V2.0

“Closed Loop”

MAF Scaling

using RomRaider Logger v0.5.0 beta

By Dweeb ☺

Disclaimer: READ IT !!!!

I have not developed this product, so I may be wrong on certain things. I am not responsible for anything that may happen to you, your engine or anything for that matter, if you use and or follow this manual and its instructions. After all, I am a Dweeb !

This is just my way of doing things, and others *(RomRaider developers or the more knowledgeable RomRaider user)* may disagree with what I have written here. This was originally done for a friend to show how I did my scaling. It worked for me…

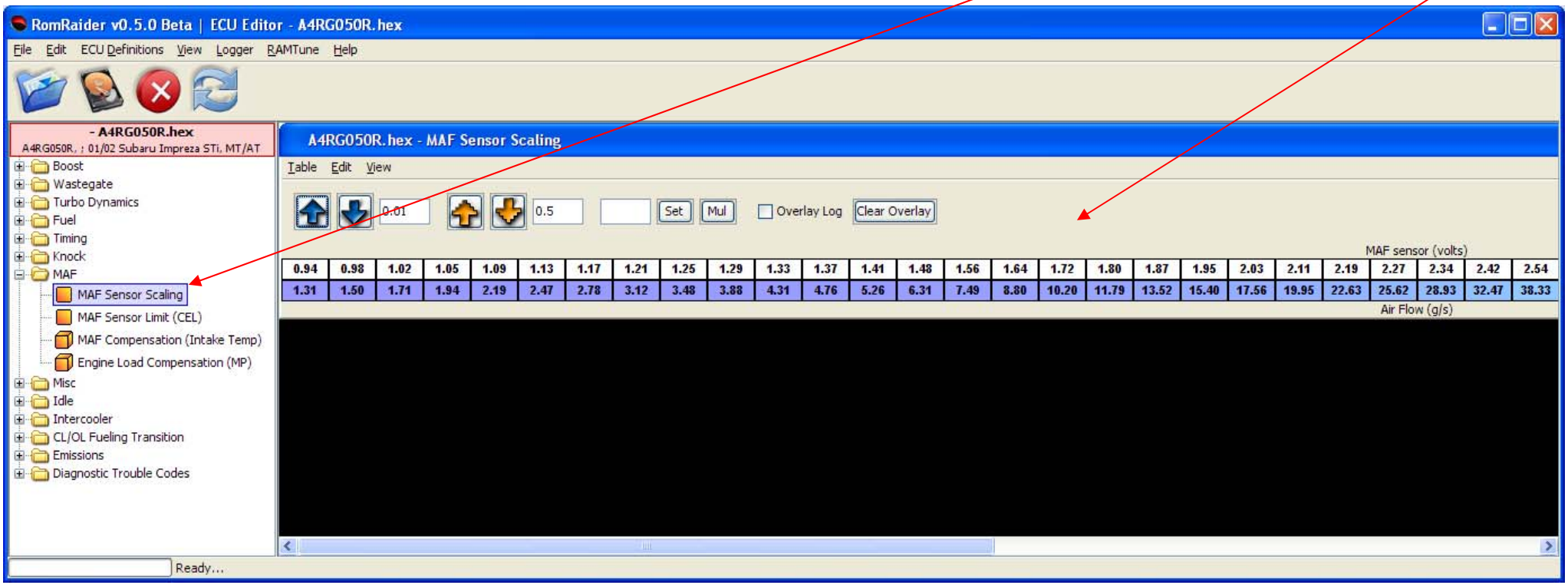
I can be reached on RomRaider forum, user ID “Dweeb” if you have any comments, correction or suggestions.

All credits for this wonderful program go to the developers of RomRaider and the RomRaider Logger.

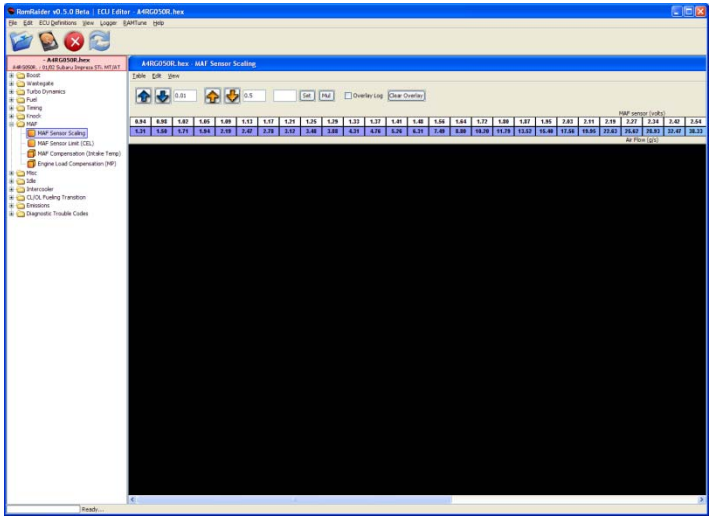
MAF Scaling - 16bit ECU Let's start with the **RomRaider v0.5.0**. Beta, - The latest release at this point. www.romraider.com

Please make sure you have the latest definitions installed, they can be found at www.romraider.com and **please read this whole manual before starting !**

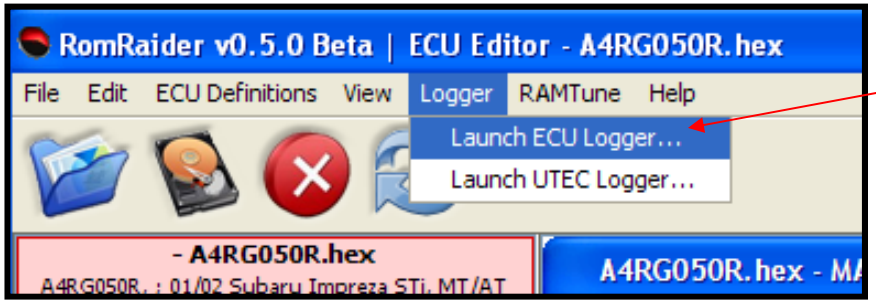
Open **RomRaider**, and then open your ECU (hex or bin) file. Once that is done, select the **"MAF"** folder and click on **"MAF Sensor Scaling"** this will open this window. *(your screen should look something like this…)* Your hex / bin file *(the one you want to modify)* needs to be open for this to work.



Or looks like this …. (in full screen) ☺

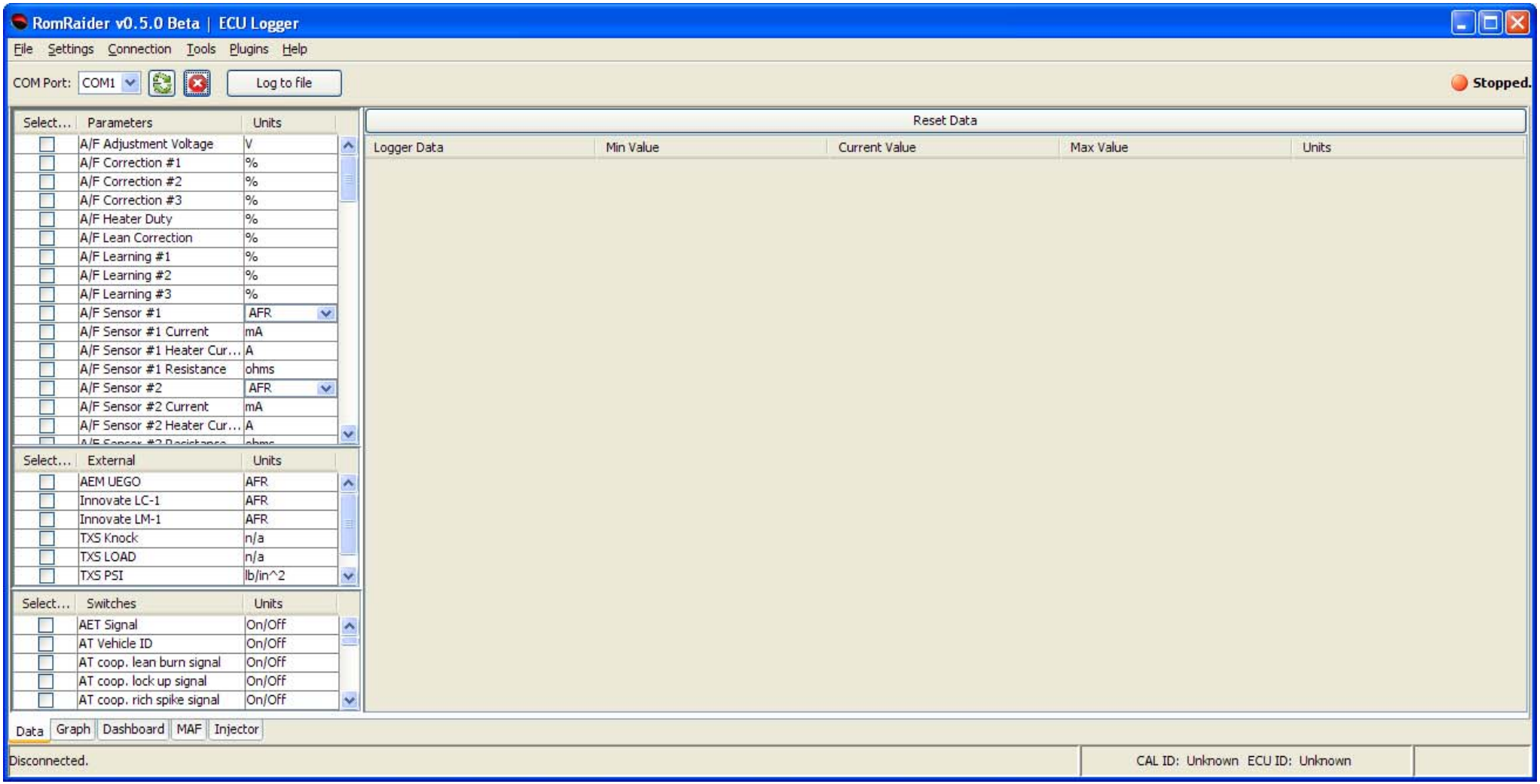


Next step is opening / starting the **“Logger”**. In **RomRaider’s** main menu select **“Logger”**, then make sure you select **“Launch ECU Logger…”**.



