BOSS GARAGE

Honduino OBD0 - V1.1

Before connecting the ECU to the car

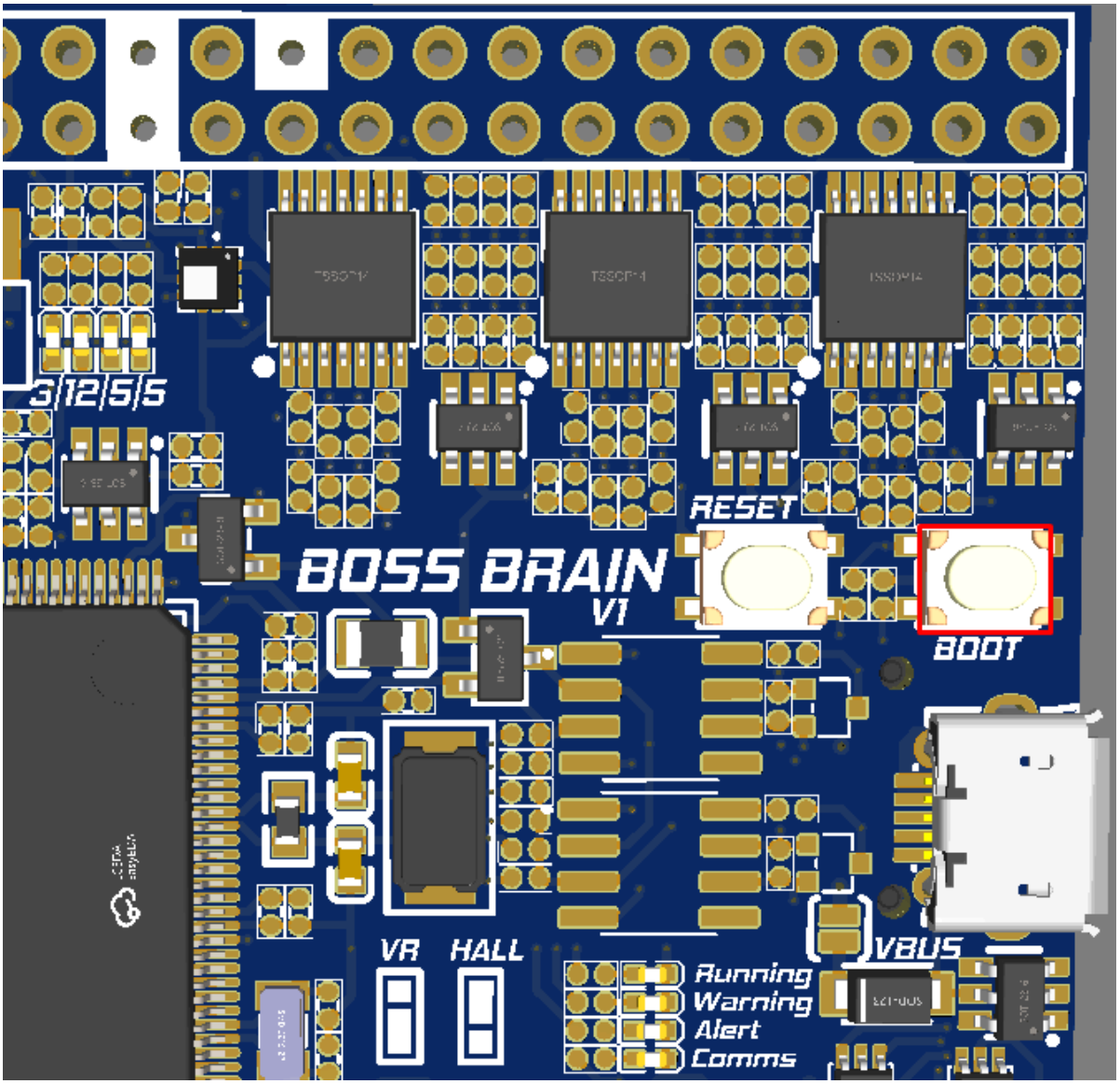
Before installing the ECU into the vehicle some pre-installation configuration must be performed.

1) Update the firmware (optional)

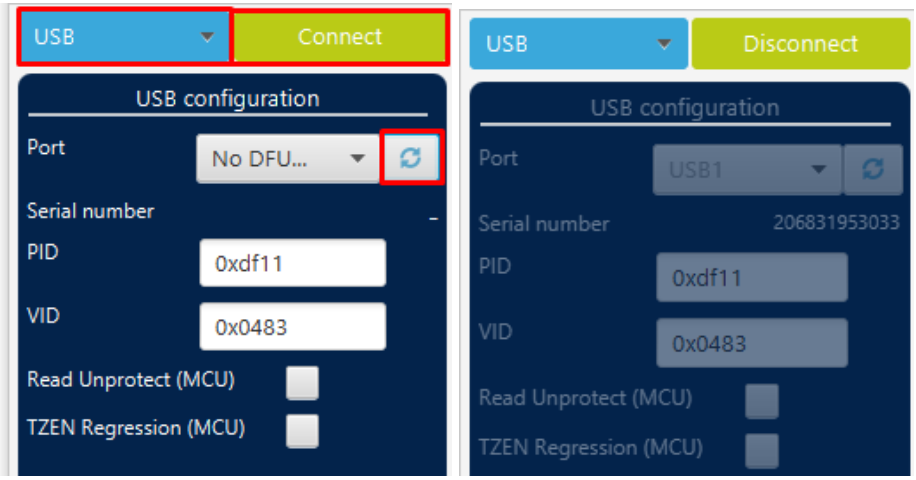
1.1. Download and install STM32CubeProgrammer V2.14

1.2. Download the latest FIRMWARE

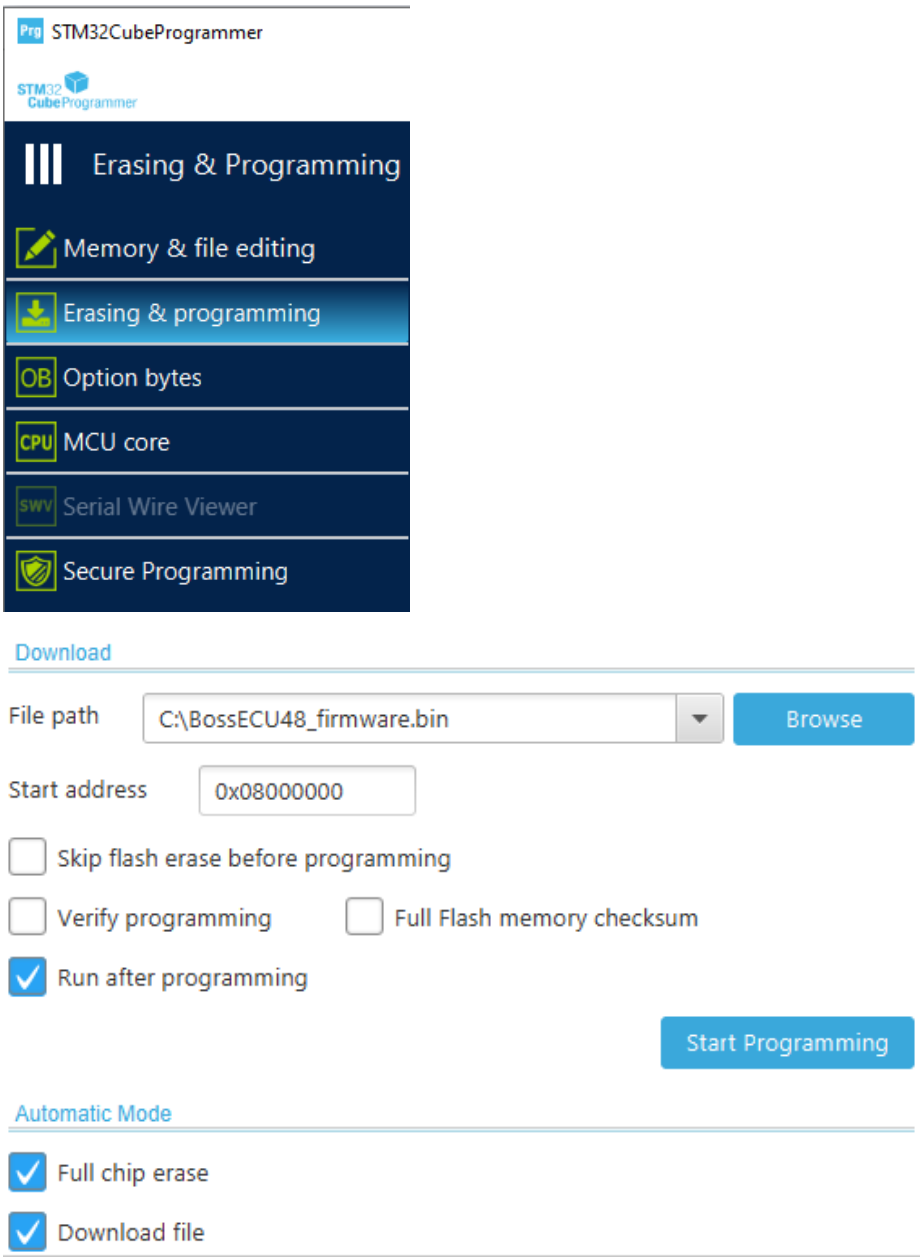
1.3. Click on the DFU button on the board and plug the USB cable into the computer



1.4. In STM32CubeProgrammer, select USB, refresh the devices, select the ECU, and connect.



1.5. Go to the “Erasing & programming” menu, browse, and select the firmware.



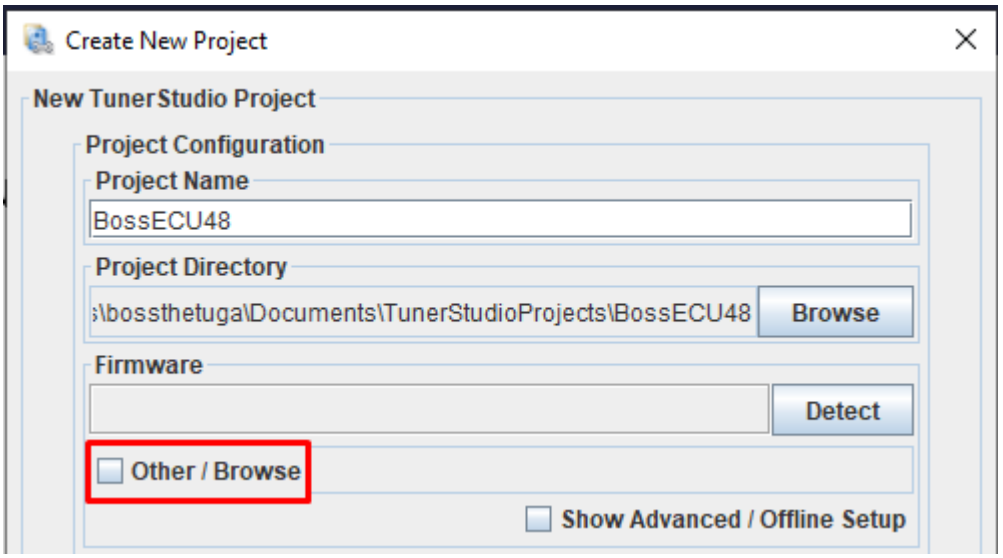
1.6. Insert the start address: 0x0800000
1.7. Select the boxes: “Run after programming”, “Full chip erase” and “Download file”
1.8. Click “Start Programming”
1.9. You successfully updated the firmware! Now, close all the STM32CubeProgrammer windows and restart the ECU by clicking the RESET button or unplug and plug the USB cable.

2) Connecting to the software

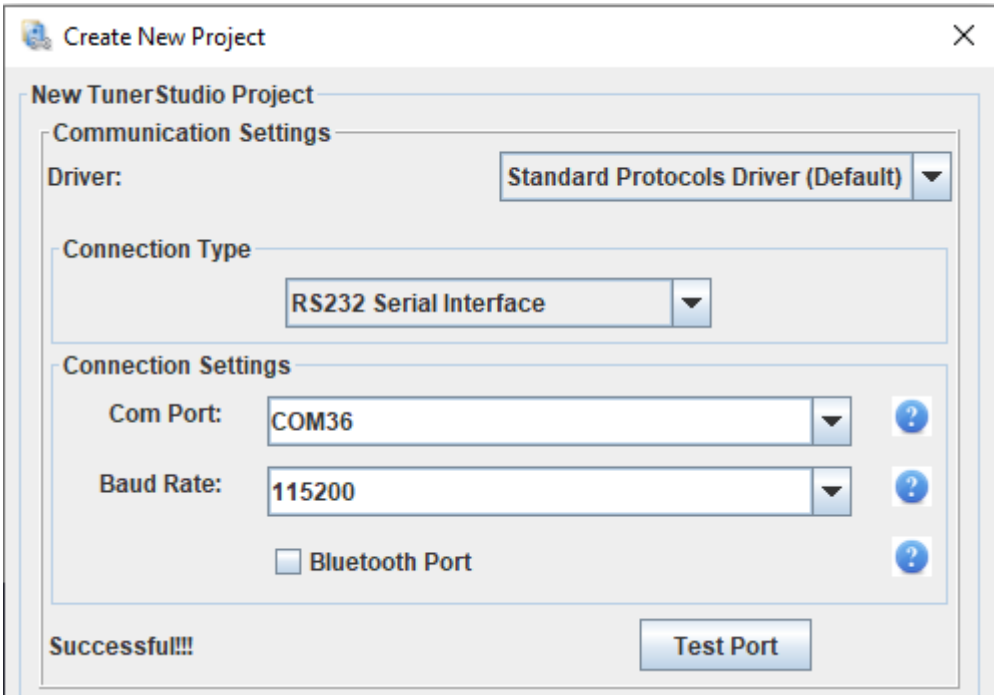
2.1. Download and install: TunerStudio

2.2. Plug the USB, it will automatically open a virtual drive with a file rusefi.ini.zip, extract it, and save it on your desktop.

2.3. Open TunerStudio, create a new project, click “Other / Browse” and select the firmware.ini file extracted before.

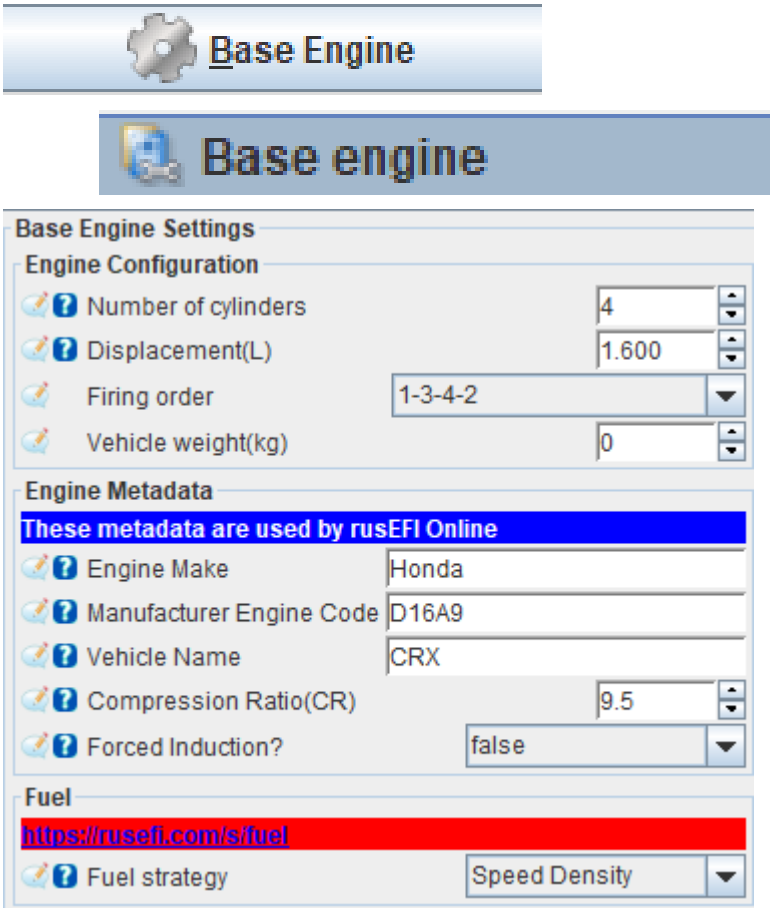


2.4. Use RS232 Serial for USB connection or Bluetooth direct



3.1) Base settings

Configure the number of cylinders, engine displacement in liters, firing order, and fuel strategy.



