Performance Vehicle Telemetry Displays

www.btigauges.com

TFT CAN Bus Gauge for EMtron
Plug and Play Installation Manual
Doc version 1.1

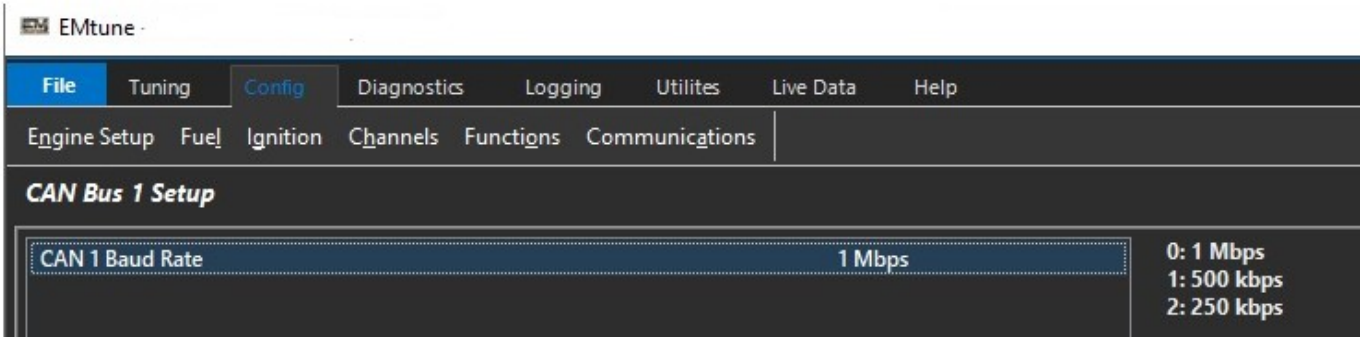
Notice: This product is intended for Off-Road use only. Never take your eyes off of the road while using this device. If you are uncomfortable with wire termination, please have this device installed by a competent shop.

**** Notice! This device should be configured by competent personnel. Raising the BOOST too much, reducing the Traction Control too much, improper use of nitrous, or improper use of a line lock can have severe consequences. You could blow your engine and or lose control of your vehicle****

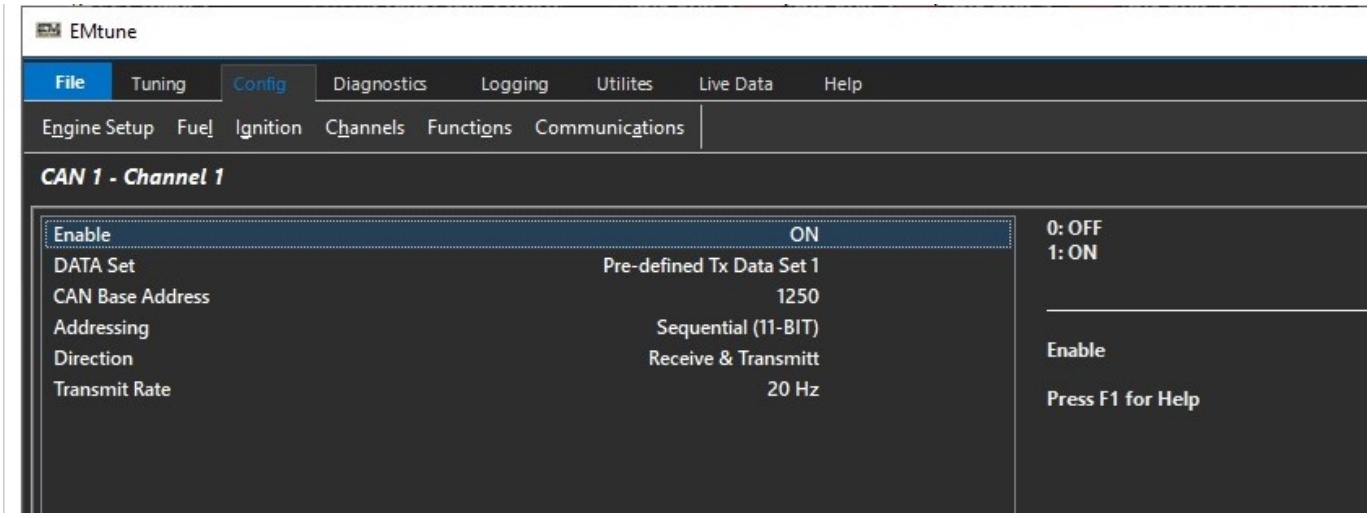
Software Configuration:

In order to enable the CAN bus data transmission, the following must be configured in the EMtune software.

