

Solaris System Exclusive

Version 1.3.0

Version

Doc version	Solaris OS version	Changes
1.0.0	1.4.0	Initial version.
1.0.1	1.4.1	Transpose parameter moved from Common to System. Per-preset velocity and aftertouch parameters added to the Common block. Changed the description of preset name behavior. Added polychain description.
1.1.0	1.4.3	Added sample pool and patch chain parameters to the Common block.
1.1.1	1.4.4	Added additional category choices.
1.2.0	2.0.1	Added phase mod oscillator and multitimbral capability.
1.2.1	2.0.1	Fixed missing page for Multi Part.
1.2.2	2.0.1	Fixed errors in Oscillator block.
1.2.3	2.0.4	Added Omni parameter. Fixed typos in Identity block and Multi Part block.
1.3.0	2.1.0	Added parameter blocks for updated sequencer and arpeggiator.

Overview

Device ID

The Solaris system exclusive makes use of the device ID as described in the MIDI specification (rather than MIDI channel as some instruments do). Thus in order for the Solaris to accept an incoming system exclusive message, the device ID in the message must match the device ID set in the Solaris. If the Solaris is set to “All” then it will accept any device ID. The device ID in messages transmitted by the Solaris will be that set in the MIDI parameters. If the device ID is set to “All” then the transmitted ID will be zero.

The Solaris will also always respond to the device ID 0x7F which is sometimes referred to as the ‘all call’ device ID. If you need to remotely discover the device ID of the Solaris, one way is to use the ID 0x7F in a Universal Identity Request. The ID in the reply message will be the ID the Solaris is currently set to.

Universal Identity Request

Solaris supports the Universal Identity Request as defined in the MIDI specification. This reports the version number of the Solaris operating system which matches the version displayed on the front panel. Since the Solaris is a system that may change over time, software programs should query the version number to confirm the current system exclusive implementation.

Addresses and Values

All parameters can be accessed individually by their three-byte address. All values are *signed* integer values. This means that many values require more space than they otherwise would if some were signed and some unsigned. But it’s more consistent to have all values interpreted the same way and it makes development easier.

Preset Blocks

The Solaris preset data is not transferred as a whole but is divided into several blocks. To request a block you send a request with the base address of the block. The base addresses are listed below. The base address always has the low part of the address as zero. When requesting individual blocks the data returned comes from the edit buffer.

Parameters within a preset block may be one, two or three bytes in size. The following is a C/C++ code example of how you might extract a value that is three bytes in size:

```
int value; // assumed that int is 4 bytes
value = (Data[index++] & 0x7F) << 25;
value |= (Data[index++] & 0x7F) << 18;
value |= (Data[index++] & 0x7F) << 11;
value >>= 11;
```

To request an entire preset, you do not need to request each block individually. You can just request a frame Start base address. See the section below on Frame Base Address.

Checksum

There are two system exclusive messages that include a checksum. These are the bulk dump and the preset name list. In the bulk dump, the checksum is that number which when added to the sum of the three-byte address and the data produces zero in the lowest 7 bits. In the preset name list, the checksum is that number which when

added to the bank number, the starting preset number and the 8 presets names produces zero in the lowest 7 bits. In either case, if the checksum is incorrect the message is invalid.

Single Parameters

Individual parameters are sent out over MIDI when they are changed by the front panel controls. These values are always represented as three-byte signed values regardless of their size as defined in a preset block. So the Single parameter SysEx message is always the same length.

For single parameters to be sent out, both the MIDI parameters TxSysEx and MidiCtrl parameters must be set to "On". Note that parameters RxSysEx and MidiCtrl are intentionally not included in the list of parameters controllable by system exclusive. If you could disable these parameters by MIDI there would be no way to re-enable them by MIDI.

Frame Base Address

In the list of base address you will see Frame Start and Frame End. The purpose of Frame Start and Frame End is to surround a set of Preset Blocks to indicate which preset bank and number the blocks refer to. These are primarily included for future use if all presets on the CF card can be requested. Currently you can only request the data from the edit buffer. To request all blocks in the current preset (edit buffer), send a bulk dump request with base address of Frame Start (high byte 7E) and bank# = 7F and preset# = 7F. The data returned will begin with a Frame Start block followed by all preset blocks and ending with a Frame End block. In the future other banks and presets may be supported.

Preset Names and Preset Name List

You can set the preset name and categories of the current preset by sending either the Preset Name block or by sending the individual parameters. This will set the preset name and categories in the current edit buffer only. It does not save the name to the preset on the CF-card because there is no system exclusive command for saving. The modified name and categories are only displayed on the front panel. To save a preset with the new name and categories you must manually save the preset immediately after changing it. The name will get reset to the original name if you reload the preset or if you navigate to a different bank.

You can retrieve the name and categories of any preset on the CF-card. The Preset Name List Request message lets you request eight names at a time from any bank. By requesting only eight names at a time the response time is kept short. So you'll need to send up to 16 requests to get the names and categories for an entire bank. The Preset Name List is transmit only. It is not a recognized received message. Note that the names returned are those as stored on the CF card and not the edit buffer. If you have changed the name in the edit buffer by system exclusive message, that new name is not returned here. To get the preset name in the edit buffer use the bulk dump request or parameter request messages.

Key Tables

The key table values are different than other parameter values. A key table value is either *fixed* or *interpolated*. Whether it is fixed or interpolated is determined by bit 13 of the value. The actual level is a signed value that occupies bits 0 to 9.

When a fixed key table entry on the Solaris is changed by editing on the front panel that value is sent out over MIDI as a system exclusive single parameter. Although that may result in the level of one or more interpolated key table entries to change, the interpolated changes are not sent out. Only changes in fixed values are sent.

If you want to set a key table entry to be fixed or want to modify a fixed entry via SysEx, you must set bit 13 to 0. If you want to change a key table entry from fixed to interpolated, you must set bit 13 to 1. In this case the level value is ignored because you cannot set the interpolated value. This value is calculated by the Solaris and is a straight line interpolation between two fixed values. To discover the actual interpolated value, you can request either single parameters or the entire block. Or, a software editor may choose to estimate the interpolated values itself though there may be slight differences due to round off error.

Polychain

When Polychain is enabled from the front panel, a Polychain parameter change message is not sent over 5-pin MIDI (but is still sent over USB MIDI). This is because the slaved Solaris should not be put in polychain mode. Furthermore, messages for several other parameters are sent only over 5-pin MIDI so that the slaved Solaris behaves appropriately as a source of extra voices. These are:

- The arpeggiators are turned off on the slave. Turning an arpeggiator on or off on the master will not send a message.
- The sequencers are turned off on the slave.
- The clock source is set to Auto so that MIDI clocks are received.
- The MIDI volume switch is turned on.
- The Omni parameter is turned off for all parts since polychain depends on distinct midi channels for multiple parts.

These are sent only over 5-pin MIDI and not USB.

Summary

Function (Hex)	SysEx Message	Description
	Identity Request	Universal request for device identity.
	Identity Response	Response to Identity Request.
10	Bulk Dump Request	Request for current Preset data. Specify using Base Address.
11	Bulk Dump	Current Preset data.
12	Parameter Request	Request a single parameter from the edit buffer.
13	Parameter Change	A single parameter value sent as a result of a Parameter Request or received by the Solaris without a request.
22	Load Sample Pool	A request to load a sample pool file from the CF card.
30	Preset State Request	Requests the current state of Compare or FxBypass
31	Preset State Change	A message sent as a result of RequestPresetState or as a result of Compare or FxBypass state changing.
32	Preset Name List Request	Requests the names and categories of 8 presets in a given bank.
33	Preset Name List	A list of the names and categories of 8 presets in a given bank.

Detail

Identity Request (Universal SysEx)	
F0	Start of SysEx (SOX)
7E	Non real time
0n	Device ID (n = 0x00 – 0x0F or 0x7F)
06	General Information
01	Identity Request
F7	End of SysEx (EOX)

Identity Request Response	
F0	SOX
7E	Non real time
0n	Device ID (n = 0x00 – 0x0F or 0x7F)
06	General Information
02	Identity Reply
00 12 34	Manufacturer ID
10 00	Device family code (10 = Solaris)
01 00	Device family member code (1 = Keyboard)
xx xx xx xx	Software revision level
F7	EOX

Bulk Dump Request	
F0	SOX
00 12 34	Manufacturer ID
0n	Device ID
10	Solaris ID
10	Function: Bulk Dump Request
aa	Base Address High
bb	Base Address Mid
cc	Base Address Low
F7	EOX

Bulk Dump	
F0	SOX
00 12 34	Manufacturer ID
0n	Device ID
10	Solaris ID
11	Function: Bulk Dump
aa	Base Address High
bb	Base Address Mid
cc	Base Address Low
dd	data
:	:
ee	checksum
F7	EOX

Parameter Request	
F0	SOX
00 12 34	Manufacturer ID
0n	Device ID
10	Solaris ID
12	Function: Parameter Request
aa	Address High
bb	Address Mid
cc	Address Low
F7	EOX

Parameter Changed	
F0	SOX
00 12 34	Manufacturer ID
0n	Device ID
10	Solaris ID
13	Function: Parameter Changed
aa	Address High
bb	Address Mid
cc	Address Low
dd	Parameter value bits 14 - 20
ee	Parameter value bits 7 - 13
ff	Parameter value bits 0 - 6
F7	EOX

Preset State Request	
F0	SOX
00 12 34	Manufacturer ID
0n	Device ID
10	Solaris ID
30	request preset state
ss	state to get (1 = Compare, 2 = FX Bypass, 3 = Solo)
F7	EOX

Preset State Change	
F0	SOX
00 12 34	Manufacturer ID
0n	Device ID
10	Solaris ID
31	preset state change
ss	state (1 = Compare, 2 = FX Bypass, 3 = Solo)
vv	value (0 = disabled, 1 = enabled) If the state is Solo (3), the value is a set of bit flags where bit 0 is the solo state of part 1, bit 1 is the solo state of part 2 and so on.
F7	EOX

Preset Name List Request	
F0	SOX
00 12 34	Manufacturer ID
0n	Device ID
10	Solaris ID
32	request preset name list
bb	bank number
pp	starting preset number
F7	EOX

bb = 0 to 7F (hex)
must be a multiple of 8 between 0 and 120. (i.e. 0, 8, 16, 24, etc.)

Preset Name List (transmit only)	
F0	SOX
00 12 34	Manufacturer ID
0n	Device ID
10	Solaris ID
33	function: preset name list
bb	bank number
pp	starting preset number
aa (x 40)	Preset Name (pp + 0)
cc	Category 1 for preset (pp + 0)
dd	Category 2 for preset (pp + 0)
:	:
aa (x 40)	Preset Name (pp + 7)
cc	Category 1 for preset (pp + 7)
dd	Category 2 for preset (pp + 7)
ee	checksum
F7	EOX

will be a multiple of 8 between 0 and 120. (i.e. 0, 8, 16, 24, etc.)

includes bank number, starting preset number, and 8 names and categories.