3.2) Ignition

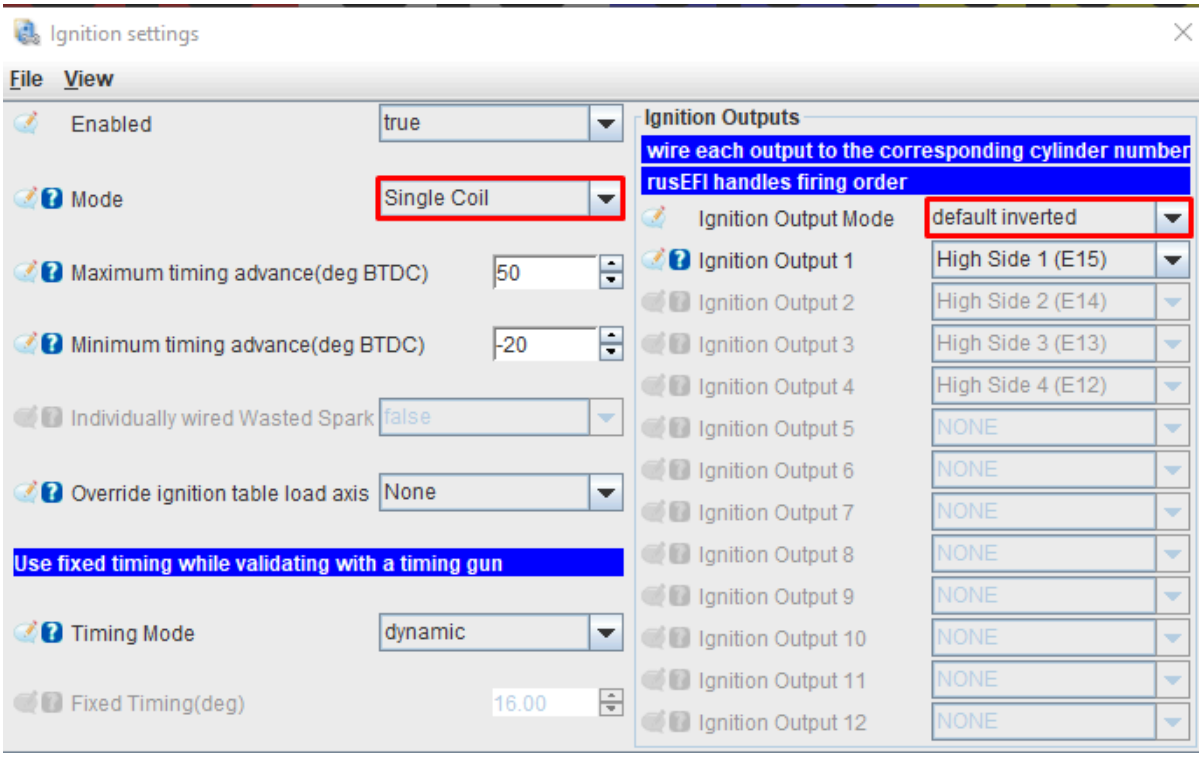
WARNING: Use only **smart coils** or dumb coils with external igniters.

3.2.1 The ICM jumper needs to be adjusted based on the ignition setup. **(CRITICAL)**

For a distributor coil, it should be soldered. When using individual coils, it must be unsoldered.

3.2.2 Configure the **Spark Mode** and **Output Mode** **(CRITICAL)**

WARNING: If the output mode isn't configured correctly, the coil(s) will overheat and potentially get damaged. If the ignition is ON and the coil starts to heat up, the configuration is likely incorrect.



Spark mode:

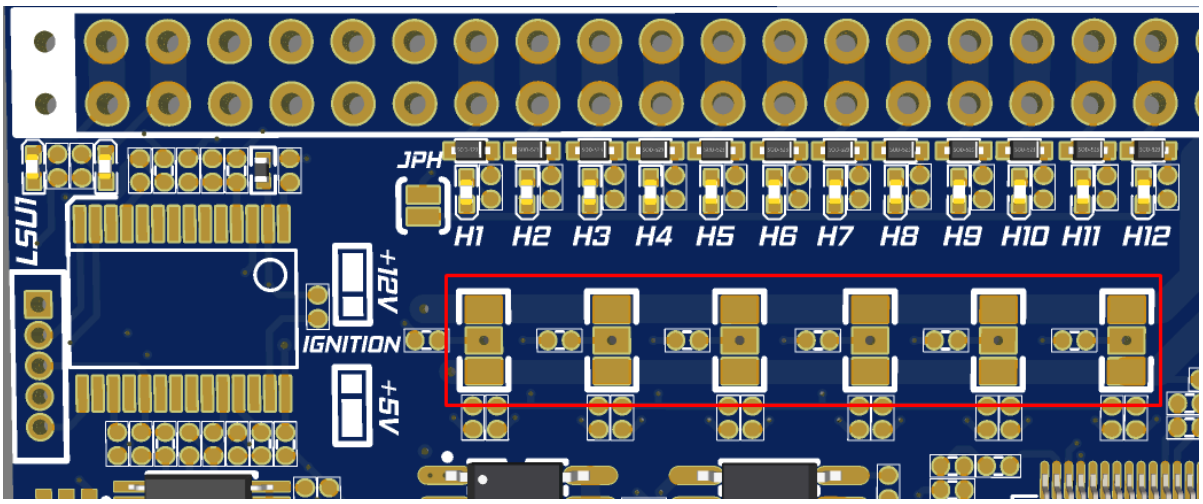
- Single coil: Distributor
- Individual coils: Smart coils in sequential mode

Ignition output mode:

- Honda distributor coils: **Default inverted (Going High)**
- Most of the smart coils: Default = (Going Low)

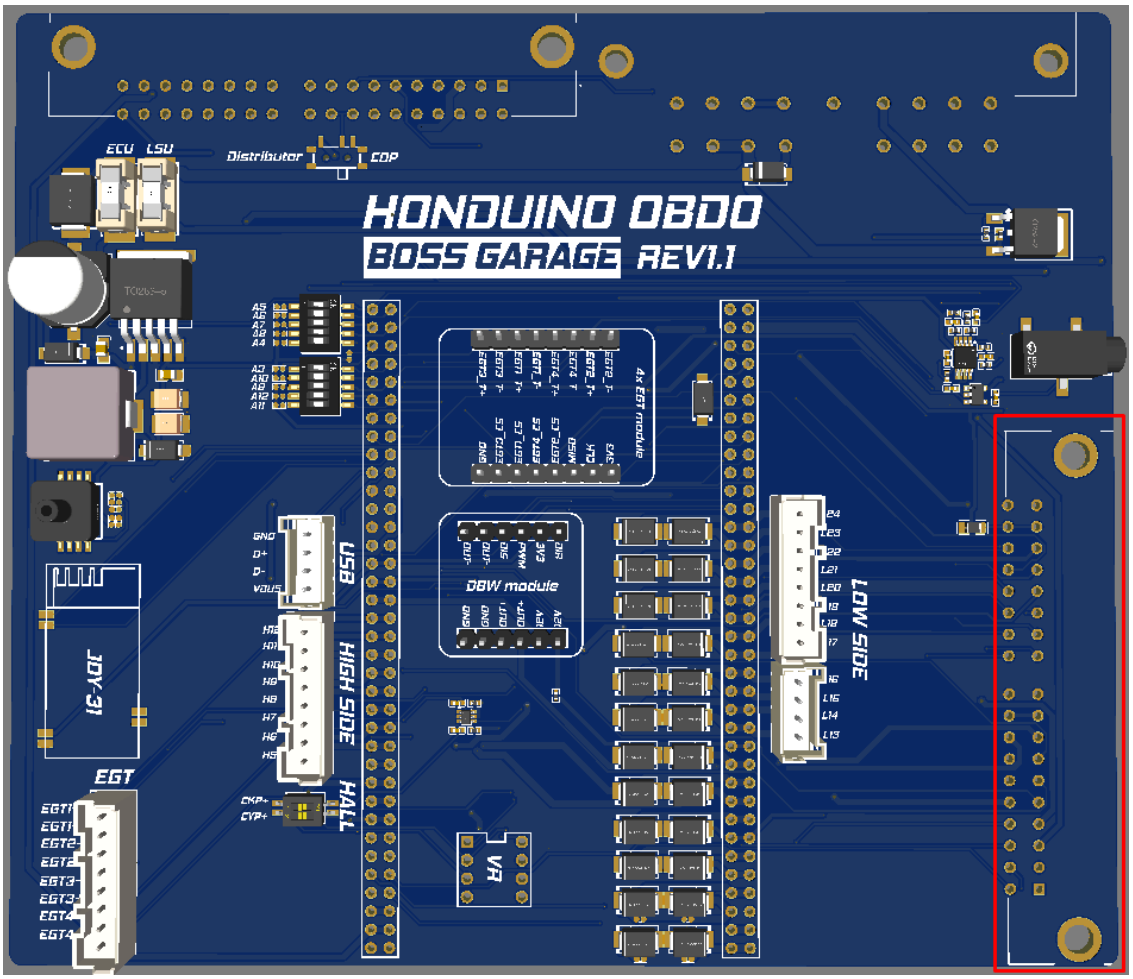
3.2.3. **Ignition voltage output:** select the voltage for each pair of ignition output via the jumpers:

H1 + H2 **H3 + H4** **H5 + H6** **H7 + H8** **H9 + H10** **H11 + H12**



- Honda distributor: **12V**
- Most of the smart coils: 5V

3.2.4. **If using individual coils:** Connect each coil signal wire to the auxiliary connector.

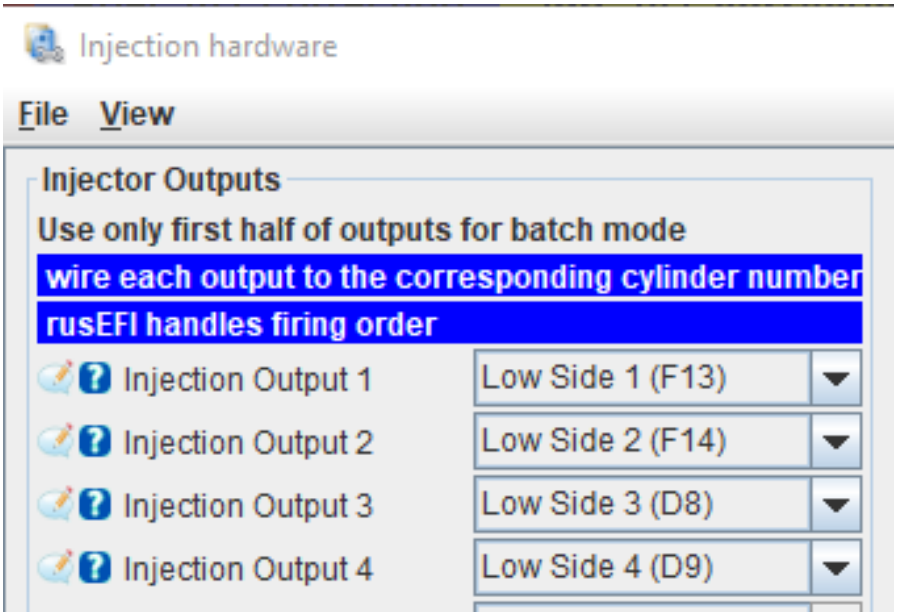


Coil number	Auxiliary connector	Tunerstudio output
Coil 1	Y2	High side 1
Coil 2	Y4	High side 2
Coil 3	Y6	High side 3
Coil 4	Y8	High side 4

3.3) Injection

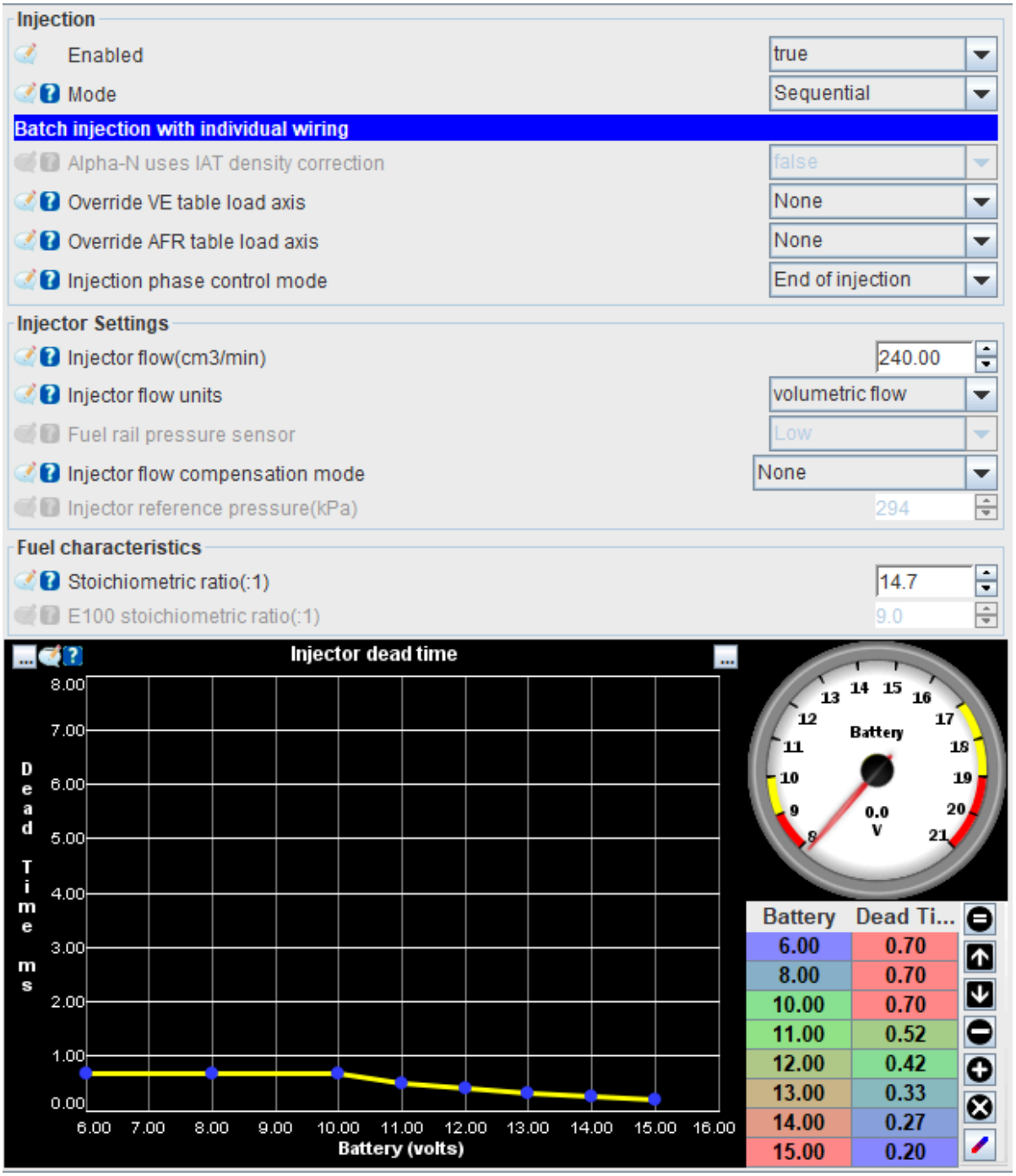
WARNING: Use only high-impedance injectors (> 8 ohms) or low impedance with a resistor box.

