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EMAX MIDI and RS-422 specs

Valid for EMAX Software Rev. 3.0
12/16/86

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QUICK REFERENCE EMAX MIDI IMPLEMENTATION CHART:

X = item implemented
- = item not implemented

MIDI command	Transmitted?	Received?	Comments
Note off	X	X	keys# 21 thru 108 (A-1 thru C7)
Note on	X	X	keys# 21 thru 108 (A-1 thru C7)
Poly key pressure	-	-	
Control Change	X	X	controllers# 0 thru 31
Program Change	X	X	program# (preset#) 0 thru 99
Channel Pressure	X	X	
Pitch Wheel	X	X	
Sustain footswitch	X	X	controller# 64
Local control on/off	-	X	
All notes off	-	X	
Omni mode off/on	-	-	ignores mode, turn all notes off
Mono mode	-	-	ignores mode, turn all notes off
Poly mode	-	-	ignores mode, turn all notes off
Song position pointer	-	-	
Song select	X	X	
Tune request	-	-	
Timing clock	X	X	
Start sequence	X	X	
Continue sequence	-	-	
Stop sequence	X	X	
Active sensing	-	-	
System reset	-	-	
System exclusives	X	X	refer to documentation

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=> The EMAX will transmit and receive data at one of two speeds:
=>      --31.25 Kbaud (asynchronous, MIDI or RS-422).
=>      --500.0 Kbaud (synchronous, RS-422 only, odd parity).
=> The EMAX powers up at 31.25 Kbaud.
=> Numbers in parenthesis () decimal, all others hex.
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>>> TRANSMITTED MESSAGES: Basic MIDI Commands >>>
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................................................................................
Note Off                                9n      n = MIDI channel no. (0 to 15)
                                        kk      kk= key# (21 to 108) (A-1 to C7)
                                        00      zero velocity
=>Not sent by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
................................................................................
Note On                                 9n      n = MIDI channel no. (0 to 15)
                                        kk      kk= key# (21 to 108) (A-1 to C7)
                                        vv      vv = velocity (1 to 127)
=>Not sent by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
................................................................................
Continuous Controller                   bn      n = MIDI channel no. (0 to 15)
                                        cc      cc = controller number (0 to 31)
                                        vv      vv = controller value (0 to 127)
=>Not sent by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
................................................................................
Sustain Footswitch                      bn      n = MIDI channel no. (0 to 15)
                                        40      cc = controller number (64)
                                        vv      vv = controller value (0 to 127)
=>Not sent by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
................................................................................
Preset Change                           cn      n = MIDI channel no. (0 to 15)
                                        pp      pp = preset number (0 to 99)
=>EMAX will send this only if preset change has been enabled in current preset.
................................................................................
Channel Pressure                        dn      n = MIDI channel no. (0 to 15)
                                        pp      pp = preset number (0 to 127)
=>Not sent by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
................................................................................
Pitch Wheel                             en      n = MIDI channel no. (0 to 15)
                                        00      wheel lsb = 0
                                        ww      ww = wheel value (0 to 127)
=>Not sent by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
................................................................................
Song Select                             f3
                                        ss      ss = sequence # (0 to 99)
=>Sent by EMAX when a new sequence is selected.
................................................................................
Timing Clock                            f8
................................................................................
Sequencer Start                         fa
................................................................................
Sequencer Stop                          fc
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>>> TRANSMITTED MESSAGES: MIDI System Exclusive Commands >>>
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................................................................................
Send Voice Parameter                    f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        30      exclusive #30
                                        kk      key # (0 to 87)
                                        0L      level (0=primary, 1=secondary)
                                        pp      voice parameter # (see list)
                                        vv      voice parameter value
                                        f7      EOX
=>EMAX will only do this if requested to (exclusive #00). Uses current preset.
................................................................................
Send Preset Parameter                   f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        31      exclusive #31
                                        pp      preset# (0 to 99, or 127 for
                                                current preset)
                                        pp      preset parameter # (see list)
                                        vv      preset parameter value
                                        f7      EOX
=>If parameter# 0's value is zero, then the preset is empty.
=>EMAX will only do this upon receiving a request (exclusive #01).
................................................................................
Send Misc Info                          f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        32      exclusive #32
                                        pp      current preset # (0 to 99)
                                        tt      master tune value (0 to 31),
                                                (16) is zero tune offset
                                        xx      bit 0: supermode     1=on 0=off
                                                bit 1: midi overflow 1=on 0=off
                                                bit 2-4: arp clock source:
                                                         0: internal
                                                         1: midi
                                                         2: 24 ppq
                                                         3: 48 ppq
                                                         4: 96 ppq
                                        LL      sound RAM remaining (bits 0-6)
                                        nn      sound RAM remaining (bits 7-13)
                                        mm      sound RAM remaining (bits 14-18)
                                        LL      preset RAM remaining (bits 0-6)
                                        nn      preset RAM remaining (bits 7-13)
                                        0m      preset RAM remaining (bit 14)
                                        ss      software rev (letter 0, ASCII)
                                        ..      software rev (letters 1 to 14)
                                        ss      software rev (letter 15, ASCII)
                                        f7      EOX
=>EMAX will only do this upon receiving a request (exclusive #02).
................................................................................
Send Sample Info                        f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        33      exclusive #33
                                        kk      key # (0 to 87)