Load Sample Pool	
F0	SOX
00 12 34	Manufacturer ID
0n	Device ID
10	Solaris ID
22	Load sample pool
rr	reserved
pp	Pool number bits 7 - 13
pp	Pool number bits 0 - 6
F7	EOX

p = part (0 – 3)

Base Addresses			
	Address High	Address Mid	Address Low
System	01	00	00
Osc	10	np	00
Rot	10	np	00
VecAM	10	6p	00
VCA	10	7p	00
Filter	11	np	00
Mix	11	4p	00
Ins	11	5p	00
LFO	12	np	00
Env	13	np	00
Looping EG	13	7p	00
Seq Params	14	2p	00
Seq Step Type	14	3p	00
Seq Note	14	4p	00
Seq Gate Length	14	4p	00
Seq Velocity	14	4p	00
Effects Routing	15	00	00
Effects	15	10	00
Keytable 1A	16	0p	00
Keytable 1B	16	1p	00
Keytable 2A	16	2p	00
Keytable 2B	16	3p	00
Keytable 3A	16	4p	00
Keytable 3B	16	5p	00
Keytable 4A	16	6p	00
Keytable 4B	16	7p	00
Part Name	17	0p	00
Part Common	17	1p	00
Arp Params	18	2p	00
Arp Step Type	18	3p	00
Arp Gate Length	18	4p	00
Arp Velocity	18	5p	00
Seq Mod A Steps	19	0p	00
Seq Mod B Steps	19	1p	00

n = osc index

n = rot index + 4

n = filter index

n = LFO index

n = Env index

Seq Mod C Steps	19	2p	00
Seq Mod D Steps	19	3p	00
Preset Name	20	00	00
Preset Common	20	10	00
Multi Part	20	2p	00
Frame Start	7E	bb	pp
Frame End	7F	bb	pp

bb = bank, pp =
program
bb = bank, pp =
program

if bb = 7F and pp = 7F, then edit buffer
if bb = 7F and pp = 7F, then edit buffer

System / MIDI

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit	Notes
01	00	00	1	Transpose	-63 to 63	half step	
		01	2	Tune	-100 to 100	1 cent	
		03	1	Load BPM	0 to 1		
		04	1	Load Outputs	0 to 1		
		05	1	Expression Pedal Polarity	Polarity		
		06	1	Switch Pedal 1 Polarity	Polarity		
		07	1	Switch Pedal 2 Polarity	Polarity		
		08	1	Expression Pedal Target Override	ExpPedOvr		
		09	1	Switch Pedal Target Override	SwPedOvr		
		0A	2	Global RndTune	0 to 100	1 cent	
		0C	2	Global Velocity Curve	-1 to 100	1%	-1 means the Preset value is used.
		0E	2	Global Velocity Offset	-1 to 100	1%	-1 means the Preset value is used.
		10	2	Global Aftertouch Curve	-1 to 100	1%	-1 means the Preset value is used.
		12	2	Global Aftertouch Offset	-1 to 100	1%	-1 means the Preset value is used.
		13	1	Load Sample Pool	0 to 1		
		14	1	MIDI Channel	0 to 15		
		15	1	Program Change Allowed	0 to 1		
		17	1	Reserved			Was global SendArp. Now per part.
		18	1	Reserved			Was global Omni. Now per part.
		19	1	Local	0 to 1		
		1A	1	Transmit SysEx	0 to 1		
		1B	1	MIDI Clock Source	ClkSrc		
		1C	1	MIDI Volume	0 to 1		
		1D	1	MIDI RealTime	0 to 1		Enable MIDI Start and Stop messages
		1E	1	Polychain	0 to 1		
		1F	1	Device ID	0 to 16		16 = All
		20	2	CC1	0 to 127		
		22	2	CC2	0 to 127		
		24	2	CC3	0 to 127		
		26	2	CC4	0 to 127		
		28	2	CC5	0 to 127		
		2A	1	Remap AT	RemapAT		
		2B	1	Page Direction	PageDir		
		2C	1	Enable Part Function	EnblPart		
		2D	1	Midi Send Joystick	Resolution		Low(1) = 7-bit, High(2) = 10-bit
		2E	1	Midi Send Aftertouch	0 to 1		
		2F	1	Midi Send Ribbon	Resolution		Low(1) = 7-bit, High(2) = 10-bit
		30	1	Midi Send Pitch Offset	0 to 1		
		31	1	Midi send Mod Wheel	0 to 1		
		32	1	Midi Send Switch Pedals	0 to 1		
		33	1	Midi Send Foot Controller	0 to 1		

Total
Bytes 34 52

RemapAT	
Off	0
AT->PlyAt	1
PlyAT->AT	2

Polarity	
+	0
-	1
Off	2

ExpPedOvr	
Off	0
Expr	1
Pan	2
Preset	3

SwPedOvr	
Off	0
Sostenuto	1
Sustain	2
Ribbon Hold	3
Seq On	4
Arp On	5
Arp Hold	6
Arp Transpose	7

Preset	8
--------	---

ClkSrc	
Internal	0
External	1
Send	2
Auto	3

PageDir	
Normal	0
Reverse	1

EnblPart	
Ver 1	0
Ver 2	1

Resolution	
Off	0
Low	1
High	2

Oscillator

n = oscillator index (0 – 3) p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
10	np	00	1	Osc Type	Osc Type	
		01	1	Osc MM1 Wave	MM1 Wave	
		02	1	Osc WT Wave	WT Wave	
		03	1	Osc CEM Wave	CEM Wave	
		04	2	Osc WAV Wave	0 to #waves-1	
		06	2	Osc VS Wave	VS Wave	
		08	1	Osc Mini Wave	Mini Wave	
		09	1	Osc PhaseMod Wave	PhsMod Wave	
		0A	1	Osc Coarse tune	-60 to +60	
		0B	2	Osc Fine tune	-100 to +100	1 cent
		0D	1	Osc Coarse (Clock sync)	ClkDiv	
		0E	3	Osc Coarse tune (No Track)	0 to 200000	0.1 Hz
		11	2	Osc Shape	0 to 100	1%
		13	2	Osc Phase	-180 to +180	1 degree
		15	1	Osc Sync	Sync	
		16	1	PhaseMod Sync	Sync	
		17	1	PhaseMod Quant	0 to 31	
		18	1	Osc Glide Enable	0 to 1	
		19	3	Osc Glide Time	0 to 200000	0.1 ms
		1C	1	Osc Clock Sync	0 to 1	
		1D	1	Osc No Track	0 to 1	
		1E	1	Osc Low	0 to 1	
		1F	9	reserved		
		28	2	Osc Mod 1 Source	ModSrc	
		2A	1	Osc Mod 1 Control Source	CtrlSrc	
		2B	2	Osc Mod 1 Control Strength	-100 to 100	1%
		2D	1	Osc Mod 1 Destination	OscModDest	
		2E	2	Osc Mod 1 Amount Pitch	-1200 to 1200	
		30	2	Osc Mod 1 Amount LinFM/PMod	-1000 to 1000	0.1%
		32	2	Osc Mod 1 Amount Shape	-100 to 100	1%
		34	2	Osc Mod 2 Source	ModSrc	
		36	1	Osc Mod 2 Control Source	CtrlSrc	
		37	2	Osc Mod 2 Control Strength	-100 to 100	1%
		39	1	Osc Mod 2 Destination	OscModDest	
		3A	2	Osc Mod 2 Amount Pitch	-1200 to 1200	
		3C	2	Osc Mod 2 Amount LinFM/PMod	-1000 to 1000	0.1%
		3E	2	Osc Mod 2 Amount Shape	-100 to 100	1%
		40	2	Osc Mod 3 Source	ModSrc	
		42	1	Osc Mod 3 Control Source	CtrlSrc	
		43	2	Osc Mod 3 Control Strength	-100 to 100	1%
		45	1	Osc Mod 3 Destination	OscModDest	
		46	2	Osc Mod 3 Amount Pitch	-1200 to 1200	
		48	2	Osc Mod 3 Amount LinFM/PMod	-1000 to 1000	0.1%
		4A	2	Osc Mod 3 Amount Shape	-100 to 100	1%
		4C	2	Osc Mod 4 Source	ModSrc	
		4E	1	Osc Mod 4 Control Source	CtrlSrc	
		4F	2	Osc Mod 4 Control Strength	-100 to 100	1%
		51	1	Osc Mod 4 Destination	OscModDest	
		52	2	Osc Mod 4 Amount Pitch	-1200 to 1200	
		54	2	Osc Mod 4 Amount LinFM/PMod	-1000 to 1000	0.1%
		56	2	Osc Mod 4 Amount Shape	-100 to 100	1%

Total
Bytes 58 88

PhsMod Wave	
Sine	0
Morph1	1
Morph2	2
CZSaw	3
CZSquare	4
CZPulse	5
CZSawPls	6
CZReso1	7
CZReso2	8
CZReso3	9

OscModDest	
None	0
Pitch	1
LinFM	2
Shape	3

ClkDiv	
1/128	0
1/64T	1
1/64	2
1/32T	3
1/32	4
1/32D	5
1/16T	6
1/16	7
1/16D	8
1/8T	9
1/8	10
1/8D	11
1/4T	12
1/4	13
1/4D	14
1/2T	15
1/2	16
1/2D	17
1/1	18
2/1	19
3/1	20
4/1	21
5/1	22
6/1	23
7/1	24
8/1	25

Mini Wave	
Tri	0
Saw+Tri	1
Saw	2
Pulse1	3
Pulse2	4
Pulse3	5

CEM Wave	
Off	0
Saw	1
Tri	2
Pulse	3
Saw+Tri	4
Saw+Pls	5
Tri+Pls	6
S+T+P	7

Osc Type	
Off	0
MM1	1
WT	2
CEM	3
WAV	4
VS	5
Mini	6
PhsMod	7

MM1 Wave	
Sine	0
Tri	1
Ramp	2
Saw	3
Pulse	4
Noise	5
S/H	6
MorphSw	7
MorphSq	8
Jaws	9

Sync	
Off	0
Gate	1

Rotor

n = 4 : Rotor 1 n = 5 : Rotor 2 p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
10	np	00	2	Rot Input 1 Source	AudioSrc	
		02	1	Rot Input 1 Level	-63 to 63	
		03	2	Rot Input 2 Source	AudioSrc	
		05	1	Rot Input 2 Level	-63 to 63	
		06	2	Rot Input 3 Source	AudioSrc	
		08	1	Rot Input 3 Level	-63 to 63	
		09	2	Rot Input 4 Source	AudioSrc	
		0B	1	Rot Input 4 Level	-63 to 63	
		0C	1	Rot Coarse tune	-60 to +60	
		0D	2	Rot Fine tune	-100 to +100	1 cent
		0F	1	Rot Coarse (Clock sync)	ClkDiv	
		10	3	Rot Coarse tune (No Track)	0 to 200000	0.1 Hz
		13	2	Rot XFade	0 to 127	
		15	1	Rot Sync	RotSync	
		16	2	Rot Phase	-180 to +180	1 degree
		18	1	Rot Clock Sync	0 to 1	
		19	1	Rot No Track	0 to 1	
		1A	1	Rot Low	0 to 1	
		1B	2	Rot Mod 1 Source	ModSrc	
		1D	1	Rot Mod 1 Control Source	CtrlSrc	
		1E	2	Rot Mod 1 Control Strength	-100 to 100	1%
		20	1	Rot Mod 1 Destination	RotModDest	
		21	2	Rot Mod 1 Amount Pitch	-1200 to 1200	
		23	2	Rot Mod 1 Amount XFade	-100 to 100	1%
		25	2	Rot Mod 2 Source	ModSrc	
		27	1	Rot Mod 2 Control Source	CtrlSrc	
		28	2	Rot Mod 2 Control Strength	-100 to 100	1%
		2A	1	Rot Mod 2 Destination	RotModDest	
		2B	2	Rot Mod 2 Amount Pitch	-1200 to 1200	
		2D	2	Rot Mod 2 Amount XFade	-100 to 100	1%
		2F	2	Rot Mod 3 Source	ModSrc	
		31	1	Rot Mod 3 Control Source	CtrlSrc	
		32	2	Rot Mod 3 Control Strength	-100 to 100	1%
		34	1	Rot Mod 3 Destination	RotModDest	
		35	2	Rot Mod 3 Amount Pitch	-1200 to 1200	
		37	2	Rot Mod 3 Amount XFade	-100 to 100	1%
		39	2	Rot Mod 4 Source	ModSrc	
		3B	1	Rot Mod 4 Control Source	CtrlSrc	
		3C	2	Rot Mod 4 Control Strength	-100 to 100	1%
		3E	1	Rot Mod 4 Destination	RotModDest	
		3F	2	Rot Mod 4 Amount Pitch	-1200 to 1200	
		41	2	Rot Mod 4 Amount XFade	-100 to 100	1%