3.3.1 Configure the outputs that correspond to each cylinder.



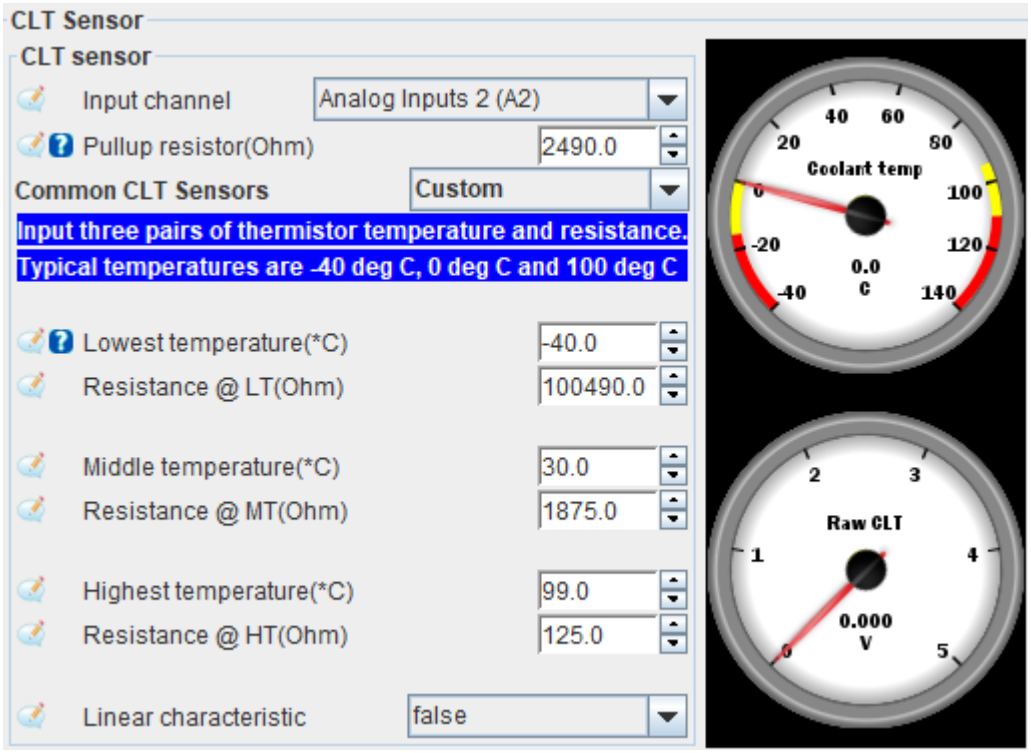
3.3.2 Injector base settings

- Injection mode
- Injector flow
- Compensation mode
- Dead time

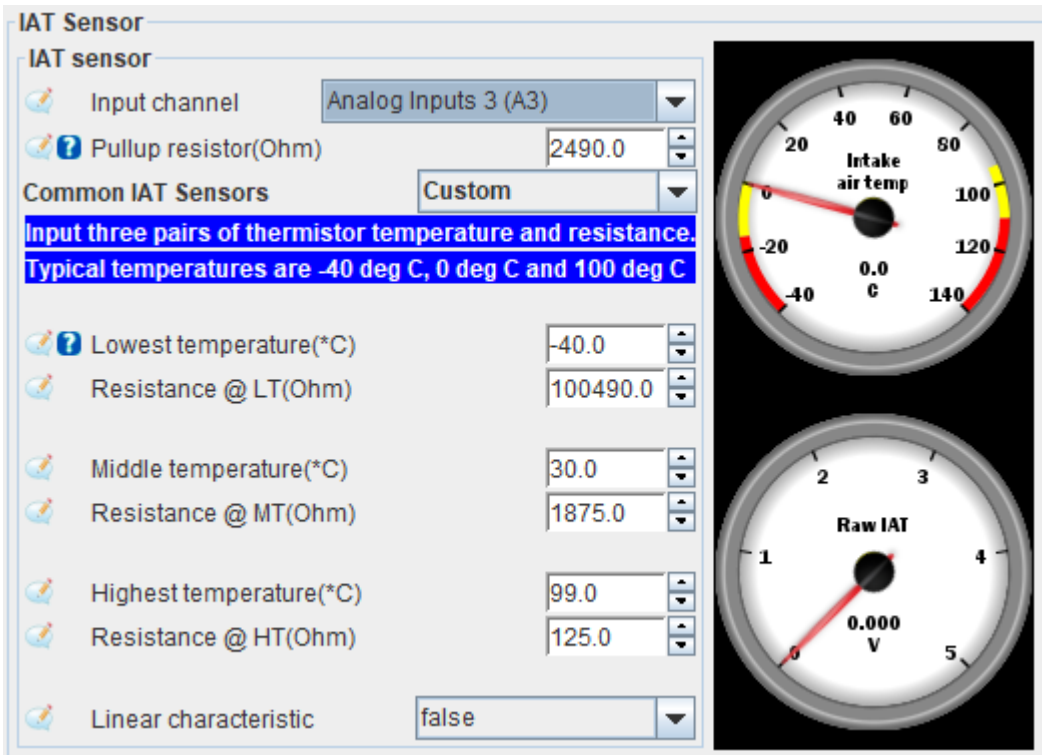


3.4) Temperature sensors

3.4.1 Coolant temperature sensor

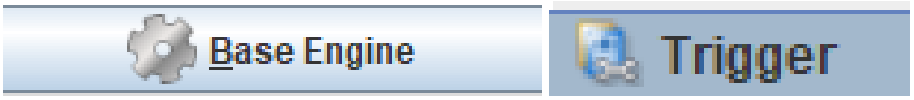


3.4.2 Intake temperature sensor

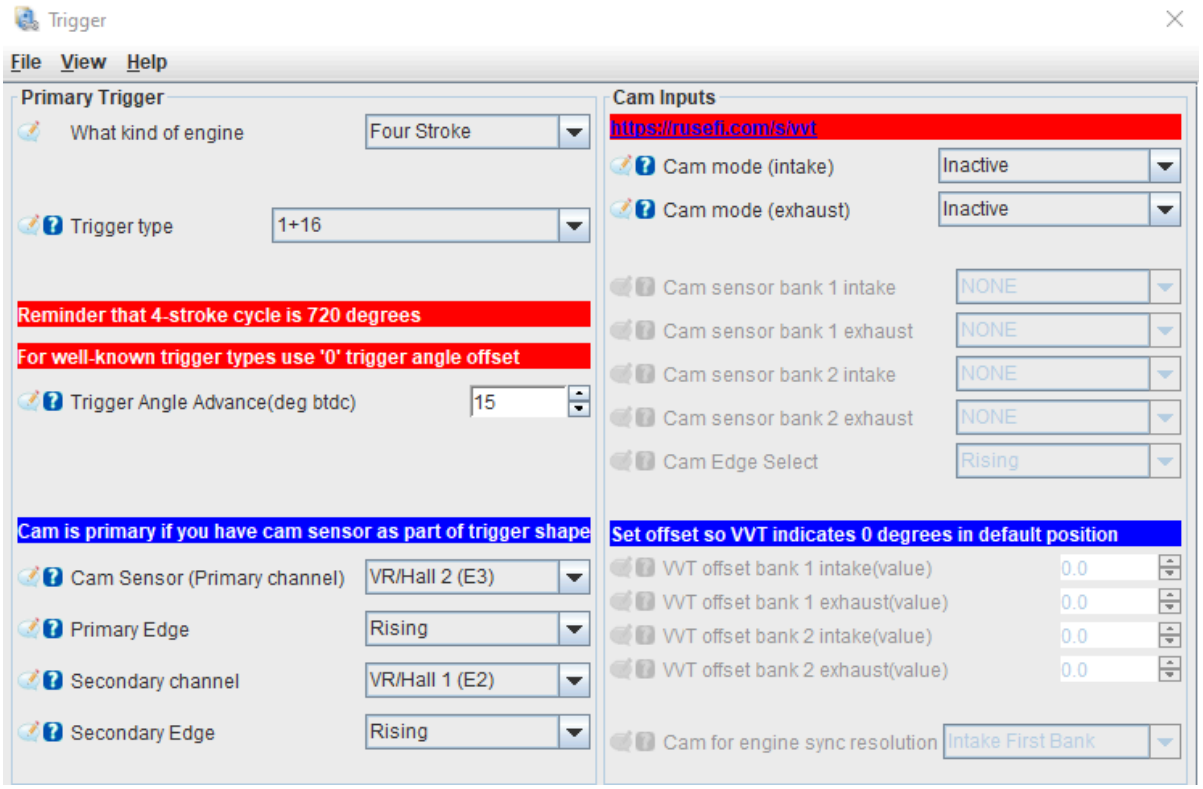


3.5) Trigger wheel

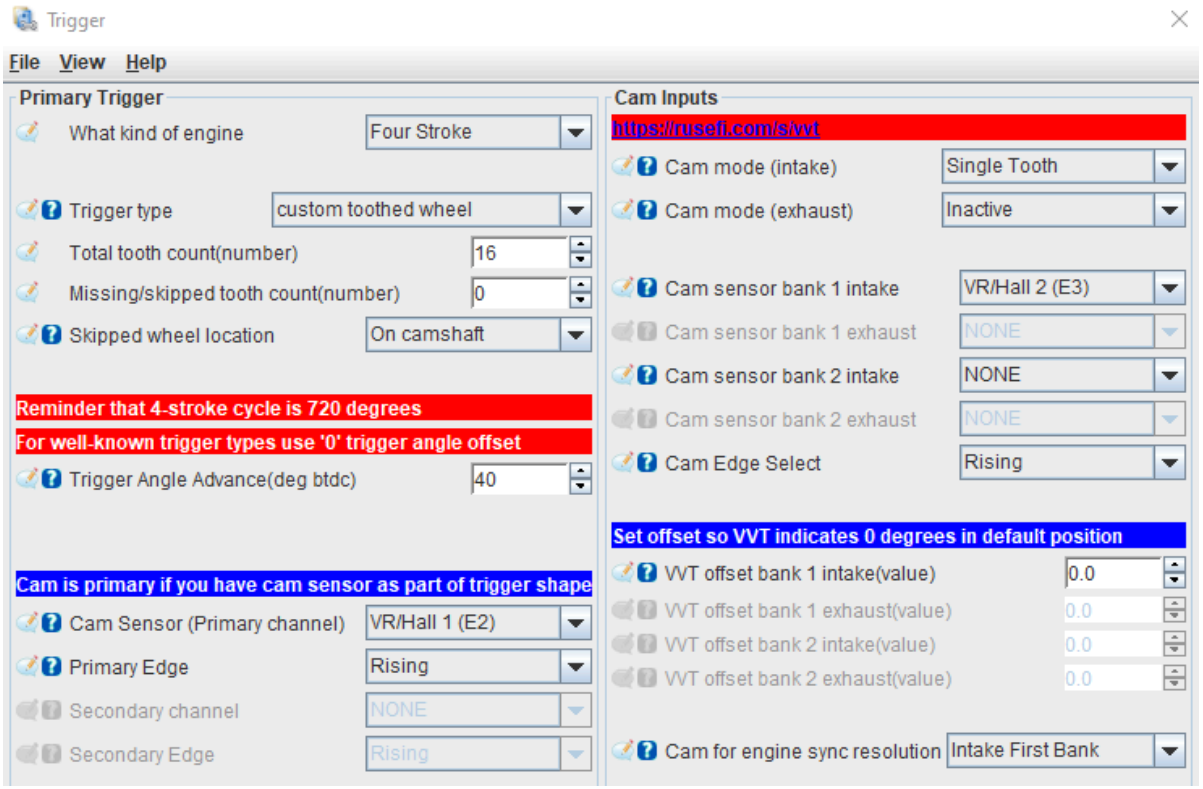
3.5.1 Configure the trigger wheel according to your distributor:



TRIGGER: 1+16

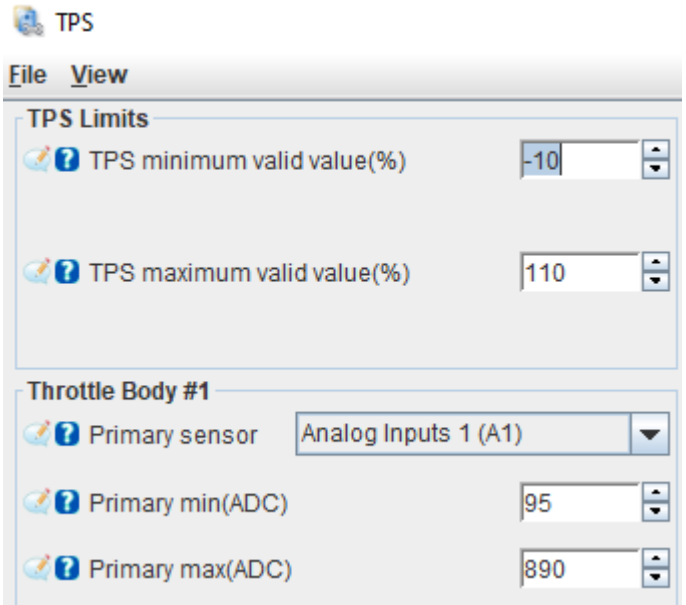


TRIGGER: Custom 16+1



Connect the ECU to the car

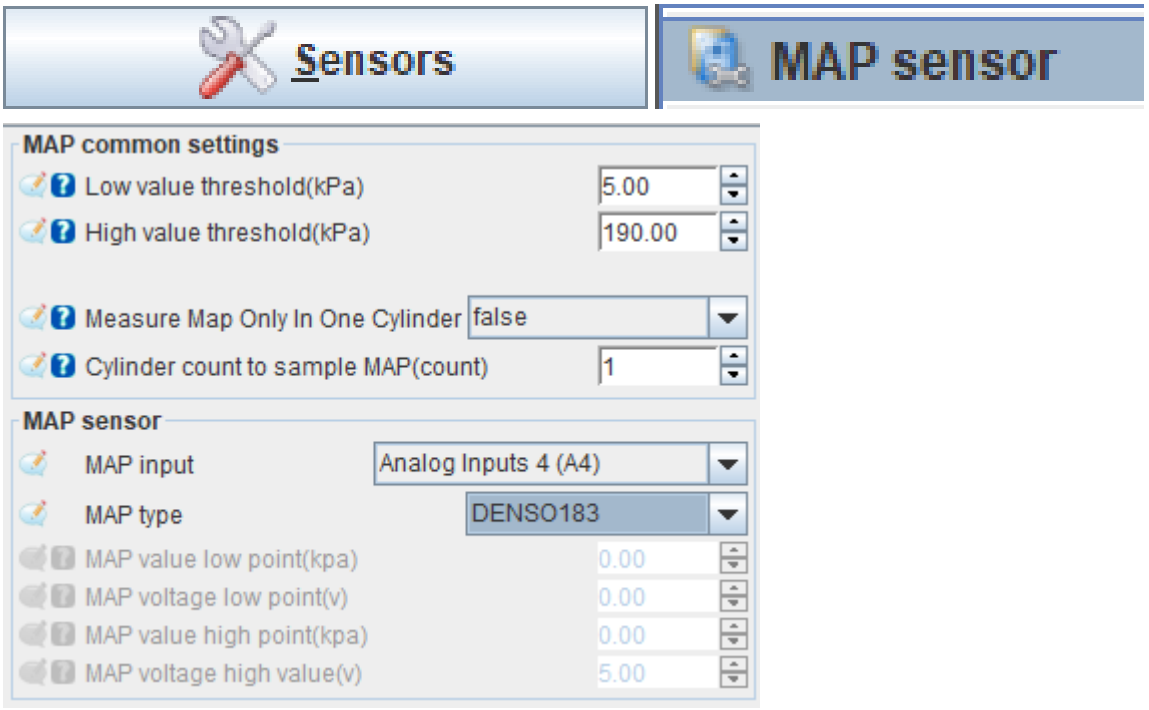
4) Throttle Position Sensor



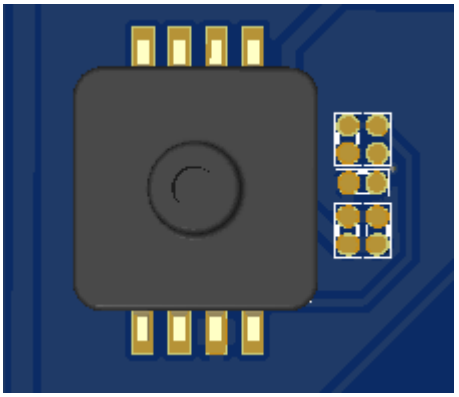
Adjust the **Primary minimum (ADC)** and **Primary max (ADC)** until the TPS reads 0% without pressing the throttle and 100% at full throttle.