1. Select either CAN1 or CAN2 . This is dependent upon which CAN bus channel is selected for termination to the desired BTI product. The default Baud Rate is set for 1Mbs on the BTI gauge, but may be adjusted to 500Kbs, or 250Kbs if desired. *If 1Mbs is not the desired baud rate, this will need to be adjusted on the Settings screen in the BTI Gauge as well.*



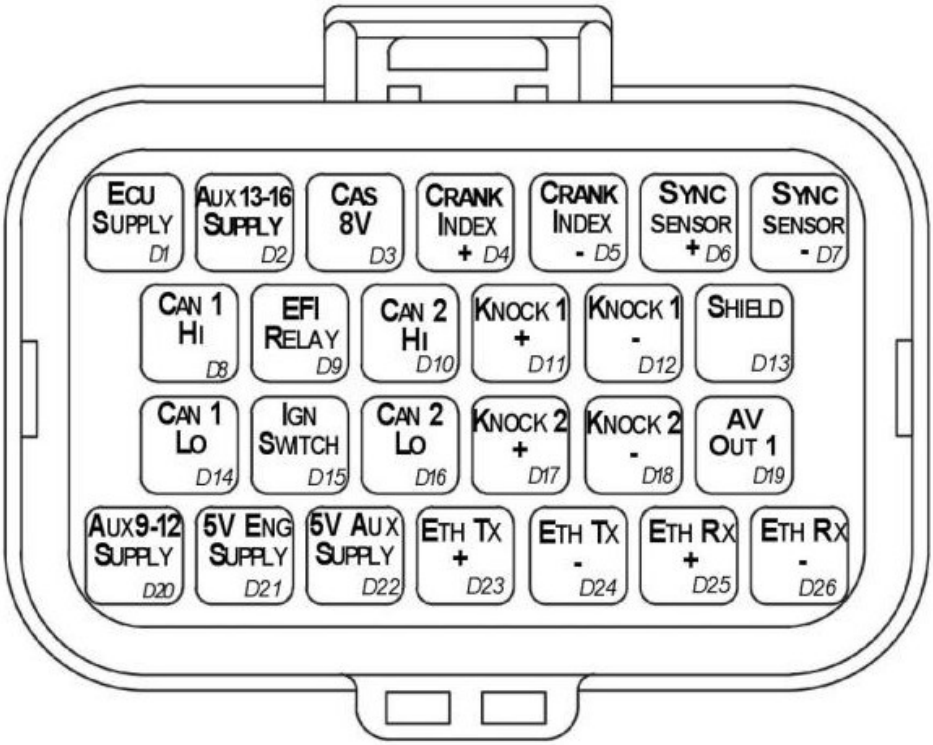
2. Select a Channel with CAN1 or CAN2
3. Set Enable to ON
4. Set CAN Address = 1250
5. Select required DATA Set; Predefined
6. Set Addressing to sequential
7. Set the Transmit rate to 20 Hz



Plug and Pin termination:

Note that both CAN busses are available on connector “D” on all Emtron ECUs
Use the following:

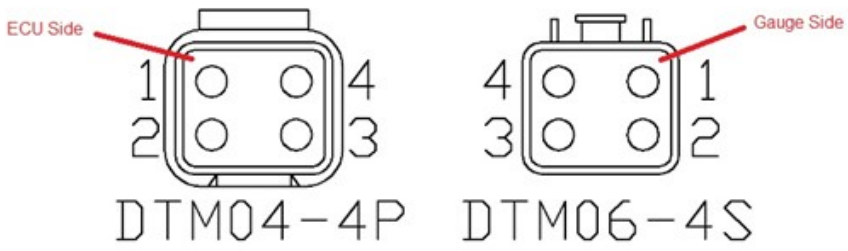
CAN 1	CAN 2
CAN 1 High – D8	CAN 2 High – D10
CAN 1 Low – D14	CAN 2 Low – D16



CONNECTOR D

Wire the 4 pin Deutsch DTM pigtail included with your BTI gauge as follows:

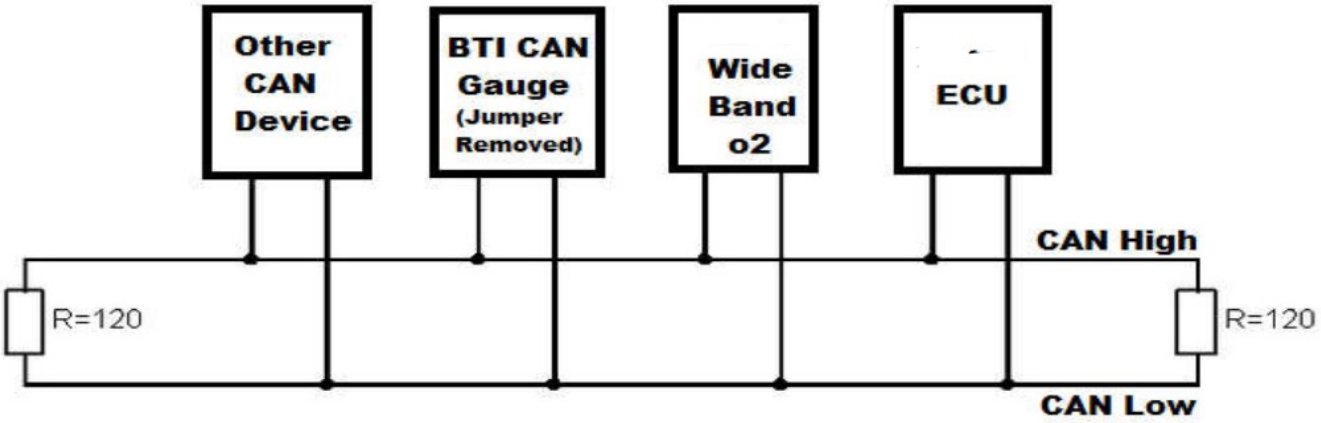
(black) Ground In
(red) 12 Volts in
(green) CAN low in
(white) CAN high in



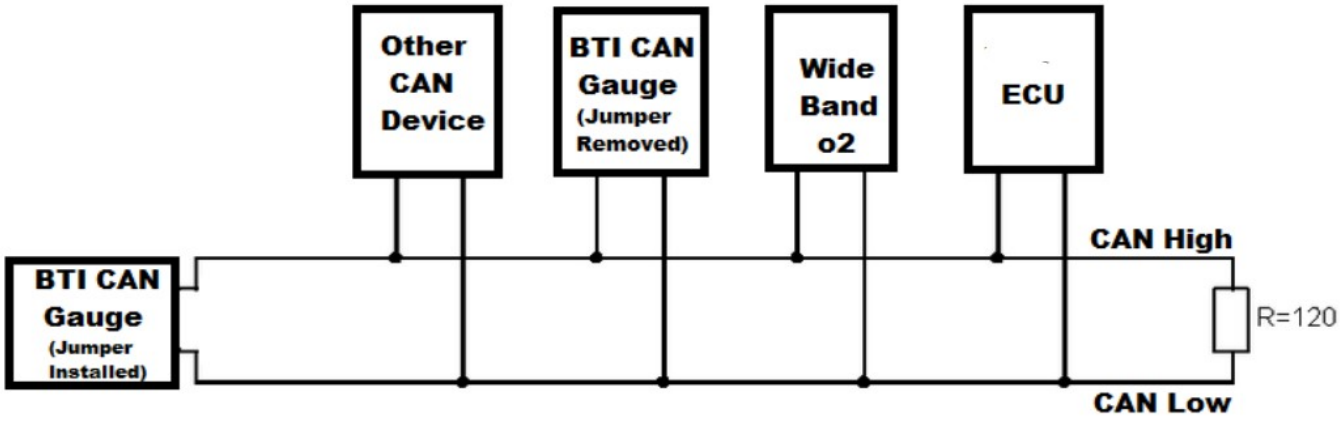
The terminations to the EMtron CAN bus are relatively simple as it only consists of two wires: CAN High and CAN Low.

Note that the Termination Jumper located in the back of the BTI gauge should be removed if the gauge is not the last device in the CAN bus or there is already a termination resistor in your CAN bus. *(Every CAN bus should have one 120 ohm termination resistor at each end of the bus, one at the ECU end and the other at the last device in the bus.)*

This is what the CAN bus should look like with multiple CAN devices on the BUS:



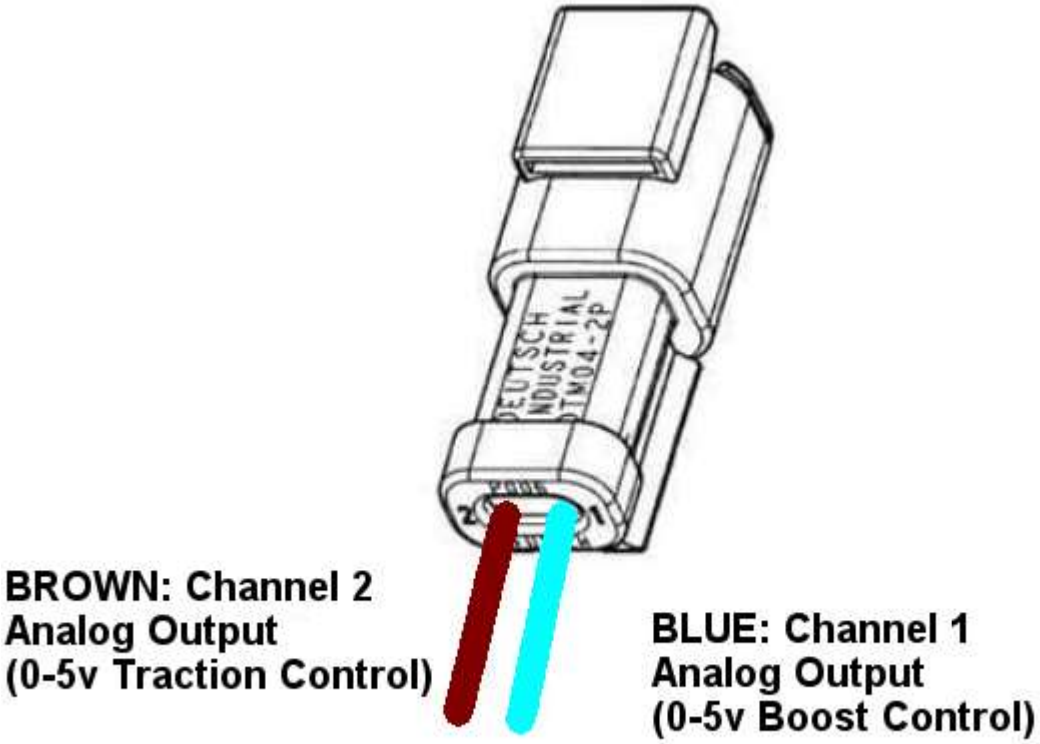
This is what the CAN bus should look like with multiple CAN devices on the bus with the BTI gauge as the last or only device on said bus:

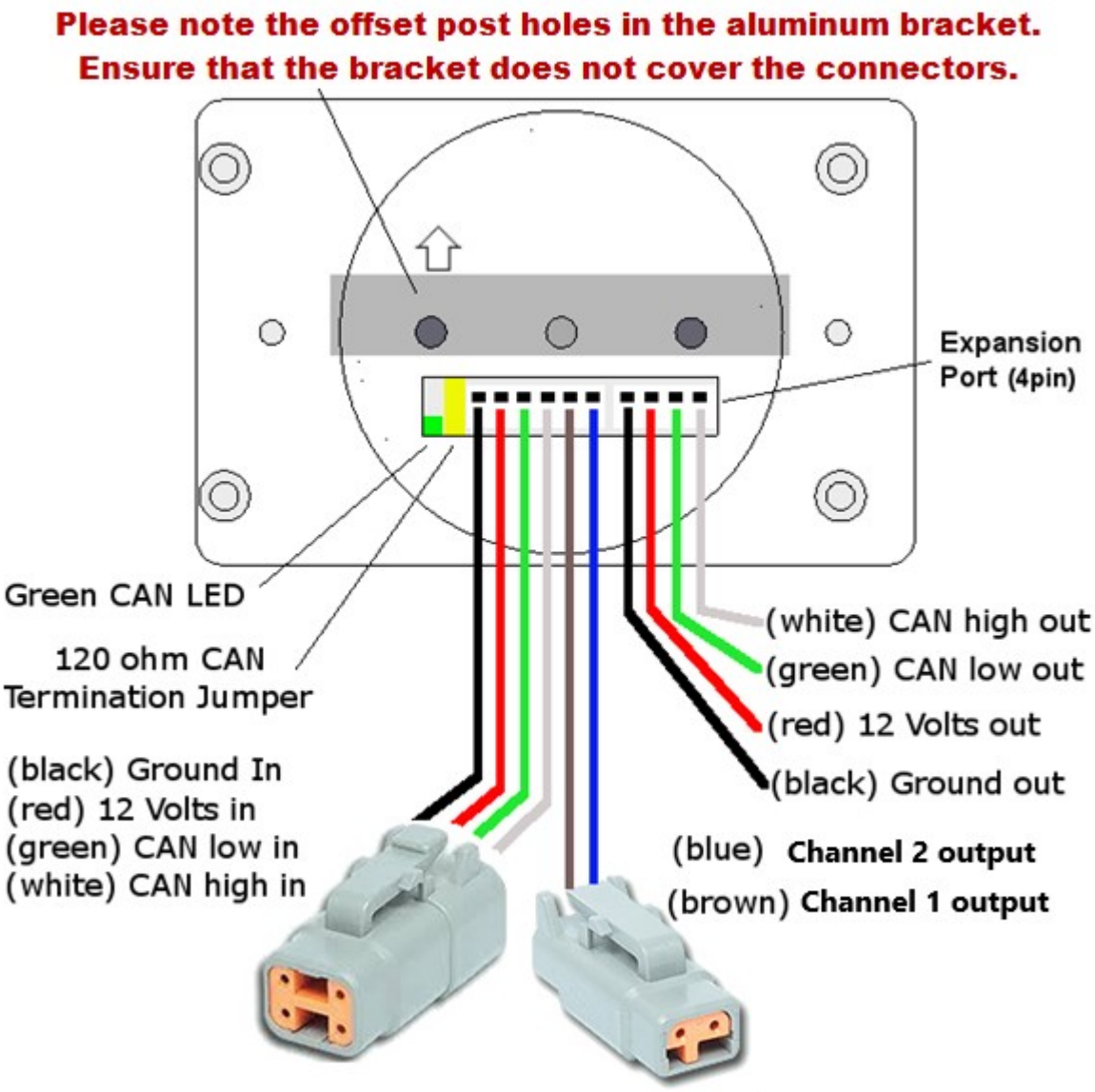


2 Pin Analog Out Connector (Brown and Blue Wires)

Disabling the CAN Xmit option on the settings screen will enable the 2 0-5 volt analog outputs on this display. Enabling the CAN Xmit will disable these outputs.

The termination of these two wires is dependent on the inputs that are assigned in the EMtune software. These two outputs are configured for Boost Control and Traction Control. Either output may be connected to a different ECU analog input (5 volt low current) .

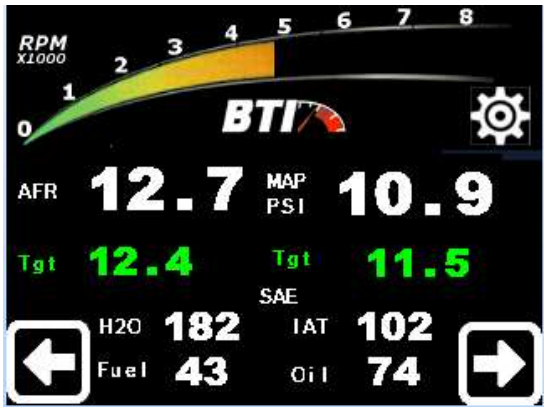




Data LED: This indicator will flash whenever the gauge is energized and CAN communications are present. Use this to confirm communications.

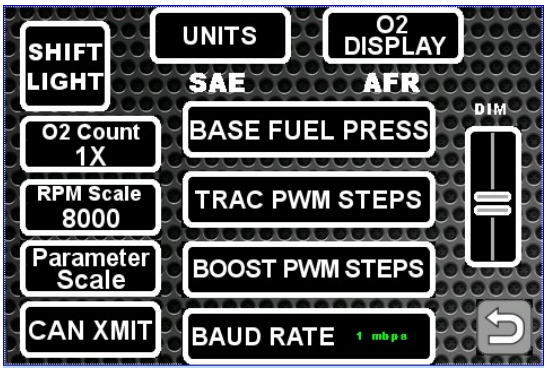
CAN Bus Termination Jumper: Remove this jumper if the gauge is not the last device on the CAN Bus. If there are multiple gauges, the last gauge should be the only gauge with the jumper installed.
Leave the jumper installed if the gauge is a standalone installation and there is nothing else on the CAN Bus.

Configuration:

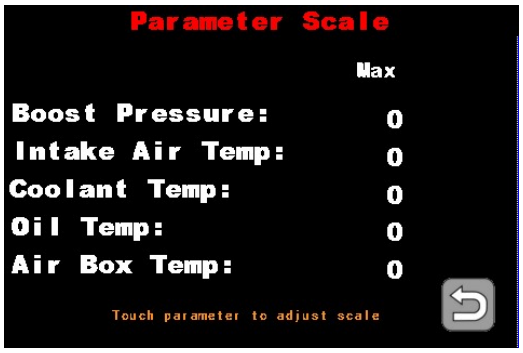


The Setup may be accessed by touching the cog wheel pictured on the top right of the diagram pictured. This is where the Units, Outputs, Boost level, Slip level, Map, Shift Light and output steps may be changed.

