# Line 6 AX2 212 MIDI Specification

The AX2 212 MIDI interface allows control over program and bank selection, the use of controllers for wah, volume, and modulation, and system exclusive commands for editing and program dumps.  Since the AX2 212 is not a sound generator, status messages for note off (8xH), note on (9xH), poly pressure (AxH), channel pressure (DxH), and pitch bend (ExH) are ignored when received, and never transmitted. Controllers (BxH) and program change commands (CxH) are received and transmitted on the MIDI channel set by the user (or modified via MIDI by using sysex commands).  If the MIDI channel is set to omni, the AX2 212 will receive commands on all channels, and transmit on channel 1.  For additional information on the specific parameters and features of the AX2 212, please refer to the AX2 212 User Manual.

Volume control

The volume control of the AX2 212 is transmitted as controller 7 any time the volume footpedal is moved.  The volume can be controlled via MIDI with either controller number 7 or 11 (both are always received).  Note that if the current program is set with the volume pedal disabled, the MIDI controller changes will have no affect.

Wah control

The wah control of the AX2 212 is transmitted as controller 4 any time the wah footpedal is moved.  The wah can be controlled via MIDI with either controller number 3 or 4 (both are always received).  Note that if the current program is set with the wah pedal disabled, or to a non-pedal controlled wah such as auto-wah, the MIDI controller changes will have no affect.  The user can also set the wah pedal to control any one of most of the parameters instead of functioning as a wah.  MIDI control of the selected parameter is then also possible, via controller 3 or 4.

Bank Select

The AX2 212 will respond to controller 0 or 32 as a bank select command.  It will take the least significant bit of either controller value, and use it to select a program bank.  If the bit is 0, the preset bank is selected.  If the bit is 1, the user bank is selected.  The change does not take affect until a program change command is received.  Bank select commands are not transmitted from the AX2 212.

Program Change

The AX2 212 responds to program change values of 0 to 127, and selects the appropriate program from the current program bank.  The AX2 212's programs are organized as 32 sets (called Sound Banks, and numbered 01 through 32) of 4 programs (called Sounds A, B, C, and D).  MIDI program number 0 relates to program 01A, MIDI program number 1 selects program 01B, and so on.  MIDI program number 127 will select program 32D.  The AX2 212 will transmit a program change command any time the user selects a new program from the front panel or the Floor Board foot controller. Note:  The user can select one received program number to be specified as a tuner

select command, so that the tuner can be turned on via a MIDI program command. This can also be edited via MIDI sysex control of the global parameters, described later.

Universal System Inquiry

The AX2 212 will respond to the universal system inquiry command if the channel received is the same as the AX2 212's MIDI channel, the channel received is 7F (all channels), or the AX2 212 is set to omni mode.  The received message is in the following format:

      F0 7E <chan> 06 01 F7      System inquiry message

If the channel received is 7F, the AX2 212 will respond with the channel also set to 7F. If the channel received is not 7F, the AX2 212's response will contain the same channel as was received.  The response transmitted from the AX2 212 is in the following format:

      F0 7E <chan> 06 02      System inquiry response
      00 01 0C      Line 6 manufacturer's ID
      00 00      AX2 212 product family code
      00 00      AX2 212 device family member code
      xx xx xx xx      Software version number (ASCII)
      F7      End of system exclusive

The software version is a four digit ASCII code, with an assumed decimal point between the second and third digit.  For example, version 1.05 would be represented by 30H 31H 30H 35H.  Note:  All received universal system commands are ignored while the AX2 212 is in tuner mode.

