



# HYDRASYNTH

MIDI NRPN Communication Spec

Firmware v1.4

Basic Information		Transmitted	Received	Remarks
MIDI Channels		1-16	Omni, 1-16	
Note Numbers		0-127	0-127	
Program Change		Yes	Yes	Enabled in System
Bank Select		Yes	Yes	
Note On velocity		Yes	Yes	
Note Off velocity		No	Yes *	Via MPE
Channel Aftertouch		Yes	Yes	Aftertouch preference is set in System page
Polyphonic Aftertouch		Yes	Yes	
Pitch Bend		Yes	Yes	On pitch wheel
NRPN's		Yes	Yes	SEE NRPN Chart
Sysex		Yes *	Yes*	For sending patches between two Hydrasynths
MIDI Clock		Yes – INT RUN mode only	Yes	Internal, USB, MIDI
MPE		Yes	Yes	Enabled in System page
NRPN		Yes	Yes	Full spec below. Most engine parameters can be controlled via NRPN's
Message	MIDI CC			
Bank Select MSB	00	Yes	Yes	Value 0 is sent; value is ignored on input
Modulation Wheel	01	Yes	Yes	
Expression	11	Yes	Yes	
Bank Select LSB	32	Yes	Yes	Range is 0 to 4
Sustain Pedal	64	Yes	Yes	
All Notes Off	123	Yes	Yes	

Firmware: from V1.4			NRPN sample: B0H 63H [MSB] 62H [LSB] 06H [VV] 26H [WW]		
Category	Parameter		NRPN MSB	NRPN LSB	VV, WW if no extra comment, then param value = VV * 128 + WW. The default param value range is [0 - 2000H].
OSC	All OSC Cent		41H	04H	
	OSC Mode		3FH	18H	when VV=00H ,set OSC1 Mode, when VV=01H ,set OSC2 Mode, when VV=02H ,set OSC3 Mode, WW = [0,1] = Single / WaveScan
	semi		3FH	11H	when VV=00H ,set OSC1 Semi, when VV=01H ,set OSC2 Semi, when VV=02H ,set OSC3 Semi, when WW > 64,semi = WW - 128. when WW <= 64,semi = WW .
OSC1	OSC1 Type		3FH	19H	VV*128+WW = [0,218]
	OSC1 Cent		41H	01H	when VV*128+WW > 4096,Cent = VV*128+W - 8192. when VV*128+WW <= 4096,Cent = VV*128+W .
	OSC1 Keytrack		3FH	54H	VV*128+WW = [0,200]
	OSC1 WavScan		41H	2AH	
	solo OSC1 wavscan		3FH	1bH	VV = [0,7] means OSC1 wav1 to wav8, WW = [0,1] = Off / On
	OSC1 WaveScan Wav1		3FH	60H	VV*128+WW = [0,218]
	OSC1 WaveScan Wav2		3FH	61H	VV*128+WW = [0,218]
	OSC1 WaveScan Wav3		3FH	62H	VV*128+WW = [0,218]
	OSC1 WaveScan Wav4		3FH	63H	VV*128+WW = [0,218]
	OSC1 WaveScan Wav5		3FH	64H	VV*128+WW = [0,218]
	OSC1 WaveScan Wav6		3FH	65H	VV*128+WW = [0,218]
OSC1 WaveScan Wav7		3FH	66H	VV*128+WW = [0,218]	
OSC1 WaveScan Wav8		3FH	67H	VV*128+WW = [0,218]	
OSC2	OSC2 Type		3FH	1AH	VV*128+WW = [0,218]
	OSC2 Cent		41H	02H	when VV*128+WW > 4096,Cent = VV*128+W - 8192. when VV*128+WW <= 4096,Cent = VV*128+W .
	OSC2 Keytrack		3FH	55H	VV*128+WW = [0,200]
	OSC2 WavScan		41H	2BH	

