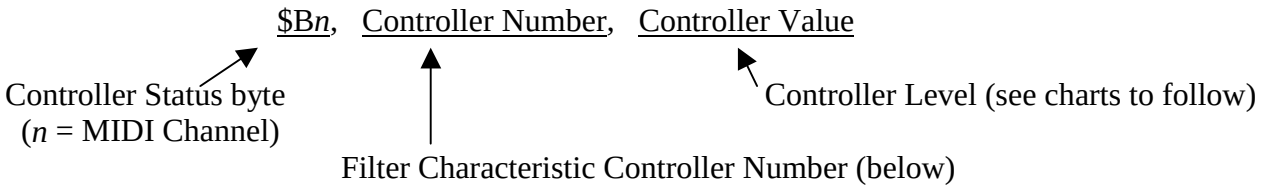
CONTROL IMPLEMENTATION FOR ASHLY PROTEA MODELS: 4.24PS, 2.24PS DIGITAL AUDIO PROCESSOR/ PARAMETRIC EQ

(Note: the same message structures are used for both
MIDI - 31.25kbps, as well as RS232 - 9600bps)

Note: $ denotes a hexadecimal number.

MIDI CONTINUOUS CONTROLLERS

Parametric Filter Related MIDI Continuous Controllers
(Note: for better resolution, use System Exclusive Messages - second part of this literature)



Filter	Characteristic	Controller #
1	Frequency	50
1	Bandwidth	51
1	Level	52
2	Frequency	53
2	Bandwidth	54
2	Level	55
3	Frequency	56
3	Bandwidth	57
3	Level	58
4	Frequency	59
4	Bandwidth	60
4	Level	61
5	Frequency	62
5	Bandwidth	63
5	Level	64
6	Frequency	65
6	Bandwidth	66
6	Level	67

Filter	Characteristic	Controller #
7	Frequency	68
7	Bandwidth	69
7	Level	70
8	Frequency	71
8	Bandwidth	72
8	Level	73
9	Frequency	74
9	Bandwidth	75
9	Level	76
10	Frequency	77
10	Bandwidth	78
10	Level	79
11	Frequency	80
11	Bandwidth	81
11	Level	82
12	Frequency	83
12	Bandwidth	84
12	Level	85

Cont.Value	Frequency
0	19.69 Hz
1	20.86
2	22.10
3	23.41
4	24.80
5	26.28
6	27.84
7	29.50
8	31.25
9	33.11
10	35.08
11	37.16
12	39.37
13	41.71
14	44.19
15	46.82
16	49.61
17	52.56
18	55.68
19	58.99
20	62.50
21	66.22
22	70.15
23	74.33
24	78.75
25	83.43
26	88.39
27	93.64
28	99.21
29	105.11
30	111.36

Cont.Value	Frequency
31	117.98
32	125.00
33	132.43
34	140.31
35	148.65
36	157.49
37	166.85
38	176.78
39	187.29
40	198.43
41	210.22
42	222.72
43	235.97
44	250.00
45	264.87
46	280.62
47	297.30
48	314.98
49	333.71
50	353.55
51	374.58
52	396.85
53	420.45
54	445.45
55	471.94
56	500.00
57	529.73
58	561.23
59	594.60
60	629.96

Cont.Value	Frequency
61	667.42
62	707.11
63	749.15
64	793.70
65	840.90
66	890.90
67	943.87
68	1000.00
69	1059.46
70	1122.46
71	1189.21
72	1259.92
73	1334.84
74	1414.21
75	1498.31
76	1587.40
77	1681.79
78	1781.80
79	1887.75
80	2000.00
81	2118.93
82	2244.92
83	2378.41
84	2519.84
85	2669.68
86	2828.43
87	2996.61
88	3174.80
89	3363.59
90	3563.59

Cont.Value	Frequency
91	3775.50
92	4000.00
93	4237.85
94	4489.85
95	4756.83
96	5039.68
97	5339.36
98	5656.85
99	5993.23
100	6349.60
101	6727.17
102	7127.19
103	7550.99
104	8000.00
105	8475.70
106	8979.70
107	9513.66
108	10079.37
109	10678.72
110	11313.71
111	11986.46
112	12699.21
113	13454.34
114	14254.38
115	15101.99
116	16000.00
117	16951.41
118	17959.39
119	19027.31
120-127	20158.74

Bandwidth	Controller Value
0.025 Octaves	0 - 1
0.033 Octaves	2 - 3
0.050 Octaves	4 - 5
0.067 Octaves	6 - 7
0.100 Octaves	8 - 9
0.125 Octaves	10 - 11
0.150 Octaves	12 - 13
0.175 Octaves	14 - 15
0.200 Octaves	16 - 17
0.250 Octaves	18 - 19
0.300 Octaves	20 - 21
0.333 Octaves	22 - 23
0.375 Octaves	24 - 25
0.400 Octaves	26 - 27
0.450 Octaves	28 - 29
0.500 Octaves	30 - 31
0.550 Octaves	32 - 33
0.600 Octaves	34 - 35
0.667 Octaves	36 - 37
0.750 Octaves	38 - 39
0.875 Octaves	40 - 41
1.000 Octaves	42 - 43
1.125 Octaves	44 - 45
1.250 Octaves	46 - 47
1.333 Octaves	48 - 49
1.500 Octaves	50 - 51
1.667 Octaves	52 - 53
1.875 Octaves	54 - 55
2.000 Octaves	56 - 57
2.250 Octaves	58 - 59
2.500 Octaves	60 - 61
2.725 Octaves	62 - 63
3.000 Octaves	64 - 65
3.333 Octaves	66 - 67