                                        0L      level (0=primary, 1=secondary)
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                                        0s      sample rate (0 to 7)
                                                        0: 10.000khz
                                                        1: 15.625khz
                                                        2: 20.000khz
                                                        3: 22.050khz
                                                        4: 27.778khz
                                                        5: 31.250khz
                                                        6: 41.667khz
                                                        7: 44.100khz
                                        LL      length (bits 0-6)
                                        LL      length (bits 7-13)
                                        LL      length (bits 14-18)
                                        ss      sustain loop start (bits 0-6)
                                        ss      sustain loop start (bits 7-13)
                                        ss      sustain loop start (bits 14-18)
                                        ee      sustain loop end (bits 0-6)
                                        ee      sustain loop end (bits 7-13)
                                        ee      sustain loop end (bits 14-18)
                                        ss      release loop start (bits 0-6)
                                        ss      release loop start (bits 7-13)
                                        ss      release loop start (bits 14-18)
                                        ee      release loop end (bits 0-6)
                                        ee      release loop end (bits 7-13)
                                        ee      release loop end (bits 14-18)
                                        0f      loop & direction flags
                                                        bit0: loop on
                                                        bit1: loop in release
                                                        bit2: backwards
                                        f7      EOX
=>EMAX will only do this upon receiving a request (exclusive #03).
.....................................................................
Send Crossfade Info                     f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        34      exclusive #34
                                        kk      key # (0 to 87)
                                        0c      crossfade info:
                                                     bits 0-2:
                                                        0: off
                                                        1: velocity fade
                                                        2: velocity switch
                                                        3: positional
                                                        4: realtime fade
                                                        5: realtime switch
                                                     bit 3:
                                                        0: primary hard
                                                        1: secondary hard
                                        ss      positional start key (0 to 87)
                                        0k      # keys in pos section-1(0 to 15)
                                        f7      EOX
=>EMAX will only do this if requested to (exclusive #04).  Uses current preset.
.....................................................................
Send Primary Voice Map                  f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        35      exclusive #35
                                        pp      primary voice# for key# (00)
                                        pp      primary voice# for key# (01)
                                        ..      primary voice# for keys# (02-86)
                                        pp      primary voice# for key# (87)
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                                        f7      EOX
=>A voice number of 127 (7f) denotes an empty voice.
=>While these voice numbers do not match the voice numbers the EMAX displays on
  the LCD when selecting voices, there is a one-to-one correspondence between
  the two sets of numbers.
=>EMAX will only do this upon receiving a request (exclusive #05).
.....................................................................
Send Secondary Voice Map                f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        36      exclusive #36
                                        ss      secondary voice# for key# (00)
                                        ss      secondary voice# for key# (01)
                                        ..      secondary voice# keys# (02-86)
                                        ss      secondary voice# for key# (87)
                                        f7      EOX
=>A voice number of 127 (7f) denotes an empty voice.
=>While these voice numbers do not match the voice numbers the EMAX displays on
  the LCD when selecting voices, there is a one-to-one correspondence between
  the two sets of numbers.
=>EMAX will only do this upon receiving a request (exclusive #06).
.....................................................................
Send One Sample Fast                    f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        37      exclusive #37
                                        kk      key # (0 to 87)
                                        0L      level (0=primary, 1=secondary)
                                        LL      length (bits 0-6)
                                        LL      length (bits 7-13)
                                        LL      length (bits 14-18)
                                        f7      EOX
=>EMAX then switches internally to 500 kbaud.
=>EMAX waits for receive to send ACK (see MMA exclusives) at 500khz:
        =>if no ACK comes within the timeout period, (programmable by using
          exclusive #21) EMAX displays error and aborts.
=>EMAX starts high speed transfer by sending MMA-type data packet at 500 kbaud:
        =>Sound data in the data packet is sent as 12 bit SIGNED linear data.
        =>Data packet (see MMA Data Packet) contains 120 bytes packed like this:
                byte 0: bbaaaaaa        aaaaaa = 6 ls bits of data word 0
                byte 1: ccccbbbb        bbbbbb = 6 ms bits of data word 0
                byte 2: dddddddcc       cccccc = 6 ls bits of data word 1
                                        dddddd = 6 ms bits of data word 1
                byte 3: ffeeeeee        eeeeee = 6 ls bits of data word 2
                    --etc--
                byte 119: zzzzzzyy      zzzzzz = 6 ms bits of data word 79
        =>Note that bit 7 is used in these packets, unlike standard MMA format.
=>EMAX then waits for an ACK, as per MMA protocol:
        =>if no response comes within a few seconds, EMAX sends CANCEL, aborts.
        =>if NAK or transmission error, EMAX retransmits packet.  EMAX will try
          re-sending 5 times before giving up and sending CANCEL.
        =>if CANCEL, EMAX displays "Cancelled by Receiver" and aborts.
        =>if WAIT, EMAX resets its timeout counter (a few seconds). If receiver
          needs more time, it must keep sending WAITs.
        =>if ACK, EMAX increments packet number and transmits next packet.
        =>Maximum packet number is 127, as per MMA protocol.  Packet numbers
          wraparound and continue from 0 after that.
        =>Receiver must handshake the last packet (respond with ACK).
=>After completion of transfer, EMAX automatically switches back to 31.25 kbaud.
=>The "length" in the header refers to # of 12-bit data words, (80 per
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packet) not to the actual number of bytes in the packet, which is 120.
=>If key and level refer to a null voice, EMAX sets length=0 and does no high speed transfer at all.
=>EMAX will only do this command upon receiving a request (exclusive #07).
=>Uses current preset.