Total
Bytes 43 67

RotSync	
Off	0
Gate	1

RotModDest	
None	0
Pitch	1
XFade	2

Vector/AM

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Address (Hex)
10	6p	00	2	Vector 1 Input 1	AudioSrc	
		02	2	Vector 1 Level 1	-100 to 100	1%
		04	2	Vector 1 Input 2	AudioSrc	
		06	2	Vector 1 Level 2	-100 to 100	1%
		08	2	Vector 1 Input 3	AudioSrc	
		0A	2	Vector 1 Level 3	-100 to 100	1%
		0C	2	Vector 1 Input 4	AudioSrc	
		0E	2	Vector 1 Level 4	-100 to 100	1%
		10	2	Vector 1 Mod Source X	ModSrc	
		12	2	Vector 1 Mod Amount X	-100 to 100	1%
		14	1	Vector 1 Offset X	-63 to 63	
		15	2	Vector 1 Mod Source Y	ModSrc	
		17	2	Vector 1 Mod Amount Y	-100 to 100	1%
		19	1	Vector 1 Offset Y	-63 to 63	
		1A	2	Vector 2 Input 1	AudioSrc	
		1C	2	Vector 2 Level 1	-100 to 100	1%
		1E	2	Vector 2 Input 2	AudioSrc	
		20	2	Vector 2 Level 2	-100 to 100	1%
		22	2	Vector 2 Input 3	AudioSrc	
		24	2	Vector 2 Level 3	-100 to 100	1%
		26	2	Vector 2 Input 4	AudioSrc	
		28	2	Vector 2 Level 4	-100 to 100	1%
		2A	2	Vector 2 Mod Source X	ModSrc	
		2C	2	Vector 2 Mod Amount X	-100 to 100	1%
		2E	1	Vector 2 Offset X	-63 to 63	
		2F	2	Vector 2 Mod Source Y	ModSrc	
		31	2	Vector 2 Mod Amount Y	-100 to 100	1%
		33	1	Vector 2 Offset Y	-63 to 63	
		34	1	AM 1 Algorithm	AMAlg	
		35	2	AM 1 Carrier	AudioSrc	
		37	2	AM 1 Mod	ModSrc	
		39	2	AM 1 Mod Amount	-100 to 100	1%
		3B	1	AM 1 Offset	-63 to 63	
		3C	1	AM 1 Mod Control Source	CtrlSrc	
		3D	2	AM 1 Mod Control Strength	-100 to 100	1%
		3F	1	AM 2 Algorithm	AMAlg	
		40	2	AM 2 Carrier	AudioSrc	
		42	2	AM 2 Mod	ModSrc	
		44	2	AM 2 Mod Amount	-100 to 100	1%
		46	1	AM 2 Offset	-63 to 63	
		47	1	AM 2 Mod Control Source	CtrlSrc	
		48	2	AM 2 Mod Control Strength	-100 to 100	1%

Total
Bytes 4A 74

AMAlg	
Shift	0
Clip	1
Abs	2
Ring	3

VCA/Lag/Envelope Follower

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
10	7p	00	2	VCA 1 Input	VCASrc	
		02	1	VCA 1 Type	VCAType	
		03	2	VCA 1 Boost	0 to 127	
		05	2	VCA 1 Level	0 to 100	1%
		07	1	VCA 1 InitPan	-63 to 63	
		08	2	VCA 1 Mod 1 Source	ModSrc	
		0A	2	VCA 1 Mod 1 Amount	-100 to 100	1%
		0C	2	VCA 1 Mod 2 Source	ModSrc	
		0E	2	VCA 1 Mod 2 Amount	-100 to 100	1%
		10	2	VCA 2 Input	VCASrc	
		12	1	VCA 2 Type	VCAType	
		13	2	VCA 2 Boost	0 to 127	
		15	2	VCA 2 Level	0 to 100	1%
		17	1	VCA 2 InitPan	-63 to 63	
		18	2	VCA 2 Mod 1 Source	ModSrc	
		1A	2	VCA 2 Mod 1 Amount	-100 to 100	1%
		1C	2	VCA 2 Mod 2 Source	ModSrc	
		1E	2	VCA 2 Mod 2 Amount	-100 to 100	1%
		20	2	VCA 3 Input	VCASrc	
		22	1	VCA 3 Type	VCAType	
		23	2	VCA 3 Boost	0 to 127	
		25	2	VCA 3 Level	0 to 100	1%
		27	1	VCA 3 InitPan	-63 to 63	
		28	2	VCA 3 Mod 1 Source	ModSrc	
		2A	2	VCA 3 Mod 1 Amount	-100 to 100	1%
		2C	2	VCA 3 Mod 2 Source	ModSrc	
		2E	2	VCA 3 Mod 2 Amount	-100 to 100	1%
		30	2	VCA 4 Input	VCASrc	
		32	1	VCA 4 Type	VCAType	
		33	2	VCA 4 Boost	0 to 127	
		35	2	VCA 4 Level	0 to 100	1%
		37	1	VCA 4 InitPan	-63 to 63	
		38	2	VCA 4 Mod 1 Source	ModSrc	
		3A	2	VCA 4 Mod 1 Amount	-100 to 100	1%
		3C	2	VCA 4 Mod 2 Source	ModSrc	
		3E	2	VCA 4 Mod 2 Amount	-100 to 100	1%
		40	1	Enable Part 1	0 to 1	
		41	1	Enable Part 2	0 to 1	
		42	1	Enable Part 3	0 to 1	
		43	1	Enable Part 4	0 to 1	
		44	2	Lag 1 Input	ModSrc	
		46	3	Lag 1 Time	0 to 100000	0.1 ms
		49	2	Lag 2 Input	ModSrc	
		4B	3	Lag 2 Time	0 to 100000	0.1 ms
		4E	2	Lag 3 Input	ModSrc	
		50	3	Lag 3 Time	0 to 100000	0.1 ms
		53	2	Lag 4 Input	ModSrc	
		55	3	Lag 4 Time	0 to 100000	0.1 ms
		58	2	EnvFol Input	AudioSrc	
		5A	2	EnvFol Input Level	0 to 100	1%
		5C	2	EnvFol Output Level	0 to 100	1%
		5E	3	EnvFol Attack	0 to 200000	0.1 ms
		61	3	EnvFol Release	0 to 200000	0.1 ms

Total
Bytes 64 100

VCASrc	
Filter	0
InsFx	1

VCAType	
Linear	0
Log	1
Sigma	2

Filter

n = filter index (0 - 3) p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
11	np	00	1	Filter Type	FilterType	
		01	1	Filter MM1 Mode	MM1Mode	
		02	1	Filter Obie Mode	ObieMode	
		03	1	Filter Comb Mode	CombMode	
		04	1	Filter Vowel1	Vowel	
		05	1	Filter Vowel2	Vowel	
		06	1	Filter Vowel3	Vowel	
		07	1	Filter Vowel4	Vowel	
		08	1	Filter Vowel5	Vowel	
		09	2	Filter Cutoff	-630 to 630	0.1
		0B	2	Filter Resonance	0 to 100	1%
		0D	2	Filter Damping	0 to 100	1%
		0F	2	Filter XFade	0 to 100	1%
		11	2	Filter Input	AudioSrc	
		13	2	Filter Key Tracking	-200 to 200	1%
		15	1	Filter Key Center	-63 to 63	
		16	2	Filter Mod 1 Source	ModSrc	
		18	1	Filter Mod 1 Control Source	CtrlSrc	
		19	2	Filter Mod 1 Control Strength	-100 to 100	1%
		1B	1	Filter Mod 1 Dest	FltModDest	
		1C	2	Filter Mod 1 Amount Pitch	-1200 to 1200	
		1E	2	Filter Mod 1 Amount	-100 to 100	1%
		20	2	Filter Mod 2 Source	ModSrc	
		22	1	Filter Mod 2 Control Source	CtrlSrc	
		23	2	Filter Mod 2 Control Strength	-100 to 100	1%
		25	1	Filter Mod 2 Dest	FltModDest	
		26	2	Filter Mod 2 Amount Pitch	-1200 to 1200	
		28	2	Filter Mod 2 Amount	-100 to 100	1%
		2A	2	Filter Mod 3 Source	ModSrc	
		2C	1	Filter Mod 3 Control Source	CtrlSrc	
		2D	2	Filter Mod 3 Control Strength	-100 to 100	1%
		2F	1	Filter Mod 3 Dest	FltModDest	
		30	2	Filter Mod 3 Amount Pitch	-1200 to 1200	
		32	2	Filter Mod 3 Amount	-100 to 100	1%
		34	2	Filter Mod 4 Source	ModSrc	
		36	1	Filter Mod 4 Control Source	CtrlSrc	
		37	2	Filter Mod 4 Control Strength	-100 to 100	1%
		39	1	Filter Mod 4 Dest	FltModDest	
		3A	2	Filter Mod 4 Amount Pitch	-1200 to 1200	
		3C	2	Filter Mod 4 Amount	-100 to 100	1%

Total
Bytes 3E 62

FilterType	
BYPASS	0
MM1	1
SSM	2
Mini	3
Obie	4
Comb	5
Vocal	6

ObieMode	
LP	0
HP	1
BP	2
BR	3

CombMode	
Tube	0
Comb	1

Vowel	
A	0
E	1
I	2
O	3
U	4
Y	5
AA	6
AE	7
OE	8
UE	9

FltModDest	
None	0
Cutoff	1
Resonance	2
Damping/XFade*	3

* Existence of Damping or XFade depends on filter type.

