
DX8 Serial Communication Specification for Sound Contractors

Version 1.0
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DX8 Serial Port Communication Specification - for Sound Contractors

General

This document outlines the message formats for communicating with the dx8 via either the front panel or rear panel RS232 port. The dx8 uses a standard RS232, 115200 kBaud binary interface for all messages.

Message Format

All messages have the following four fields:

Sync	Device ID	Message ID	Data
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There are no reserved bytes in the protocol; a data byte can be any value so that no packing is necessary.

Sync

The purpose of the sync byte is to provide a means to help the dx8 gain synchronization with an incoming message stream should it be 'hot plugged', or if it starts receiving bad data (like what happens when the baud rate is wrong). The dx8 uses the value 0xA5 for this purpose. When the dx8 gets out of sync, it waits until it receives an 0xA5, and then begins parsing the message. If the data which follows is the sync byte is a valid message, it will process it. Otherwise, it will continue parsing the stream until it gets another 0xA5 and then repeat the process. While not completely foolproof, in practice this gives really good sync capability while allowing for a simple protocol and stable, reliable rejection of garbled data.

Device ID

The device ID specifies the network address of the unit. This value is assigned by using the Mackie dx8 GUI.

To communicate with a network of dx8's, you only need to run 1 serial control line to any dx8 on the network. From there, you can access any device on the network by specifying the device ID that you wish to send the message to.

If you specify a value of 0x00 for the device ID, this specifies that the message is a global message, so that all devices should listen to it. Version 1.0 of the dx8 does not use the device ID; you can send 00 for this value.

Message ID

This specifies what type of a message is being sent. For instance, a parameter edit message has ID 0x78, and a preset recall message has ID 0x77. See appendix A for a list of all the supported messages.

Data

The usage of this field is up to each individual message.

Appendix A - Supported Messages

The following messages are supported by the dx8. In the following table, dev ID specifies the device ID to which the message is being addressed. For instance, to send a 'Ping' message to device ID 01, you need the following 4 bytes:

Ping Message = A5 01 80 00

Message	Format (hex)	Description
Ping	A5 <Dev ID> 80 00	Ping the device to get its Software Information and see if it is alive! The dx8 responds with a Ping Response message as shown below
Ping Response	A5 <Dev ID> 7F <Device Type> <SW Version>	This message is sent by the dx8 in response to Ping. The returned values are <Device Type> - 16 bit device number. For the dx8, the Device Type is 0x0101. <SW Version> - 16 bit version of the software
Parameter Edit	A5 <Dev ID> 78<Effect ID> < Channel> <Index> <Value>	Appendix B specifies Effect ID (input fader, input tone control, 31 band EQ, master fader level, etc.), channel (1-8 for inputs, 1 or 2 for the outputs) and indices (the parameter index within effect) for all parameters.
Preset Recall	A5 <Dev ID> 77 00 00 00 <Preset #>	Recalls the specified preset (1-16). Note the three zeros between the 77 and the preset number. These exist for future expansion. Presets can be set up using the Mackie dx8 GUI.
Temporary Preset Recall or Unload	A5 <Dev ID> 76 00 00 <Load/Unload> <Preset>	Temporarily recalls or unloads the specified preset (1-16) based on the next byte. If 1, it is loaded, if 2 it is unloaded. The two zeros between the 76 and the load/unload byte exist for future expansion
Update Mode Edit	A5 <Dev ID> 6D 00 00 <Meter Num> <mode>	<p>This message is used to set the update mode for both the meters and parameter edits. The update mode can be either polled (<mode> = 1) or auto (<mode> = 2). In auto mode, the dx8 mode spontaneously generates the responses. The generated messages will be sent out the same COM port as this message is received on, but only 1 COM port can actively be sending parameter and meter information at any 1 time.</p> <p><Meter Num> determines what is affected by this command. If <Meter Num> = 0, this affects whether or not parameter edits are echoed. If <Meter Num> = 1..Num Meters, only updates for the specified meter will be affected If <Meter Num> = 255, All meters will be affected by mode. However, this will not affect whether parameter edits are echoed. Note that neither meter info nor parameter edits will be sent if the PC heartbeat is not detected.</p> <p>When set to auto, will send all meter and parameter update messages until the mode is set back to polled. Note: power cycling the dx8 will cause the mode to be set to polled.</p>
PC connected heartbeat	A5 <Dev ID> 65 00 00 00 00	Sent by the PC to the dx8 to indicate it is connected. If this message has not been received in the preceeding 15 seconds, the dx8 assumes that the PC is no longer connected. The dx8 will then stop sending meter and parameter edit information, if it is in auto update mode.
Meter Information Response	A5 <Dev ID> 6E 00 <Meter Num> <Meter Val Hi> <Meter Val Lo>	Sent from the dx8 to give meter information. This is either in response to a meter data request, or due to the dx8 being in auto meter mode. Meter Val Hi is the signed 8 bit level in dB, and Meter Val Lo is the fractional portion of a dB, so that together they form a signed 8.8 number. See Appendix C for further information.
Meter Data Request	6F 6E 00 00 <Meter Num>	Polls the dx8 to get the value of the specified meter (see update mode edit & appendix C for further info).

