BTI

Performance Vehicle Telemetry Displays

www.btigauges.com

BTI 52mm multi-integration CAN gauge.
Installation Manual
Doc version 1.0

**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
or reducing the Traction Control too much can have severe consequences.   You could blow your
engine and or lose control of your vehicle****

Index
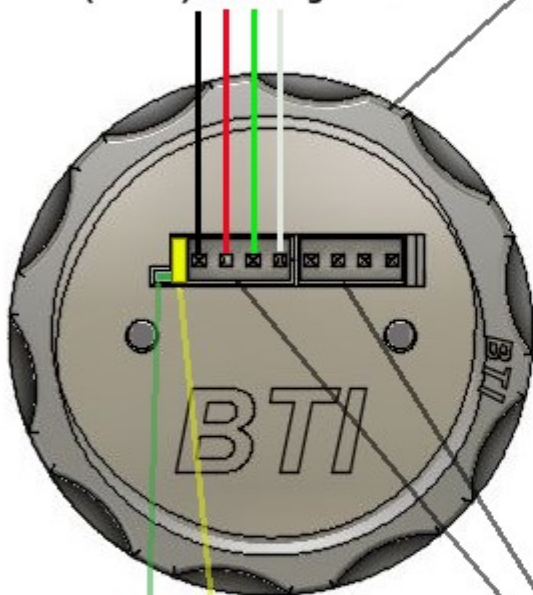
General installation / wiring:

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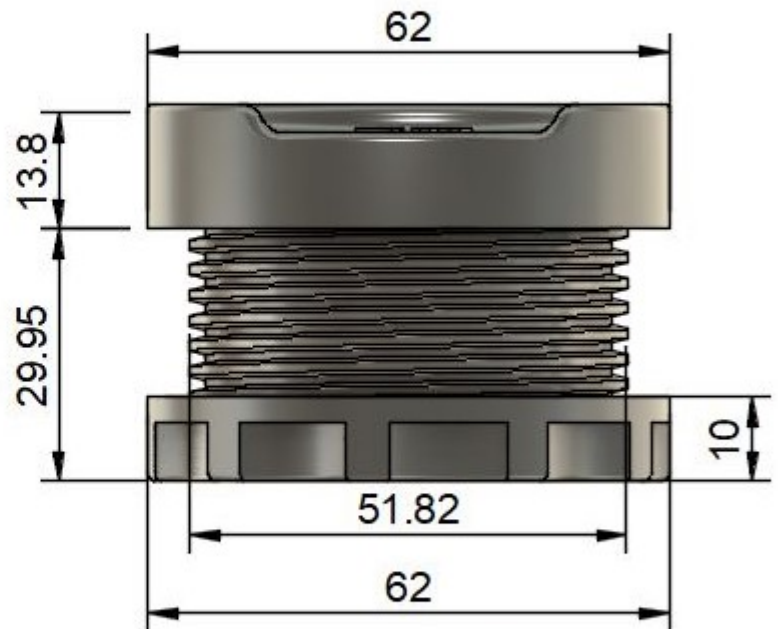
(black) Ground In
(red) 12 Volts in
(green) CAN low in
(white) CAN high in

Mounting Nut

Termination Resistor
Jumper

CAN Data LED

Main and Expansion Connections
(paralel connections do not matter
which is used)

62

13.8

29.95

51.82

62

10

All measurements in mm

The wiring is similar for all models. All integrations are shipped with the AEMnet
standard DTM connector cable with exception to customers whom selected the
Haltech 4 pin DTM connector which is conveniently wired 180 degrees from the
AEMnet DTM connector standard. We then ship conversion pig-tails for various ECU
connection options. Please see specific ECU integrations for wiring specifics.
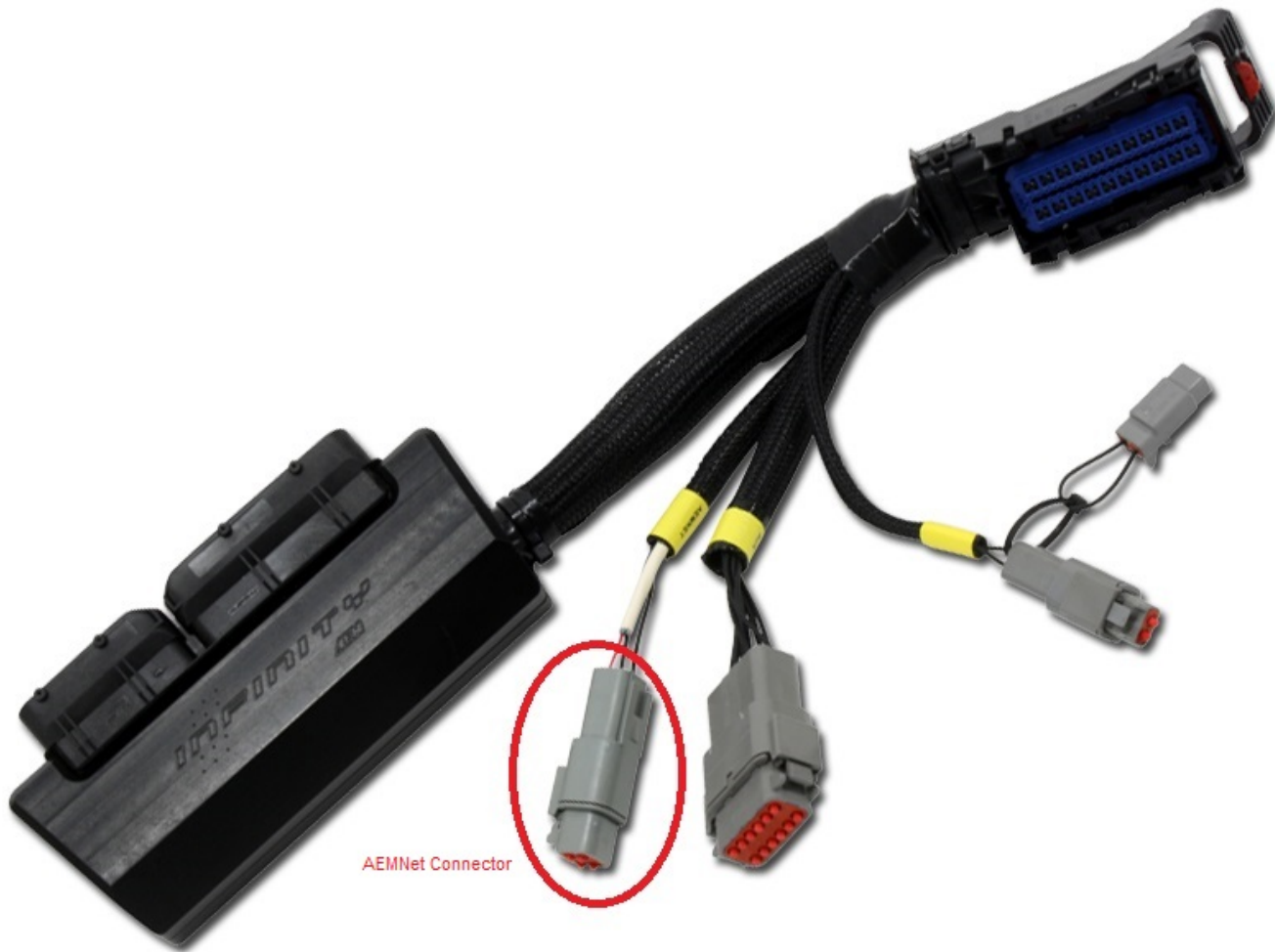
AEM Infinity

Plug and Play harness installation:

Plug and play wiring harness for Infinity ECUs with the AEM wiring harness:

Locate the 4 pin AEM NET wiring connector on the Infinity harness. Connect the Plug and play harness into the Infinity harness and run the cable to the desired gauge installation location. Note that the gauge gets power and the CAN signal from this cable and no other wiring is necessary.
** Notice** It has come to our attention that some of the first AEM Infinity factory harnesses had the CAN high and CAN low wires reversed **(Most Infinity 8 Supra harnesses)**. Pin 1 should be White (CAN high) and Pin 2 should be Green (CAN low).

AEMNet Connector

Plug and pin harness installation:
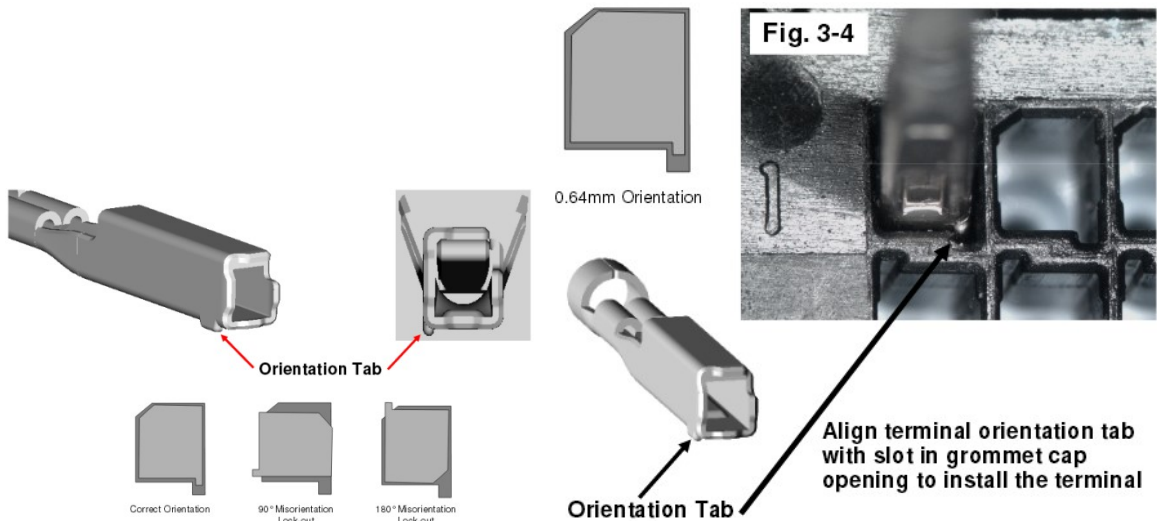
Plug and pin wiring harness for Infinity ECUs:

The termination to the Infinity ECU is relatively simple as it only consists of two wires: CAN A High and CAN A Low. Included on the plug and pin harness are two pins that will simply plug into the Infinity (Molex MX 123) connectors.

