Basic Guide for CTR 2.1 RC1

🔥 CTR Guide

Content

🔥 CTR Guide - BIOS Preparation + RAM

- **<u>BIOS:</u> Make sure you have your BIOS configured properly, either following the "Basic BIOS Guide for CTR" or by being 100% sure you're an expert enough to judge that your settings are compatible with CTR**

- **<u>RAM:</u> Make sure that your RAM is stable.**
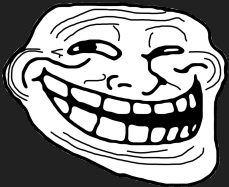
Nah I wanna get going, cause I am using XMP

- **XMP is not equal to "stable"!!!**

- **So do yourself a favor and stability check your RAM!**
  (if you know how - skip the next 3 slides)

Skip the section about RAM stability testing

🔥 CTR Guide - RAM Stability check

- **For this stability test, you can choose whatever "RAM-tester" you want. In the following, I will explain how to use memtest, which is integrated in Yuri's (1usmus) Ryzen DRAM Calculator a VERY comfortably way.**

- **Download it (for example) here:** DRAM Calculator for Ryzen (v1.7.3) Download | TechPowerUp

- **Extract the files and open it by clicking**

- **Go to** MEMbench **slide**

🔥 CTR Guide - RAM Stability check

- **Change** MEMbench mode **from "Easy" to "Memtest"**

- **Change** Task scope (%) **from "100%" to "500%"**

- **Click** Run

🔥 CTR Guide - RAM Stability check

- **The test will take some time. It is finished when each thread is hitting above 500% of "Task scope (%)"**

- **Very rough estimation:**
  - **3 hours (+/- 30 min)**

- **Trust me, it is worth waiting!**

- **When it finishes without errors I wouldn't call your RAM rock stable, but it is highly unlikely unstable**

Threads	Task scope (%)	Errors
All	100.3	0
1	4.2	0
2	4.2	0
3	4.2	0
4	4.2	0
5	4.2	0
6	4.2	0
7	4.2	0
8	4.2	0
9	4.2	0
10	4.2	0
11	4.2	0
12	4.2	0
13	4.2	0
14	4.2	0
15	4.2	0
16	4.1	0
17	4.2	0
18	4	0
19	4.2	0
20	4	0
21	4.2	0
22	4.2	0
23	4.2	0
24	4.2	0

🔥 CTR Guide - First Start and diagnostic

- **Start CTR**

- **Click on** 🕐 **TUNER**

- **Click on** DIAGNOSTIC

- **The diagnostic process will start by opening Cinebench and doing a multi core test.**

- **In case your PC crashed / diagnostic ends immediately after the Cinebench run, try to increase the diagnostic voltage. Switch** Settings mode Default ⌄
to Advanced and set this Diagnostic voltage (mV) 1250 **and run diagnostic again**

🔥 CTR Guide - Diagnostic

- **CTR will show you what its doing**

```
20:12:00: CCX1 (158): 4375 MHz, 1187 mV
20:12:00: CCX2 (133): 4375 MHz, 1187 mV
20:12:00: Step# 1. Diagnostic VID: 1187 mV
20:12:01: Stress test 1 started...
20:12:07: CCX1 VID injection: 100%  CCX2 VID injection: 0%
20:12:07: Vdroop 4,3 %
20:12:07: Recommended to increase the voltage compensation!
20:12:37: Stress test stopped.
```

- **Each of your CCX will be tested with a defined clock speed and a defined voltage.**

- **CTR will do two tests of each voltage setting. If your chip is able to handle this load it will decrease the voltage by 6 mV as a next step and test again.**

OMG!!!!!!
This is taking
forever!!!

- **Yes it will take some time. The better your chip, the longer it will take!**

- **How long? Nobody can answer this question, because nobody knows the quality of your chip**
  - **A rough estimation:**
    "time to bronze"   = up to 10 min
    "time to silver"   = up to 25 min
    "time to gold"   = up to 40 min

- **This will be continued until one of the following cases are happening:**
  - **One thread falls down**
  - **Your PC crashes (DON'T PANIC!!!)**

- **If your PC crashed, CTR will start automatically some time after the reboot. This is nothing to worry about!**

🔥 CTR Guide - First Start - Diagnostic result

- **The goal of the whole procedure is to determine the lowest voltage at which your CPU is stable at the diagnostic frequency**

- **This information is used by CTR to define the following things:**
  - **Category of your sample**
    - **Platinum / Gold / Silver / Bronze**
  - **CCX Delta = How much MHz your CCX1 will be able to clock higher than your CCX2 (estimation!)**
  - **Recommendation of…**
    - **Voltage and reference frequency settings for P1 (Profile 1)**
    - **Voltage and reference frequency settings for P2 (Profile 2)**
    - **Voltage and reference frequency settings for undervolting**

Phoenix - hello there :)
CTR completed diagnostic in alternative mode

DIAGNOSTIC RESULTS
AMD Ryzen 9 5900X 12-Core Processor
Max temperature: 42.4°
Energy efficient: 4.05
Your CPU is SILVER SAMPLE
Recomended CCX delta: 100
Theoretical maximum CCX delta: 125
Recomended values for overclocking (P1 profile):
Reference voltage: 1175 mV
Reference frequency: 4525 MHz
Recomended values for overclocking (P2 profile):
Reference voltage: 1275 mV
Reference frequency: 4675 MHz
Recomended values for undervolting:
Reference voltage: 1000 mV
Reference frequency: 4175 MHz

I HIGHLY RECOMMEND TO TAKE A SCREENSHOT OR NOTE DOWN THE DIAGNOSTIC RESULTS! ‼️

🔥 CTR Guide - First Start - Tuning P1 profile

Wall of text! Show me tuning!

- **OK… the next step is the tuning process. The diagnostic recommendation of P1 have been already loaded.**

Recomended CCX delta: 100
Theoretical maximum CCX delta: 125
Recomended values for overclocking (P1 profile):
Reference voltage: 1175 mV
Reference frequency: 4525 MHz

- **All you have to do is to click on** TUNE

- **This process will take some time.**
  - **In most cases about 20-25 min**
  - **5600X / 5800X will be faster**
  - **5900X / 5950X will be slower**
    - **(each CCX gets tested)**

- **CTR will test your processor in a similar way as diagnostic. But now each CCX will be tested at a given frequency**

Testing mode	AVX Light	Reference voltage (mV)	1175	Max PPT (W)	200
Cycle time (s)	360	Reference frequency (MHz)	4525	Max EDC (A)	200
CCX delta (MHz)	100	Max frequency (MHz)	4900	Max TDC (A)	150
Polling period (ms)	500	Diagnostic voltage (mV)	1187	Max temperature (°C)	85

🔥 CTR Guide - First Start - Tuning P1 profile

- **When the tuning process has finished you will get a result like this:**

```
Penalties for the final profile: level 3
23:40:01: CCX1 (158): 4475 MHz, 1181 mV  OC=
23:40:01: CCX2 (133): 4425 MHz, 1181 mV  OC+
Cinebench R20 started
Phoenix deactivated!
Cinebench R20 finished with result: 8347
Voltage: 1.211 V  PPT: 139.2 W  Temperature: 49.2°
```

- **What does that mean?**
  - **CCX1 will run at 4475 Mhz**
  - **CCX2 will run at 4425 Mhz**
  - **with a voltage of 1181 mV**

- **This is your first profile, which is called "P1"**
  - **by default CTR will use the P1 profile for loads that will have a CPU usage of 75-100 %.**

FAQ time!