	solo OSC2 wavscan		3FH	1cH	VV = [0,7] means OSC2 wav1 to wav8, WW = [0,1] = Off / On
	OSC2 WaveScan Wav1		3FH	68H	VV*128+WW = [0,218]
	OSC2 WaveScan Wav2		3FH	69H	VV*128+WW = [0,218]
	OSC2 WaveScan Wav3		3FH	6AH	VV*128+WW = [0,218]
	OSC2 WaveScan Wav4		3FH	6BH	VV*128+WW = [0,218]
	OSC2 WaveScan Wav5		3FH	6CH	VV*128+WW = [0,218]
	OSC2 WaveScan Wav6		3FH	6DH	VV*128+WW = [0,218]
	OSC2 WaveScan Wav7		3FH	6EH	VV*128+WW = [0,218]
	OSC2 WaveScan Wav8		3FH	6FH	VV*128+WW = [0,218]
OSC3	OSC3 Type		3FH	0DH	VV*128+WW = [0,218]
	OSC3 Cent		41H	03H	when VV*128+WW > 4096,Cent = VV*128+W - 8192.when VV*128+WW <= 4096,Cent = VV*128+W .
	OSC3 Keytrack		3FH	56H	VV*128+WW = [0,200]
Mutator	Mutator Mode		3FH	21H	VV = [0,3] means MUTATOR 1-4 WW = [0,7] means FM-Lin (FM) / WavStack (Detune) / OSC Sync (Sync) / PW-Orig (PW) / PW-Sqeez (squeeze) / PW-ASM (custom) / Harmonic/PhazDiff
	Mutator Sources (FM-Lin)		3FH	24H	VV = [0,3] means MUTATOR 1-4 WW = [0,12] means Sine / Triangle / OSC1 / OSC2 / OSC3 / RingMod / Noise / Mutator1 / Mutator2 / Mutator3 / Mutator4 /Mod in 1 / Mod in 2
	Mutator Sources (OSC Sync)		3FH	22H	VV = [0,3] means MUTATOR 1-4 WW = [0,2] means OSC1 / OSC2 / OSC3
Mutator1	Mutator1 Ratio		41H	2CH	
	Mutator1 Depth		40H	1FH	
	Mutator1 Dry/Wet		40H	22H	
	Mutator1 Fdbk		40H	25H	
	Mutator1 window		40H	1CH	
	Mutator1 Warp1		40H	60H	
	Mutator1 Warp2		40H	61H	
	Mutator1 Warp3		40H	62H	
	Mutator1 Warp4		40H	63H	
	Mutator1 Warp5		40H	64H	
	Mutator1 Warp6		40H	65H	
	Mutator1 Warp7		40H	66H	
Mutator1 Warp8		40H	67H		
Mutator2	Mutator2 Ratio		41H	2DH	

	Mutator2 Depth		40H	20H	
	Mutator2 Dry/Wet		40H	23H	
	Mutator2 Fdbk		40H	26H	
	Mutator2 window		40H	1DH	
	Mutator2 Warp1		40H	68H	
	Mutator2 Warp2		40H	69H	
	Mutator2 Warp3		40H	6AH	
	Mutator2 Warp4		40H	6BH	
	Mutator2 Warp5		40H	6CH	
	Mutator2 Warp6		40H	6DH	
	Mutator2 Warp7		40H	6EH	
	Mutator2 Warp8		40H	6FH	
Mutator3	Mutator3 Ratio		41H	2EH	
	Mutator3 Depth		40H	21H	
	Mutator3 Dry/Wet		40H	24H	
	Mutator3 Fdbk		40H	27H	
	Mutator3 window		40H	1EH	
	Mutator3 Warp1		40H	70H	
	Mutator3 Warp2		40H	71H	
	Mutator3 Warp3		40H	72H	
	Mutator3 Warp4		40H	73H	
	Mutator3 Warp5		40H	74H	
	Mutator3 Warp6		40H	75H	
	Mutator3 Warp7		40H	76H	
Mutator3 Warp8		40H	77H		
Mutator4	Mutator4 Ratio		41H	2FH	
	Mutator4 Depth		40H	16H	
	Mutator4 Dry/Wet		40H	17H	
	Mutator4 Fdbk		40H	1BH	
	Mutator4 Window		40H	1AH	
	Mutator4 Warp1		40H	78H	
	Mutator4 Warp2		40H	79H	
	Mutator4 Warp3		40H	7AH	
	Mutator4 Warp4		40H	7BH	
	Mutator4 Warp5		40H	7CH	
Mutator4 Warp6		40H	7DH		

	Mutator4 Warp7		40H	7EH	
	Mutator4 Warp8		40H	7FH	
Ring-Noise	Type of noise		3FH	27H	VV*128+WW = [0,6] means White/Pink/Brown/Red/Blue/Violet/Grey
	RM12 Depth		40H	03H	
	Signal source for RM		3FH	26H	VV = [0,1] means source 1-2 WW = [0,9] means OSC1 / OSC2 / OSC3 / Noise / Mutator1 / Mutator2 / Mutator3 / Mutator4 / Mod in 1 / Mod in 2
Mix	MIXER SOLO		3FH	25H	VV*128+WW = [0,1] means OFF / ON
	OSC1 Vol		40H	07H	
	OSC1 Pan		40H	08H	
	OSC1 FRate		40H	31H	
	OSC2 Vol		40H	09H	
	OSC2 Pan		40H	0AH	
	OSC2 FRate		40H	32H	
	OSC3 Vol		40H	0BH	
	OSC3 Pan		40H	0CH	
	OSC3 FRate		40H	33H	
	Noise Vol		40H	0DH	
	Noise Pan		40H	0EH	
	Noise FRate		40H	34H	
	RM12 Vol		40H	01H	
	RM12 Pan		40H	04H	
	RM12 FRate		40H	35H	
	Filter routing selector		3FH	2CH	VV*128+WW = [0,1] means Series / Parallel
Filter1	Filter1 Position of Drive		3FH	29H	VV*128+WW = [0,1] means Pre / Post
	Filter1 Cutoff		40H	28H	
	Filter1 Drive		40H	2BH	
	Filter1 Res		40H	29H	
	Filter1 Special		40H	2AH	
	Filter1 Keytrack		41H	66H	
	Filter1 LFO1amt		41H	60H	
	Selects order of vowels		3FH	2EH	VV*128+WW = [0,7] means AEIOU/ AIUEO / AUIOE / AOUIE / IOUAE / UEAOI / IOEAU / UIEAO
Type of filter 1 model		3FH	28H	VV*128+WW = [0,10] means LP_LDR12 / LP_LDR24 / LP_FAT12 / LP_FAT24 / LP_GATE / LP_MS20 / HP_MS20 / LP_3_LER / BP_3_LER / HP_3_LER /	