Send Ready	f0	system exclusive
	18	E-mu id
	02	EMAX id
	38	exclusive #38
	f7	EOX

=>EMAX sends this after processing time-consuming system exclusives.
=>Sender should wait for this signal before sending more commands.
=>EMAX will also send this if requested to (exclusive #08).

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>>> TRANSMITTED MESSAGES: MMA Sample Dump Commands >>>
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=>MMA stands for MIDI Manufacturer's Association.
=>For more details on MMA exclusives, contact an MMA representative.
................................................................................
MMA Sample Dump Header                  f0      system exclusive
                                        7e
                                        0c      midi base channel (0 to 15)
                                        01      MMA exclusive number
                                        kk      sample number (Key # 0 to 87)
                                        0L      sample number (Pri/Sec 0 or 1)
                                        0c      significant bits (12)
                                        pp      sample period (lsb) in nsec
                                        pp      sample period (nsb)
                                        pp      sample period (msb)
                                        LL      sample length (lsb) in words
                                        LL      sample length (nsb)
                                        LL      sample length (msb)
                                        ss      sustain loop start word (lsb)
                                        ss      sustain loop start word (nsb)
                                        ss      sustain loop start word (msb)
                                        ee      sustain loop end word (lsb)
                                        ee      sustain loop end word (nsb)
                                        ee      sustain loop end word (msb)
                                        0t      loop type (0-fwd 1-bkd/fwd)
                                        f7      EOX
................................................................................
MMA Data Packet                         f0      system exclusive
                                        7e
                                        0c      midi base channel (0 to 15)
                                        02      MMA exclusive number
                                        cc      packet count (0 to 127)
                                        ..      120 data bytes
                                        ..
                                        xx      checksum of above 124 bytes
                                        f7      EOX
=>The 120 data bytes represent 60 12-bit unsigned linear EMAX data words:
        byte 0:   0bbbbbbb      bbbbbbb = 7 ms bits of data word 0
        byte 1:   0aaaaa00        aaaaa = 5 ls bits of data word 0
        byte 2:   0ddddddd      ddddddd = 7 ms bits of data word 1
        byte 3:   0ccccc00        ccccc = 5 ls bits of data word 1
            --etc--
        byte 119: 0yyyyy00      yyyyyyy = 5 ls bits of data word 59
................................................................................
Acknowledge (ACK)                       f0      system exclusive
                                        7e
                                        0c      midi base channel (0 to 15)
                                        7f
                                        pp      packet number
                                        f7      EOX
................................................................................
Not Acknowledged (NAK)                  f0      system exclusive
                                        7e
                                        0c      midi base channel (0 to 15)
                                        7e
                                        pp      packet number
                                        f7      EOX
................................................................................
Cancel Dump (CANCEL)                    f0      system exclusive
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	7e	
	0c	midi base channel (0 to 15)
	7d	
	pp	packet number
	f7	EOX
Wait (WAIT)	f0	system exclusive
	7e	
	0c	midi base channel (0 to 15)
	7c	
	pp	packet number
	f7	EOX

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>>> RECEIVED MESSAGES: Basic MIDI Commands >>>
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
.....................................................................
Note Off                                8n      n = MIDI channel no. (0 to 15)
                                        kk      kk= key# (21 to 108) (A-1 to C7)
                                        vv      vv = velocity (1 to 127) ignored
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Note Off                                9n      n = MIDI channel no. (0 to 15)
                                        kk      kk= key# (21 to 108) (A-1 to C7)
                                        00      zero velocity
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Note On                                 9n      n = MIDI channel no. (0 to 15)
                                        kk      kk = key# (21 to 108) (A0 to C6)
                                        vv      vv = velocity (1 to 127)
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Continuous Controller                   bn      n = MIDI channel no. (0 to 15)
                                        cc      cc = controller # (0 to 31)
                                        vv      vv = controller value (0 to 127)
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Sustain Footswitch                      bn      n = MIDI channel no. (0 to 15)
                                        40      cc = controller number (64)
                                        vv      vv = controller value
                                                     (0 to 63 = off)
                                                     (64 to 127 = on)
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Local Control Off                       bn      n = MIDI channel no. (0 to 15)
                                        7a      (122)
                                        00
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Local Control On                        bn      n = MIDI channel no. (0 to 15)
                                        7a      (122)
                                        7f
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
All Notes Off                           bn      n = MIDI channel no. (0 to 15)
                                        7b      (123)
                                        00
=>MIDI "All Notes Off" messages only turn off notes whose source was MIDI.
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Poly Mode (all notes off)               bn      n = MIDI channel no. (0 to 15)
                                        7c      (124)
                                        00
=>EMAX ignores the midi mode change, but it does execute "all notes off".
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Omni Mode (all notes off)               bn      n = MIDI channel no. (0 to 15)
                                        7d      (125)
                                        00
=>EMAX ignores the midi mode change, but it does execute "all notes off".
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Mono Mode (all notes off)               bn      n = MIDI channel no. (0 to 15)
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                                        7e      (126)
                                        00
=>EMAX ignores the midi mode change, but it does execute "all notes off".
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Poly Mode (all notes off)               bn      n = MIDI channel no. (0 to 15)
                                        7f      (127)
                                        00
=>EMAX ignores the midi mode change, but it does execute "all notes off".
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Preset Change                           cn      n = MIDI channel no. (0 to 15)
                                        pp      pp = preset number (0 to 99)
=>Always received. "Preset Change On/Off" from the front panel has no effect.
.....................................................................
Channel Pressure                        dn      n = MIDI channel no. (0 to 15)
                                        pp      pp = pressure value (0 to 127)
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
.....................................................................
Pitch Wheel                             en      n = MIDI channel no. (0 to 15)
                                        xx      xx = don't care
                                        ww      ww = wheel value (0 to 127)
=>Ignored by EMAX if the front panel midi option "Notes,Wheels" is set to "no".
=>Range selectable via front panel "pitch bend range" (0 to +- 4 semitones).
.....................................................................
Song Position Pointer                   f2
                                        xx      xx = don't care
                                        xx      xx = don't care
=>EMAX does NOT respond to position information, but it does reset all internal
  sequencer wheels in case they were left hanging by an external controller.
.....................................................................
Song Select                             f3
                                        ss      ss = sequence # (0 to 99)
=>Receiving this selects a new sequence on the EMAX.
.....................................................................
Timing Clock                            f8
.....................................................................
Sequencer Start                         fa
.....................................................................
Sequencer Stop                          fc
.....................................................................
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<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
>>> RECEIVED MESSAGES: MIDI System Exclusive Commands >>>
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................................................................................
Request to Send Voice Parameter        f0      system exclusive
                                       18      E-mu id
                                       02      EMAX id
                                       00      exclusive #00
                                       kk      key # (0 to 87)
                                       0L      level (0=primary, 1=secondary)
                                       pp      voice parameter # (see list)
                                       f7      EOX
=>Upon receiving this, EMAX does a Send Voice Parameter (exclusive #30).
=>Uses current preset.
................................................................................
Request to Send Preset Parameter       f0      system exclusive
                                       18      E-mu id
                                       02      EMAX id
                                       01      exclusive #01
                                       pp      preset# (0 to 99, or 127 for
                                               current preset)
                                       pp      preset parameter # (see list)
                                       f7      EOX
=>Upon receiving this, EMAX does a Send Preset Parameter (exclusive #31).
................................................................................
Request to Send Misc Info              f0      system exclusive
                                       18      E-mu id
                                       02      EMAX id
                                       02      exclusive #02
                                       f7      EOX
=>Upon receiving this, EMAX does a Send Misc Info (exclusive #32).
................................................................................
Request to Send Sample Info            f0      system exclusive
                                       18      E-mu id
                                       02      EMAX id
                                       03      exclusive #03
                                       kk      key # (0 to 87)
                                       0L      level (0=primary, 1=secondary)
                                       f7      EOX
=>Upon receiving this, EMAX does a Send Sample Info (exclusive #33).
=>Uses current preset.
................................................................................
Request to Send Crossfade Info         f0      system exclusive
                                       18      E-mu id
                                       02      EMAX id
                                       04      exclusive #04
                                       kk      key # (0 to 87)
                                       f7      EOX
=>Upon receiving this, EMAX does a Send Crossfade Info (exclusive #34).
=>Uses current preset.
................................................................................
Request to Send Primary Voice Map      f0      system exclusive
                                       18      E-mu id
                                       02      EMAX id
                                       05      exclusive #05
                                       f7      EOX
=>Upon receiving this, EMAX does a Send Primary Voice Map (exclusive #35).
................................................................................
Request to Send Secondary Voice Map    f0      system exclusive
                                       18      E-mu id
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	02	EMAX id
	06	exclusive #06
	f7	EOX