- **"My P1 recommended voltage is different!"**
  - **CTR will recommend the following voltages for your CPU running P1:**
    - **5600X - 1150 mV**
    - **5800X - 1250 mV**
    - **5900X - 1175 mV**
    - **5950X - 1150 mV**

- **"What is this 1181 mV - i thought it has tested at 1175 mV"**
  - **CTR is trying to find a compromise between max clock speed and lowest possible voltage for this clock speed. To make the clock speed of 4475 Mhz / 4425 Mhz reliable, CTR has added 6 mV**

🔥 CTR Guide - First Start - Tuning P1 profile

- **How to save your profile P1?**

- **Go into** PROFILES

- **The profiles section will look like this**

- **Just click on** FILL & SAVE P1 PROFILE

🔥 CTR Guide - First Start - Tuning P1 profile

- **Now the P1 section will look like this**

P1 PROFILE : filled and saved!							
VID (mV)	1181	CPU usage min (%)	75	Holding time (ms)	750	SAVE P1 PROFILE	
CCX1 (MHz)	4475	CCX3 (MHz)	0	CCX5 (MHz)	0	CCX7 (MHz)	0
CCX2 (MHz)	4425	CCX4 (MHz)	0	CCX6 (MHz)	0	CCX8 (MHz)	0

ACTIVATE P1 PROFILE

- **The message "filled and saved!" next to P1 Profile is important!**

- **In addition CTR has already determined the values for your PX Profile.**

WOW, a "X" in the name - should be fast!

- **Yeah! The new PX profile is the so called low thread profile which comes into play especially during gaming and one threaded loads**

- **What does PX?**

- **loads with up to 2 threads will activate**

  HIGH STATE (MHz) 4975

- **loads with up to 4 threads will activate**

  MID STATE (MHz) 4925

- **on 5600X and 5900X loads with up to 6 threads will activate**

  LOW STATE (MHz) 4850

- **on 5800X and 5950X it will be able to boost up to 8 threaded loads to the low state**

- **For now you can save your PX profile If you encounter stability problems with PX check the "PX troubleshooting" section of the guide!**

🔥 CTR Guide - First Start - Tuning

- You can now activate P1 by clicking on **ACTIVATE P1 PROFILE** but this will act like a manual OC, so you will have P1 applied all the time.

- Therefore it is better to use "Hybrid OC" All of the workloads that exceed the PX profile but doesn't reach the the minimum CPU usage of P1 (75% by default) the standard boost pattern of the CPU will be applied

- To activate this AWESOME feature you simply have to check **CTR HYBRID OC** ▢

- I recommend to also check **Autoload profile with OS** ▢ to autoload the profiles

- If you don't want CTR to autoload the profiles with OS you can skip to the next slide!

- Now click the buttons in the following order:
  - (Make sure CTR Hybrid OC is checked)
  - ACTIVATE P1
  - ACTIVATE PX
  - SAVE PX
  - SAVE P1
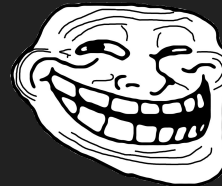
  Save again?!?

- Yes, with the first saving you simply saved the values of the profile, with the saving after the activation, you saved the activation ;-)

🔥 CTR Guide - First Start - Tuning

Wait! What is with loads between PX and P1?

Recomended values for overclocking (P2 profile):
Reference voltage: 1275 mV
Reference frequency: 4675 MHz

- **This is your P2!**

- **Did you took a screenshot or notes about the diagnostic results? No? And you had a reboot since the diagnostic?**

- **You can look in the CTR folder. There is a folder named "CTR logs". You have to work through the files.**

- **To begin with the tuning process of P2 you have to enter the diag. results manually. Go into** 🕐 TUNER

- **Enter these values as followed:**

| Reference voltage (mV) | 1275 |
| Reference frequency (MHz) | 4675 |

- **Click** TUNE

- **You can return to slide 11 for step-by-step through the tuning process. It is the same as setting up P1!**

🔥 CTR Guide - Don't hunt a category

FUCK, I lost the silicon lottery!!! Only got Bronze...

- **To be honest, there are many of these factors that you cannot change**
  - **At least not right now**

- **Maybe you have, but there are so many factors which come into play during diagnostic…**
  - **Quality of your CPU**
  - **Power supply getting old (keyword ripple)**
  - **Number and quality of your VRM phases**
  - **AGESA (!!!) / BIOS version**
  - **BIOS configuration**
  - **Background processes**
  - **RAM / FCLK stability**
  - **CPU Temperature**
  - **...**

This is only luck - or you buy 10 samples and start to binning them by yourself ;-)

Getting a new PSU?

Getting a better motherboard? Improve cooling of VRM's somehow?

Hope that someday AMD will fix their shit? (USB… or "L3 Cache Aida Hotfix")

Only the last three can be influenced at short term IMO
Background processes should be clear and you RAM should already be checked for stability!

🔥 CTR Guide - Don't hunt a category - Temps

- **So the temperature remains…**

- **Quick example of what of an impact the temperature can have:**

DIAGNOSTIC RESULTS
AMD Ryzen 9 5900X 12-Core Processor
Max temperature: 47.8°
Energy efficient: 4.12
Your CPU is GOLDEN SAMPLE
Recomended CCX delta: 75
Theoretical maximum CCX delta: 100
Recomended values for overclocking (P1 profile):
Reference voltage: 1175 mV
Reference frequency: 4550 MHz
Recomended values for overclocking (P2 profile):
Reference voltage: 1275 mV
Reference frequency: 4700 MHz
Recomended values for undervolting:
Reference voltage: 1000 mV
Reference frequency: 4200 MHz

DIAGNOSTIC RESULTS
AMD Ryzen 9 5900X 12-Core Processor
Max temperature: 35.3°
Energy efficient: 4.17
Your CPU is GOLDEN SAMPLE
Recomended CCX delta: 100
Theoretical maximum CCX delta: 125
Recomended values for overclocking (P1 profile):
Reference voltage: 1175 mV
Reference frequency: 4575 MHz
Recomended values for overclocking (P2 profile):
Reference voltage: 1275 mV
Reference frequency: 4725 MHz
Recomended values for undervolting:
Reference voltage: 1000 mV
Reference frequency: 4225 MHz

Avg. temperature during diagnostic = 38°C
Diagnostic voltage = 1043 mV

Avg. temperature during diagnostic = 27°C
Diagnostic voltage = 1025 mV

🔥 CTR Guide - Don't hunt a category - Temps

- **Another example: 5950X**   (Special thanks to Drejfuss)

00:17:31: Step# 14. Diagnostic VID: 1121 mV

DIAGNOSTIC RESULTS
AMD Ryzen 9 5950X 16-Core Processor
Max temperature: 62,4°
Energy efficient: 3,9
Your CPU is SILVER SAMPLE
Recomended CCX delta: 100
Theoretical maximum CCX delta: 125
Recomended values for overclocking (P1 profile):
Reference voltage: 1100 mV
Reference frequency: 4225 MHz

Cooling setup:
Arctic Liquid 280MM - standard mount, MX-4, Push config (2x140MM) max curve 1150 RPM

01:29:13: Step# 16. Diagnostic VID: 1109 mV

DIAGNOSTIC RESULTS
AMD Ryzen 9 5950X 16-Core Processor
Max temperature: 54,7°
Energy efficient: 3,94
Your CPU is SILVER SAMPLE
Recomended CCX delta: 125
Theoretical maximum CCX delta: 150
Recomended values for overclocking (P1 profile):
Reference voltage: 1100 mV
Reference frequency: 4300 MHz

Cooling setup:
Arctic Liquid 360MM - offset mount, Kryonaut, Push-Pull config (6x120MM) max curve 950 RPM

- **So temperature is important. It won't make a platinum sample out of a bronze one, but it will improve your diagnostic + tuning results and your stability**

- **Consider to**
  - **clean you cooler / radiator**
  - **repaste and remount it**
  - **get a cooler with a offset mounting or get a offset mounting kit (it works wonders)**

🔥 CTR Guide - Another word about categories

I've done all I could, now I will RMA this crappy bronze sample…!

