

Confirmation of Approval
for
MIDI Standard
MMA/AMEI

Date of issue: 2/28/99
Originated by: AMEI

Reference TSBB Item #: 146 TSBB Volume #: 22 (revised)

Title: Scale/Octave Tuning
CA#: 021

Related item(s): MIDI Tuning Standard, #141 MIDI Tuning Specification Extensions

Abstract:

Scale/Octave Tuning is a micro-tuning that is automatically repeated in every octave by calibrating a single octave of notes in small fractions of an equal-tempered half-step. This proposal is an extension to the MIDI Tuning Standard. There are four messages proposed.

Background:

The original MIDI tuning dump message had to define a frequency to each of 128 keys. This proposal defines an easier micro tuning that sets offsets from an equal-tempered half-step by the cent.

Details:

If the instrument has a selectable octave tuning presets, this message will offset the tuning from the currently selected preset. The default behavior is to assume that the instrument is set to an equal temperament, and the message will offset from that. Each message that is received will offset from the original preset, not from the modified tuning.

The first and second messages will offset the tuning of each note in cents. The range is -64/+63 cents. The first message is a real time version. Notes that are already sounding should be updated after receiving this message, and future notes will be tuned to the new offsets. The second message is non-real time.

The third and fourth messages will offset the tuning of each note using a 2 byte encoding, which allows greater range and resolution. With two tuning bytes, the tuning range can be expanded to approximately +/-100 cents with a resolution of .012207 cents (200 cents divided by 16,384 = .012207 cents). The third message is a real time message. Notes that are already sounding should be updated after receiving this message, and future notes will be tuned to the new offsets. The fourth message is non real-time.

A message can update multiple MIDI channels simultaneously. This is achieved by using a 3 byte channel field in the SysEx message, with 1 bit representing each MIDI channel. There are 5 additional bits in one of the channel bytes, which must be set to 0. These bits are reserved for future expansion of the tuning messages. They are NOT to be used in any proprietary fashion.

SCALE/OCTAVE TUNING**MESSAGE #1 [UNIVERSAL REAL-TIME SYSEX]****Scale/Octave Tuning 1-Byte Form (Real-Time)**

F0 7F <device ID> 08 08 ff gg hh [ss] ... F7

```

F0 7F      Universal Real-Time SysEx header
<device ID> ID of target device (7F = all devices)
08         sub-ID#1 = "MIDI Tuning Standard"
08         sub-ID#2 = "scale/octave tuning 1-byte form (Real-
           Time)"
ff         channel/options byte 1
           bits 0 to 1 = channel 15 to 16
           bit 2 to 6 = reserved for future expansion
gg         channel byte 2 - bits 0 to 6 = channel 8 to 14
hh         channel byte 3 - bits 0 to 6 = channel 1 to 7
[ss]      12 byte tuning offset of 12 semitones from C to B
           00H means -64 cents
           40H means  0 cents (equal temperament)
           7FH means +63 cents

F7         EOFX

```

MESSAGE #2 [UNIVERSAL NON REAL-TIME SYSEX]**Scale/Octave Tuning 1-Byte Form (Non Real-Time)**

F0 7E <device ID> 08 08 ff gg hh [ss] ... F7

```

F0 7E      Universal Non Real-Time SysEx header
<device ID> ID of target device (7F = all devices)
08         sub-ID#1 = "MIDI Tuning Standard"
08         sub-ID#2 = "scale/octave tuning 1-byte form (Non Real-
           Time)"
ff         channel/options byte 1
           bits 0 to 1 = channel 15 to 16
           bit 2 to 6 = reserved for future expansion
gg         channel byte 2 - bits 0 to 6 = channel 8 to 14
hh         channel byte 3 - bits 0 to 6 = channel 1 to 7
[ss]      12 byte tuning offset of 12 semitones from C to B
           00H means -64 cents
           40H means  0 cents (equal temperament)
           7FH means +63 cents

F7         EOFX

```

MESSAGE #3 [UNIVERSAL REAL-TIME SYSEX]**Scale/Octave Tuning 2-Byte Form (Real-Time)**

F0 7F <device ID> 08 09 ff gg hh [ss tt] ... F7

```

F0 7F      Universal Real-Time SysEx header
<device ID> ID of target device (7F = all devices)
08         sub-ID#1 = "MIDI Tuning Standard"
09         sub-ID#2 = "scale/octave tuning 2-byte form (Real-
           Time)"
ff         channel/options byte 1
           bits 0 to 1 = channel 15 to 16
           bit 2 to 6 = reserved for future expansion

```

gg channel byte 2 - bits 0 to 6 = channel 8 to 14
 hh channel byte 3 - bits 0 to 6 = channel 1 to 7
 [ss tt] 24 byte tuning offset of 2 bytes per semitone from C
 to B
 00H 00H means -100 cents (8,192 steps of .012207
 cents)
 40H 00H means 0 cents (equal temperament)
 7FH 7FH means +100 cents (8,191 steps of .012207
 cents)
 F7 EOX

**MESSAGE #4 [UNIVERSAL NON REAL-TIME SYSEX]
Scale/Octave Tuning 2-Byte Form (Non Real-Time)**

F0 7E <device ID> 08 09 ff gg hh [ss tt] ... F7

F0 7E Universal Non Real Time SysEx header
 <device ID> ID of target device (7F = all devices)
 08 sub-ID#1 = "MIDI Tuning Standard"
 09 sub-ID#2 = "scale/octave tuning 2-byte form (Non Real-
 Time)"
 ff channel/options byte 1
 bits 0 to 1 = channel 15 to 16
 bit 2 to 6 = reserved for future expansion
 gg channel byte 2 - bits 0 to 6 = channel 8 to 14
 hh channel byte 3 - bits 0 to 6 = channel 1 to 7
 [ss tt] 24 byte tuning offset of 2 bytes per semitone from C
 to B
 00H 00H means -100 cents (8,192 steps of .012207
 cents)
 40H 00H means 0 cents (equal temperament)
 7FH 7FH means +100 cents (8,191 steps of .012207
 cents)
 F7 EOX

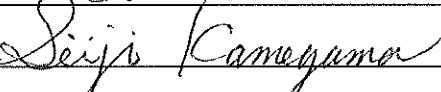
Notes:

Using a channel bitmap scheme in a system exclusive message is unconventional, but this ability is really necessary for the computer based tuning schemes, in order to change intonation identically on several channels quickly. GM Level 2 will only need to support one channel or all channels in their messages, so the bitmap scheme is not needed. Also, GM Level 2 will only support the 1 byte version of the messages.

The intent of a non-real time message is that it should specifically be sent as a setup message. If it is NOT sent as a setup message (that is, if it is sent during performance), it is assumed that the message will be ignored for notes that are already sounding. However, certain Recommended Practices, (RPs), may implement this differently. Manufacturers should therefore consult the specific RP for the required response and should document the device's response in the user manual.

Approved by MMA: 

Date: 5/12/95

Approved by AMEI: 

Date: 5/7/98