=>Upon receiving this, EMAX dos a Send Secondary Voice Map (exclusive #36).

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Request to Send One Sample Fast	f0	system exclusive
	18	E-mu id
	02	EMAX id
	07	exclusive #07
	kk	key # (0 to 87)
	0L	level (0=primary, 1=secondary)
	f7	EOX

=>Upon receiving this, EMAX dos a Send One Sample Fast (exclusive #37).
=>Uses current preset.

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Request to Send Ready	f0	system exclusive
	18	E-mu id
	02	EMAX id
	08	exclusive #08
	f7	EOX

=>Upon receiving this, EMAX dos a Send Ready (exclusive #38).
=>Provided as a means for an external device to find out if EMAX is present.

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<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
>>> RECEIVED MESSAGES: More System Exclusive Commands >>>
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................................................................................
Execute Load Bank from disk             f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        10      exclusive #10
                                        00      from bank #
                                        f7      EOX
=>External device can tell EMAX to load bank from disk.
=>After finishing task, EMAX sends READY message.
................................................................................
Execute Get Voice                       f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        11      exclusive #11
                                        pp      from preset # (0 to 99)
                                        0L      from level:
                                                        0: primary
                                                        1: secondary
                                                        2: both
                                        LL      low key # (0 to 87)
                                        hh      hi key # (0 to 87)
                                        pp      to preset # (0 to 99)
                                        0L      to level:
                                                      0: primary
                                                      1: secondary
                                                      2: both
                                        LL      new low key # (0 to 87)
                                        f7      EOX
=>This command duplicates front panel function.
=>EMAX does no checks to see if data bytes are within legal range or not.
=>After finishing task, EMAX sends READY message.
................................................................................
Execute Edit Assignment                 f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        12      exclusive #12
                                        0L      level:
                                                        0: primary
                                                        1: secondary
                                        kk      key # (0 to 87)
                                        kk      new original key # (0 to 87)
                                        LL      new low key # (0 to 87)
                                        hh      new hi key # (0 to 87)
                                        0L      new lo channel (0 to 15)
                                        0h      new hi channel (0 to 15)
                                        f7      EOX
=>This command duplicates front panel function.
=>EMAX does no checks to see if data bytes are within legal range or not.
=>Uses current preset.
=>After finishing task, EMAX sends READY message.
................................................................................
Execute Erase Voice(s)                  f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        13      exclusive #13
                                        0L      level:
                                                        0: primary
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                                                1: secondary
                                                2: both
                                        LL      lo key # (0 to 87)
                                        hh      hi key # (0 to 87)
                                        f7      EOX
=>This command duplicates front panel function.
=>EMAX does no checks to see if data bytes are within legal range or not.
=>Uses current preset.
=>After finishing task, EMAX sends READY message.
.....................................................................
Execute Crossfade Change                f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        14      exclusive #14
                                        LL      lo key # (0 to 87)
                                        hh      hi key # (0 to 87)
                                        0d      direction:
                                                0: primary hard
                                                1: secondary hard
                                        0m      crossfade mode:
                                                0: off
                                                1: velocity fade
                                                2: velocity switch
                                                3: positional
                                                4: realtime fade
                                                5: realtime switch
                                        f7      EOX
=>This command duplicates front panel function.
=>EMAX does no checks to see if data bytes are within legal range or not.
=>Uses current preset.
=>After finishing task, EMAX sends READY message.
.....................................................................
Execute Create Preset                   f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        15      exclusive #15
                                        pp      preset # (0 to 99)
                                        f7      EOX
=>This command duplicates front panel function.
=>EMAX does no checks to see if data bytes are within legal range or not.
=>If preset already exists, it will be overwritten.
=>After finishing task, EMAX sends READY message.
.....................................................................
Execute Erase Preset                    f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        16      exclusive #16
                                        pp      preset # (0 to 99)
                                        f7      EOX
=>This command duplicates front panel function.
=>EMAX does no checks to see if data bytes are within legal range or not.
=>After finishing task, EMAX sends READY message.
.....................................................................
Execute Copy Preset                     f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        17      exclusive #17
                                        pp      from preset # (0 to 99)
                                        pp      to preset # (0 to 99)
                                        f7      EOX
```

=>This command duplicates front panel function.
=>EMAX does no checks to see if data bytes are within legal range or not.
=>EMAX will not allow the "to preset" to be the current preset.
=>After finishing task, EMAX sends READY message.

.....

Accept New Sample Fast	f0	system exclusive
	18	E-mu id
	02	EMAX id
	18	exclusive #18
	LL	low key # (0 to 87)
	hh	hi key # (0 to 87)
	0L	level (0=primary, 1=secondary)
	0s	sample rate (0 to 7)
		0: 10.000khz
		1: 15.625khz
		2: 20.000khz
		3: 22.050khz
		4: 27.778khz
		5: 31.250khz
		6: 41.667khz
		7: 44.100khz
	LL	length (bits 0-6)
	LL	length (bits 7-13)
	LL	length (bits 14-18)
	f7	EOX

=>EMAX now switches internally to 500 kbaud.
=>EMAX waits at least 100msec to allow sender to switch baud rates.
=>EMAX then checks if dump will fit:
        if it won't fit: EMAX sends CANCEL and returns to 31.25 kbaud.
        if it will fit: EMAX sends ACK and continues.
=>Sender starts high speed transfer by sending MMA-type data packet at 500kbaud:
        =>The sound data in the data packet is sent as 12 bit linear data.
        =>Data packet (see MMA Data Packet) contains 120 bytes packed like this:

byte 0: bbaaaaaa	aaaaaa = 6 ls bits of data word 0
byte 1: ccccbbbb	bbbbbb = 6 ms bits of data word 0
byte 2: ddddddcc	cccccc = 6 ls bits of data word 1
	dddddd = 6 ms bits of data word 1
byte 3: ffeeeeee	eeeeee = 6 ls bits of data word 2
--etc--	
byte 119: zzzzzzyy	zzzzzz = 6 ms bits of data word 79

        =>Note that bit 7 is used in these packets, unlike standard MMA format.
=>Sender then waits for an ACK, as per MMA protocol:
        =>if EMAX detected transmission error, it sends NAK, expects re-send.
          EMAX will tolerate 5 re-sends before sending CANCEL and aborting.
        =>if packet received correctly, EMAX sends ACK, expects next packet.
        =>EMAX will handshake the last packet.
=>After completion of transfer, EMAX automatically switches back to 31.25 kbaud.
=>Receiver must wait at least 5 msec after receipt of EMAX's ACK of the last
  packet before sending another command to EMAX (at 31.25 kbaud).
=>EMAX sets loop start points at the first byte, loop end points at the last
        byte, and sets all loops off. To change these, use exclusive #1c,
        "Change Sample Info".
=>The "length" in the header refers to # of 12-bit data bytes, (80 per
        packet) not to the actual number of bytes in the packet, which is 120.
=>EMAX does no checks to see if data bytes are within legal range or not.
=>EMAX makes the sample's "original key" = hi key.
=>For internal reasons, EMAX replaces the first two and the last two bytes of
        the sample dump with zeroes. Sender should also pad the ends with two
        zeroes and not use these bytes when looping sounds.
=>Uses current preset.