Level	Controller Value
-20.0 dB	0 - 1
-19.5 dB	2 - 3
-19.0 dB	4 - 5
-18.5 dB	6 - 7
-18.0 dB	8 - 9
-17.5 dB	10 - 11
-17.0 dB	12 - 13
-16.5 dB	14 - 15
-16.0 dB	16 - 17
-15.5 dB	18 - 19
-15.0 dB	20 - 21
-14.5 dB	22 - 23
-14.0 dB	24 - 25
-13.5 dB	26 - 27
-13.0 dB	28 - 29
-12.5 dB	30 - 31
-12.0 dB	32 - 33
-11.5 dB	34 - 35
-11.0 dB	36 - 37
-10.5 dB	38 - 39
-10.0 dB	40 - 41
-9.5 dB	42 - 43
-9.0 dB	44 - 45
-8.5 dB	46 - 47
-8.0 dB	48 - 49
-7.5 dB	50 - 51
-7.0 dB	52 - 53
-6.5 dB	54 - 55
-6.0 dB	56 - 57
-5.5 dB	58 - 59
-5.0 dB	60 - 61
-4.5 dB	62 - 63
-4.0 dB	64 - 65
-3.5 dB	66 - 67
-3.0 dB	68 - 69
-2.5 dB	70 - 71
-2.0 dB	72 - 73
-1.5 dB	74 - 75
-1.0 dB	76 - 77
-0.5 dB	78 - 79
0.0 dB	80 - 81
+0.5 dB	82 - 83
+1.0 dB	84 - 85
+1.5 dB	86 - 87
+2.0 dB	88 - 89
+2.5 dB	90 - 91
+3.0 dB	92 - 93
+3.5 dB	94 - 95
+4.0 dB	96 - 97
+4.5 dB	98 - 99
+5.0 dB	100 - 101
+5.5 dB	102 - 103
+6.0 dB	104 - 105
+6.5 dB	106 - 107
+7.0 dB	108 - 109
+7.5 dB	110 - 111
+8.0 dB	112 - 113
+8.5 dB	114 - 115
+9.0 dB	116 - 117
+9.5 dB	118 - 119
+10.0 dB	120 - 127

Controller#86 - Low Shelf Corner Frequency

Controller Value	Frequency
0	19.69
1	20.26
2	20.86
3	21.47
4	22.10
5	22.74
6	23.41
7	24.10
8	24.80
9	25.53
10	26.28
11	27.05
12	27.84
13	28.66
14	29.50
15	30.36
16	31.25
17	32.17
18	33.11
19	34.08
20	35.08
21	36.10
22	37.16
23	38.25
24	39.37
25	40.53
26	41.71
27	42.94
28	44.19
29	45.49
30	46.82
31	48.19
32	49.61
33	51.06
34	52.56
35	54.10
36	55.68
37	57.31
38	58.99
39	60.72
40	62.50
41	64.33
42	66.22
43	68.16
44	70.15
45	72.21
46	74.33
47	76.50
48	78.75
49	81.05
50	83.43
51	85.87
52	88.39
53	90.98
54	93.64
55	96.39
56	99.21
57	102.12
58	105.11
59	108.19
60	111.36
61	114.63
62	117.98
63	121.44
64	125.00
65	128.66
66	132.43
67	136.31
68	140.31
69	144.42
70	148.65
71	153.01
72	157.49
73	162.10
74	166.85
75	171.74
76	176.78
77	181.96
78	187.29
79	192.78
80	198.43
81	204.24
82	210.22
83	216.38
84	222.72
85	229.25
86	235.97
87-127	242.88

Controller#87 - Low Shelf Level

Controller Value	Level
0	-15.0
1	-14.5
2	-14.0
3	-13.5
4	-13.0
5	-12.5
6	-12.0
7	-11.5
8	-11.0
9	-10.5
10	-10.0
11	-9.5
12	-9.0
13	-8.5
14	-8.0
15	-7.5
16	-7.0
17	-6.5
18	-6.0
19	-5.5
20	-5.0
21	-4.5
22	-4.0
23	-3.5
24	-3.0
25	-2.5
26	-2.0
27	-1.5
28	-1.0
29	-0.5
30	0.0
31	0.5
32	1.0
33	1.5
34	2.0
35	2.5
36	3.0
37	3.5
38	4.0
39	4.5
40	5.0
41	5.5
42	6.0
43	6.5
44	7.0
45	7.5
46	8.0
47	8.5
48	9.0
49	9.5
50	10.0
51	10.5
52	11.0
53	11.5
54	12.0
55	12.5
56	13.0
57	13.5
58	14.0
59	14.5
60-127	15.0

Controller#88 - High Shelf Corner Frequency

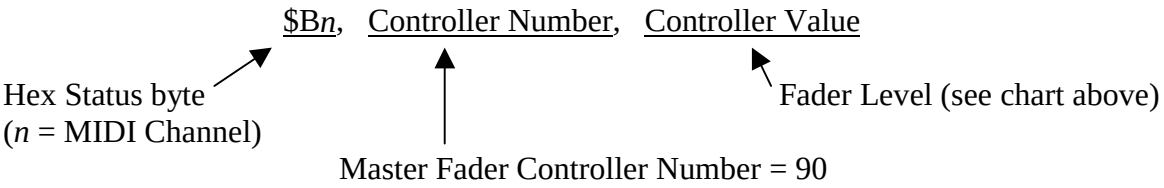
Controller Value	Frequency	Controller Value	Frequency	Controller Value	Frequency
0	1633.92	30	3886.13	59	8979.70
1	1681.79	31	4000.00	60	9242.82
2	1731.07	32	4117.21	61	9513.66
3	1781.80	33	4237.85	62	9792.43
4	1834.01	34	4362.03	63	10079.37
5	1887.75	35	4489.85	64	10374.72
6	1943.06	36	4621.41	65	10678.72
7	2000.00	37	4756.83	66	10991.63
8	2058.60	38	4896.21	67	11313.71
9	2118.93	39	5039.68	68	11645.23
10	2181.02	40	5187.36	69	11986.46
11	2244.92	41	5339.36	70	12337.69
12	2310.71	42	5495.81	71	12699.21
13	2378.41	43	5656.85	72	13071.32
14	2448.11	44	5822.61	73	13454.34
15	2519.84	45	5993.23	74	13848.58
16	2593.68	46	6168.84	75	14254.38
17	2669.68	47	6349.60	76	14672.06
18	2747.91	48	6535.66	77	15101.99
19	2828.43	49	6727.17	78	15544.51
20	2911.31	50	6924.29	79	16000.00
21	2996.61	51	7127.19	80	16468.84
22	3084.42	52	7336.03	81	16951.41
23	3174.80	53	7550.99	82	17448.12
24	3267.83	54	7772.26	83	17959.39
25	3363.59	55	8000.00	84	18485.64
26	3462.15	56	8234.42	85	19027.31
27	3563.59	57	8475.70	86	19584.86
28	3668.02	58	8724.06	87	20158.74
29	3775.50				