- **Of course you can, wouldn't be fair to the vendor, but it's you sample…**

- **Here you can see what to expect from what kind of samples...**

- **Let's say, you have a bronze 5900X (makes it easier for me to bench…)**

- **You RMA or sell it and get another one. The chances are 16,1 % to get a golden, 65,2 % a silver or 18,8 % to get again a bronze sample**

Ryzen 5 - 5600X

Samples tested:	606
Best Diag-Voltage:	911
Avg. Mhz @1150mV:	4396
Avg. Mhz @1300mV:	4583

Bronze 15,8% — Platinum 1,0% — Gold 34,2% — Silver 49,0%
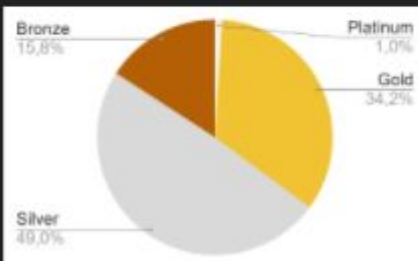
Ryzen 7 - 5800X

Samples tested:	594
Best Diag-Voltage:	881
Avg. Mhz @1250mV:	4564
Avg. Mhz @1325mV:	4622

Bronze 25,0% — Platinum 0,2% — Gold 46,7% — Silver 28,1%
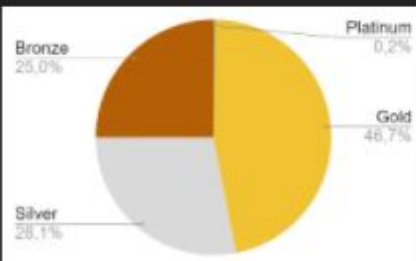
Ryzen 9 - 5900X

Samples tested:	543
Best Diag-Voltage:	1037
Avg. Mhz @1175mV:	4471/4368
Avg. Mhz @1275mV:	4628/4515

Bronze 25,0% — Gold 15,3% — Silver 59,7%
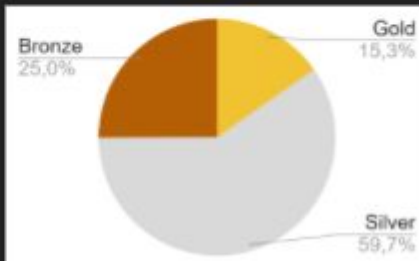
Ryzen 9 - 5950X

Samples tested:	336
Best Diag-Voltage:	1019
Avg. Mhz @1150mV:	4315/4234
Avg. Mhz @1250mV:	4611/4518

Bronze 18,8% — Gold 16,1% — Silver 65,2%
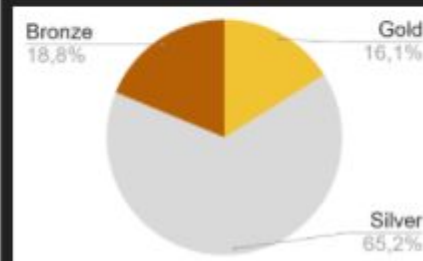
🔥 CTR Guide - Another word about categories

- So let's say you got a silver sample, which will be most likely. What will be the benefit of the whole procedure?

- According to my research in the CTR stats, here are the average clock speeds that each sample will get (remember: in average!)

- So instead of P1 @ 4400/4275 Mhz (bronze) you will get to 4425/4375 Mhz.

- Isn't that much… +25 CCX1 / +100 CCX2

- Or you get really lucky to get a golden 5900X -> P1 @ 4575/4525 Mhz

- That would be a gain of +175 CCX1 / + 250 CCX2

Category	5600X		5800X		5900X			5950X		
	Voltage	Mhz	Voltage	Mhz	Voltage	Mhz		Voltage	Mhz	
						CCD1	CCD2		CCD1	CCD2
Platinum	1150	4600	1250	4775	-	-	-	-	-	-
Gold	1150	4500	1250	4650	1175	4575	4525	1100	4425	4375
	1300	4650	1325	4700	1275	4700	4650	1250	4650	4600
Silver	1150	4375	1250	4550	1175	4425	4375	1100	4350	4250
	1300	4550	1325	4600	1275	4600	4500	1250	4600	4500
Bronze	1150	4250	1250	4450	1175	4400	4275	1100	4250	4125
	1300	4475	1325	4475	1275	4575	4400	1250	4350	4300

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🔥CTR Guide - Another word about categories

- **So we know the candidates, now we will look at how a bronze, silver and a golden 5900X compete against each other**

- **In addition, as I have unfortunately no data of the possible PX settings of each category, I will assume them as followed:**

Sample	PX High	PX Mid	PX Low
Gold	5.050 Mhz	5.000 Mhz	4.975 Mhz
Silver	5.000 Mhz	4.950 Mhz	4.925 Mhz
Bronze	4.950 Mhz	4.900 Mhz	4.875 Mhz

■ stock ■ CO ■ Bronze ■ Silver ■ Gold

CO = a golden 5900X with maxed out curve optimizer

1T (PX-H)
- 636
- 640
- 639
- 645
- 652

2T (PX-H)
- 1259
- 1269
- 1265
- 1277
- 1290

4T (PX-M)
- 2424
- 2463
- 2518
- 2544
- 2556

6T (PX-L)
- 3559
- 3592
- 3736
- 3773
- 3791

18T (P2)
- 7216
- 7617
- 7459
- 7533
- 7790

24T (P1)
- 8112
- 9006 — 220 W @ 1,334 V :-)
- 8494
- 8618
- 8870 — 155 W @ 1,175 V :-)
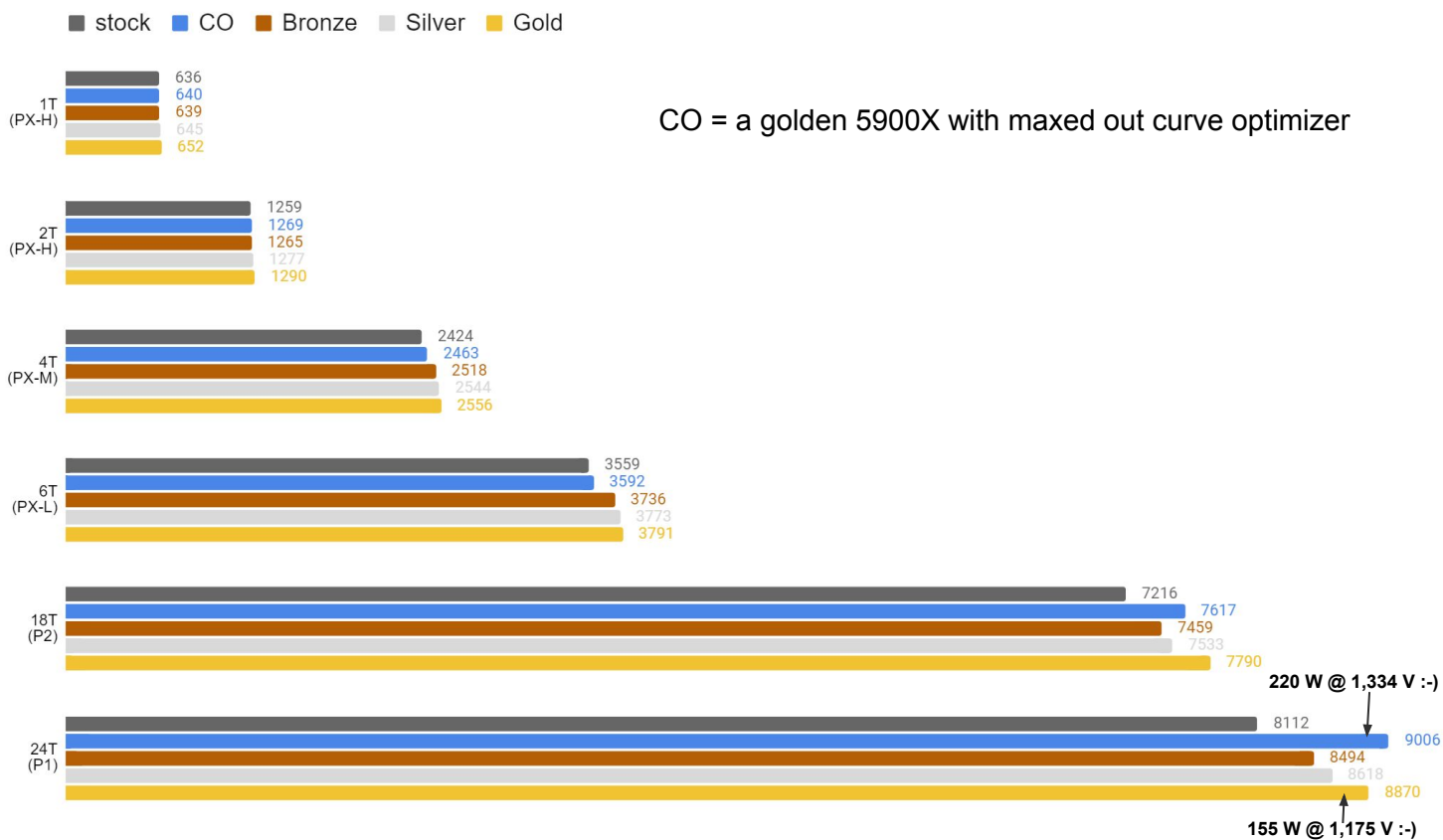
🔥 CTR Guide - Another word about categories