Message Examples

These examples assume a device ID of 00, which is the global device ID. The following examples use the information from Appendix B.

To do this...	Send this...
Adjust fader 7 on the output A bus to 0 dB	A5 00 78 04 01 07 C1
Adjust master fader for output B to +10 dB	A5 00 78 05 02 01 FF
Select base preset 4	A5 00 77 00 00 00 04
Load temporary preset 3	A5 00 76 00 00 01 03
Unload temporary preset 3	A5 00 76 00 00 02 03
Set channel 3's low tone level control to + 15 dB	A5 00 78 01 03 01 1E
Set channel 7's high tone frequency to 3.16 kHz	A5 00 78 01 07 04 0F
Force channel 3 on	A5 00 78 0F 03 06 01
Force channel 3 off	A5 00 78 0F 03 06 02
Set channel 3 to 'no force'	A5 00 78 0F 03 06 00
Mute output B (latching)	A5 00 78 0F 00 03 01
Mute input 6 (momentary)	A5 00 78 0F 06 03 01
Set control group 2 to 0 dB	A5 00 78 0F 05 02 C1
Enable parameter echoing from the dx8	A5 00 6D 00 00 00 02
Put meter 1 (input #1) into auto mode	A5 00 6D 00 00 01 02
PC connected heartbeat	A5 00 65 00 00 00 00
Poll the dx8 for meter #6	A5 00 6F 6E 00 00 06

See Appendix C for examples relating to meter information responses

Appendix B - Effect IDs, Channels, Numbers and Ranges

Level Control

The levels are controlled using the output mixer 'effects'. There are two channels for this effect, corresponding to the two outputs. Each has 8 parameters, corresponding to the fader settings for each of the 8 inputs. Additionally, each output has a master fader 'effect'. Again, there are two channels, one for each output. In this case, there is only 1 parameter per effect.

Effect Name	Parameter Name	Effect ID	Channel	Parameter Number	Value	Value description
Output Mixer	Input Fader gain	4	1 (Output A) 2 (Output B)	1 (Input 1) to 8	0-255 (0xFF)	255 (0xFF) = + 10 dB 193 (0xC1) = 0 dB, 0 = off

Effect Name	Parameter Name	Effect ID	Channel	Parameter Number	Value	Value description
Master fader	Gain	5	1-2	1	0-255 (0xFF)	255 (0xFF) = + 10 dB 193 (0xC1) = 0 dB, 0 = off

Compressor

Each output has a compressor.

Effect Name	Parameter Name	Effect ID	Channel	Parameter Number	Value	Value description
Compressor	Enable	7	1-2	1	0-1	0 = off, 1 = on
Compressor	Threshold	7	1-2	2	0-236	0 = -60 dB, 236 = -1.0 dB
Compressor	Ratio	7	1-2	3	0-87	0 = 1.0:1 87 = 20:1
Compressor	Attack Time	7	1-2	4	0-173	0 = .1 mS, 173 = 2500 mS
Compressor	Release Time	7	1-2	5	0-118	0 = 10 mS, 118 = 2500 mS
Compressor	Gain	7	1-2	6	0-200	0 = 0 dB 200 = 20 dB

Tone and EQ settings

Each input has a high and low shelving EQ, as does each output. Additionally, each output has a 31 band graphic equalizer.