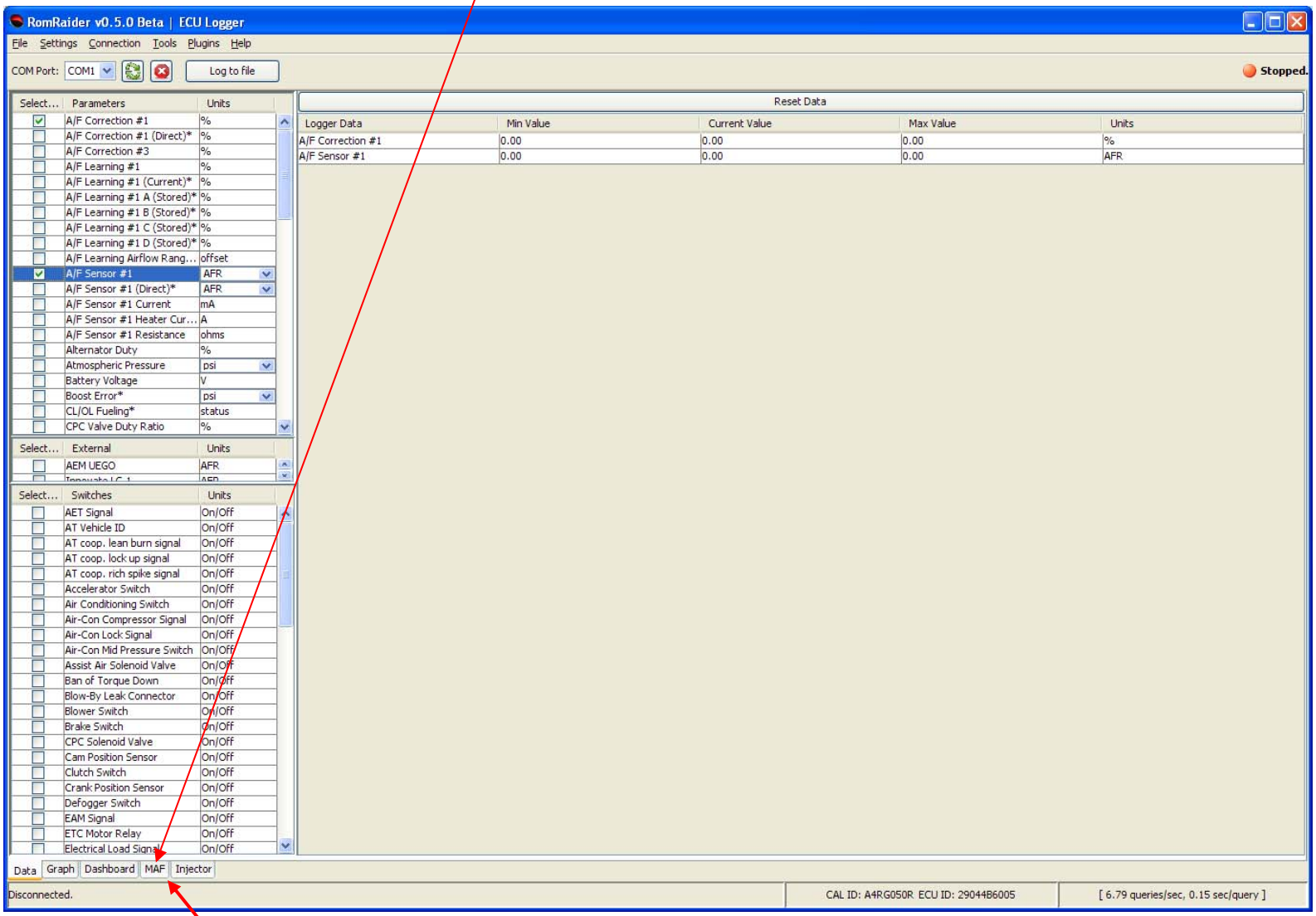
It takes few seconds to open up, so please be patient.

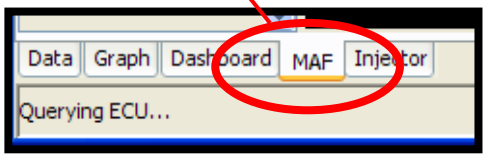
When the “**ECU Logger”** app opens up, it looks like this.



In this screen you can log and view all of the parameters that are availble to see/log for your ECU. But we do not need to worry about this screen for now. **Leave it blank as above, and "DO NOT" select any parameters like in the screen bellow.** (the reason for this is, the more **"Parameters"** you have selected, the slower the **"polling"** of the ECU will be = lower amount of "**queries per second"** that you can retrieve and log).

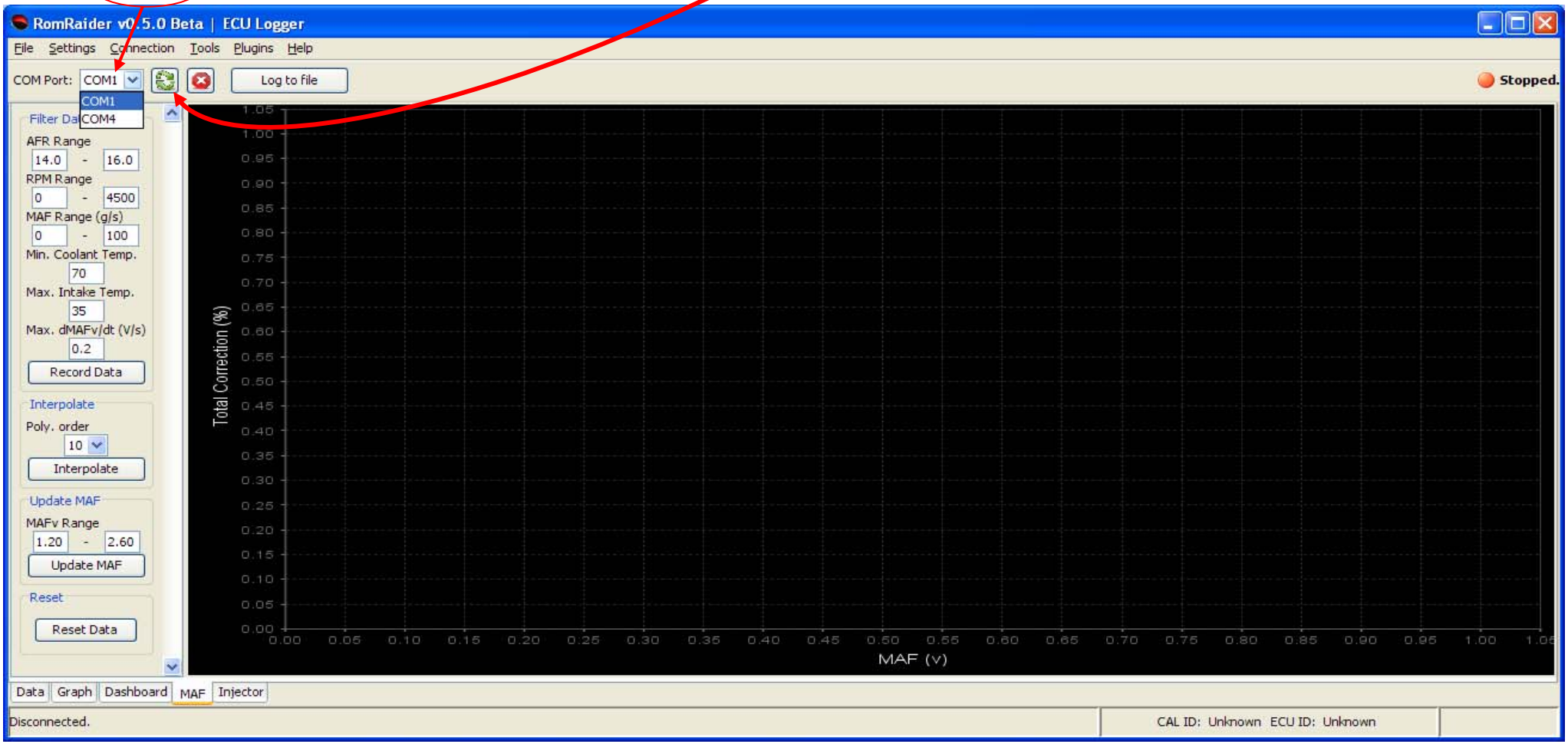
The next thing that you must do is select the **"MAF"** tab on the bottom of the **ECU Logger** window by clicking on it.





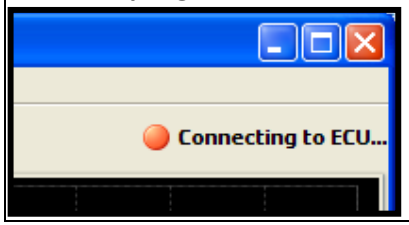
When you select the **“MAF”** tab, the screen should look like this now. *(see bellow).* Now select the **“COM Port”** that you have your **“Tactrix”** cable hooked up to. Make sure you car is **started** (running), or at least the ignition is in the “ON” position. *(we need to test the connection to the ECU).*

Once the”COM Port” is selected, click on the “Reset ECU Connection” button.