5) MAP sensor

Any MAP sensor can be used, but the most used is the stock one on input A4.

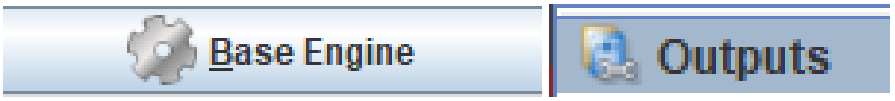


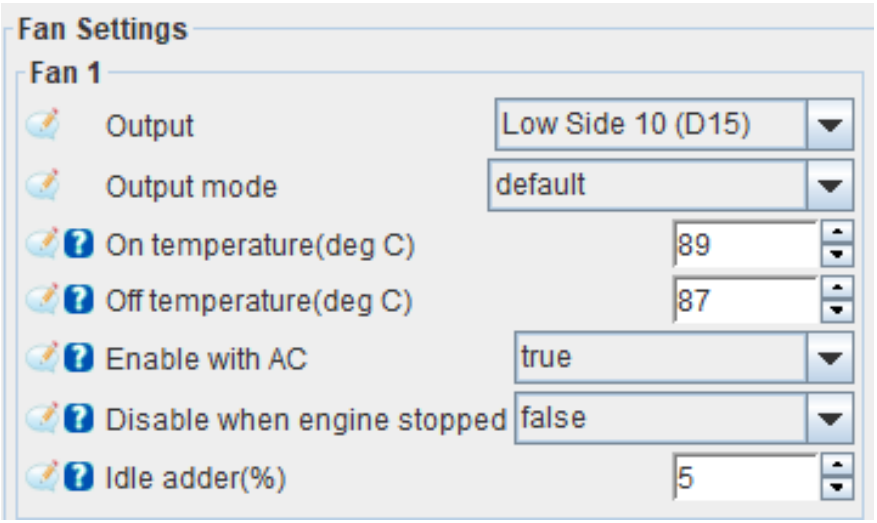
You can also solder an onboard MAP sensor to A5 or connect to the auxiliary inputs.



6) Radiator fan

A valve controls the radiator fan mechanically, but the ECU can activate it early or independently.

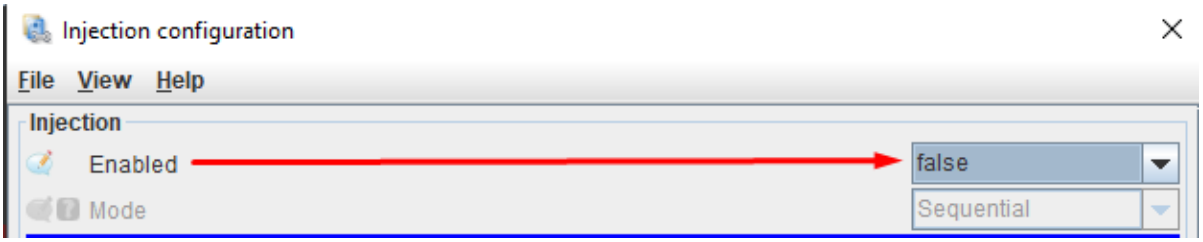




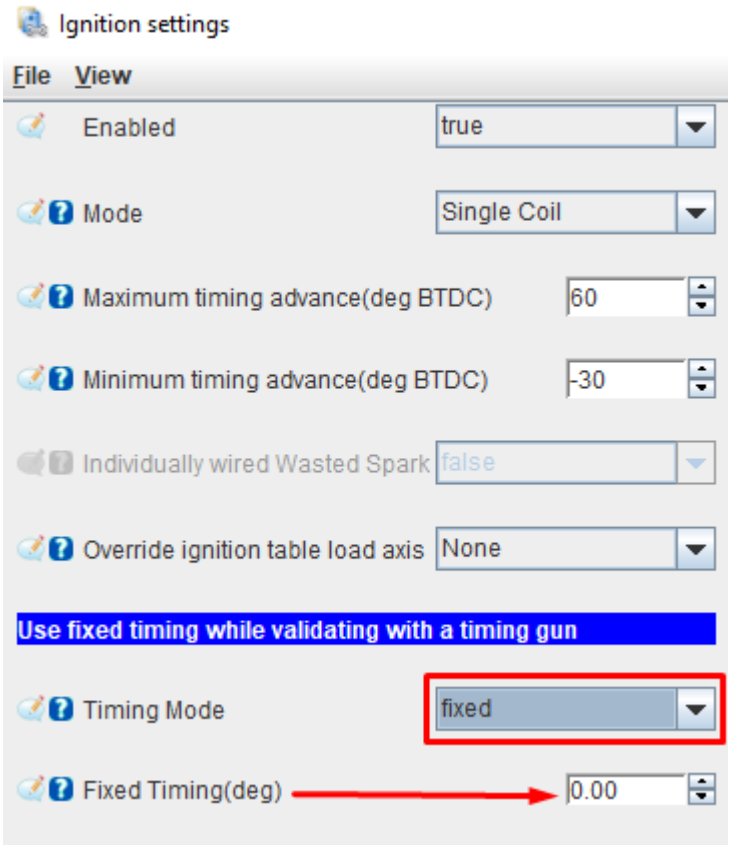
7) Ignition base timing (same as the rotation of the distributor)

To sync the ignition timing with the engine, it's necessary to adjust with the help of a [Timing Light gun].

7.1. Disable the injection **(if the car starts, skip this step)**

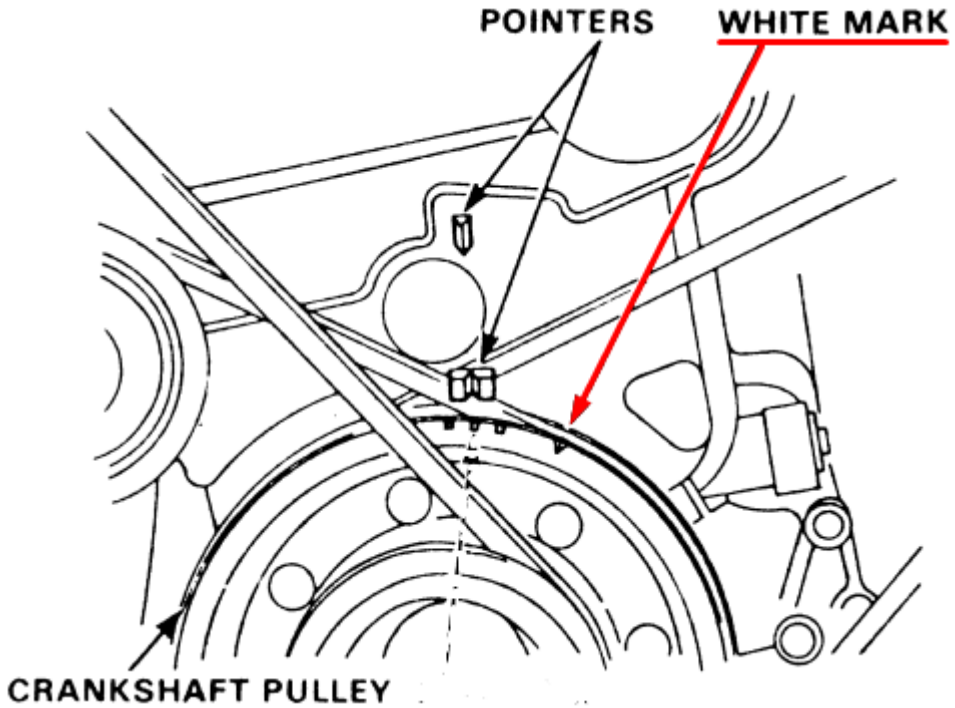


7.2. Change the timing mode from **dynamic** to **fixed**, so the ECU fires the coil always on the 16-degree angle.



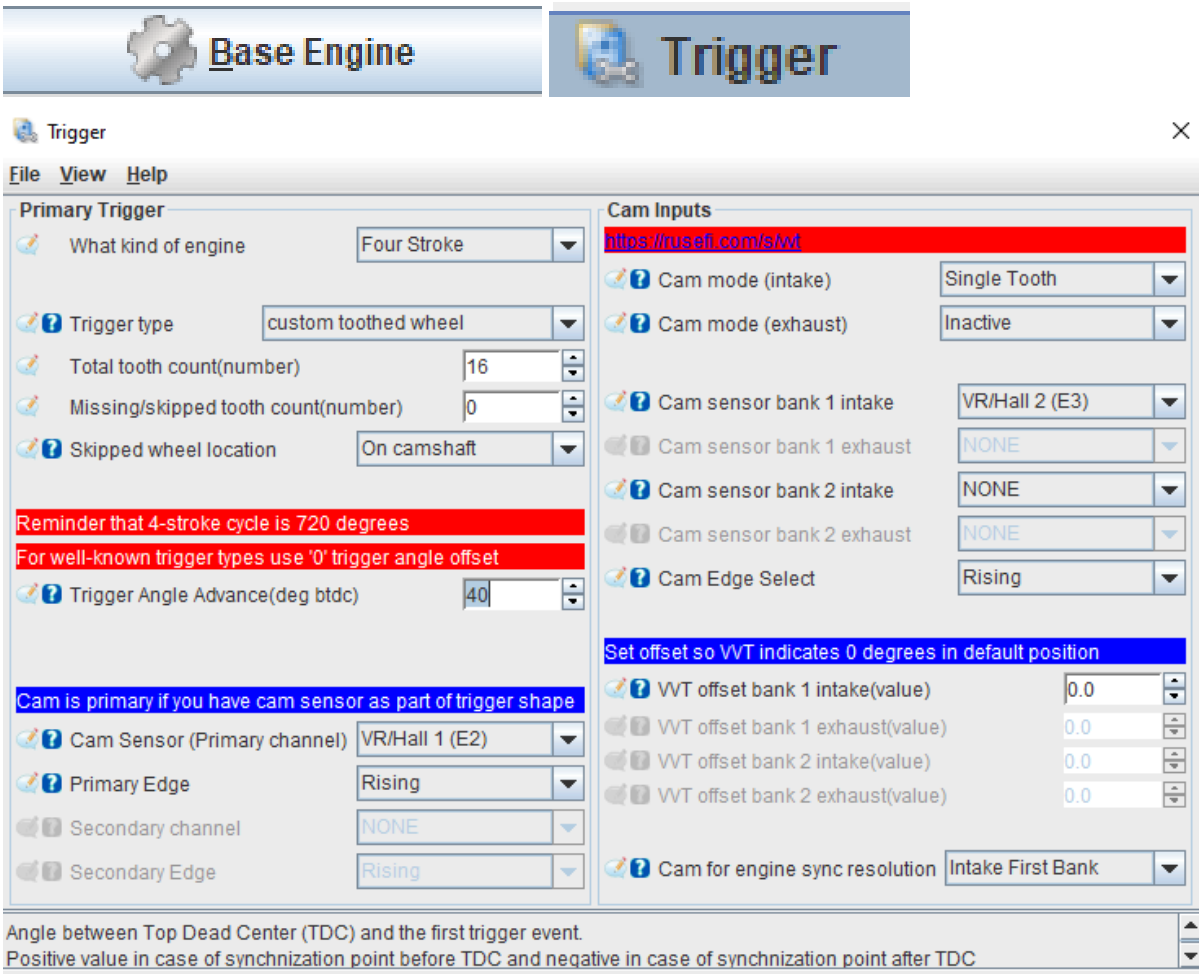
7.1. Use a white sharpie to **mark the 0-degree mark** on the crank pulley.

The crank pulley has four marks, with the alone mark of the four being 0 degrees (TDC).

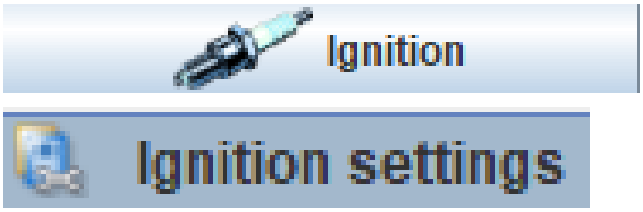


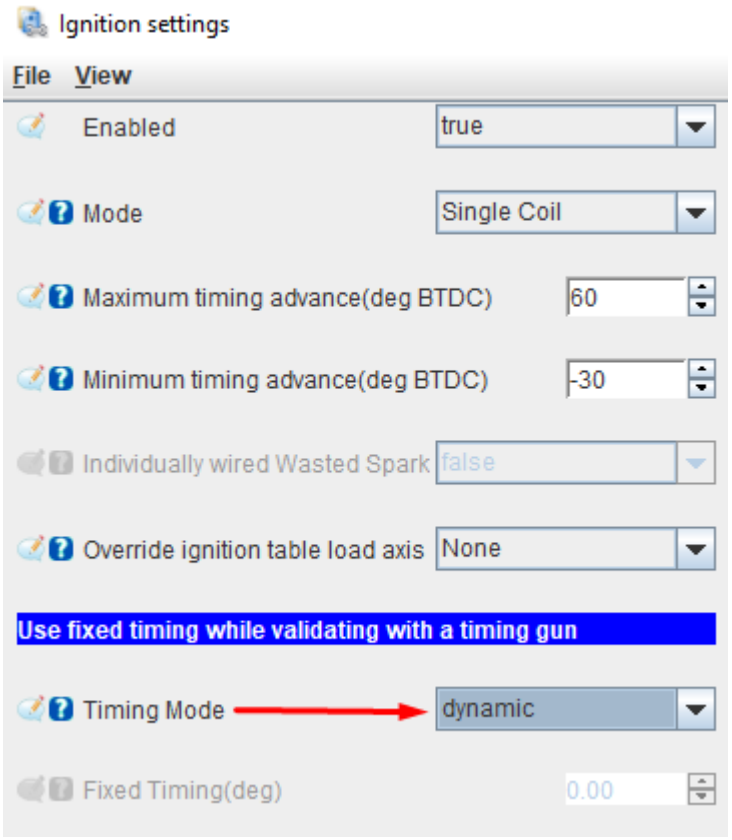
7.3. Attach the timing light clamp to spark plug wire 1, ensuring the arrow points toward the spark plug.

