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AFR500CAN Setup Manual

(Addendum to AFR500V2 Tuning Manual)

Table of Contents

1. Addendum Note

This manual is an addendum to the AFR500V2 Tuning Manual. For installation & tuning information, please see the AFR500V2 Tuning Manual.

2. Introduction

The AFR500CAN should be configured using the AFRCAN Programmer software. CANbus message IDs, baud rate, data rate, and other settings may be adjusted. There are options for choosing some preprogrammed outputs for use with CAN Enabled ECUs, OBD2 ECU tuners, aftermarket gauges, dashes, & loggers.

3. New features in the AFR500CAN

The AFR500CAN is a major iteration on the AFR500V2. All features & functions of the original AFR500V2 remain intact with the added improvements below:

- OBD-II Compatibility. Works with most 2008 and newer CANbus based systems.
- CANbus output on IDs 1h-7FFh(11-bit) or 1h-1FFFFFFFh(29-bit)
- USB-CDC Serial Output for HPTuners & EFI Live Software
- AFRCAN Programmer software for:
    - -configure CAN interface
    - -configure CAN ID/bitrate/frequency/PID
    - -update AFR500CAN firmware
    - -configure AFR500 Range

4. Kit Contents

- AFR500CAN Controller
- USB programming harness
- AFR500CAN Setup Manual
- 1 red CAN termination resister jumper contact
- CANbus adapter harness (Optional)
- Wideband oxygen sensor (Bosch LSU 4.2, 4.9, or NTK Sensors)

• 13ft (standard), 7ft, or 24ft wiring harness
• AFR500v2 Tuning Manual
• Weld-in sensor bung
• Screw-in sensor plug
• Adhesive backed hook & loop pair
• 3 red configuration jumper contacts

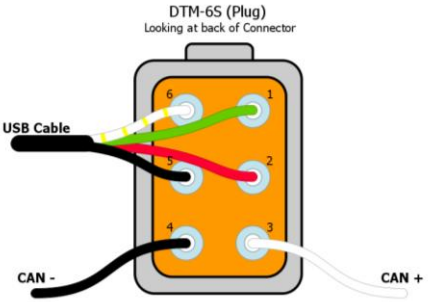
5. Functional Description

The wideband controller AFR500CAN can communicate the current lambda O2 reading over can through OBD2 inline adapter or by plugging into a CANbus expansion hub or ECU.

6. Wiring Installation

The DTM-6S wiring pinout follows:

3. White wire – CAN + high
4. Black wire – CAN - low



If not using a premade adapters harness, Pin 3: CAN+ high and Pin 4: CAN- low should be used to connect to the CANbus.
For Haltech, Motec, AEMnet using the appropriate adapter harness plug, you plug the 4 Way DTM connector into a receiving CANbus connector or hub. Then plug the 6 Way DTM connector into the DTM-6P USB/CAN connector coming from the back of the AFR500CAN unit.

For OBDII setups (HPTuners and EFI live)

1. Plug in the OBDII adapter harness to your cars OBDII port, then plug the device in to the adapter harness.

2. Plug the other end of the adapter harness with the 6 Way connector into the DTM-6P USB/CAN connector coming from the back of the AFR500CAN unit.

7. Setting & Explanation of Options

The AFR500CAN has an internal 120R terminating resistor that is enabled using a jumper. It is installed by default from the factory.

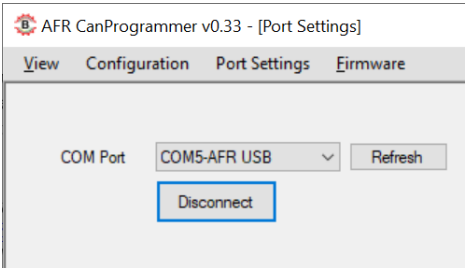
8. AFRCAN Programmer Setup

The AFR500CAN may be configured using the AFRCAN Programmer software. CANbus message IDs, baud rate, data rate, and other settings may be adjusted. There are also options for choosing

some preprogrammed outputs for use with HPTuners, EFI Live, Serial Out, AEMnet, Motec, Haltech, and Default CAN. Default CAN is useful for programming into ECU Master and Megasquirt 3 ECUs.