1. First you should see **“Connecting to ECU…”** in the Top Right corner of your **Logger** window,

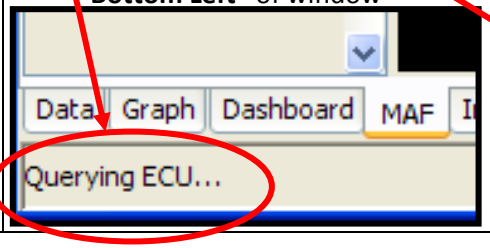
Top Right of window



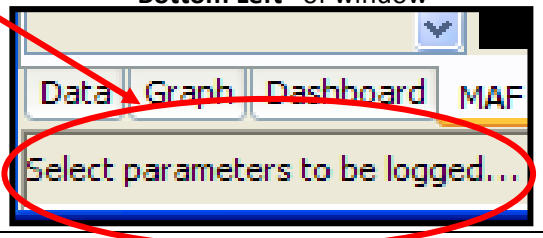
Then >

2. **If your connection to the ECU is correct, you will see in the corners of your “ECU Logger” window.**
(Querying ECU…or Select parameters to be logged on the bottom left, and Reading data on top right…)

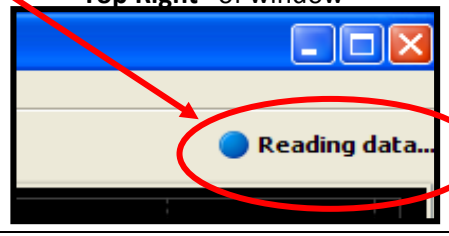
Bottom Left of window



Bottom Left of window



Top Right of window

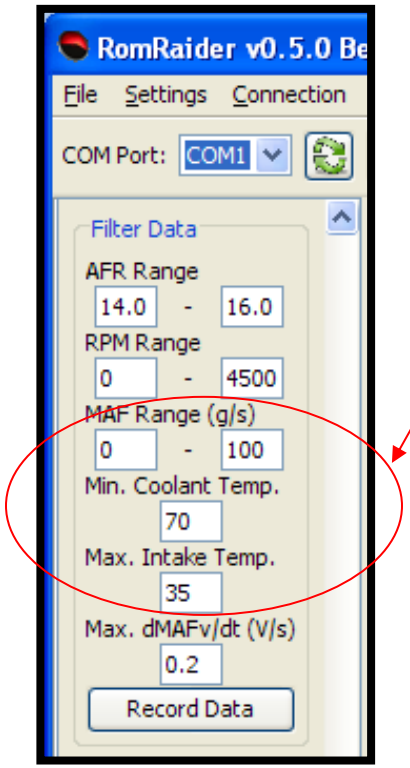


If you have **“Reading Data…”** in the Top Right corner of your **Logger**, you are **connected, Great !**

The next thing we must modify is the **”Filter Data”** for the **“MAF Range (g/s)”** and **“Max. Intake Temp.”** You can also lower the **“Min. Coolant Temp”** if you like.

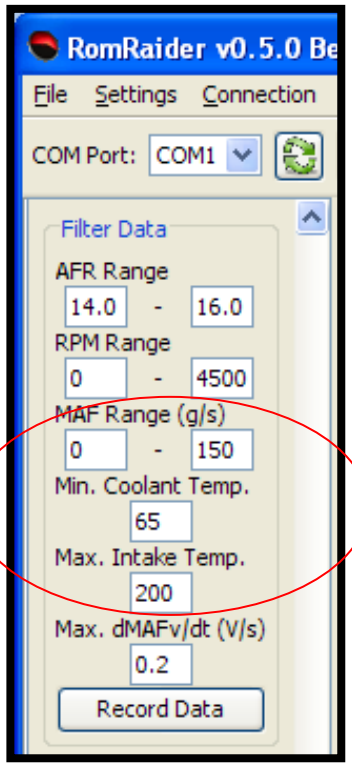
I usually bump the **“MAF Range (g/s)”** to about **0 to 150**, no real reason for it, as you are out of **“Closed Loop”** by then. I do it just in case I get a weird reading from the MAF, I like to see it POP up a weirdly placed dots on the screen…..
The stock default values in this **RomRaider** version do not work very well (as the **“Max. Intake Temp”)** is too low for the summer.
I usually bump it up to at **least 150 -200 degrees F**. I think the reason behind the low **“Max. Intake Temp”** is for the logger **not to** “LOG” the AFR corrections if you are getting hot air *(heat soak)* when standing still. *(I may be wrong on this, I didn’t develop the software ☺)*

Stock Settings



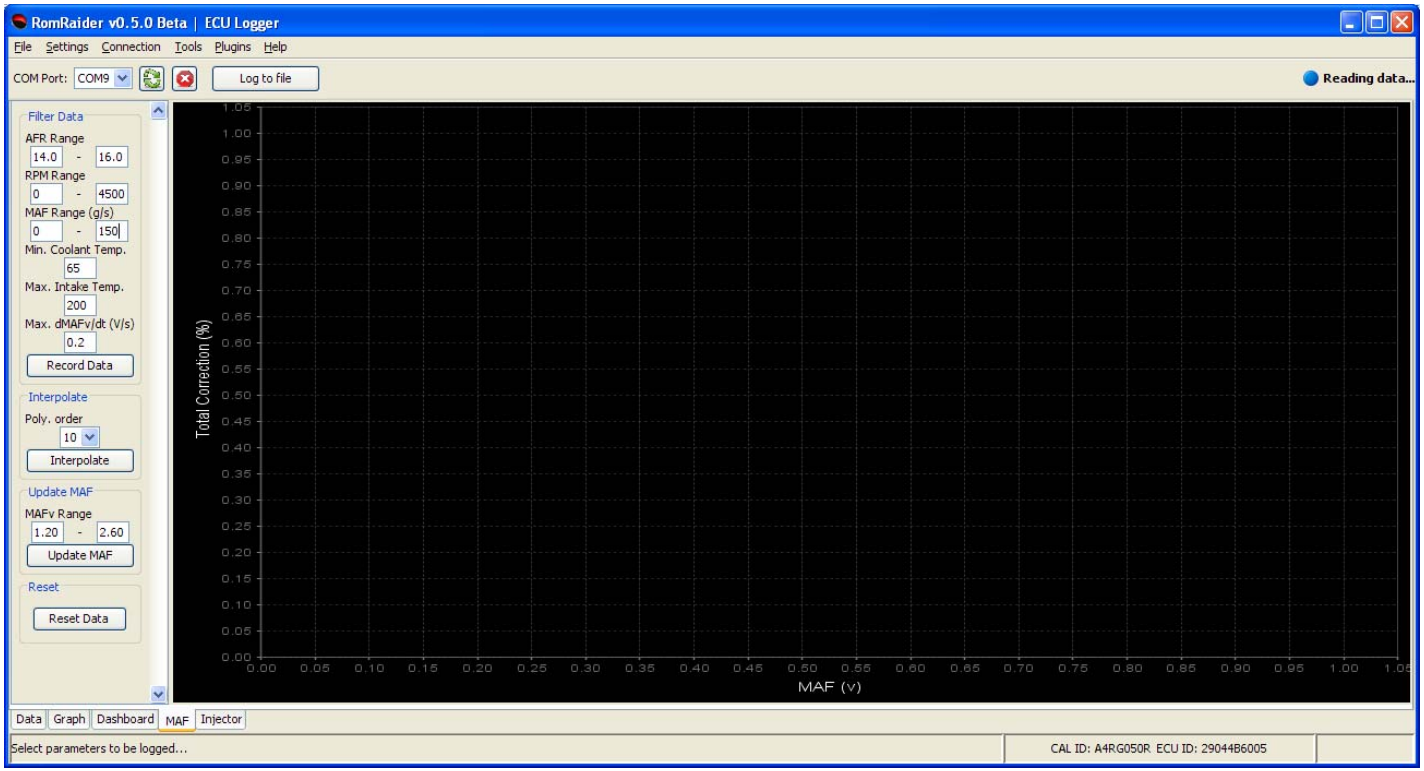
these are the values that I change

My Settings.



NOTE: You can do a *“test log/graph”* just by recording your car idling to see if the logging is working before you go out. Just make sure the car is warmed up and above the “Min. Coolant Temp.” value, and the intake air temp is bellow the “Max. Intake Temp.” value. *(that is why I set “Max Intake Air” value high)*

Now that we have adjusted some of the "**Data Filters**", we are at this screen, **hopefully engine running and Connected to the ECU**.



Now we are ready to start logging the **MAF (v)** against the **AFR Correction**. What you need to do is go for a nice long drive **(at least 40 minutes)** to log the **"Closed Loop"** correction. There are 2 ways of doing this.

1. Normal driving, different gears and speeds, but keeping it in "closed loop" as much as possible.
2. Highway driving, in high gear, and cruising at different rpm's with very little load. ← this is what I do…

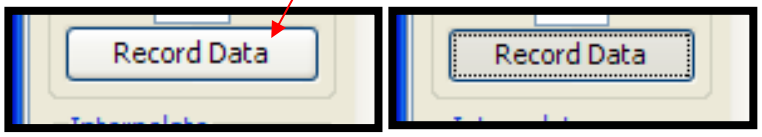
So… find an empty looooooooong road, or a highway at 2 am. *(the reason for the empty road is you are going to go different speeds, and having people behind you beeping their horn gets annoying after a while).* So, once you find this road, and you car is up to temp, start driving. You need to start driving smooth in 5th or 6th gear, with engine speeds changing between 1200-3500rpm. Remember, no sudden moves of the throttle *(be gentle),* be smooth, and <u>do not go into boost !</u>

Remember you need to stay in **"Closed Loop"**.

When ready, press the **"Record Data"** button. The **"button"** will turn slightly darker with a thicker border *(to indicate it is Logging)*, but it is hard to see.