					VOWEL
	Filter1 Vel Env		41H	69H	
	Filter1 ENV1amt		41H	61H	
Filter2	Filter2 Position of Drive		3FH	2BH	VV*128+WW = [0,1] means Pre / Post
	Flt2 Cutoff		40H	2CH	
	Flt2 Res		40H	2DH	
	Flt2 Type		40H	2EH	
	Filter2 Keytrack		41H	67H	
	Filter2 LFO1amt		41H	62H	
	Filter2 Vel Env		41H	6AH	
	Filter2 ENV1amt		41H	63H	
AMP	Amp Level		40H	02H	
	Amp Vel Env		41H	6BH	
	Amp LFO2amt		41H	64H	
PRE-FX	PRE-FX type		3BH	7FH	
	PRE-FX preset		3BH	00H	depends on PRE-FX type
	PRE-FX Mix		41H	6EH	
	PRE-FX Param1		41H	6FH	
	PRE-FX Param2		41H	70H	
	PRE-FX Param3		3BH	30H	depends on PRE-FX type
	PRE-FX Param4		3BH	40H	depends on PRE-FX type
	PRE-FX Param5		3BH	50H	depends on PRE-FX type
	Sidechn type(when PRE-FX type is compress)		3BH	73H	depends on PRE-FX type
Delay	Delay BPMsync		3BH	70H	VV*128+WW = [0,1] means OFF / ON
	Delay Dry/Wet		41H	78H	
	Delay Feedback		41H	75H	
	Delay FeedTone		41H	76H	
	Delay Time		41H	74H	
	Delay Type		3BH	71H	VV*128+WW = [0,4] means BASIC / BASIC_ST / PANDELAY / LRCDELAY / REVERSE
	Delay Wet tone		41H	77H	
Reverb	Reverb Dry/Wet		41H	7EH	
	Reverb HiDamp		41H	7BH	
	Reverb LoDamp		41H	7CH	

	Reverb Predelay		41H	7DH	
	Reverb Time		41H	79H	
	Reverb Tone		41H	7AH	
	Reverb type		3CH	72H	VV*128+WW = [0,3] means HALL / ROOM / PLATE / CLOUD
POST-FX	POST-FX type		3CH	7FH	
	POST-FX preset		3CH	00H	depends on POST-FX type
	POST FX Mix		41H	71H	
	POST-FX Param1		41H	72H	
	POST-FX Param2		41H	73H	
	POST-FX Param3		3CH	30H	depends on POST-FX type
	POST-FX Param4		3CH	40H	depends on POST-FX type
	POST-FX Param5		3CH	50H	depends on POST-FX type
	Sidechn type(when POST-FX type is compress)		3CH	73H	depends on POST-FX type
LFO1	LFO1 Gain		41H	0BH	
	LFO1 Wave		3FH	04H	VV=00H set Wave to WW
	LFO1 BMP Sync		3FH	04H	VV=01H set BPM Sync to WW
	LFO1 TrigSync		3FH	04H	VV=03H set TrigSync to WW
	LFO1 Smooth		3FH	04H	VV=06H set Smooth to WW
	LFO1 Steps		3FH	04H	VV=07H set Steps to WW
	LFO1 Delay(BPM Sync off)		3FH	04H	VV=11H set Delay to WW
	LFO1 Fadein(BPM Sync off)		3FH	04H	VV=12H set FadeIn to WW
	LFO1 Delay(BPM Sync on)		3FH	04H	VV=21H set Delay to WW
	LFO1 Fadein(BPM Sync on)		3FH	04H	VV=13H set FadeIn to WW
	LFO1 One-Shot		3FH	04H	VV=14H set One-Shot to WW
	LFO1 phase		3FH	30H	VV*128+WW = [0,360]
	LFO1 Rate		41H	05H	
	LFO1 Rate(BPM Sync on)		43H	05H	[Rhythm List (LFO Rate)]
		LFO1 step1 to step8		3AH	10H-17H
LFO2	LFO2 Gain		41H	0CH	
	LFO2 Wave		3FH	05H	VV=00H set Wave to WW
	LFO2 BMP Sync		3FH	05H	VV=01H set BPM Sync to WW
	LFO2 TrigSync		3FH	05H	VV=03H set TrigSync to WW
	LFO2 Smooth		3FH	05H	VV=06H set Smooth to WW



