

## 4.24C System Exclusive Messages

### Notes:

- 1) Units are identified by their Midi channel assignment, which is located on their Utility screen.
- 2) On power up the unit's baud rate defaults to 31.25Kbps (MIDI). When four to five bytes of 9600bps data are received, the unit automatically changes its baud rate, and transmits a preamble of ten \$F9 characters at the new 9600bps rate.
- 3) Message types 5-13, & 21 (below) are always echoed out of the 4.24C, and on to the next unit.
- 4) Meter requests, data requests, and preset names requests invoke a response message, from the selected MIDI channel. However, if the MIDI channel is not assigned to any unit then the original request message is echoed back to the PC.
- 5) The trigger MIDI dump message causes the selected unit to transmit its 30 presets into the next unit in line, overwriting that unit's settings. If the PC is the receiving device then the user is prompted to select a file name to save the dump to.
- 6) Message types 15-20 keep the software updated, when a local change occurs on the selected unit.
- 7) Midi Program Change messages may be used to recall presets when 31.25Kbps (MIDI) baud rate is implemented.  
Program Change: \$Cn \$xx, where  $n$  = MIDI channel and  $xx$  = preset number (0-29 = preset 1-30).

### Message Types:

00 = meter response	12 = preset save message
01 = data request	13 = new working preset name
02 = data response	14 = trigger MIDI dump
03 = preset names request	15 = current unit's local gain change update
04 = preset names response	16 = current unit's local eq filter change update
05 = preset download	17 = current unit's local delay change update
06 = gain message	18 = current unit's local crossover change update
07 = eq filter message	19 = current unit's local limiter change update
08 = delay message	20 = current unit's local status change update
09 = crossover filter message	21 = recall preset with muting option
10 = limiter message	7F = MIDI Bulk Dump
11 = status message	

### Meter Levels:

**Step1:** Computer transmits a Channel Pressure byte as meter data request: \$Dn, where  $n$  = MIDI channel number

**Step2:** First unit assigned to this MIDI channel responds with a System Exclusive meter message, as follows:

<u>Byte#</u>	<u>Value</u>	<u>Description</u>
1	Start Byte: \$F0	Sys-Ex status byte ( $\$$ denotes hexadecimal numbers)
2	00	Sys-Ex id escapement
3	01	Ashly MIDI manufacturer id most significant byte
4	\$2A	Ashly MIDI manufacturer id least significant byte
5	\$03	4.24C Model number
6	\$0n	$n$ = MIDI channel number (\$0-F), the device id number
7	MSG Type: 00	Meter response message
8	xx	Input A level
9	xx	Input B level
10	xx	Input C level
11	xx	Input D level
12	xx	Output 1 level
13	xx	Output 2 level
14	xx	Output 3 level
15	xx	Output 4 level
16	xx	Output 5 level
17	xx	Output 6 level
18	xx	Output 7 level

19	<i>xx</i>	Output 8 level
20	<i>xx</i>	Output 1 gain reduction
21	<i>xx</i>	Output 2 gain reduction
22	<i>xx</i>	Output 3 gain reduction
23	<i>xx</i>	Output 4 gain reduction
24	<i>xx</i>	Output 5 gain reduction
25	<i>xx</i>	Output 6 gain reduction
26	<i>xx</i>	Output 7 gain reduction
27	<i>xx</i>	Output 8 gain reduction
28	<i>End Byte:</i>	<i>\$F7</i> Sys-Ex end of transmission byte

**Meter Notes:**

All input and output level bytes use the following binary format: 0CLLLLLL  
 Bits 5-0 represent the dBu level, where 0 = <-42 dBu, 1 to \$3F = -42 dBu to +20 dBu.  
 Bit 6 represents clipping (>+20 dBu), where 0 = not clipped, 1 = clipped. The clip detector monitors the overall stage level, as well as EQ filters, & HPF/LPF (if applicable).  
 All gain reduction bytes represent the actual decibel amount of attenuation applied by the output's limiter (0 = 0 dB, 1 = 1 dB, ...).