*(I wish the button turned **<u>RED !!</u>**, hint, hint, great and all-mighty developers)*

Not Recording **Recording**

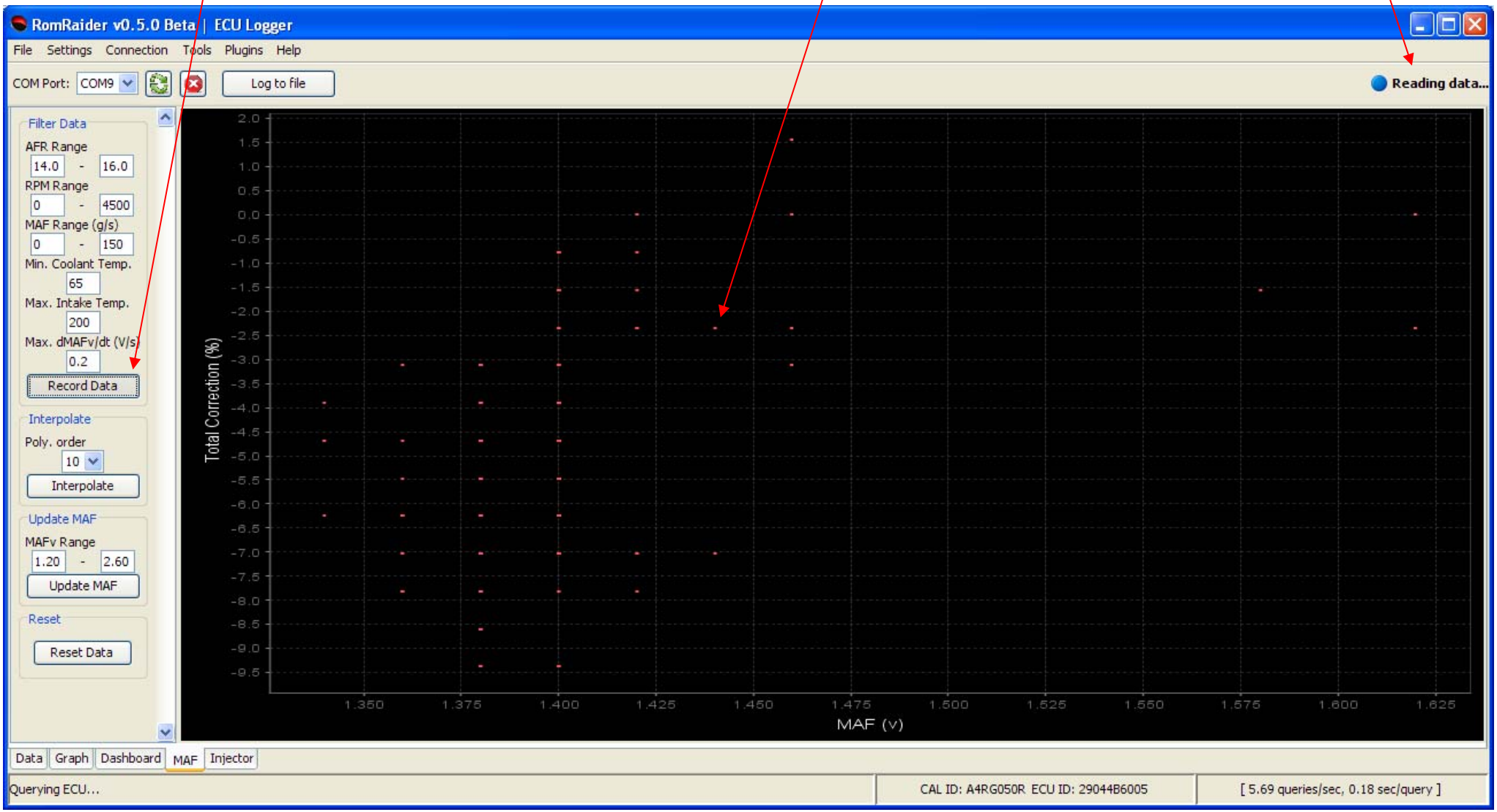


< --- notice the "slight" color difference !

Remember you can do a *"<u>sample test</u>"* by recording <u>"idling"</u> to see if the logging is working before you go out.

After pressing the **"Record Data"** button, recording / logging will start, and it will start to display **"DOTS"** in the black window *(graphing region) - see bellow for example.* If you are not seeing any **"DOTS"** after few seconds, there is a problem. You may have the incorrect **"Filter Data"** values. Check it over. Make sure you are **connected**.

This is a **"Test Log"** while idling about a minute and "burping" the throttle very slightly just to see if everything is working fine, and if you are logging..

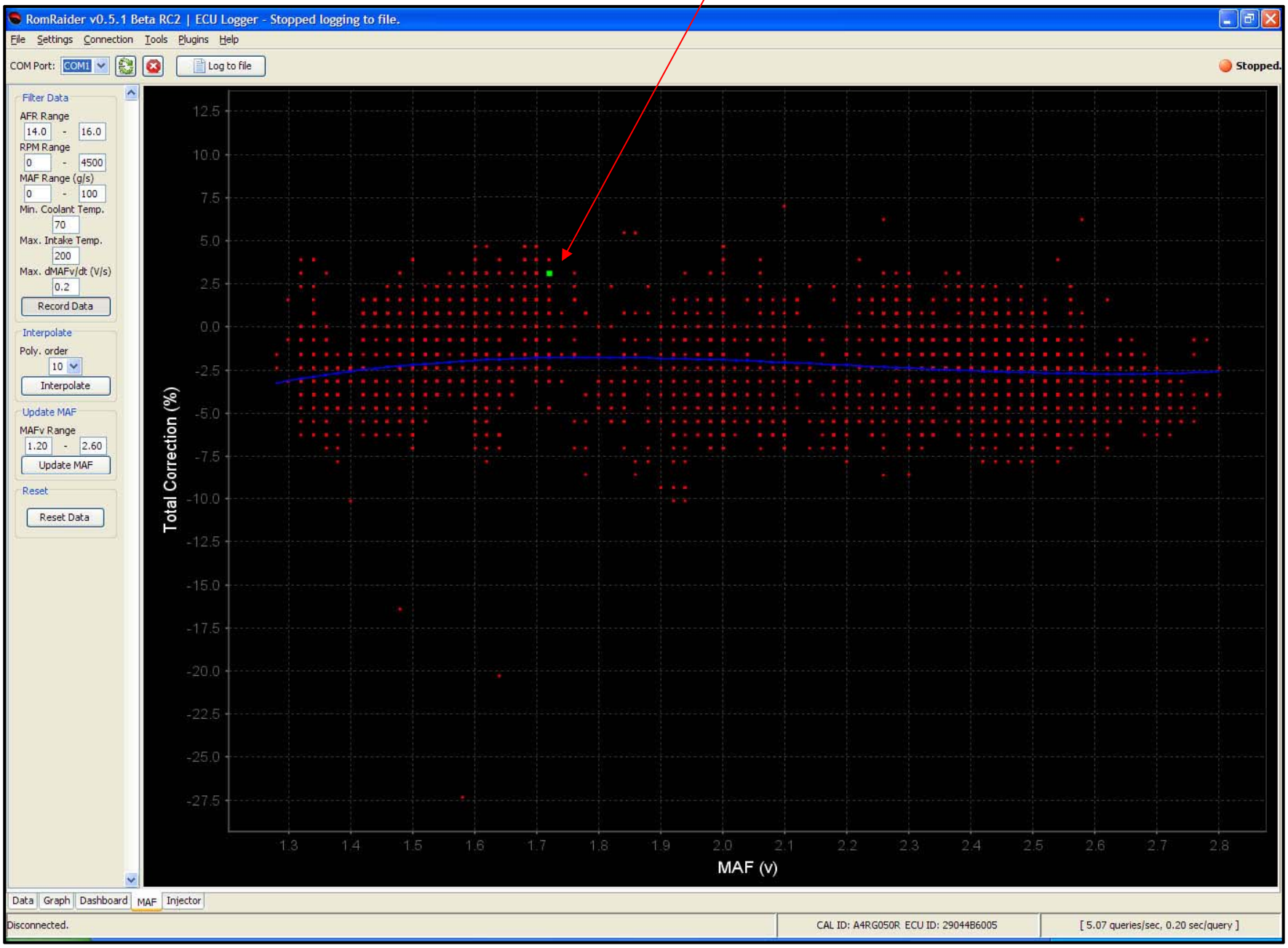


When recording/logging, if you need to **stop or slow down a lot**, you can always "Pause" the recording by pressing the **"Record Data"** again, (this will STOP/ Pause the recording for the time being) and then you can press the **"Record Data"** again to continue recording. This feature helps if you don't have a place where you can drive long distance without stopping. So just continue to LOG, **the longer the recording/logging session the better**. But remember, you will need to do this a few times over to scale your MAF properly, (as in… record, adjust the MAF Scaling, save - record, adjust the MAF Scaling, save, - record, adjust the MAF Scaling, save) so don't do a single whole day drive/log. Instead do a few 5 min idle Logs, then few 30-40 min drives, and log different RPM and loads. *(it takes time, patience and practice to get it right).* This will get you pretty close.