System Exclusive

System exclusive commands are used for sending and receiving programs, global settings, and for editing specific parameters.  All transmitted and received sysex commands contain the same first five bytes:

      F0      Sysex command
      00      Line 6 ID msb
      01      Line 6 ID mid
      0C      Line 6 ID lsb
      00      AX2 212 ID

The next byte (sixth byte) contains the opcode for the desired sysex command.  There are currently six opcodes supported, and they are summarized here along with their data format:

      00      Program dump
            <program #> <83 bytes program data...> F7
      01      Edit buffer dump
             00 <83 bytes program data...>  F7
      02      Global buffer dump
             <48 bytes global data...> F7

03      Sysex dump request
                <type> {<program #>} F7
                 {} may be omitted depending on type:
                        <type>=0 (program), <program #>=0..127
                        <type>=1 (edit buffer),  no <program #>
                        <type>=2 (global data),  no <program #>
                        <type>=3 (all programs), no <program #>
                        (responds with 128 programs + global data)
04      Parameter edit
                [<parameter #> <dataLSNibble> <dataMSNibble>] F7
                        Data in [...] can be repeated
05      Store edit buffer
                <program #> F7


Note:  All received universal system commands are ignored while the AX2 212 is in tuner mode.


Program and Editing Formats

When sending or receiving a program or edit dump, the data is packed in the following format so as to minimize the amount of bytes required to transmit the program.  For each 7 consecutive bytes of a program (labeled a through g below), 8 MIDI bytes are sent, as follows:

|   |   |   | Bit # |   |   |   |   |        |
|---|---|---|---|---|---|---|---|--------|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Byte   |
| 00 | a7 | a6 | a5 | a4 | a3 | a2 | a1 | Byte 0 |
| 00 | a0 | b7 | b6 | b5 | b4 | b3 | b2 | Byte 1 |
| 00 | b1 | b0 | c7 | c6 | c5 | c4 | c3 | Byte 2 |
| 00 | c2 | c1 | c0 | d7 | d6 | d5 | d4 | Byte 3 |
| 00 | d3 | d2 | d1 | d0 | e7 | e6 | e5 | Byte 4 |
| 00 | e4 | e3 | e2 | e1 | e0 | f7 | f6 | Byte 5 |
| 00 | f5 | f4 | f3 | f2 | f1 | f0 | g7 | Byte 6 |
| 00 | g6 | g5 | g4 | g3 | g2 | g1 | g0 | Byte 7 |

Since there are a total of 72 bytes per program (prior to this packing format), 83 bytes of data are required to be sent out MIDI once converted to this format.  When combined with the sysex header and EOX, the total number of bytes transmitted per program is 91 bytes.

All parameters are stored as 8-bit values.  If the parameter range allows negative numbers, the parameters is stored as a 2's compliment 8-bit number.  There are 72 bytes stored with each program, each byte representing one parameter.  The first 66 bytes relate to the 11 rows of six parameters, in order, starting from the top left-most parameter as printed on the AX2 212 front panel.  For simplicity, the last two parameters of the first two rows (MIDI Channel, Transmit Sounds, Gate/Hum Per Sound, Aux Per Sound) are stored with each program, although they are global parameters and the value stored (or received) within each program will be ignored.  The last six bytes of each program are spare and are reserved for future use.  They should be left unchanged.  Currently, the last three bytes of these six are used to represent the

software version number in use when the program was last stored.  This is encoded with the first digit range being 32 through 40 (representing "1." through "9."), and the next two digits' range being 0 through 9 each, to represent the two digit decimal number after the decimal point.  For example, version 1.05 software programs would have the last three bytes set to 32, 00, 05.  A change in version number does not necessarily mean any change in functionality for a program's parameters.  Since the program memory could have been loaded with programs from a previous software version, these bytes cannot be used to determine the software version of the AX2 212 via MIDI.  To determine the current version number, use the universal system inquiry message.

