

SYSEX DOCUMENTATION

Version 1.0 September 2002

ENGLISH

DDX3216

AUTOMATED DIGITAL MIXING CONSOLE



www.behringer.com

```
*****
Header :
*****
```

```
F0          System ex
00          0 = Manufact ID 2 bytes, 7E = USEM none Real Time, 7F = USEM Real Time
20          Behr. Man Id
32          "
ic          MIDI channel info
           i = 0AB0, A=1 ignore app ID, B=1 ignore midi channel (
omni )
           c = MIDI channel 0..F ( 1..16 )
dd          Apparatus id , 0B for DDX3216
rf          Function code: 0rffffff
           r = request bit  1= request 0= here's the data
           fffffff = function number 0..3F
           Function 20: parameter change
           Function 22: channel attenuation
```

```
-----
--/20 = do direct par change
-----
```

All changed controllers are send per frame within one System exclusive header
After the function code we have

nn number of changed parameters (min = 1, max = 23 / frame)

```
dd  A series of 4 bytes per parameter: 1e = module (channel) number
dd  2e = parameter number
dd  3e = parameter high 7 bit parameter value is 1:1
dd  4e = parameter low 7 bit
```

```
..
dd  Last parameter
dd
dd
dd
```

F7

```
-----
--/22 = do (group)channel attenuator
-----
```

All changed controllers are send per frame within one System exclusive header
After the function code we have

nn number of changed parameters (min = 1, max = 23 / frame)

```
dd  A series of 3 bytes per parameter: 1e = channel nr 0= chan 1 ( attenuates
all channels in same mute group )
dd  2e = parameter high 7 bit parameter value is 1:1
dd  3e = parameter low 7 bit
```

```
..
dd  Last parameter
dd
dd
```

F7

Ch. 1 - 32

no.	Parameter	switch	value range	value properties
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
3	Pan		0 - 60	dB = -30 + value
4	Rout. to Main	X		
5	Rout. to Bus	X		
6	Bus Volume		0 - 1472	dB = -80 + value/16
7	Bus Volume Pre/Post	X		
8	Bus Pan		0 - 60	dB = -30 + value
9	Bus Pan Follow Channel	X		
20	EQ on	X		
21	EQ band 1 Filter type	X	0,1,2	0 = param. 1 = HC, 2 = HSh
22	EQ band 1 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
23	EQ band 1 Gain		0 - 72	dB = -18 + value/2
24	EQ band 1 Q		0 - 40	Q = 0.1 * pow (100, value /40);
26	EQ band 2 Frequency		0 - 159	Hz = 20 * pow(1000, value /159)
27	EQ band 2 Gain		0 - 72	dB = -18 + value/2
28	EQ band 2 Q		0 - 40	Q = 0.1 * pow (100, value /40);
30	EQ band 3 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
31	EQ band 3 Gain		0 - 72	dB = -18 + value/2
32	EQ band 3 Q		0 - 40	Q = 0.1 * pow(100, value /40);
33	EQ band 4 Filter type	X	0,1,2	0 = param. 1 = LC, 2 = LSh
34	EQ band 4 Frequency		0 - 159	Hz = 20 * pow(1000, value /159)
35	EQ band 4 Gain		0 - 72	dB = -18 + value/2
36	EQ band 4 Q		0 - 40	Q = 0.1 * pow(100, value /40);
37	High Pass on	X		
38	High Pass Frequency		0 - 80	Hz = 4 * pow(100, value / 80);
40	Compressor on	X		
41	Compressor Key	X	0-16	Channel 1-16 + self/sum
42	Compressor Attack		0-200	msec = value
43	Compressor Release		0-255	msec = 20 * pow(250, value / 255)
44	Compressor Ratio		0-15	1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.5, 3.0, 3.5, 4.0, 5.0, 6.0, 8.0, 10.0, 20.0, 100.0
45	Compressor Knee	X	0-5	
46	Compressor Threshold		0-60	dB = -60 + value
47	Compressor Gain		0-24	dB = value
50	Gate on	X		
51	Gate Hold		0 - 255	msec = 10 * pow(100, value/ 255)
52	Gate Attack		0 - 200	msec = value
53	Gate Release		0 - 255	msec = 20 * pow(250, value / 255)
54	Gate Range		0 - 61	dB = -value (61 = -oo)
55	Gate Threshold		0 - 90	dB = -90 + value
60	Channel Delay on	X		
61	Delay Phase	X	0,1	normal,invert
62	Delay Time		0 - 115	sample = value * value
63	Delay Feedback		0 - 180	% = -90 + value
64	Delay Mix		0 - 100	% = value
70	Aux 1 send volume		0 - 1472	dB = -80 + value/16
71	Aux 1 pre/post	X		
72	Aux 2 send volume		0 - 1472	dB = -80 + value/16