Controller#89 - High Shelf Level

Controller Value	Level	Controller Value	Level	Controller Value	Level
0	-15.0	21	-4.5	41	5.5
1	-14.5	22	-4.0	42	6.0
2	-14.0	23	-3.5	43	6.5
3	-13.5	24	-3.0	44	7.0
4	-13.0	25	-2.5	45	7.5
5	-12.5	26	-2.0	46	8.0
6	-12.0	27	-1.5	47	8.5
7	-11.5	28	-1.0	48	9.0
8	-11.0	29	-0.5	49	9.5
9	-10.5	30	0.0	50	10.0
10	-10.0	31	0.5	51	10.5
11	-9.5	32	1.0	52	11.0
12	-9.0	33	1.5	53	11.5
13	-8.5	34	2.0	54	12.0
14	-8.0	35	2.5	55	12.5
15	-7.5	36	3.0	56	13.0
16	-7.0	37	3.5	57	13.5
17	-6.5	38	4.0	58	14.0
18	-6.0	39	4.5	59	14.5
19	-5.5	40	5.0	60-127	15.0
20	-5.0				

Controller #90 – Master Gain Fader:

Fader Level(dB):	Controller Value:	Fader Level(dB):	Controller Value:
-INF	0-4	0.2	65-66
-29.5	5-6	0.4	67-68
-23.5	7-8	0.6	69-70
-20	9-10	0.8	71-72
-17.5	11-12	1	73-74
-15.6	13-14	1.2	75-76
-14	15-16	1.4	77-78
-12.6	17-18	1.6	79-80
-11.5	19-20	1.8	81-82
-10.5	21-22	2	83-84
-9	23-24	2.2	85-86
-8.7	25-26	2.4	87-88
-8	27-28	2.6	89-90
-7.3	29-30	2.8	91-92
-6.6	31-32	3	93-94
-6.0	33-34	3.2	95-96
-5.5	35-36	3.4	97-98
-4.9	37-38	3.6	99-100
-4.4	39-40	3.8	101-102
-4.0	41-42	4	103-104
-3.5	43-44	4.2	105-106
-3.1	45-46	4.4	107-108
-2.7	47-48	4.6	109-110
-2.3	49-50	4.8	111-112
-1.9	51-52	5	113-114
-1.6	53-54	5.2	115-116
-1.2	55-56	5.4	117-118
-0.9	57-58	5.6	119-120
-0.6	59-60	5.8	121-122
-0.3	61-62	6	123-127
0 (unity)	63-64		



Ex) Set the Master fader to +6dB on a Protea channel assigned to MIDI channel 11:
$BA, 90, 123

Note: You can use a PC's serial RS232 COM Port to directly control an Ashly Protea product. To do so, simply change the baud rate on your Protea unit (refer to the Protea user manual). The message format remains identical to MIDI, but the baud rate is now a PC compatible 9600bps. By providing a DB9 connector with direct serial port interface, Ashly allows direct hook up to a PC/Laptop without the inconvenience of additional interface hardware.

Controller #91 – Limiter Threshold:

Threshold(dBu):	Controller Value:	Threshold(dBu):	Controller Value:
-20	0-44	1	65
-19	45	2	66
-18	46	3	67
-17	47	4	68
-16	48	5	69
-15	49	6	70
-14	50	7	71
-13	51	8	72
-12	52	9	73
-11	53	10	74
-10	54	11	75
-9	55	12	76
-8	56	13	77
-7	57	14	78
-6	58	15	79
-5	59	16	80
-4	60	17	81
-3	61	18	82
-2	62	19	83
-1	63	20	84-127
0	64		

Controller #92 – Limiter Ratio:

Ratio:	Controller Value:	Ratio:	Controller Value:
1.2:1	0-60	6:1	65
1.5:1	61	10:1	66
2:1	62	20 :1	67
3:1	63	INF:1	68-127
4:1	64		

Controller #93 – Limiter Attack Time:

Time(ms):	Controller Value:	Time(ms):	Controller Value:
0.5	0-61	10	65
1	62	20	66
2	63	50	67-127
5	64		

Controller #94 – Limiter Release Time:

Time(ms):	Controller Value:	Time(ms):	Controller Value:
10	0-61	200	65
20	62	500	66
50	63	1,000 (1 sec)	67-127
100	64		

Controller #95– 4th Order High Pass Filter:

Cut Off Freq.(hz):	Controller Value:	Cut Off Freq.(hz):	Controller Value:
OFF	0-4	471	59
20	5	500	60
22	6	529	61
23	7	561	62
24	8	594	63
26	9	629	64
27	10	667	65
29	11	707	66
31	12	749	67
33	13	793	68
35	14	840	69
37	15	890	70
39	16	943	71
41	17	1,000	72
44	18	1,050	73
46	19	1,120	74
49	20	1,180	75
52	21	1,250	76
55	22	1,330	77
58	23	1,410	78
62	24	1,490	79
66	25	1,580	80
70	26	1,680	81
74	27	1,780	82
78	28	1,880	83
83	29	2,000	84
88	30	2,110	85
93	31	2,240	86
99	32	2,370	87
105	33	2,510	88
111	34	2,660	89
117	35	2,820	90
125	36	2,990	91
132	37	3,170	92
140	38	3,360	93
148	39	3,560	94
157	40	3,770	95
166	41	4,000	96
176	42	4,230	97
187	43	4,480	98
198	44	4,750	99
210	45	5,030	100
222	46	5,330	101
235	47	5,650	102
250	48	5,990	103
264	49	6,340	104
280	50	6,720	105
297	51	7,120	106
314	52	7,550	107
333	53	8,000	108
353	54	8,470	109
374	55	8,970	110
396	56	9,510	111
420	57	10,000	112
445	58	10,600	113-127

