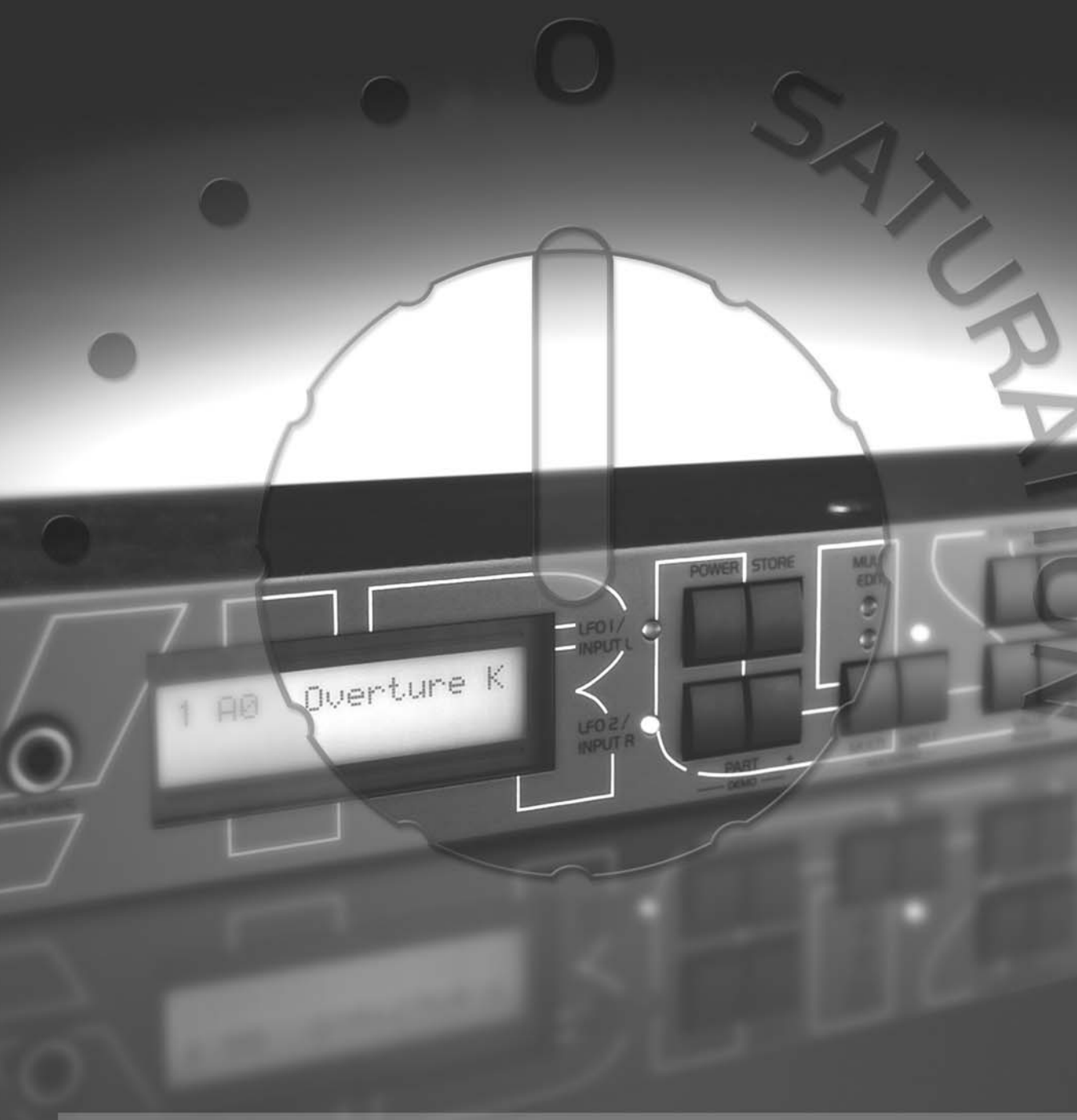

VIRUS RACK CLASSIC ADDENDUM 2.2

access

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VIRUS RACK CLASSIC ADDENDUM 2.1

Content

New features in OS 2.2

24 ADDITIONAL ARPEGGIATOR PATTERNS

The 24 new styles can be found from arpeggiator pattern number 41 onwards. They have been created with especially dance musicians in mind. There is a small number of sequences which sound very similar in the first place. They work great in sync - try to use two of those arpeggiator pattern on two different patches which running in parallel. You might also notice that some patterns contain very short notes. Those "dead notes" will spice up your music with additional groove elements.

PURE TUNING

For centuries we have been playing musical instruments that are out of tune...

Ever since the emergence of polyphonic instruments, including all keyboards as well as fretted instruments such as the lute and guitar, tuning has always been a compromise. Several attempts from the 16th-18th centuries to standardise the temperament (tuning) of church organs and virginals helped a little, but they were battling against the mighty laws of physics – see the "Theory" section below.