73	Aux 2 pre/post	X		
74	Aux 3 send volume		0 - 1472	dB = -80 + value/16
75	Aux 3 pre/post	X		
76	Aux 4 send volume		0 - 1472	dB = -80 + value/16
77	Aux 4 pre/post	X		
80	FX 1 send volume		0 - 1472	dB = -80 + value/16
81	FX 1 pre/post	X		
82	FX 2 send volume		0 - 1472	dB = -80 + value/16
83	FX 2 pre/post	X		
84	FX 3 send volume		0 - 1472	dB = -80 + value/16
85	FX 3 pre/post	X		
86	FX 4 send volume		0 - 1472	dB = -80 + value/16
87	FX 4 pre/post	X		
	Bus 1-16			
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
	Aux mast. 1-4			
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
	FX mast. 1-4			
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
90	FX type	X	0 - 26	see FX chapter
91	FX parameter 1		see FX chapter	see FX chapter
92	FX parameter 2		see FX chapter	see FX chapter
93	FX parameter 3		see FX chapter	see FX chapter
94	FX parameter 4		see FX chapter	see FX chapter
95	FX parameter 5		see FX chapter	see FX chapter
96	FX parameter 6		see FX chapter	see FX chapter
97	FX parameter 7		see FX chapter	see FX chapter
98	FX parameter 8		see FX chapter	see FX chapter
	FX Ret. 1-8			
1	Volume		0 - 1472	dB = -80 + value/16
2	Mute	X		
3	Pan		0 - 60	dB = -30 + value
4	Rout. to Main	X		
5	Rout. to Bus	X		
6	Bus Volume		0 - 1472	dB = -80 + value/16
7	Bus Volume Pre/Post	X		
8	Bus Pan		0 - 60	dB = -30 + value
9	Bus Pan Follow Channel	X		
70	Aux 1 send volume		0 - 1472	dB = -80 + value/16
71	Aux 1 pre/post	X		
72	Aux 2 send volume		0 - 1472	dB = -80 + value/16
73	Aux 2 pre/post	X		

74	Aux 3 send volume		0 - 1472	dB = -80 + value/16
75	Aux 3 pre/post	X		
76	Aux 4 send volume		0 - 1472	dB = -80 + value/16
77	Aux 4 pre/post	X		
	Master			
1	Volume		0 - 1472	dB = -80 + value/16
3	Balance		0 - 60	dB = -30 + value
20	EQ on	X		
21	EQ band 1 Filter type	X	0,1,2	0 = param. 1 = HC, 2 = HSh
22	EQ band 1 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
23	EQ band 1 Gain		0 - 72	dB = -18 + value/2
24	EQ band 1 Q		0 - 40	Q = 0.1 * pow (100, value /40);
26	EQ band 2 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
27	EQ band 2 Gain		0 - 72	dB = -18 + value/2
28	EQ band 2 Q		0 - 40	Q = 0.1 * pow (100, value /40);
32	EQ band 3 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
33	EQ band 3 Gain		0 - 72	dB = -18 + value/2
34	EQ band 3 Q		0 - 40	Q = 0.1 * pow (100, value /40);
36	EQ band 4 Filter type	X	0,1,2	0 = param. 1 = LC, 2 = LSh
37	EQ band 4 Frequency		0 - 159	Hz = 20 * pow (1000, value /159)
38	EQ band 4 Gain		0 - 72	dB = -18 + value/2
39	EQ band 4 Q		0 - 40	Q = 0.1 * pow (100, value /40);
40	Compressor on	X		
42	Compressor Attack		0-200	msec = value
43	Compressor Release		0-255	msec = 20 * pow (250, value / 255)
44	Compressor Ratio		0-15	1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.5, 3.0, 3.5, 4.0, 5.0, 6.0, 8.0, 10.0, 20.0, 100.0
45	Compressor Knee	X	0-5	
46	Compressor Threshold		0-60	dB = -60 + value
47	Compressor Gain		0-24	dB = value
48	Fader pre/post Compressor	X		

DDX3216 SysEx parameter of FX algorithms

/***** Bypass *****/

Nr.	Name:	sysex value range:	parameter range:	scale :
90 =	BYPASS	0		

Parameter :

91 = -
 92 = -
 93 = -
 94 = -
 95 = -
 96 = -
 97 = -
 98 = -

/***** Cathedral *****/

// Structure:

```
//
//                               /--o
// o-- PreDel - HiShv - Reverb
//                               |  \--o
//                               MOD
//
```

// PreDelay: Delays the whole reverb effect
 // Decay: Reverb time
 // Damping: Damping of high frequencies in %
 // Bass Multiply: Decay of low frequencies
 // Reverb Modulation: Modulation depth of reverb tail
 // Diffusion: Density of late reflections
 // Density: Density of early reflections
 // Hi-Shv Damp: Damping input High-Shelving

Nr.	Name:	sysex value range:	parameter range:	scale :
90 =	CATHEDRAL	1		

91 =	Decay	0 - 89	= 2 - 20 s	log
92 =	Damping	0 - 100	= 0 - 100 %	lin
93 =	Bass Multiply	0 - 100	= -50 - +50	lin
94 =	Reverb Mod.	0 - 49	= 1 - 50	lin
95 =	PreDelay	0 - 139	= 0 - 490 ms	log
96 =	Density	0 - 50	= 0 - 50	lin
97 =	Diffusion	0 - 20	= 0 - 20	lin
98 =	Hi-Shv Damp	0 - 30	= 0 - 30 dB	lin

/***** Plate *****/

// Structure:

```
//
//          ----- M      G
//          /          /-- I -- A --o
```

```
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
```

// PreDelay: Delays the whole reverb effect
 // Decay: Reverb time
 // HiDec Damp: Damping of high frequencies in %
 // HiDec Freq: Frequency above the decay is damped
 // Diffusion: Density of late reflections
 // Stereo Width: Stereo width of late reflections
 // Hi-Shv Damp: Damping input high-shelving
 // Metal Res.: Adds a metal-type resonance