	LFO2 Steps		3FH	05H	VV=07H set Steps to WW
	LFO2 Delay(BPM Sync off)		3FH	05H	VV=11H set Delay to WW
	LFO2 Fadein(BPM Sync off)		3FH	05H	VV=12H set FadeIn to WW
	LFO2 Delay(BPM Sync on)		3FH	05H	VV=21H set Delay to WW
	LFO2 Fadein(BPM Sync on)		3FH	05H	VV=13H set FadeIn to WW
	LFO2 One-Shot		3FH	05H	VV=14H set One-Shot to WW
	LFO2 phase		3FH	31H	VV*128+WW = [0,360]
	LFO2 Rate		41H	06H	
	LFO2 Rate(BPM Sync on)		43H	06H	[Rhythm List (LFO Rate)]
	LFO2 step1 to step8		3AH	18H-1FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
LFO3	LFO3 Gain		41H	0DH	
	LFO3 Wave		3FH	06H	VV=00H set Wave to WW
	LFO3 BMP Sync		3FH	06H	VV=01H set BPM Sync to WW
	LFO3 TrigSync		3FH	06H	VV=03H set TrigSync to WW
	LFO3 Smooth		3FH	06H	VV=06H set Smooth to WW
	LFO3 Steps		3FH	06H	VV=07H set Steps to WW
	LFO3 Delay(BPM Sync off)		3FH	06H	VV=11H set Delay to WW
	LFO3 Fadein(BPM Sync off)		3FH	06H	VV=12H set FadeIn to WW
	LFO3 Delay(BPM Sync on)		3FH	06H	VV=21H set Delay to WW
	LFO3 Fadein(BPM Sync on)		3FH	06H	VV=13H set FadeIn to WW
	LFO3 One-Shot		3FH	06H	VV=14H set One-Shot to WW
	LFO3 phase		3FH	32H	VV*128+WW = [0,360]
	LFO3 Rate		41H	07H	
	LFO3 Rate(BPM Sync on)		43H	07H	[Rhythm List (ENV LFO)]
LFO3 step1 to step8		3AH	20H-27H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128	
LFO4	LFO4 Gain		41H	0EH	
	LFO4 Wave		3FH	07H	VV=00H set Wave to WW
	LFO4 BMP Sync		3FH	07H	VV=01H set BPM Sync to WW
	LFO4 TrigSync		3FH	07H	VV=03H set TrigSync to WW
	LFO4 Smooth		3FH	07H	VV=07H set Smooth to WW
	LFO4 Steps		3FH	07H	VV=07H set Steps to WW
	LFO4 Delay(BPM Sync off)		3FH	07H	VV=11H set Delay to WW

	LFO4 Fadein(BPM Sync off)		3FH	07H	VV=12H set FadeIn to WW
	LFO4 Delay(BPM Sync on)		3FH	07H	VV=21H set Delay to WW
	LFO4 Fadein(BPM Sync on)		3FH	07H	VV=13H set FadeIn to WW
	LFO4 One-Shot		3FH	07H	VV=14H set One-Shot to WW
	LFO4 phase		3FH	33H	VV*128+WW = [0,360]
	LFO4 Rate		41H	08H	
	LFO4 Rate(BPM Sync on)		43H	08H	[Rhythm List (LFO Rate)]
	LFO4 step1 to step8		3AH	28H-2FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
LFO5	LFO5 Gain		41H	0FH	
	LFO5 Wave		3FH	08H	VV=00H set Wave to WW
	LFO5 BMP Sync		3FH	08H	VV=01H set BPM Sync to WW
	LFO5 TrigSync		3FH	08H	VV=03H set TrigSync to WW
	LFO5 Smooth		3FH	08H	VV=08H set Smooth to WW
	LFO5 Steps		3FH	08H	VV=08H set Steps to WW
	LFO5 Delay(BPM Sync off)		3FH	08H	VV=11H set Delay to WW
	LFO5 Fadein(BPM Sync off)		3FH	08H	VV=12H set FadeIn to WW
	LFO5 Delay(BPM Sync on)		3FH	08H	VV=21H set Delay to WW
	LFO5 Fadein(BPM Sync on)		3FH	08H	VV=13H set FadeIn to WW
	LFO5 One-Shot		3FH	08H	VV=14H set One-Shot to WW
	LFO5 phase		3FH	34H	VV*128+WW = [0,360]
	LFO5 Rate		41H	09H	
	LFO5 Rate(BPM Sync on)		43H	09H	[Rhythm List (LFO Rate)]
	LFO5 step1 to step8		3AH	30H-37H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
ENV1	ENV1 Delay(BPM Sync off)		3FH	00H	VV=08H , BPM Sync off ,set Delay to WW,
	ENV1 Attack(BPM Sync off)		41H	11H	
	ENV1 Hold(BPM Sync off)		41H	16H	
	ENV1 Decay(BPM Sync off)		41H	1BH	
	ENV1 Sustain		41H	20H	
	ENV1 Release(BPM Sync off)		41H	25H	

