

## VRC ESP Simplified

When you have a look at the VRC ESP analysis data, at first glance it may look overwhelming. So let's break it down in a way that's easy to understand what's really happening after using VRC Easy Spread n' Peel (ESP).

### What was tested?

Five vinyl recordings were chosen with the intent to find recordings of different genres and dynamic content. Each recording saw different amounts of playtime, storage time, storage habits, and grime over the course of their history. The goal was to find consistent and measurable differences before and after ESP was applied.

### How was it tested?

The first step was to digitize the chosen selections before and after ESP treatments were applied, and measure them with computer software. This was accomplished with modest consumer equipment available to anyone, in an average environment to prove that even the most humble equipment will see and hear the results.

### How was it measured?

Each segment of audio that was tested, was aligned and measured at the exact precise times before and after cleaning. This would ensure the measurements that relied on timing were accurate. Not only did each recording need to be referenced to itself in terms of how well the product improved playback, but in a way that could be related to each other as well, since we were working with such a broad assortment of audio material.

The chart on the first page is simply an overview of all of the tests that were performed, and it's average percentage of improvement, with the baseline measurements being taken from the original recording. It's simply easier to visualize all of the data at a glance, without needing to do all of the math.

Mean Averages of Gains	
Average db RMS	22.98%
Maximum Digital Peak	116.07%
Minimum Digital Floor	1143.40%
Integrated Loudness	10.17%
Dynamic Range	25.03%
Short Term Loudness Max	36.31%
Short Term Loudness Min	467.77%
Momentary Loudness Max	103.30%
Momentary Loudness Min	255.63%
Total Gains Average Improvement	
242.30%	

The measurements for average db RMS, and the 4 different loudness measurements, are just a way of averaging loudness over a given period of time. So each show the same kind of data, with the exception that they are all weighted and averaged over different amounts of time and values.

The measurements for maximum digital peak, and minimum digital floor also factor in to the previous loudness measurements. We can think of the minimum digital floor as “hiss” or dirt, and the maximum digital peak as a “pop” or jump of the needle. There’s more to it than that, but it’s probably the easiest way of explaining what these are. They are the immediate highest and lowest dynamic measurements in a recording. So being able to look at these afterwards is a great way of being able to see how ESP is pulling the grime out of a vinyl.

The difference between the highest and lowest values is called dynamic range. In all cases we’re looking to improve and increase dynamic range by pulling out the dirt and debris which create additional noise on top of the original recording. Conversely with the instantaneous and average measurements we took, the lower the numbers after cleaning the better.

All things factored, these are simply just a narrow scope of what we can measure with modest equipment and a bit of math. So not only do the results show improvement on paper, but the results are stunning after using ESP.

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Analysis

# VRC Easy Spread n' Peel

All measurements based on 20 second sample of audio at the same sample position between cleanings. Percentages are calculated on a base log of 20.

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Total Gains Average Improvement
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Analysis

<b>Pre-clean</b>					
	Diamond	Elton John	Stevens	Tchaikovsky	Vivaldi
Average db RMS	-17.77	-18.84	-22.02	-21.97	x
Maximum Digital Peak	-12.08	-9.39	-15.28	-13.68	x
Minimum Digital Floor	-97.02	-47.84	-82.72	-83.04	x
Integrated Loudness	-17.3	-15.2	-21	-21.7	-13.7
Dynamic Range	3.9	4.8	3.5	6.1	2.2
Short Term Loudness Max	-15.1	-12.9	-18.7	-19.2	-12.4
Short Term Loudness Min	-20.6	-33.1	-22.9	-26	-15.2
Momentary Loudness Max	-13.4	-8.4	-15.8	-14.8	-9.4
Momentary Loudness Min	-23.7	-40.9	-26.4	-32.5	-19.5

<b>1<sup>st</sup> Clean</b>					
	Diamond	Elton John	Stevens	Tchaikovsky	Vivaldi
Average db RMS	-18.05	-18.21	-22.74	-22.74	x
Maximum Digital Peak	-13.51	-9.72	-15.91	-15.9	x
Minimum Digital Floor	-78.96	-82.31	-76	-76	x
Integrated Loudness	-17.6	-15.5	-19.9	-22.7	-13.5
Dynamic Range	3.9	4.5	7	3.9	2.1
Short Term Loudness Max	-15.4	-12.7	-15.8	-21.4	-12.3
Short Term Loudness Min	-20.6	-18.8	-23.5	-25.9	-14.8
Momentary Loudness Max	-13.6	-8.5	-9.8	-17.5	-9.3
Momentary Loudness Min	-24.2	-28.9	-27.3	-32.4	-18.9

<b>2<sup>nd</sup> Clean</b>					
	Diamond	Elton John	Stevens	Tchaikovsky	Vivaldi
Average db RMS	-17.99	-17.63	-21.02	-22.57	x
Maximum Digital Peak	-13.43	-8.69	-8.14	-15.81	x
Minimum Digital Floor	-74.78	-83.49	-81.55	-75.71	x
Integrated Loudness	-17.6	-14.9	-19.4	-22.7	-13.4
Dynamic Range	4	4.1	7.3	3.8	2.2
Short Term Loudness Max	-15.3	-12.3	-15	-21.4	-12.1
Short Term Loudness Min	-20.7	-18	-23.1	-25.9	-14.7
Momentary Loudness Max	-13.4	-7.8	-8.9	-17.4	-9.1
Momentary Loudness Min	-24.6	-29.5	-27.1	-32.5	-18.8