7.1. Adjust the **Trigger Angle Advance** value until the 0-degree mark on the crank pulley aligns with the pointer on the distribution cover.



7.4. Unlock the timing, so the ECU sends the ignition table values.

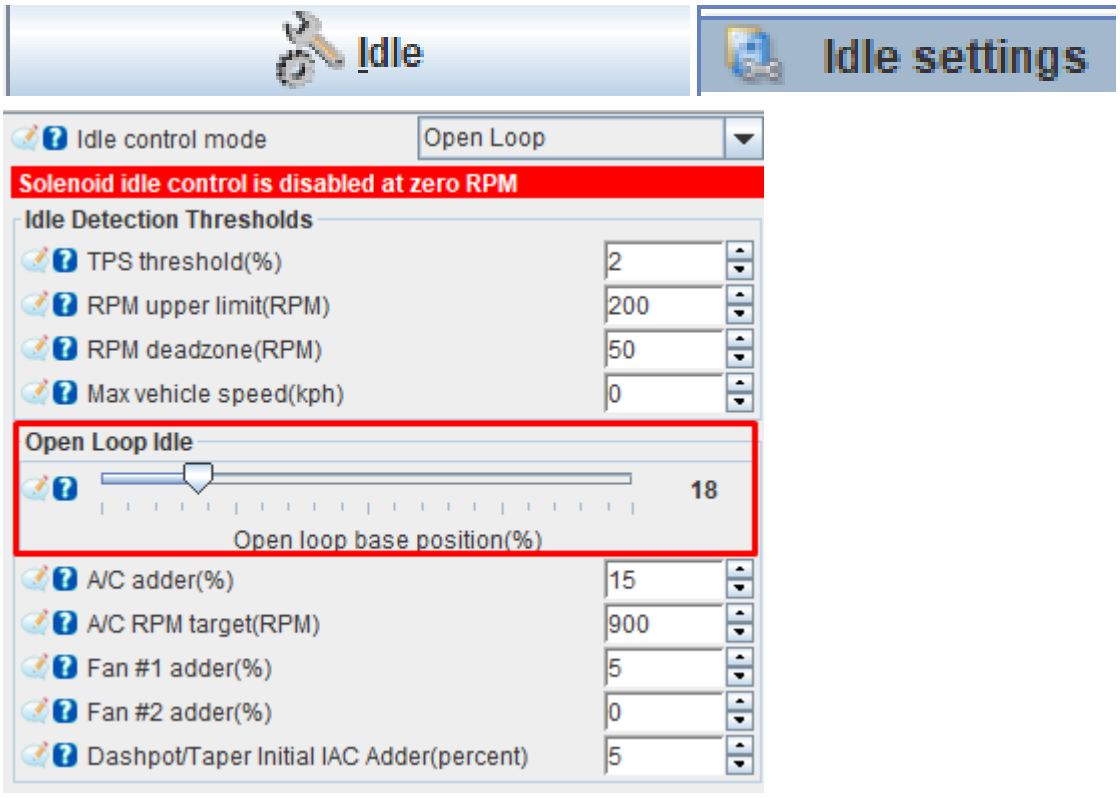




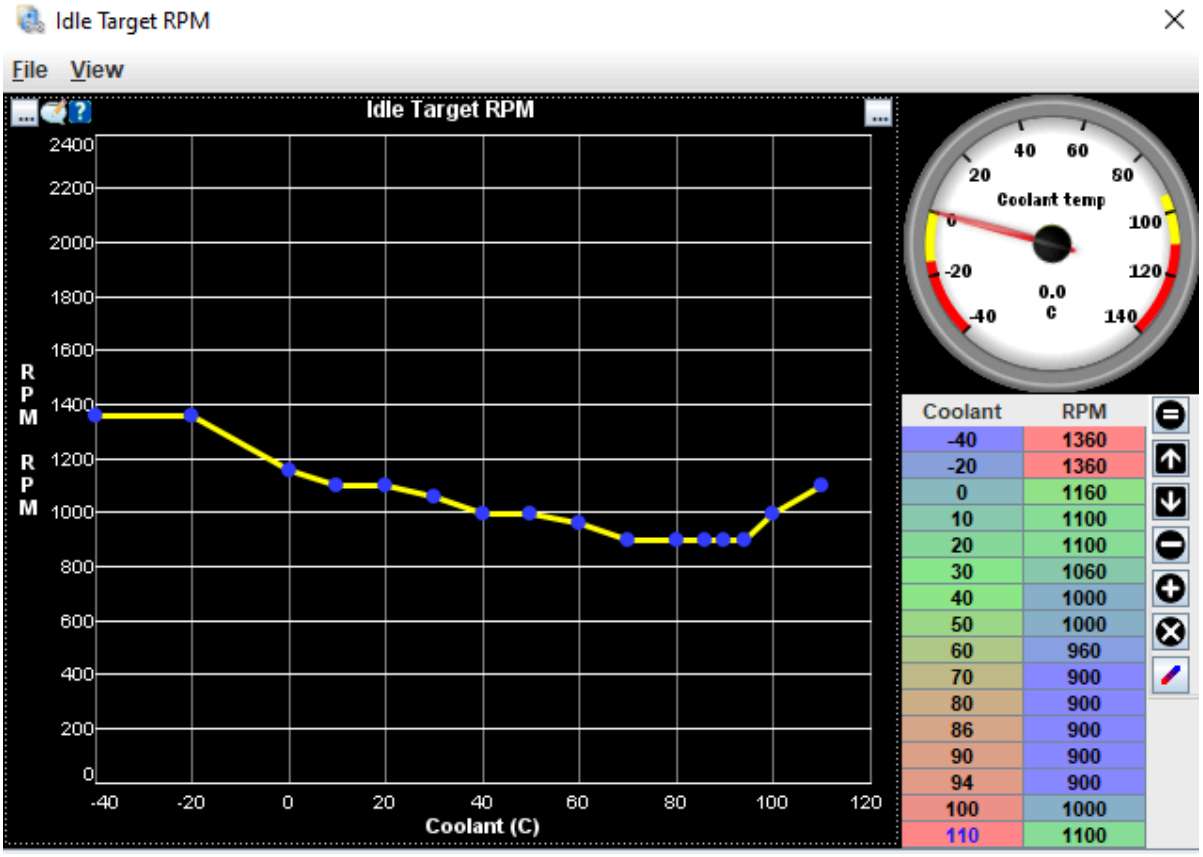
7.5. **The timing is synced,** now start your car 🥳🥳🥳

8) Idle control

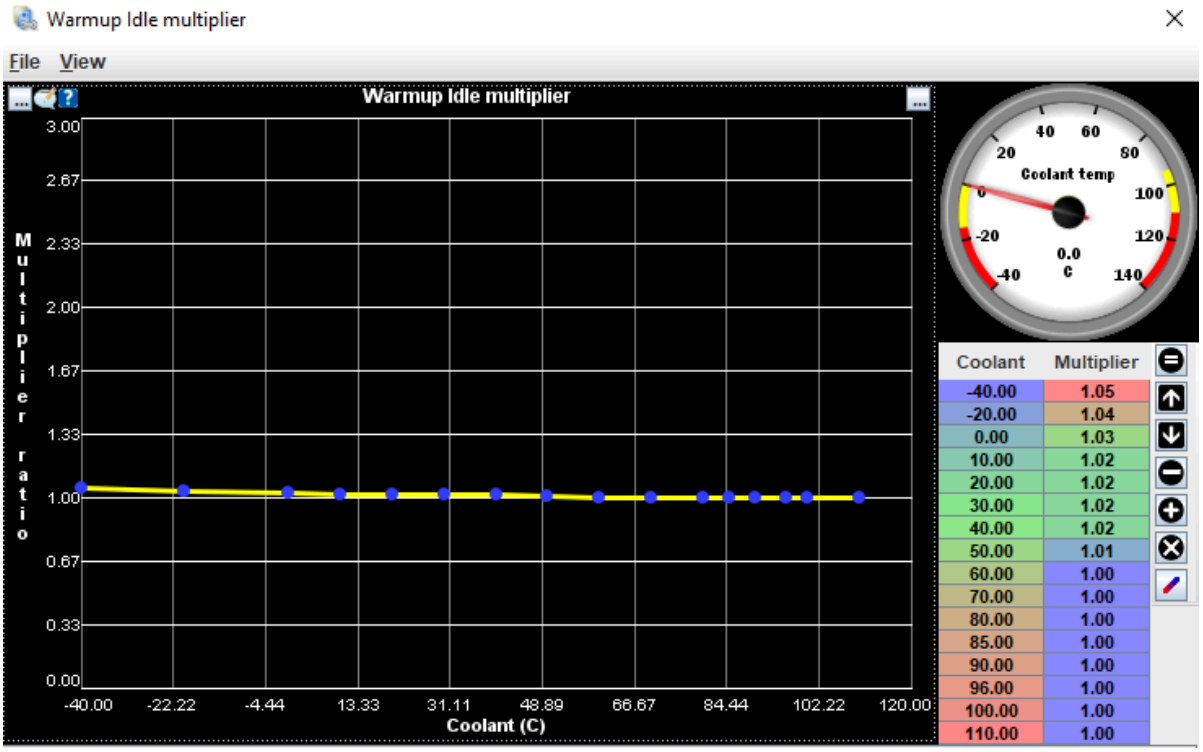
8.1. Adjust the idle when the engine is at its normal operating temperature.



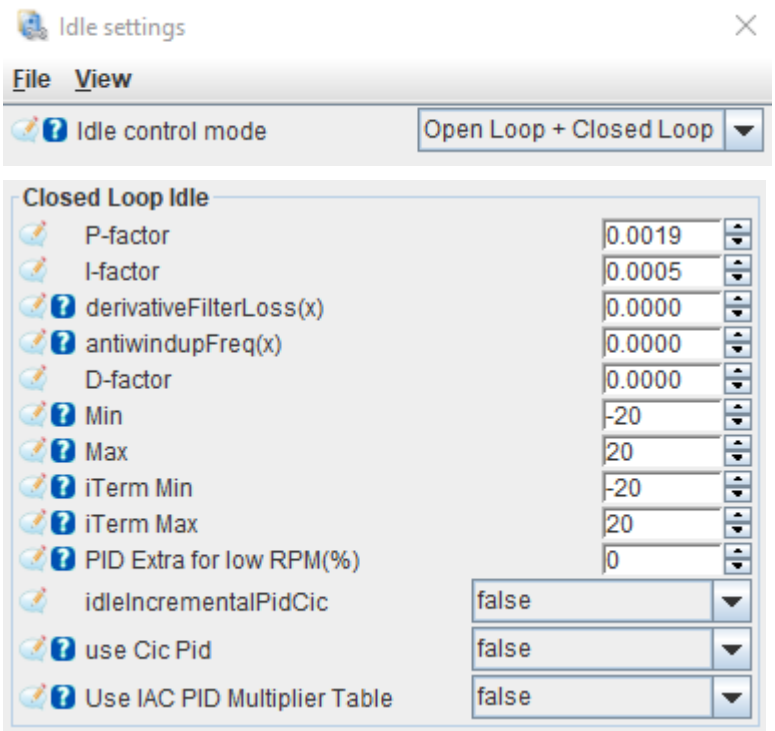
8.2. **Idle Target RPM** is used to control the idle in closed-loop mode.



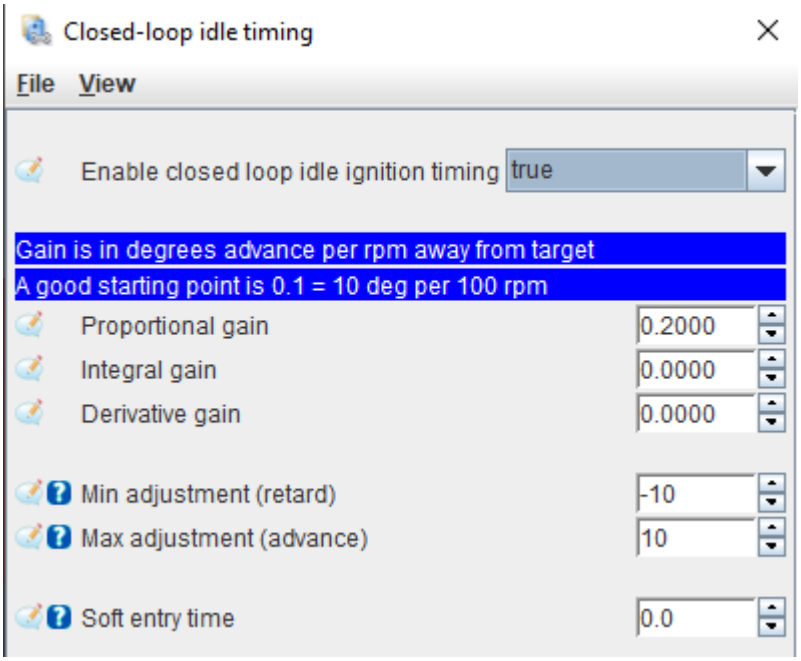
8.3. **Warmup Idle Multiplier** adjusts the value based on the open-loop idle setting.



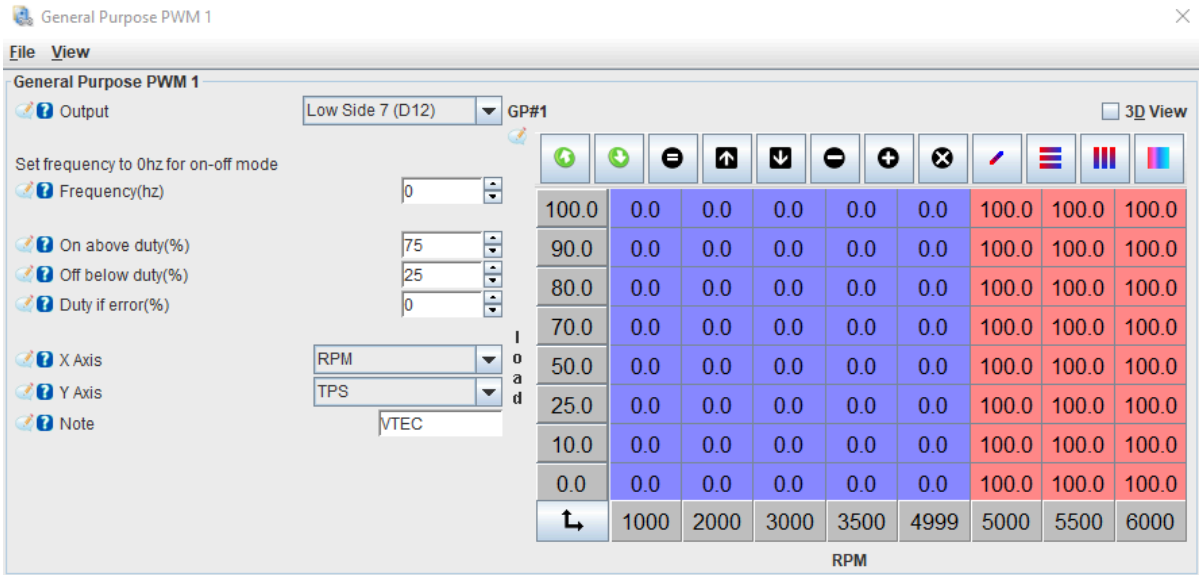
8.4. **Closed-loop idle** adjusts the idle by a PID algorithm.