Notice: It is imperative that the pins are properly inserted into the correct positions on the connector! Removal and repining of these connectors is very difficult and requires special tools. Improper connection to the wrong pins could result to damage to the gauge or the ECU.

Double check your work here!

If you have questions regarding the Molex MX 123 connector, refer to this document for assistance: http://www.molex.com/mx_upload/family//MX123UserManual.pdf

Note that the pins have an orientation tab that only allows the pin to be inserted in one orientation. See the figure below to see the orientation and how the pin will be locked out if the orientation is not correct.
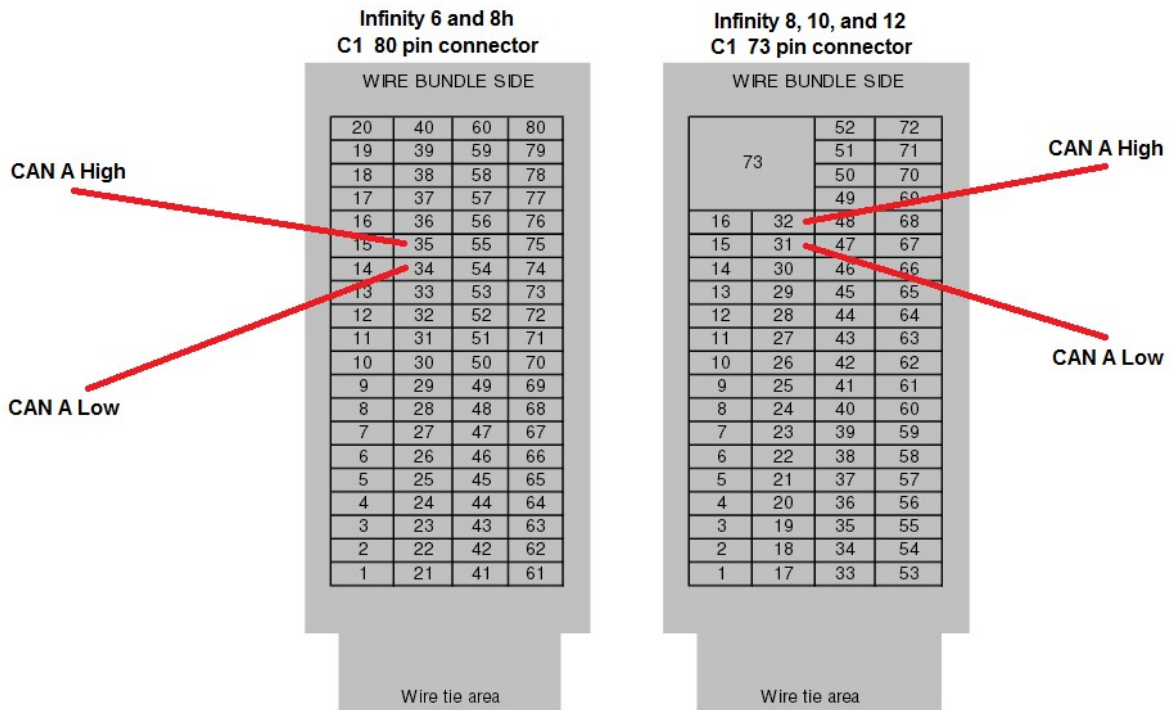
0.64mm Orientation

Fig. 3-4

Orientation Tab

Correct Orientation   90° Misorientation Lock-out   180° Misorientation Lock-out

Orientation Tab

Align terminal orientation tab with slot in grommet cap opening to install the terminal

As per the AEM Infinity 8, 10, and 12 documentation:

C1-31	CANL_A_Out	Dedicated High Speed CAN Transceiver	Recommend twisted pair (one twist per 2") with terminating resistor. Contact AEM for additional information.
C1-32	CANH_A_Out	Dedicated High Speed CAN Transceiver	Recommend twisted pair (one twist per 2") with terminating resistor. Contact AEM for additional information.

As per the AEM Infinity 6 and 8h documentation:

C1-34	CANL_A_Out	Dedicated High Speed CAN Transceiver	Recommend twisted pair (one twist per 2") with terminating resistor. Contact AEM for additional information.
C1-35	CANH_A_Out	Dedicated High Speed CAN Transceiver	Recommend twisted pair (one twist per 2") with terminating resistor. Contact AEM for additional information.

Infinity 6 and 8h
C1 80 pin connector

WIRE BUNDLE SIDE

20	40	60	80
19	39	59	79
18	38	58	78
17	37	57	77
16	36	56	76
15	35	55	75
14	34	54	74
13	33	53	73
12	32	52	72
11	31	51	71
10	30	50	70
9	29	49	69
8	28	48	68
7	27	47	67
6	26	46	66
5	25	45	65
4	24	44	64
3	23	43	63
2	22	42	62
1	21	41	61

Wire tie area

Infinity 8, 10, and 12
C1 73 pin connector

WIRE BUNDLE SIDE

CAN A High — CAN A Low

Wire tie area

The plug and pin harness has two signal wires (Green and White). Pin the White wire to CAN A High and the Green wire to CAN A Low on the corresponding connector. Connect the Red wire to a switched on / ignition power source and connect the Black wire to ground.

Data LED: This indicator will flash when ever 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 stand alone installation and there is nothing else on the CAN Bus.

** Note that all GPS, G-force and Yaw readings are derived from the AEM Vehicle Dynamics Module (PN 30-2203). The absence of this module will result in a "0" value on corresponding readings.

AEM V2

Wiring harness installation:

Plug and play wiring harness for Infinity V2 ECUs with the AEM wiring harness:

Locate the 4 pin AEM NET wiring connector on the V2 harness. Connect the Plug and play harness into the AEMnet 4 pin harness and run the cable to the desired gauge installation location. Note that the gauge gets power and the CAN signal from this cable and no other wiring is necessary.

AEMnet CONNECTORS

The AEMnet has four wires, two are for communication (white pin 1 and green pin 2) and two are for powering (red pin 3 and black pin 4) certain AEMnet devices. Only the two communication wires (white pin 1 and green pin 2) are needed for the Series 2 EMS to send/receive data as the EMS is not powered by AEMnet. The red and black wires will need to be connected when using the Series 2 EMS with devices that are powered by AEMnet such as the Dyno-Shaft (see individual instructions for details). The AEMnet connectors are shown below in figure 1. See table 1 for the AEMnet connection pinout.
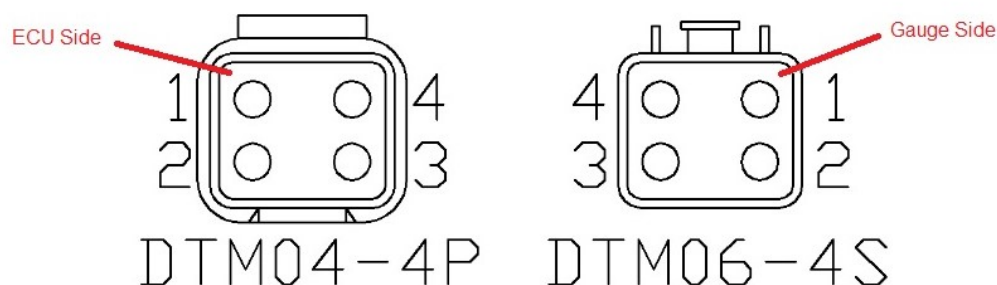
Figure 1: AEMnet connectors, wire entry view

AEMnet Connector		Series 2 EMS Connector
Pin 1	White	CAN1H
Pin 2	Green	CAN1L
Pin 3	Red	AEMnet Power (switched 12 volts)
Pin 4	Black	AEMnet Ground

Table 1: AEMnet connector pinout

INSTALLING THE AEMnet ADAPTER HARNESS

4. Table 2 below lists the corresponding CAN1L and CAN1H pin locations for each Series 2 EMS.

EMS	Adapter p/n	CAN1L (Green wire) LOCATION	CAN1H (White wire) LOCATION
30-6100	30-3433	11A	12A
30-6101	30-3433	11A	12A