Installation

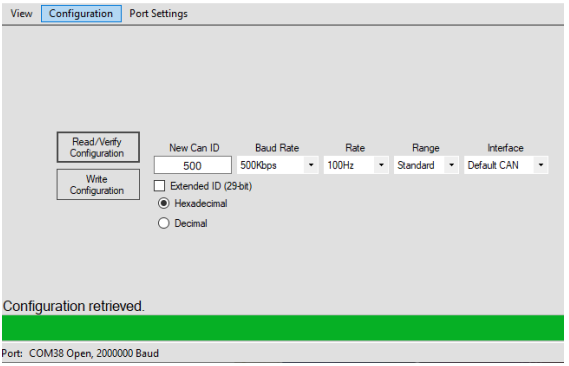
1. Download the software at bmotorsports.com/download/software/AFRCAN_Programmer.exe . Double click "AFRCANProgrammer.exe" to install.
2. Once installed, Start the AFRCAN Programmer software.
3. Power up the AFR500CAN from a 12v power source using the main harness. The AFR500CAN will not operate via USB power.
4. Plug in the USB adapter harness to the AFR500CAN then to your computer's USB port.
5. Open the Port Settings and click refresh. Locate the COM Port labeled "AFR USB" and click connect.



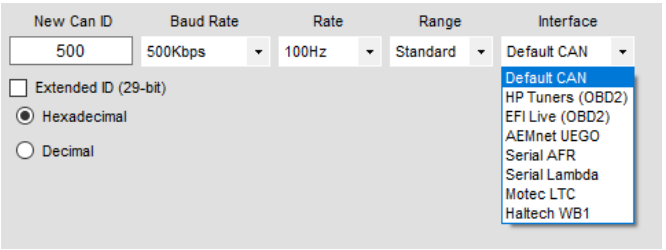
6. Next, click the "Connect" button, then click on the menu "Configuration" to return to the main window.

Configuration

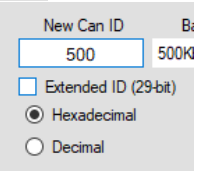
1. Before changing any settings, we must first retrieve the current configuration, do this by clicking the button labeled "Read/Verify Configuration", once successful the message "Configuration Retrieved" will be displayed at the bottom.



2. The Interface drop down menu lets you choose an option which will preconfigure the settings to that option's default settings (ID, Baud, Rate). "Default CAN" defaults to a generic message output structure for use with most stand-alone ECUs (See Section 16. for message structures). “Serial AFR” and “Serial Lambda” will output a signal over the included USB cable for VCM Scanner serial wideband feedback.

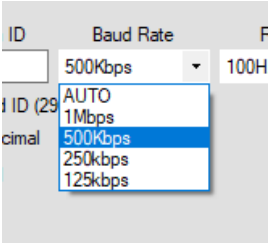


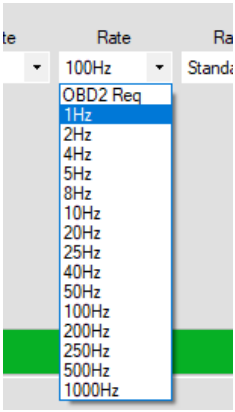
3. CAN address ID: The first box is for changing the CAN ID (Default is 0x500, 11 bit), there are options for displaying the ID in hexadecimal or decimal and 11-bit or 29-bit (Extended ID).



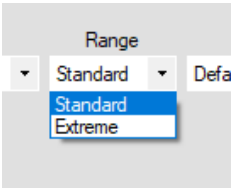
4. Baud Rate: The second box is a drop-down menu for changing the CANbus Baud Rate (Default is 500kbps).