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = PLATE		2		
Parameter :				
91 = Decay		0 - 90	= 1 - 10 s	log
92 = HiDec Damp		0 - 100	= 0 - 100 %	lin
93 = HiDec Freq		0 - 106	= 0.2 - 20 KHz	log
94 = Stereo Width		0 - 20	= 0 - 20	lin
95 = PreDelay		0 - 138	= 0 - 490 ms	log
96 = Metal Res.		0 - 20	= 0 - 20	lin
97 = Diffusion		0 - 20	= 0 - 20	lin
98 = HiShv Cut		0 - 30	= 0 - 30 dB	lin

/***** Small Hall *****/

// Structure:

```
//
//                               /--o
// o-- PreDel - HiShv - Reverb
//                               |  \--o
//                               MOD
```

```
//
// PreDelay:      Delays the whole reverb effect
// Decay:         Reverb time
// Damping:       Damping of high frequencies in %
// Bass Multiply: Decay of low frequencies
// Reverb Modulation: Modulation depth of reverb tail
// Diffusion:     Density of the late reflections
// Hi-Shv Damp:   Damping input high-shelving
// HiShv Freq:    Frequency of the input high-shelving
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = SMALL HALL		3		
91 = Decay		0 - 34	= 0.5 - 1.2 s	log
92 = Damping		0 - 100	= 0 - 100 %	lin
93 = Bass Multiply		0 - 100	= -50 - +50	lin
94 = Reverb Mod.		0 - 49	= 1 - 50	lin
95 = PreDelay		0 - 76	= 0 - 100 ms	log
96 = Diffusion		0 - 20	= 0 - 20	lin
97 = HiShv Freq		0 - 53	= 1 - 10 KHz	log
98 = Hi-Shv Damp		0 - 30	= 0 - 30 dB	lin

/***** Room *****/

// Structure:

```
//
//                               /--o
// o-- PreDel - HiShv - Reverb
//                               \--o
```

```
//
// PreDelay:      Delays the whole reverb effect
// Decay:         Reverb time
// Damping:       Damping of high frequencies in %
// Bass Multiply: Decay of low frequencies
// Diffusion:     Density of the late reflections
// Mic Distance:  Position of the mics in the room
// Hi-Shv Freq:   Frequency of the input high-shelving
// Hi-Shv Damp:   Damping input high-shelving
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = ROOM		4		
Parameter :				
91 = Decay		0 - 43	= 1 - 3 s	log
92 = Damping		0 - 100	= 0 - 100 %	lin
93 = Bass Multiply		0 - 100	= -50 - +50	lin
94 = Diffusion		0 - 20	= 0 - 20	lin
95 = PreDelay		0 - 92	= 0 - 150 ms	log
96 = Mic Distance		0 - 100	= 0 - 100	lin
97 = Hi-Shv Freq		0 - 53	= 1 - 10 KHz	log
98 = Hi-Shv Damp		0 - 30	= 0 - 30 dB	lin

/***** Concert *****/

// Structure:

```
//
//          ----- M      G
//          /          /-- I -- A --o
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
```

```
// PreDelay:      Delays the whole reverb effect
// Decay:          Reverb time
// HiDec Damp:     Damping of high frequencies in %
// Diffusion:      Density of the late reflections
// Hi-Shv Damp:    Damping input high-shelving
// ER/Rev-Balance: Level balance between early and late reflections
// ER-Stereo Width: Stereo width of early reflections
// Size:           Size of the simulated room
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = CONCERT		5		
Parameter :				
91 = Decay		0 - 90	= 0.8 - 8 s	log
92 = HiDec Damp		0 - 100	= 0 - 100 %	lin
93 = ER/Rev-Balance		0 - 100	= 0 - 100 %	lin
94 = Size		0 - 49	= 1 - 50	lin
95 = PreDelay		0 - 138	= 0 - 490 ms	log
96 = ER-Stereo Width		0 - 20	= 0 - 20	lin
97 = Diffusion		0 - 20	= 0 - 20	lin
98 = Hi-Shv Damp		0 - 30	= 0 - 30 dB	lin

/***** Stage *****/

// Structure:

```
//
//          ----- M      G
//          /          /-- I -- A --o
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
```

```
// PreDelay:      Delays the whole reverb effect
// Decay:          Reverb time
// HiDec Damp:     Damping of high frequencies in %
// Diffusion:      Density of the late reflections
// ER/Rev-Balance: Level balance between early and late reflections
// Size:           Size of the simulated room
// Stereo Width:   Stereo width of late reflections
// Rev-Delay:      Delay of the late reflections relative to the
//                  early reflections
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = STAGE		6		


```

Parameter :
91 = Decay          0 - 89          = 2 - 20 s          log
92 = HiDec Damp     0 - 100         = 0 - 100 %         lin
93 = ER/Rev-Balance 0 - 100         = 0 - 100 %         lin
94 = Size           1 - 49          = 1 - 50           lin
95 = PreDelay       0 - 138         = 0 - 490 ms        log
96 = Rev-Delay      0 - 138         = 0 - 490 ms        log
97 = Diffusion      0 - 20          = 0 - 20           lin
98 = Stereo Width   0 - 20          = 0 - 20           lin