Table 2: CAN1L and CAN1H pin locations

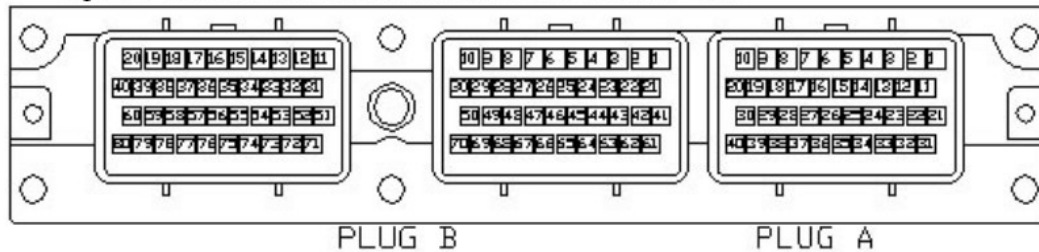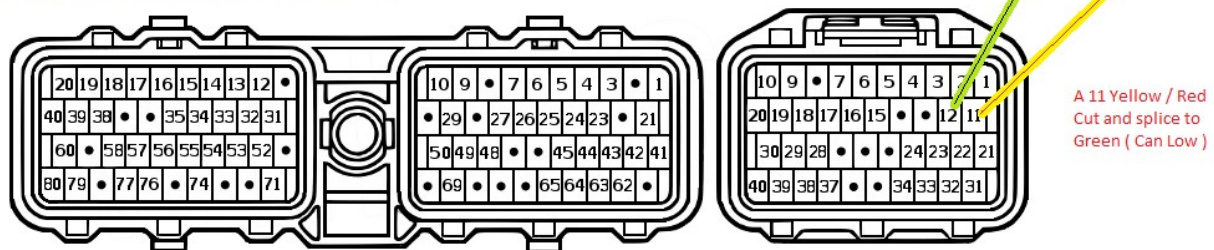Figure 6 below shows the connectors for the Series 2 EMS.
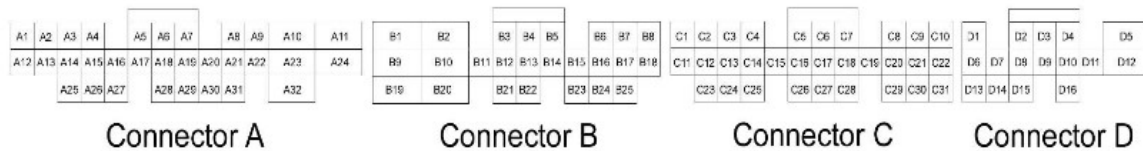

Figure 6: Wire-side view of pinout for 6100 and 6101 EMS

Toyota Supra (JZA80) / Aristo (JZS147) - 2JZ-GTE

A 12 Lt Green / Black
Cut and splice to
White (Can High)

A 11 Yellow / Red
Cut and splice to
Green (Can Low)

Notice: Not all 2JZ wiring harnesses have pins a 11 and a 12 populated. In the event this should occur, pins or pre-terminated pins with wires are available from Toyota.

The PIN part number is TE Connectivity 175197-2
or if you insist on OEM Toyota parts: Toyota 82998-24060

4. Table 2 below lists the corresponding CAN1L and CAN1H pin locations for each Series 2 EMS.

EMS	Adapter p/n	CAN1L (Green wire) LOCATION	CAN1H (White wire) LOCATION
30-6030	30-3430	C22	C21
30-6050	30-3432	D14	D10
30-6051	30-3432	D14	D10
30-6052	30-3432	D14	D10
30-6053	30-3432	D14	D10
30-6060	30-3432	C28	C29
30-6310	30-3431	77	87
30-6311	30-3431	57/77	67/87
30-6320	30-3435	33	13

Table 2: CAN1L and CAN1H pin locations

Figures 7, 8, 9, and 10 below show the connectors for each Series 2 EMS.
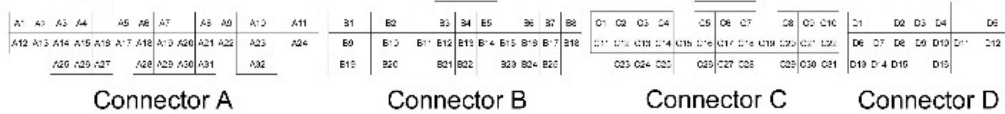
Figure 7: Wire-side view of pinout for 6030

Figure 8: Wire-side view of pinout for 6050, 6051, 6052, 6053, and 6060 EMS
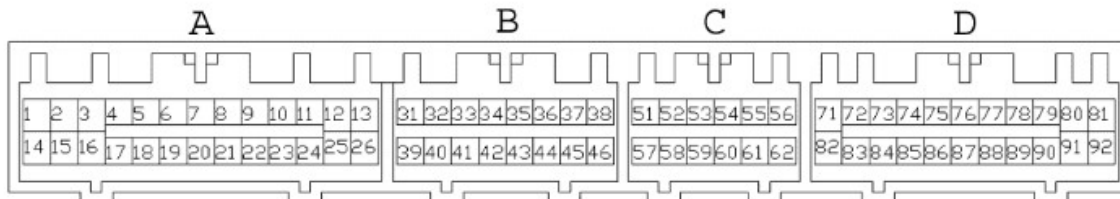
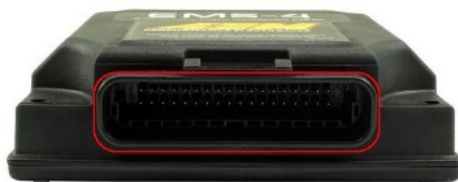Figure 9: Wire-side view of pinout for 6310 and 6311 EMS
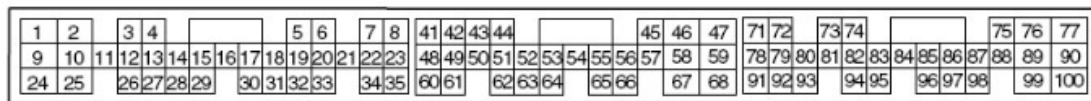
Figure 10: Wire-side view of Pinout for 6320 EMS

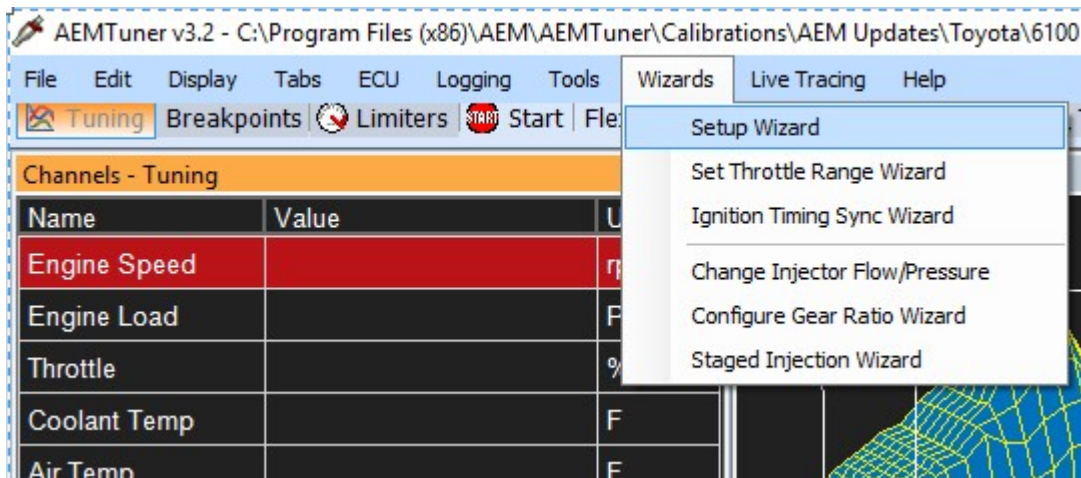EMS-4 CAN Bus wiring:

Pin 34 CAN Low (Green Wire)
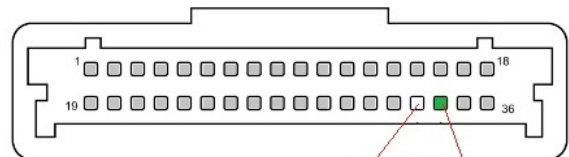
Pin 33 CAN High (White Wire)

10

AEM Tuner software configuration:

In order to have a properly functioning gauge, it is mandatory that the CAN protocol is configured in the AEM Tuner software.

