx yy) F7 (xx yy is optional)
- DEC unit: F0 00 00 50 04 07 00 cc (xx yy) F7 (xx yy is optional)

All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

cc = MIDI channel (see MIDI channel table at end)
xx yy is optional. xx = minimum value, yy = maximum value

Example
To program a Footswitch Controller with the Program Change INC function on MIDI channel 16, and a second Footswitch Controller with the Program Change DEC function on MIDI channel 16, send them the following System Exclusive programming commands:

INC unit: F0 00 00 50 04 07 01 0F F7
DEC unit: F0 00 00 50 04 07 00 0F F7

PROGRAM CHANGE ENTER AND SELECT
To program the Footswitch Controller to allow a keyboard to be used as a numeric keypad to enter program numbers, or notes from a keyboard to select specific programs numbers, send the Footswitch Controller the following System Exclusive programming command:

- F0 00 00 50 04 14 mm cc F7

All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

mm specifies the mode of operation as follows:

- 00: Keyboard is used as a numeric keypad to enter the program number (0 - 127) while footswitch is depressed, with middle C representing “0”, to A above middle C representing “9”
- >0: Keyboard is used to select a specific program number (0 - 127) while footswitch is depressed, starting from note mm for program #0. Pressing the note twice adds 64 to the program value.

The Program Change message is sent on release of the footswitch.

cc = MIDI channel (see MIDI channel table at end)
SYSTEM EXCLUSIVE
To program the Footswitch Controller to send out a System Exclusive message when the footswitch is depressed, send it the following System Exclusive Programming commands:

- **F0 00 00 50 04 06 01 F7** followed by **F0 ... F7**
  where **F0 ... F7** is the System Exclusive message the Footswitch Controller is being programmed to send (max. 20 bytes)
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

To program the Footswitch Controller to send out a System Exclusive message when the footswitch is released, send it the following System Exclusive Programming commands:

- **F0 00 00 50 04 06 00 F7** followed by **F0 ... F7**
  where **F0 ... F7** is the System Exclusive message the Footswitch Controller is being programmed to send (max. 20 bytes)
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

**Example**
To program the Footswitch Controller to send out the MIDI Machine Control *Play* command (F0 7F 7F 06 02 F7) when the footswitch is depressed, and the MIDI Machine Control *Stop* command (F0 7F 7F 06 01 F7) when the footswitch is released, send the Footswitch Controller the following System Exclusive Programming commands:

F0 00 00 50 04 06 01 F7 followed by F0 7F 7F 06 02 F7
F0 00 00 50 04 06 00 F7 followed by F0 7F 7F 06 01 F7

**NOTE-ON FILTER**
To program the Footswitch Controller to filter Note-On messages on a selected MIDI channel when the footswitch is depressed, send it the following System Exclusive Programming command:

- **F0 00 00 50 04 0C cc aa F7**
  cc = MIDI channel (see MIDI channel table at end)
  aa = 01: Send All-Notes-Off on depression of footswitch, aa = 00: do not send All-Notes-Off on depression

To start filtering Note-On messages depress the footswitch (the All-Notes-Off message is sent out at this time), to stop filtering release the footswitch.
RECHANNELIZE
To program the Footswitch Controller to rechannelize an incoming MIDI channel to a selected outgoing MIDI channel when the footswitch is depressed, send it the following System Exclusive Programming command:

- **F0 00 00 50 04 09 (10) cc (pp) (00) F7**  
  (10, pp, and 00 are optional)
  
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  
  10 is optional, if included then the 16 notes from middle C up are used to select the channel. If omitted, then 
  the number of notes played while the footswitch is depressed is used to select the channel.
  
  cc = Incoming MIDI channel to rechannelize (see MIDI channel table at end)
  
  pp is optional, specifies preset outgoing MIDI channel (see MIDI channel table at end)
  
  00 is optional, if included then incoming notes are ignored while footswitch is depressed

To rechannelize an incoming MIDI channel depress the footswitch (the All-Notes-Off message is sent out at this time), select the channel by playing notes on the keyboard (these notes are not echoed to MIDI Out), and release the footswitch. If no notes are received by the Footswitch Controller during this period, the outgoing MIDI channel is set to the preset pp. To program the Footswitch Controller to ignore incoming notes and change directly to the preset MIDI channel pp when the footswitch is depressed, insert 00 in the above command as shown.