First suggested in 1636, our modern "Equal Temperament" was only in common use from the late 18th century onwards because it was considered much too much of a compromise at the time. Despite it's one advantage (the freedom to play in any key), Equal Temperament simply dilutes the fundamental problem, spreading it across all the notes in the octave.

Experienced singers and string players use "just" intonation – they adapt to any keys and modulations (key changes) because they have infinitely variable control over pitch. Within certain limits, the pitch of wind instruments can also be varied by adjusting embouchure (lip position/tension). A group of musicians instinctively approaches a common overtone structure, minimizing the "friction" between all the voices in a chord. This results in the wonderfully rich but compact sound of symphony orchestras or gospel choirs.

Unfortunately, realtime intonation was not a feasible proposition for makers of keyboard instrument. Finding a usable method of performing fine adjustments to each and every note seemed physically impossible, especially when playing polyphonically.

These days, digital musical instruments can automate this process. The Pure Tuning (aka. Hermode) algorithm analyses chords and immediately adjusts the pitch of each note so that the prominent harmonics line up. Especially for normal synthesizer sounds, the difference between Equal Temperament and Pure Tuning

may appear to be rather subtle at first (though this difference can be accentuated – see below):

Select the factory preset C126 (-Init-) on your Virus. Turn the Detune value down to 7 to make the phasing between the two oscillators nice and slow. Play a few simple major chords, or just a C-major triad if you prefer, and vary the PureTuning Intensity parameter.

At 127, PureTuning is fully on: The chord is well intonated (like a choir) and does not exhibit any beating between notes. This may seem a little unusual at first, but it sounds perfectly "straight" and correct after you have familiarized yourself with the effect. Setting PureTuning back to zero ("Equal") switches it off again: The chord is beating and, after comparing the two extremes, this original setting sounds equally unusual. The chord now appears to be tuned rather oddly, not quite pure enough, slightly spoiled compared with the maximum setting.

Astonishingly, this is the very same Equal Temperament we have been hearing all our lives – the big compromise!

Let's accentuate the effect now: Change the Distortion Intensity parameter (the one in the Effects section, not Filter saturation) to "Hard". Distortion in the Effects section is applied to the chord as a whole, blending the sound in the same way a guitar amplifier would. Medium range major chords now sound nice and grungy, but when played higher up the keyboard, this grunge becomes rather annoying. Turning up PureTuning causes this unpleasant grunge to disappear entirely because all the notes are perfectly in tune i.e. they have a simple frequency ratio.

The root cause of the unpleasant grunge is easy to find: Turn Pure-Scale down to zero and play middle C together with its fifth (G): Sounds clean enough. This is a typical "power chord" as played by guitarrists with their ampflifiers at maximum distortion settings. Now add the E to form a major C chord: There's that dirt again. The major third (E) is obviously way out of tune. Now turn PureTuning slowly up to maximum; you should be able to hear the major third being continuously adjusted downwards until it reaches purity.

When playing very high chords with distortion you can hear the lowest common denominator of chords: A subharmonic – a low note which is not actually being played. It is the same note as the root of the chord, but two octaves lower.

If the sound appears too sterile at maximum PureTuning, this is likely to be because there is always minimum beating between notes. Turn PureTuning down to the central position: "Natural". Although tuning is also nominally 100% pure at this setting, the actual pitch of notes is once again subject to the fluctuations, the natural anomalies responsible for a lot of the "life" in acoustic instruments (as well as true analogue synthesizers).

Even if you only play octaves, the "Natural" setting often causes beating between the notes! This effect is therefore independant of the chord structure, and can/should be accentuated via oscillator Detune (or even Unison mode) to beef up the sound. That's how the monumental sound of a symphony orchestra arises: the richness of the sound is solely dependant upon the number of musicians (oscillators), not upon harmonic complexity.

PureTuning works perfectly for major triads and dominant seventh chords. Due to the physics involved (see below), minor chords are more of a problem – they don't sound quite as pure. However, PureTuning is also very effective here because the subharmonics are managed well.

Equal-temperament was a radical break from all the other “tempered” methods, where polyphonic instruments could only be played in a few diatonic modes. Note that Johann Sebastian Bach’s “The Well-Tempered Clavier” is thought to have been based on a variation of “Werckmeister 3” tuning. Much more suitable for playing in any key, but not quite the same as Equal Temperament!

PureTuning combines classical intonation with the universality of Equal Temperament.

Let Pure Tuning inspire you!

THEORY

Interestingly, the feeling of harmony in a major chord is a phenomenon based upon physics, not on psycho-acoustics alone. The notes in a perfectly tuned C-major triad (C, E, G) have exact integer frequency ratios: From E to C is 5:4 (or 1:1.25) and from G to C is 3:2 (1: 1.5). The same applies to any major chord. It is fairly common knowledge that the frequency ratio of an octave is 2:1 – the upper note is exactly double the frequency of the lower one. Assuming a C is exactly 1000 Hz, the E would be 1250 Hz and the G would be 1500 Hz. The next C would be 2000 Hz. Very simple, very nice...