Steps to create the protocol and generate the multipliers:

1. Open the AEM Tuner software and proceed to the Wizard / Setup Wizard:

1. Now select "Telemetry: AEMNet" and click on the space under "Matched". This should insert the word "Matched" if the datastream is not linked.
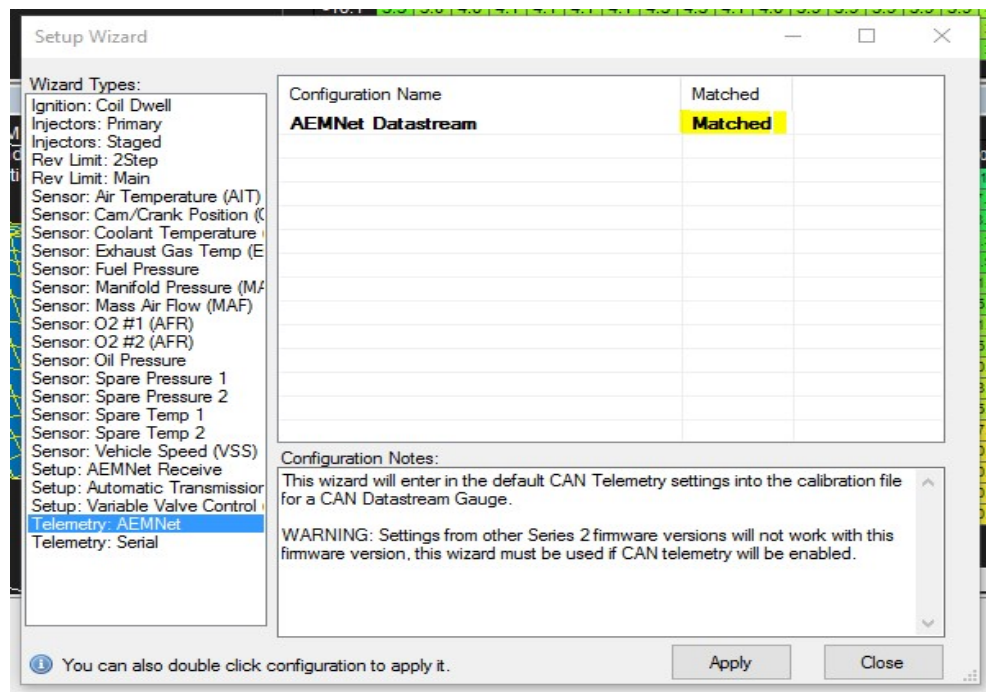
Now that the datastream is matched, this will build the basis for the standard transmit and save some time in configuration.

2. Now we must create the CAN Message Data. Note that there will be different CAN transmissions for cars using the AEM V2 to control an automatic transmission vs cars running Flex Fuel. We do this in order to get the most amount of Data out of V2 given it's limited communication size.

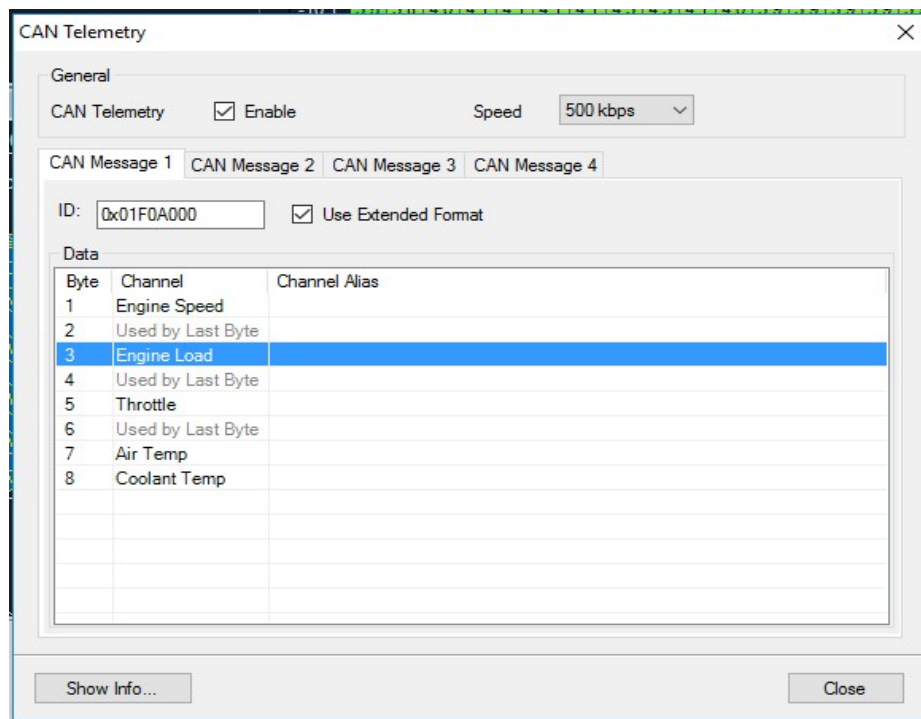In order to do this, navigate to Tools / Configure Telemetry / CAN Telemetry:
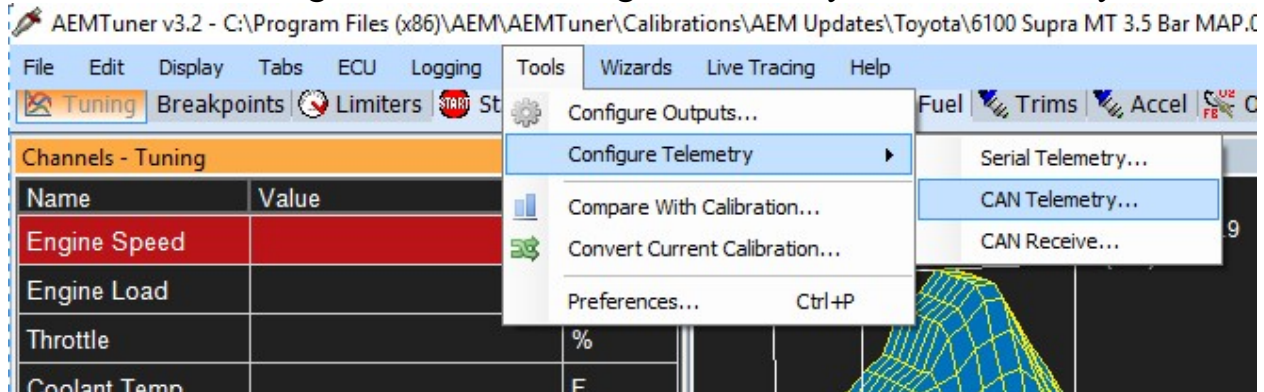
Standard CAN transmission:
(Manual transmission cars with or without flex fuel) :

Can Message 1 should look like this:

Change Byte 3 from "Engine Load" to "MAP Voltage" AEM V2 is not capable of outputting the MAP pressure on the CAN bus, so we will need to put in a scalar and offset in the gauge in order to get our MAP Pressure.

CAN Message 1 should now look like this:

Notice that "MAP Volts" may change to one of the ADCR channels once you have made your selection. This behavior is normal:

1. Now we must create CAN Message 2. Match CAN message 2 to the following:

2. Now create CAN Message 3 to match the following:

CAN Telemetry

General

CAN Telemetry ☑ Enable Speed | 500 kbps ∨ |

CAN Message 1 | CAN Message 2 | **CAN Message 3** | CAN Message 4

ID: 0x01F0A002 ☑ Use Extended Format

Data

Byte	Channel	Channel Alias
1	O2 #1 FB Value	
2	Used by Last Byte	
3	O2 Target	
4	Spare Temp 1	
5	Boost Target	
6	Used by Last Byte	
7	Fuel Inj Duty Pri	
8	Used by Last Byte	

3. Now given the wizard's auto configuration, CAN Message 4 should already look like the following:

CAN Telemetry

General

CAN Telemetry ☑ Enable Speed | 500 kbps ∨ |

CAN Message 1 | CAN Message 2 | CAN Message 3 | **CAN Message 4**

ID: 0x01F0A003 ☑ Use Extended Format

Data

Byte	Channel	Channel Alias
1	O2 #1	
2	O2 #2	
3	Vehicle Speed	
4	Used by Last Byte	
5	Gear Calculated	
6	Ign Timing	
7	Battery Volts	
8	Used by Last Byte	

4. Skip the Automatic Transmission CAN protocol configuration and proceed to step # 7 on generating the CAN multiplier sheet on the bottom half of page 14 in this document.

Auto CAN transmission:
(Automatic transmission cars) :
Can Message 1 should look like this:

Change Byte 3 from "Engine Load" to "MAP Voltage" AEM V2 is not capable of outputting the MAP pressure on the CAN bus, so we will need to put in a scalar and offset in the gauge in order to get our MAP Pressure.
CAN Message 1 should now look like this:

Notice that "MAP Volts" may change to one of the ADCR channels once you have made your selection. This behavior is normal:

4A. Now we must create CAN Message 2. Match CAN message 2 to the following:

CAN Telemetry

General

CAN Telemetry ☑ Enable   Speed 500 kbps ▽

CAN Message 1 | CAN Message 2 | CAN Message 3 | CAN Message 4

ID: 0x01F0A001   ☑ Use Extended Format

Data

Byte	Channel	Channel Alias
1	Spare Temp 2	
2	A/T Gear Change Rqd	A/T Gear Manual, A/T Gear Over Drive, A/T Gear Ready, A/T Gear Stat...
3	A/T Gear Selector	
4	Timing Errors	
5	Fuel Pressure	
6	Oil Pressure	
7	EGT 1	
8	EGT 2	

5A. Now create CAN Message 3 to match the following:

CAN Telemetry

General

CAN Telemetry ☑ Enable   Speed 500 kbps ▽

CAN Message 1 | CAN Message 2 | CAN Message 3 | CAN Message 4

ID: 0x01F0A002   ☑ Use Extended Format

Data

Byte	Channel	Channel Alias
1	O2 #1 FB Value	
2	Used by Last Byte	
3	O2 Target	
4	Spare Temp 1	
5	Boost Target	
6	Used by Last Byte	
7	Fuel Inj Duty Pri	
8	Used by Last Byte	

6A. Now given the wizard's auto configuration, CAN Message 4 should already look like the following, with exception of the "Gear Calculated". Change this to "A/T Gear".