```
.....................................................................
Replace New Sample Fast                 f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        19      exclusive #19
                                        kk      key # (0 to 87)
                                        0L      level (0=primary, 1=secondary)
                                        f7      EOX
=>EMAX now switches internally to 500 kbaud.
=>EMAX waits at least 100msec, then sends ACK command (see MMA exclusives).
=>EMAX then proceeds as Accept New Sample Fast (exclusive #18).
=>EMAX replaces sound data, leaving intact all loop and length information.
=>Uses current preset.
.....................................................................
Change Voice Parameter                  f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        1a      exclusive #1a
                                        LL      low key (0 to 87)
                                        hh      hi key (0 to 87)
                                        0L      level (0=pri, 1=sec, 2=both)
                                        pp      voice parameter # (see list)
                                        vv      voice parameter value
                                        f7      EOX
=>Uses current preset.
=>if key and level refer to a null voice, EMAX doesn't change anything.
=>EMAX does no checks to see if parameter bytes are within legal range.
=>After finishing task, EMAX sends READY message.
.....................................................................
Change Preset Parameter                 f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        1b      exclusive #1b
                                        pp      preset# (0 to 99, or 127 for
                                                current preset)
                                        pp      preset parameter # (see list)
                                        vv      preset parameter value
                                        f7      EOX
=>EMAX does no checks to see if parameter bytes are within legal range.
=>After finishing task, EMAX sends READY message.
.....................................................................
Change Sample Info                      f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        1c      exclusive #1c
                                        kk      key # (0 to 87)
                                        0L      level (0=primary, 1=secondary)
                                        0s      sample rate (0 to 7)
                                        ss      sustain loop start (bits 0-6)
                                        ss      sustain loop start (bits 7-13)
                                        ss      sustain loop start (bits 14-18)
                                        ee      sustain loop end (bits 0-6)
                                        ee      sustain loop end (bits 7-13)
                                        ee      sustain loop end (bits 14-18)
                                        ss      release loop start (bits 0-6)
                                        ss      release loop start (bits 7-13)
                                        ss      release loop start (bits 14-18)
                                        ee      release loop end (bits 0-6)
                                        ee      release loop end (bits 7-13)
                                        ee      release loop end (bits 14-18)
```