Reality isn’t quite that simple. We expect more from our (chromatic) keyboard instruments. We demand that the frequency ratio of all semitone steps should be the same, that no particular key has “priority” over any other. Chords in the key of B or C# should sound just as good as they do in C. The truth is that they actually sound just as bad!

Rule Number One: An octave interval should be an octave, it should be exactly double/half the frequency of the reference note. If you take this rule as the basis and work out a constant ratio you can apply to all 12 semitones, you arrive at the 12^{th} root of 2, i.e. 1.059463. Test this by multiplying this value with itself 12 times, or take a pocket calculator with the “power” (^) function and tap in 1.059463 ^ 12. The result is exactly 2 (or 1.9999 recurring). A perfect octave. Sounds complicated, but it seems to work – so where’s the problem?

Let’s get back to our C-major chord and work out the frequency ratios using this “magic” number. The interval C-E is four semitones, which means we should multiply the magic number with itself four times (1.059463 ^ 4). Feel free to try it – your Virus is doing this kind of thing all the time :-). The result is 1.2599. Fairly close to 1.25 (see above), but not near enough: It is detuned all of 14 cents (14% of a semitone). A singer with perfect intonation would sing the E exactly 14 cents lower than this!

The interval from C to G is seven semitones: 1.059463 to the power of 7 is 1.4983. Not bad, but not quite the 1.5 me might have expected. This detuning is equivalent to only 2 cents, but still...

So that’s the big disadvantage of the tempered scale, the standard for all modern (western) keyboard instruments. Why can’t the notes simply be tuned “correctly” instead? Just intonation depends upon the current situation, upon the context: An A-minor triad (A, C, E) also includes the notes E and C like in our C-major chord, but their functions are now Fifth and minor Third (instead of major Third and Root). So the frequency ratio should certainly not be 5:4 (1.25) for them to be perfectly in tune!

Is it actually possible to hear the disadvantages of Equal Temperament? Not immediately – we have become too accustomed to it throughout our lives. However, we can certainly react to its more unpleasant side-effects: Electric guitarrists avoid playing full chords when using very distorted sounds. Instead, they often limit their

playing to the so-called “power chords” which leave out the Third (so they are neither major nor minor). Attempting to add the Third to a power chord only results in a very rough and muddy sound.

New features in OS 2.1

COPY DELAY/REVERB FX

Copies the delay or reverb settings from a single patch into the current multi patch. The function is located in the Delay/Reverb edit menu.

EDIT>EFX>DELAY/REVERB

```
Copy SingleDelay
« multi [STORE]
```

To perform a copy, switch to single mode and recall the patch which contains the delay/reverb setting you wish to use within the multi patch. Next switch back to the multimode, select the copy function and press [STORE] to proceed.

The same procedure works in multi/single mode.

New features in OS 2.0

PHASER

The phaser is located in the effects section:

EFX > Phaser

Phaser become famous in the late 60s and can shape a sound in a very distinctive way.

■ *Please note that the latest Virus rack presets do use the Phaser. In case you prefer the patches to sound exactly like they sounded before, please set the DIR/EFF level to OFF.*

DIR/EFF

Controls the balance of volume levels between the direct signal and the Phaser signal: At a value of 0, only the direct signal is audible, at a value of 127, only the Phaser output signal is audible. The values between these two extremes determine the mix of the two signals.

The pure phaser signal is generated by frequency-dependent phase shifting (PHASER Frequency) and pitch modulation of the phaser's own LFOs (PHASER Rate and Depth). Not until the direct or dry signal (PHASER Dir/Eff) is mixed to the wet effects signal is the typical phaser effect generated.

DEPTH

Controls the intensity of the Phaser frequency modulation by the LFO.

FREQUENCY

The characteristic corner frequency of the phaser's all-pass filter. The frequencies of the left and right sides are shifted every so slightly to create a real stereo effect.

RATE

Determines the speed of the Phaser LFO.

FEEDBACK

Controls the amount of feedback in the Phaser. On the phaser, FEEDBACK lets you boost specific frequencies in the phase-shifted signal. The FEEDBACK parameter is bipolar; positive or negative feedback values let you dial in different phaser characteristics.

STAGES

Use STAGES (1-6) to select the number of phaser stages or filter poles. This determines directly the number of filter notches and peaks in the phaser signal.

SPREAD

Use SPREAD to increase or decrease the distance between the notches and peaks in the frequency spectrum. In other words, here you can adjust bandwidth of the phaser effect.

RINGMODULATOR

The ringmodulator is located in the effects section:

EFX > Ringmodulator

The ringmodulator modulates the output signal of the active SINGLE patch or active PART with an external audio signal. This allows you to ring-modulate the residual signal of the SINGLE or PART with an external audio signal. The effect multiplies the amplitudes of both signals, which provides the frequencies' sums and differences. The more harmonics in the incoming signal, the more distinct the modulation. Especially drumloops modulated with a sine wave create interesting sounds. The incoming signal is determined with INPUT SELECT. Depending on the incoming signal, the ring modulator operates in mono or stereo.