## Analysis

### 1<sup>st</sup> Clean Difference

	Diamond	Elton John	Stevens	Tchaikovsky	Vivaldi
Average db RMS	-0.28	0.63	-0.72	-0.77	x
Maximum Digital Peak	-1.43	-0.33	-0.63	-2.22	x
Minimum Digital Floor	18.06	-34.47	6.72	7.04	x
Integrated Loudness	-0.3	-0.3	1.1	-1	0.2
Dynamic Range	0	-0.3	3.5	-2.2	-0.1
Short Term Loudness Max	-0.3	0.2	2.9	-2.2	0.1
Short Term Loudness Min	0	14.3	-0.6	0.1	0.4
Momentary Loudness Max	-0.2	-0.1	6	-2.7	0.1
Momentary Loudness Min	-0.5	12	-0.9	0.1	0.6

### 2nd Clean Difference

	Diamond	Elton John	Stevens	Tchaikovsky	Vivaldi
Average db RMS	0.06	0.58	1.72	0.17	x
Maximum Digital Peak	0.08	1.03	7.77	0.09	x
Minimum Digital Floor	4.18	-1.18	-5.55	0.29	x
Integrated Loudness	0	0.6	0.5	0	0.1
Dynamic Range	0.1	-0.4	0.3	-0.1	0.1
Short Term Loudness Max	0.1	0.4	0.8	0	0.2
Short Term Loudness Min	-0.1	0.8	0.4	0	0.1
Momentary Loudness Max	0.2	0.7	0.9	0.1	0.2
Momentary Loudness Min	-0.4	-0.6	0.2	-0.1	0.1

### Final Difference from Original

	Diamond	Elton John	Stevens	Tchaikovsky	Vivaldi
Average db RMS	-0.22	1.21	1	-0.6	x
Maximum Digital Peak	-1.35	0.7	7.14	-2.13	x
Minimum Digital Floor	22.24	-35.65	1.17	7.33	x
Integrated Loudness	-0.3	0.3	1.6	-1	0.3
Dynamic Range	0.1	-0.7	3.8	-2.3	0
Short Term Loudness Max	-0.2	0.6	3.7	-2.2	0.3
Short Term Loudness Min	-0.1	15.1	-0.2	0.1	0.5
Momentary Loudness Max	0	0.6	6.9	-2.6	0.3
Momentary Loudness Min	-0.9	11.4	-0.7	0	0.7

Analysis

**Percent Difference 1<sup>st</sup> Clean**

	Diamond	Elton John	Stevens	Tchaikovsky	Vivaldi
Average db RMS	-3.17%	7.52%	-7.96%	-8.48%	
Maximum Digital Peak	-15.18%	-3.73%	-7.00%	-22.55%	
Minimum Digital Floor	699.83%	-98.11%	116.77%	124.91%	
Integrated Loudness	-3.39%	-3.39%	13.50%	-10.87%	2.33%
Dynamic Range	0.00%	-3.39%	49.62%	-22.38%	-1.14%
Short Term Loudness Max	-3.39%	2.33%	39.64%	-22.38%	1.16%
Short Term Loudness Min	0.00%	418.80%	-6.67%	1.16%	4.71%
Momentary Loudness Max	-2.28%	-1.14%	99.53%	-26.72%	1.16%
Momentary Loudness Min	-5.59%	298.11%	-9.84%	1.16%	7.15%

**Percent Difference 2<sup>nd</sup> Clean**

	Diamond	Elton John	Stevens	Tchaikovsky	Vivaldi
Average db RMS	0.69%	6.91%	21.90%	1.98%	
Maximum Digital Peak	0.93%	12.59%	144.62%	1.04%	
Minimum Digital Floor	61.81%	-12.70%	-47.22%	3.40%	
Integrated Loudness	0.00%	7.15%	5.93%	0.00%	1.16%
Dynamic Range	1.16%	-4.50%	3.51%	-1.14%	1.16%
Short Term Loudness Max	1.16%	4.71%	9.65%	0.00%	2.33%
Short Term Loudness Min	-1.14%	9.65%	4.71%	0.00%	1.16%
Momentary Loudness Max	2.33%	8.39%	10.92%	1.16%	2.33%
Momentary Loudness Min	-4.50%	-6.67%	2.33%	-1.14%	1.16%

**Percent Difference Final**

	Diamond	Elton John	Stevens	Tchaikovsky	Vivaldi
Average db RMS	-2.50%	14.95%	12.20%	-6.67%	
Maximum Digital Peak	-14.39%	8.39%	127.51%	-21.75%	
Minimum Digital Floor	1194.20%	-98.35%	14.42%	132.54%	
Integrated Loudness	-3.39%	3.51%	20.23%	-10.87%	3.51%
Dynamic Range	1.16%	-7.74%	54.88%	-23.26%	0.00%
Short Term Loudness Max	-2.28%	7.15%	53.11%	-22.38%	3.51%
Short Term Loudness Min	-1.14%	468.85%	-2.28%	1.16%	5.93%
Momentary Loudness Max	0.00%	7.15%	121.31%	-25.87%	3.51%
Momentary Loudness Min	-9.84%	271.54%	-7.74%	0.00%	8.39%