Controller #96 – 4th Order Low Pass Filter:

Cut Off Freq.(hz):	Controller Value:	Cut Off Freq.(hz):	Controller Value:
33	1-13	890	70
35	14	943	71
37	15	1,000	72
39	16	1,050	73
41	17	1,120	74
44	18	1,180	75
46	19	1,250	76
49	20	1,330	77
52	21	1,410	78
55	22	1,490	79
58	23	1,580	80
62	24	1,680	81
66	25	1,780	82
70	26	1,880	83
74	27	2,000	84
78	28	2,110	85
83	29	2,240	86
88	30	2,370	87
93	31	2,510	88
99	32	2,660	89
105	33	2,820	90
111	34	2,990	91
117	35	3,170	92
125	36	3,360	93
132	37	3,560	94
140	38	3,770	95
148	39	4,000	96
157	40	4,230	97
166	41	4,480	98
176	42	4,750	99
187	43	5,030	100
198	44	5,330	101
210	45	5,650	102
222	46	5,990	103
235	47	6,340	104
250	48	6,720	105
264	49	7,120	106
280	50	7,550	107
297	51	8,000	108
314	52	8,470	109
333	53	8,970	110
353	54	9,510	111
374	55	10,000	112
396	56	10,600	113
420	57	11,300	114
445	58	11,900	115
471	59	12,060	116
500	60	13,400	117
529	61	14,200	118
561	62	15,100	119
594	63	16,000	120
629	64	16,900	121
667	65	17,900	122
707	66	19,000	123
749	67	20,100	124
793	68	OFF	125-127, 0
840	69		

Controller #97 – Course Delay Adjust:

Delay Time(ms):	Controller Value:	Delay Time(ms):	Controller Value:
0.00	0	666.66	125
5.33	1	671.99	126
10.67	2 …	677.32	127

Note: Ashly Control systems use MIDI System Exclusive messages to adjust the delay time. If your system does not support Sys-Ex you may still do a course delay adjustment using Controller #97. The course controller is limited to a resolution of 5.333228ms per step. Sys-Ex delay messages have a resolution of 0.020833ms per step.

Controller #98, 99, 100, 101 – EQ, Limiter, Hpf/Lpf, Delay function in/out Status:

Status:	Controller Value:	Status:	Controller Value:
OUT	0-63	IN	64-127

Controller #102 – Limiter Location:

Location:	Controller Value:	Location:	Controller Value:
Pre-EQ	0-63	Post-EQ	64-127

Controller #103-114 Parametric Filters (1-12 respectively) in/out Status:

Status:	Controller Value:	Status:	Controller Value:
OUT	0-63	IN	64-127

Controller #115 & 116 Low Shelf & High Shelf in/out Status:

Status:	Controller Value:	Status:	Controller Value:
OUT	0-63	IN	64-127

Controller #117 – Channel Mute Status:

Status:	Controller Value:	Status:	Controller Value:
Not muted	0-63	Muted	64-127

Controller #118 & 119 Low Shelf & High Shelf Slope:

Slope:	Controller Value:	Slope:	Controller Value:
6 dB/Octave	0-63	12 dB/Octave	64-127

(end of MIDI Continuous Controllers)

SYSTEM EXCLUSIVE MESSAGES

Ashly Protea 4.24g, 4.24gs, & 2.24g System Exclusive Data Inquiry

Step1: Control device transmits a MIDI Sys-Ex Channel Data Inquiry Message to the Protea(s)

Byte#		*Value*	*Description*
0	*Start Byte*:	$F0	Sys-Ex status byte ($ *denotes hexadecimal*)
1		00	Sys-Ex id escapement
2		01	Ashly MIDI manufacturer id most significant byte
3		$2A	Ashly MIDI manufacturer id least significant byte
4		02	Digital Parametric EQ family model number
5	*MSG Type*:	00	Data inquiry message
6		$0*n*	*n* = MIDI channel number ($0-F), the channel to satisfy the request
7		01	Mode byte, default = 01
8	*End Byte*:	$F7	Sys-Ex end of transmission byte

Step2: First assigned Protea unit responds with a MIDI Sys-Ex Channel Data Message. If no units contain the respective MIDI channel, the Data Inquiry Message is echoed back to the control device.

Byte#		*Value*	*Description*
0	*Start Byte*:	$F0	Sys-Ex status byte ($ *denotes hexadecimal*)
		00	Sys-Ex id escapement
		01	Ashly MIDI manufacturer id most significant byte
		$2A	Ashly MIDI manufacturer id least significant byte
		02	Digital Parametric EQ family model number
5	*MSG Type*:	06	Channel data message
6	*Channel*:	$0*n*	*n* = MIDI channel number ($0-F), channel this message came from
7	*Preset #*:	*xx*	Current preset number loaded to that channel, 0-127 (1-128 to the user)
8	*Mute Status*:	0*x*	Channel Output Status: 0 = not muted, 1 = muted
9	*Name Bytes*:	*xx*	First character - Refer to attached ASCII character chart
		xx	Second Character
		xx	Third Character
		xx	Fourth Character
		xx	Fifth Character
		xx	Sixth Character
		xx	Seventh Character
		xx	Eighth Character
		xx	Ninth Character
		xx	Tenth character
19	*EQ Settings*:	*xx*	Filter 1 - Frequency Byte1 (see charts on the final pages for details)
		xx	Filter 1 - Frequency Byte2
		xx	Filter 1 - Bandwidth
		xx	Filter 1 - Level
		xx	Filter 2 - Frequency Byte1
		xx	Filter 2 - Frequency Byte2
		xx	Filter 2 - Bandwidth
		xx	Filter 2 - Level
		xx	Filter 3 - Frequency Byte1
		xx	Filter 3 - Frequency Byte2
		xx	Filter 3 - Bandwidth
		xx	Filter 3 - Level
		xx	Filter 4 - Frequency Byte1
		xx	Filter 4 - Frequency Byte2
		xx	Filter 4 - Bandwidth
		xx	Filter 4 - Level