```

/***** Spring Reverb *****/

```

// Structure:
//          ----- M      G
//          /          /-- I -- A --o
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
// PreDelay:      Delays the whole reverb effect
// Decay:         Reverb time
// HiDec Damp:     Damping of high frequencies in %
// HiDec Freq:     Frequency above the decay is damped
// Stereo Width:   Stereo spread of the late reflections
// HiShv Freq:     Frequency of the input high-shelver
// Hi-Shv Damp:    Damping input high-shelver
// Metal Res.:    Adds a metal-type resonance

```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = SPRING REVERB		7		

```

Parameter :
91 = Decay          0 - 36          = 2 - 5 s          log
92 = HiDec Damp     0 - 100         = 0 - 100 %         lin
93 = HiDec Freq     0 - 106         = 0.2 - 20 KHz      log
94 = Stereo Width   0 - 20          = 0 - 20           lin
95 = PreDelay       0 - 138         = 0 - 490 ms        log
96 = Metal Res.     0 - 20          = 0 - 20           lin
97 = HiShv Freq     0 - 68          = 1 - 20 KHz        log
98 = Hi-Shv Damp    0 - 30          = 0 - 30 dB         lin

```

/***** Gated Reverb *****/

```

// Structure:
//          ----- M      G
//          /          /-- I -- A --o
// o-- FILTER -- ER -- REVERB      X      T
//          \          \-- E -- E --o
//          ----- R
//
// PreDelay:      Delays the whole reverb effect
// Decay:         Reverb time
// HiDec Damp:     Damping of high frequencies in %
// Diffusion:     Density of the late reflections
// Stereo Width:   Stereo spread of the late reflections
// Gate Thresh:    Threshold for the gate
// Gate Hold:      Hold time for the gate
// Gate Resp:      Attack/Release time for the gate

```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = GATED REVERB 8				

```

Parameter :
91 = Decay          0 - 90          = 1 - 10 s          log
92 = HiDec Damp     0 - 100         = 0 - 100 %         lin

```

93 = Diffusion	0 - 20	= 0 - 20	lin
94 = Stereo Width	0 - 20	= 0 - 20	lin
95 = PreDelay	0 - 138	= 0 - 490 ms	log
96 = Gate Thresh	0 - 60	= -60 - 0 dB	lin
97 = Gate Hold	0 - 156	= 10 - 1000 ms	log
98 = Gate Resp	0 - 101	= 2 - 200 ms	log

/***** Stereo Delay

*****/

// Structure:

```
//
//      +-+ DELAY_L ----->---*--->-o
//      /  |
//      /  -- FB_L <- LP/HP <-
// o--- \
//      \  -- FB_R <- LP/HP <-
//      \  |
//      +-+ DELAY_R ----->---*--->-o
//
```

// Delay: Delay time

// Feedback: Feedback Level

// Feedback-HP: Cut Frequency of the Feedback High pass

// Feedback-LP: Cut Frequency of the Feedback Low pass

Nr.	Name:	sysex value range:	parameter range:	scale :
-----	-------	--------------------	------------------	---------

90 = STEREO DELAY 9

Parameter :

91 = Delay L	0 - 2700	= 0 - 2700 ms	lin
92 = Delay R	0 - 2700	= 0 - 2700 ms	lin
93 = Feedback L	0 - 99	= 0 - 99 %	lin
94 = Feedback R	0 - 99	= 0 - 99 %	lin
95 = Feedback-HP	0 - 144	= 20 Hz - 10 KHz	log
96 = Feedback-LP	0 - 122	= 100 Hz - 20 KHz	log
97 = -			
98 = -			

/***** Echo *****/

// Structure:

```
//
//      +-----+ DELAY_L ----->-----*--->-o
//      /      |
//      /      | -- FB <- LP/HP <- F_DELAY_L <-
// o--- \      |
//      \      | -- FB <- LP/HP <- F_DELAY_R <-
//      \      |
//      -- IG +- DELAY_R ----->-----*--->-o
//
```

// Delay: Delay time

// Feedback Delay: Length of the Feedback Delay

// Feedback: Feedback Level

// Feedback-HP: Cut Frequency of the Feed. High pass

// Feedback-LP: Cut Frequency of the Feed. Low pass

// Input Gain-R: Input Gain of the Right Delay

Nr.	Name:	sysex value range:	parameter range:	scale :
-----	-------	--------------------	------------------	---------

90 = ECHO 10

Parameter :

91 = Delay L	0 - 1800	= 0 - 1800 ms	lin
92 = Delay R	0 - 1800	= 0 - 1800 ms	lin
93 = Feedback Del.L	0 - 162	= 0 - 900 ms	log
94 = Feedback Del.R	0 - 162	= 0 - 900 ms	log

95 = Feedback-HP	0 - 144	= 20 Hz - 10 KHz	log
96 = Feedback-LP	0 - 122	= 100 Hz - 20 KHz	log
97 = Feedback	0 - 99	= 0 - 99 %	lin
98 = Input Gain-R	0 - 100	= 0 -100 %	lin

/***** Stereo Chorus *****/

// Structure:

```
//
//      .- PITCH ----->---o
//      |      |
//      |      (45/90/180°)
//      |      |
//      |      LFO (~,/\/)
//      |      |
// o-----+- PITCH ----->---o
//
```

//
// Wave: Waveform of the Oscillator (Sine, Triangular)
// LFO Speed: Speed of the Oscillator
// Mod Depth: Depth of the Modulation

// Mod Delay: Delay length of the Modulation
// Ste Phase: Stereo LFO Offset Angle