	ENV1 Delay(BPM Sync on)		3FH	00H	VV=18H , BPM Sync on ,set Delay to WW,
	ENV1 Attack(BPM Sync on)		43H	11H	[Rhythm List (ENV LFO)]
	ENV1 Decay(BPM Sync on)		43H	1BH	[Rhythm List (ENV LFO)]
	ENV1 Hold(BPM Sync on)		43H	16H	[Rhythm List (ENV LFO)]
	ENV1 Release(BPM Sync on)		43H	25H	[Rhythm List (ENV LFO)]
	ENV1 AtkCurve		3FH	70H	VV*128+WW = [0,128]
	ENV1 DecCurve		3FH	75H	VV*128+WW = [0,128]
	ENV1 Loop		3FH	00H	VV=06H ,set Env Loop to WW,
	ENV1 Legato		3FH	00H	VV=07H ,set Legato to WW,
	ENV1 BPM Sync		3FH	00H	VV=0CH ,set BPM Sync to WW,
	ENV1 Freerun		3FH	00H	VV=0DH ,set Freerun to WW,
	ENV1 Reset		3FH	00H	VV=0FH ,set Reset to WW,
	ENV1 RelCurve		3FH	7AH	VV*128+WW = [0,128]
ENV2	ENV2 Delay(BPM Sync off)		3FH	01H	VV=08H , BPM Sync off ,set Delay to WW,
	ENV2 Attack(BPM Sync off)		41H	12H	
	ENV2 Hold(BPM Sync off)		41H	17H	
	ENV2 Decay(BPM Sync off)		41H	1CH	
	ENV2 Sustain		41H	21H	
	ENV2 Release(BPM Sync off)		41H	26H	
	ENV2 Delay(BPM Sync on)		3FH	01H	VV=18H , BPM Sync on ,set Delay to WW,
	ENV2 Attack(BPM Sync on)		43H	12H	[Rhythm List (ENV LFO)]
	ENV2 Decay(BPM Sync on)		43H	1CH	[Rhythm List (ENV LFO)]
	ENV2 Hold(BPM Sync on)		43H	17H	[Rhythm List (ENV LFO)]
	ENV2 Release(BPM Sync on)		43H	26H	[Rhythm List (ENV LFO)]
	ENV2 AtkCurve		3FH	71H	VV*128+WW = [0,128]
	ENV2 DecCurve		3FH	76H	VV*128+WW = [0,128]
	ENV2 Loop		3FH	01H	VV=06H ,set Env Loop to WW,
	ENV2 Legato		3FH	01H	VV=07H ,set Legato to WW,
ENV2 BPM Sync		3FH	01H	VV=0CH ,set BPM Sync to WW,	

	ENV2 Freerun		3FH	01H	VV=0DH ,set Freerun to WW,
	ENV2 Reset		3FH	01H	VV=0FH ,set Reset to WW,
	ENV2 RelCurve		3FH	7BH	VV*128+WW = [0,128]
ENV3	ENV3 Delay(BPM Sync off)		3FH	02H	VV=08H , BPM Sync off ,set Delay to WW,
	ENV3 Attack(BPM Sync off)		41H	13H	
	ENV3 Hold(BPM Sync off)		41H	18H	
	ENV3 Decay(BPM Sync off)		41H	1DH	
	ENV3 Sustain		41H	22H	
	ENV3 Release(BPM Sync off)		41H	27H	
	ENV3 Delay(BPM Sync on)		3FH	02H	VV=18H , BPM Sync on ,set Delay to WW,
	ENV3 Attack(BPM Sync on)		43H	13H	[Rhythm List (ENV LFO)]
	ENV3 Decay(BPM Sync on)		43H	1DH	[Rhythm List (ENV LFO)]
	ENV3 Hold(BPM Sync on)		43H	18H	[Rhythm List (ENV LFO)]
	ENV3 Release(BPM Sync on)		43H	27H	[Rhythm List (ENV LFO)]
	ENV3 AtkCurve		3FH	72H	VV*128+WW = [0,128]
	ENV3 DecCurve		3FH	77H	VV*128+WW = [0,128]
	ENV3 Loop		3FH	02H	VV=06H ,set Env Loop to WW,
	ENV3 Legato		3FH	02H	VV=07H ,set Legato to WW,
	ENV3 BPM Sync		3FH	02H	VV=0CH ,set BPM Sync to WW,
	ENV3 Freerun		3FH	02H	VV=0DH ,set Freerun to WW,
	ENV3 Reset		3FH	02H	VV=0FH ,set Reset to WW,
	ENV3 RelCurve		3FH	7CH	VV*128+WW = [0,128]
ENV4	ENV4 Delay(BPM Sync off)		3FH	03H	VV=08H , BPM Sync off ,set Delay to WW,
	ENV4 Attack(BPM Sync off)		41H	14H	
	ENV4 Hold(BPM Sync off)		41H	19H	
	ENV4 Decay(BPM Sync off)		41H	1EH	
	ENV4 Sustain		41H	23H	
	ENV4 Release(BPM Sync off)		41H	28H	
	ENV4 Delay(BPM Sync on)		3FH	03H	VV=18H , BPM Sync on ,set Delay to WW,