		xx	Filter 5 - Frequency Byte1
		xx	Filter 5 - Frequency Byte2
		xx	Filter 5 - Bandwidth
		xx	Filter 5 - Level
		xx	Filter 6 - Frequency Byte1
		xx	Filter 6 - Frequency Byte2
		xx	Filter 6 - Bandwidth
		xx	Filter 6 - Level
		xx	Filter 7 - Frequency Byte1
		xx	Filter 7 - Frequency Byte2
		xx	Filter 7 - Bandwidth
		xx	Filter 7 - Level
		xx	Filter 8 - Frequency Byte1
		xx	Filter 8 - Frequency Byte2
		xx	Filter 8 - Bandwidth
		xx	Filter 8 - Level
		xx	Filter 9 - Frequency Byte1
		xx	Filter 9 - Frequency Byte2
		xx	Filter 9 - Bandwidth
		xx	Filter 9 - Level
		xx	Filter 10 - Frequency Byte1
		xx	Filter 10 - Frequency Byte2
		xx	Filter 10 - Bandwidth
		xx	Filter 10 - Level
		xx	Filter 11 - Frequency Byte1
		xx	Filter 11 - Frequency Byte2
		xx	Filter 11 - Bandwidth
		xx	Filter 11 - Level
		xx	Filter 12 - Frequency Byte1
		xx	Filter 12 - Frequency Byte2
		xx	Filter 12 - Bandwidth
		xx	Filter 12 - Level
67	*Low Shelf:*	*xx*	Low Shelf - Frequency Byte1 (see charts on the final pages for details)
		xx	Low Shelf - Frequency Byte2
		xx	Low Shelf - Level
70	*High Shelf:*	*xx*	High Shelf - Frequency Byte1 (see charts on the final pages for details)
		xx	High Shelf - Frequency Byte2
		xx	High Shelf - Level
73	*Master Gain*:	*xx*	Master Gain Level (see charts on the final pages for details)
74	*Limiter*:	*xx*	Threshold (see charts on the final pages for details)
		xx	Ratio
		xx	Attack Time
		xx	Release Time
78	*HPF*:	*xx*	24 dB/octave High pass filter (see charts on the final pages for details)
79	*LPF*:	*xx*	24 dB/octave Low pass filter (see charts on the final pages for details)
80	*Delay Byte1*:	*xx*	Binary: 0*xxxxxxx* - Upper byte of Delay Word with its msbit filtered out
	Delay Byte2:	*xx*	Binary: 0*yyyyyyy* - Lower byte of Delay Word with its msbit filtered out
	Delay Byte3:	0*x*	Binary: 000000zz - Bits 15 & 7 of the Delay Word (in bits 1 & 0). Delay range is 0-$FFFF in steps of 0.0208333 ms.
83	*Status Byte*:	*xx*	Bits0-3 = EQ, Limiter, HPF/LPF, Delay i/o status respectively, where zero denotes "Out". Bit4 = Limiter location, where 0 denotes pre-EQ Bits5-6 = Low Shelf & High Shelf slopes, where 0 denotes "6 dB/octave" and 1 denotes "12 dB/octave". Bit7 is always zero (as per MIDI spec).
84	*Filter i/o Byte1*:	*xx*	Bits0-6 represent the status of Parametric Filters 1-7, where 0 = bypassed and 1 = engaged.
85	*Filter i/o Byte2*:	*xx*	Bits0-4 represent the status of Parametric Filters 8-12, Bit5 represents the status of the Low Shelf, and Bit6 represents the status of the High Shelf (0 = bypassed and 1 = engaged).
86	*End Byte*:	$F7	Sys-Ex end of transmission byte

Sending New Working Settings To The 4.24ps, & 2.24ps

Byte#		*Value*	*Description*
0	*Start Byte*:	$F0	Sys-Ex status byte ($ *denotes hexadecimal*)
		00	Sys-Ex id escapement
		01	Ashly MIDI manufacturer id most significant byte
		$2A	Ashly MIDI manufacturer id least significant byte
		02	Digital Parametric EQ family model number
5	*MSG Type*:	$11	New working settings message
6	*Channel*:	$0*n*	*n* = MIDI channel number ($0-F), channel to receive new settings
7	*EQ Settings*:	*xx*	Filter 1 - Frequency Byte1 (see charts on the final pages for details)
		xx	Filter 1 - Frequency Byte2
		xx	Filter 1 - Bandwidth
		xx	Filter 1 - Level
		xx	Filter 2 - Frequency Byte1
		xx	Filter 2 - Frequency Byte2
		xx	Filter 2 - Bandwidth
		xx	Filter 2 - Level
		xx	Filter 3 - Frequency Byte1
		xx	Filter 3 - Frequency Byte2
		xx	Filter 3 - Bandwidth
		xx	Filter 3 - Level
		xx	Filter 4 - Frequency Byte1
		xx	Filter 4 - Frequency Byte2
		xx	Filter 4 - Bandwidth
		xx	Filter 4 - Level
		xx	Filter 5 - Frequency Byte1
		xx	Filter 5 - Frequency Byte2
		xx	Filter 5 - Bandwidth
		xx	Filter 5 - Level
		xx	Filter 6 - Frequency Byte1
		xx	Filter 6 - Frequency Byte2
		xx	Filter 6 - Bandwidth
		xx	Filter 6 - Level
		xx	Filter 7 - Frequency Byte1
		xx	Filter 7 - Frequency Byte2
		xx	Filter 7 - Bandwidth
		xx	Filter 7 - Level
		xx	Filter 8 - Frequency Byte1
		xx	Filter 8 - Frequency Byte2
		xx	Filter 8 - Bandwidth
		xx	Filter 8 - Level
		xx	Filter 9 - Frequency Byte1
		xx	Filter 9 - Frequency Byte2
		xx	Filter 9 - Bandwidth
		xx	Filter 9 - Level
		xx	Filter 10 - Frequency Byte1
		xx	Filter 10 - Frequency Byte2
		xx	Filter 10 - Bandwidth
		xx	Filter 10 - Level
		xx	Filter 11 - Frequency Byte1
		xx	Filter 11 - Frequency Byte2
		xx	Filter 11 - Bandwidth
		xx	Filter 11 - Level
		xx	Filter 12 - Frequency Byte1
		xx	Filter 12 - Frequency Byte2
		xx	Filter 12 - Bandwidth
		xx	Filter 12 - Level