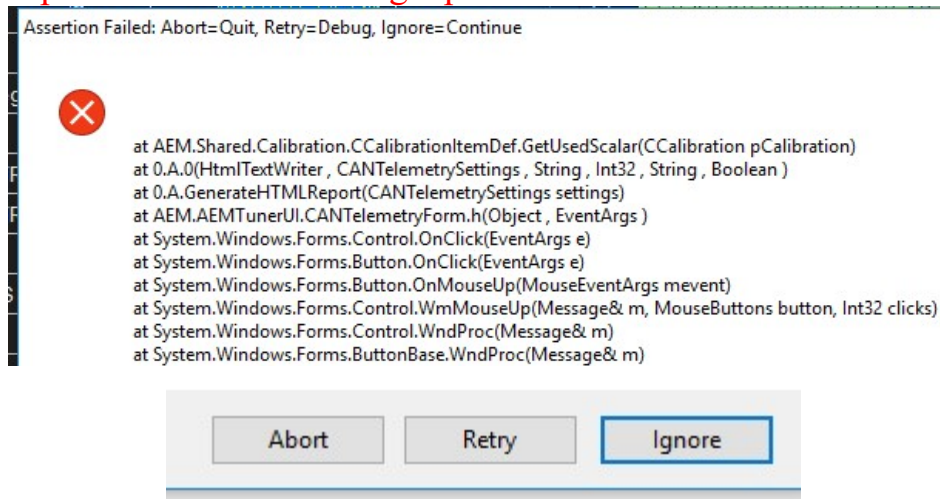7. Generate the Multiplier Sheet:

Click on "Show Info" in order to generate the CAN Configuration Sheet with the Scalars and Offsets. We will need this info in order to ensure that the displays are accurate. Click "Show Info…" to generate the sheet.

Notice that sometimes it is possible to get an error when generating this sheet. You may have to click "Ignore" up to 3 times in order to get past this.

```
Assertion Failed: Abort=Quit, Retry=Debug, Ignore=Continue

    ❌

        at AEM.Shared.Calibration.CCalibrationItemDef.GetUsedScalar(CCalibration pCalibration)
        at 0.A.0(HtmlTextWriter, CANTelemetrySettings, String, Int32, String, Boolean)
        at 0.A.GenerateHTMLReport(CANTelemetrySettings settings)
        at AEM.AEMTunerUI.CANTelemetryForm.h(Object, EventArgs)
        at System.Windows.Forms.Control.OnClick(EventArgs e)
        at System.Windows.Forms.Button.OnClick(EventArgs e)
        at System.Windows.Forms.Button.OnMouseUp(MouseEventArgs mevent)
        at System.Windows.Forms.Control.WmMouseUp(Message& m, MouseButtons button, Int32 clicks)
        at System.Windows.Forms.Control.WndProc(Message& m)
        at System.Windows.Forms.ButtonBase.WndProc(Message& m)

         [ Abort ]        [ Retry ]        [ Ignore ]
```

Telemetry Info

CAN Telemetry Settings

| CAN Telemetry: | Enabled |
| Speed: | 500 kbps |

CAN Message Data

CAN Message 1

ID: 0x01F0A000

Byte	Name	Units	Scalar	Offset	Min	Max	Signed?	Bitmask
1	Engine Speed [msb]	rpm	0.390625	0	0.0	25599.6	No	
2	Engine Speed [lsb]							
3	ADCR02 [msb]	Volts	7.78198227635585E-05	0	0.0000	5.0999	No	
	(MAP Volts [msb])	Volts	7.78198227635585E-05	0	0.0000	5.0999	No	
4	ADCR02 [lsb]							
5	Throttle [msb]	%	0.00152587890625	0	0.000	99.998	No	
6	Throttle [lsb]							
7	Air Temp	°C	1	0	-128	127	Yes	
8	Coolant Temp	°C	1	0	-128	127	Yes	

'() indicates alias channels.'

CAN Message 2

ID: 0x01F0A001

Byte	Name	Units	Scalar	Offset	Min	Max	Signed?	Bitmask
1	Flex Fuel Content [msb]	%	1	-49	-31	1253083	No	
	(Flex Fuel Freq [msb])	Hz	1	1	19.1	1253132.9	No	
	(Flex Fuel Per [msb])	ms	0.000798000022768974	0	0.0000	52.2969	No	
2	Flex Fuel Content [lsb]							

Once the CAN Telemetry Settings Sheet is generated, the Fuel Pressure Scalar, Oil Pressure Scalar, Boost Target Scalar, O2 Scalar, and O2 Offset must be verified

ECU Master integrtation

ECU Master Classic Confiugration:

Software Configuration:

The ECU Master software must be configured in order for the BTI CAN gauge to function. The configuration only requires a few steps:

1. Open the client software and expand the "Ext. port" directory. Click on "General" and make sure that "Device" is set to "CAN-Bus", "CAN-Bus speed" is set to "1 Mbps", and "Send EMU data over CAN-Bus" is checked.
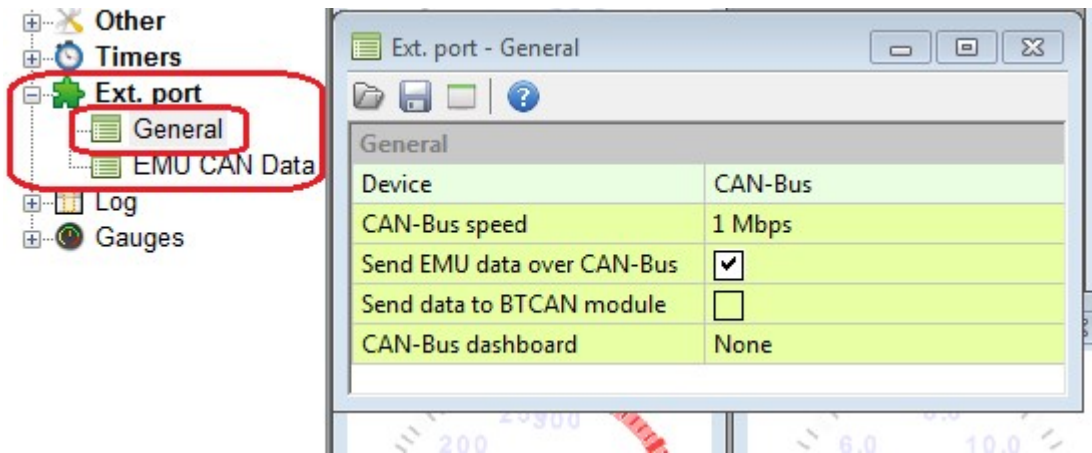
2. Open the "EMU CAN Data in the "Ext. port" directory and ensure that the "EMU CAN Data" has the following address listed:
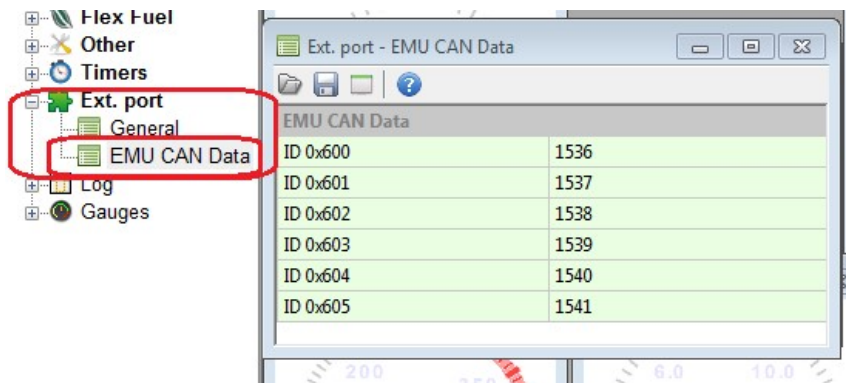
ECU Master Classic Termination:

The ECU Master Classic ECU does require that you have the CAN Expansion module in order to have access to the CAN bus communication feature.

Connect Pin 1 on the Module to the GREEN wire on the harness.
Connect Pin 5 on the Module to the WHITE wire on the harness
The red wire on the BTI gauge harness should be tied to ignition +12 Volts while the black wire should be tied to ground.

1 – CAN L
5 – CAN H
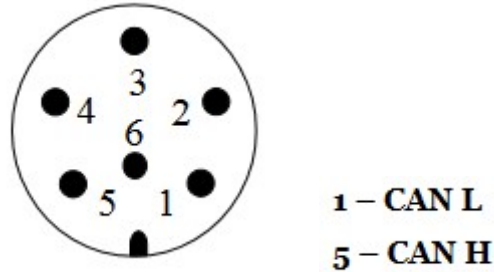
ECU Master Black Termination

Wire the White wire (CAN high) to pin 12 on the 39 pin connector.
Wire the Green wire (CAN low) to pin 25 on the 39 pin connector. The Black wire will need to be tied to chassis ground and the Red wire will need to be tied to an ignition source that has power only when the ignition is energized.