MM1Mode	
LP4	0
LP3	1
LP2	2
LP1	3
HP4	4
HP3	5
HP2	6
HP1	7
BP4	8
BP2	9
BP2+LP1	10
BP2+LP2	11
BP2+HP1	12
BP2+HP2	13
BR4	14
BR2	15
BR2+LP1	16
BR2+LP2	17
BR2+HP1	18
BR2+BP2	19
AP3	20
AP3+LP1	21
AP3+HP1	22

Mixers

p = part (0 - 3)

Address (Hex)		Size (Dec)	Parameter Name	Range (Dec)
11	4p	00	2 Mixer 1 Input 1 Source	AudioSrc
		02	1 Mixer 1 Input 1 Level	-63 to 63
		03	2 Mixer 1 Input 1 Mod Source	ModSrc
		05	1 Mixer 1 Input 1 Mod Amount	-63 to 63
		06	2 Mixer 1 Input 2 Source	AudioSrc
		08	1 Mixer 1 Input 2 Level	-63 to 63
		09	2 Mixer 1 Input 2 Mod Source	ModSrc
		0B	1 Mixer 1 Input 2 Mod Amount	-63 to 63
		0C	2 Mixer 1 Input 3 Source	AudioSrc
		0E	1 Mixer 1 Input 3 Level	-63 to 63
		0F	2 Mixer 1 Input 3 Mod Source	ModSrc
		11	1 Mixer 1 Input 3 Mod Amount	-63 to 63
		12	2 Mixer 1 Input 4 Source	AudioSrc
		14	1 Mixer 1 Input 4 Level	-63 to 63
		15	2 Mixer 1 Input 4 Mod Source	ModSrc
		17	1 Mixer 1 Input 4 Mod Amount	-63 to 63
		18	2 Mixer 1 Output Amount	0 to 127
		1A	2 Mixer 1 Output Mod Source	ModSrc
		1C	1 Mixer 1 Output Mod Amount	-63 to 63
		1D	2 Mixer 2 Input 1 Source	AudioSrc
		1F	1 Mixer 2 Input 1 Level	-63 to 63
		20	2 Mixer 2 Input 1 Mod Source	ModSrc
		22	1 Mixer 2 Input 1 Mod Amount	-63 to 63
		23	2 Mixer 2 Input 2 Source	AudioSrc
		25	1 Mixer 2 Input 2 Level	-63 to 63
		26	2 Mixer 2 Input 2 Mod Source	ModSrc
		28	1 Mixer 2 Input 2 Mod Amount	-63 to 63
		29	2 Mixer 2 Input 3 Source	AudioSrc
		2B	1 Mixer 2 Input 3 Level	-63 to 63
		2C	2 Mixer 2 Input 3 Mod Source	ModSrc
		2E	1 Mixer 2 Input 3 Mod Amount	-63 to 63
		2F	2 Mixer 2 Input 4 Source	AudioSrc
		31	1 Mixer 2 Input 4 Level	-63 to 63
		32	2 Mixer 2 Input 4 Mod Source	ModSrc
		34	1 Mixer 2 Input 4 Mod Amount	-63 to 63
		35	2 Mixer 2 Output Amount	0 to 127
		37	2 Mixer 2 Output Mod Source	ModSrc
		39	1 Mixer 2 Output Mod Amount	-63 to 63
		3A	2 Mixer 3 Input 1 Source	AudioSrc
		3C	1 Mixer 3 Input 1 Level	-63 to 63
		3D	2 Mixer 3 Input 1 Mod Source	ModSrc
		3F	1 Mixer 3 Input 1 Mod Amount	-63 to 63
		40	2 Mixer 3 Input 2 Source	AudioSrc
		42	1 Mixer 3 Input 2 Level	-63 to 63

		43	2	Mixer 3 Input 2 Mod Source	ModSrc
11	4p	45	1	Mixer 3 Input 2 Mod Amount	-63 to 63
		46	2	Mixer 3 Input 3 Source	AudioSrc
		48	1	Mixer 3 Input 3 Level	-63 to 63
		49	2	Mixer 3 Input 3 Mod Source	ModSrc
		4B	1	Mixer 3 Input 3 Mod Amount	-63 to 63
		4C	2	Mixer 3 Input 4 Source	AudioSrc
		4E	1	Mixer 3 Input 4 Level	-63 to 63
		4F	2	Mixer 3 Input 4 Mod Source	ModSrc
		51	1	Mixer 3 Input 4 Mod Amount	-63 to 63
		52	2	Mixer 3 Output Amount	0 to 127
		54	2	Mixer 3 Output Mod Source	ModSrc
		56	1	Mixer 3 Output Mod Amount	-63 to 63
		57	2	Mixer 4 Input 1 Source	AudioSrc
		59	1	Mixer 4 Input 1 Level	-63 to 63
		5A	2	Mixer 4 Input 1 Mod Source	ModSrc
		5C	1	Mixer 4 Input 1 Mod Amount	-63 to 63
		5D	2	Mixer 4 Input 2 Source	AudioSrc
		5F	1	Mixer 4 Input 2 Level	-63 to 63
		60	2	Mixer 4 Input 2 Mod Source	ModSrc
		62	1	Mixer 4 Input 2 Mod Amount	-63 to 63
		63	2	Mixer 4 Input 3 Source	AudioSrc
		65	1	Mixer 4 Input 3 Level	-63 to 63
		66	2	Mixer 4 Input 3 Mod Source	ModSrc
		68	1	Mixer 4 Input 3 Mod Amount	-63 to 63
		69	2	Mixer 4 Input 4 Source	AudioSrc
		6B	1	Mixer 4 Input 4 Level	-63 to 63
		6C	2	Mixer 4 Input 4 Mod Source	ModSrc
		6E	1	Mixer 4 Input 4 Mod Amount	-63 to 63
		6F	2	Mixer 4 Output Amount	0 to 127
		71	2	Mixer 4 Output Mod Source	ModSrc
		73	1	Mixer 4 Output Mod Amount	-63 to 63
Total Bytes		74	116		

Insert FX

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
11	5p	00	1	InsFx 1 Mode	InsFxMode	
		01	2	InsFx 1 Input	InsFxSrc	
		03	1	InsFx 1 Value	-63 to 63	
		04	2	InsFx 1 Mod Source	ModSrc	
		06	2	InsFx 1 Mod Amount	-100 to 100	
		08	1	InsFx 1 Control Source	CtrlSrc	
		09	2	InsFx 1 Control Strength	-100 to 100	
		0B	1	InsFx 2 Mode	InsFxMode	
		0C	2	InsFx 2 Input	InsFxSrc	
		0E	1	InsFx 2 Value	-63 to 63	
		0F	2	InsFx 2 Mod Source	ModSrc	
		11	2	InsFx 2 Mod Amount	-100 to 100	
		13	1	InsFx 2 Control Source	CtrlSrc	
		14	2	InsFx 2 Control Strength	-100 to 100	
		16	1	InsFx 3 Mode	InsFxMode	
		17	2	InsFx 3 Input	InsFxSrc	
		19	1	InsFx 3 Value	-63 to 63	
		1A	2	InsFx 3 Mod Source	ModSrc	
		1C	2	InsFx 3 Mod Amount	-100 to 100	
		1E	1	InsFx 3 Control Source	CtrlSrc	
		1F	2	InsFx 3 Control Strength	-100 to 100	
		21	1	InsFx 4 Mode	InsFxMode	
		22	2	InsFx 4 Input	InsFxSrc	
		24	1	InsFx 4 Value	-63 to 63	
		25	2	InsFx 4 Mod Source	ModSrc	
		27	2	InsFx 4 Mod Amount	-100 to 100	
		29	1	InsFx 4 Control Source	CtrlSrc	
		2A	2	InsFx 4 Control Strength	-100 to 100	

Total
Bytes 2CH 44

InsFxMode	
Off	0
Decimate	1
Bit Chop	2
Distortion	3

InsFxSrc	
Mixer	0
Filter	1

LFO

n = LFO index (0 - 4) p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
12	np	00	1	LFO Shape	LFOShape	
		01	3	LFO Rate	0 to 50000	0.01 Hz
		04	1	LFO Rate Sync	ClkDiv	
		05	2	LFO Phase	-180 to +180	1 degree
		07	2	LFO Delay Start	0 to 100	0.1 seconds
		09	2	LFO Fade In	0 to 100	0.1 seconds
		0B	2	LFO Fade Out	0 to 100	0.1 seconds
		0D	2	LFO Level	0 to 100	1%
		0F	1	LFO Clock Sync	0 to 1	
		10	1	LFO Offset	0 to 1	
		11	1	LFO Retrigger	0 to 1	
		12	2	LFO Mod 1 Source	ModSrc	
		14	1	LFO Mod 1 Control Source	CtrlSrc	
		15	2	LFO Mod 1 Control Strength	-100 to 100	1%
		17	1	LFO Mod 1 Dest	LFOModDest	
		18	2	LFO Mod 1 Amount Rate	-1200 to 1200	0.1
		1A	2	LFO Mod 1 Amount	-100 to 100	1%
		1C	2	LFO Mod 2 Source	ModSrc	
		1E	1	LFO Mod 2 Control Source	CtrlSrc	
		1F	2	LFO Mod 2 Control Strength	-100 to 100	1%
		21	1	LFO Mod 2 Dest	LFOModDest	
		22	2	LFO Mod 2 Amount Rate	-1200 to 1200	0.1
		24	2	LFO Mod 2 Amount	-100 to 100	1%
		26	2	LFO Mod 3 Source	ModSrc	
		28	1	LFO Mod 3 Control Source	CtrlSrc	
		29	2	LFO Mod 3 Control Strength	-100 to 100	1%
		2B	1	LFO Mod 3 Dest	LFOModDest	
		2C	2	LFO Mod 3 Amount Rate	-1200 to 1200	0.1
		2E	2	LFO Mod 3 Amount	-100 to 100	1%

Total
Bytes 30 48

InsFxMode	
Off	0
Decimate	1
Bit Chop	2
Distortion	3

LFOModDest	
None	0
Rate	1
Level	2

ClkDiv	
1/128	0
1/64T	1
1/64	2
1/32T	3
1/32	4
1/32D	5
1/16T	6
1/16	7
1/16D	8
1/8T	9
1/8	10
1/8D	11
1/4T	12
1/4	13
1/4D	14
1/2T	15
1/2	16
1/2D	17
1/1	18
2/1	19
3/1	20
4/1	21
5/1	22
6/1	23
7/1	24
8/1	25

Envelope Generator

n = EG index (0 - 5) p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
13	np	00	3	EG Delay	0 to 200000	0.1 ms
		03	3	EG Attack	0 to 200000	0.1 ms
		06	3	EG Decay	0 to 200000	0.1 ms
		09	2	EG Sustain	0 to 127	
		0B	3	EG Release	0 to 200000	0.1 ms
		0E	2	EG Attack Slope	0 to 127	
		10	2	EG Decay Slope	0 to 127	
		12	3	EG Sustain Slope	-20000 to 20000	1 ms
		15	2	EG Release Slope	0 to 127	
		17	1	EG Attack Mod Source	EGModSrc	
		18	1	EG Decay Mod Source	EGModSrc	
		19	1	EG Sustain Mod Source	EGModSrc	
		1A	1	EG Release Mod Source	EGModSrc	
		1B	1	EG Attack Mod Amount	-63 to 63	
		1C	1	EG Decay Mod Amount	-63 to 63	
		1D	1	EG Sustain Mod Amount	-63 to 63	
		1E	1	EG Release Mod Amount	-63 to 63	
		1F	2	EG Velocity	0 to 127	