	ENV4 Attack(BPM Sync on)		43H	14H	[Rhythm List (ENV LFO)]
	ENV4 Decay(BPM Sync on)		43H	1EH	[Rhythm List (ENV LFO)]
	ENV4 Hold(BPM Sync on)		43H	19H	[Rhythm List (ENV LFO)]
	ENV4 Release(BPM Sync on)		43H	28H	[Rhythm List (ENV LFO)]
	ENV4 AtkCurve		3FH	73H	VV*128+WW = [0,128]
	ENV4 DecCurve		3FH	78H	VV*128+WW = [0,128]
	ENV4 Loop		3FH	03H	VV=06H ,set Env Loop to WW,
	ENV4 Legato		3FH	03H	VV=07H ,set Legato to WW,
	ENV4 BPM Sync		3FH	03H	VV=0CH ,set BPM Sync to WW,
	ENV4 Freerun		3FH	03H	VV=0DH ,set Freerun to WW,
	ENV4 Reset		3FH	03H	VV=0FH ,set Reset to WW,
	ENV4 RelCurve		3FH	7DH	VV*128+WW = [0,128]
ENV5	ENV5 Delay(BPM Sync off)		3FH	04H	VV=08H , BPM Sync off ,set Delay to WW,
	ENV5 Attack(BPM Sync off)		41H	15H	
	ENV5 Hold(BPM Sync off)		41H	1AH	
	ENV5 Decay(BPM Sync off)		41H	1FH	
	ENV5 Sustain		41H	24H	
	ENV5 Release(BPM Sync off)		41H	29H	
	ENV5 Delay(BPM Sync on)		3FH	04H	VV=18H , BPM Sync on ,set Delay to WW,
	ENV5 Attack(BPM Sync on)		43H	15H	[Rhythm List (ENV LFO)]
	ENV5 Decay(BPM Sync on)		43H	1FH	[Rhythm List (ENV LFO)]
	ENV5 Hold(BPM Sync on)		43H	1AH	[Rhythm List (ENV LFO)]
	ENV5 Release(BPM Sync on)		43H	29H	[Rhythm List (ENV LFO)]
	ENV5 AtkCurve		3FH	74H	VV*128+WW = [0,128]
	ENV5 DecCurve		3FH	79H	VV*128+WW = [0,128]
	ENV5 Loop		3FH	04H	VV=06H ,set Env Loop to WW,
	ENV5 Legato		3FH	04H	VV=07H ,set Legato to WW,
	ENV5 BPM Sync		3FH	04H	VV=0CH ,set BPM Sync to WW,
ENV5 Freerun		3FH	04H	VV=0DH ,set Freerun to WW,	
ENV5 Reset		3FH	04H	VV=0FH ,set Reset to WW,	