Effect Name	Parameter Name	Effect ID	Channel	Parameter Number	Value	Value description
Input Tone Control	Low Shelf Level	1	1-8	1	0-255 (0xFF)	0 = -15 dB, 127 (0x7F) = 0 dB, 255 (0xFF) = + 15dB
Input Tone Control	Low Shelf Freq	1	1-8	2	0-255 (0xFF)	0 = 20 Hz, 127 (0x7F) = 99.4 Hz, 255 (0xFF) = 500 Hz
Input Tone Control	High Shelf Level	1	1-8	3	0-255 (0xFF)	0 = -15 dB, 127 (0x7F) = 0 dB, 255 (0xFF) = + 15dB
Input Tone Control	High Shelf Freq	1	1-8	4	0-255 (0xFF)	0 = 500 Hz, 127 (0x7F) = 3.14kHz 255 (0xFF) = 20 kHz

Effect Name	Parameter Name	Effect ID	Channel	Parameter Number	Value	Value description
Output Tone Control	Low Shelf Level	3	1-2	1	0-255 (0xFF)	0 = -15 dB, 127 (0x0F) = 0 dB, 255 (0x1E) = + 15dB
Output Tone Control	Low Shelf Freq	3	1-2	2	0-255 (0xFF)	0 = 20 Hz, 127 (0x7F) = 99.4 Hz, 255 (0xFF) = 500 Hz
Output Tone Control	High Shelf Level	3	1-2	3	0-255 (0xFF)	0 = -15 dB, 127 (0x7F) = 0 dB, 255 (0xFF) = + 15dB
Output Tone Control	High Shelf Freq	3	1-2	4	0-255 (0xFF)	0 = 500 Hz, 127 (0x7F) = 3.14kHz 255 (0xFF) = 20 kHz

Effect Name	Parameter Name	Effect ID	Channel	Parameter Number	Value	Value description
31 Band EQ	Bypass	2	1-2	1	0-1	0 = in, 1 = out (bypassed)
31 Band EQ	20.0Hz	2	1-2	2	0-255 (0xFF)	0 = -15 dB, 127 (0x7F) = 0 dB, 255 (0xFF) = + 15dB
31 Band EQ	25.0Hz	2	1-2	3	0-255(0xFF)	
31 Band EQ	31.5Hz	2	1-2	4	0-255(0xFF)	
31 Band EQ	40.0Hz	2	1-2	5	0-255(0xFF)	
31 Band EQ	50.0Hz	2	1-2	6	0-255(0xFF)	
31 Band EQ	63.0Hz	2	1-2	7	0-255(0xFF)	
31 Band EQ	80.0Hz	2	1-2	8	0-255(0xFF)	
31 Band EQ	100Hz	2	1-2	9	0-255(0xFF)	
31 Band EQ	125Hz	2	1-2	10 (0x0A)	0-255(0xFF)	
31 Band EQ	160Hz	2	1-2	11 (0x0B)	0-255(0xFF)	
31 Band EQ	200Hz	2	1-2	12 (0x0C)	0-255(0xFF)	
31 Band EQ	250Hz	2	1-2	13 (0x0D)	0-255(0xFF)	
31 Band EQ	315Hz	2	1-2	14 (0x0E)	0-255(0xFF)	
31 Band EQ	400Hz	2	1-2	15 (0x0F)	0-255(0xFF)	
31 Band EQ	500Hz	2	1-2	16 (0x10)	0-255(0xFF)	
31 Band EQ	630Hz	2	1-2	17 (0x11)	0-255(0xFF)	
31 Band EQ	800Hz	2	1-2	18 (0x12)	0-255(0xFF)	
31 Band EQ	1.00kHz	2	1-2	19 (0x13)	0-255(0xFF)	
31 Band EQ	1.25kHz	2	1-2	20 (0x14)	0-255(0xFF)	
31 Band EQ	1.60kHz	2	1-2	21 (0x15)	0-255(0xFF)	
31 Band EQ	2.00kHz	2	1-2	22 (0x16)	0-255(0xFF)	
31 Band EQ	2.50kHz	2	1-2	23 (0x17)	0-255(0xFF)	
31 Band EQ	3.15kHz	2	1-2	24 (0x18)	0-255(0xFF)	
31 Band EQ	4.00kHz	2	1-2	25 (0x19)	0-255(0xFF)	
31 Band EQ	5.00kHz	2	1-2	26 (0x1A)	0-255(0xFF)	
31 Band EQ	6.30kHz	2	1-2	27 (0x1B)	0-255(0xFF)	
31 Band EQ	8.00kHz	2	1-2	28 (0x1C)	0-255(0xFF)	
31 Band EQ	10.0kHz	2	1-2	29 (0x1D)	0-255(0xFF)	
31 Band EQ	12.5kHz	2	1-2	30 (0x1E)	0-255(0xFF)	
31 Band EQ	16.0kHz	2	1-2	31 (0x1F)	0-255(0xFF)	
31 Band EQ	20.0kHz	2	1-2	32 (0x20)	0-255(0xFF)	