DIR/EFF

- **"LEFT"** The ring modulator is inactive, only the direct signal is audible.
- **"CENTER"** Purely the ring modulator signal is audible.
- **"RIGHT"** The external audio signal is audible.

  You'll find a further ring modulator in the Oscillator section of the VIRUS. It operates individually for each voice using the signals of Oscillators 1 and 2.

New Features in OS 1.5

1024 PATCHES

OS version 1.5 or higher supports 1024 internal sound patches. Overwriting the demo song frees up the necessary space in the flash ROM. Install OSxx second1024.mid to load the additional patches into your Virus. Details on the installation can be found in the user manual.

SysEx documentation

CLASSES

P: PERFORMANCE CONTROLLER

Accessible by Control message. Performance Controllers are not stored with a Single-Sound. If more than one Multi Part is set to the same MIDI channel, all Parts on this MIDI channel receive the same Performance Controllers.

A: SOUND PARAMETER OF BANK A

Accessible by Control message, SysEx-Parameterchange and Single-Dump.The Sound Parameters are stored with a Single Sound. When received as Control Message, the Sound Parameter is received only by the Multi Part with the lowest part number, if more than one Multi Part is set to the same MIDI channel. When received as SysEx-Parameterchange or Single-Dump, the part is addressed by the part number irrespective of the actual MIDI channel setting.

B: SOUND PARAMETER OF BANK B

Accessible by MIDI Polyphonic Pressure, SysEx-Parameterchange and Single-Dump.The Sound Parameters are stored with a Single Sound. When received as Polyphonic Pressure, the Sound Parameter is received only by the Multi Part with the lowest part number, if more than one Multi Part is set to the same MIDI channel. When received as SysEx-Parameterchange or Single-Dump, the part is addressed by the part number irrespective of the actual MIDI channel setting.

M: MULTI PARAMETER

Accessible by SysEx-Parameterchange and Multi-Dump The Multi Parameters are stored with a Multi Patch.

MS: MULTI/SINGLE PARAMETER

When in Single Mode, the parameter is received and stored with the Single Sound.When in Multi Mode, the parameter is received and stored with the Multi Patch. In Multi Mode the Single Sound settings are ignored while the corresponding Multi Patch settings are active.

NP: NON-PART-SENSITIVE SOUND PARAMETER

When in Multi Mode, the parameter affects all Multi Parts.

BPC: BANK/PROGRAM-CHANGE PARAMETER BANK SELECT

selects the Single bank accessed by a subsequent Program Change, similar to the regular Bank Select.Bank Change directly changes the Single program to the requested bank, without changing the program number. Program Change directly changes the Single program to

the requested program number, without changing the bank number; similar to the regular Program Change. Part number $40 will address the Single buffer in Single Mode.

G: GLOBAL PARAMETER

The Global Parameters are independend of Single Sounds or Multi Patches and non-part sensitive.

VB: VIRUS B PARAMETER

These parameters are only available on Virus b and Virus kb/Indigo in Version 3.0 and followers. Virus b parameter changes are ignored by Virus a

■ *On non-part-sensitive parameters the part number is ignored, but must still be sent as any value.*

■ *The Virus can be switched between Multi Mode and Single Mode by parameter C123 Part Number.*

■ *Remarks for editor/librarian programs Not all 256 bytes of a Single or Multi Dump are defined as a parameter. Some of them are defined for internal use or reserved for future applications. In a bulk dump these byte should not be changed, they should be sent to the Virus on the same value as they were received in the dump.*

■ *One of the internal parameter (Page A #0) is the Sound Version Number. On future Virus system updates new parameters will be defined. When the Virus receives an older sound, the new parameters will be set to default values in the edit buffer and the version number will be updated automatically. The Virus update algorithm can be used from outside just by sending a dump and requesting it back. To prevent incompatibilites and confusion, the Sound Version Number should not be changed by any other device that the Virus itself. When sounds are imported into a software library, they should be automatically pathed through the Virus first, before allowing a change of parameters. Otherwise the Virus might reset new parameters, when the sound is loaded into the Virus, after editing parameters.*

SINGLE DUMP TABLE

No.	Class	Name	Range	Value	Text
PAGE A					
A 0	p	Bank Select	0..3		Bank A..D
A 1	p	Modulation Wheel			
A 2	p	Breath Controller			
A 3	p	Contr 3			
A 4	p	Foot Controller			
A 5	a	Portamento Time	0..127		
A 6	p	Data Slider			
A 7	p	Channel Volume	0..127		
A 8	p	Balance			
A 9	p	Contr 9			
A 10	a	Panorama	0..127	-64..0..+63:	Left..Center..Right
A 11	p	Expression	0..127		
A 12	p	Contr 12			
A 13	p	Contr 13			
A 14	p	Contr 14			
A 15	p	Contr 15			
A 16	p	Contr 16			
A 17	a	Osc1 Shape	0..127	-64..0..+63:	Wave..Saw..Pulse
A 18	a	Osc1 Pulsewidth	0..127		
A 19	a	Osc1 Wave Select	0..64		Sine, Triangle, Wave 3..64
A 20	a	Osc1 Semitone	0..127	-64..+63	
A 21	a	Osc1 Keyfollow	0..127	-64..+63,	Default: 32
A 22	a	Osc2 Shape	0..127	-64..0..+63:	Wave..Saw..Pulse
A 23	a	Osc2 Pulsewidth	0..127		