55	*Low Shelf:*	*xx*	Low Shelf - Frequency Byte1 (see charts on the final pages for details)
		xx	Low Shelf - Frequency Byte2
		xx	Low Shelf - Level
58	*High Shelf:*	*xx*	High Shelf - Frequency Byte1 (see charts on the final pages for details)
		xx	High Shelf - Frequency Byte2
		xx	High Shelf - Level
61	*Master Gain*:	*xx*	Master Gain Level (see charts on the final pages for details)
62	*Limiter*:	*xx*	Threshold (see charts on the final pages for details)
		xx	Ratio
		xx	Attack Time
		xx	Release Time
66	*HPF*:	*xx*	24 dB/octave High pass filter (see charts on the final pages for details)
67	*LPF*:	*xx*	24 dB/octave Low pass filter (see charts on the final pages for details)
68	*Delay Byte1*:	*xx*	Binary: 0*xxxxxxx* - Upper byte of Delay Word with its msbit filtered out
	Delay Byte2:	*xx*	Binary: 0*yyyyyyy* - Lower byte of Delay Word with its msbit filtered out
	Delay Byte3:	0*x*	Binary: 000000zz - Bits 15 & 7 of the Delay Word (in bit positions: 1 & 0). Delay range is 0-$FFFF in steps of 0.0208333 ms.
71	*Status Byte*:	*xx*	Bits0-3 = EQ, Limiter, HPF/LPF, Delay i/o status respectively, where zero denotes "Out". Bit4 = Limiter location, where 0 denotes pre-EQ Bits5-6 = Low Shelf & High Shelf slopes, where 0 denotes "6 dB/octave" and 1 denotes "12 dB/octave". Bit7 is always zero (as per MIDI spec).
72	*Filter i/o Byte1*:	*xx*	Bits0-6 represent the status of Parametric Filters 1-7, where 0 = bypassed and 1 = engaged.
73	*Filter i/o Byte2*:	*xx*	Bits0-4 represent the status of Parametric Filters 8-12, Bit5 represents the status of the Low Shelf, and Bit6 represents the status of the High Shelf (0 = bypassed and 1 = engaged).
74	*Spare Byte:*	00	
75	*End Byte*:	$F7	Sys-Ex end of transmission byte

Preset Save Message (Including New Preset Name)

Byte#		*Value*	*Description*
0	*Start Byte*:	$F0	Sys-Ex status byte ($ *denotes hexadecimal*)
		00	Sys-Ex id escapement
		01	Ashly MIDI manufacturer id most significant byte
		$2A	Ashly MIDI manufacturer id least significant byte
		02	Digital Parametric EQ family model number
5	*MSG Type*:	$03	Preset save message, including preset number to save to and new name
6	*Channel*:	$0*n*	*n* = MIDI channel number ($0-F), channel whose data is to be stored
7	*Preset Number*:	*xx*	0-127 (1-128 to the user), preset number to save working data to
8	*New Name*:	*xx*	First character - Refer to attached ASCII character chart
		xx	Second Character
		xx	Third Character
		xx	Fourth Character
		xx	Fifth Character
		xx	Sixth Character
		xx	Seventh Character
		xx	Eighth Character
		xx	Ninth Character
		xx	Tenth character
18	*Mode Byte*:	01	1=default (tells the unit which mode the Protea remote is displaying)
19	*End Byte*:	$F7	Sys-Ex end of transmission byte

System Exclusive Parametric EQ Filter Message:

Byte#		*Value*	*Description*
0	*Start Byte*:	$F0	Sys-Ex status byte ($ *denotes hexadecimal*)
		00	Sys-Ex id escapement
		01	Ashly MIDI manufacturer id most significant byte
		$2A	Ashly MIDI manufacturer id least significant byte
		02	Digital Parametric EQ family model number
5	*MSG Type*:	$26	Parametric Filter message
6	*Channel*:	$0*n*	*n* = MIDI channel number ($0-F), channel whose data is to be stored
7	*Filter Number*:	*xx*	valid values: 0-11 (filters 1-12 respectively)
8	*Freq. Byte1*:	*xx*	Refer to the Sys-Ex Parametric Filter Frequency definition on page 16
9	*Freq. Byte2*:	*xx*	(as above)
10	*Bandwidth*:	*xx*	Refer to Sys-Ex Parametric EQ Bandwidths chart
11	*Level*:	*xx*	Refer to Sys-Ex Parametric EQ Levels chart
12	*End Byte*:	$F7	Sys-Ex end of transmission byte

System Exclusive Delay Adjustment Message:

$F0, $00, $01, $2A, $02, $05, MIDI Channel Byte, Delay Byte1, Delay Byte2, Delay Byte3, $F7

The first six bytes and the last byte are fixed, and contain the standard protocol required for a MIDI Sys-Ex message packet plus a byte that tells the Protea that this is a delay adjustment. The MIDI Channel Byte contains the number of the channel to adjust; Valid range is 0-16 ($0-$0F). Delay Byte1 contains the most significant byte of the new delay value with bit7 removed; Valid range is 0-127 ($0-$7F). Delay Byte2 contains the least significant byte of the new delay word with bit7 removed; Valid range is 0-127 ($0-$7F). Delay Byte3 carries the upper bits that were removed from the previous two bytes (see below).