- So we are talking about a difference of 0,9 - 1,2 % (bronze / silver) or 1,5 - 4,4 % (bronze / gold)

- Even with a bronze sample you are constantly over stock performance by a good amount

- And you are practically on par with the values of a golden 5900X with maxed out curve optimizer.

- If you think this (IMO) negligible differences are worth the effort, then please play it fair and sell you sample to the private market and buy another one.

Don't RMA it…

…tune it properly...

...but don't be that guy!

🔥 CTR Guide - Fighting the droop :-)

Hello?!? I still lost the lottery!!! What can I do?

- **So you accepted the recommendation to put LLC on Auto?**

- **Well in that case we can do something!**

- **WARNING: If you do not know what LLC by general is and what Vdroop is for: Please watch buildzoid's great videos**

LLC ->

and Vdroop ->

- **Activate your P1 profile and start an all core Cinebench run while you watch the tuner page of CTR.**

- **It's about those two values:**

CPU TEL (V)	1.125	CPU VID (V)	1.175

- **After watching the videos I recommended, you know about Vdroop!**

- **So here we have CPU VID of 1175 mV and a CPU TEL of 1125 mV (which is the voltage that the processor effectively gets). To calculate the droop you can go like this:**
  VID - TEL = droop -> 1175 - 1125 = 50 mV
  droop / VID x 100 = droop %
  -> 50 / 1175 x 100 = 4,4 %

🔥 CTR Guide - Fighting the droop :-)

Good! I have droop, you have droop… And now?!?

- **We can compensate the droop!**

- **So we got 4,4 % and now we can calculate the higher CPU VID value we have to set to get effectively 1175 mV to our CPU.**

- **Because you watched the videos I have not to tell you, that it is dangerous for your cpu, or? :-)**

- **1175 mV x 0,044 = 52 mV**

- **Add this to 1175 mV -> 1227 mV**

- **Use this as your new P1 voltage**

- **REMEMBER: Do not use my values - calculate your own!!!**

- **Run Cinebench all core again and watch the voltage readings! Now it should look like this:**

  CPU TEL (V)   1.174   **(+/- 5 mV is OK!)**

- **Now it's time for another tune!**

- **To keep the tuning duration short raise you P1 frequency by 50 Mhz**

- **Dig out your diagnostic recommendation of P1 or run another diagnostic.**

- **Enter the new calculated voltage in**
  Reference voltage (mV)   **set your**
  Reference frequency (MHz)   **and click tune!**

🔥 CTR Guide - PX Troubleshooting

- Having trouble with the PX profile? Got a reboot while the rocket symbol was showing that PX was active?

- CTR has some problems with calculating "real" values for the PX profile atm. It's not about the calculations of CTR - it is about the values to calculate with.
  It's not Yuri's fault - in many cases AMD screwed up the classification of each core right at the factory.
  He is already working on a solution for this.

- Until it is ready, we can use a workaround with another amazing new feature of CTR, called "boost tester". You will get the results of it by clicking **BOOST TESTER** on the tuner page.

- The result of it is similar to the one you got during the diagnostic process before. It looks like this:

```
CTR BOOST TESTER RESULTS (test version)
CORE / FREQUENCY / VID / TEMP
C01     F 4817     V 1.486     T 52.55
C02     F 4835     V 1.482     T 51.14
C03     F 4919     V 1.492     T 51.47
C04     F 4918     V 1.491     T 51.93
C05     F 4843     V 1.485     T 54.78
C06     F 4807     V 1.476     T 52.01
C07     F 4734     V 1.48      T 49.5
C08     F 4710     V 1.462     T 47.58
C09     F 4707     V 1.482     T 49.32
C10     F 4702     V 1.48      T 49.42
C11     F 4713     V 1.457     T 48.81
C12     F 4721     V 1.484     T 50.78
```

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🔥 CTR Guide - PX Troubleshooting

- **What we see in this result is the ability of each core to boost to a specific frequency. As we concentrate on setting up PX profile we will only look at the cores of CCX1:**

```
CTR BOOST TESTER RESULTS (test version)
CORE / FREQUENCY / VID / TEMP
C01      F 4817    V 1.486    T 52.55
C02      F 4835    V 1.482    T 51.14
C03      F 4919    V 1.492    T 51.47
C04      F 4918    V 1.491    T 51.93
C05      F 4843    V 1.485    T 54.78
C06      F 4807    V 1.476    T 52.01
```

- **In addition we take a look at the CPPC core order (which is in the diag result too)**

```
CORES ORDER (from the best to the worst)
###   CPPC   VID    FIT
1     C04    C03    C04
2     C03    C04    C06
3     C05    C05    C07
4     C02    C02    C09
5     C01    C01    C05
6     C06    C06    C02
```

- **As we learned previously, each PX state (high, medium and low) represents a different load type.**
  - **High** -> up to 2 threads
  - **Medium** -> up to 4 threads
  - **Low** -> up to 6 or 8 threads
    - 6 threads -> 5600X / 5900X
    - 8 threads -> 5800X / 5950X

- **Windows will load the cores according to this order**

```
###   CPPC
1     C04
2     C03
3     C05
4     C02
5     C01
6     C06
```

High -> C04 + C03
Medium -> C04, C03, C05, C02
Low -> all of em

🔥 CTR Guide - PX Troubleshooting

- **Again we have the following table, now with the colored marks**

- **Now we look for the lowest frequency of each class.**

```
CTR BOOST TESTER RESULTS (test version)
CORE / FREQUENCY / VID / TEMP
C01     F 4817     V 1.486     T 52.55
C02     F 4835     V 1.482     T 51.14
C03     F 4919     V 1.492     T 51.47
C04     F 4918     V 1.491     T 51.93
C05     F 4843     V 1.485     T 54.78
C06     F 4807     V 1.476     T 52.01
```

In this example we got

High   4918 Mhz (rounded to 25) -> 4925 Mhz

Medium   4835 Mhz (rounded to 25) -> 4825 Mhz

Low   4807 Mhz (rounded to 25) -> 4800 Mhz

- **After running a diagnostic CTR suggests me the following PX values:**
    - **PX High   -> 5075 Mhz**
    - **PX Mid   -> 5025 Mhz**
    - **PX Low   -> 5000 Mhz**

- **As I know (after testing) those suggested values are unfortunately not stable (damn I wish they would!!!!!!!!)**

- **So my suggestion is to begin with the average value of both suggestions. (Rounded down [!] to 25)**

- **For my case this would be the following:**
    - **PX High   -> 5000 Mhz**
    - **PX Mid   -> 4925 Mhz**
    - **PX Low   -> 4900 Mhz**

- **This will be our starting point for stability testing the PX profil**

🔥 CTR Guide - Stability testing the PX Profile

- **Now you got your PX values, let's test them with OCCT.**
  (To use a different program is another temporary workaround. I am pretty sure, Yuri will have a solution for stability testing the PX profile soon!)