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = STEREO CHORUS		11		
Parameter :				
91 = Wave,	0 - 1	= Tri , Sine	switch	
92 = LFO Speed	0 - 94	= 0.05 - 20 KHz	log	
93 = Mod Depth	0 - 100	= 0 - 100 %	lin	
94 = Mod Delay	0 - 99	= 5 - 100 ms	log	
95 = Ste Phase	0 - 2	= 45,90,180 dgr	switch	
96 = -				
97 = -				
98 = -				

/***** Stereo Flanger *****/

// Structure:

```
//
//      -- FB---<- LP -<-
//      |      |
//      +- PITCH ----->---*--->-o
//      |      |
//      |      (45/90/180°)
//      |      |
//      |      LFO (~,/\/)
//      |      |
// o-----+- PITCH ----->---*--->-o
//      |      |
//      -- FB---<- LP -<-
//
```

//
// Wave: Waveform of the Oscillator (Sine, Triangular)
// LFO Speed: Speed of the Oscillator
// Mod Depth: Depth of the Modulation
// Mod Delay: Delay length of the Modulation
// Feedback: Feedback Level

```
// Feed-LP: Cut Frequency of the Feedback Low pass
// Ste Phase: Stereo LFO Offset Angle
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= STEREO FLANGER	12		
Parameter :				
91	= Wave	0 - 1	= Tri , Sine	switch
92	= LFO Speed	0 - 94	= 0.05 - 20 Hz	log
93	= Mod Depth	0 - 100	= 0 - 100 %	lin
94	= Mod Delay	0 - 99	= 0.5 - 50 ms	log
95	= Feedback	0 - 198	= -99 - +99 %	lin
96	= Feed-LP	0 - 106	= 0.2 - 20 KHz	log
97	= Ste Phase	0 - 2	= 45,90,180 dgr	switch
98	= -			

```
/***** Stereo Phaser *****/
```

```
// Structure:
```

```
//
//      -- FB----<-----
//      |                               |
//      +- PHASE_SHIFT -->-*-->-o
//      |                               |
//      | (0..180°)
//      |                               |
//      | LFO
//      |                               |
// o-----+- PHASE_SHIFT -->-*-->-o
//      |                               |
//      --- FB----<-----
//
```

```
//
// Speed: Speed of the Oscillator
// Stages: Amount of Phase Shift
// Depth: Depth of the Modulation
// Feedback: Feedback Level
// Ste Phase: Stereo LFO Offset Angle
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= STEREO PHASER	13		
Parameter :				
91	= Stages	2 - 9	= 2 - 9	lin
92	= Speed	0 - 76	= 0.1 - 14 Hz	log
93	= Depth	0 - 100	= 0 - 100 %	lin
94	= Feedback	0 - 198	= -99 - +99 %	lin
95	= Ste Phase	0 - 180	= 0 - 180 dgr	lin
96	= -			
97	= -			
98	= -			

```
/***** Pitch Shifter
```

```
*****/
```

```
// Structure:
```

```
//
// o--+- PITCH_SHIFT -- DELAY -*-->-o
//      |                               |
//      - FB --<-----<-----
//
```

```
// Semitones: Pitch Shift in Semitones
```

```
// Cents:      Additional Pitch Shift in Cents
// Delay:      Delay time
// Feedback:    Feedback Level
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = PITCH SHIFTER		14		
Parameter :				
91 = Semitones		0 - 24	= -12 - +12	lin
92 = Cents		0 - 100	= -50 - +50	lin
93 = Delay		0 - 158	= 0 - 800 ms	log
94 = Feedback		0 - 80	= 0 - 80 %	lin
95 = -				
96 = -				
97 = -				
98 = -				