Touching the O2 Display button will change the O2 sensor output from AFR to Lambda
Touching the Turbocharger (left) will allow the boost level to be changed (if configured).
Touching the Traction button (center) will allow the traction control to be adjusted (if configured)
Touching the Map button (right) will allow the Map output to be changed (if configured)

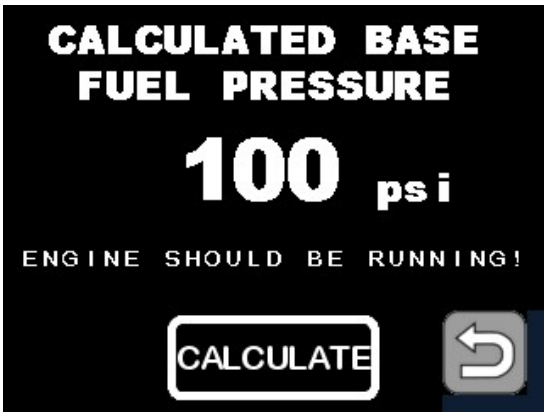


Touching the **Settings** button will allow for Outputs, Shift Light, Base Fuel Pressure, and Output levels to be configured:
Touching the **Units** button will change the units from **SAE** to **SI** units.
O2 Count: Use this function to display 2 wide band sensors instead of 1.
RPM Scale: Use this function to switch between an **8K RPM** scale vs. a **10K RPM** scale for higher revving vehicles.
Baud Rate: allows for the user to change the following baud rates: **250k, 500k, 1mbps**.
Incorrect baud rates may crash communications and or lock up the gauge and or the ECU!

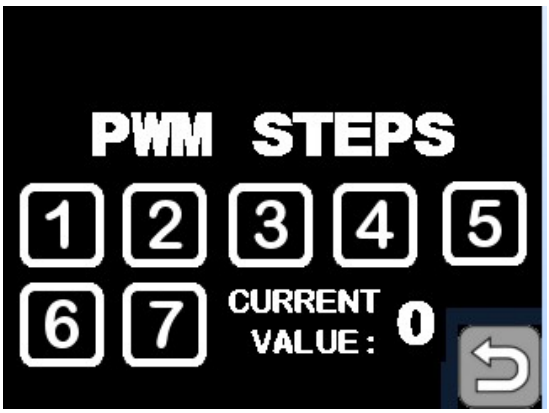


Parameter scale: Use this screen to set the maximum range for boost pressure and various temperature slide bars and graphs.
Example: You will be running a 30 psi boost target. The max boost pressure could be 35 psi to give the slide bars and graphs the best resolution. The same goes for temperatures. These values should be entered with respect to which units are selected: SI or SAE. If SI units are selected, Boost Pressure should be entered in kPa and temps should be entered in Celsius. If SAE units are selected, Boost Pressure should be entered in psi and temps in Fahrenheit.

The **Shift Light** functions by RPM per gear. This means that a shift light may be configured in 1st gear at 6500 RPM while the Shift light could be illuminated in 2nd gear at 7000 RPM if desired. Simply touch the Gear or RPM that you wish to change and adjust accordingly using the arrow keys.
Touch the Back arrow to save and the shift light should illuminate while saving.



Base Fuel Pressure: Use this feature to calculate the base fuel pressure while the vehicle is at normal idle. This will be used on the **Fuel** screen in order to verify proper fuel pressure regulator function (assuming that you are using a rising rate regulator with a 1:1 ratio).

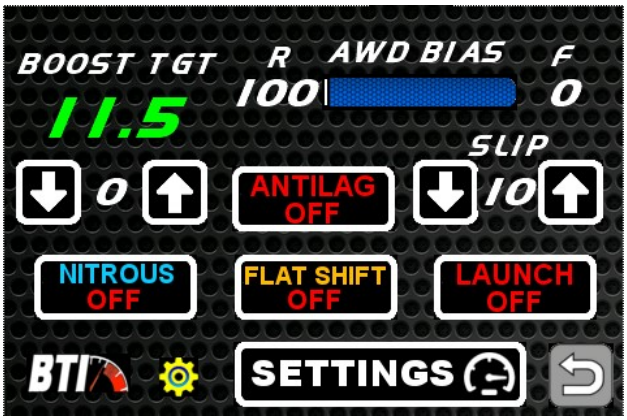


TRAC, BOOST, and **MAP PWM Steps:**
Use these screens to program how many steps that these feature will have. These outputs provide a low current 0-5 volt analog output. That output will be divided by how many steps are programmed.
Example: You have boost assigned to Output # 1 and you wish to have the max number of steps (7). This will actually be 8 steps including 0. The full voltage will be divided by the number of steps. Example: (5 volts / 7 steps = .71 volts per step)