```
                                        0f      loop & direction flags
                                                bit0: loop on
                                                bit1: loop in release
                                                bit2: backwards
                                        f7      EOX
=>if key and level refer to a null voice, EMAX doesn't change anything.
=>EMAX does no checks to see if parameter bytes are within legal range or not.
=>Be aware that if sample rate is changed, the key assignments may no longer
  be valid due to transpose limitations.  EMAX will not correct for this.
=>After finishing task, EMAX sends READY message.
.....................................................................
Erase All                               f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        1d      exclusive #1d
                                        f7      EOX
=>Erases all presets, sequences, sounds. Same as front panel option in "Master".
=>After finishing task, EMAX sends READY message.
.....................................................................
Change Current Preset                   f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        1e      exclusive #1e
                                        pp      preset # (0 to 99)
                                        f7      EOX
=>Same as MIDI change preset, but bypasses omni/poly, midi on checks.
=>If preset doesn't exist, nothing happens: current preset doesn't change.
=>After finishing task, EMAX sends READY message.
.....................................................................
Shorten Sample                          f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        1f      exclusive #1f
                                        kk      key # (0 to 87)
                                        0L      level (0=primary, 1=secondary)
                                        LL      # bytes (bits 0-6)
                                        LL      # bytes (bits 7-13)
                                        LL      # bytes (bits 14-18)
                                        f7      EOX
=>Uses current preset.
=>The # of bytes specified is the # of bytes to shorten the sample by.
=>if key and level refer to a null voice, EMAX doesn't shorten anything.
=>EMAX assumes sample is at least as long as # of bytes to be shortened by.
=>Loop end points are set to end of sample if shortened beyond original points.
=>After finishing task, EMAX sends READY message.
.....................................................................
Lengthen Sample                         f0      system exclusive
                                        18      E-mu id
                                        02      EMAX id
                                        20      exclusive #20
                                        kk      key # (0 to 87)
                                        0L      level (0=primary, 1=secondary)
                                        LL      # bytes (bits 0-6)
                                        LL      # bytes (bits 7-13)
                                        LL      # bytes (bits 14-18)
                                        f7      EOX
=>Uses current preset.
=>The # of bytes specified is the # of bytes to lengthen the sample by.
=>if key and level refer to a null voice, EMAX doesn't lengthen anything.
=>EMAX assumes there is enough memory in EMAX to accommodate lengthening.
```

=>Loop points remain unaffected.
=>After finishing task, EMAX sends READY message.

.....

Modify Time Out	f0	system exclusive
	18	E-mu id
	02	EMAX id
	21	exclusive #21
	tt	timeout in seconds (0 to 127)
	f7	EOX

=>This sets the time EMAX waits for sample dump handshaking before timing out.
=>EMAX defaults to a timeout of 4 seconds.
=>Once changed, value will stay changed until modified by this command or until power is turned off.
=>After finishing task, EMAX sends READY message.

.....

Change Misc Info	f0	system exclusive
	18	E-mu id
	02	EMAX id
	22	exclusive #22
	tt	master tune value (0 to 31), (16) is zero tune offset
	xx	bit 0: supermode 1=on 0=off bit 1: midi overflow 1=on 0=off bit 2-4: arp clock source: 0: internal 1: midi 2: 24 ppq 3: 48 ppq 4: 96 ppq
	f7	EOX

=>NOTE: due to a bug in EMAX Rev 3.0 software, master tune values of 0 to 15 (-48 cents to -3 cents) don't work properly. This should be fixed next rev.
=>After finishing task, EMAX sends READY message.

.....

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
>>> RECEIVED MESSAGES: MMA Sample Dump Commands >>>
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
=>MMA stands for MIDI Manufacturer's Association.
=>For more details on MMA exclusives, contact an MMA representative.
................................................................................
Sample Dump Header                        f0      system exclusive
                                          7e
                                          0c      midi base channel (0 to 15)
                                          01      MMA exclusive number
                                          kk      sample number (Key # 0 to 87)
                                          LL      sample number (Pri/Sec 0 or 1)
                                          0c      significant bits
                                          pp      sample period (lsb) in nsec
                                          pp      sample period (nsb)
                                          pp      sample period (msb)
                                          LL      sample length (lsb) in words
                                          LL      sample length (nsb)
                                          LL      sample length (msb)
                                          ss      sustain loop start word (lsb)
                                          ss      sustain loop start word (nsb)
                                          ss      sustain loop start word (msb)
                                          ee      sustain loop end word (lsb)
                                          ee      sustain loop end word (nsb)
                                          ee      sustain loop end word (msb)
                                          0t      loop type (ignored)
                                          f7      EOX
=>Upon receiving this, EMAX will send a WAIT while it decides whether it will
  accept the sample dump or not.
=>EMAX will only accept this sample dump if there is enough memory remaining to
  accommodate it, AND the current preset is not empty.
  Note: EMAX determines if it will fit by comparing length with amount of
        memory remaining. It does not take into account the fact that some
        samples may be erased and hence some memory freed up.
=>If EMAX decides to accept, it will send an ACK, if not, it will send a CANCEL.
=>EMAX places the sample at the specified key only (no transpose range is set).
=>EMAX ignores loop type and uses forwards only always.
=>EMAX rounds off sample period to its closest internal sample rate:
        10, 15.625, 20, 22.05, 27.78, 31.25, 41.667, or 44.1 khz.
=>For internal reasons, EMAX replaces the first two and the last two bytes of
  the sample dump with zeroes.  Sender should also pad the ends with two zeroes
  and not use these bytes when looping sounds.
................................................................................
MMA Data Packet                           f0      system exclusive
                                          7e
                                          0c      midi base channel (0 to 15)
                                          02      MMA exclusive number
                                          cc      packet count (0 to 127)
                                          ..      120 data bytes
                                          ..
                                          xx      checksum of above 124 bytes
                                          f7      EOX
=>The 120 data bytes are packed according to the "significant bits" in the
  sample dump header.  EMAX will configure itself accordingly.
................................................................................
Sample Dump Request                       f0      system exclusive
                                          7e
                                          0c      midi base channel (0 to 15)
                                          03      MMA exclusive number
                                          kk      sample number (Key # 0 to 87)
```

	LL	sample number (Pri/Sec 0 or 1)
	f7	EOX
Acknowledge (ACK)	f0	system exclusive
	7e	
	0c	midi base channel (0 to 15)
	7f	
	pp	packet number
	f7	EOX
Not Acknowledged (NAK)	f0	system exclusive
	7e	
	0c	midi base channel (0 to 15)
	7e	
	pp	packet number
	f7	EOX
Cancel Dump (CANCEL)	f0	system exclusive
	7e	
	0c	midi base channel (0 to 15)
	7d	
	pp	packet number
	f7	EOX
Wait (WAIT)	f0	system exclusive
	7e	
	0c	midi base channel (0 to 15)
	7c	
	pp	packet number
	f7	EOX

<<<<<<<<<<<<<<<<
>>> SUPERMODE <<<
<<<<<<<<<<<<<<<<

"Supermode" is an EMAX MIDI mode designed to enhance the Sequencer/MIDI interface. It is basically equivalent to "Poly Mode On" for all 16 MIDI channels simultaneously.

When Supermode is on, the OMNI/POLY setting is ignored, but the MIDI Notes/Wheels flag of the CURRENT PRESET is still checked by EMAX to determine whether to accept or ignore incoming MIDI performance data.

EMAX's sequencer has 16 tracks, and each track has an independent preset assigned to it. These presets are referred to as "Sequencer Presets".