Total
Bytes 21 33

EGModSrc	
Off	0
Velocity	1
Key tracking	2
Mod Wheel	3
CC 1	4
CC 2	5
CC 3	6
CC 4	7

Looping Envelope Generator

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
13	7p	00	1	Loop EG Start	0 to 7	1 segment
		01	1	Loop EG Key Off	0 to 7	1 segment
		02	2	Loop EG Slope	0 to 127	
		04	1	Loop EG Sync	0 to 1	
		05	2	Loop EG Repeat	0 to 100	
		07	1	Loop EG Loop	0 to 1	
		08	1	Loop EG Mod Level Source	EGModSrc	
		09	2	Loop EG Mod Level Amount	-300 to 300	1%
		0B	1	Loop EG Mod Time Source	EGModSrc	
		0C	2	Loop EG Mod Time Amount	-300 to 300	1%
		0E	3	Loop EG Time 1	0 to 200000	0.1 ms
		11	1	Loop EG Time Sync 1	ClkDiv	
		12	2	Loop EG Level X 1	-127 to 127	
		14	2	Loop EG Level Y 1	-127 to 127	
		16	3	Loop EG Time 2	0 to 200000	0.1 ms
		19	1	Loop EG Time Sync 2	ClkDiv	
		1A	2	Loop EG Level X 2	-127 to 127	
		1C	2	Loop EG Level Y 2	-127 to 127	
		1E	3	Loop EG Time 3	0 to 200000	0.1 ms
		21	1	Loop EG Time Sync 3	ClkDiv	
		22	2	Loop EG Level X 3	-127 to 127	
		24	2	Loop EG Level Y 3	-127 to 127	
		26	3	Loop EG Time 4	0 to 200000	0.1 ms
		29	1	Loop EG Time Sync 4	ClkDiv	
		2A	2	Loop EG Level X 4	-127 to 127	
		2C	2	Loop EG Level Y 4	-127 to 127	
		2E	3	Loop EG Time 5	0 to 200000	0.1 ms
		31	1	Loop EG Time Sync 5	ClkDiv	
		32	2	Loop EG Level X 5	-127 to 127	
		34	2	Loop EG Level Y 5	-127 to 127	
		36	3	Loop EG Time 6	0 to 200000	0.1 ms
		39	1	Loop EG Time Sync 6	ClkDiv	
		3A	2	Loop EG Level X 6	-127 to 127	
		3C	2	Loop EG Level Y 6	-127 to 127	
		3E	3	Loop EG Time 7	0 to 200000	0.1 ms
		41	1	Loop EG Time Sync 7	ClkDiv	
		42	2	Loop EG Level X 7	-127 to 127	
		44	2	Loop EG Level Y 7	-127 to 127	
		46	3	Loop EG Time 8	0 to 200000	0.1 ms
		49	1	Loop EG Time Sync 8	ClkDiv	
		4A	2	Loop EG Level X 8	-127 to 127	
		4C	2	Loop EG Level Y 8	-127 to 127	

Total
Bytes 4E 78

EGModSrc	
Off	0
Velocity	1
Key tracking	2
Mod Wheel	3
CC 1	4
CC 2	5
CC 3	6
CC 4	7

ClkDiv	
1/128	0
1/64T	1
1/64	2
1/32T	3
1/32	4
1/32D	5
1/16T	6
1/16	7
1/16D	8
1/8T	9
1/8	10
1/8D	11
1/4T	12
1/4	13
1/4D	14
1/2T	15
1/2	16
1/2D	17
1/1	18
2/1	19
3/1	20
4/1	21
5/1	22
6/1	23
7/1	24
8/1	25

Sequencer Params

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
14	2p	00	1	Enable	0 to 1	
		01	1	Mode	Seq Mode	
		02	1	Division	Seq ClkDiv	
		03	1	Direction	Seq Direction	
		04	2	Swing	0 to 375	0.20%
		06	1	Sequence Length	0 to 31	1 step
		07	2	Global Gate	0 to 100	1%
		09	1	Reset	0 to 1	
		0A	1	Velocity Source		
		0B	1	Seq Hold	0 to 1	
		0C	1	Send Midi	0 to 1	
		0D	1	Global Ratchet	GlbRtch	
		0E	2	Ratchet Probability	0 to 100	1%
		10	1	ModA Seq Length	0 to 15	1 step
		11	1	ModB Seq Length	0 to 15	1 step
		12	1	ModC Seq Length	0 to 15	1 step
		13	1	ModD Seq Length	0 to 15	1 step
		14	1	Mod Source 1	Mod Source	
		15	2	Mod Amount 1	-100 to 100	1%
		17	1	Mod Destination 1	Mod Destination	
		18	1	Mod Source 2	Mod Source	
		19	2	Mod Amount 2	-100 to 100	1%
		1B	1	Mod Destination 2	Mod Destination	
		1C	2	Rand Amount 1	0 to 100	1%
		1E	1	Rand Destination 1	Rand Destination	
		1F	2	Rand Amount 2	0 to 100	1%
		21	1	Rand Destination 2	Rand Destination	

Total
Bytes 22 34

Seq Mode	
Key	0
KeyStep	1
Mod Only	2

Seq ClkDiv	
1/32	0
1/16T	1
1/16	2
1/8T	3
1/8	4
1/4T	5
1/4	6
1/2T	7
1/2	8
1/1	9
2/1	10
3/1	11
4/1	12
6/1	13
8/1	14

Rand Destination	
None	0
Note	1
Step Type	2
Velocity	3
Global Gate	4

GlbRtch	
1	0
2	1
3	2
4	3
6	4
8	5
Step	6

Mod Source	
Off	0
AT	1
ModWheel	2
AT+ModWheel	3
Ribbon1	4
Ribbon2	5
Joy X	6
Joy Y	7
Foot Ctrl	8
Pedal 1	9
Pedal 2	10
Assign 1	11
Assign 2	12

Mod Destination	
None	0
Seq Length	1
Division	2
Direction	3
Global Gate	4
Velocity	5
Note	6
Step Type	7
Rand Amount 1	8
Rand Amount 2	9
GlbRtch	10
RtchProb	11

Seq Direction	
Forward	0
Backward	1
PingPong	2
Fwd-Back	3
Random	4
OneShot	5

Sequencer Step Type

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
14	3p	00	1	Step 1 Step Type	Seq Step Type
		01	1	Step 2 Step Type	Seq Step Type
		02	1	Step 3 Step Type	Seq Step Type
		03	1	Step 4 Step Type	Seq Step Type
		04	1	Step 5 Step Type	Seq Step Type
		05	1	Step 6 Step Type	Seq Step Type
		06	1	Step 7 Step Type	Seq Step Type
		07	1	Step 8 Step Type	Seq Step Type
		08	1	Step 9 Step Type	Seq Step Type
		09	1	Step 10 Step Type	Seq Step Type
		0A	1	Step 11 Step Type	Seq Step Type
		0B	1	Step 12 Step Type	Seq Step Type
		0C	1	Step 13 Step Type	Seq Step Type
		0D	1	Step 14 Step Type	Seq Step Type
		0E	1	Step 15 Step Type	Seq Step Type
		0F	1	Step 16 Step Type	Seq Step Type
		10	1	Step 17 Step Type	Seq Step Type
		11	1	Step 18 Step Type	Seq Step Type
		12	1	Step 19 Step Type	Seq Step Type
		13	1	Step 20 Step Type	Seq Step Type
		14	1	Step 21 Step Type	Seq Step Type
		15	1	Step 22 Step Type	Seq Step Type
		16	1	Step 23 Step Type	Seq Step Type
		17	1	Step 24 Step Type	Seq Step Type
		18	1	Step 25 Step Type	Seq Step Type
		19	1	Step 26 Step Type	Seq Step Type
		1A	1	Step 27 Step Type	Seq Step Type
		1B	1	Step 28 Step Type	Seq Step Type
		1C	1	Step 29 Step Type	Seq Step Type
		1D	1	Step 30 Step Type	Seq Step Type
		1E	1	Step 31 Step Type	Seq Step Type
		1F	1	Step 31 Step Type	Seq Step Type

Total
Bytes 20 32

Seq Step Type	
Note	0
Tie	1
Rest	2
Ratchet 1	3
Ratchet 2	4
Ratchet 3	5
Ratchet 4	6
Ratchet 6	7
Ratchet 8	8

Sequencer Note

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
14	4p	00	2	Step 1 Note Offset	-48 to 48
		02	2	Step 2 Note Offset	-48 to 48
		04	2	Step 3 Note Offset	-48 to 48
		06	2	Step 4 Note Offset	-48 to 48
		08	2	Step 5 Note Offset	-48 to 48
		0A	2	Step 6 Note Offset	-48 to 48
		0C	2	Step 7 Note Offset	-48 to 48
		0E	2	Step 8 Note Offset	-48 to 48
		10	2	Step 9 Note Offset	-48 to 48
		12	2	Step 10 Note Offset	-48 to 48
		14	2	Step 11 Note Offset	-48 to 48
		16	2	Step 12 Note Offset	-48 to 48
		18	2	Step 13 Note Offset	-48 to 48
		1A	2	Step 14 Note Offset	-48 to 48
		1C	2	Step 15 Note Offset	-48 to 48
		1E	2	Step 16 Note Offset	-48 to 48
		20	2	Step 17 Note Offset	-48 to 48
		22	2	Step 18 Note Offset	-48 to 48
		24	2	Step 19 Note Offset	-48 to 48
		26	2	Step 20 Note Offset	-48 to 48
		28	2	Step 21 Note Offset	-48 to 48
		2A	2	Step 22 Note Offset	-48 to 48
		2C	2	Step 23 Note Offset	-48 to 48
		2E	2	Step 24 Note Offset	-48 to 48
		30	2	Step 25 Note Offset	-48 to 48
		32	2	Step 26 Note Offset	-48 to 48
		34	2	Step 27 Note Offset	-48 to 48
		36	2	Step 28 Note Offset	-48 to 48
		38	2	Step 29 Note Offset	-48 to 48
		3A	2	Step 30 Note Offset	-48 to 48
		3C	2	Step 31 Note Offset	-48 to 48
		3E	2	Step 32 Note Offset	-48 to 48

Total
Bytes 40 64

Sequencer Gate

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
14	5p	00	2	Step 1 Gate	0 to 100
		02	2	Step 2 Gate	0 to 100
		04	2	Step 3 Gate	0 to 100
		06	2	Step 4 Gate	0 to 100
		08	2	Step 5 Gate	0 to 100
		0A	2	Step 6 Gate	0 to 100
		0C	2	Step 7 Gate	0 to 100
		0E	2	Step 8 Gate	0 to 100
		10	2	Step 9 Gate	0 to 100
		12	2	Step 10 Gate	0 to 100
		14	2	Step 11 Gate	0 to 100
		16	2	Step 12 Gate	0 to 100
		18	2	Step 13 Gate	0 to 100
		1A	2	Step 14 Gate	0 to 100
		1C	2	Step 15 Gate	0 to 100
		1E	2	Step 16 Gate	0 to 100
		20	2	Step 17 Gate	0 to 100
		22	2	Step 18 Gate	0 to 100
		24	2	Step 19 Gate	0 to 100
		26	2	Step 20 Gate	0 to 100
		28	2	Step 21 Gate	0 to 100
		2A	2	Step 22 Gate	0 to 100
		2C	2	Step 23 Gate	0 to 100
		2E	2	Step 24 Gate	0 to 100
		30	2	Step 25 Gate	0 to 100
		32	2	Step 26 Gate	0 to 100
		34	2	Step 27 Gate	0 to 100
		36	2	Step 28 Gate	0 to 100
		38	2	Step 29 Gate	0 to 100
		3A	2	Step 30 Gate	0 to 100
		3C	2	Step 31 Gate	0 to 100
		3E	2	Step 32 Gate	0 to 100