No.	Class	Name	Range	Value	Text
A 24	a	Osc2 Wave Select	0..64		Sine, Triangle, Wave 3..64
A 25	a	Osc2 Semitone	0..127	-64..+63	
A 26	a	Osc2 Detune	0..127		
A 27	a	Osc2 FM Amount	0..127		
A 28	a	Osc2 Sync	0..1		0:Off 1:On
A 29	a	Osc2 Filt Env Amt	0..127	-64..+63	
A 30	a	FM Filt Env Amt	0..127	-64..+63	
A 31	a	Osc2 Keyfollow	0..127	-64..+63:	Default: 32
A 32	p	Bank Select	0..3		Bank A..D
A 33	a	Osc Balance	0..127		-64..+63:
A 34	a	Suboscillator Volume	0..127		
A 35	a	Suboscillator Shape	0..1		0:Square 1:Triangle
A 36	a	Osc Mainvolume	0..127		
A 37	a	Noise Volume	0..127		
A 38	a	Ringmodulator Volume	0..127		
A 39	a	Noise Color	0..127	-64..0..+63	
A 40	a	Cutoff	0..127		
A 41	a	Cutoff2	0..127	-64..+63	
A 42	a	Filter1 Resonance	0..127		
A 43	a	Filter2 Resonance	0..127		
A 44	a	Filter1 Env Amt	0..127		
A 45	a	Filter2 Env Amt	0..127		
A 46	a	Filter1 Keyfollow	0..127	-64..+63	
A 47	a	Filter2 Keyfollow	0..127	-64..+63	
A 48	a	Filter Balance	0..127	-64..+63	
A 49	a	Saturation Curve	0..6		0:Off 1:Light 2:Soft 3:Middle 4:Hard 5:Digital ..

No.	Class	Name	Range	Value	Text
A 51	a	Filter1 Mode	0..3		0:LP 1:HP 2:BP 3:BS
A 52	a	Filter2 Mode	0..3		0:LP 1:HP 2:BP 3:BS
A 53	a	Filter Routing	0..3		0:Ser4 1:Ser6 2:Par4 3:Split
A 54	a	Filter Env Attack	0..127		
A 55	a	Filter Env Decay	0..127		
A 56	a	Filter Env Sustain	0..127		
A 57	a	Filter Env Sustain Time	0..127	-64..+63:	Fall..Infinite..Rise
A 58	a	Filter Env Release	0..127		
A 59	a	Amp Env Attack	0..127		
A 60	a	Amp Env Decay	0..127		
A 61	a	Amp Env Sustain	0..127		
A 62	a	Amp Env Sustain Time	0..127	-64..+63:	Fall..Infinite..Rise
A 63	a	Amp Env Release	0...127		
A 64	p	Hold Pedal			
A 65	p	Portamento Pedal			
A 66	p	Sostenuto Pedal			
A 67	a	Lfo1 Rate	0..127		
A 68	a	Lfo1 Shape	0..5		0:Sine 1:Tri 2:Saw 3:Square 4:S&H 5:S&G ..
A 69	a	Lfo1 Env Mode	0..1		0:Off 1:On
A 70	a	Lfo1 Mode	0..1		0:Poly 1:Mono
A 71	a	Lfo1 Symmetry	0..127	-64..+63	
A 72	a	Lfo1 Keyfollow	0..127		
A 73	a	Lfo1 Keytrigger	0..127		0:Off, 1..127:Keytrigger Phase
A 74	a	Osc1 Lfo1 Amount	0..127	-64..+63	
A 75	a	Osc2 Lfo1 Amount	0..127	-64..+63	
A 76	a	PW Lfo1 Amount	0..127	-64..+63	
A 77	a	Reso Lfo1 Amount	0..127	-64..+63	