Effect Name	Parameter Name	Effect ID	Channel	Parameter Number	Value	Value description
5 Band Parametric EQ	Bypass	6	1-2	1	0-1	0 = in, 1 = out (bypassed)
5 Band Parametric EQ	Band 1 Level	6	1-2	2	0-255 (0xFF)	0 = -15 dB, 127 (0x7F) = 0 dB, 255 (0xFF) = + 15dB
5 Band Parametric EQ	Band 1 Freq	6	1-2	3	0-255 (0xFF)	0 = 20 Hz, 127 (0x7F) = 623 Hz, 255 (0xFF) = 20 kHz NOTE: log spacing
5 Band Parametric EQ	Band 1 Bandwidth	6	1-2	4	0-255(0xFF)	0 = 0.1 octave, 255 (0xFF) = 6.0 octaves
5 Band Parametric EQ	Band 1 Level	6	1-2	5	0-255(0xFF)	
5 Band Parametric EQ	Band 2 Freq	6	1-2	6	0-255(0xFF)	
5 Band Parametric EQ	Band 2 Bandwidth	6	1-2	7	0-255(0xFF)	
5 Band Parametric EQ	Band 3 Level	6	1-2	8	0-255(0xFF)	
5 Band Parametric EQ	Band 3 Freq	6	1-2	9	0-255(0xFF)	
5 Band Parametric EQ	Band 3 Bandwidth	6	1-2	10 (0x0A)	0-255(0xFF)	
5 Band Parametric EQ	Band 4 Level	6	1-2	11 (0x0B)	0-255(0xFF)	
5 Band Parametric EQ	Band 4 Freq	6	1-2	12 (0x0C)	0-255(0xFF)	
5 Band Parametric EQ	Band 4 Bandwidth	6	1-2	13 (0x0D)	0-255(0xFF)	
5 Band Parametric EQ	Band 5 Level	6	1-2	14 (0x0E)	0-255(0xFF)	
5 Band Parametric EQ	Band 5 Freq	6	1-2	15 (0x0F)	0-255(0xFF)	
5 Band Parametric EQ	Band 5 Bandwidth	6	1-2	16 (0x10)	0-255(0xFF)	

Mutes, Groups and Force Values

The dx8's various mutes, mute groups, control groups, and force settings can be controlled by using 'Global' parameter edits. These are considered global, as opposed to the other parameters which are all selectable on a preset basis.

Effect Name	Parameter Name	Effect ID	Channel	Parameter Number	Value	Value description
Global	Output A Mute Latching	15 (0x0F)	0	1	0-1	0 = off, 1 = on
Global	Output A Mute Momentary	15 (0x0F)	0	2	0-1	0 = off, 1 = on
Global	Output B Mute Latching	15 (0x0F)	0	3	0-1	0 = off, 1 = on
Global	Output A Mute Momentary	15 (0x0F)	0	4	0-1	0 = off, 1 = on
Global	Output A+B Mute Latching	15 (0x0F)	0	5	0-1	0 = off, 1 = on
Global	Output A+B Mute Momentary	15 (0x0F)	0	6	0-1	0 = off, 1 = on
Global	Output A+B Group Level	15 (0x0F)	0	7	0-255 (0xFF)	255 (0xFF) = + 10 dB, 193 (0xC1) = 0 dB, 0 = off
Global	Disable All Modifiers	15(0x0F)	0	8	0-1	0 = enable, 1 = disable
Global	Active Base Preset	15 (0x0F)	0	11	1-16	Currently loaded base preset. See note 1
Global	Logic Input Switch Status	15 (0x0F)	0	16-27	0-1	The 'raw' status of the 10 logic inputs. See note 2
Global	Active Preset Active	15 (0x0F)	0	28	1-16	Currently active preset. See note 1
Global	Temporary Preset Status	15 (0x0F)	0	29	0-1	Set if active preset is a temporary preset. See note 1
Global	Input Mute Latching	15 (0x0F)	1-8	1	0-1	0 = off, 1 = on
Global	Input Group Mute Latching	15 (0x0F)	1-8	2	0-1	0 = off, 1 = on
Global	Input Mute Momentary	15 (0x0F)	1-8	3	0-1	0 = off, 1 = on
Global	Input Group Mute Momentary	15 (0x0F)	1-8	4	0-1	0 = off, 1 = on
Global	Control Group Level	15 (0x0F)	1-8	5	0-255 (0xFF)	255 (0xFF) = + 10 dB, 193 (0xC1) = 0 dB, 0 = off
Global	Force Status	15 (0x0F)	1-8	6	0-2	0=no force, 1=force on, 2= force off

Note 1: The active base preset, active preset, and temporary preset status can be recalled from the, but it cannot be set using this mechanism. (Use a preset recall message (0x77) to change the base preset.) Essentially, this is a 'read only' variable.