```
/***** Delay *****/
```

```
// Structure:
```

```
//
```

```
// o-----+ DELAY_L ----->---*--->-o
```

```
//      |                               |
```

```
//      -- FB---<- LP/HP -<-
```

```
//
```

```
// Delay:      Delay time
```

```
// Feedback:    Feedback Level
```

```
// Feedback-HP: Cut Frequency of the Feed. High pass
```

```
// Feedback-LP: Cut Frequency of the Feed. Low pass
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = DELAY		15		
Parameter :				
91 = Delay		0 - 1800	= 0 - 1800 ms	lin
92 = Feedback		0 - 99	= 0 - 99 %	lin
93 = Feedback-HP		0 - 144	= 20 Hz - 10 KHz	log
94 = Feedback-LP		0 - 122	= 100 Hz - 20 KHz	log
95 = -				
96 = -				
97 = -				
98 = -				

```
/***** Flanger *****/
```

```
// Structure:
```

```
//
```

```
//      LFO (~,/\/)
```

```
//      |
```

```
// o-----+ PITCH ----->---*--->-o
```

```
//      |                               |
```

```
//      -- FB---<- LP -<-
```

```
//
```

```
// Wave:      Waveform of the Oscillator (Sine, Triangular)
```

```
// LFO Speed:  Speed of the Oscillator
```

```
// Mod Depth:  Depth of the Modulation
```

```
// Mod Delay:  Delay length of the Modulation
```

```
// Feedback:    Feedback Level
```

```
// Feed-LP:     Cut Frequency of the Feedback Low pass
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = FLANGER		16		
Parameter :				
91 = Wave		0 - 1	= Tri , Sine	switch
92 = LFO Speed		0 - 94	= 0.05 - 20 Hz	log

93 = Mod Depth	0 - 100	= 0 - 100 %	lin
94 = Mod Delay	0 - 99	= 0.5 - 50 ms	log
95 = Feedback	0 - 198	= -99 - +99 %	lin
96 = Feed-LP	0 - 106	= 0.2 - 20 KHz	log
97 = -			
98 = -			

/****** Chorus *****/

// Structure:

//

// LFO (~,/\/)

//

// o-----+ PITCH ----->---o

//

// Wave: Waveform of the Oscillator (Sine, Triangular)

// LFO Speed: Speed of the Oscillator

// Mod Depth: Depth of the Modulation

// Mod Delay: Delay length of the Modulation

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = CHORUS		17		
Parameter :				
91 = Wave		0 - 1	= Tri , Sine	switch
92 = LFO Speed		0 - 94	= 0.05 - 20 KHz	log
93 = Mod Depth		0 - 100	= 0 - 100 %	lin
94 = Mod Delay		0 - 99	= 5 - 100 ms	log
95 = -				
96 = -				
97 = -				
98 = -				

/****** Phaser *****/

// Structure:

//

// LFO

//

// o-----+ PHASE_SHIFT -->*->--o

//

// --- FB-----<-----

//

// Speed: Speed of the Oscillator

// Stages: Amount of Phase Shift

// Depth: Depth of the Modulation

// Feedback: Feedback Level

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = PHASER		18		
Parameter :				
91 = Stages		2 - 7	= 2 - 7	lin
92 = Speed		0 - 76	= 0.1 - 14 Hz	log
93 = Depth		0 - 100	= 0 - 100 %	lin
94 = Feedback		0 - 198	= -99 - +99 %	lin
95 = -				
96 = -				
97 = -				
98 = -				

/****** Tremolo *****/

// Structure:

//

// LFO (~,/\/,|_|)

```
//
//      | \
// o----| >----->--o
//      | /
//
//
// Wave:      Waveform of the Oscillator (Sine, Triangular, Square)
// Speed:      Speed of the Oscillator
// Depth:      Depth of the Amplitude Modulation
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = TREMOLO		19		
Parameter :				
91 = Wave		0 - 2	= Sine,Tri,Square switch	
92 = Speed		0 - 94	= 0.05 - 20 Hz	log
93 = Depth		0 - 100	= 0 - 100 %	lin
94 = -				
95 = -				
96 = -				
97 = -				
98 = -				

```
/****** Autopan *****/
// Structure:
//
//      | \
// o--*--| >----->--o
//      | | \
//      | 180°-- LFO (~,/\/,|_|_)
//      |  /
//      | \
//      ---| >----->--o
//      | /
//
// Wave:      Waveform of the Oscillator (Sine,Triangular,Square)
// Speed:      Speed of the Oscillator
// Depth:      Depth of the Amplitude Modulation
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = AUTOPAN		20		
Parameter :				
91 = Wave		0 - 2	= Sine,Tri,Square switch	
92 = Speed		0 - 94	= 0.05 - 20 Hz	log
93 = Depth		0 - 100	= 0 - 100 %	lin
94 = -				
95 = -				
96 = -				
97 = -				
98 = -				

```
/****** Enhancer *****/
// Structure:
//
//      --- Proc -|>--
//      |         |
// o-----*-- High -*-----+-- NR ---+--o
//      |         |
//      -- Bass Proc. -----|>-----
//
//
```

```
// Hgh-Freq: HP - Frequency
// Hgh-Q: HP - Q
// Process: Amount of High Processing
// NR-Thresh: Noise Reduction Threshold
// NR-Resp: Noise Reduction Speed
// Bass-Freq: Bass Processor - Freq.
// Bass-Q: Bass Processor - Q
// Bass-Level: Bass Processor - Level
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= ENHANCER	21		
Parameter :				
91	= Hgh-Freq	0 - 57	= 1 - 12 kHz	log
92	= Hgh-Q	0 - 30	= 1 - 4	lin
93	= Process	0 - 100	= 0 - 100 %	lin
94	= NR-Resp	0 - 110	= 20 - 400 ms	log
95	= Bass-Freq	0 - 53	= 50 - 500 Hz	log
96	= Bass-Q	0 - 30	= 1 - 4	lin
97	= Bass-Level	0 - 100	= 0 - 100 %	lin
98	= NR-Thresh	0 - 90	= -90 - 0 dB	lin

/***** Graphic EQ *****/

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= GRAPHIC EQ	22		
Parameter :				
91	= 50 Hz	0 - 60	= -15 - +15 dB	lin
92	= 250 Hz	0 - 60	= -15 - +15 dB	lin
93	= 1.5 kHz	0 - 60	= -15 - +15 dB	lin
94	= 7 kHz	0 - 60	= -15 - +15 dB	lin
95	= 100 Hz	0 - 60	= -15 - +15 dB	lin
96	= 500 Hz	0 - 60	= -15 - +15 dB	lin
97	= 3.5 kHz	0 - 60	= -15 - +15 dB	lin
98	= 14 kHz	0 - 60	= -15 - +15 dB	lin