8.5. **Closed-loop idle timing** adjusts the idle by advancing or retarding the ignition timing.

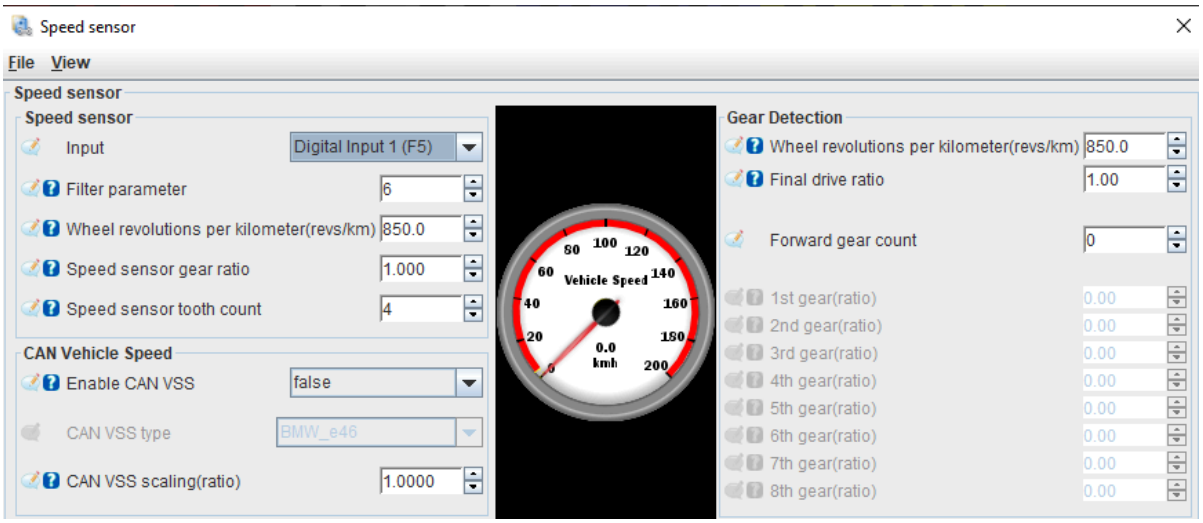


9) VTEC solenoid

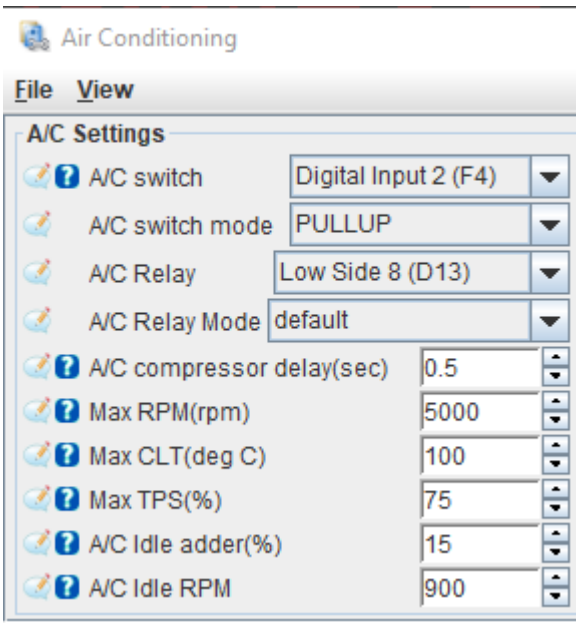


0 = OFF
100 = ON

10) Vehicle Speed Sensor



11) Air Conditioner



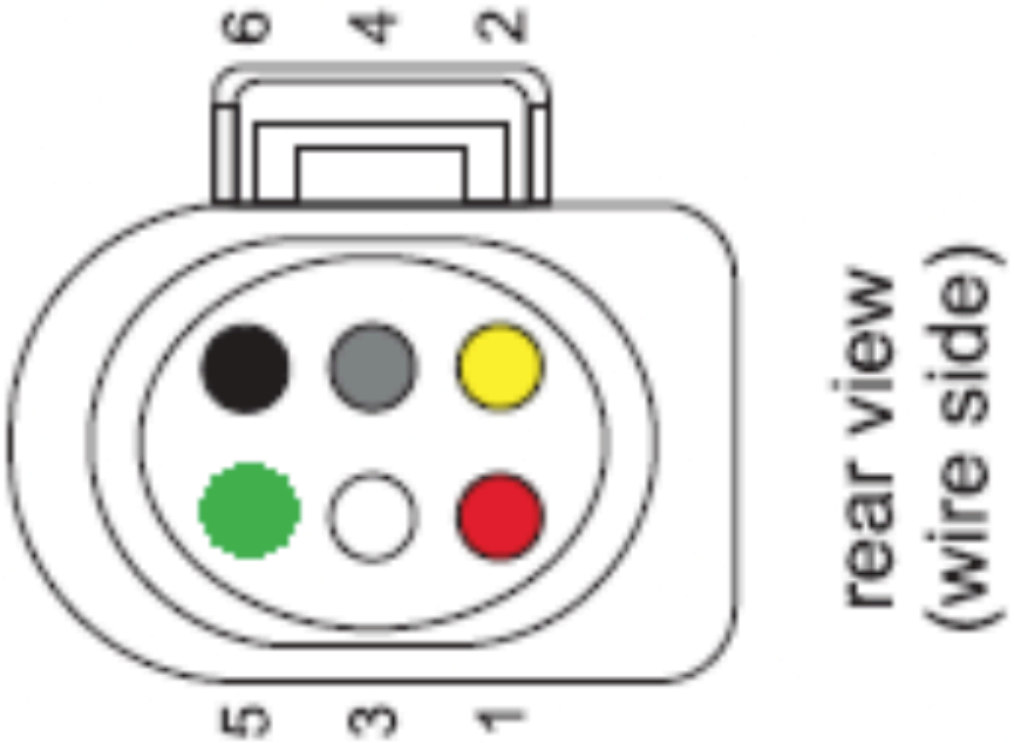
Extra features

12) Wideband

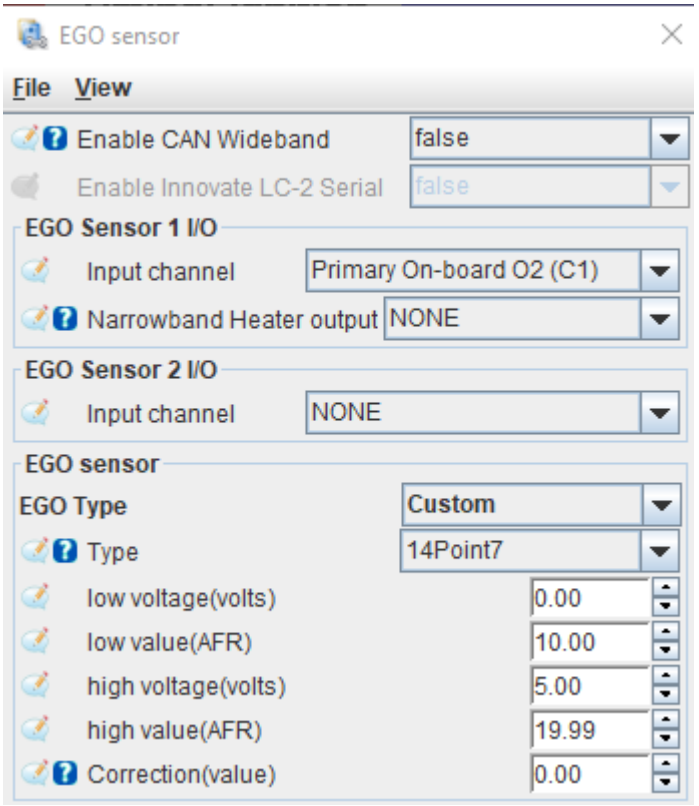
To tune the VE table, a wideband sensor is necessary for measuring the air-fuel ratio.

12.1. You can either connect an LSU 4.9 sensor directly to the onboard controller or use a 0-5V signal from an external controller via an analog input.

Auxiliary connector	LSU 4.9 sensor
Y1	5 (IA)
Y3	6 (NERMEST)
Y5	1 (IP)
Y7	2 (VGND)
Y9	3 (HEATER-)
Y11	4 (HEATER+)



12.2. Configure the wideband linear output values

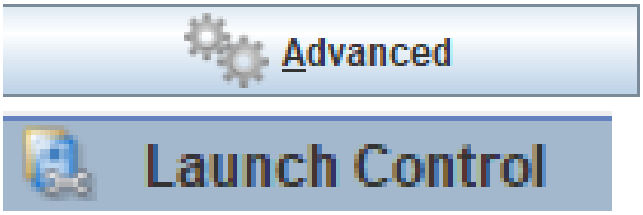


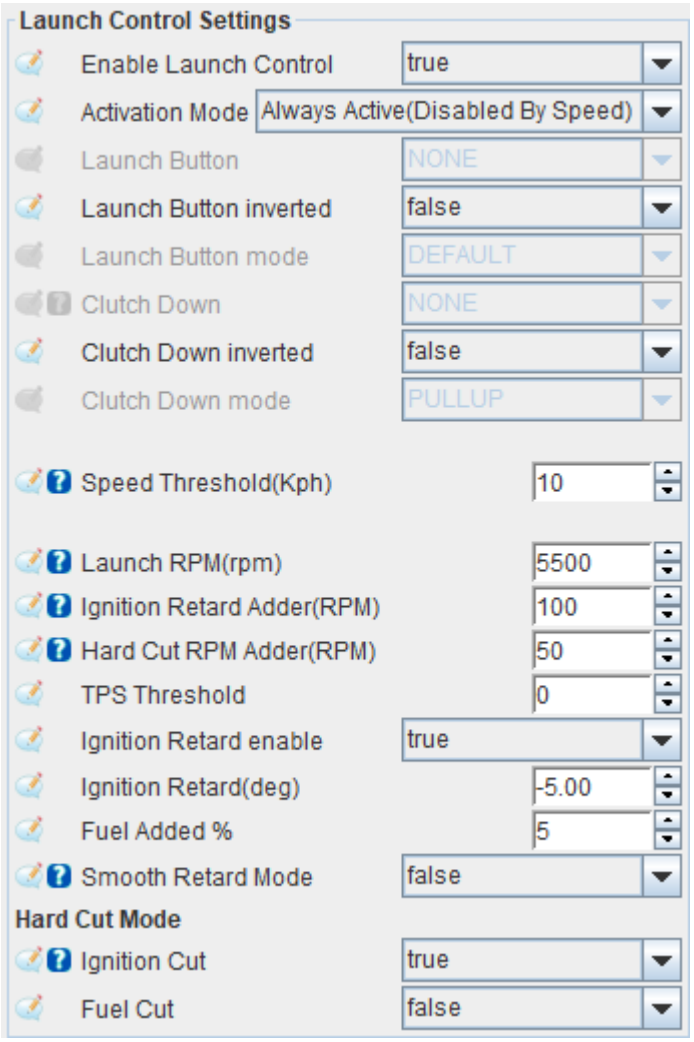
13) Launch control

The launch control is used to launch… **I mean, spit flames, a lot of 🔥🔥🔥!**

13.1. Select the activation mode: it can be Speed-based, Launch, Clutch, or Brake button.

13.2. If using a button, wire a switch that sends a ground signal to an unused digital input.



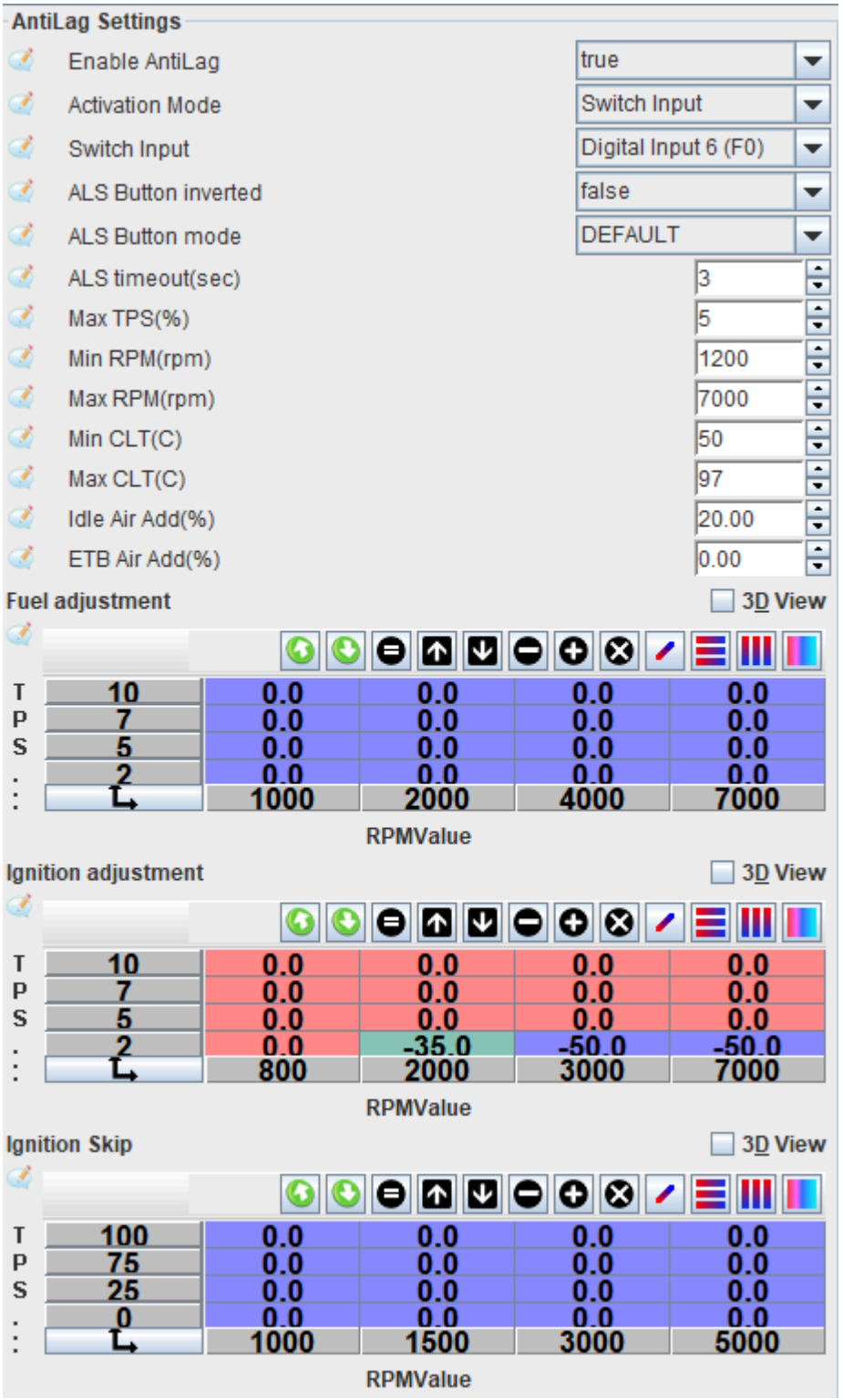


- Launch RPM: A secondary Rev limit engaged by the driver to help launch the vehicle faster.
- Ignition Retard Adder: Range from Launch RPM for Timing Retard to activate.
- Hard Cut RPM Adder: Range from Launch RPM to activate Hard Cut.
- Smooth Rertard Mode: Interpolates the Ignition Retard from 0 to 100% within the RPM Range.