5. Data Rate: The third drop down menu is for selecting the Data Update Rate (Default is 100Hz).



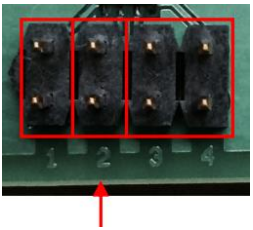


6. Range: **The Range drop down MUST match the Jumper 2 setting on the AFR500 circuit board or the CAN Output will be wrong!**



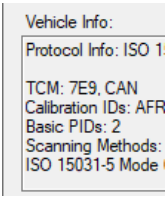
7. No jumper = Standard (Default), 9.0-16.0 GASOLINE, 0.618-1.098 LAMBDA

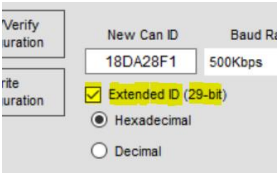
   Jumper = Extreme, 6.0-20.0 GASOLINE, 0.411-1.373 LAMBDA



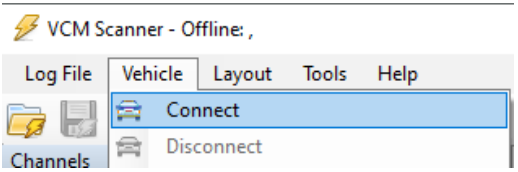
9. HPTuners VCM Scanner Setup

Note: If you are having trouble connecting you may need to change the CAN ID from the default 7E5. Connect the VCM Scanner without the AFR500C connected and go to the "Details" tab to see you what CAN IDs are being used by the vehicle. Usually the hex ID is followed by ", CAN" (Note: OBD2 CAN IDs respond as the base ID plus 8 for example IDs 7E0-7E7 respond as 7E8-7EF). Some newer vehicles may need to check the "Extended 29-Bit" in AFR CANProgrammer.

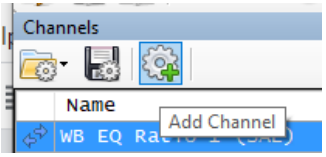




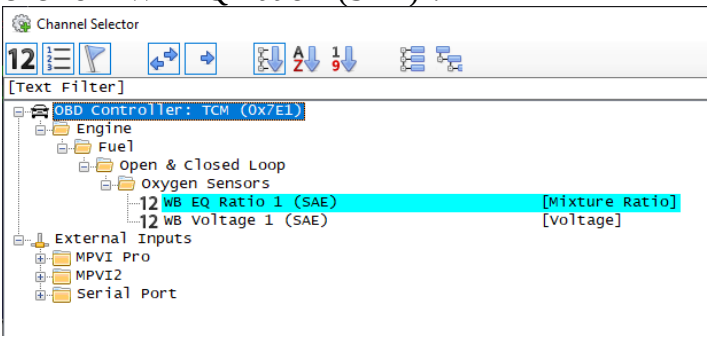
1. With the HPTuners USB cable plugged in and the car powered on, open “VCM Scanner” and click on the “Vehicle” menu then select “Connect”.



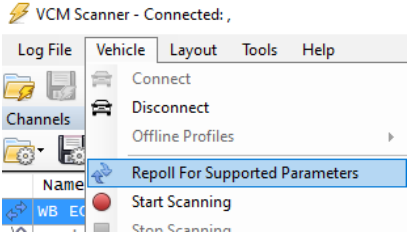
2. After connecting you will need to add “WB EQ Ratio 1” to the Channels window. First click on the gear with the green “+”.



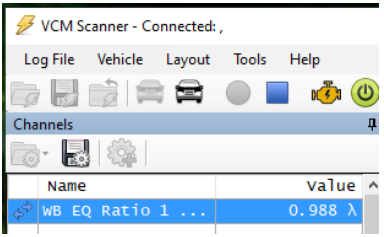
3. In the tree navigate to "OBD Controller: TCM (0x7E5)" [7E5 is default, ID may be programmed differently], "Engine", "Fuel", "Open & Closed Loop", "Oxygen Sensors" and double click on "WB EQ Ratio 1 (SAE)".



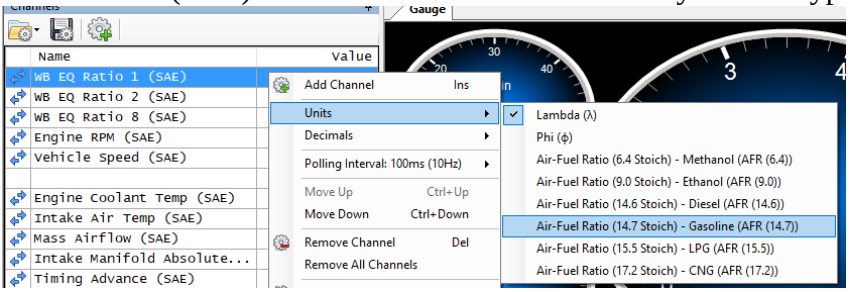
4. If “WB EQ Ratio (SAE)” doesn’t show up you may need to click “Repoll For Supported Parameters” from the “Vehicle” menu.