- **Download** OCCT
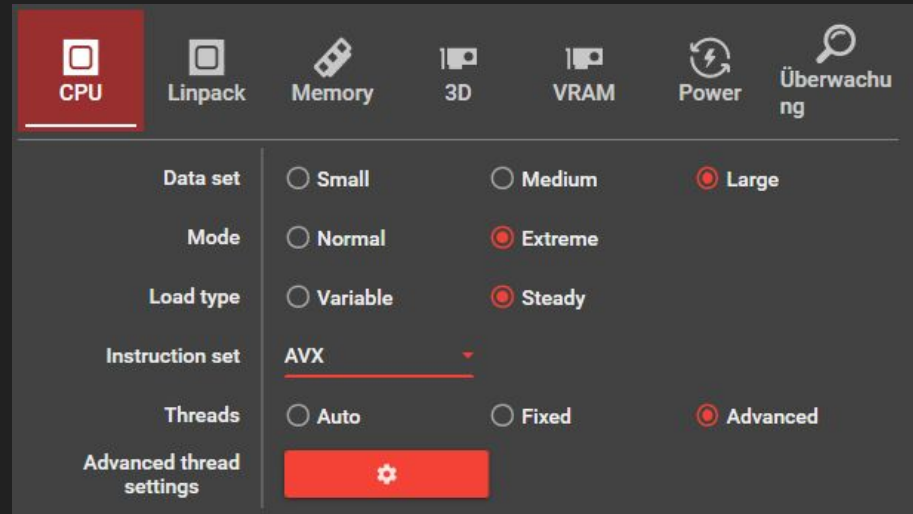
- **Make sure that you download the actual beta version of it!**
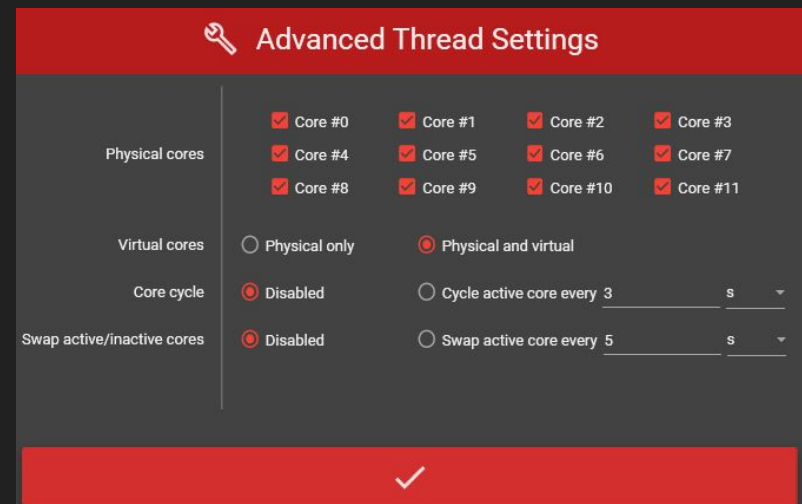
- **Open OCCT by just double click it. There is no installation needed**

- **Set it up like this**

Now click here ⬆ **and this will open:**

🔥 CTR Guide - Stability testing the PX Profile

- **At first uncheck all cores**

Physical cores	☐ Core #0	☐ Core #1	☐ Core #2	☐ Core #3
	☐ Core #4	☐ Core #5	☐ Core #6	☐ Core #7
	☐ Core #8	☐ Core #9	☐ Core #10	☐ Core #11

- **OCCT will name the cores a bit different (because it starts to count at 0 instead of 1). So add the following information to your notes:**

  CPPC OCCT
  C04 -> Core #3
  C03 -> Core #2
  C05 -> Core #4
  C02 -> Core #1
  C01 -> Core #0
  C06 -> Core #5

- **To test the PX High profile we want to load C04 and C03 of our cores. This means we have to check Core #3 and Core #2 in OCCT and CTR will handle the rest.**
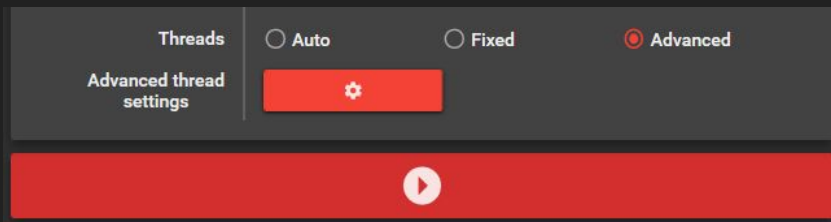

Now click this

🔥 CTR Guide - Stability testing the PX Profile

- To start the test, click on

- A window will appear, on which you will asked to subscribe to a OCCT Pro license. You simply have to wait 10 seconds and finally you have to click on this window a soon as it appears and the test will be started

- For a initial test of the PX frequencies I recommend to test each of the PX sub profiles <u>at least for 5 minutes</u>.

- By clicking this symbol you can stop and by clicking you can reset the test.

- If there are no error messages while running it for 5 minutes you can rise the frequency of the testes PX sub profile by 25 Mhz and test again.

- An error message(s) will look like this:

30

🔥 CTR Guide - Stability testing the PX Profile

- If you encounter those messages decrease the frequency of the tested PX sub profile by 25 Mhz and test again.

- Sometimes it can be that your PC will crash during the test. In this case I recommend to lower the frequency of the tested PX sub profile by at least 50 or just to be sure 75 Mhz and test again.

- After you have done this for each PX profile and all of them are at least 5 min stable you can test for longer if you want.

- **WARNING: If you are not sure what you are doing, I do NOT recommend to raise the PX voltage!!!**

- If you found a stable set of frequencies for each of your PX profiles you can try to decrease the PX voltage by 25 mV and test again.

- This will be reducing temperature if this is a problem. The lower the voltage the lower the temperature.

- If you are worried about your temperatures (85°C and above) you can try to start the PX tuning process with 1400 mV set as PX voltage

-

🔥 CTR Guide - BSOD - how to know which core crashed

- **If you are struggling with instability, whether it is PX, P2 or P1 and you encounter a BSOD (Blue screen of death) chances are high that windows will log it.**

- **To check if, go to your "windows event viewer" (just search in the field near to windows logo after "event").**

- **Go to Actions and click Create Custom View**
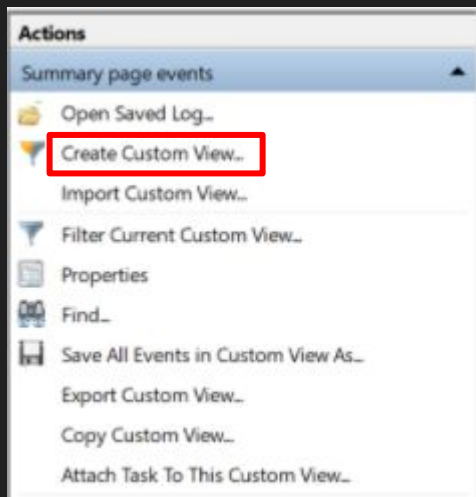
- **Enter / change these values in the new window**
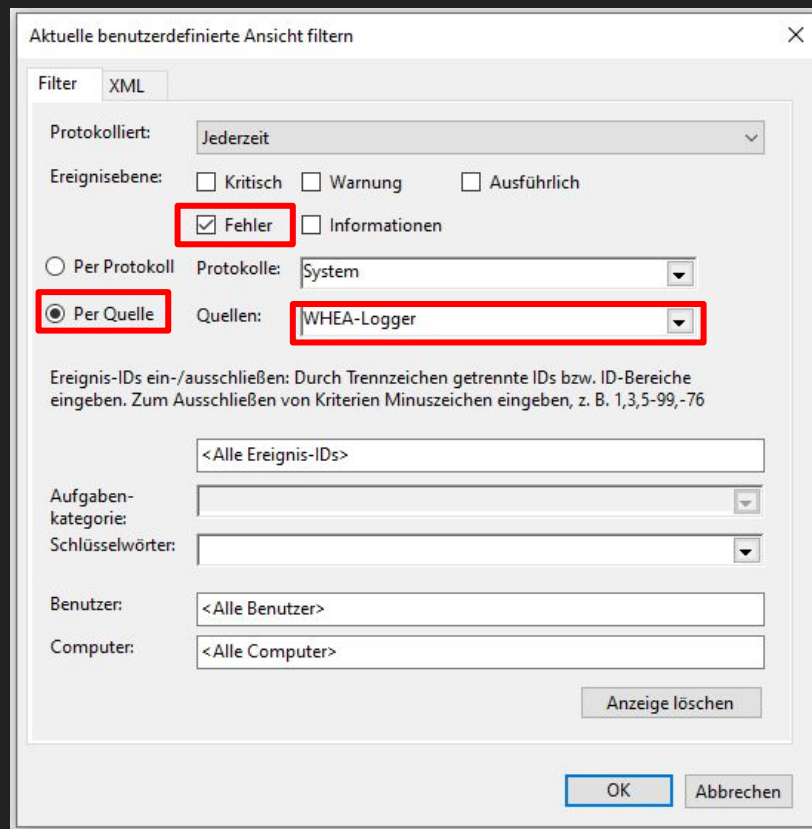
(sorry - I only got it in german...)