14) Anti-lag

The ANTI-LAG is used to help decrease the lag of the… **I mean, spit flames, a lot of 🔥🔥🔥!**

14.1. Wire a switch that sends a ground signal to an unused digital input.

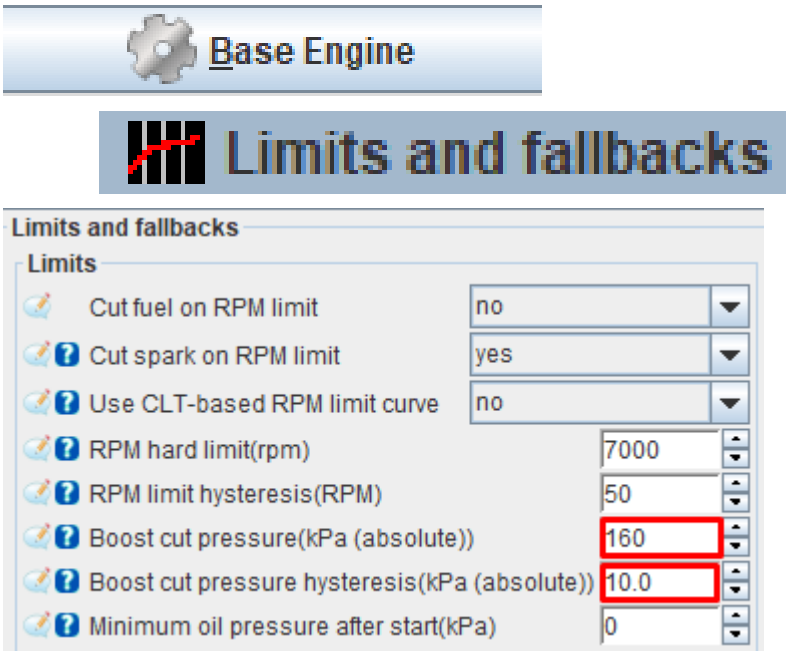


15) Boost control

A boost controller is a device used to increase the boost pressure produced by the turbocharger.

15.1. Connect the negative wire of the boost controller valve to an auxiliary low-side output.

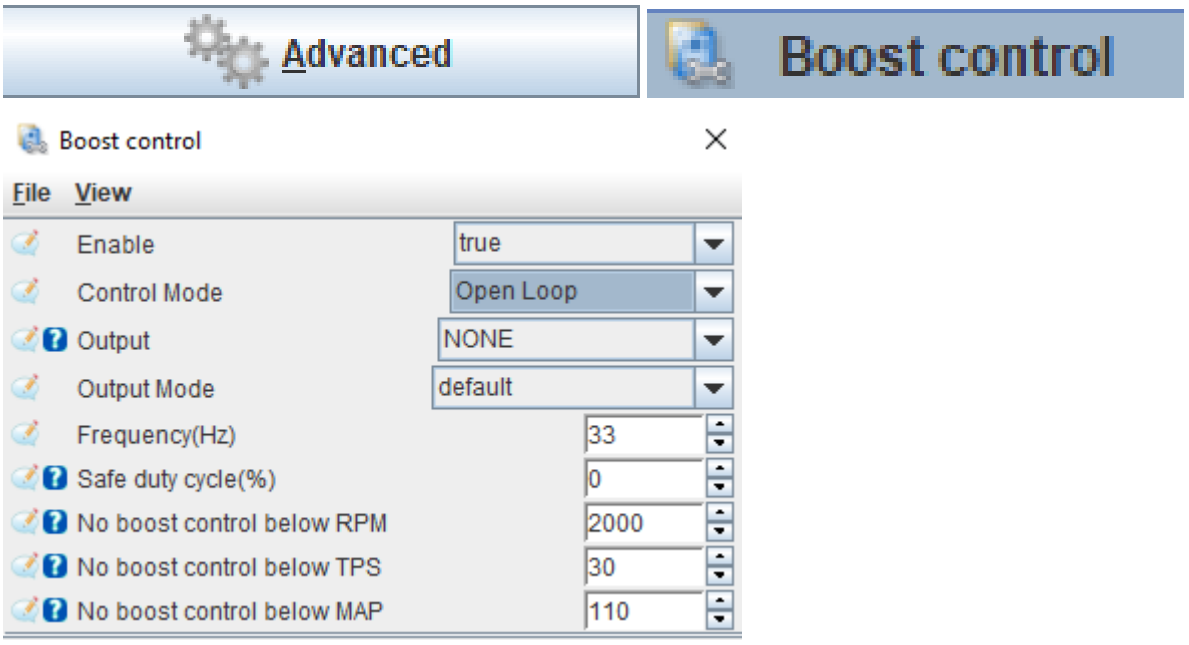
15.2. Activate a boost limit to protect the engine from overboost.



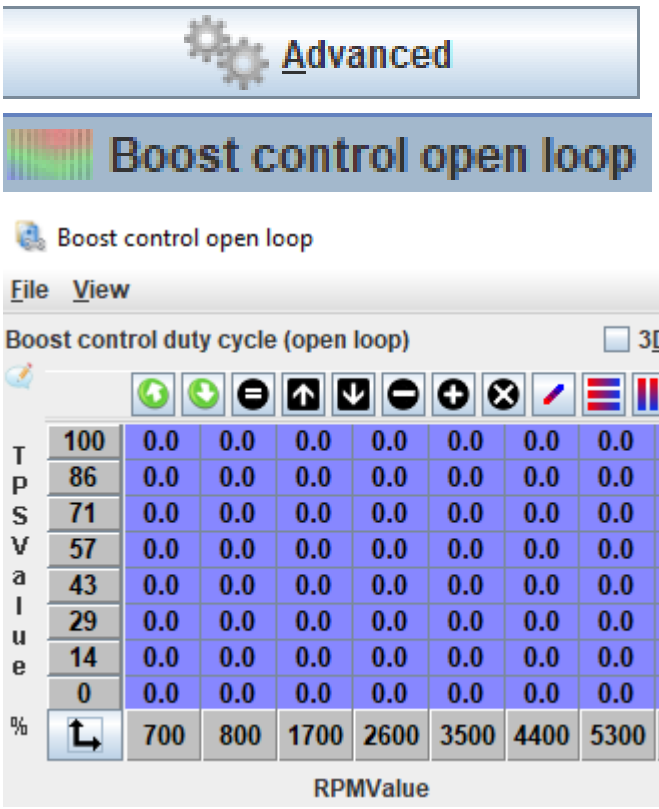
- Boost cut pressure (absolute): MAP value above which fuel is cut in case of overboost.
- Boost cut pressure hysteresis: If hard cut is 160kpa, and boostCutPressureHyst is 10, when the ECU sees 160kpa, fuel/ign will cut, and stay cut until 160-10=150kpa is reached.
- 160kpa absolute = 100 kpa atmosphere + 60 kpa of boost

15.3. Select **Open-loop** mode and the auxiliary output.

Open-loop: Regulates the boost valve's duty cycle according to the percentage values in the control table.

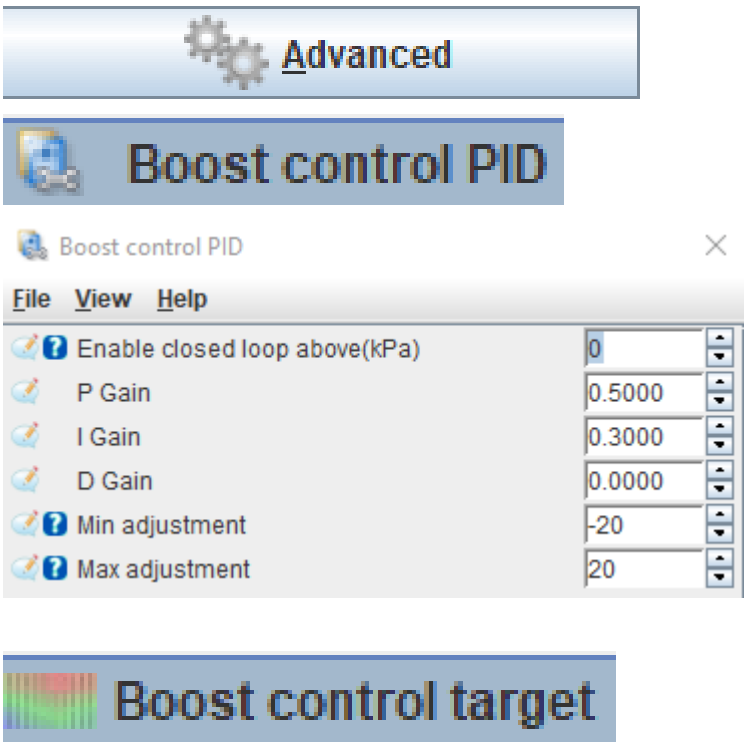


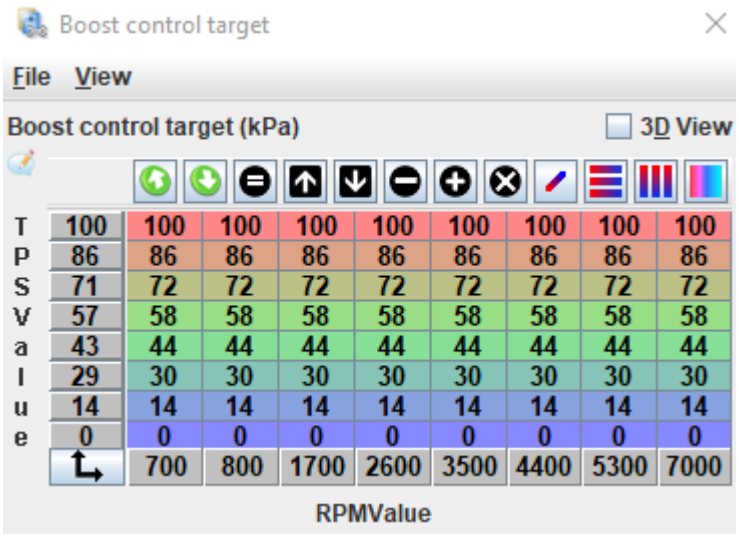
15.4. Configure the Boost control open-loop table.



15.5. It's possible to enable the **Open + Closed-loop** and control the boost more precisely.

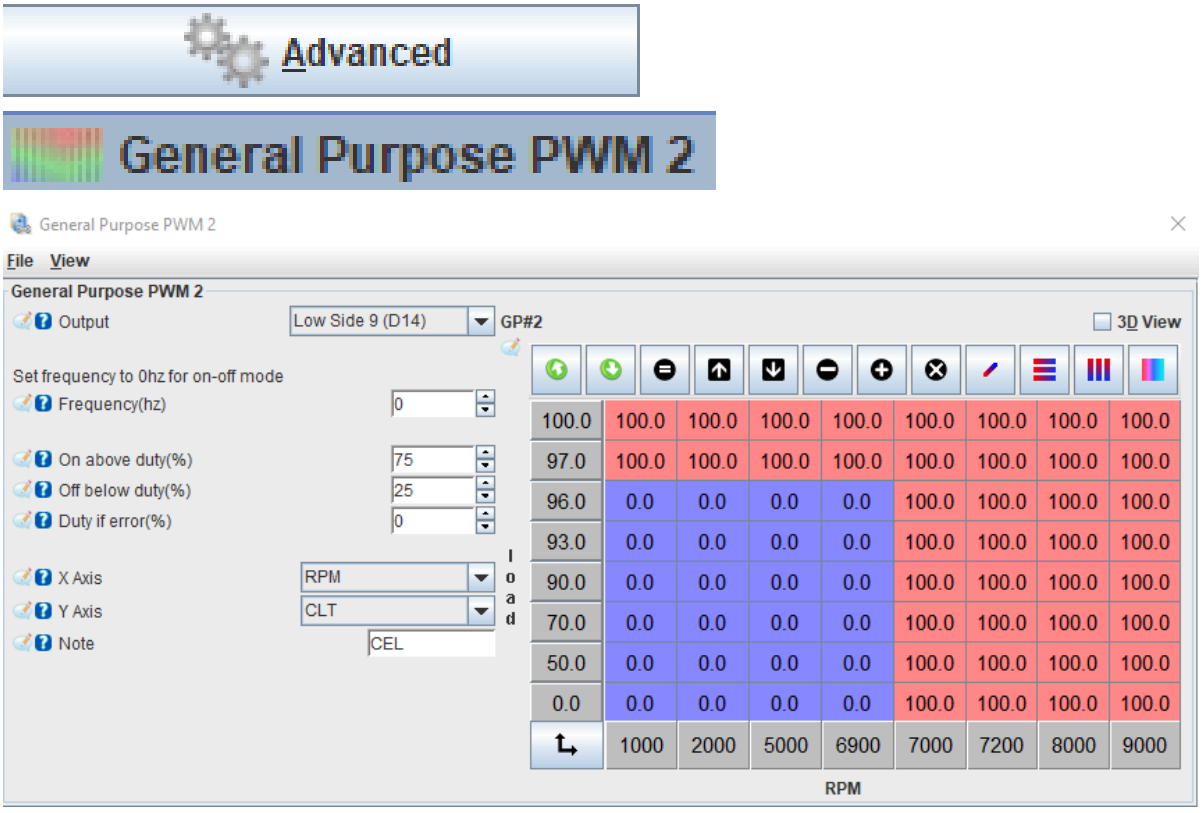
Open + Closed-loop: Regulates the boost valve's duty cycle using the open-loop table, combined with a PID algorithm and a target table.





16) CEL: Shift / Warning light

The engine light can be used as a programmable output. I prefer to use it as a shift indicator and for coolant temperature warnings.

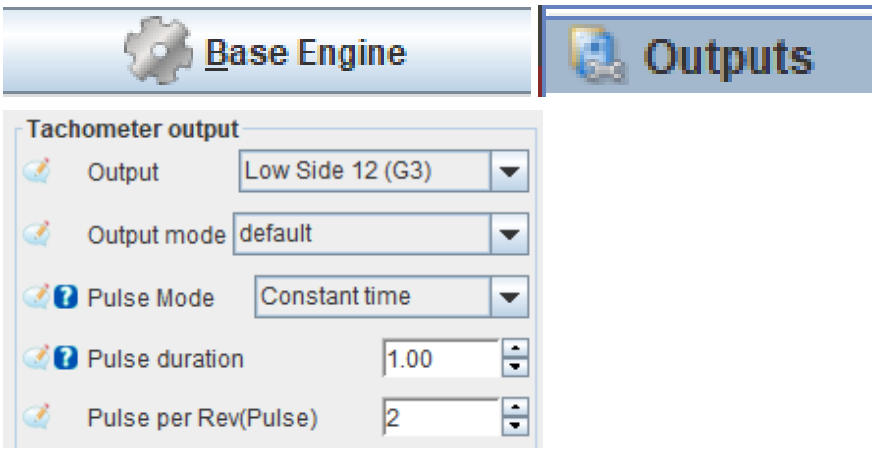


0 = OFF
100 = ON

17) Tachometer

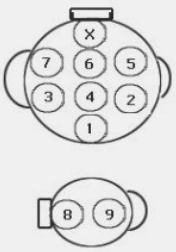
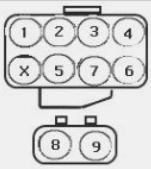
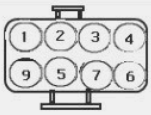
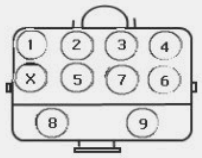
The ECU can control the tachometer. With a stock distributor, the signal is sent by the distributor coil. However, modifications are required if you switch to a coil-on-plug ignition or want the ECU to control the signal.