The chart below shows the EMAX sound mapping:

---FOR SUPERMODE ON---

SOURCE	WHAT YOU HEAR	WHAT THE SEQUENCER RECORDS	WHAT IS TRANSMITTED OVER MIDI
MIDI ch 1	seq preset 1	seq track 1	
ch 2	seq preset 2	seq track 2	
...	...	...	(nothing)
ch 16	seq preset 16	seq track 16	
EMAX KEYBOARD	current preset	(nothing)	current preset's basic channel
SEQ track 1	seq preset 1		each track transmits
track 2	seq preset 2		over basic channel
...	...	(nothing)	defined in its
track 16	seq preset 16		sequencer preset

---FOR SUPERMODE OFF---

SOURCE	WHAT YOU HEAR	WHAT THE SEQUENCER RECORDS	WHAT IS TRANSMITTED OVER MIDI
MIDI ch 1-16	current preset (if it passes omni/poly, basic channel tests)	single enabled track	(nothing)
EMAX KEYBOARD	current preset	single enabled track	current preset's basic channel
SEQ track 1	seq preset 1		each track transmits
track 2	seq preset 2		over basic channel
...	...	(nothing)	defined in its
track 16	seq preset 16		sequencer preset

<<<<<<<<<<<<<<<<<<<<<<<<<<<
>>> REALTIME CONTROLLERS <<<
<<<<<<<<<<<<<<<<<<<<<<<<<<<

EMAX has 6 realtime sources: left wheel, right wheel, pressure, pedal, midiA, and midiB. These sources may be the on board controls, or coming in over MIDI, or both.

EMAX has 9 realtime destinations: pitch, filter, level, lfo to pitch, lfo to filter, lfo to level, attack, pan, crossfade.

The chart below shows the affect of sources on destinations. "Initial" refers to the initial value of the EMAX destination.

SOURCE	DESTINATION	EFFECT ON DESTINATION min	center	max
Left Wheel	Pitch, Filter, Pan	initial-50%	initial	initial+50%
Left Wheel	Level, LFO->Pitch, LFO->Filter, LFO->Level, Attack, Crossfade	initial	initial	initial+100%
Right Wheel Pressure, Pedal, MIDI A MIDI B	Pitch, Filter, Pan	initial	initial	initial+50%
Right Wheel Pressure, Pedal, MIDI A MIDI B	Level, LFO->Pitch, LFO->Filter, LFO->Level, Attack, Crossfade	initial	initial+50%	initial+100%

<<<<<<<<<<<<<<<<<<<<<<<<<
>>> MIDI OVERFLOW MODE >>>
<<<<<<<<<<<<<<<<<<<<<<<<<

When MIDI Overflow Mode is off, if all of EMAX's voices are being used and another key is pressed, EMAX "steals" the voice that has been playing the longest and uses that voice for the new note.

When MIDI Overflow Mode is on, instead of "stealing" when it runs out of voices, EMAX will send any new notes out over MIDI. This way, another EMAX or an EMAX rack can play those extra notes, resulting in a total of 16 possible simultaneous notes instead of the 8 available with one EMAX.

For this mode to be useful, a few things should be remembered:

(1) MIDI Overflow Mode only supports 2 EMAXs overflowed together, a "master" and a "slave".

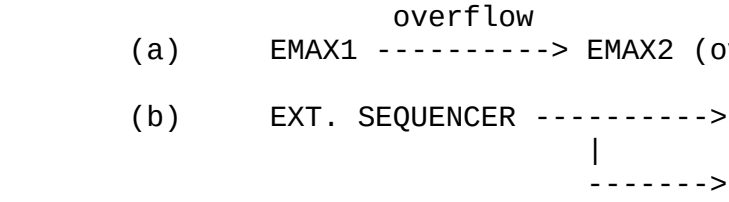
(2) The "slave" must be another EMAX (or EMAX rack).

(3) Both EMAXs must be using the same bank.

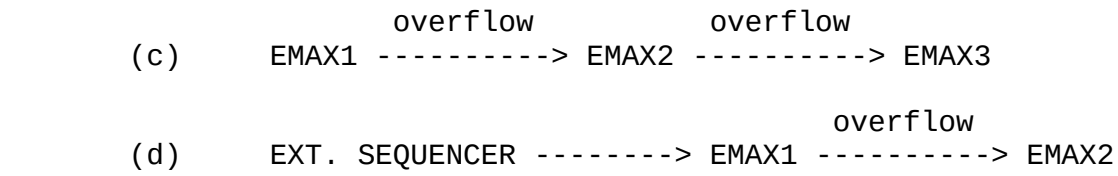
(4) The "master" EMAX should be put in MIDI Overflow Mode, but the "slave" should not. (If both EMAXs were put in Overflow Mode, then the 17th note would not be played by either EMAX but instead the "slave" would send it out over MIDI.)

(5) While you CAN hook up 3 EMAXs master-slave1-slave2 and get a 24 note system, the problem is wheel information from the master only gets recognized by slave1 and is not echoed to slave2. For the same reason, one shouldn't expect to be able to hook up an external sequencer to drive 2 EMAXs in MIDI Overflow Mode. Instead, use two MIDI Outs from the sequencer and control the two EMAXs on separate MIDI channels.