/***** LFO-Filter *****/

```
// Structure:
//
//          LFO (~,/\/, _|^-)
//          |
// o----- BP/LP/HP ----->---o
```

```
//
// Speed:      LFO Speed
// Wave:       LFO Wave Form
// Slewing:    Square Wave Sharpness
// Base Freq:  Filter Bottom Frequency
// Depth      Filter Freq. Modulation Depth
// Filter-Mode: Low pass, High pass, Band pass
// Filter-Q:   Filter Resonance
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90	= LFO FILTER	23		
Parameter :				
91	= Speed	0 - 105	= 0.05 - 40 Hz	log
92	= Wave	0 - 2	= Sine,Tri,Square	switch
93	= Base Freq	0 - 100	= 100 Hz - 10 KHz	log
94	= Depth	0 - 100	= 0 - 100 %	lin
95	= -			
96	= Slewing	0 - 48	= 1 - 50 ms	log

97 = Filter-Mode	0 - 2	= HP, BP, LP	switch
98 = Filter-Q	0 - 49	= 1 - 20	log

/***** Auto-Filter *****/

// Structure:

//

// --> ENV ->-

// |

// o----*----- BP/LP/HP ---->--o

//

// Base Freq: Filter Bottom Frequency

// Sensitivity: Envelope Modulation Depth

// Attack: Envelope Attack Time

// Release: Envelope Release Time

// Filter-Mode: Low pass, High pass, Band pass

// Filter-Q: Filter Resonance

Nr.	Name:	sysex value range:	parameter range:	scale :
-----	-------	--------------------	------------------	---------

90 = AUTO FILTER	24			
------------------	----	--	--	--

Parameter :

91 = Base Freq	0 - 100	= 100 Hz - 10 KHz	log
----------------	---------	-------------------	-----

92 = Sensitivity	0 - 100	= 0 - 100 %	lin
------------------	---------	-------------	-----

93 = Attack	0 - 156	= 10 - 1000 ms	log
-------------	---------	----------------	-----

94 = Release	0 - 156	= 10 - 1000 ms	log
--------------	---------	----------------	-----

95 = Filter-Mode	0 - 2	= HP, BP, LP	switch
------------------	-------	--------------	--------

96 = Filter-Q	0 - 49	= 1 - 20	log
---------------	--------	----------	-----

97 =	-		
------	---	--	--

98 =	-		
------	---	--	--

/***** LoFi *****/

// Structure:

//

// Pink Noise -- LP - HP --|>---

// |

// o----- Bit Mask - LP - HP -----+---o

// |

// Buzz --|>---

//

// Bits: Signal Resolution

// Signal-HP: Signal High pass

// Signal-LP: Signal Low pass

// Noise-Gn: Noise Level

// Noise-HP: Noise High pass

// Noise-LP: Noise Low pass

// Buzz-Gn: Buzz Level

// Buzz-Freq: Buzz Frequency

Nr.	Name:	sysex value range:	parameter range:	scale :
-----	-------	--------------------	------------------	---------

90 = LOWFI	25			
------------	----	--	--	--

Parameter :

91 = Bits	0 - 6	= 6 - 16	log
-----------	-------	----------	-----

92 = Noise-Gn	0 - 100	= 0 - 100 %	lin
---------------	---------	-------------	-----

93 = Noise-HP	0 - 154	= 20 Hz - 16 KHz	log
---------------	---------	------------------	-----

94 = Noise-LP	0 - 106	= 0.2 - 20 KHz	log
---------------	---------	----------------	-----

95 = Signal-HP	0 - 154	= 20 Hz - 16 KHz	log
----------------	---------	------------------	-----

96 = Signal-LP	0 - 121	= 0.1 - 20 KHz	log
----------------	---------	----------------	-----

97 = Buzz-Gn	0 - 100	= 0 - 100 Hz	lin
--------------	---------	--------------	-----

98 = Buzz-Freq 0 - 1 = 50, 60 Hz switch

/****** Ring Modulator *****/

// Structure:

```
//
// (~,/\/, _|) LFO --|>---
//
//      o---*----- AM-Mod -- LP --o
//      |
//      -- ENV --|>---
```

```
//
// Mod.-Mode:      LFO Modulation Mode
// LFO-Speed:      LFO Frequency
// Env-Response:   Envelop Attack/Release time
// AM-Carrier Freq.: AM Frequency
// AM-Depth:      AM Modulation Depth
// Modul.-Depth:   LFO Env-Modulation Depth
// Band limit:     Signal Low pass Freq.
```

Nr.	Name:	sysex value range:	parameter range:	scale :
90 = RING MODULATOR		26		
Parameter :				
91 = Mod.-Mode		0 - 3	= Sine, Tri ,Square, Env	switch
92 = LFO-Speed		0 - 107	= 0.1 - 100 Hz	log
93 = AM-Carrier Freq.		0 - 106	= 0.1 - 10 KHz	log
94 = Band limit		0 - 121	= 0.1 - 20 KHz	log
95 = Modul.-Depth		0 - 100	= 0 - 100 %	lin
96 = Env-Response		0 - 156	= 10 - 1000 ms	log
97 = AM-Depth		0 - 100	= 0 - 100 %	lin
98 = -				

```

*****
MIDI File dump Protocol   ( RS232 )
*****

*****
Header :
*****

F0          System ex
00      0 = Manufact ID 2 bytes, 7E = USEM none Real Time, 7F = USEM Real Time
20      Behr. Man Id
32      "
ic          MIDI channel info
            i = 0AB0, A=1 ignore app ID, B=1 ignore midi channel ( omni )
            c = MIDI channel 0..F ( 1..16 )
dd          Apparatus id , 0B for DD32
rf          Function code: 0rffffff
            r = request bit  1= request 0= here's the data
            fffffff = function number 0..3F
            Behr. Function numbers:
                    0 = Device Id + active MIDI channel      ( we use for
connection test )
                    4 = Meter Data
                    F = Memory Dump