Delay Word:

x	n	n	n	n	n	n	n

Delay Byte1

y	z	z	z	z	z	z	z

0 z z z z z z z = Delay Byte2
0 0 0 0 0 0 x y = Delay Byte3

The valid decimal range for the 16 bit delay word is 0–65,535 (0-FFFF hex). The new delay value, in milliseconds, is equivalent to 0.0208333 multiplied by the Delay Word.

Examples) Delay Word:	Delay Value(ms):	Delay Byte1:	Delay Byte2:	Delay Byte3:
0	0	0	0	0
1	0.0208	0	1	0
128	2.6667	0	0	1
65,535	1,365.3103	$7F	$7F	3

System Exclusive Scene Recall Message:

$F0, $00, $01, $2A, $02, $16, Scene Number, $F7

The first six bytes and the last byte are fixed, and contain the standard protocol required for an Ashly Sys-Ex Scene Recall message. The seventh byte, Scene Number, has a valid range of 0-49 (user scene numbers 1-50). This is a global message type, meaning that it is channel independent. All Proteas in the system will perform this event when this message is received.

Example) To recall scene #2 transmit:

$F0, $00, $01, $2A, $01, $16, $01, $F7

↑

Scene number = user number - 1

(end of System Exclusive messages)

CHARTS FOR SYSTEM EXCLUSIVE DATA CHARACTERS

Custom ASCII Name Characters

Note: You must subtract 32(base 10) from your Ansi Standard ASCII character values before you transmit them to a Protea unit, as in the Sys-Ex Save message. Likewise, to convert Protea character values to Ansi Standard you must add 32(base 10) to the value.

Examples) characters 0 - 9, are represented by Protea ASCII values $10 - $19
characters A - Z, are represented by Protea ASCII values $21 - $3A
characters a - z, are represented by Protea ASCII values $41 - $5A

Parametric EQ Filter Frequencies

There are 241 frequency centers for the Parametric Filters (1/24 octave resolution). These frequencies are represented by 8 bits of data (1 byte), however MIDI does not allow the use of the most significant bit of data bytes. Therefor we must split the Frequency Byte into two bytes as follows:

x	7	6	5	4	3	2	1

Frequency Byte1

x	0	x	x	x	x	x	x

Frequency Byte2

The Bits from the original Frequency Byte are numbered 7 through 0 where 0 is the least significant. All bits containing the "x" must be set to logic 0. Valid values for the original Frequency Byte are 0-240. To determine the frequency for each setting use the following equation in which "value" is the original Frequency Byte value:
F = 1000 * 10^((value - 136) * (log(2)) / 24)

Parametric EQ Filter Bandwidths

Bandwidth	*Preset Byte Value*	*Bandwidth*	*Preset Byte Value*
0.025 Octaves	0	0.600 Octaves	17
0.033 Octaves	1	0.667 Octaves	18
0.050 Octaves	2	0.750 Octaves	19
0.067 Octaves	3	0.875 Octaves	20
0.100 Octaves	4	1.000 Octaves	21
0.125 Octaves	5	1.125 Octaves	22
0.150 Octaves	6	1.250 Octaves	23
0.175 Octaves	7	1.333 Octaves	24
0.200 Octaves	8	1.500 Octaves	25
0.250 Octaves	9	1.667 Octaves	26
0.300 Octaves	10	1.875 Octaves	27
0.333 Octaves	11	2.000 Octaves	28
0.375 Octaves	12	2.250 Octaves	29
0.400 Octaves	13	2.500 Octaves	30
0.450 Octaves	14	2.725 Octaves	31
0.500 Octaves	15	3.000 Octaves	32
0.550 Octaves	16	3.333 Octaves	33

Parametric EQ Filter Levels

Level	*Preset Byte Value*	*Level*	*Preset Byte Value*
-20.0 dB	0	-4.5 dB	31
-19.5 dB	1	-4.0 dB	32
-19.0 dB	2	-3.5 dB	33
-18.5 dB	3	-3.0 dB	34
-18.0 dB	4	-2.5 dB	35
-17.5 dB	5	-2.0 dB	36
-17.0 dB	6	-1.5 dB	37
-16.5 dB	7	-1.0 dB	38
-16.0 dB	8	-0.5 dB	39
-15.5 dB	9	0.0 dB	40
-15.0 dB	10	+0.5 dB	41
-14.5 dB	11	+1.0 dB	42
-14.0 dB	12	+1.5 dB	43
-13.5 dB	13	+2.0 dB	44
-13.0 dB	14	+2.5 dB	45
-12.5 dB	15	+3.0 dB	46
-12.0 dB	16	+3.5 dB	47
-11.5 dB	17	+4.0 dB	48
-11.0 dB	18	+4.5 dB	49
-10.5 dB	19	+5.0 dB	50
-10.0 dB	20	+5.5 dB	51
-9.5 dB	21	+6.0 dB	52
-9.0 dB	22	+6.5 dB	53
-8.5 dB	23	+7.0 dB	54
-8.0 dB	24	+7.5 dB	55
-7.5 dB	25	+8.0 dB	56
-7.0 dB	26	+8.5 dB	57
-6.5 dB	27	+9.0 dB	58
-6.0 dB	28	+9.5 dB	59
-5.5 dB	29	+10.0 dB	60
-5.0 dB	30		