**Data Request:**

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	<i>Start Byte:</i>	<i>\$F0</i>	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		<i>00</i>	Sys-Ex id escapement
3		<i>01</i>	Ashly MIDI manufacturer id most significant byte
4		<i>\$2A</i>	Ashly MIDI manufacturer id least significant byte
5		<i>\$03</i>	4.24C model number
6		<i>\$0n</i>	<i>n</i> = MIDI channel number (\$0-F), the device id number
7	<i>MSG Type:</i>	<i>01</i>	Data request message
8	<i>End Byte:</i>	<i>\$F7</i>	Sys-Ex end of transmission byte

**Data Response Message:**

(Response to a Data Request Message. Refer to Excel file: 4.24C\_Data\_Response.xls)

**Preset Names Request:**

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	<i>Start Byte:</i>	<i>\$F0</i>	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		<i>00</i>	Sys-Ex id escapement
3		<i>01</i>	Ashly MIDI manufacturer id most significant byte
4		<i>\$2A</i>	Ashly MIDI manufacturer id least significant byte
5		<i>\$03</i>	4.24C model number
6		<i>\$0n</i>	<i>n</i> = MIDI channel number (\$0-F), the device id number
7	<i>MSG Type:</i>	<i>03</i>	Preset names request message
8	<i>End Byte:</i>	<i>\$F7</i>	Sys-Ex end of transmission byte

### Preset Names - response to previous message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	Start Byte:	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0n	n = MIDI channel number (\$0-F), the device id number
7	MSG Type:	04	Preset names response message
8-607		xx	ASCII characters in the range \$20-\$7A, for all thirty 20 character preset names
608	End Byte:	\$F7	Sys-Ex end of transmission byte

### Preset Download:

(identical to Data Response, except the Message Type Byte = 05)

### Gain Message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	Start Byte:	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0n	n = MIDI channel number (\$0-F), the device id number
7	MSG Type:	06	input / output gain message
8		0x	Gain node: 0-11 = Input A through Output 8 respectively
9		xx	Gain bits 13-7; 7792 to 8312 = -40 to +12 dB, (8192 = 0dB)
10		xx	Gain bits 6-0
11	End Byte:	\$F7	Sys-Ex end of transmission byte

### EQ Filter Message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	Start Byte:	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0n	n = MIDI channel number (\$0-F), the device id number
7	MSG Type:	07	EQ filter message
8		xx	Filter number: Input A=0-5 ... Input D=18-23, Output 1=24-27 ... Output 8=52-55
9		xx	Frequency bits 7-1 (x7654321)
10		xx	Frequency bit 0 (x0xxxxxx)
11		xx	Q value

12	<i>xx</i>	Filter Gain bits 13-7 (Refer to miscellaneous info at the end of this document)
13	<i>xx</i>	Filter Gain bits 6-0
14	<i>0x</i>	Type: 0 = Parametric EQ, 1 = Low Shelf 1 <sup>st</sup> order, 2 = Low Shelf 2 <sup>nd</sup> order, 3 = High Shelf 1 <sup>st</sup> order, 4 = High Shelf 2 <sup>nd</sup> order
15	<i>End Byte:</i>	\$F7 Sys-Ex end of transmission byte

### Delay Message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	<i>Start Byte:</i>	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0 <i>n</i>	<i>n</i> = MIDI channel number (\$0-F), the device id number
7	<i>MSG Type:</i>	08	Delay message
8		<i>0x</i>	Delay Node: 0-11 = Input A through Output 8 respectively
9		<i>xx</i>	Delay bits 20-14 (bits 20-16 are always zero)
10		<i>xx</i>	Delay bits 13-7 Delay Time = (Delay Word) * (1/48,000 seconds)
11		<i>xx</i>	Delay bits 6-0
12	<i>End Byte:</i>	\$F7	Sys-Ex end of transmission byte