The following list shows the name and range for each parameter of a program.  It also indicates the parameter number to be used when editing a parameter directly via the parameter edit command (04).  The parameter number can be easily determined by looking at the front panel.  The column number is represented in bits 4 through 6 of the parameter number as column 0 through 5, and the row number is represented in bits 0 through 3 as row 0 through 10 (A).

| Parm | Description | Range | Comments |
|------|-------------|-------|----------|
| | AUX/MIDI | | |
| 00H | Aux Input Mix | 0/99 | |
| 10H | Aux Input Bass | -50/50 | |
| 20H | Aux Input Treble | -50/50 | |
| 30H | Aux Input Reverb | 0/99 | |
| 40H | Midi Channel | 0/16 | 0=omni, not stored |
| 50H | Transmit Sounds | 0/129 | 128=edit buffer, 129=all, not stored |
| | NOISE GATE | | |
| 01H | Noise Gate On/Off | 0/1 | |
| 11H | Noise Gate Threshold | 0/99 | |
| 21H | Noise Gate Decay | 0/99 | |
| 31H | Hum Canceller | 0/99 | 0=off |
| 41H | Gate/Hum Per Sound | 0/1 | 0=all, 1=per sound, not stored |
| 51H | Aux Per Sound | 0/1 | 0=all, 1=per sound, not stored |
| | COMP/PEDALS | | |
| 02H | Compression Level | 0/5 | 0=off |
| 12H | Volume Pedal On/Off | 0/3 | 0=off, 1=pre, 2=dist, 3=post |
| 22H | Distortion Box | 0/120 | See note 1 |
| 32H | Wah Type | 0/28 | See note 2 |
| 42H | Wah Depth | 0/99 | |
| 52H | Auto-Volume Attack | 0/99 | 0=off |
| | AMP MODEL | | |
| 03H | Model Select | 0/27 | See note 3 |
| 13H | Bass | 0/99 | |
| 23H | Mid | 0/99 | |
| 33H | Treble | 0/99 | |
| 43H | Bright Switch | 0/1 | 0=off |
| 53H | Amp Model Out Level | 0/99 | |

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        GRAPHIC EQ
04H   80Hz               -19/19
14H   240Hz              -19/19
24H   750Hz              -19/19
34H   2200Hz             -19/19
44H   6600Hz             -19/19
54H   Presence            0/99
        TREMOLO/CAB
05H   Tremolo Type        0/4      Off, mono, stereo 90°, stereo 180°, Ring Mod
15H   Tremolo Speed       0/99
25H   Tremolo Depth       0/99
35H   Tremolo Shape       0/99
45H   Cabinet Type        0/15     See note 4
55H   Cabinet Stereo Spread 0/1    0=off
        DELAY
06H   Delay Type          1/14     Mono, stereo, ping-pong, 10 multi-taps, tape echo
16H   Main Delay Time     0/99
26H   Delay Time Offset   0/99
36H   Delay Feedback      0/99
46H   Dynamic Delay       0/99
56H   Delay Level         0/99
        CHORUS
07H   Chorus Type         1/6      Chorus, flange, phaser, rotary, vibrato, freq mod
17H   Chorus Speed        0/99
27H   Chorus Depth        0/99
37H   Chorus Feedback     0/99
47H   Chorus Shape        1/4      Mono sine, stereo sine, mono sqr, stereo sqr
57H   Chorus Level        0/99
        REVERB
08H   Reverb Type         1/5      Spring; dark, bright room; dark, bright hall
18H   Predelay            0/99
28H   Reverb Decay        0/99
38H   Reverb Tone         0/99
48H   Reverb Diffusion    0/99
58H   Reverb Level        0/99
        FX ON/OFF
09H   Distortion Box On/Off 0/1    0=off
19H   Drive On/Off        0/1      0=off
29H   EQ On/Off           0/1      0=off
39H   Trem/Chorus On/Off  0/1      0=off
49H   Delay On/Off        0/1      0=off
59H   Reverb On/Off       0/1      0=off
        MAIN
0AH   Drive               0/99
13H   Bass                0/99
23H   Mid                 0/99
33H   Treble              0/99
4AH   Channel Volume      0/99
5AH   Delay/Reverb        0/99
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Note 1:  The Distortion Box parameter is displayed as OFF when set to 0, and then displayed for values 1 through 120 as 1.0, 1.1, 1.2, ..., 1.9, 2.0, 2.1, ..., 12.8,12.9.  The left digit determines the distortion box model, and the right digit determines the amount of distortion.  See the user manual for details.