******* UPDATE ***** July 2008**

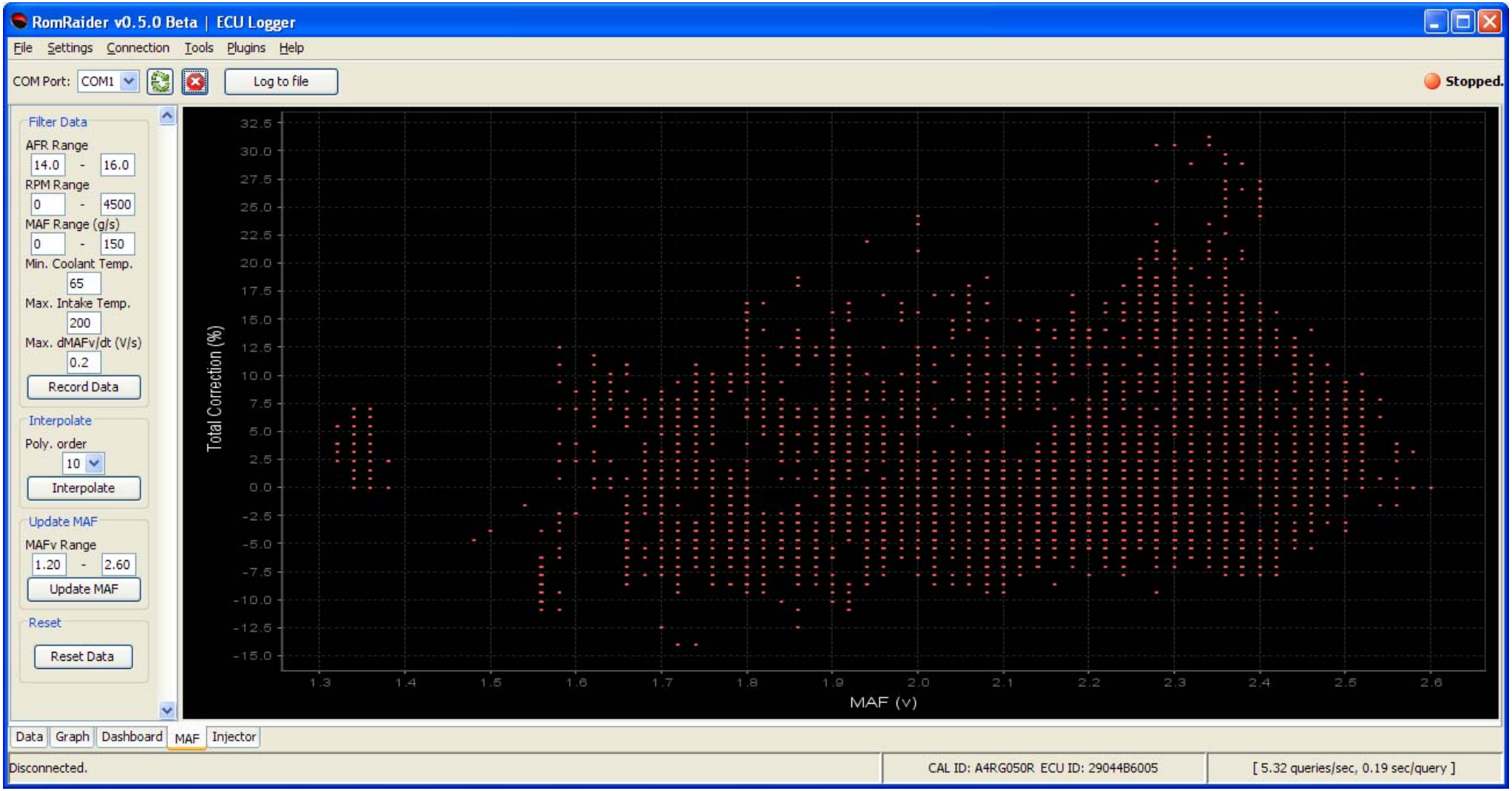
In the "newest" version of RomRaider "v0.5.1 Beta RC2" you can see where the latest "DOT" is placed on the graph when you are logging your MAF corrections. It is **bigger** and different color. This great feature makes it easier to see what is going on.

(Please disregard the blue line in the graph for now)

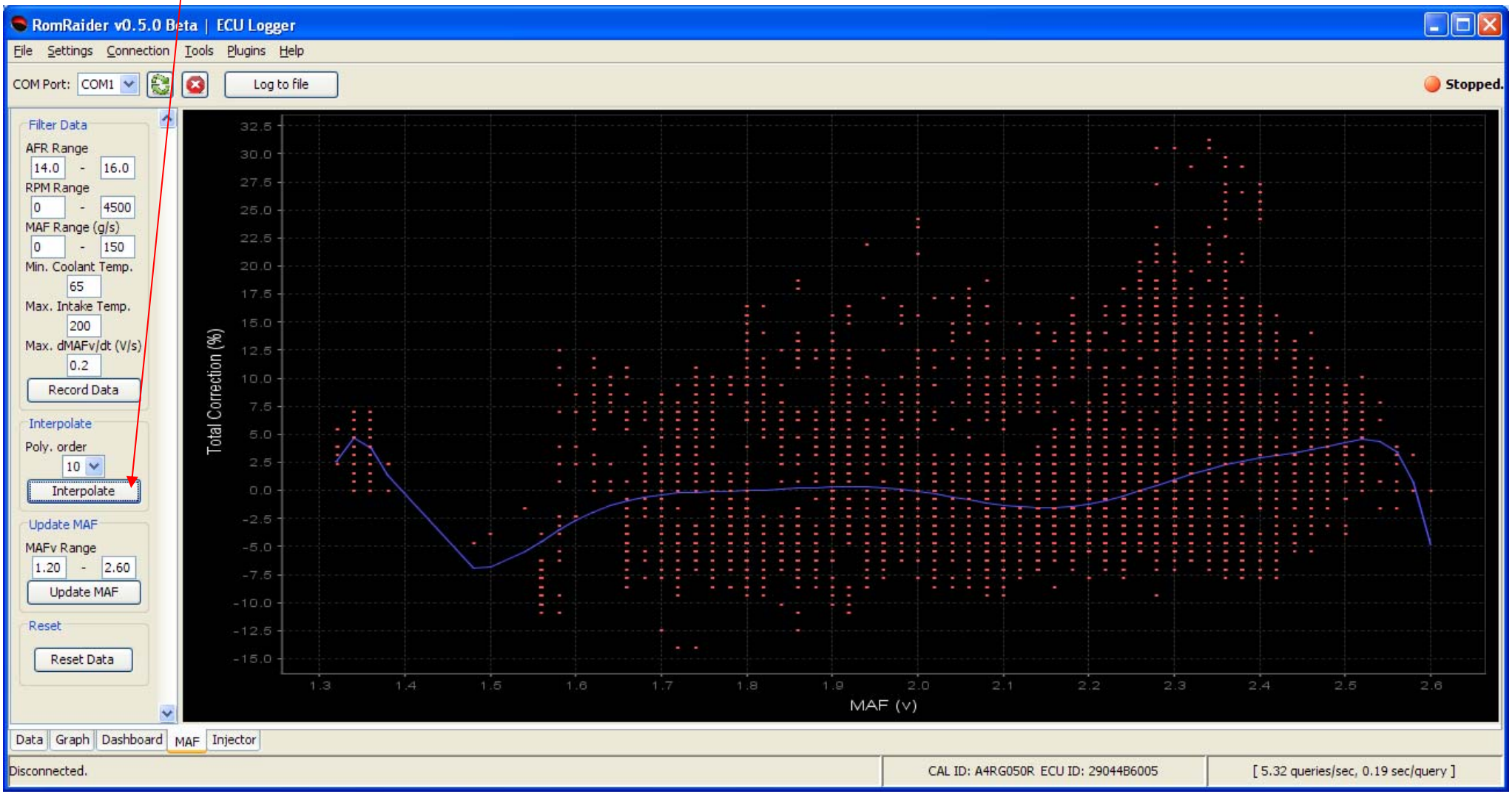


After driving for about 30-45 minutes, your **“Graph window”** should look like this, (a big mess) with many **“DOTS”** on it.

To **STOP** recording press the **“Record Data”** button again. Once stopped, find a safe spot off the road and park. Next, you need to **“Interpolate”** the DATA Log.



Press the **"Interpolate"** button. This will average out the **"Corrections"** made to the fueling at any given MAF (v). You can get different "curves" by changing the Interpolation value. ***(the value of 10 works fairly well for most cases)*** *(See different scenarios with different **"Poly. order"** values bellow)*



From what I understand this **Blue Line** represents the "average AF correction value" that the ECU "applied" to the fuel delivery in "Closed Loop" at the specific engine loads and RPM's.

Next page shows 2 graphs with different Interpolation values, a **value of 3 and 20.**
The graphs are scaled *(squished)* versions of above graph to fit 2 on a page. You can see the difference the **"Poly. Order" value** makes on the **"blue Line"**

RomRaider v0.5.0 Beta | ECU Logger

File Settings Connection Tools Plugins Help

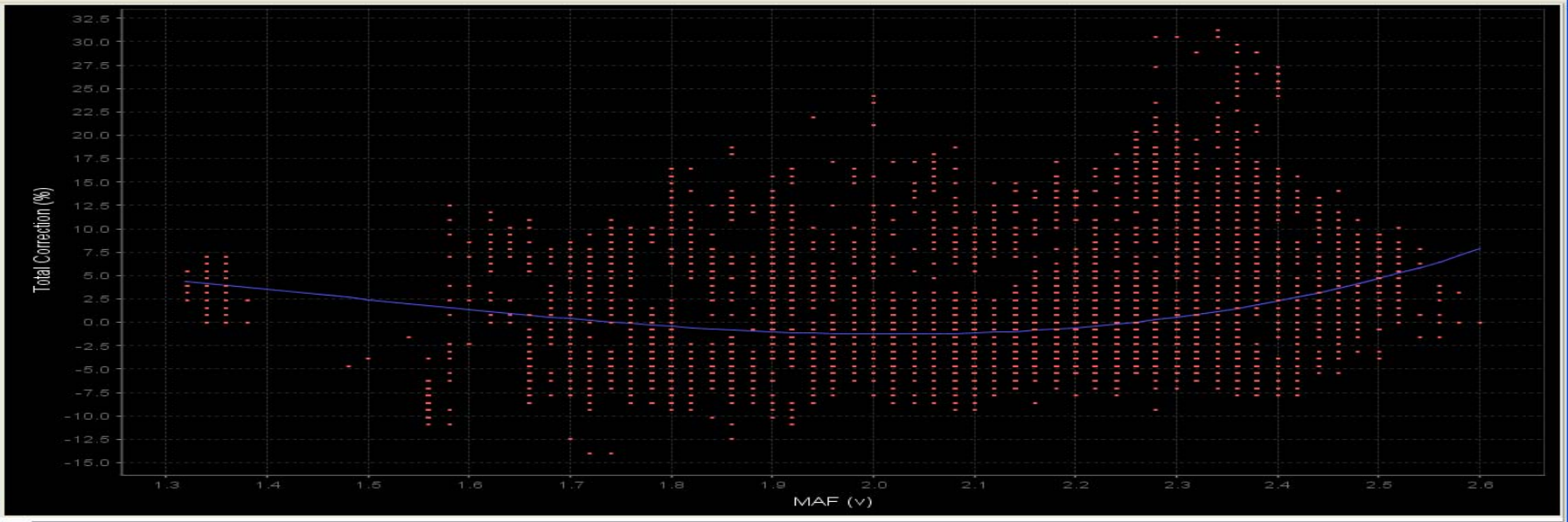
COM Port: COM1 Log to file Stopped.