No.	Class	Name	Range	Value	Text
A 78	a	FiltGain Lfo1 Amount	0..127	-64..+63	
A 79	a	Lfo2 Rate	0..127		
A 80	a	Lfo2 Shape	0..5		0:Sine 1:Tri 2:Saw 3:Square 4:S&H 5:S&G ..
A 81	a	Lfo2 Env Mode	0..1		0:Off 1:On
A 82	a	Lfo2 Mode	0..1		0:Poly 1:Mono
A 83	a	Lfo2 Symmetry	0..127	-64..+63	
A 84	a	Lfo2 Keyfollow	0..127		
A 85	a	Lfo2 Keytrigger	0..127		0:Off, 1..127:Keytrigger Phase
A 86	a	OscShape Lfo2 Amount	0..127	-64..+63	
A 87	a	FmAmount Lfo2 Amount	0..127	-64..+63	
A 88	a	Cutoff1 Lfo2 Amount	0..127	-64..+63	
A 89	a	Cutoff2 Lfo2 Amount	0..127	-64..+63	
A 90	a	Panorama Lfo2 Amount	0..127	-64..+63	
A 91	a	Patch Volume	0..127		
A 93	a	Transpose	0..127	-64..+63	
A 94	a	Key Mode	0..4		0:Poly 1..4: Mono1-4
A 97	a	Unison Mode	0..15		0:Off 1:Twin 2..15
A 98	a	Unison Detune	0..127		
A 99	a	Unison Panorama Spread	0..127		
A100	a	Unison Lfo Phase	0..127	-64..+63	
A101	a	Input Mode	0..2		0:Off 1:Dynamic 2:Static 3:ToEffects
A102	a	Input Select	0..8		0:In1L 1:In1L+R 2:In1R ..
A105	a	Chorus Mix	0..127		
A106	a	Chorus Rate	0..127		
A107	a	Chorus Depth	0..127		
A108	a	Chorus Delay	0..127		
A109	a	Chorus Feedback	0..127	-64..+63	

No.	Class	Name	Range	Value	Text
A110	a	Chorus Lfo Shape	0..5		0:Sine 1:Tri 2:Saw 3:Square 4:S&H 5:S&G ..
A112	a	Delay/Reverb Mode	0..1		0:Off 1:Delay 2:Reverb 3:Rev+Feedb1
A113	a,ms	Effect Send	0..127		
A114	a,ms,np	Delay Time	0..127		
A115	a,ms,np	Delay Feedback	0..127		
A116	a,ms,np	Delay Rate	0..127		
		Reverb Decay Time	0..127		
A117	a,ms,np	Delay Depth	0..127		
		Reverb Room Size	0..3		0:Ambience 1:SmallRoom 2:LargeRoom 3:Hall
A118	a,ms,np	Delay Lfo Shape	0..5		0:Sine 1:Tri 2:Saw 3:Square 4:S&H 5:S&G ..
		Reverb Damping	0..127		
A119	a,ms,np	Delay Color	0..127	-64..+63	
A123	p	All Notes Off			

No.	Class	Name	Range	Value	Text
PAGE B					
B 1	b	Arp Mode	0..6		0:Off 1:Up 2:Down 3:Up&Down 4:AsPlayed 5:Random 6:Chord
B 2	b	Arp Pattern Select	0..31		
B 3	b	Arp Octave Range	0..3		
B 4	b	Arp Hold Enable	0..1		0:Off 1:On
B 5	b	Arp Note Length	0..127	-64..+63c	
B 6	b	Arp Swing	0..127	50%..75%	
B 7	b	Lfo3 Rate	0..127		
B 8	b	Lfo3 Shape	0..5		0:Sine 1:Tri 2:Saw 3:Square 4:S&H 5:S&G ..
B 9	b	Lfo3 Mode	0..1		0:Poly 1:Mono
B 10	b	Lfo3 Keyfollow	0..127		
B 11	b	Lfo3 Destination	0..5		0:Osc1 1:Osc1+2 2:Osc2 3:PW1 4:PW1+2 5:PW2
B 12	b	Osc Lfo3 Amount	0..127		
B 13	b	Lfo3 Fade-In Time	0..127		
B 16	b	Clock Tempo	0..127	63..190 BPM	
B 17	b	Arp Clock	1..17	1/64..1/1	
B 18	b	Lfo1 Clock	0..19		Off, 1/64..4/1
B 19	b	Lfo2 Clock	0..19		Off, 1/64..4/1
B 20	b,ms,np	Delay Clock	0..16		Off, 1/64..3/4
B 21	b	Lfo3 Clock	0..19		Off, 1/64..4/1
B 25	b	Control Smooth Mode	0..3		0:Off, 1:On, 2:Auto, 3:Note
B 26	b	Bender Range Up	0..127	-64..+63	
B 27	b	Bender Range Down	0..127	-64..+63	
B 28	b	Bender Scale	0..1		0:Linear 1:Exponential
B 30	b	Filter1 Env Polarity	0..1		0:Negative 1:Positive
B 31	b	Filter2 Env Polarity	0..1		0:Negative 1:Positive

No.	Class	Name	Range	Value	Text
B 32	b	Filter2 Cutoff Link	0..1		0:Off 1:On
B 33	b	Filter Keytrack Base	0..127		C-1..G9
B 35	b	Osc Init Phase	0..127		0:Off 1..127
B 36	b	Punch Intensity	0..127		
B 39	b	Vocoder Mode	0..12		0:Off 1:Osc 2:OscHold 3:Noise 4:In L 5:In L+R ..
B 47	b	Osc1 Shape Velocity	0..127	-64..+63	
B 48	b	Osc2 Shape Velocity	0..127	-64..+63	
B 49	b	PulseWidth Velocity	0..127	-64..+63	
B 50	b	Fm Amount Velocity	0..127	-64..+63	
B 54	b	Filter1 EnvAmt Velocity	0..127	-64..+63	
B 55	b	Filter1 EnvAmt Velocity	0..127	-64..+63	
B 56	b	Resonance1 Velocity	0..127	-64..+63	
B 57	b	Resonance2 Velocity	0..127	-64..+63	
B 60	b	Amp Velocity	0..127	-64..+63	
B 61	b	Panorama Velocity	0..127	-64..+63	
B 62	b	Definable1 Single			see Definable List
B 63	b	Definable2 Single			see Definable List
B 64	b	Assign1 Source			see Assign Sources List
B 65	b	Assign1 Destination			see Assign Destinations List
B 66	b	Assign1 Amount	0..127	-64..+63	
B 67	b	Assign2 Source			see Assign Sources List
B 68	b	Assign2 Destination1			see Assign Destinations List