Note 2:  The Wah Type can be set to off, wah pedal, auto-wah, rando-wah, and sample/hold for settings 0 through 4, respectively.  For settings 5 through 28, the display will show 5.1, 5.2, 5.3, ..., 5.9, 5.10, 5.11, ..., 5.24.  These settings relate to the 24 possible modulation assignments of the wah pedal.  The specific parameters that can be modulated are detailed in the user manual.

Note 3:  The Preamp Type range of 0/27 is displayed with the left most digit representing the preamp category (eg. 0=Jazz Clean, 1=Small Tweed, 2=Tweed Blues, 3=Black Panel, etc…).  The right digit represents the variation of the category.  The specific preamp model names are listed in the user manual.

Note 4:  The Cabinet Type can be set to off (0), or any of 15 specific types.  The display of these parameters shows the category in the left digit of the display as 1, 2, 3, 4, or 5, representing 1x12, 2x10, 2x12, 4x10, and 4x12 cabinets, respectively, and the right digit displays one of three types for each category.  See the user manual for more details on the cabinet models.

Global Data

The global data consists of 21 parameters that are not stored with each program, and therefore affect the overall operation of the AX2 212 at all times.  The format for receiving or transmitting the global data is different than the programs, since there is much less data to be sent.  Each parameter is represented by two MIDI bytes, each containing one nibble (4 bits) of the parameter.  The least significant nibble is sent first.  The following list shows the order, name, and range of each global parameter:

| Parm | Description | Range | Comments |
|------|-------------|-------|----------|
| 00 | Global Aux Input Mix | 0/99 | Has no affect if Aux Per Sound=1 |
| 01 | Global Aux Input Bass | -50/50 | Has no affect if Aux Per Sound=1 |
| 02 | Global Aux Input Treble | -50/50 | Has no affect if Aux Per Sound=1 |
| 03 | Global Aux Input Reverb | 0/99 | Has no affect if Aux Per Sound=1 |
| 04 | Midi Channel | 0/16 | 0=omni, see note 1 |
| 05 | Transmit Sounds | 0/129 | 128=edit buffer, 129=all, see note 1 |
| 06 | Global Noise Gate On/Off | 0/1 | Has no affect if Gate/Hum Per Sound=1 |
| 07 | Global Noise Gate Thresh | 0/99 | Has no affect if Gate/Hum Per Sound=1 |
| 08 | Global Noise Gate Decay | 0/99 | Has no affect if Gate/Hum Per Sound=1 |
| 09 | Global Hum Canceller | 0/99 | Has no affect if Gate/Hum Per Sound=1 |
| 10 | Gate/Hum Per Sound | 0/1 | 0=all, 1=per sound, see note 1 |
| 11 | Aux Per Sound | 0/1 | 0=all, 1=per sound, see note 1 |
| 12 | Tuner Gain | 0/99 | |
| 13 | Tuner Reference | -5/5 | 0=440Hz |
| 14 | Tuner Midi Program | 0/128 | 0=off |
| 15 | Global Drive | -55/55 | See note 2 |

| | | | |
|---|---|---|---|
| 16 | Global Bass | -55/55 | See note 2 |
| 17 | Global Mid | -55/55 | See note 2 |
| 18 | Global Treble | -55/55 | See note 2 |
| 19 | Global Channel Volume | -55/55 | See note 2 |
| 20 | Global Delay/Reverb | -55/55 | See note 2 |

Note 1:  These parameters can also be edited using the parameter edit command (04), since they exist in the parameter matrix on the front panel.  Also, if Aux Per Sound and/or Gate/Hum Per Sound are in global mode (0), then the global parameters for aux and gate will be edited when using the parameter edit command (04) for those program parameters.

Note 2:  The actual range of the last six parameters is displayed as -50 through +50. Parameter values of -5 through +5 on the global parameters are all treated as 0 (and are displayed as 0), and are used as a dead zone to make it easy to set a zero value from the front panel knobs.