17.1. Select the output Low-Side 12 to send the RPM signal.



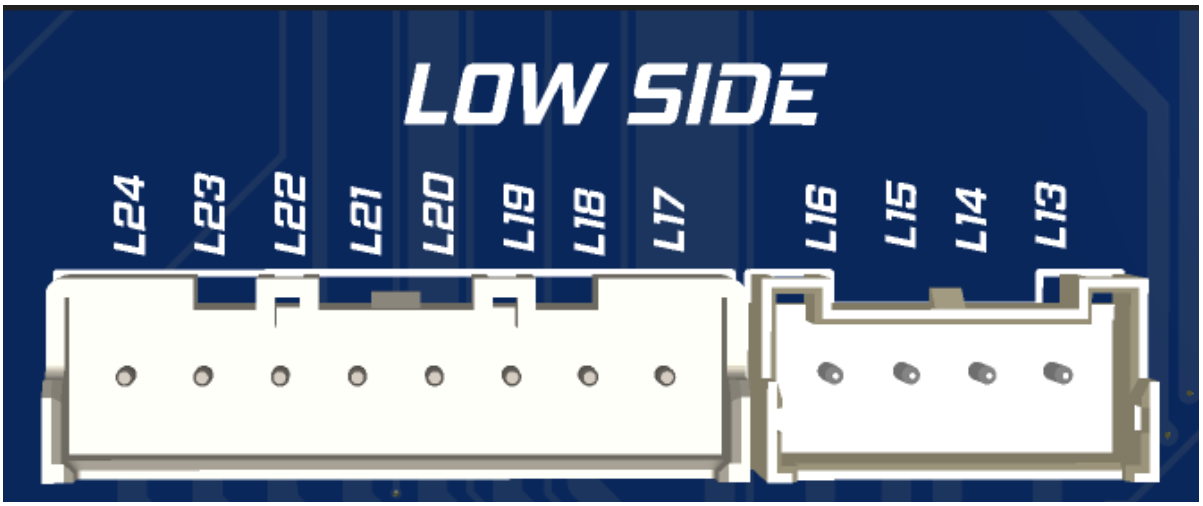
17.2. Connect the output Low-Side 12 to the speed output wire previously controlled by the distributor.

Auxiliary connector	Tunerstudio output
Z12	Low side 12

OBD/Model	Plug Type (all plugs are shown from wired side)	Wiring Color and Wire Function (Wire colors may vary pay attention more to the number positions)
OBD0 (except Civic DPFI Models) 1988- 1991		1. Large White (Ign input signal) 2. Orange (Crank position output) 3. Orange/Blue (TDC output) 4. Blue/Green (CYP output) 5. White(Crank position ground) 6. Blue/Yellow (CYP ground) 7. White/Blue (TDC ground) 8. Blue (Speed output) 9. Black/Yellow (Ign input)
OBD1 1992- 1995		1. Yellow/Green (Ign input signal) 2. Blue/Green (Crank position output) 3. Orange/Blue (TDC output) 4. Orange (CYP output) 5. Blue/Yellow or White (Crank position ground) 6. White or Black (CYP ground) 7. White/Blue or Red (TDC ground) 8. Blue (Engine speed output) 9. Blk/Yellow (Ign Input) X- blank spot
OBD2b Civic (except HX and Si) 1996+		1.Yellow/Green (Ign input signal) 2. Lt blue or blue (Crank position output) 3. Orange/Blue or Green (TDC output) 4. Orange or Yellow (CYP output) 5. White (Crank position ground) 6. Black (CYP ground) 7. White/Blue or Red (TDC ground) 9. Black/Yellow (Ign input)
OBD2a Civic OBD2b Civic Civic HX and Si OBD2a and OBD2b Integra	1996+ 	1. Yellow/Green(Ign input signal). 2. Blue/ Green (Crank Position output) 3. Orange/Blue (TDC output) 4. Orange (CYP output) 5. Blue/Yellow (Crank Position Ground) 6. White (CYP ground) 7. White/Blue (TDC ground) 8.Blue (Engine speed output) 9. Black/Yellow (Ign input) X- blank spot

18) Auxiliary inputs/outputs

LOW SIDE: Controls injectors and valves using a ground signal, handling up to 10A.



- **L13 to L24:** Configurable for any auxiliary function

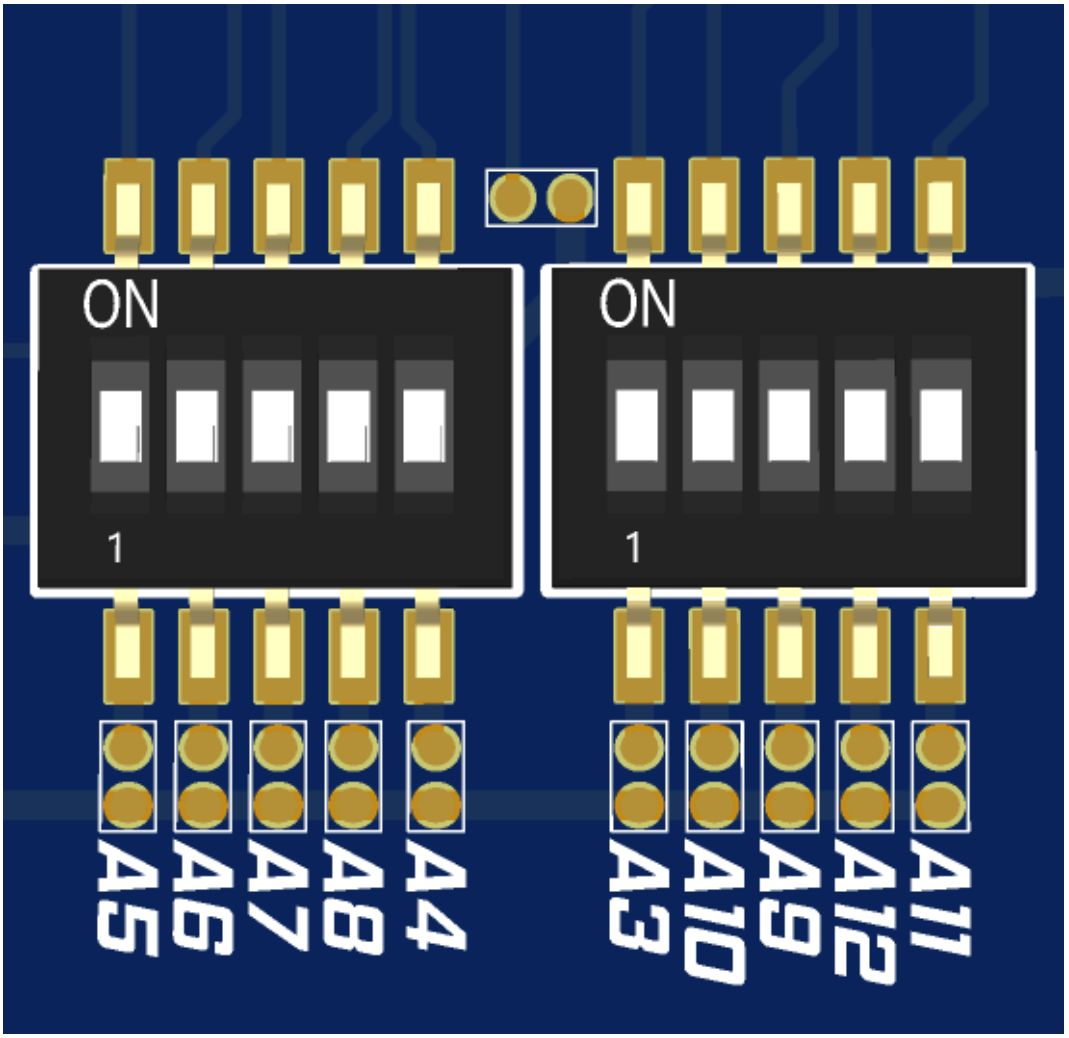
HIGH SIDE: Controls smart ignition coils with 5V or 12V signals.

- **H5 to H12:** Configurable for any auxiliary function

ANALOG: Inputs for sensors with a 0-5V output or for temperature sensors.

Auxiliary connector	Tunerstudio Analog Input	Function
Z2	Analog Input 5	On-board MAP sensor
Z4	Analog Input 8	Free
Z6	Analog Input 10	Free
Z8	Analog Input 11	Free
Z10	Analog Input 12	Free

NOTE1: If no sensor is wired, it can be repurposed for any other function.
NOTE2: To use temperature sensors, the corresponding input switch must be set to the ON position.



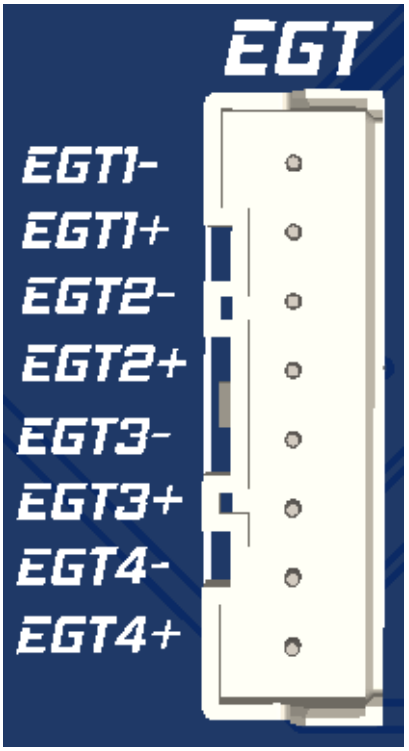
DIGITAL: Inputs for hall sensors (0-5V)

Auxiliary connector	Tunerstudio Analog Input	Function
Z1	Digital Input 3	Free
Z3	Digital Input 4	Free
Z5	Digital Input 5	Free
Z7	Digital Input 6	Free

Z9	Digital Input 7	Free
Z11	Digital Input 8	Free

NOTE: If no sensor is wired, it can be repurposed for any other function.

EGT: Inputs for exhaust temperature sensors (Type K)



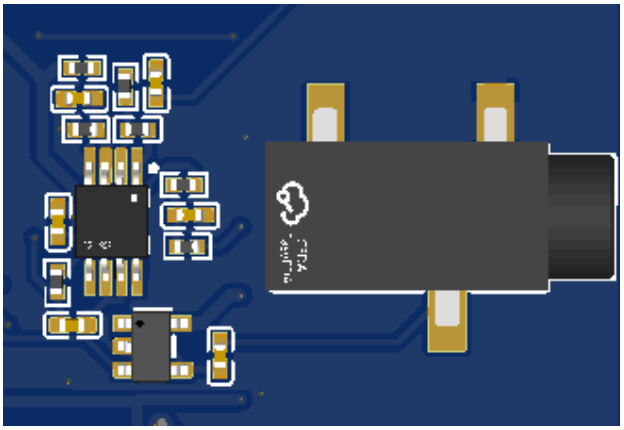
Drive-by-wire: Controls a 2-wire electronic throttle body or ITB.

Auxiliary connector	Function
Y15	Motor output +
Y16	Motor output -
Y17	5V for TPS1
Y18	5V for TPS2

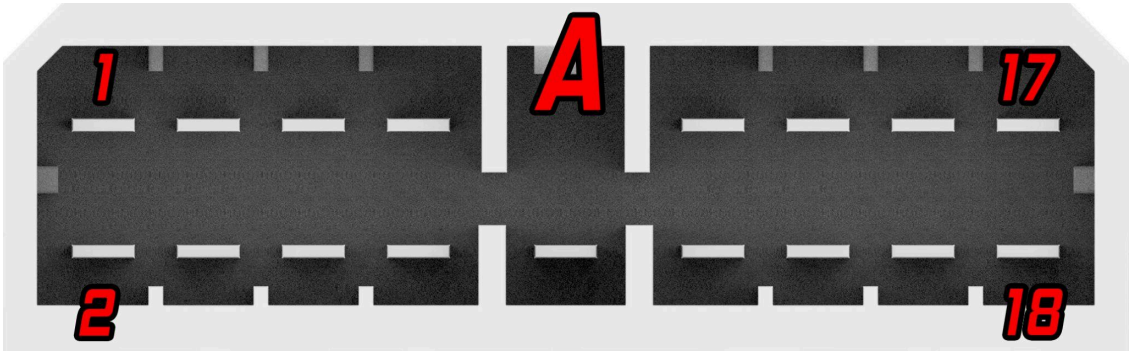
Y19	Ground for TPS1
Y20	Ground for TPS2

NOTE: If no sensor is wired, it can be repurposed for any other function.

KNOCK: This is a 3.5mm jack output for knock audio monitoring



19) PINOUT: OBD0 MPFI



PIN	FUNCTION	TUNERSTUDIO
A1	Injector 1	Low side 1
A2	Ground	
A3	Injector 2	Low side 2
A4	Ground	
A5	Injector 3	Low side 3
A7	Injector 4	Low side 4
A8	VTEC solenoid	Low side 7
A11	Idle valve	Low side 6

A12	Fuel pump relay	Low side 5
A13	+12V Ignition	
A14	Fuel pump relay	Low side 5
A15	+12V Ignition	
A16	Ground	
A18	Ground	

PIN	FUNCTION	TUNERSTUDIO
B2	DSCV	Low side 11
B3	A/C clutch relay	Low side 8
B4	FAN relay	Low side 10
B6	CEL	Low side 9
B8	A/C signal	Digital Input 2
B10	CKP+	VR/Hall 1 (E2)
B12	CKP-	
B15/B17	Distributor coil	High side 1
B19	Knock	Analog Input 9
C1	CYP+	VR/Hall 2 (E3)
C2	CYP-	
C5	Intake Air Temperature	Analog Input 3
C6	Engine Coolant Temperature	Analog Input 2
C7	Throttle Position Sensor	Analog Input 1
C8	Secondary O2 Signal	Analog Input 7

C11	Manifold Absolute Pressure	Analog Input 4
C12	Ground for MAP	
C13	+5V (2) for MAP	x
C14	Ground for TPS	
C15	+5V (1) for TPS	x
C16	Primary O2 Signal	Analog Input 6

This is an auxiliary connector for extra functions, it's placed alone on the right side of the ECU case

PIN	FUNCTION	TUNERSTUDIO
Y1	LSU 4.9: 5 (IA)	x
Y2	Coil on Plug 1	High Side 1
Y3	LSU 4.9: 6 (NERMEST)	x
Y4	Coil on Plug 2	High Side 2
Y5	LSU 4.9: 1 (IP)	x
Y6	Coil on Plug 3	High Side 3
Y7	LSU 4.9: 2 (VGND)	x
Y8	Coil on Plug 4	High Side 4
Y9	LSU 4.9: 3 (HEATER-)	x
Y10	CAN1 High	x
Y11	LSU 4.9: 4 (HEATER+)	x
Y12	CAN1 Low	x
Y13	Can 2 High	x

Y14	Can 2 Low	x
Y15	DBW Motor +	x
Y16	DBW Motor -	x
Y17	5V for TPS1	x
Y18	5V for TPS2	x
Y19	Ground for TPS1	
Y20	Ground for TPS2	

This is an auxiliary connector for extra functions, it's placed alone on the right side of the ECU case

PIN	FUNCTION	TUNERSTUDIO
Z1	Free	Digital Input 3
Z2	Onboard MAP sensor	Analog Input 5
Z3	Free	Digital Input 4
Z4	Free	Analog Input 8
Z5	Free	Digital Input 5
Z6	Free	Analog Input 10
Z7	Free	Digital Input 6
Z8	Free	Analog Input 11
Z9	Free	Digital Input 7
Z10	Free	Analog Input 12
Z11	Free	Digital Input 8
Z12	Tachometer	Low Side 12

Z13	5V for sensors	x
Z14	5V for sensors	x
Z15	Ground for sensors	
Z16	Ground for sensors	