RIGHT:



WRONG:



Voice Parameter List: (for use with exclusives #00 and #30)

Parameter#	Parameter	# of bits	Value Range (Decimal)
0	VCA Attack	5	0 to 31
1	VCA Hold	5	0 to 31
2	VCA Decay	5	0 to 31
3	VCA Sustain	5	0 to 31
4	VCA Release	5	0 to 31
5	LFO Rate	7	1 to 120
6	LFO Delay	7	0 to 99
7	LFO Variation	4	0 to 15
8	Vibrato	4	0 to 15
9	Tuning	5	0 to 31 (-16 to 15 to user)
10	Vel to Fc	4	0 to 15
11	Vel to FAttack	4	0 to 15
12	Vel to Pan	4	0 to 15
13	Tremolo	4	0 to 15
14	Vel to Level	4	0 to 15
15	Vel to Pitch	4	0 to 15
16	Vel to Attack	4	0 to 15
17	Rt Pitch enable	1	0 to 1 (1 = enabled)
18	Rt Fc enable	1	0 to 1
19	Rt Level enable	1	0 to 1
20	Rt Vibr enable	1	0 to 1
21	Rt Fvibr enable	1	0 to 1
22	Rt Trem enable	1	0 to 1
23	Rt Att enable	1	0 to 1
24	Rt Pan enable	1	0 to 1
25	--not used--		
26	--not used--		
27	--not used--		
28	Original Key	6	0 to 87
29	Lo Channel	3	0 to 7
30	Hi Channel	3	0 to 7
31	Filter Cutoff	7	0 to 120
32	Filter Q	7	0 to 99
33	Env Amount	7	0 to 100 (-50 to 50 to user)
34	--not used--		
35	--not used--		
36	--not used--		
37	--not used--		
38	--not used--		
39	VCF Attack	5	0 to 31
40	VCF Hold	5	0 to 31
41	VCF Decay	5	0 to 31
42	VCF Sustain	5	0 to 31
43	VCF Release	5	0 to 31
44	Velocity to Q	4	0 to 15
45	Solo	1	0 to 1
46	Nontranspose	1	0 to 1
47	Kybd Tracking	4	0 to 15
48	Pan	4	1 to 15 (8 = center)
49	LFO to Pan	4	0 to 15
50	LFO to Fc	4	0 to 15
51	Delay	6	0 to 63
52	Attenuation	5	0 to 31
53	Chorus	1	0 to 1
54	Character #0	6	0 to 63
55	Character #1	6	0 to 63

56	Character #2	6	0 to 63
57	Character #3	6	0 to 63
58	Character #4	6	0 to 63
59	Character #5	6	0 to 63

Note: Characters #0 to #5 are not used by EMAX at all, and can be used by interfacing programs to name individual voices. To be compatible with each other, programs should add 32 to the 0 to 63 number to make an ASCII range of 32 to 95.

.....

Preset Parameter List: (for use with exclusives #01 and #31)

Parameter#	Parameter	# of bits	Value Range (Decimal)
0	Preset Name 1st letter	7	ASCII (=0 if preset empty)
1	--not used--		
2	2nd letter	7	ASCII
3	--not used--		
4	3rd letter	7	ASCII
5	--not used--		
6	4th letter	7	ASCII
7	--not used--		
8	5th letter	7	ASCII
9	--not used--		
10	6th letter	7	ASCII
11	--not used--		
12	7th letter	7	ASCII
13	--not used--		
14	8th letter	7	ASCII
15	--not used--		
16	9th letter	7	ASCII
17	--not used--		
18	10th letter	7	ASCII
19	--not used--		
20	11th letter	7	ASCII
21	--not used--		
22	12th letter	7	ASCII
23	--not used--		
24	Left Wheel Dest	4	0 to 9
25	Right Wheel Dest	4	0 to 9
26	Pressure Dest	4	0 to 9
27	Pedal Dest	4	0 to 9
28	MIDI Controller A Dest	4	0 to 9
29	MIDI Controller B Dest	4	0 to 9

Possible Controller Destinations:

0: off
1: pitch
2: filter freq
3: level
4: vibrato
5: filter vibrato
6: tremolo
7: attack
8: pan
9: crossfade

30	Footswitch #1 Dest	4	0 to 7
31	Footswitch #2 Dest	4	0 to 7

Possible Controller Destinations:

0: off
1: realtime arpeggiator footswitch
2: realtime sequencer control
3: realtime sustain
4: realtime release
5: realtime cross-switch
6: realtime advance preset
7: realtime sample control

32	MIDI Basic Channel	4	0 to 15
33	Omni/Poly 1:Omni 0:Poly	1	0 to 1
34	MIDI Enabled	1	0 to 1

1: All events

	0: No notes or wheels		
35	Preset Change Enabled	1	0 to 1
36	Local Control On	1	0 to 1
37	Seq Start/Stop Enabled	1	0 to 1
38	MIDI Port 1:Out 0:Thru	1	0 to 1
39	--not used--		
40	MIDI Left Wheel Cntrlr	6	0 to 34
41	MIDI Right Wheel Cntrlr	6	0 to 34
42	MIDI Pressure	6	0 to 34
43	MIDI Pedal Controller	6	0 to 34
44	MIDI A input Controller	6	0 to 34
45	MIDI B input Controller	6	0 to 34
	Possible Controllers:		
	0: off		
	1 to 32: midi controller #		
	33: pitch wheel		
	34: channel pressure		
	Arpeggiator Tempo is 16 bits:		4000 to 24000
46	Arpeggiator Tempo Lo	2	0 to 3
47	Arpeggiator Tempo Mid	7	0 to 127
48	Arpeggiator Tempo Hi	7	0 to 127
49	Arpeggiator Resolution	4	0 to 9
50	Arpeggiator Repeats	3	0 to 7
51	Arpeggiator On/Off	1	0 to 1
52	Arpeggiator Mode	3	0 to 5
	Possible Arpeggiator Modes:		
	0: up		
	1: down		
	2: up/down		
	3: forward assignment		
	4: backward assignment		
	5: random		
53	Arpeggiator Latch Mode	2	0 to 2
	0: offlatch		
	1: autolatch		
	2: extendlatch		
54	Cruz Control	1	0 to 1
55	Arpeggiator Glissando	1	0 to 1
56	Arpeggiator Interval	4	0 to 15
57	Arpeggiator Extensions	4	0 to 15
58	Arpeggiator Velocity	7	0 to 127
59	Arpeggiator Hi Key	7	0 to 87
60	Arpeggiator Lo Key	7	0 to 87
61	Pitch Wheel Range	3	1 to 4
	0: invalid		
	1: +- 1 semitone		
	2: +- 2 semitones		
	3: +- 3 semitones		
	4: +- 4 semitones		
62	--not used--		
63	--not used--		
64	Velocity Curve	4	0 to 13
65	--not used--		
66	--not used--		
67	Arpeggiator Harmony1	4	0 to 15
68	Arpeggiator Harmony2	4	0 to 15