Total
Bytes 40 64

Sequencer Velocity

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
14	6p	00	2	Step 1 Velocity	0 to 127
		02	2	Step 2 Velocity	0 to 127
		04	2	Step 3 Velocity	0 to 127
		06	2	Step 4 Velocity	0 to 127
		08	2	Step 5 Velocity	0 to 127
		0A	2	Step 6 Velocity	0 to 127
		0C	2	Step 7 Velocity	0 to 127
		0E	2	Step 8 Velocity	0 to 127
		10	2	Step 9 Velocity	0 to 127
		12	2	Step 10 Velocity	0 to 127
		14	2	Step 11 Velocity	0 to 127
		16	2	Step 12 Velocity	0 to 127
		18	2	Step 13 Velocity	0 to 127
		1A	2	Step 14 Velocity	0 to 127
		1C	2	Step 15 Velocity	0 to 127
		1E	2	Step 16 Velocity	0 to 127
		20	2	Step 17 Velocity	0 to 127
		22	2	Step 18 Velocity	0 to 127
		24	2	Step 19 Velocity	0 to 127
		26	2	Step 20 Velocity	0 to 127
		28	2	Step 21 Velocity	0 to 127
		2A	2	Step 22 Velocity	0 to 127
		2C	2	Step 23 Velocity	0 to 127
		2E	2	Step 24 Velocity	0 to 127
		30	2	Step 25 Velocity	0 to 127
		32	2	Step 26 Velocity	0 to 127
		34	2	Step 27 Velocity	0 to 127
		36	2	Step 28 Velocity	0 to 127
		38	2	Step 29 Velocity	0 to 127
		3A	2	Step 30 Velocity	0 to 127
		3C	2	Step 31 Velocity	0 to 127
		3E	2	Step 32 Velocity	0 to 127

Total
Bytes 40 64

Sequencer Mod Steps

p = part (0 - 3), n=0 Mod A, n=1 Mod B, n=2 Mod C, n=3 Mod D

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
19	np	00	2	Step 1 Level	-127 to 127
		02	2	Step 2 Level	-127 to 127
		04	2	Step 3 Level	-127 to 127
		06	2	Step 4 Level	-127 to 127
		08	2	Step 5 Level	-127 to 127
		0A	2	Step 6 Level	-127 to 127
		0C	2	Step 7 Level	-127 to 127
		0E	2	Step 8 Level	-127 to 127
		10	2	Step 9 Level	-127 to 127
		12	2	Step 10 Level	-127 to 127
		14	2	Step 11 Level	-127 to 127
		16	2	Step 12 Level	-127 to 127
		18	2	Step 13 Level	-127 to 127
		1A	2	Step 14 Level	-127 to 127
		1C	2	Step 15 Level	-127 to 127
		1E	2	Step 16 Level	-127 to 127
		20	2	Step 17 Level	-127 to 127
		22	2	Step 18 Level	-127 to 127
		24	2	Step 19 Level	-127 to 127
		26	2	Step 20 Level	-127 to 127
		28	2	Step 21 Level	-127 to 127
		2A	2	Step 22 Level	-127 to 127
		2C	2	Step 23 Level	-127 to 127
		2E	2	Step 24 Level	-127 to 127
		30	2	Step 25 Level	-127 to 127
		32	2	Step 26 Level	-127 to 127
		34	2	Step 27 Level	-127 to 127
		36	2	Step 28 Level	-127 to 127
		38	2	Step 29 Level	-127 to 127
		3A	2	Step 30 Level	-127 to 127
		3C	2	Step 31 Level	-127 to 127
		3E	2	Step 32 Level	-127 to 127

Total
Bytes 40 64

Key Tables

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
16	0p	00	2	KeyTable 1, Key 0	0 - 1000	0.1%
		02	2	KeyTable 1, Key 1		
		04	2	KeyTable 1, Key 2		
		:	:			
		7C	2	KeyTable 1, Key 62		
		7E	2	KeyTable 1, Key 63		

Total
Bytes 80 128

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
16	1p	00	2	KeyTable 1, Key 64	0 - 1000	0.1%
		02	2	KeyTable 1, Key 65		
		:	:			
		7C	2	KeyTable 1, Key 126		
		7E	2	KeyTable 1, Key 127		

Total
Bytes 80 128

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
16	2p	00	2	KeyTable 2, Key 0	0 - 1000	0.1%
		02	2	KeyTable 2, Key 1		
		04	2	KeyTable 2, Key 2		
		:	:			
		7C	2	KeyTable 2, Key 62		
		7E	2	KeyTable 2, Key 63		

Total
Bytes 80 128

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
16	3p	00	2	KeyTable 2, Key 64	0 - 1000	0.1%
		02	2	KeyTable 2, Key 65		
		:	:			
		7C	2	KeyTable 2, Key 126		
		7E	2	KeyTable 2, Key 127		

Total
Bytes 80 128

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
16	4p	00	2	KeyTable 3, Key 0	0 - 1000	0.1%
		02	2	KeyTable 3, Key 1		
		04	2	KeyTable 3, Key 2		
		:	:			
		7C	2	KeyTable 3, Key 62		
		7E	2	KeyTable 3, Key 63		

Total
Bytes 80 128

Notes
<p>bit 13: 0 = fixed, 1 = interpolated</p> <p>bit 0 - 9: amount</p> <p>Setting a value with bit 13 as 1 will set that key to be interpolated. In this case, the amount is ignored.</p> <p>For key tables a SysEx message is only sent out when:</p> <ol style="list-style-type: none"> 1. A table entry changes from fixed to interpolated 2. A table entry changes from interpolated to fixed 3. A fixed value changes <p>A SysEx message is not sent out for interpolated value changes.</p>

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
16	5p	00	2	KeyTable 3, Key 64	0 - 1000	0.1%
		02	2	KeyTable 3, Key 65		
		:	:			
		7C	2	KeyTable 3, Key 126		
		7E	2	KeyTable 3, Key 127		

Total
Bytes 80 128

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
16	6p	00	2	KeyTable 4, Key 0	0 - 1000	0.1%
		02	2	KeyTable 4, Key 1		
		04	2	KeyTable 4, Key 2		
		:	:			
		7C	2	KeyTable 4, Key 62		
		7E	2	KeyTable 4, Key 63		

Total
Bytes 80 128

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
16	7p	00	2	KeyTable 4, Key 64	0 - 1000	0.1%
		02	2	KeyTable 4, Key 65		
		:	:			
		7C	2	KeyTable 4, Key 126		
		7E	2	KeyTable 4, Key 127		

Total
Bytes 80 128

Part Name

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
17	Op	00	2	Part Name 1	32 – 126
		02	2	Part Name 2	32 – 126
		04	2	Part Name 3	32 – 126
		06	2	Part Name 4	32 – 126
		08	2	Part Name 5	32 – 126
		0A	2	Part Name 6	32 - 126
		0C	2	Part Name 7	32 - 126
		0E	2	Part Name 8	32 - 126
		10	2	Part Name 9	32 - 126
		12	2	Part Name 10	32 - 126
		14	2	Part Name 11	32 - 126
		16	2	Part Name 12	32 - 126
		18	2	Part Name 13	32 - 126
		1A	2	Part Name 14	32 - 126
		1C	2	Part Name 15	32 - 126
		1E	2	Part Name 16	32 - 126
		20	2	Part Name 17	32 - 126
		22	2	Part Name 18	32 - 126
		24	2	Part Name 19	32 - 126
		26	2	Part Name 20	32 - 126

Total
Bytes 28 40

Part Common

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit	Notes
17	1p	00	1	PitchWheelUpRange	-63 to 63		
		01	1	PitchWheelDownRange	-63 to 63		
		02	1	LFO 5 Mod Wheel	0 to 1		
		03	2	LFO 5 Mod Wheel Max	-100 to 100	1%	
		05	1	Glide Type	GlideType		
		06	1	Glide Mode	GlideMode		
		07	3	Glide Time	0 to 100000		
		0A	2	Glide Rate	0 to 100		
		0C	2	Glide Range	0 to 100		
		0E	1	Play Mode	PlayMode		
		0F	1	Legato	Legato		
		10	1	Note Priority	Priority		
		11	1	EgReset	EgReset		
		12	1	UniVoice	UniVoice		
		13	2	UniTune	-100 to 100		
		15	1	Unison Enable	0 to 1		
		16	2	RndTune	-1 to 100	1 cent	-1 means that the Global RndTune parameter value is used.
		18	1	Assign 1 Function	Assign		
		19	1	Assign 2 Function	Assign		
		1A	1	Expression Pedal Function	ExpPed		
		1B	1	Switch Pedal 1 Function	SwitchPed		
		1C	1	Switch Pedal 2 Function	SwitchPed		
		1D	2	Velocity Curve	0 to 100	1 %	
		1F	2	Velocity Offset	0 to 100	1 %	
		21	2	Aftertouch Curve	0 to 100	1 %	
		23	2	Aftertouch Offset	0 to 100	1 %	
		25	1	ChordStackNotes	0 to 10		Number of chord stack notes actually used
		26	2	ChordStackNote 1	0 to 127		The number of half steps above the lowest note in the chord.
		28	2	ChordStackNote 2	0 to 127		
		2A	2	ChordStackNote 3	0 to 127		
		2C	2	ChordStackNote 4	0 to 127		
		2E	2	ChordStackNote 5	0 to 127		
		30	2	ChordStackNote 6	0 to 127		
		32	2	ChordStackNote 7	0 to 127		
		34	2	ChordStackNote 8	0 to 127		
		36	2	ChordStackNote 9	0 to 127		
		38	2	ChordStackNote 10	0 to 127		

Total

Bytes

3A

58

GlideType	
Porta	0
Gliss	1
FingPort	2
FingGlis	3

GlideMode	
C-Time	0
C-Rate	1
Exp	2

PlayMode	
Poly	0
Mono	1

Legato	
Off	0
Reassign	1
Retrigger	2

UniVoice	
2	0
3	1
4	2
5	3
6	4
7	5
8	6
All	7
Chord	8

Assign	
Off	0
Global Glide	1
Glide 01	2
Glide 02	3
Glide 03	4
Glide 04	5
Glide All	6
Ribbon Hold	7
Arp Transpose	8
Solo	9

EgReset	
ShutDown	0
Running	1

ExpPed	
Off	0
Expr	1
Pan	2

SwitchPed	
Off	0
Sostenuto	1
Sustain	2
Ribbon Hold	3
Seq On	4
Arp On	5
Arp Hold	6
Arp Transpose	7