5. Next select “Start Scanning” from the “Vehicle” menu. This will start logging the vehicle parameters, you will see lambda values displayed in the right column.

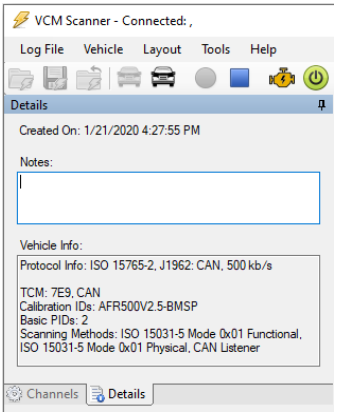


6. If you prefer to view AFR you can right click on "WB EQ Ratio 1 (SAE)" and “Units” select the AFR for your fuel type.



Note that this may not match the AFR500CAN display whose stoichiometric reference is 14.56 (Indolene Clear).

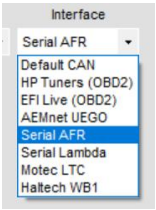
7. Near the bottom of the “Channels window is a tab labeled “Details” which display the AFR500 controller properties and CAN ID.



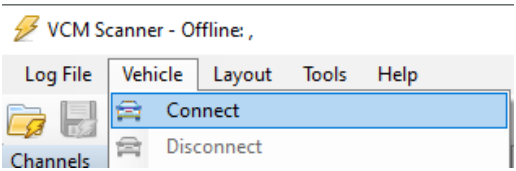
10. HPTuners Pre-CAN VCM Scanner USB Serial Setup

1. Plug in the AFR500C USB programming/serial cable to your computer.

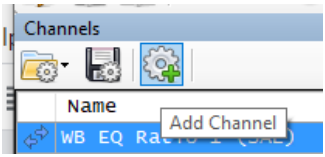
2. Using Section 8 “AFRCAN Programmer Setup” retrieve settings, then change the “Interface” to “Serial AFR” for air-fuel-ratio, or “Serial Lambda” for lambda.



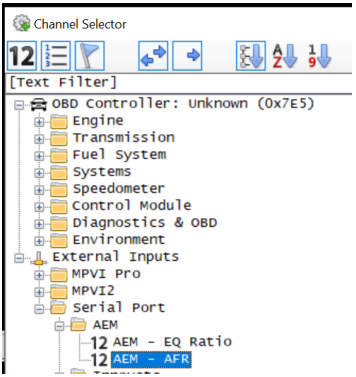
3. With the HPTuners USB cable plugged in and the car powered on, open “VCM Scanner” and click on the “Vehicle” menu then select “Connect”.



4. After connecting you will need to add “AEM - AFR” or “AEM - EQ Ratio” to the Channels window. First click on the gear with the green “+”.

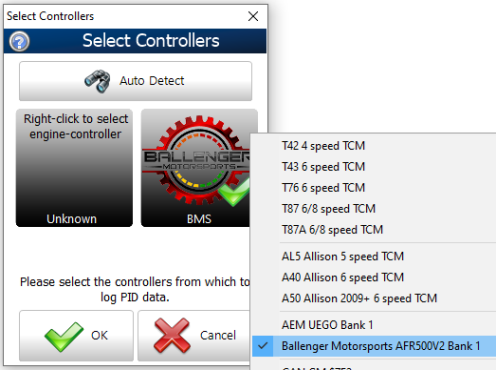


5. In the tree navigate to "External Inputs", "Serial Port", "AEM" and double click on "AEM - AFR” for air-fuel-ratio, or AEM - EQ Ratio for lambda. (Note: this must correspond to the “Serial AFR” or “Serial Lambda” Interface setting in AFR CANProgrammer settings.)