Low Shelf Frequencies & Levels

(Refer to MIDI Continuous Controller Tables, where Controller Value = Preset Byte Value)

High Shelf Frequencies & Levels

(Refer to MIDI Continuous Controller Tables, where Controller Value = Preset Byte Value)

Master Gain Fader Levels & Corresponding Preset Byte Values

Fader Level(dB)	*Preset Byte Value*	*Fader Level(dB)*	*Preset Byte Value*
-INF	4	0.2	66
-29.5	6	0.4	68
-23.5	8	0.6	70
-20	10	0.8	72
-17.5	12	1	74
-15.6	14	1.2	76
-14	16	1.4	78
-12.6	18	1.6	80
-11.5	20	1.8	82
-10.5	22	2	84
-9	24	2.2	86
-8.7	26	2.4	88
-8	28	2.6	90
-7.3	30	2.8	92
-6.6	32	3	94
-6.0	34	3.2	96
-5.5	36	3.4	98
-4.9	38	3.6	100
-4.4	40	3.8	102
-4.0	42	4	104
-3.5	44	4.2	106
-3.1	46	4.4	108
-2.7	48	4.6	110
-2.3	50	4.8	112
-1.9	52	5	114
-1.6	54	5.2	116
-1.2	56	5.4	118
-0.9	58	5.6	120
-0.6	60	5.8	122
-0.3	62	6	124
0 (unity)	64		

Compressor/Limiter Thresholds & Corresponding Preset Byte Values

Threshold(dBu)	*Preset Byte Value*	*Threshold(dBu)*	*Preset Byte Value*
-20	44	1	65
-19	45	2	66
-18	46	3	67
-17	47	4	68
-16	48	5	69
-15	49	6	70
-14	50	7	71
-13	51	8	72
-12	52	9	73
-11	53	10	74
-10	54	11	75
-9	55	12	76
-8	56	13	77
-7	57	14	78
-6	58	15	79
-5	59	16	80
-4	60	17	81
-3	61	18	82
-2	62	19	83
-1	63	20	84
0	64		

Compressor/Limiter Ratios & Corresponding Preset Byte Values

Limiter Ratio	*Preset Byte Value*	*Limiter Ratio*	*Preset Byte Value*
1.2:1	60	6:1	65
1.5:1	61	10:1	66
2:1	62	20:1	67
3:1	63	INF:1	68
4:1	64		

Compressor/Limiter Attack Times & Corresponding Preset Byte Values

Attack Time(ms)	*Preset Byte Value*	*Attack Time(ms)*	*Preset Byte Value*
0.5	61	10	65
1	62	20	66
2	63	50	67
5	64		

Compressor/Limiter Release Times & Corresponding Preset Byte Values

Release Time(ms)	*Preset Byte Value*	*Release Time(ms)*	*Preset Byte Value*
10	61	200	65
20	62	500	66
50	63	1,000 (1 sec)	67
100	64		

HPF Cut Off Frequency & Corresponding Preset Byte Values

Frequency(Hz)	*Preset Byte Value*	*Frequency(Hz)*	*Preset Byte Value*
OFF	0	471	59
20	5	500	60
22	6	529	61
23	7	561	62
24	8	594	63
26	9	629	64
27	10	667	65
29	11	707	66
31	12	749	67
33	13	793	68
35	14	840	69
37	15	890	70
39	16	943	71
41	17	1,000	72
44	18	1,050	73
46	19	1,120	74
49	20	1,180	75
52	21	1,250	76
55	22	1,330	77
58	23	1,410	78
62	24	1,490	79
66	25	1,580	80
70	26	1,680	81
74	27	1,780	82
78	28	1,880	83
83	29	2,000	84
88	30	2,110	85
93	31	2,240	86
99	32	2,370	87
105	33	2,510	88
111	34	2,660	89
117	35	2,820	90
125	36	2,990	91
132	37	3,170	92
140	38	3,360	93
148	39	3,560	94
157	40	3,770	95
166	41	4,000	96
176	42	4,230	97
187	43	4,480	98
198	44	4,750	99
210	45	5,030	100
222	46	5,330	101
235	47	5,650	102
250	48	5,990	103
264	49	6,340	104
280	50	6,720	105
297	51	7,120	106
314	52	7,550	107
333	53	8,000	108
353	54	8,470	109
374	55	8,970	110
396	56	9,510	111
420	57	10,000	112
445	58	10,600	113

LPF Cut Off Frequency & Corresponding Preset Byte Values

Frequency(Hz):	*Value(base 10)*:	*Frequency(Hz)*:	*Value(base 10)*:
33	13	890	70
35	14	943	71
37	15	1,000	72
39	16	1,050	73
41	17	1,120	74
44	18	1,180	75
46	19	1,250	76
49	20	1,330	77
52	21	1,410	78
55	22	1,490	79
58	23	1,580	80
62	24	1,680	81
66	25	1,780	82
70	26	1,880	83
74	27	2,000	84
78	28	2,110	85
83	29	2,240	86
88	30	2,370	87
93	31	2,510	88
99	32	2,660	89
105	33	2,820	90
111	34	2,990	91
117	35	3,170	92
125	36	3,360	93
132	37	3,560	94
140	38	3,770	95
148	39	4,000	96
157	40	4,230	97
166	41	4,480	98
176	42	4,750	99
187	43	5,030	100
198	44	5,330	101
210	45	5,650	102
222	46	5,990	103
235	47	6,340	104
250	48	6,720	105
264	49	7,120	106
280	50	7,550	107
297	51	8,000	108
314	52	8,470	109
333	53	8,970	110
353	54	9,510	111
374	55	10,000	112
396	56	10,600	113
420	57	11,300	114
445	58	11,900	115
471	59	12,060	116
500	60	13,400	117
529	61	14,200	118
561	62	15,100	119
594	63	16,000	120
629	64	16,900	121
667	65	17,900	122
707	66	19,000	123
749	67	20,100	124
793	68	OFF	0
840	69		