	ENV5 RelCurve		3FH	7EH	VV=0FH ,WW = [0,128]
ARP	ARP Division		39H	03H	VV=01H ,WW = [0,11]
	ARP Swing		39H	03H	VV=02H ,WW = [50,75]
	ARP Gate		39H	03H	VV=03H ,WW = [5,100]
	ARP Octmode		39H	03H	VV=04H ,WW = [0,4]
	ARP Octave		39H	03H	VV=05H ,WW = [1,4]
	ARP Mode		39H	03H	VV=06H ,WW = [0,7]
	ARP Length		39H	03H	VV=07H ,WW = [0,32]
	ARP TapTrig		39H	03H	VV=08H ,WW = [0,1]
	ARP Phrase		39H	03H	VV=09H ,WW = [0,63]
	ARP Ratchet		39H	03H	VV=0AH ,WW = [0,127]
	ARP Chance		39H	03H	VV=0BH ,WW = [0,100]
Macro	Macro1 Target		3EH	30H-37H	when VV=02H ,set mod target num to WW, when VV=04H ,set mod target num to WW+128, when VV=05H ,set mod target num to WW+256
	Macro1 Btn value1 to value8		3DH	30H-37H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
	Macro1 Depth1 to Depth8		36H	30H-37H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
	Macro2 Target		3EH	38H-3FH	when VV=02H ,set mod target num to WW, when VV=04H ,set mod target num to WW+128, when VV=05H ,set mod target num to WW+256
	Macro2 Btn value1 to value8		3DH	38H-3FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
	Macro2 Depth1 to Depth8		36H	38H-3FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
	Macro3 Target		3EH	40H-47H	when VV=02H ,set mod target num to WW, when VV=04H ,set mod target num to WW+128, when VV=05H ,set mod target num to WW+256
	Macro3 Btn value1 to value8		3DH	40H-47H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
	Macro3 Depth1 to Depth8		36H	40H-47H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128

Macro4 Target		3EH	48H-4FH	when VV=02H ,set mod target num to WW, when VV=04H ,set mod target num to WW+128, when VV=05H ,set mod target num to WW+256
Macro4 Btn value1 to value8		3DH	48H-4FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
Macro4 Depth1 to Depth8		36H	48H-4FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
Macro5 Target		3EH	50H-57H	when VV=02H ,set mod target num to WW, when VV=04H ,set mod target num to WW+128, when VV=05H ,set mod target num to WW+256
Macro5 Btn value1 to value8		3DH	50H-57H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
Macro5 Depth1 to Depth8		36H	50H-57H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
Macro6 Target		3EH	58H-5FH	when VV=02H ,set mod target num to WW, when VV=04H ,set mod target num to WW+128, when VV=05H ,set mod target num to WW+256
Macro6 Btn value1 to value8		3DH	58H-5FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
Macro6 Depth1 to Depth8		36H	58H-5FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
Macro7 Target		3EH	60H-67H	when VV=02H ,set mod target num to WW, when VV=04H ,set mod target num to WW+128, when VV=05H ,set mod target num to WW+256
Macro7 Btn value1 to value8		3DH	60H-67H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
Macro7 Depth1 to Depth8		36H	60H-67H	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
Macro8 Target		3EH	68H-6FH	when VV=02H ,set mod target num to WW, when VV=04H ,set mod target num to WW+128, when VV=05H ,set mod target num to WW+256
Macro8 Btn value1 to value8		3DH	68H-6FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128

	Macro8 Depth1 to Depth8		36H	68H-6FH	VV*128+WW = 0 means depth = -128 VV*128+WW = 4096 means depth = 0 VV*128+WW = 8192 means depth = 128
	marco1 panel value		3FH	58H	VV*128+WW = [0,1024]
	marco2 panel value		3FH	59H	VV*128+WW = [0,1024]
	marco3 panel value		3FH	5AH	VV*128+WW = [0,1024]
	marco4 panel value		3FH	5BH	VV*128+WW = [0,1024]
	marco5 panel value		3FH	5CH	VV*128+WW = [0,1024]
	marco6 panel value		3FH	5DH	VV*128+WW = [0,1024]
	marco7 panel value		3FH	5EH	VV*128+WW = [0,1024]
	marco8 panel value		3FH	5FH	VV*128+WW = [0,1024]
ModMatrix	ModMatrix Mod Source		3EH	00H-1FH	when VV=01H ,set mod soures num to WW, when VV=03H ,set mod soures num to WW+128,
	ModMatrix Mod Target		3EH	00H-1FH	when VV=02H ,set mod target num to WW, when VV=04H ,set mod target num to WW+128, when VV=05H ,set mod target num to WW+256,
	ModMatrix1 Depth		41H	40H	
	ModMatrix2 Depth		41H	41H	
	ModMatrix3 Depth		41H	42H	
	ModMatrix4 Depth		41H	43H	
	ModMatrix5 Depth		41H	44H	
	ModMatrix6 Depth		41H	45H	
	ModMatrix7 Depth		41H	46H	
	ModMatrix8 Depth		41H	47H	
	ModMatrix9 Depth		41H	48H	
	ModMatrix10 Depth		41H	49H	
	ModMatrix11 Depth		41H	4AH	
	ModMatrix12 Depth		41H	4BH	
	ModMatrix13 Depth		41H	4CH	
	ModMatrix14 Depth		41H	4DH	
	ModMatrix15 Depth		41H	4EH	
	ModMatrix16 Depth		41H	4FH	
	ModMatrix17 Depth		41H	50H	
	ModMatrix18 Depth		41H	51H	
	ModMatrix19 Depth		41H	52H	
ModMatrix20 Depth		41H	53H		
ModMatrix21 Depth		41H	54H		