### Crossover Filter Message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	<i>Start Byte:</i>	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0 <i>n</i>	<i>n</i> = MIDI channel number (\$0-F), the device id number
7	<i>MSG Type:</i>	09	Crossover filter message
8		<i>0x</i>	Filter number: 0 = Output 1 HPF, 1 = Output 1 LPF, ... 15 = Output 8 LPF
9		<i>xx</i>	Frequency bits 7-1 (x7654321)
10		<i>xx</i>	Frequency bit 0 (x0xxxxxx)
11		<i>0x</i>	Type: 0 = Butterworth2, 1 = Bessel2, 2 = Linkwitz2, 3 = Butterworth/Linkwitz3, 4 = Bessel3, 5 = Butterworth4, 6 = Bessel4, 7 = Linkwitz4
12	<i>End Byte:</i>	\$F7	Sys-Ex end of transmission byte

### Limiter Message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	<i>Start Byte:</i>	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number

6		\$0n	n = MIDI channel number (\$0-F), the device id number
7	MSG Type:	10	Limiter message
8		0x	Limiter Node: 4-11 = Output 1-8 respectively
9		xx	Limiter Threshold: \$2C-\$54 = -20 to +20dBu
10		xx	Limiter Ratio: 0-8 = 1.2, 1.5, 2, 3, 4, 6, 10, 20, INF:1
11		xx	Limiter Attack: 0-6 = 0.5, 1, 2, 5, 10, 20, 50ms/dB
12		xx	Limiter Release: 0-6 = 10, 20, 50, 100, 200, 500, 1000ms/dB
13	End Byte:	\$F7	Sys-Ex end of transmission byte

### Status Message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	Start Byte:	\$F0	Sys-Ex status byte (\$ denotes hexadecimal numbers)
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0n	n = MIDI channel number (\$0-F), the device id number
7	MSG Type:	11	Status message
8		0x	Output 1 source: 0-6 = A, B, C, D, A+B, C+D, ALL
9		0x	Output 2 source: 0-6 = A, B, C, D, A+B, C+D, ALL
10		0x	Output 3 source: 0-6 = A, B, C, D, A+B, C+D, ALL
11		0x	Output 4 source: 0-6 = A, B, C, D, A+B, C+D, ALL
12		0x	Output 5 source: 0-6 = A, B, C, D, A+B, C+D, ALL
13		0x	Output 6 source: 0-6 = A, B, C, D, A+B, C+D, ALL
14		0x	Output 7 source: 0-6 = A, B, C, D, A+B, C+D, ALL
15		0x	Output 8 source: 0-6 = A, B, C, D, A+B, C+D, ALL
16		xx	EQ i/o byte 1 [00AB1234]: 0 = out, 1 = in
17		xx	EQ i/o byte 2 [00CD5678]: 0 = out, 1 = in
18		0x	Limiter i/o byte 1 [00001234]: 0 = out, 1 = in
19		0x	Limiter i/o byte 2 [00005678]: 0 = out, 1 = in
20		0x	Polarity byte 1 [00001234]: 0 = normal, 1 = inverted
21		0x	Polarity byte 2 [00005678]: 0 = normal, 1 = inverted
22		xx	Mute byte 1 [00AB1234]: 0 = not muted, 1 = muted
23		xx	Mute byte 2 [00CD5678]: 0 = not muted, 1 = muted
24	End Byte:	\$F7	Sys-Ex end of transmission byte

### Preset Save Message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	Start Byte:	\$F0	Sys-Ex status byte (\$ denotes hexadecimal numbers)
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0n	n = MIDI channel number (\$0-F), the device id number
7	MSG Type:	12	Preset save message
8		xx	Preset number to save to: 0-29 = preset 1-30
9-28		xx	New preset name: ASCII characters in the range \$20-\$7A, except \$5C
29	End Byte:	\$F7	Sys-Ex end of transmission byte

### New Working Name Message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	Start Byte:	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0n	<i>n</i> = MIDI channel number (\$0-F), the device id number
7	MSG Type:	13	New working name message
8-27		xx	New preset name: ASCII characters in the range \$20-\$7A, except \$5C
28	End Byte:	\$F7	Sys-Ex end of transmission byte

### Trigger MIDI Dump Message:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	Start Byte:	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0n	<i>n</i> = MIDI channel number (\$0-F), the device id number
7	MSG Type:	14	Trigger MIDI dump message
8	End Byte:	\$F7	Sys-Ex end of transmission byte

### Current Unit's Local Updates (message types:15-20)

(These messages are generated when a local change occurs on the 4.24C currently selected by Protea System Software. They provide updated settings to the software. They are similar to message types 6-11, only the type byte is different.)