All you have to change is checking "errors" and checking "by source" and select WHEA-Logger and click ok!

🔥 CTR Guide - BSOD - how to know which core crashed

- **Back to the main window of the event viewer you will see under custom views your created view. (You can right click it and rename it if you want)**

- **Now open this new view!
What's exactly in there is not that important, cause we are looking for this:**

- **Processor-APIC-ID: 17…
This is telling us that the thread with the APIC-ID 17 was the cause of the BOSD. All clear? :-)**

- **To make sure AMD / windows doesn't screwed the relationship of thread number and APIC-ID you can use CPU-Z to get this information.**

- **Open CPU-Z, got to About-slide and click on "Save Report (.HTML)"**

33
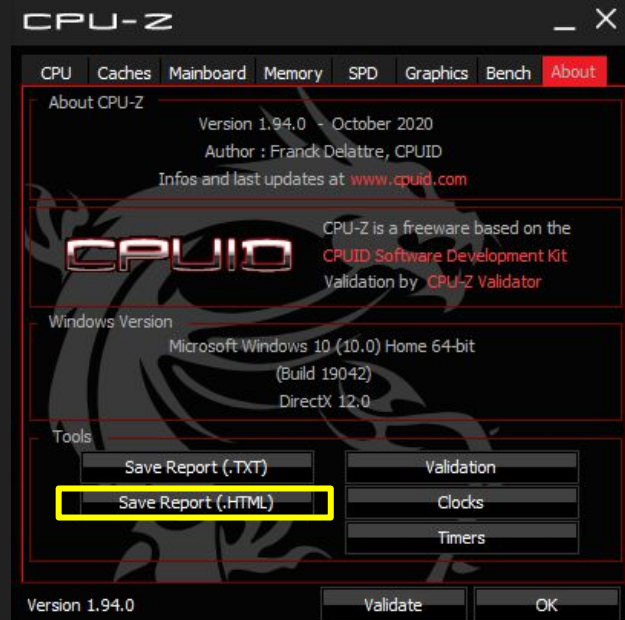
🔥 CTR Guide - BSOD - how to know which core crashed

- **Open the created CPU-Z report (under documents by default) and you will see this:**

```
APICs
-----------------------------------

Socket 0
        -- Node 0
                -- CCX 0
                        -- Core 0 (ID 0)
                                -- Thread 0      0
                                -- Thread 1      1
                        -- Core 1 (ID 1)
                                -- Thread 2      2
                                -- Thread 3      3
                        -- Core 2 (ID 2)
                                -- Thread 4      4
                                -- Thread 5      5
                        -- Core 3 (ID 3)
                                -- Thread 6      6
                                -- Thread 7      7
                        -- Core 4 (ID 4)
                                -- Thread 8      8
                                -- Thread 9      9
                        -- Core 5 (ID 5)
                                -- Thread 10     10
                                -- Thread 11     11
                -- CCX 1
                        -- Core 6 (ID 8)
                                -- Thread 12     16
                                -- Thread 13     17
                        -- Core 7 (ID 9)
                                -- Thread 14     18
                                -- Thread 15     19
                        -- Core 8 (ID 10)
                                -- Thread 16     20
                                -- Thread 17     21
                        -- Core 9 (ID 11)
                                -- Thread 18     22
                                -- Thread 19     23
                        -- Core 10 (ID 12)
                                -- Thread 20     24
                                -- Thread 21     25
                        -- Core 11 (ID 13)
                                -- Thread 22     26
                                -- Thread 23     27
```

- **So in our example it was APIC-ID 17 which has crashed. Now we see that it is the second thread of Core 6 -> in CTR it would be named as Core 7 (starting to count at 1 instead of 0).**

- **For example - you were stress testing all cores (P1) with programm XYZ - now you know that it was CCX2 which failed. So I would lower the frequency of CCX2 by 25 Mhz and try again to provoke this kind of failure.**

🔥 CTR Guide - A stretchy topic...

- **After tuning as I described before, I got for example a PX High frequency of 5000 Mhz**

  + 50 Mhz? LOL! A 5900X does 1T 4950 Mhz by default!

- **Yes and no...**

  YES -> It is boosting up to 4950 Mhz with a very (!!!) light load. And yes it will show you a clock speed of 4950 Mhz during Cinebench single core bench.

  NO -> I've forced Cinebench (not a very light load at all!) to use one of the preferred cores of my CPU and run a single core bench. Here is the result of the average clock speed (effective) during the run:

  Average 4,899.7 MHz **with this it scored 632 p.**

- **With the mentioned 5000 Mhz it scored 646 points. And here is the average clock speed (effective) during this run:** Average 4,999.4 MHz

Ok, but my curve optimizer boost is up to 5050 Mhz during Cinebench 1T - I will lose performance with CTR PX High set to 5000 Mhz.

- **No, you won't. There is quite some clock stretching happening when using curve optimizer. Yeah it shows 5050 Mhz…**

- **The relation of frequency to points in Cinebench R20 single core bench is almost linear. So it is really simple to calculate with the rule of three how much points to expect with a given frequency. The CO guy above scored 640 points but he should have scored 652 points because of 5050 Mhz. What happened?**