Filter Data
AFR Range 14.0 - 16.0
RPM Range 0 - 4500
MAF Range (g/s) 0 - 150
Min. Coolant Temp. 65
Max. Intake Temp. 200
Max. dMAFv/dt (V/s) 0.2
Record Data

Interpolate
Poly. order 3
Interpolate

Update MAF
MAFv Range 1.20 - 2.60
Update MAF

Reset
Reset Data



Data Graph Dashboard MAF Injector

Disconnected. CAL ID: A4RG050R ECU ID: 29044B6005 [5.32 queries/sec, 0.19 sec/query]

RomRaider v0.5.0 Beta | ECU Logger

File Settings Connection Tools Plugins Help

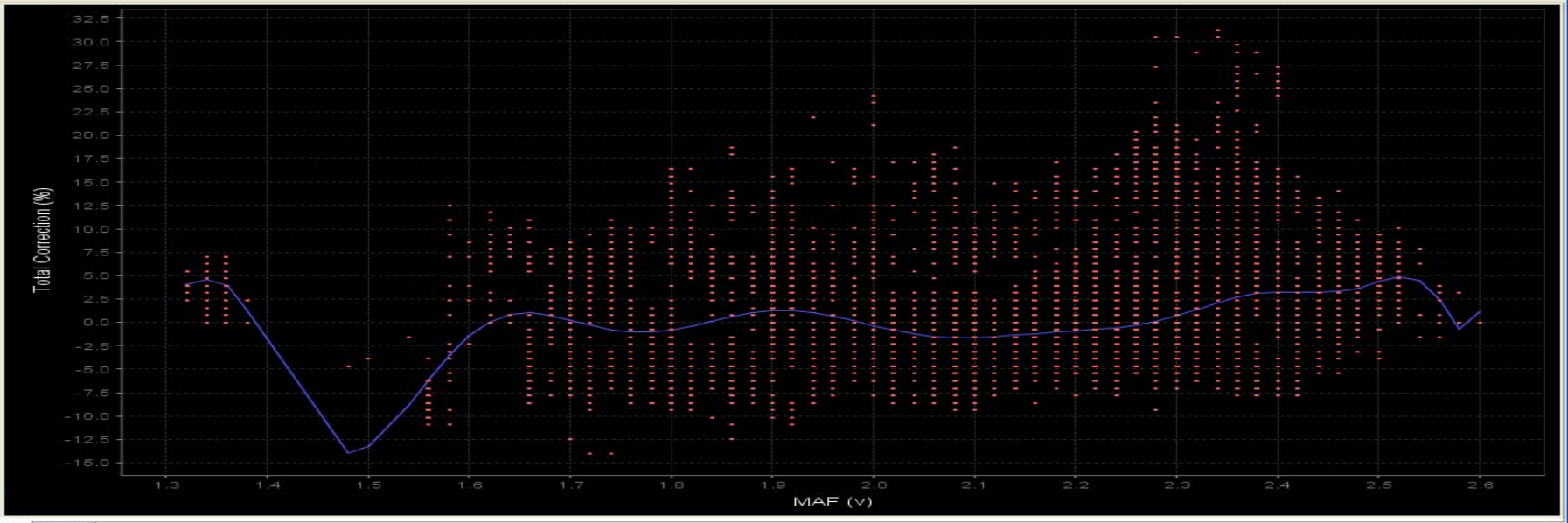
COM Port: COM1 Log to file Stopped.

Filter Data
AFR Range 14.0 - 16.0
RPM Range 0 - 4500
MAF Range (g/s) 0 - 150
Min. Coolant Temp. 65
Max. Intake Temp. 200
Max. dMAFv/dt (V/s) 0.2
Record Data

Interpolate
Poly. order 20
Interpolate

Update MAF
MAFv Range 1.20 - 2.60
Update MAF

Reset
Reset Data



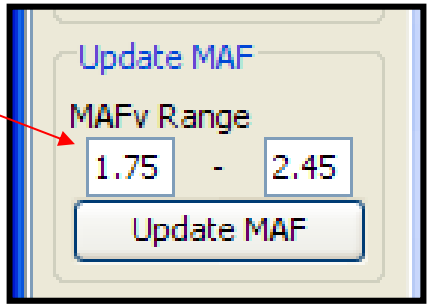
Data Graph Dashboard MAF Injector

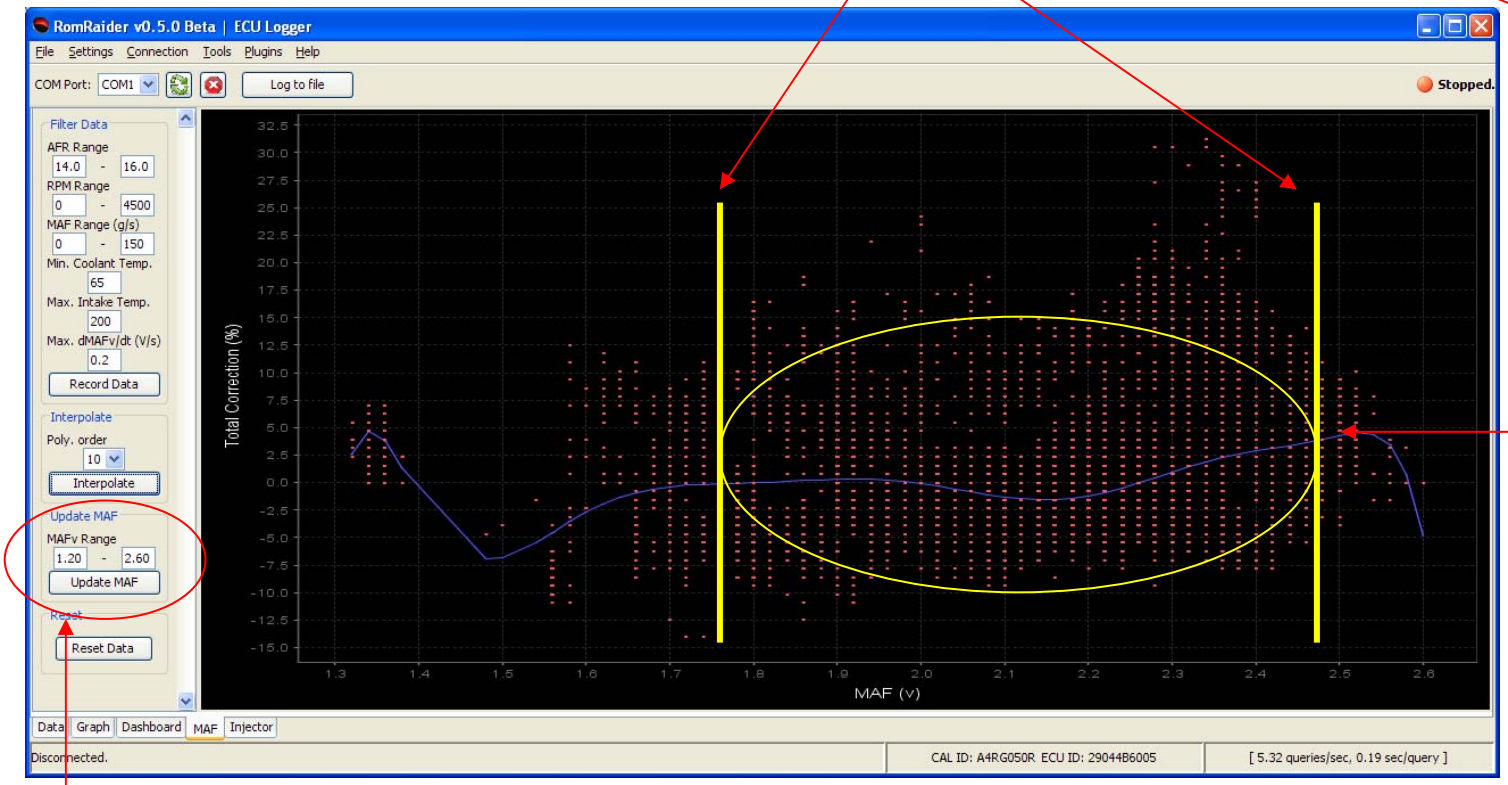
Disconnected. CAL ID: A4RG050R ECU ID: 29044B6005 [5.32 queries/sec, 0.19 sec/query]

Once you decided what is the best **“Interpolate value”** (the default value of **10** works fairly well usually), the next thing to do is apply this **“Correction”** to the existing **“MAF Sensor Scaling”** table to your **“Opened Map”** in RomRaider..

But first you must decide what is the **“MAFv Range”** that you want to update. I personally look for a region in the graph that has a lot of “DOTS” (log values) and I pick the values MAF(v) that correspond to this region. Or if I am looking and trying to fix a specific **“AFR or other problem areas”** then I would use the values that correspond to these areas. **The MAF (v) values are at the bottom of the graph**.