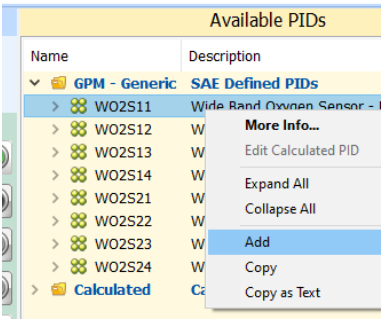
6. Next select “Start Scanning” from the “Vehicle” menu. This will start logging the vehicle parameters, you will see AFR or lambda values displayed in the right column.

11. EFI Live Scan and Tune Setup



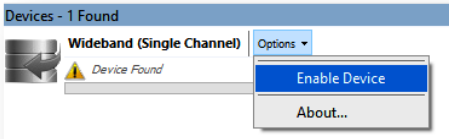
1. With Flashscan USB cable plugged in and the car powered on, open “EFI Live Scan and Tune” and click on “F2: Scan” menu then select “Auto Detect”.
2. In the “Select Controller” window you can Select “Auto Detect” or right click on the “Right-click to select trans-controller” and select “Ballenger Motorsports AFR500V2 Bank 1” then click “OK”.

3. Under “Available PIDs” right-click on “WO2S11” then select “Add”

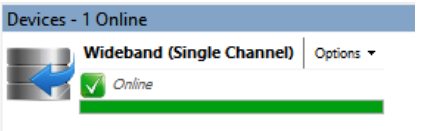


4. Select the Menu “F3: Data” the click Yellow “Start Monitoring Data” button and you will see the lambda value under the “Value” column.

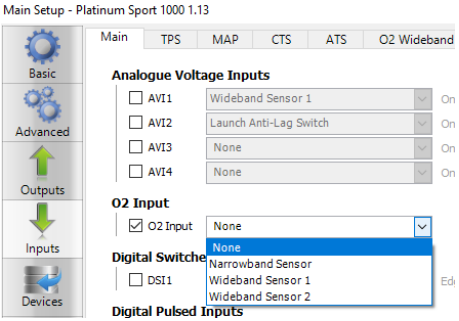
12. Haltech ECU Setup



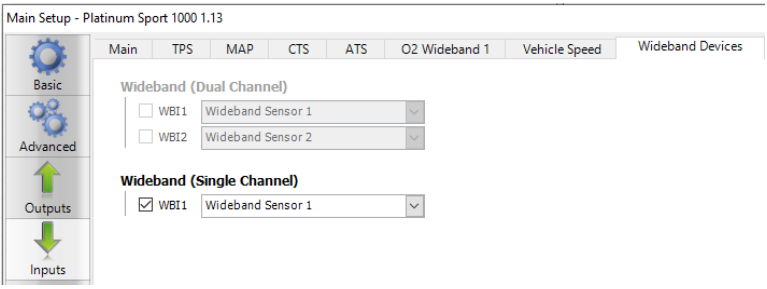
1. With the AFR500CAN connected and power up, turn on the car to power up the ECU and open the Haltech software and connect to the ECU.
2. Under the “Devices” tab you should see wideband (single channel) saying “Device Found”. Click the “Options” pull down and select “Enable Device”
3. The software will then ask to reset the ECU and after the wideband will show up as “Online”



4. Under the “Inputs” then “Main” tab of the “Main Settings” window the (analog) O2 Input should be set to “None”.



5. Under the “Inputs” and “Wideband Devices” tab, Wideband (Single Channel) WB1 should be checked and pull-down label “Wideband Sensor 1” should be selected.



13. Motec ECU Setup

1. From the “Adjust” menu select “General Setup” then “Communication” then “CAN Setup”.
2. Under Parameter “CAN 1 Data” enter “1” for “PLM Receive”
3. Under “CAN 1 Address” enter the decimal address value which by default is 1120 (460h).
4. The default “CAN 1 Transfer Rate” of 50 may be left alone.

14. Message Structure for Default CAN Setting

Default CAN					
Byte	Label	Data Type	Scaling	Offset	Range
0-1	Lambda	16 bit unsigned	.001 Lambda/bit	0	0-4.095
2	AFR	8 bit unsigned	.1 AFR/bit	0	0-25.5
3-7	-	-	-	-	-