Black 39pin conector

#		#		#	
1	Ignition coil #5	14	Ignition coil #4	27	Power Ground
2	EGT in #1	15	EGT in #2	28	Ecu Ground
3	Knock Sensor in #1	16	Knock Sensor in #2	29	Sensor Ground
4	Analog In #2	17	Analog In #3	30	Analog In #4
5	CLT In	18	TPS In	31	Analog In #1
6	WBO Vs	19	WBO Ip	32	IAT In
7	Camsync In #2	20	VSS In	33	WBO VGND
8	Primary trigger	21	Camsync In #1	34	+5V supply
9	Flex Fuel In	22	WBO Rcal	35	Analog In #5
10	Switch #1 In	23	Switch #2 In	36	Switch #3 In
11	RS232 TXD	24	RS232 RXD	37	Analog In #6
12	CAN H	25	CAN L	38	Sensor Ground
13	Constant +12V	26	+5V supply	39	Sensor Ground

ECU Master Black Software Configuration

Navigate to the CAN configuration and double click to begin the CAN configuration. Once you are in the CAN configuration, select the following:


In order to receive instructions from the display to the ECU, we must emulate the "ECU Switch board"

EMTRON configuration:

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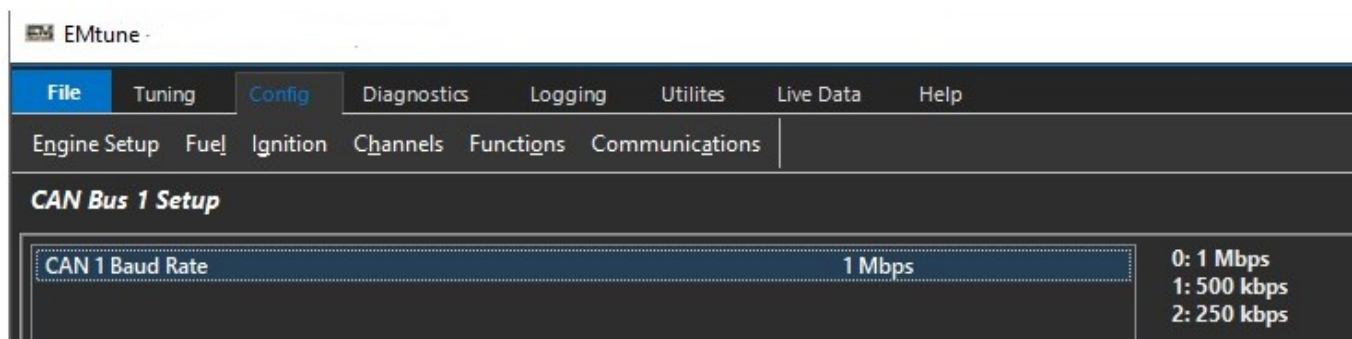
2. Select a Channel with CAN1 or CAN2
3. Set Enable to ON
4. Set CAN Address = 1250
5. Select required DATA Set; Predefined
6. Set Addressing to sequential
7. Set the Transmit rate to 20 Hz
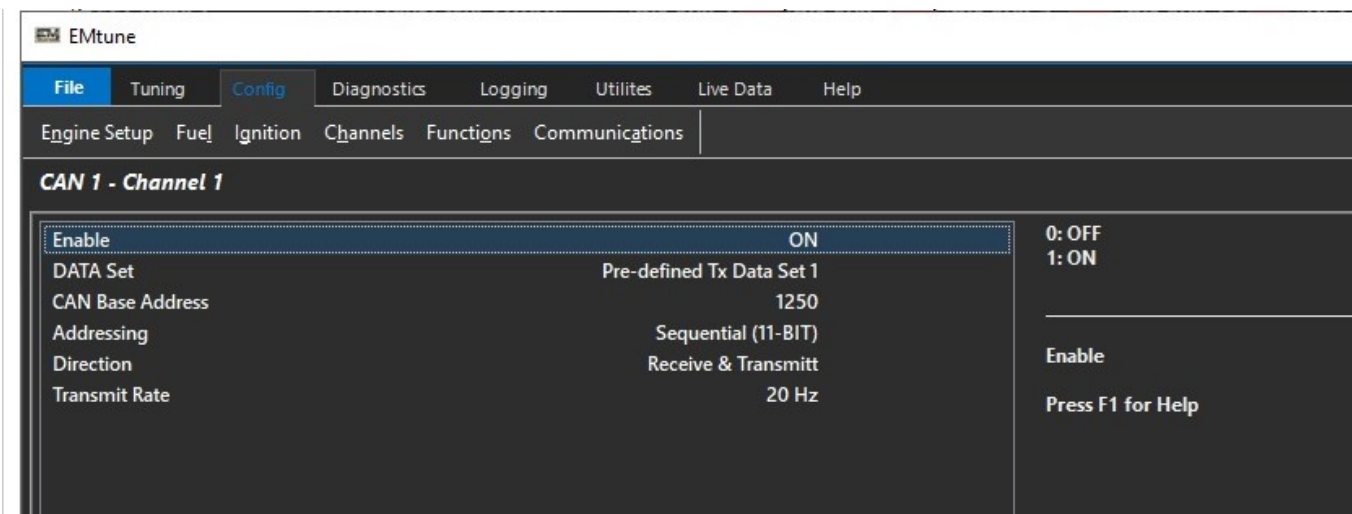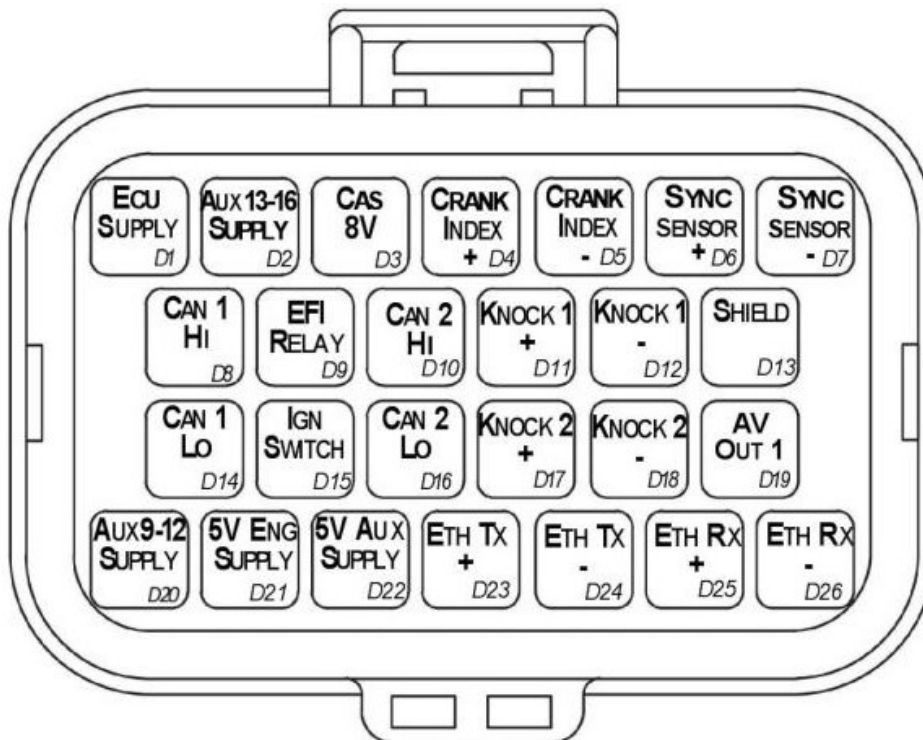
Plug and Pin termination:

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

ECU SUPPLY D1	AUX 13-16 SUPPLY D2	CAS 8V D3	CRANK INDEX + D4	CRANK INDEX - D5	SYNC SENSOR + D6	SYNC SENSOR - D7
CAN 1 HI D8	EFI RELAY D9	CAN 2 HI D10	KNOCK 1 + D11	KNOCK 1 - D12		SHIELD D13
CAN 1 LO D14	IGN SWITCH D15	CAN 2 LO D16	KNOCK 2 + D17	KNOCK 2 - D18		AV OUT 1 D19
AUX 9-12 SUPPLY D20	5V ENG SUPPLY D21	5V AUX SUPPLY D22	ETH TX + D23	ETH TX - D24	ETH RX + D25	ETH RX - D26

CONNECTOR D

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

Power and CAN Flying Loom Connector: DTM 4 pin (M).