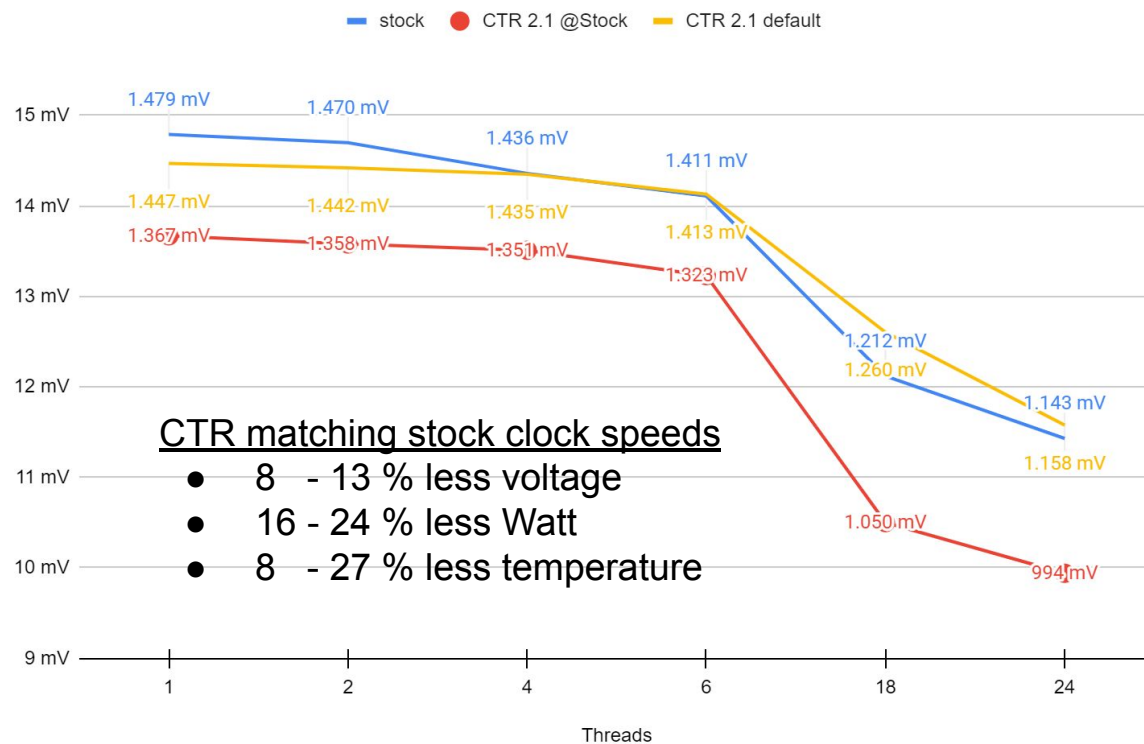 **This:** Average 4,944.6 MHz

- **Welcome to clockstrech-city!**
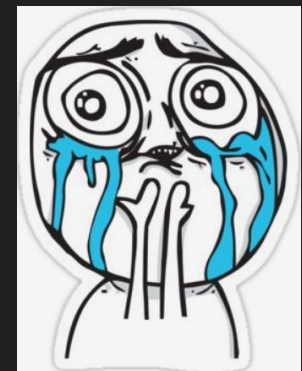
🔥 CTR Guide - Voltage Mythbusting

I know a guy who knows a guy who heard from an expert on Reddit (must have been a former development engineer at AMD) that CTR is using way too much voltage !!!

- **ABSOLUTELY NOT!!!**

- **In fact CTR is orientated on stock voltage curve.**

- **AMD is pumping a lot more voltage through the chip than it really needs!**

- **I configured CTR to match the stock clock speeds and Cinebench points for each scenario.**

Voltage comparison

Legend: stock | CTR 2.1 @Stock | CTR 2.1 default

Threads	stock	CTR 2.1 @Stock	CTR 2.1 default
1	1.479 mV	1.367 mV	1.447 mV
2	1.470 mV	1.358 mV	1.442 mV
4	1.436 mV	1.351 mV	1.435 mV
6	1.411 mV	1.323 mV	1.413 mV
18	1.212 mV	1.050 mV	1.260 mV
24	1.143 mV	994 mV	1.158 mV

CTR matching stock clock speeds
- 8 - 13 % less voltage
- 16 - 24 % less Watt
- 8 - 27 % less temperature

🔥 CTR Guide - Performance Mythbusting

But the experts on Reddit said also stuff like...
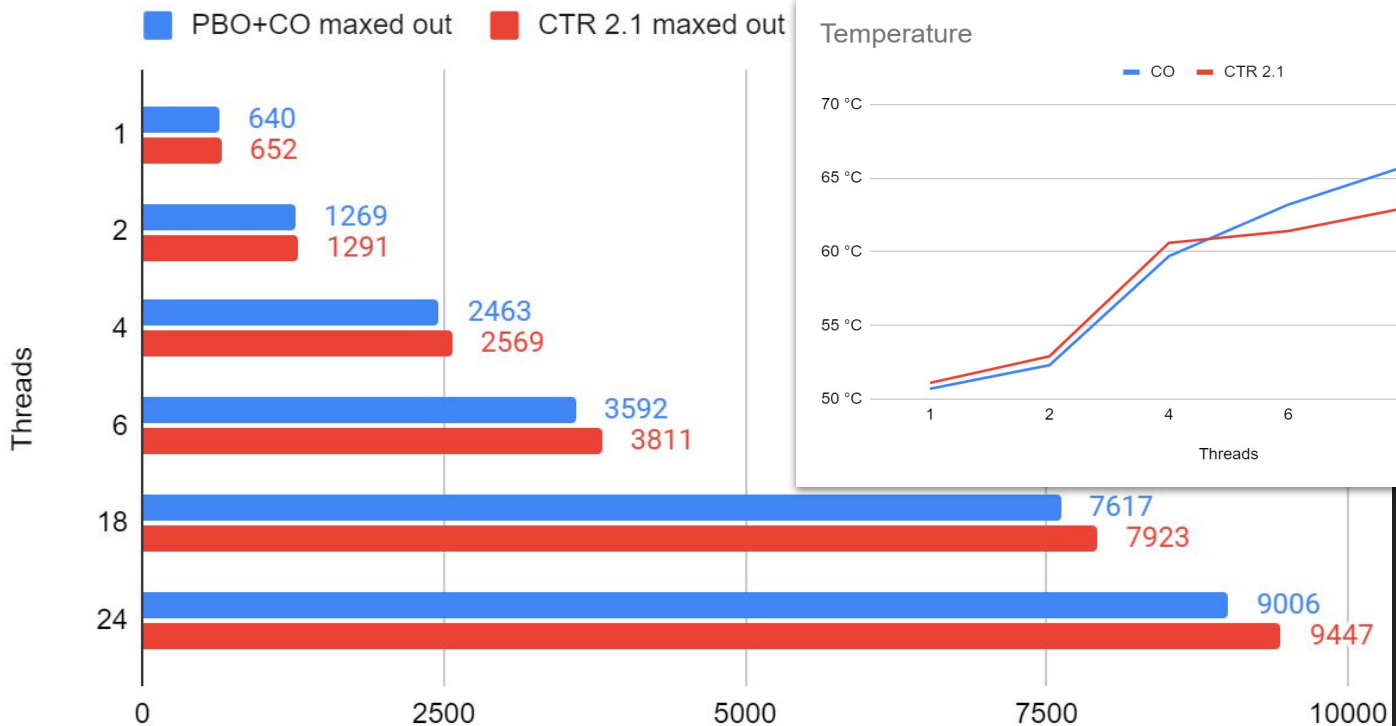
CENSORED 16 days ago
CTR didn't do as good as my manual CO tune.

CENSORED CENSORED CENSORED s ago
With CTR, anything heavier than CB20 is **a risk to your processor**. And before you say "well most people don't do anything heavy, they'll be playing games etc", let me turn around and point out that **you are sacrificing single core performance with an all-core OC like this.**

There is no real benefit.

So curve optimizer has more performance to offer?

Well let's bench!