	ModMatrix22 Depth		41H	55H	
	ModMatrix23 Depth		41H	56H	
	ModMatrix24 Depth		41H	57H	
	ModMatrix25 Depth		41H	58H	
	ModMatrix26 Depth		41H	59H	
	ModMatrix27 Depth		41H	5AH	
	ModMatrix28 Depth		41H	5BH	
	ModMatrix29 Depth		41H	5CH	
	ModMatrix30 Depth		41H	5DH	
	ModMatrix31 Depth		41H	5EH	
	ModMatrix32 Depth		41H	5FH	
Ribbon	Ribbon Mode		3FH	3BH	VV=00H ,Control mode of ribbon strip.
	Key Span		3FH	3BH	VV=01H ,Key span for entire ribbon strip
	Octave		3FH	3BH	VV=02H ,Shift octave
	quantize		3FH	3BH	VV=03H ,Quantize to scale
	ModControl		3FH	3BH	VV=10H ,Toggle for volume control of Mod Wheel to Theremin
	Glide		3FH	3BH	VV=11H ,Amount of glide
Voice	Detune		3FH	39H	VV*128+WW = [0,127]
	StWidth		3FH	44H	VV*128+WW = [0,127]
	Vib Amt		3FH	43H	VV*128+WW = [0,12]
	AnalogFL		3FH	46H	VV*128+WW = [0,127]
	Density		3FH	3CH	VV*128+WW = [1,8]
	GlidCurv		3FH	14H	VV*128+WW = [0,128] means [Log(-64), Lin(0), Exp(64)]
	Glide		3FH	12H	VV*128+WW = [0,1] means OFF / ON
	GlidLgto		3FH	1FH	VV*128+WW = [0,1] means OFF / ON
	GlidTime		3FH	15H	VV*128+WW = [0, 127]
	StMode		3FH	48H	VV*128+WW = [0,2]
	Polyphny		3FH	13H	VV*128+WW = [0,1] means OFF / ON
	PitchBnd		3FH	41H	VV*128+WW = [0,24]
	Vib Rate(BPM Sync off)		3FH	42H	VV*128+WW = [0,127]
	Vib Rate(BPM Sync on)		3FH	3FH	[Rhythm List (Vibrato)]
	RdmPhase		3FH	1EH	VV*128+WW = [0,1] means OFF / ON
	WarmMode		3FH	4FH	VV*128+WW = [0,1] means OFF / ON
Vib BPM		3FH	49H	VV*128+WW = [0,1] means OFF / ON	
Global	All notes off		3FH	4EH	VV*128+WW = [0,16383]

	All notes off and effect silence		3FH	57H	VV*128+WW = [0,16383]
	Bank select MSB	00H			VV = [0,127]
	Modulation wheel.	01H			VV = [0,127]
	Expression pedal	0BH			VV = [0,127]
	Bank select LSB	20H			VV = [0,127]
	Sustain pedal	40H			VV = [0,127]
	All notes off	7BH			VV = [0,127]
System	CVSource		3FH	4CH	VV*128+WW = [0,1]
	Fade in for aftertouch		3FH	3EH	VV*128+WW = [0,400]
	Delay for aftertouch		3FH	3DH	VV*128+WW = [0,400]
	OverFlow		3FH	4BH	VV*128+WW = [0,1]
	release for aftertouch		3FH	4DH	VV*128+WW = [0,400]

### RHYTHM LISTS

ARP	1/1 1/2 1/4 1/8 1/16 1/32 1/1T 1/2T 1/4T 1/8T 1/16T 1/32T
Vibrato	1/4 1/8 1/16 1/32 1/1T 1/2T 1/4T 1/8T 1/16T 1/32T 1/1Dot 1/2Dot 1/4Dot 1/8Dot 1/16Dot 1/32Dot
ENV LFO	0 1/64T 1/64 1/32T 1/64Dot 1/32 1/16T 1/32Dot 1/16 1/8T 1/16Dot 1/8 1/4T 1/8Dot 1/4 1/2T 1/4Dot 1/2 1/1T 1/2Dot 1/1 1/1Dot 8' 12' 16' 24' 32' 64'
LFO Rate	64' 32' 24' 16' 12' 8' 1/1Dot 1/1 1/2Dot 1/1T 1/2 1/4Dot 1/2T 1/4 1/8Dot 1/4T 1/8 1/16Dot 1/8T 1/16 1/32Dot 1/16T 1/32 1/64Dot 1/32T 1/64 1/64T
FX Delay	1/64T 1/64 1/32T 1/64Dot 1/32 1/16T 1/32Dot 1/16 1/8T 1/16Dot 1/8 1/4T 1/8Dot 1/4 1/2T 1/4Dot 1/2 1/1T 1/2Dot 1/1 1/1Dot