No.	Class	Name	Range	Value	Text
B 69	b	Assign2 Amount1	0..127	-64..+63	
B 70	b	Assign2 Destination2			see Assign Destinations List
B 71	b	Assign2 Amount2	0..127	-64..+63	
B 72	b	Assign3 Source			see Assign Sources List
B 73	b	Assign3 Destination1			see Assign Destinations List
B 74	b	Assign3 Amount1	0..127	-64..+63	
B 75	b	Assign3 Destination2			see Assign Destinations List
B 76	b	Assign3 Amount2	0..127	-64..+63	
B 77	b	Assign3 Destination3			see Assign Destinations List
B 78	b	Assign3 Amount3	0..127	-64..+63	
B 79	b	LFO1 Assign Dest			see Assign Destinations List
B 80	b	LFO1 Assign Amount	0..127	-64..+63	
B 81	b	LFO2 Assign Dest			see Assign Destinations List
B 82	b	LFO2 Assign Amount	0..127	-64..+63	
B 84	OS2.0	Phaser Mode	0..6		0:Off, 1..6: Phaser Stages
B 85	OS2.0	Phaser Mix	0..127		
B 86	OS2.0	Phaser Rate	0..127		
B 87	OS2.0	Phaser Depth	0..127		
B 88	OS2.0	Phaser Feedback	0..127	-64 .. +63	
B 89	OS2.0	Phaser Spread	0..127		
B 97	b	Abalog Boost Intensity	0..127		
B 98	b	Analog Boost Tune	0..127		
B 99	OS2.0	Input Ringmodulator	0..127		0: Off 1..127: Direct .. Ringmodulator .. Input

No.	Class	Name	Range	Value	Text
B112	b	Single Name Char1	32..127	ASCII	
B113	b	Single Name Char2	32..127	ASCII	
B114	b	Single Name Char3	32..127	ASCII	
B115	b	Single Name Char4	32..127	ASCII	
B116	b	Single Name Char5	32..127	ASCII	
B117	b	Single Name Char6	32..127	ASCII	
B118	b	Single Name Char7	32..127	ASCII	
B119	b	Single Name Char8	32..127	ASCII	
B120	b	Single Name Char9	32..127	ASCII	
B121	b	Single Name Char10	32..127	ASCII	
B122	b	Filter Select	0..2		0:Filt1 1:Filt2 2:Filt1*2
B123	b				Category1
B124	b				Category2

No.	Class	Name	Range	Value	Text
Page C					
C 5	m,np	Multi Name Char1	32..127	ASCII	
C 6	m,np	Multi Name Char2	32..127	ASCII	
C 7	m,np	Multi Name Char3	32..127	ASCII	
C 8	m,np	Multi Name Char4	32..127	ASCII	
C 9	m,np	Multi Name Char5	32..127	ASCII	
C 10	m,np	Multi Name Char6	32..127	ASCII	
C 11	m,np	Multi Name Char7	32..127	ASCII	
C 12	m,np	Multi Name Char8	32..127	ASCII	
C 13	m,np	Multi Name Char9	32..127	ASCII	
C 14	m,np	Multi Name Char10	32..127	ASCII	
C 22	m,np	Delay Output Select	0..14		0:Out1L 1:Out1L+R 2:Out1R ..
C 31	m,bpc	Part Bank Select	0..3	Bank A..D	
C 32	m,bpc	Part Bank Change	0..3	Bank A..D	
C 33	m,bpc	Part Program Change	0..127		
C 34	m	Part Midi Channel	0..15	1..16	
C 35	m	Part Low Key	0..127	C-1..G9	
C 36	m	Part High Key	0..127	C-1..G9	
C 37	m	Part Transpose	0..127	-64..+63	
C 38	m	Part Detune	0..127	-64..+63	
C 39	m	Part Volume	0..127	-64..+63	0=Unity Gain
C 40	m	Part Midi Volume Init	0..127	Off, 1..127	
C 41	m	Part Output Select	0..14		0:Out1L 1:Out1L+R 2:Out1R ..
C 45	g	Second Output Select	0..15		0:Off 1:Out1L 2:Out1L+R 3:Out1R ..
C 66	g	Keyb Transpose	0..127	-64..+63	
C 72	m	Part Enable	0..1		0:Off 1:On