Note 2: These values reflect the current state of the logic input switches. They are read only variables.

Level Meter Information

Meter information can be received in two modes - automatic or polled. In auto mode (mode=2), the information is spontaneously generated by the dx8 every (approximately) 75 msec. All levels are sent up at once, each in its own level response message. In polled mode (mode=1), you request (using a data request message) a particular meter number and you get a Meter info response message. In automatic mode, you must keep sending the "PC connected heartbeat" (message ID 0x65) message to continue receiving automatic updates.

Each meter has a number, currently from 1-16. In the future, there will be more meters to reflect the state of various patch points within the plugins. Meters 1-8 are the 8 inputs. Meters 9-18 correspond to the indicated points on the following somewhat wonky drawing.

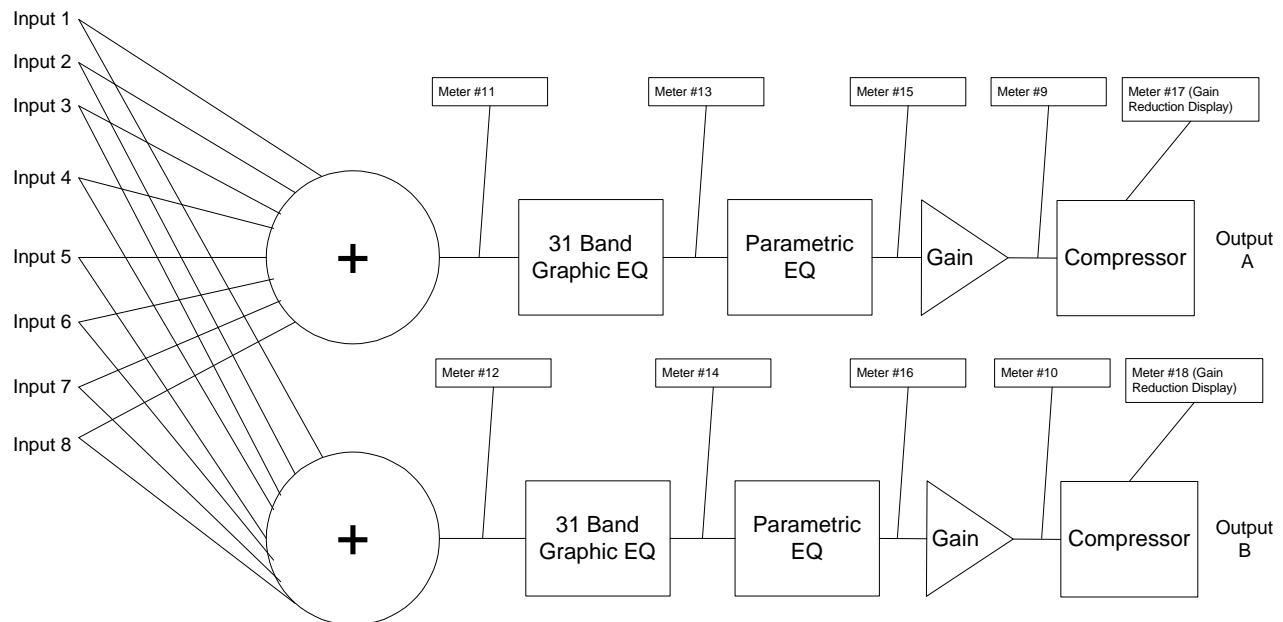


Figure 1: Meter Numbers

In polled mode, the Meter # parameter of the meter request message corresponds to which meter you would like to get. In automatic mode, the Meter # parameter of the update mode message corresponds to which level is (automatically) sent from the dx8. For instance, setting Meter# = 10 gets Output A.

Level information within the Meter Information response message is in dB. A floating point number can be constructed from the two parts; Level Hi is the integer portion of the dB reading, and Level Lo is the fractional part. Note that Level Hi is a signed 8 bit integer. Here are a couple

of examples; the first 5 bytes are all the same as they specify which meter & device they are coming from:

Message Received	db Level
A5 00 6E 00 01 01 00	1.00
A5 00 6E 00 01 01 80	1.50
A5 00 6E 00 01 FF 00	-1.00
A5 00 6E 00 01 FF 80	-0.50
A5 00 6E 00 01 FE BB	-1.27
A5 00 6E 00 01 A0 00	-96.00