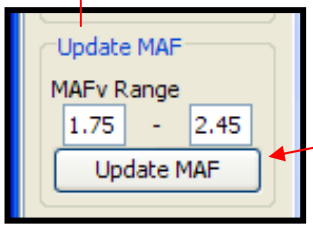
As an example on this graph, I would take the values of **“MAF(v)”** from **1.75** to **2.45**, and input them into the **”MAFv Range”** boxes





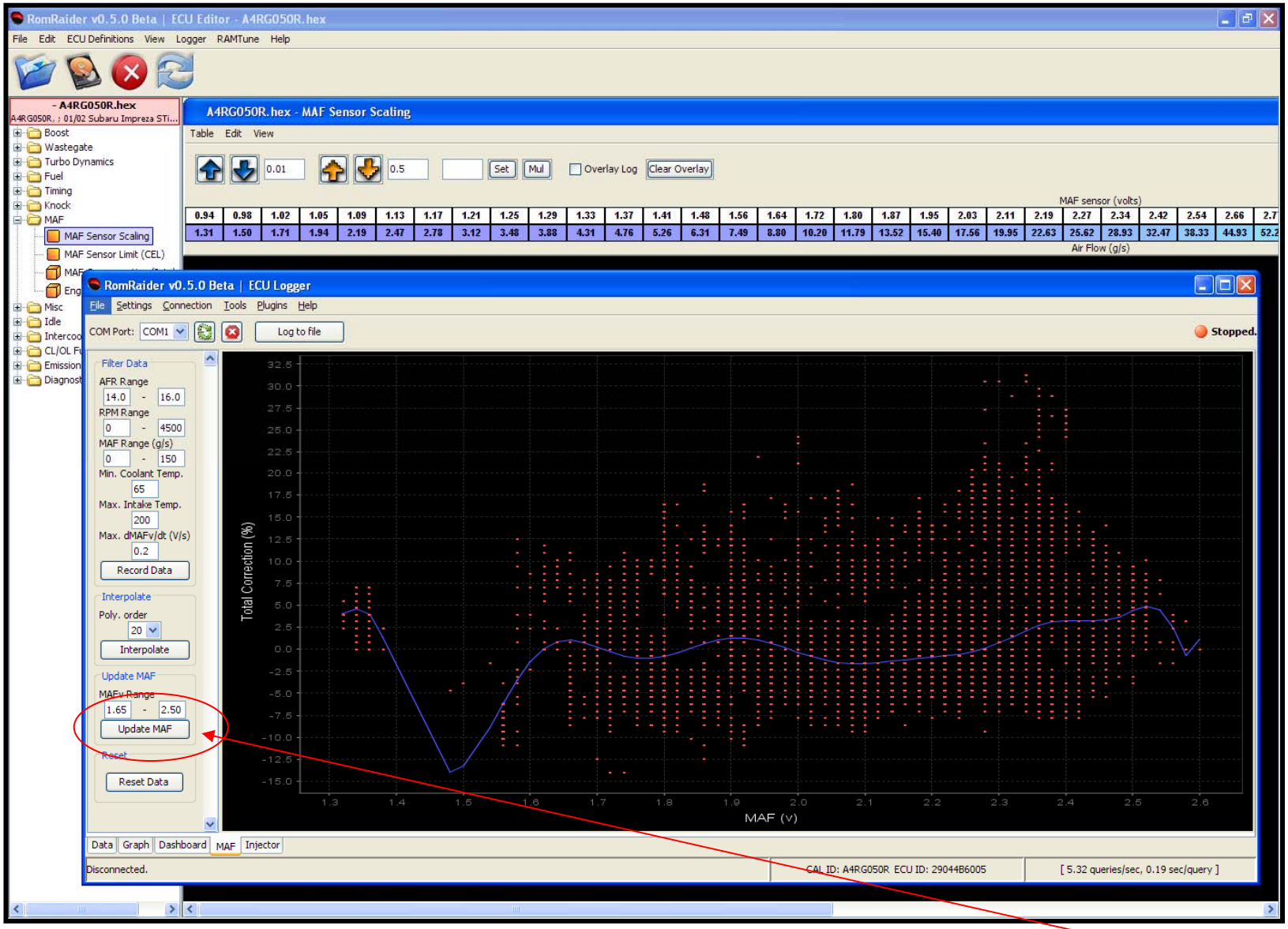
The yellow lines are for demonstration

The updating of the **“MAF Sensor Scaling”** map is accomplished by selecting the **“Update MAF”** button. **(DO NOT Update yet !)**



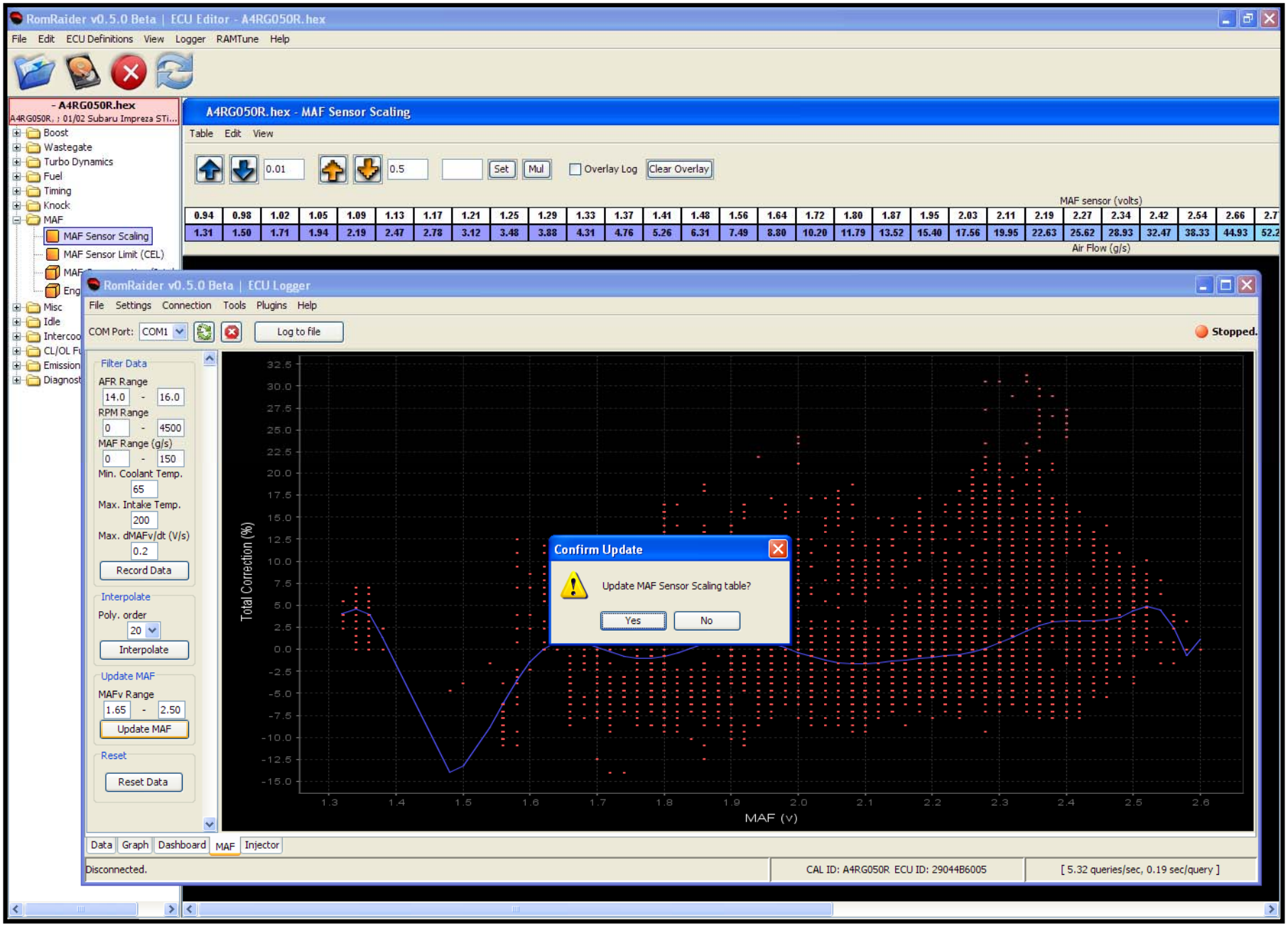
NOTE: You may choose to update **only** a value from 1.80 to 2.10 for example. **It does not need to be the whole graph (whole MAF (v) scale).**
You can also update multiple regions, **one at a time**. As in, first you update 1.35 – 1.60, then you update 1.95 – 2.25, then 2.40 – 2.60, and so on….

Next I like to bring the main **RomRaider** window to the front and then overlay the “Logger window” in front like this. This way I can see both my Log/Graph Map and my original **“MAF Sensor Scaling”** map.



Once you have **selected and inputted** the correct values into the **“MAFv Range”** that you wish to update, Press the **“Update MAF”** button.

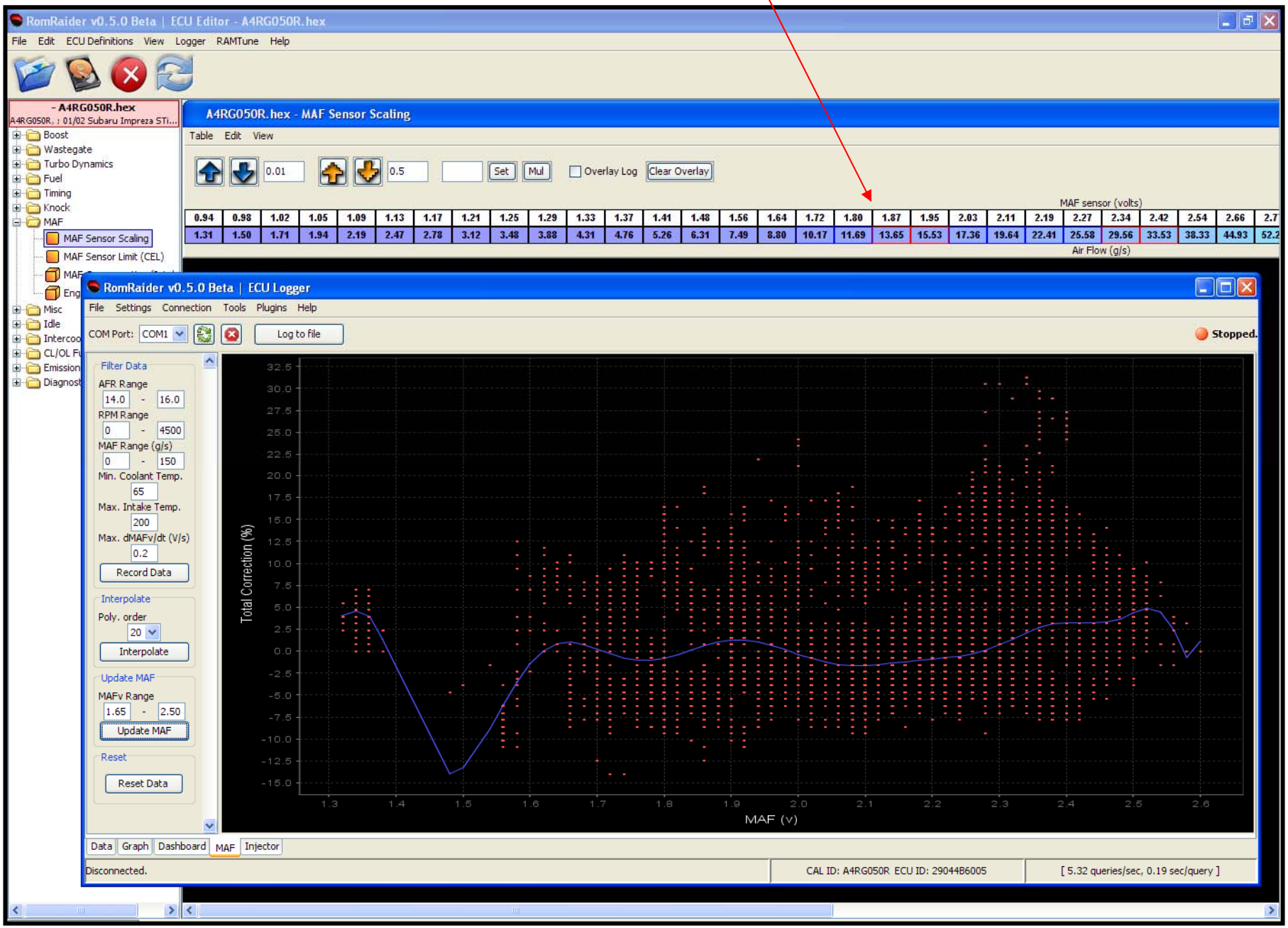
When the **“Confirmation Update“** box pops up. Select **“YES”.**



Now look at the values in the MAF (v) rage in the **“MAF Sensor Scaling”** map that you specified to change.