Solo	8
------	---

Priority	
Last	0
Low	1
High	2

Effects Routing

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit	Notes
15	00	00	1	Channel 1 Input	Input		
		01	1	Channel 1 Slot 1	EffectType		
		02	1	Channel 1 Slot 2	EffectType		
		03	1	Channel 1 Slot 3	EffectType		
		04	1	Channel 1 Slot 4	EffectType		
		05	1	Channel 2 Input	Input		
		06	1	Channel 2 Slot 1	EffectType		
		07	1	Channel 2 Slot 2	EffectType		
		08	1	Channel 2 Slot 3	EffectType		
		09	1	Channel 2 Slot 4	EffectType		
		0A	1	Channel 3 Input	Input		
		0B	1	Channel 3 Slot 1	EffectType		
		0C	1	Channel 3 Slot 2	EffectType		
		0D	1	Channel 3 Slot 3	EffectType		
		0E	1	Channel 3 Slot 4	EffectType		
		0F	1	Channel 4 Input	Input		
		10	1	Channel 4 Slot 1	EffectType		
		11	1	Channel 4 Slot 2	EffectType		
		12	1	Channel 4 Slot 3	EffectType		
		13	1	Channel 4 Slot 4	EffectType		

Total
Bytes 14 20

Input	
Off	0
Synth	1
Ext-1/2	2
Ext-3/4	3
S/P-DIF	4
FXChannel 1	5
FXChannel 2	6
FXChannel 2	7
FXChannel 4	8

EffectType	
Off	0
Chorus/Flanger	1
Phaser	2
Delay	3
EQ	4

Effects

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit	Notes
15	10	00	1	Cho/Fla Mode	0 to 1		
		01	2	Cho/Fla Frequency	0 to 5000	0.01 Hz	
		03	2	Cho/Fla Depth	0 to 100	1%	
		05	2	Cho/Fla Phase	-180 to +180	1 degree	
		07	2	Cho/Fla Offset	0 to 127		
		09	2	Cho/Fla Input Level	0 to 100	1%	
		0B	2	Cho/Fla Feedback	-100 to 100	1%	
		0D	2	Cho/Fla Dry	0 to 100	1%	
		0F	2	Cho/Fla Wet	-100 to 100	1%	
		11	1	Phaser Mode	0 to 1		
		12	2	Phaser Frequency	0 to 5000	0.01 Hz	
		14	2	Phaser Depth	0 to 100	1%	
		16	2	Phaser Phase	-180 to +180	1 degree	
		18	3	Phaser Offset	0 to 200000	0.1 Hz	
		1B	2	Phaser Input Level	0 to 100	1%	
		1D	2	Phaser Feedback	-100 to 100	1%	
		1F	2	Phaser Dry	0 to 100	1%	
		21	2	Phaser Wet	0 to 100	1%	
		23	1	Delay Mode	DelayMode		
		24	3	Delay Time Left	0 to 200000	0.1 ms	
		27	3	Delay Time Right	0 to 200000	0.1 ms	
		2A	1	Delay Beats Left	ClkDiv		
		2B	1	Delay Beats Right	ClkDiv		
		2C	2	Delay Feedback Left	0 to 100	1%	
		2E	2	Delay Feedback Right	0 to 100	1%	
		30	2	Delay Damping	0 to 100	1%	
		32	2	Delay Dry	0 to 100	1%	
		34	2	Delay Wet	0 to 100	1%	
		36	1	Delay MIDI Clk	0 to 1		
		37	1	EQ Mode	0 to 1		
		38	3	EQ Frequency 1	0 to 200000	0.1 Hz	
		3B	2	EQ Q 1	47 to 256		$Q = \max(0.70, (\text{value} / 256) * (\text{value} / 256) * 20)$
		3D	2	EQ Gain 1	-120 to 120	0.1	
		3F	3	EQ Frequency 2	0 to 200000	0.1 Hz	
		42	2	EQ Q 2	47 to 256		$Q = \max(0.70, (\text{value} / 256) * (\text{value} / 256) * 20)$
		44	2	EQ Gain 2	-120 to 120	0.1	
		46	3	EQ Frequency 3	0 to 200000	0.1 Hz	
		49	2	EQ Q 3	47 to 256		$Q = \max(0.70, (\text{value} / 256) * (\text{value} / 256) * 20)$
		4B	2	EQ Gain 3	-120 to 120	0.1	

Total
Bytes 4D 77

ClkDiv	
1/128	0
1/64T	1
1/64	2
1/32T	3
1/32	4
1/32D	5
1/16T	6
1/16	7
1/16D	8
1/8T	9
1/8	10
1/8D	11
1/4T	12
1/4	13
1/4D	14
1/2T	15
1/2	16
1/2D	17
1/1	18
2/1	19
3/1	20
4/1	21
5/1	22
6/1	23
7/1	24
8/1	25

DelayMode	
Bypass	0
Delay	1
XDelay	2

Preset Name

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
20	00	00	2	Preset Name 1	32 – 126
		02	2	Preset Name 2	32 – 126
		04	2	Preset Name 3	32 – 126
		06	2	Preset Name 4	32 – 126
		08	2	Preset Name 5	32 – 126
		0A	2	Preset Name 6	32 - 126
		0C	2	Preset Name 7	32 - 126
		0E	2	Preset Name 8	32 - 126
		10	2	Preset Name 9	32 - 126
		12	2	Preset Name 10	32 - 126
		14	2	Preset Name 11	32 - 126
		16	2	Preset Name 12	32 - 126
		18	2	Preset Name 13	32 - 126
		1A	2	Preset Name 14	32 - 126
		1C	2	Preset Name 15	32 - 126
		1E	2	Preset Name 16	32 - 126
		20	2	Preset Name 17	32 - 126
		22	2	Preset Name 18	32 - 126
		24	2	Preset Name 19	32 - 126
		26	2	Preset Name 20	32 - 126
		28	1	Category 1	Category 1
		29	1	Category 2	Category 2

Category 1	
None	0
Arpeggio	1
Bass	2
Drum	3
Effect	4
Keyboard	5
Lead	6
Pad	7
Sequence	8
Texture	9
Atmosphere	10
Bells	11
Mono	12
Noise	13
Organ	14
Percussive	15
Strings	16
Synth	17
Vocal	18
User 1	19
User 2	20
User 3	21
User 4	22
User 5	23
User 6	24
User 7	25
User 8	26
User 9	27
User 10	28

Category 2	
None	0
Acoustic	1
Aggressive	2
Big	3
Bright	4
Chord	5
Classic	6
Dark	7
Electric	8
Moody	9
Soft	10
Short	11
Synthetic	12
Upbeat	13
Metallic	14
Template	15
User 1	16
User 2	17
User 3	18
User 4	19
User 5	20
User 6	21
User 7	22
User 8	23
User 9	24
User 10	25

Preset Common

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit	Notes
20	10	00	3	Performance knob 1 param			Three-byte parameter address. MSB first. The address returned is {0,0,0} if not assigned.
		03	3	Performance knob 2 param			
		06	3	Performance knob 3 param			
		09	3	Performance knob 4 param			
		0C	3	Performance knob 5 param			
		0F	2	Performance knob 1	-100 to 100	1%	
		11	2	Performance knob 2	-100 to 100	1%	
		13	2	Performance knob 3	-100 to 100	1%	
		15	2	Performance knob 4	-100 to 100	1%	
		17	2	Performance knob 5	-100 to 100	1%	
		19	2	BPM	30 to 300		
		1B	1	Assign Button 1 Mode	AssignMode		
		1C	1	Assign Button 2 Mode	AssignMode		
		1D	1	Assign Button 1 Enable	0 to 1		
		1E	1	Assign Button 2 Enable	0 to 1		
		1F	1	Clock Sync	0 to 1		
		20	2	Reserved			
		22	2	Joystick X position	0 to 1023		In a preset, represents the initial position.
		24	2	Joystick Y position	0 to 1023		In a preset, represents the initial position.
		26	2	Ribbon Offset			
		28	2	Ribbon Intensity			
		2A	1	Ribbon Hold	0 to 1		
		2B	1	Ribbon Touch Offset	0 to 1		
		2C	3	Reserved			
		2F	2	Sample Pool	0 to number of pools - 1		Valid range depends on the number of sample pools available
		31	1	Output 1/2	OutputSrc		
		32	1	Output 3/4	OutputSrc		
		33	1	Output 5/6	OutputSrc		
		34	1	Output 7/8	OutputSrc		
		35	1	Output S/P-DIF	OutputSrc		

Total
Bytes 36 54

AssignMode	
Toggle	0
Momentary	1

OutputSrc	
Off	0
Synth	1
Ext-1/2	2
Ext-3/4	3
S/P-DIF	4
FXChannel 1	5
FXChannel 2	6
FXChannel 2	7
FXChannel 4	8

Multi Part

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit	Notes
20	2p	00	1	MIDI Channel	0 to 16		16 = Global
		01	1	Part Enable	0 to 1		
		02	1	Number of Voices	NumberOfVoices		
		03	2	High Key	0 to 127		
		05	2	Low Key	0 to 127		
		07	2	High Velocity	0 to 127		
		09	2	Low Velocity	0 to 127		
		0B	1	Transpose	-63 to 63	Half step	
		0C	2	Tune	-100 to 100	1 cent	
		0E	2	Volume	0 to 127		
		10	1	Pan	-63 to 63		
		11	1	Pitch	0 to 1		Filter
		12	1	Mod Wheel	0 to 1		Filter
		13	1	Aftertouch	0 to 1		Filter
		14	1	Joystick X	0 to 1		Filter
		15	1	Joystick Y	0 to 1		Filter
		16	1	Ribbon 1	0 to 1		Filter
		17	1	Ribbon 2	0 to 1		Filter
		18	1	Sustain	0 to 1		Filter
		19	1	Reserved			
		1A	1	Expression	0 to 1		Filter
		1B	1	Omni mode	0 to 1		

Total

Bytes 1C 28

NumberOfVoices	
None	0
2 Voices	1
4 Voices	2
6 Voices	3
8 Voices	4
10 Voices	5

Arpeggiator Params

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)	Unit
18	2p	00	1	Enable	0 to 1	
		01	1	Division	ArpClkDiv	
		02	1	Direction	Direction	
		03	1	Octave	0 to 3	
		04	2	Swing	0 to 375	0.20%
		06	1	Latch	0 to 1	
		07	1	Velocity Source	Velocity Source	
		08	1	Pattern Length	0 to 31	
		09	2	Global Gate	0 to 100	1%
		0B	1	Arp Hold	0 to 1	
		0C	1	Send Midi	0 to 1	
		0D	1	Mod Source 1	Mod Source	
		0E	2	Mod Amount 1	-100 to 100	1%
		10	1	Mod Destination 1	Arp Mod Dest	
		11	1	Mod Source 2	Mod Source	
		12	2	Mod Amount 2	-100 to 100	1%
		14	1	Mod Destination 2	Arp Mod Dest	
		15	2	Rand Amount 1	0 to 100	1%
		17	1	Rand Destination 1	Rand Destination	
		18	2	Rand Amount 2	0 to 100	1%
		1A	1	Rand Destination 2	Rand Destination	