            We Add:
                    50/10 = Req/Dump Current Settings
                    51/11 = Req/Dump PC-card file list
                    52/12 = Req/Dump "File" from PCCARD
            Plus a 'what' Byte:
ww          =
            F_ALL = All
            F_SETUP      = Prefs and Status
            F_CHANL      = Channel Lib
            F_EQL        = EQ Lib
            F_DYNL       = Dyn Lib
            F_FXL        = FX Lib
            F_AUT        = AutoMation
            F_SNAPS      = Snaps

            So Computer says 0x50 F_ALL, and DD32 spits out 0x10 F_ALL and
all data
            Or Computer says 0x10 F_ALL, with all data and DD32 recieves
it

            So Computer says 0x51 F_ALL, and DD32 spits out 0x11 F_ALL and
all *.all filenames in data blok

            So Computer says 0x52 F_ALL + filename , and DD32 spits out
0x10 F_ALL and all data of file ( Computer knows the name name )

            So Computer says 0x12 F_ALL + filename , and DD32 spits out
0x52 F_ALL and filename
            ( DD32 now knows the filename ) and Computer spits out 0x10
F_ALL and all data of file

-----
            50/10 = Req/Dump Current Settings
-----

When the Request bit = 0 The following bytes define the data:

```

```

vv          Data file version number      1..7F  current version = 1

hh          Total Number of data blocks, ( block size = 1000 ) hh*128+ll  ( max
+/- 14Mbyte )
ll

hh          Number of data block (0 = first) hh*128+ll
ll

dd          Byte Count number of data 00..7F
.           Decoded as 7 bytes of 7 bit data
.           and one byte of 7 bits, defining
.           the high bits of the previous 7 bytes
.           So Byte count is always modula 8
dd

cc          Check Sum = !(sum)&0x7F

F7          OEX  ( Header size without data = 15 )

```

When the Request bit = 1 The following bytes define the request:

```

hh          Number of data block (0 = first) hh*128+ll
ll

F7          OEX  ( Header size without data = 11 )

```

51/11 = Req/Dump PC-card file list

When the Request bit = 0 The following bytes define the data:

```

dd          a number of filenames each 9 byte long ( 8 char + 0 )
..          eg. "FILE_CH1""\0'
dd

F7

```

When the Request bit = 1 The following bytes define the request:

```

F7

```

52/12 = Req/Dump "File" from PCCARD

When the Request bit = 0 The following bytes define the data:

```

dd          a c-string filename eg  "FILE_CH1""\0' or "B""\0'
..
dd

F7

```

When the Request bit = 1 The following bytes define the request:

```

dd          a c-string filename eg  "FILE_CH1""\0' or "B""\0'
..
dd

```

F7

Error Handling:

On wrong check sum send a new request of that block.

Protocol :

getting a file out of the DDX3216

```
DD32          PC
Sender         Receiver = initiator
               <- REQ blok 0
Send 0 -> Check sum ok
               <- REQ 1
Send 1 -> Checksum nok
               <- REQ 1
Send 1 -> Checksum ok
               <- REQ 2
Send 2 -> Checksum ok
                        done
```

sending a file to the DDX3216

```
DD32          PC
Reciever      Sender = initiator
                        Send blok 0
Checksum
REQ1  ->
               <- Send 1
Checksum
REQ2  ->
               <- Send 2
Checksum
done
```

Test On PC version:

Make a midi.dat file with in text: (format as above REQ Dump)

F0 00 20 32 00 0B 50 01 00 00 F7

F0 00 20 32 00 0B 50 01 00 01 F7

F0 00 20 32 00 0B 50 01 00 02 F7

F0 00 20 32 00 0B 50 01 00 03 F7

,
,

F0 00 20 32 00 0B 50 01 00 0F F7

Run dd32pc an pres F4 on keyboard

exit dd32pc

there must be a file called midi.aat with 16 bloks :

F0 F7 F0....F7 etc.

rename this file to midi.dat

run dd32pc again, press F4 and the file should be correctly loaded.

For RS232 the same, but: rs232.dat and F3

--/20 = do direct par change

All changed controllers are sent per frame within one system exclusive header
After the function code we have

nn number of changed parameters (min = 1, max = 23 / frame)

dd A series of 4 bytes per parameter: 1e = module (channel) number

dd 2e = parameter number

dd 3e = parameter high 7 bit parameter value is 1:1

dd 4e = parameter low 7 bit

..

dd Last parameter

dd

dd

dd

F7

--/22 = do (group)channel attenuator

All changed controllers are sent per frame within one system exclusive header
After the function code we have

nn number of changed parameters (min = 1, max = 23 / frame)

dd A series of 3 bytes per parameter: 1e = channel nr 0= chan 1 (attenuates
all channels in same mute group)

dd 2e = parameter high 7 bit parameter value is 1:1

dd 3e = parameter low 7 bit

..

dd Last parameter

dd

dd

F7

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BEHRINGER Spezielle Studiotechnik GmbH, Hanns-Martin-Schleyer-Str. 36-38, 47877 Willich-Münchheide II, Germany
Tel. +49 (0) 21 54 / 92 06-0, Fax +49 (0) 21 54 / 92 06-30