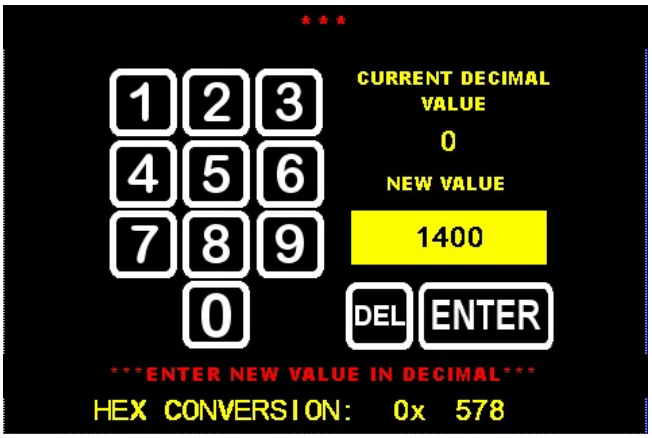
Operation:

Parameters written in White are live data, Green parameters are targets, parameters written in Yellow are peaks, and blue parameters are freeze frame data. In most cases, touching the peaks will reset that peak. The Boost peak is by episode (this resets every time positive boost is reached).

Can Xmit: Enabling this function will the display to send data back to the ECU over the CAN bus. At the time of this publication, we do not have an example of any CAN RX data configuration in the EMtune software.



Pressing the yellow cog wheel on this screen will allow the user to set the CAN transmission address. The address is set in decimal, but a conversion to Hex is listed at the bottom of the screen:



The data stream is as follows:

CAN 0 Address set with the yellow cog wheel * on the CAN transmission screen.
CAN 1 address is the CAN 0 address +1.

---"CAN 0"---

Byte 0&1 (16 bits) (Boost Control*)	Byte 2&3 (16 bits) (Anti-Lag 0/5 v)	Byte 4&5 (16 bits) (Launch 0/5 v)	Byte 6&7 (16 bits) (Nitrous 0/5 v)

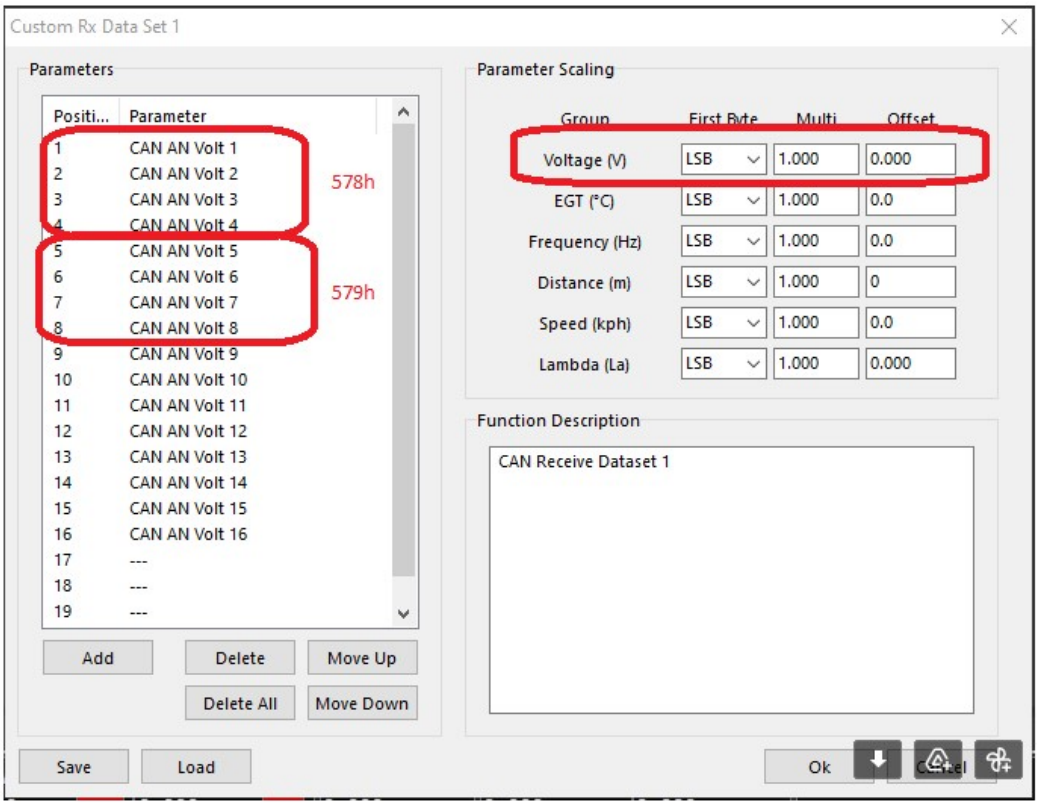
*Boost Control 0 – 5.000 volts
divided by PWM Steps (10 Boost PWM steps will output .500 volts per step)