Pin	Function	Wire Colour
1	Ground	BLACK
2	CAN Lo	GREEN
3	CAN Hi	YELLOW
4	12V Supply	RED

Table 3.0. ETC4 Power and CAN Deustch Connector Pinout

Gauge side wiring:

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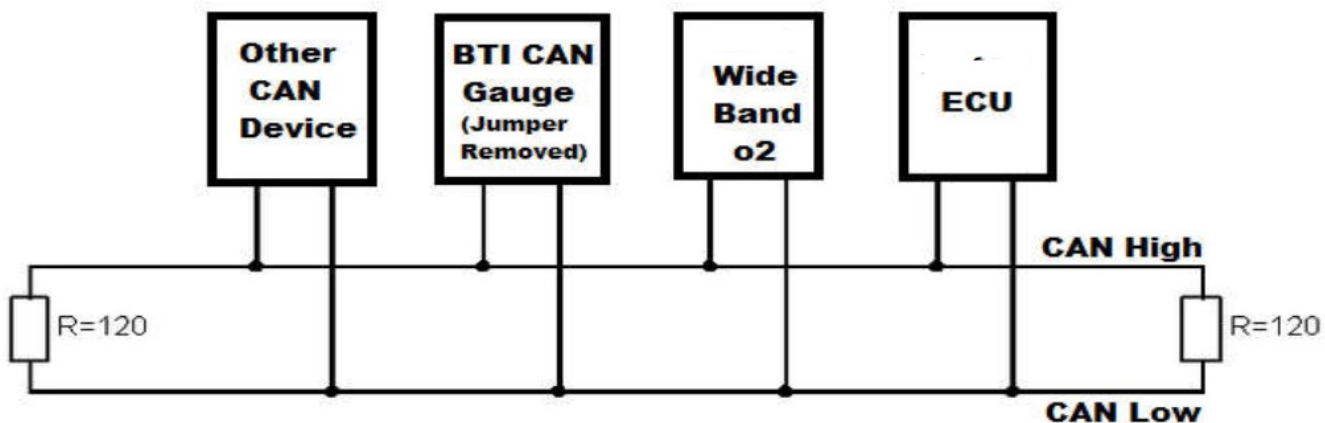
This is what the CAN bus should look like with multiple CAN devices on the bus with the BTI gauge as the last or only device on said bus:

HALTECH Integration:

Plug and Play harness installation:

Plug and play wiring harness for Haltech ECUs with the BTI wiring harness:

Simply plug the BTI connector straight into the Haltech ECU and the gauge will receive both power and CAN bus communications.
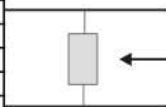
Notice! This diagram is for the Tyco connectors that are plugged directly into the ECU

HALTECH PLATINUM SPORT SERIES 1 & 2
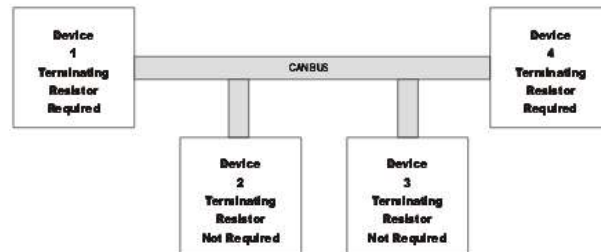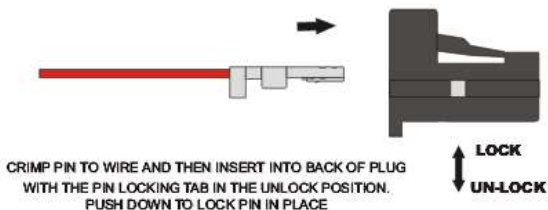## REAR CAN CONNECTOR

SERIES IS KNOWN BY LAST DIGIT ON SERIAL NUMBER OF UNIT

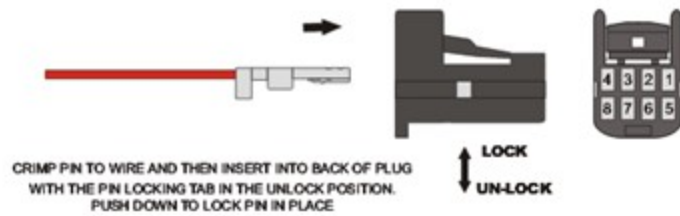| Pin #	Function
1	Ground
2	Reserved
3	CAN LO
4	12V Out
5	Reserved
6	Reserved
7	CAN HI
8	Reserved

CONNECT 120 OHM TERMINATING RESISTOR IF REQUIRED.
TERMINATING RESISTOR WILL BE REQUIRED IF ECU
IS AT THE END OF A CAN BUS,
LEAVE OPEN IF ECU IS IN THE MIDDLE OF A CAN BUS
SEE EXAMPLE

TERMINATING RESISTOR EXAMPLE

Device 1 — Terminating Resistor Required

Device 4 — Terminating Resistor Required

Device 2 — Terminating Resistor Not Required

Device 3 — Terminating Resistor Not Required

CANBUS

CRIMP PIN TO WIRE AND THEN INSERT INTO BACK OF PLUG
WITH THE PIN LOCKING TAB IN THE UNLOCK POSITION.
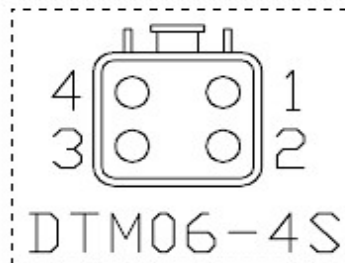PUSH DOWN TO LOCK PIN IN PLACE

LOCK
UN-LOCK

4 3 2 1
8 7 6 5

Notice! This diagram is for the Tyco connectors that are plugged into the Haltech CAN hub:

Pin#	Function	Color
1	Ground	Black
4	12V Out	Red
2,3,6	CAN Low	Green
7,8	CAN High	White

CRIMP PIN TO WIRE AND THEN INSERT INTO BACK OF PLUG
WITH THE PIN LOCKING TAB IN THE UNLOCK POSITION.
PUSH DOWN TO LOCK PIN IN PLACE

LOCK

UN-LOCK

Elite DTM06 Connector:

DTM06-4S

Deutsch 4pin connector:
1- 12v
2- Ground
3- CAN High
4- CAN Low

Make sure you select which CAN port you are using in ESP

If you are running a Nexus ECU or an Elite ECU on Nexus software, you will need to go into the Nexus software and activate the CAN data transmission to the gauge. Go into the connections menu and check the circle for "Haltech CAN Supported Dash".

LINK G4 Integration

Software Configuration:

You will need the bti_gauges.lcs file which can be downloaded from:
http://www.btigauges.com/link--vipec.html (bottom of the page)
(This file may be found on the Link / Vipec product page at the bottom).

Drop this file into the CAN directory that typically resides at:
C:\Link G4\PCLink G4+\CAN