Total
Bytes 1B 27

Velocity Source	
Pattern	0
Keyboard	1
Both	2

Direction	
Up	0
Down	1
Up/Down	2
AsPlayed	3
Random	4
Down2	5
Up/Down2	6
Chord	7

Mod Source	
Off	0
AT	1
ModWheel	2
AT+ModWheel	3
Ribbon1	4
Ribbon2	5
Joy X	6
Joy Y	7
Foot Ctrl	8
Pedal 1	9
Pedal 2	10
Assign 1	11
Assign 2	12

ArpClkDiv	
1/32	0
1/16T	1
1/16	2
1/8T	3
1/8	4
1/4T	5
1/4	6
1/2T	7
1/2	8
1/1	9
2/1	10
3/1	11
4/1	12
6/1	13
8/1	14

Arp Mod Dest	
None	0
Pattern Length	1
Division	2
Direction	3
Global Gate	4
Velocity	5
Note	6
Step Type	7
Rand Amount 1	8
Rand Amount 2	9

Rand Destination	
None	0
Note	1
Step Type	2
Velocity	3
Global Gate	4

Arpeggiator Step Type

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
18	3p	00	1	Step 1 Step Type	Arp Step Type
		01	1	Step 2 Step Type	Arp Step Type
		02	1	Step 3 Step Type	Arp Step Type
		03	1	Step 4 Step Type	Arp Step Type
		04	1	Step 5 Step Type	Arp Step Type
		05	1	Step 6 Step Type	Arp Step Type
		06	1	Step 7 Step Type	Arp Step Type
		07	1	Step 8 Step Type	Arp Step Type
		08	1	Step 9 Step Type	Arp Step Type
		09	1	Step 10 Step Type	Arp Step Type
		0A	1	Step 11 Step Type	Arp Step Type
		0B	1	Step 12 Step Type	Arp Step Type
		0C	1	Step 13 Step Type	Arp Step Type
		0D	1	Step 14 Step Type	Arp Step Type
		0E	1	Step 15 Step Type	Arp Step Type
		0F	1	Step 16 Step Type	Arp Step Type
		10	1	Step 17 Step Type	Arp Step Type
		11	1	Step 18 Step Type	Arp Step Type
		12	1	Step 19 Step Type	Arp Step Type
		13	1	Step 20 Step Type	Arp Step Type
		14	1	Step 21 Step Type	Arp Step Type
		15	1	Step 22 Step Type	Arp Step Type
		16	1	Step 23 Step Type	Arp Step Type
		17	1	Step 24 Step Type	Arp Step Type
		18	1	Step 25 Step Type	Arp Step Type
		19	1	Step 26 Step Type	Arp Step Type
		1A	1	Step 27 Step Type	Arp Step Type
		1B	1	Step 28 Step Type	Arp Step Type
		1C	1	Step 29 Step Type	Arp Step Type
		1D	1	Step 30 Step Type	Arp Step Type
		1E	1	Step 31 Step Type	Arp Step Type
		1F	1	Step 31 Step Type	Arp Step Type

Total
Bytes 20 32

Arp Step Type	
Note	0
Tie	1
Rest	2

Arpeggiator Gate

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
18	4p	00	2	Step 1 Gate	0 to 100
		02	2	Step 2 Gate	0 to 100
		04	2	Step 3 Gate	0 to 100
		06	2	Step 4 Gate	0 to 100
		08	2	Step 5 Gate	0 to 100
		0A	2	Step 6 Gate	0 to 100
		0C	2	Step 7 Gate	0 to 100
		0E	2	Step 8 Gate	0 to 100
		10	2	Step 9 Gate	0 to 100
		12	2	Step 10 Gate	0 to 100
		14	2	Step 11 Gate	0 to 100
		16	2	Step 12 Gate	0 to 100
		18	2	Step 13 Gate	0 to 100
		1A	2	Step 14 Gate	0 to 100
		1C	2	Step 15 Gate	0 to 100
		1E	2	Step 16 Gate	0 to 100
		20	2	Step 17 Gate	0 to 100
		22	2	Step 18 Gate	0 to 100
		24	2	Step 19 Gate	0 to 100
		26	2	Step 20 Gate	0 to 100
		28	2	Step 21 Gate	0 to 100
		2A	2	Step 22 Gate	0 to 100
		2C	2	Step 23 Gate	0 to 100
		2E	2	Step 24 Gate	0 to 100
		30	2	Step 25 Gate	0 to 100
		32	2	Step 26 Gate	0 to 100
		34	2	Step 27 Gate	0 to 100
		36	2	Step 28 Gate	0 to 100
		38	2	Step 29 Gate	0 to 100
		3A	2	Step 30 Gate	0 to 100
		3C	2	Step 31 Gate	0 to 100
		3E	2	Step 32 Gate	0 to 100

Total
Bytes 40 64

Arpeggiator Velocity

p = part (0 - 3)

Address (Hex)			Size (Dec)	Parameter Name	Range (Dec)
18	5p	00	2	Step 1 Velocity	0 to 127
		02	2	Step 2 Velocity	0 to 127
		04	2	Step 3 Velocity	0 to 127
		06	2	Step 4 Velocity	0 to 127
		08	2	Step 5 Velocity	0 to 127
		0A	2	Step 6 Velocity	0 to 127
		0C	2	Step 7 Velocity	0 to 127
		0E	2	Step 8 Velocity	0 to 127
		10	2	Step 9 Velocity	0 to 127
		12	2	Step 10 Velocity	0 to 127
		14	2	Step 11 Velocity	0 to 127
		16	2	Step 12 Velocity	0 to 127
		18	2	Step 13 Velocity	0 to 127
		1A	2	Step 14 Velocity	0 to 127
		1C	2	Step 15 Velocity	0 to 127
		1E	2	Step 16 Velocity	0 to 127
		20	2	Step 17 Velocity	0 to 127
		22	2	Step 18 Velocity	0 to 127
		24	2	Step 19 Velocity	0 to 127
		26	2	Step 20 Velocity	0 to 127
		28	2	Step 21 Velocity	0 to 127
		2A	2	Step 22 Velocity	0 to 127
		2C	2	Step 23 Velocity	0 to 127
		2E	2	Step 24 Velocity	0 to 127
		30	2	Step 25 Velocity	0 to 127
		32	2	Step 26 Velocity	0 to 127
		34	2	Step 27 Velocity	0 to 127
		36	2	Step 28 Velocity	0 to 127
		38	2	Step 29 Velocity	0 to 127
		3A	2	Step 30 Velocity	0 to 127
		3C	2	Step 31 Velocity	0 to 127
		3E	2	Step 32 Velocity	0 to 127

Total
Bytes 40 64

Source Lists

AudioSrc			
0	Off	42	EG 3
1	Osc 1	43	EG 4
2	Osc 2	44	EG 5
3	Osc 3	45	EG 6
4	Osc 4	46	Looping EG -X axis
5	Rotor 1	47	Looping EG -Y axis
6	Rotor 2	48	Velocity
7	AM 1	49	Aftertouch
8	AM 2	50	Note
9	Vector 1	51	Mod Wheel
10	Vector 2	52	Aftertouch + Mod Wheel
11	Mixer 1	53	Ribbon 1
12	Mixer 2	54	Ribbon 2
13	Mixer 3	55	Joystick X
14	Mixer 4	56	Joystick Y
15	Filter 1	57	CC 1
16	Filter 2	58	CC 2
17	Filter 3	59	CC 3
18	Filter 4	60	CC 4
19	Insert FX 1	61	CC 5
20	Insert FX 2	62	Seq A
21	Insert FX 3	63	Seq B
22	Insert FX 4	64	Seq C
23	VCA 1	65	Seq D
24	VCA 2	66	ExpPed
25	VCA 3	67	SusPed
26	VCA 4	68	Assignable Button 1
27	White Noise	69	Assignable Button 2
28	Pink Noise	70	Envelope Follower
29	External Input 1	71	-----
30	External Input 2	72	Key Table 1
31	External Input 3	73	Key Table 2
32	External Input 4	74	Key Table 3
33	S/PDIF Input Left	75	Key Table 4
34	S/PDIF Input Right	76	Polyphonic Aftertouch
35	LFO 1	77	Lag Processor 1
36	LFO 2	78	Lag Processor 2
37	LFO 3	79	Lag Processor 3
38	LFO 4	80	Lag Processor 4
39	Vibrato LFO	81	Breath Control
40	EG 1	82	Maximum Value
41	EG 2		

ModSrc			
0	Off	42	Polyphonic Aftertouch
1	LFO 1	43	Lag Processor 1
2	LFO 2	44	Lag Processor 2
3	LFO 3	45	Lag Processor 3
4	LFO 4	46	Lag Processor 4
5	Vibrato LFO	47	Breath Control
6	EG 1	48	Maximum Value
7	EG 2	49	Osc 1
8	EG 3	50	Osc 2
9	EG 4	51	Osc 3
10	EG 5	52	Osc 4
11	EG 6	53	Rotor 1
12	Looping EG -X axis	54	Rotor 2
13	Looping EG -Y axis	55	AM 1
14	Velocity	56	AM 2
15	Aftertouch	57	Vector 1
16	Note	58	Vector 2
17	Mod Wheel	59	Mixer 1
18	Aftertouch + Mod Wheel	60	Mixer 2
19	Ribbon 1	61	Mixer 3
20	Ribbon 2	62	Mixer 4
21	Joystick X	63	Filter 1
22	Joystick Y	64	Filter 2
23	CC 1	65	Filter 3
24	CC 2	66	Filter 4
25	CC 3	67	Insert FX 1
26	CC 4	68	Insert FX 2
27	CC 5	69	Insert FX 3
28	Seq A	70	Insert FX 4
29	Seq B	71	VCA 1
30	Seq C	72	VCA 2
31	Seq D	73	VCA 3
32	ExpPed	74	VCA 4
33	SusPed	75	White Noise
34	Assignable Button 1	76	Pink Noise
35	Assignable Button 2	77	External Input 1
36	Envelope Follower	78	External Input 2
37	-----	79	External Input 3
38	Key Table 1	80	External Input 4
39	Key Table 2	81	S/PDIF Input Left
40	Key Table 3	82	S/PDIF Input Right
41	Key Table 4		

CtrlSrc			
0	Off	30	Seq C
1	LFO 1	31	Seq D
2	LFO 2	32	ExpPed
3	LFO 3	33	SusPed
4	LFO 4	34	Assignable Button 1
5	Vibrato LFO	35	Assignable Button 2
6	EG 1	36	Envelope Follower
7	EG 2	37	-----
8	EG 3	38	Key Table 1
9	EG 4	39	Key Table 2
10	EG 5	40	Key Table 3
11	EG 6	41	Key Table 4
12	Looping EG -X axis	42	Polyphonic Aftertouch
13	Looping EG -Y axis	43	Lag Processor 1
14	Velocity	44	Lag Processor 2
15	Aftertouch	45	Lag Processor 3
16	Note	46	Lag Processor 4
17	Mod Wheel	47	Breath Control
18	Aftertouch + Mod Wheel	48	Maximum Value
19	Ribbon 1		
20	Ribbon 2		
21	Joystick X		
22	Joystick Y		
23	CC 1		
24	CC 2		
25	CC 3		
26	CC 4		
27	CC 5		
28	Seq A		
29	Seq B		