### Recall Preset with muting option:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	Start Byte:	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6		\$0n	<i>n</i> = MIDI channel number (\$0-F), the device id number
7	MSG Type:	21	Preset recall with mute option message
8		xx	Preset number 0-29 (Presets 1-30)
9		xx	Mute option: 0 = normal preset recall, 1-\$7f = recall preset with outputs muted
10	End Byte:	\$F7	Sys-Ex end of transmission byte

### MIDI Bulk Dump:

<u>Byte#</u>		<u>Value</u>	<u>Description</u>
1	<i>Start Byte:</i>	\$F0	Sys-Ex status byte ( <i>\$ denotes hexadecimal numbers</i> )
2		00	Sys-Ex id escapement
3		01	Ashly MIDI manufacturer id most significant byte
4		\$2A	Ashly MIDI manufacturer id least significant byte
5		\$03	4.24C model number
6	<i>MSG Type:</i>	7F	MIDI Bulk Dump message, Note: channel number does not apply
7-15,966		<i>xx</i>	Data bytes
15,967	<i>End Byte:</i>	\$F7	Sys-Ex end of transmission byte

## 4.24C Miscellaneous

Frequency: All system exclusive messages that include frequency information use the same format. The first frequency byte contains frequency bits 7-1 (in bit 6-0 positions). The second frequency byte contains frequency bit 0 (in bit 6 position). The frequency is derived from this 8-bit Value using the following equation:

$$\text{Frequency} = 1000 * 2^{[(\text{Value} - 147)/24]}$$

Crossover HPF frequency range: OFF to 21.98kHz, Value = 10 to 254

Crossover LPF frequency range: 19.7Hz to OFF, Value = 11 to 255

Parametric filter frequency range: 19.7Hz to 21.98kHz, Value = 11 to 254

Parametric filter gain range: -30dB to +15dB in 0.1dB steps, Gain Word = 7892 to 8342 (8192 = 0dB)

Low Shelf frequency range: 19.7Hz to 2.0kHz, Value = 11 to 147

High Shelf frequency range: 3.89kHz to 21.98kHz, Value = 194 to 254

Shelf filter gain range: -15dB to +15dB in 0.1dB steps, Gain Word = 8042 to 8342 (8192 = 0dB)

Delay Time = [Delay Word] \* 1/48,000 seconds

Input delay word range = 0-32,760 (0-682.500ms)

Output delay word range = 0-1,024 (0-21.333ms)

Note: there is a propagation delay of approximately 1.46ms from any input to any output, due to the digital converters

### Parametric filter Q byte:

Note: octaves = 1/Q value

<u>byte value</u>	<u>Q value</u>	<u>byte value</u>	<u>Q value</u>	<u>byte value</u>	<u>Q value</u>	<u>byte value</u>	<u>Q value</u>
0	64.00	20	7.13	40	2.24	60	0.71
1	57.02	21	6.73	41	2.12	61	0.67
2	50.80	22	6.35	42	2.00	62	0.63
3	45.25	23	5.99	43	1.89	63	0.59
4	40.32	24	5.66	44	1.78	64	0.56
5	35.92	25	5.34	45	1.68	65	0.53
6	32.00	26	5.04	46	1.59	66	0.50
7	28.51	27	4.76	47	1.50	67	0.47
8	25.40	28	4.49	48	1.41	68	0.45
9	22.63	29	4.24	49	1.33	69	0.42
10	20.16	30	4.00	50	1.26	70	0.40
11	17.96	31	3.78	51	1.19	71	0.37
12	16.00	32	3.56	52	1.12	72	0.35
13	14.25	33	3.36	53	1.06	73	0.33
14	12.70	34	3.17	54	1.00	74	0.31
15	11.31	35	3.00	55	0.94	75	0.30
16	10.08	36	2.83	56	0.89	76	0.28
17	8.98	37	2.67	57	0.84	77	0.26
18	8.00	38	2.52	58	0.79	78	0.25
19	7.55	39	2.38	59	0.75		