No.	Class	Name	Range	Value	Text
C 73	m	Part Midi Volume Enable	0..1		0:Off 1:On
C 74	m	Part Hold Pedal Enable	0..1		0:Off 1:On
C 75	m	Keyb To Midi	0..1		0:Off 1:On
C 77	m	Note Steal Priority	0..1		0:Low 1:High
C 78	m	Part Prog Change Enable	0..1		0:Off 1:On
C 85	g	Glob Prog Change Enable	0..1		0:Off 1:On
C 86	g	MultiProg Change Enable	0..1		0:Off 1:On
C 87	g	Glob Midi Volume Enable	0..1		0:Off 1:On
C 90	g	Input Thru Level	0..127		
C 91	g	Input Boost	0..127		
C 92	g	Master Tune	0..127	-64..+63	
C 93	g	Device ID	0..16	1..16, Omni	
C 94	g	Midi Control Low Page	0..1		0:SysEx 1:Contr
C 95	g	Midi Control High Page	0..1		0:SysEx 1:PolyPrs
C 96	g	Midi Arpeggiator Send	0..1		0:Off 1:On
C 97	g	Knob Display	0..3		0:Off 1:Short 2:Long 3:On
C 98	g	Midi Dump Tx	0..4		0:Single 1:SingleBankA 2:SingleBankB ..
C 99	g	Midi Dump Rx	0..4		0:Disable 1:Enable 2:ForceToBankA ..
C105	g	Multi Program Change	0..127		
C106	g	Midi Clock Rx			0:Disable 1:Auto 2:Send
C110	g	Definable1 Mode	0..2		0:Single 1:Global 2:Midi
C111	g	Definable2 Mode	0..2		0:Single 1:Global 2:Midi
C112	g	Definable1 Global			see Definable List
C113	g	Definable2 Global			see Definable List
C114	g	Definable1 Midi	0..127		
C115	g	Definable2 Midi	0..127		
C116	g	Expert Mode	0..1		0:0ff 1:On

No.	Class	Name	Range	Value	Text
C117	g	Knob Mode	0..3		0:Off 1:Jump 2:Snap 3:Relative
C118	g	Memory Protect	0..1		0:0ff 1:Warn 2:On
C120	g	Soft Thru	0..1		0:0ff 1:On
C121	g	Panel Destination	0..2		0:Internal 1:Int+Midi 2:Midi
C122	g	Play Mode	0..2		0:Single 1:MultiSingle 2:Multi
C123	g	Part Number	0..15;40		0..15:Multi Part 1..16; 40:Single Buffer
C124	g	Global Channel	0..15	1..16	
C125	g	Led Mode	0..2		0:Lfo 1:Input 2:Auto ..
C126	g	LCD Contrast	0..127		
C127	g	Master Volume	0..127		

MULTI DUMP TABLE

NO	REF	NAME	RANGE	VALUE	TEXT
0..3		Internal			
4..13		Multi Name Characters 1..10	32..127	ASCII	
14		Internal			
15		Multi Clock Tempo	0..127	63..190 BPM	
16		Multi Delay Mode	0..1	0:Off 1:On	
17		Multi Delay Time	0..127		
18		Multi Delay Feedback	0..127		
19		Multi Delay Rate	0..127		
20		Multi Delay Depth	0..127		
21		Multi Delay Shape	0..5		0:Sine 1:Tri 2:Saw 3:Square 4:S&H 5:S&G
22		Multi Delay Output Select	0..127		0:Out1L 1:Out1L+R 2:Out1R ..
23		Multi Delay Clock	0..16		Off, 1/64..3/4
24		Multi Delay Color	0..127	-64..+63	
25..31		Internal			
32..47	Part 1..16	Bank Number	0..1		
48..63	Part 1..16	Program Number	0..127		
64..79	Part 1..16	Midi Channel	0..15	1..16	
80..95	Part 1..16	Low Key	0..127	C-1..G9	
96..111	Part 1..16	High Key	0..127	C-1..G9	
112..127	Part 1..16	Transpose	0..127	-64..+63	
128..143	Part 1..16	Detune	0..127	-64..+63	

NO	REF	NAME	RANGE	VALUE	TEXT
144..159	Part 1..16	Part Volume	0..127	-64..+63;	0=Unity Gain
160..175	Part 1..16	Midi Volume Init	0..127	Off, 1..127	
176..191	Part 1..16	Output Select	0..14		0:Out1L 1:Out1L+R 2:Out1R ..
192..207	Part 1..16	Effect Send	0..127		
208..239		Internal			
240..255		Part State		Part 1..16	Bitfield (see Part State Bitfield)

NO	REF	NAME	RANGE	VALUE	TEXT
Part State Bitfield:					
Bit 0		Part Enable			0:Off 1:On
Bit 1		Part Midi Volume Enable			0:Off 1:On
Bit 2		Part Hold Pedal Enable			0:Off 1:On
Bit 4		Internal			
Bit 5		Note Steal Priority			0:Low 1:High
Bit 6		Part Prog Change Enable			0:Off 1:On

■ *All bytes are shown in decimal representation.*