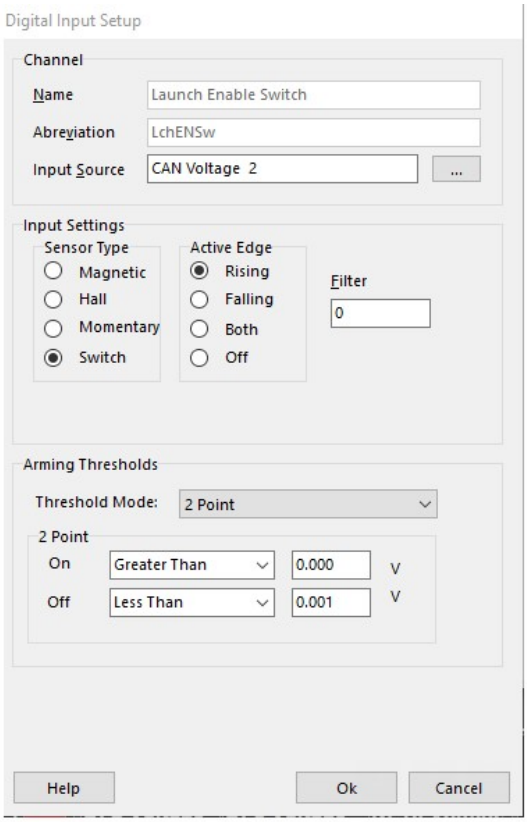
---"CAN 1"---

Byte 0 (16 bits) (Traction control**)	Byte 1 (16 bits) (Flat Shift 0/5 v)	Byte 2 (16 bits) (AWD Bias slider***)	Byte 3 (16 bits) (Currently not used)

**Traction Control 0 – 5.000 volts
divided by PWM Steps (10 Trac PWM steps will output .500 volts per step)
***AWD Bias Slider displays 0-100% but outputs 0 – 5.000 Volts on the CAN Data stream.

Emtron Tech support has been kind enough to provide these configuration examples in the EMtune software. Emtron support suggests using the CAN address 1400 (578 hex) for data reception from the BTI display.


Custom Rx Data Set 1
Parameters
Positi...
Parameter
1 CAN AN Volt 1
2 CAN AN Volt 2
3 CAN AN Volt 3
4 CAN AN Volt 4
578h
5 CAN AN Volt 5
6 CAN AN Volt 6
7 CAN AN Volt 7
8 CAN AN Volt 8
579h
9 CAN AN Volt 9
10 CAN AN Volt 10
11 CAN AN Volt 11
12 CAN AN Volt 12
13 CAN AN Volt 13
14 CAN AN Volt 14
15 CAN AN Volt 15
16 CAN AN Volt 16
17 ---
18 ---
19 ---
Add
Delete
Move Up
Delete All
Move Down
Save
Load
Parameter Scaling
Group
First Byte
Multi
Offset
Voltage (V) LSB 1.000 0.000
EGT (°C) LSB 1.000 0.0
Frequency (Hz) LSB 1.000 0.0
Distance (m) LSB 1.000 0
Speed (kph) LSB 1.000 0.0
Lambda (La) LSB 1.000 0.000
Function Description
CAN Receive Dataset 1
Ok


Digital Input Setup
Channel
Name
Launch Enable Switch
Abreviation
LchENSw
Input Source
CAN Voltage 2
...
Input Settings
Sensor Type
Magnetic
Hall
Momentary
Switch
Active Edge
Rising
Falling
Both
Off
Filter
0
Arming Thresholds
Threshold Mode:
2 Point
2 Point
On
Greater Than
0.000
V
Off
Less Than
0.001
V
Help
Ok
Cancel

Warranty:
All BTI Gauges carry a 1 year warranty effective at the time of purchase.

- This warranty extends only to products distributed and/or sold by BTI Gauges. It is effective only if the products are purchased and operated in the USA. (Within the USA including US 48 States, Alaska and Hawaii.)
- This warranty covers only normal use of the computer. BTI Gauges shall not be liable under this warranty if any damage or defect results from (i) misuse, abuse, neglect, improper shipping or installation; (ii) disasters such as fire, flood, lightning or improper electric current; or (iii) service or alteration by anyone other than an authorized BTI Gauge representative.
- You must retain your bill of sale or other proof of purchase to receive warranty service.
- No warranty extension will be granted for any replacement part(s) furnished to the purchaser in fulfillment of this warranty.
- Warranty claims must be sent to sales@btigauges.com.