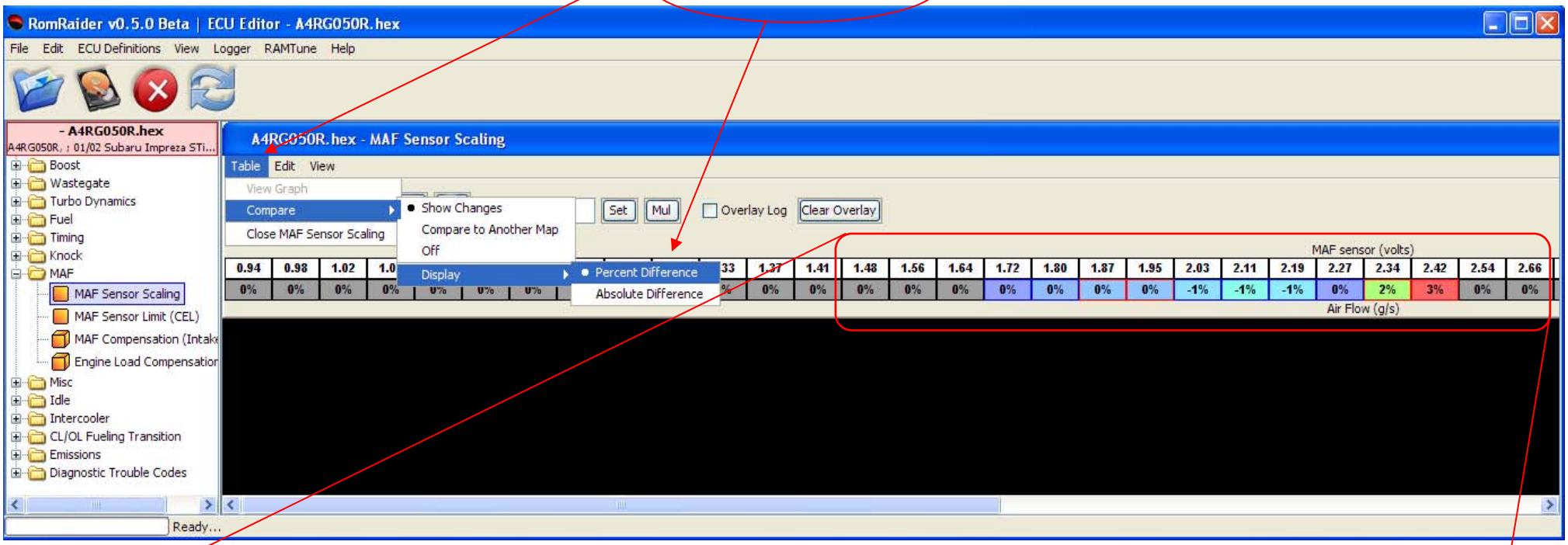
Some of the “**Cells”** with-in the “selected MAF (v) values” will be **outlined** in **different colors.** These are the **“Cells”** that have been changed / updated to new values.

****** Please check that the values “out of the selected region” <u>have NOT changed</u> ******



You can check what **“corrections / updates”** were made to these **“Cell”** by clicking on “**Table**” then selecting “**Compare**” and “**Show Changes**” .

You can select to show either **“Percentage or Difference”** that has been applied.



Absoltue Difference Close up of the “MAF Sensor Scaling” map – with applied corrections.

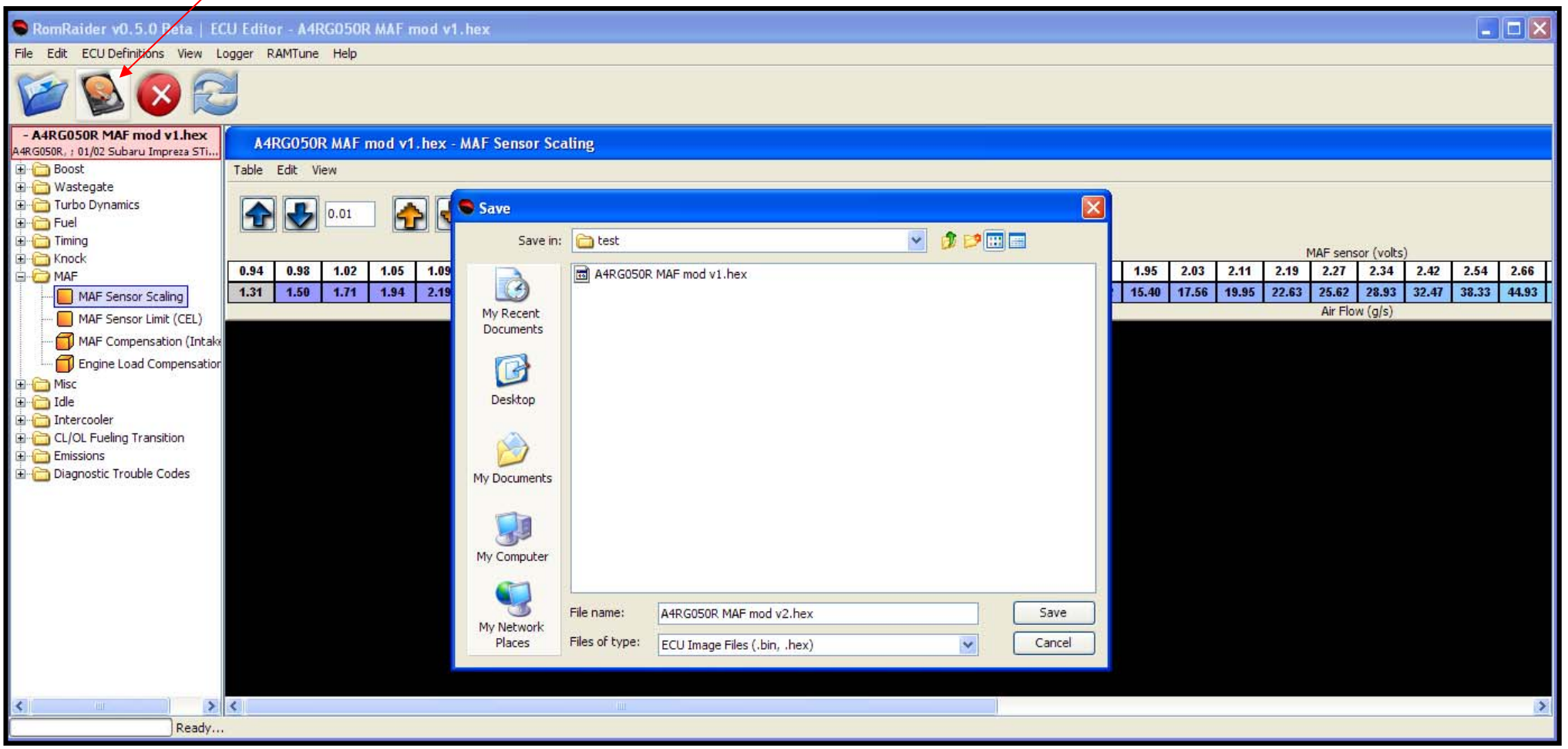
MAF sensor (volts)														
1.48	1.56	1.64	1.72	1.80	1.87	1.95	2.03	2.11	2.19	2.27	2.34	2.42	2.54	2.66
0.00	0.00	0.00	-0.03	-0.10	0.13	0.12	-0.19	-0.31	-0.22	-0.04	0.63	1.06	0.00	0.00
Air Flow (g/s)														

Percentage Difference

MAF sensor (volts)														
1.48	1.56	1.64	1.72	1.80	1.87	1.95	2.03	2.11	2.19	2.27	2.34	2.42	2.54	2.66
0%	0%	0%	0%	0%	0%	0%	-1%	-1%	-1%	0%	2%	3%	0%	0%
Air Flow (g/s)														

Once you have verified the changes, (and it looks OK) you need to save the changes.

Click on the **Hard Drive** icon  , this will bring up the **Save file** window. **Rename the file to something new** *(in case you make a mistake)* **and then save it.**



That's all the steps for scaling the MAF using the Logger. Now upload the newly saved file to your ECU with your favorite "ECU" flashing / uploading program.
Now you need to repeat these steps few times to achieve the desired result (properly scaled MAF), so go out and log some more.
(please watch your AFR values when you go for a drive after you have flashed / uploaded the new file to your ECU).

You will need to do this Log/Scale/Correction steps few times, the amount will depend on how bad the actual **"MAF Sensor Scaling"** was or what you are trying to compensate for or adjust for. This should help you to dial in your MAF, if you changed your MAF pipe diameter (as in Bigger MAF pipe), different intake pipes…etc. Basically any change that may have affected the reading your MAF is returning to your ECU.