Example Setting
To program the Footswitch Controller to accept rechannelize selection for incoming MIDI channel 1 when the footswitch is depressed, send it the following System Exclusive programming command:

F0 00 00 50 04 09 00 F7

Example Operation with Above Setting
To rechannelize from MIDI channel 1 to MIDI channel 2 depress the footswitch, play any two notes, and release the footswitch. All MIDI channel 1 messages will now be rechannelized to MIDI channel 2. Continuing to tap the footswitch will cause the Footswitch Controller to toggle between the original and selected channels.

TRANSPOSE
To program the Footswitch Controller to transpose incoming note messages by a selected interval by depressing the footswitch, send it the following System Exclusive Programming command:

- **F0 00 00 50 04 0A cc (pp) (00) F7**  
  (pp and 00 are optional)
  
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  
  cc = Incoming MIDI channel to transpose (see MIDI channel table at end)
  
  pp is optional, specifies preset transpose interval (40 = zero transpose)
  
  00 is optional, if included then incoming notes are ignored while footswitch is depressed

To specify a transpose interval depress the footswitch (the All-Notes-Off message is sent out at this time), play the note above or below middle C corresponding to the transpose interval (this note is not echoed to MIDI Out), and release the footswitch. If no notes are received by the Footswitch Controller during this period, the transpose interval is set to the preset transpose interval pp. To program the Footswitch Controller to ignore incoming notes and change directly to the preset transpose interval pp when the footswitch is depressed, insert a 00 after the pp in the above programming command.
**TAP TEMPO**

To program the Footswitch Controller to operate in Tap Tempo mode sending MIDI timing clocks at a tempo corresponding to the taps of the footswitch, send it the following System Exclusive programming command:

- **F0 00 00 50 04 0B F7**
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)

To program the Footswitch Controller to operate in Tap Tempo mode and also send a Note or Control Change message along with each tap of the footswitch, send it the following System Exclusive programming command:

- **F0 00 00 50 04 0B aa nn vv cc (00) F7**  (00 is optional)
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  - **aa** = 01 to send Note, 02 to send Control Change
  - **nn** = Note number if **aa** = 01, Control Change number if **aa** = 02
  - **vv** = Note velocity if **aa** = 01, Control Change value if **aa** = 02
  - **cc** = MIDI channel of outgoing Note or Control Change message (see MIDI channel table at end)
  - **00** is optional. If inserted, nothing is sent on release of the footswitch. If not inserted then a Note-Off (if **aa** = 01) or Control Change of value zero (if **aa** = 02) is sent on release of the footswitch.

To program the Footswitch Controller to operate in Tap Tempo mode and also respond to a Note or Control Change message (of value>0) as a tap, send it the following System Exclusive programming command:

- **F0 00 00 50 04 0B aa nn cc F7**
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  - **aa** = 11 for Note, 12 for Control Change
  - **nn** = Note number if **aa** = 11, Control Change number if **aa** = 12
  - **cc** = MIDI channel of incoming Note or Control Change message (see MIDI channel table at end)

To program the Footswitch Controller to operate in Tap Tempo mode and also to respond to a Note to specify the exact tempo in bpm, send it the following System Exclusive programming command:

- **F0 00 00 50 04 0B 21 bb cc F7**
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  - **bb** = offset added to Note number to obtain tempo
  - **cc** = MIDI channel of incoming Note message (see MIDI channel table at end)

To program the Footswitch Controller to operate in Tap Tempo mode and also to respond to a Control Change message to specify the exact tempo in bpm, send it the following System Exclusive programming command:

- **F0 00 00 50 04 0B 22 nn bb cc F7**
  All bytes must be in Hexadecimal format (see hexadecimal conversion table at end)
  - **nn** = Control Change number
  - **bb** = offset added to Control Change value to obtain tempo
  - **cc** = MIDI channel of incoming Control Change message (see MIDI channel table at end)
SONG SELECT
To program the Footswitch Controller to send out a Song Select message when the footswitch is depressed, send it the following System Exclusive programming command:

- **F0 00 00 50 04 0E ss (tt) F7** *(all values in Hexadecimal)*
  - **ss** = Song Select sent on depression of footswitch
  - **tt** is optional, specifies Song Select sent on release of footswitch

**Example**
To program the Footswitch Controller to send out Song Select #5 when the footswitch is depressed, send it the following System Exclusive programming command:

F0 00 00 50 04 0E F7

SONG SELECT INC
To program the Footswitch Controller to increment Song Select messages when the footswitch is depressed, send it the following System Exclusive programming command:

- **F0 00 00 50 04 0F 01 (xx yy) F7** *(all values in Hex)*
  - **xx yy** is optional. **xx** = minimum value, **yy** = maximum value

**Example**
To program the Footswitch Controller to increment through Song Select numbers 0 - 10 in response to depression of the footswitch, send it the following System Exclusive programming command:

F0 00 00 50 04 01 00 0A F7

SIMULATE FOOTSWITCH CLOSURE
To cause the Footswitch Controller to simulate the action of the footswitch without physically depressing or releasing the footswitch, send it the following following System Exclusive message:

- **F0 00 00 50 04 10 aa F7** *(all values in Hexadecimal)*
  - **aa** = 00: Simulate RELEASE, **aa** = 01: Simulate DEPRESSION

**Example**
To cause the Footswitch Controller to simulate a footswitch depression, send it the following System Exclusive message:

F0 00 00 50 04 10 01 F7
MIDI CHANNEL TABLE
The value cc in the programming commands is assigned according to the following table:

| MIDI Channel | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | ALL |
|--------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| cc           | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 0A | 0B | 0C | 0D | 0E | 0F |

MIDI CONTROL CHANGE TABLE

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Hexadecimal</th>
<th>Control Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>00</td>
<td>Bank Select</td>
</tr>
<tr>
<td>1</td>
<td>01</td>
<td>Modulation wheel or lever</td>
</tr>
<tr>
<td>2</td>
<td>02</td>
<td>Breath Controller</td>
</tr>
<tr>
<td>3</td>
<td>03</td>
<td>Undefined</td>
</tr>
<tr>
<td>4</td>
<td>04</td>
<td>Foot controller</td>
</tr>
<tr>
<td>5</td>
<td>05</td>
<td>Portamento time</td>
</tr>
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<td>6</td>
<td>06</td>
<td>Data entry MSB</td>
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<td>Channel Volume</td>
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<td>Balance</td>
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<td>9</td>
<td>09</td>
<td>Undefined</td>
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<td>10</td>
<td>0A</td>
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<td>44</td>
<td>Legato Fsw (vv=00-3F: Normal, 40-7F: Legato)</td>
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<td>69</td>
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<td>Hold 2</td>
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<td>70</td>
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<td>71</td>
<td>47</td>
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<td>72</td>
<td>48</td>
<td>Sound Controller 3 (default: Release Time)</td>
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<td>Sound Controller 4 (default: Attack Time)</td>
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<td>74</td>
<td>4A</td>
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<td>75-79</td>
<td>4B-4F</td>
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<td>80-83</td>
<td>50-53</td>
<td>General Purpose Controllers (#’s 5-8)</td>
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<td>84</td>
<td>54</td>
<td>Portamento Control</td>
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<td>85-90</td>
<td>55-5A</td>
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HEXADECIMAL CONVERSION TABLE

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