Cinebench R20 performance - 5900X

🔥 CTR Guide - Performance Mythbusting

Rendering?
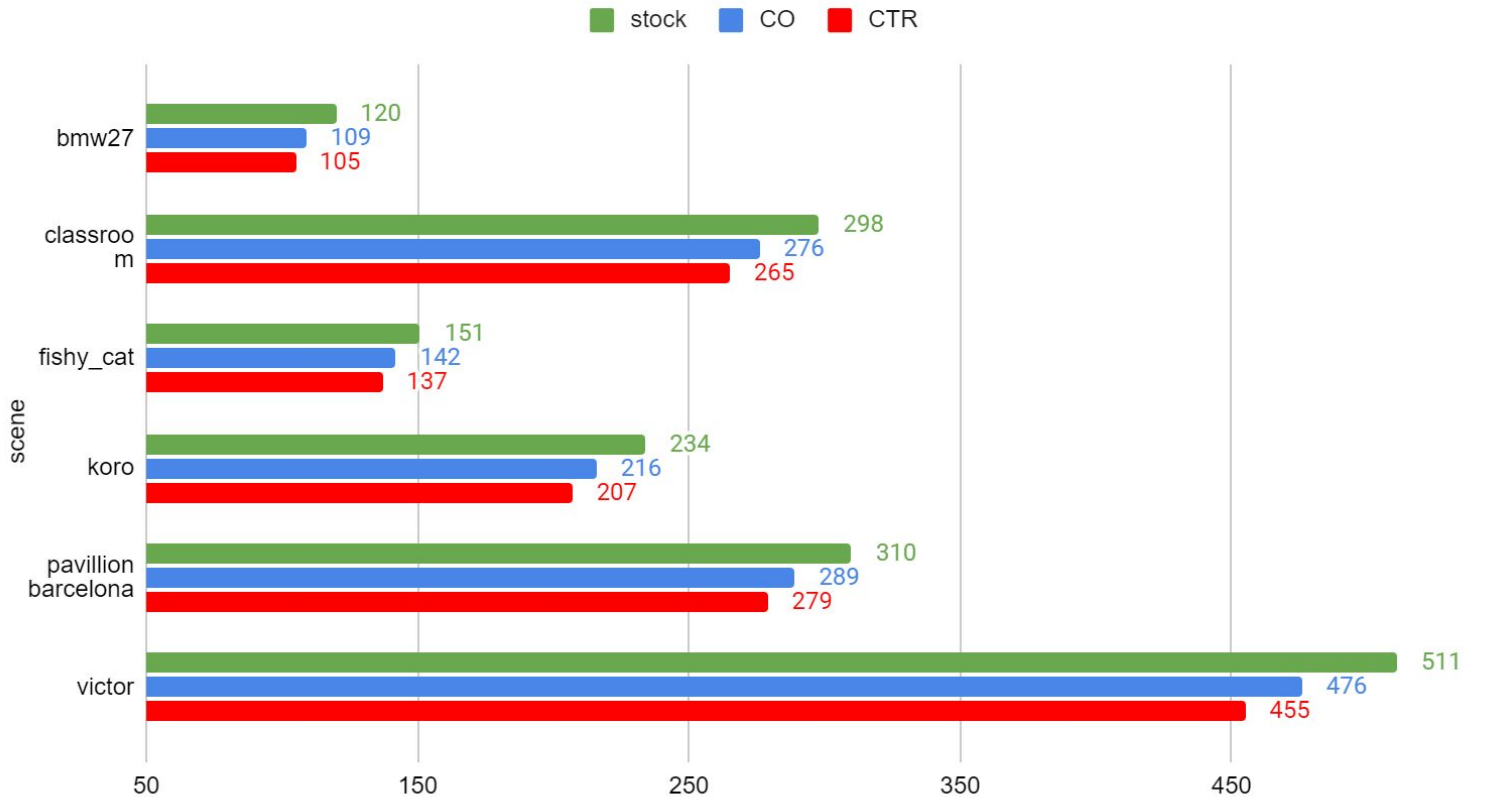
🔥 CTR Guide - And again, Voltage Mythbusting
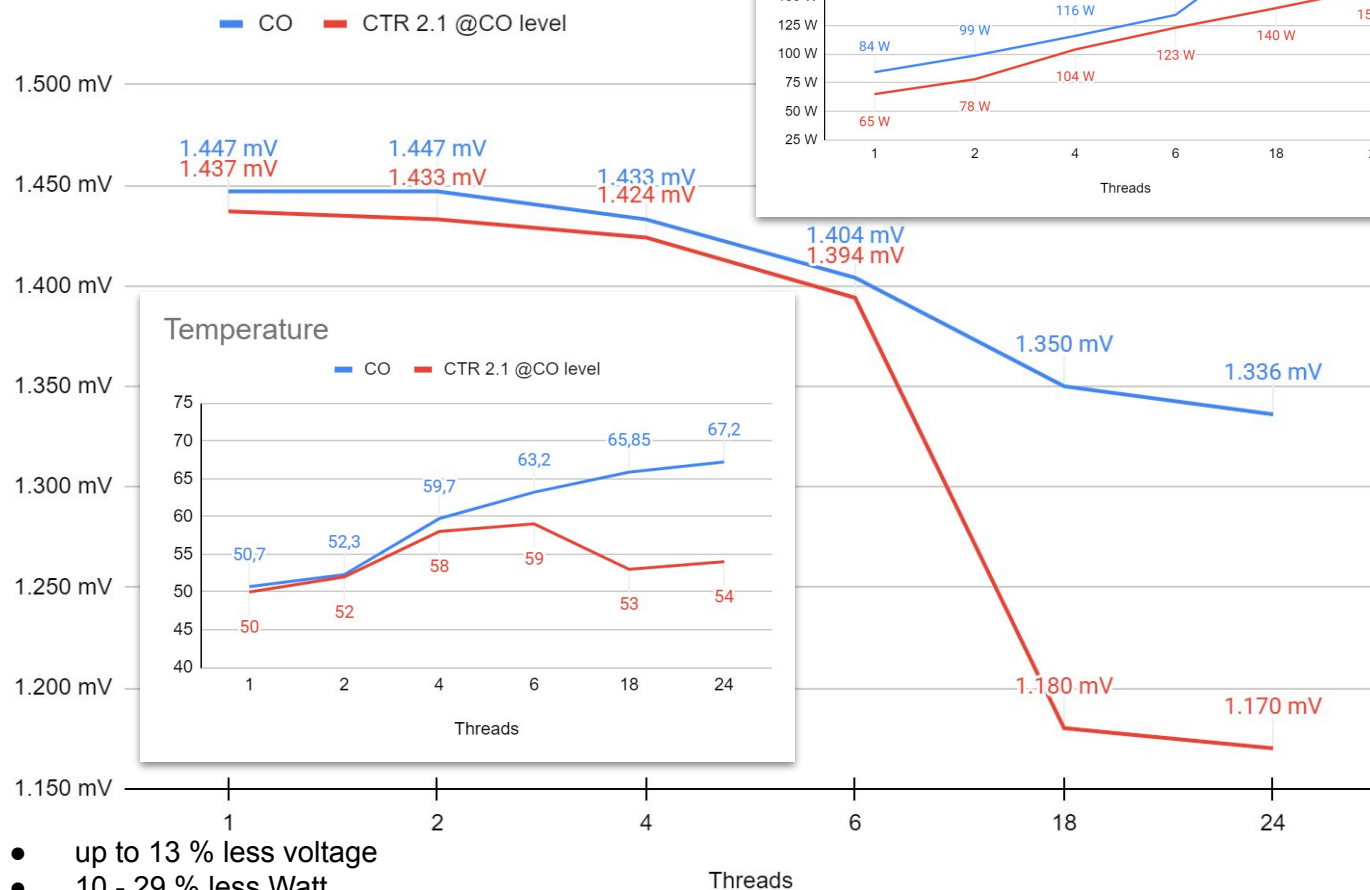
But it will use more voltage to keep up with a probable tuned PBO + CO!!!

- … NO!

- To keep up with PBO + CO
  I configured CTR to match the CO clock speeds and Cinebench points for each scenario (as before against stock)

Power consumption

CTR at CO performance level

Temperature

- up to 13 % less voltage
- 10 - 29 % less Watt
- up to 19 % less temperature

🔥 CTR Guide - The last word...

Please keep in mind that CTR is constantly being developed.

When I think about what else Yuri has planned with it, I get dizzy. And I think he told me just a bit of it...

We should perhaps call what comes out Zen3.1usmus!

Because of the constantly development it can be that something isn't working as it should. Or your special configuration (CPU / motherboard / BIOS / …) is unique and causes you to struggle.

If it is like that, please do not hesitate to use the "problem-solving " channel of 1usmus patreon club @ discord.

There are always users online which could help.

If not - there are the "CTR Experts" (ACE, Ann Martiné, arcanazen, DayDreamer, Gadfly, rizlah and myself Riwwelorsch) who will try to help.

If that doesn't help either, there's still Yuri - but please follow these steps before you direct mail Yuri. He is putting all of his time (and more) in this project. So help yourself, don't disturb him by involving him directly in a question that can be solved by the other users or the CTR experts.

Remember - don't be that guy! ;-)

Actual build is shit!!! Gonna go back to Beta 5!