Open the Link or Vipec software and proceed to ECU Controls / CAN Setup:
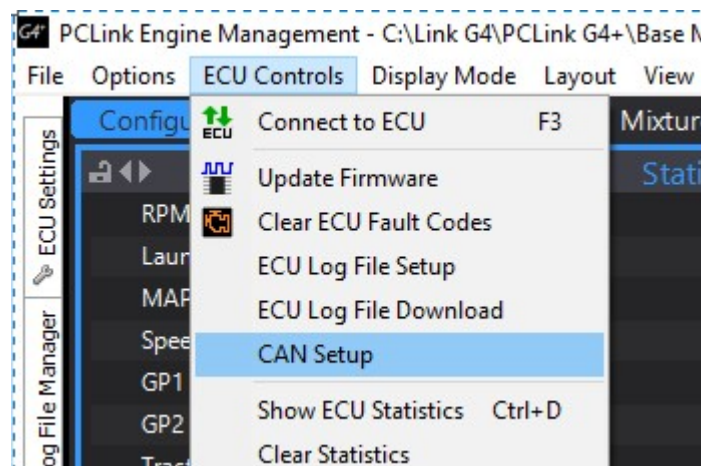
Select the CAN channel that you will be using. " CAN1" or "CAN2" (Drop in ECUs may be using "CAN 2" if that connector is used for switched power.)
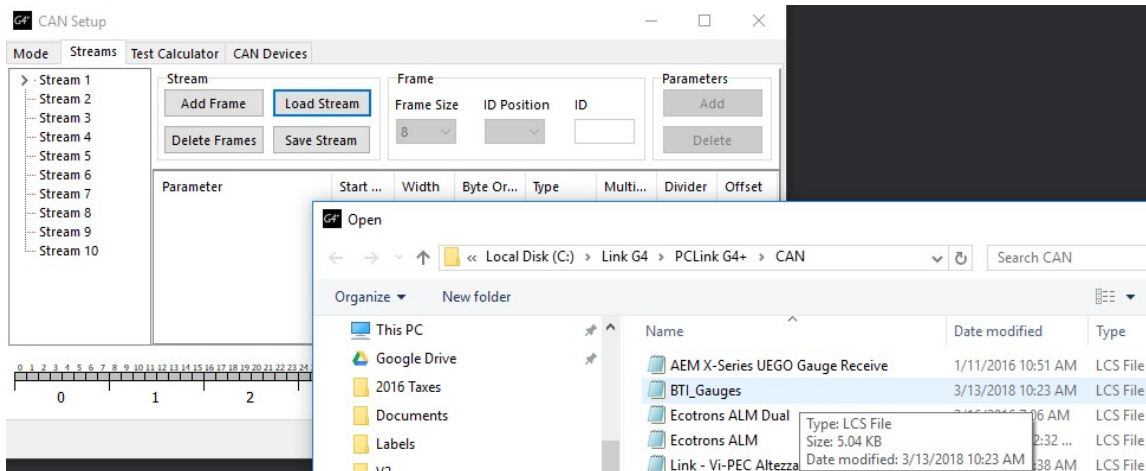Under the Mode tab, ensure that Mode is set to "User Defined", Baud Rate is   "1 Mbit/s" OBD is OFF.
Ensure that Channel 1 is set to "Transmit User Stream 1, CAN ID = 1000, and set the Format to Normal.
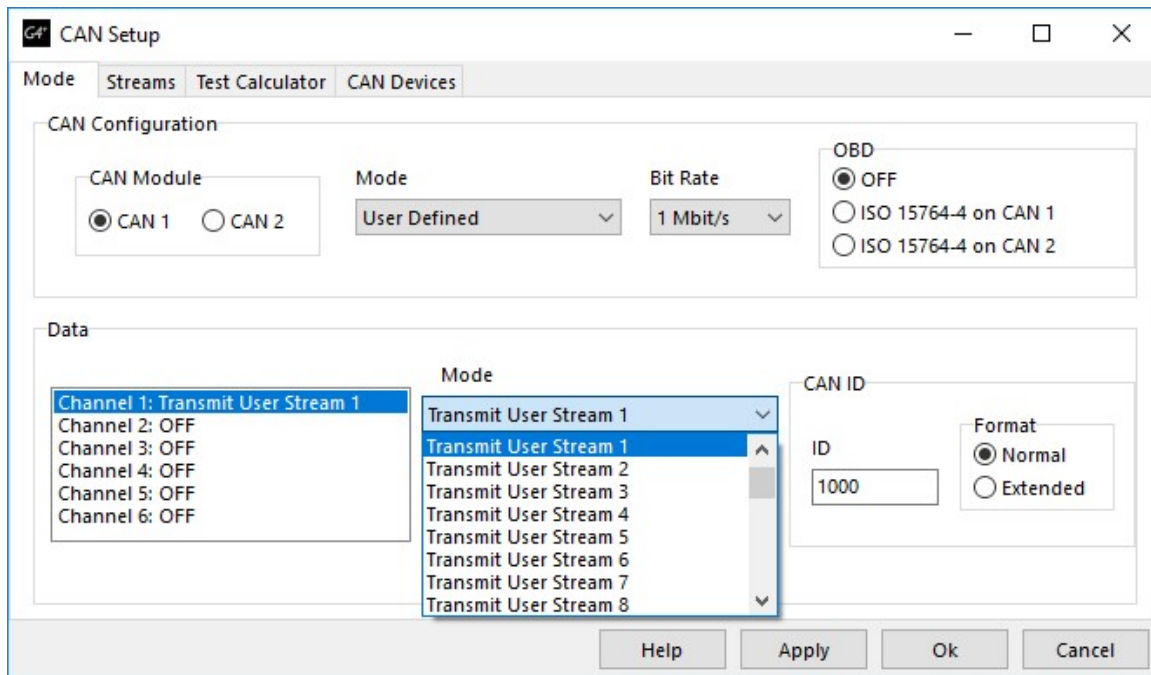
Ensure that the "Transmit Rate" is set to "20 Hz"
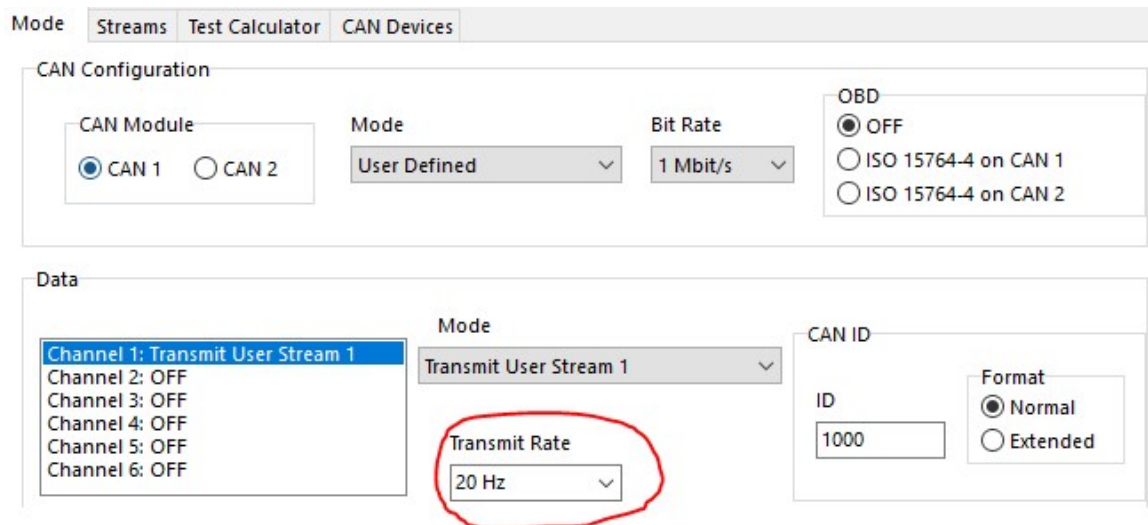
Proceed to the "Streams" tab, select "Stream 1" in the left hand pane and click "Load Stream". Select the BTI_Gauges LCS file.

Click "Apply" and "OK" to finish the setup.
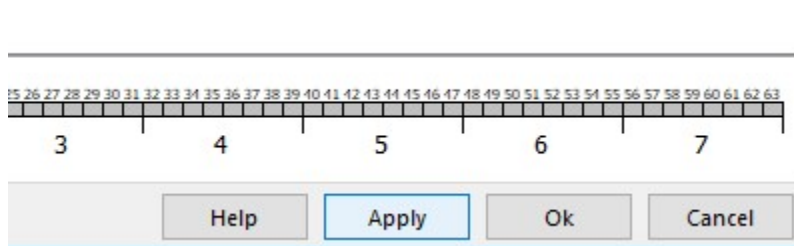
Plug and Play harness installation:

Wiring Instructions

The Link / Vipec integrations are available with three different cable options:

1. 6 Pin Amphenol connector

2. Plug and Pin harness that must be pinned into the main ECU connector

3. Drop in ECU header connector

6 Pin Amphenol connector:

CAN_F Pinout
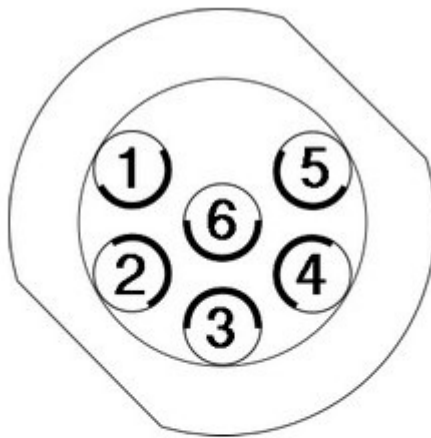**looking into back of connector**

Pin	Colour	Function
1	Brown	Ground
2	Blue	NC
3	White	CAN H
4	Green	CAN L
5	Yellow	ECU RS232 TX
6	Grey	ECU RS232 RX

Notice that the red wire in the harness must be terminated to a switched on 12 volt power source.
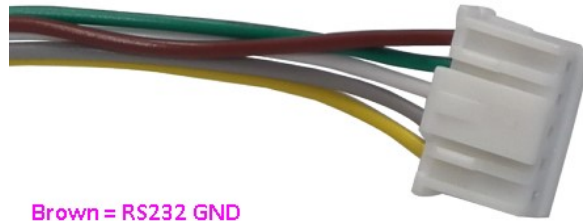
Plug and Pin termination:

Viewed looking into ECU header (or wire side of loom connector)
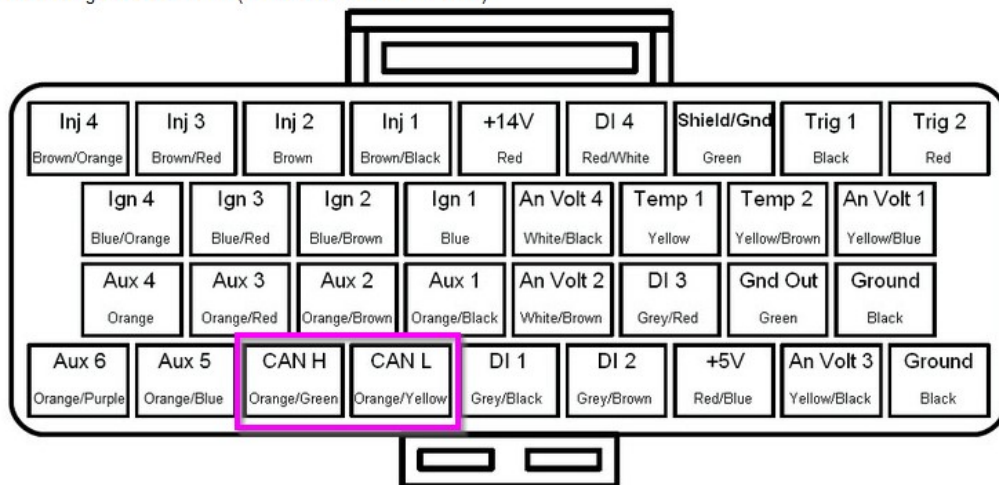
Drop-in ECU Connector:

This cable plugs directly into the 5 pin header CAN 1 or CAN 2 header on the circuit board:

Brown = RS232 GND
Green = CAN L
White = CAN H
Grey = RS232 Rx
Yellow = RS232 Tx

CAN bus 1 uses a 5 pin connector and is labeled on the ECU as 'CAN 1/RS232'.
If using this connector for CAN ensure the cable being used doesn't have Serial wires connected as this can act as an aerial and prevent USB communications from working.

CAN 1/RS232 Connector		
Pin	**Function**	**Colour**
1	Comms GND	Brown
2	CAN1 L	Green
3	CAN1 H	White
4	RS232-RX	Grey
5	RS232-TX	Yellow

CAN bus 2 uses a 5 pin connector and is labeled on the ECU as 'CAN 2/OBD'.

CAN 2/OBD Connector		
Pin	**Function**	**Colour**
1	GND	Brown
2	CAN2 L	Green
3	CAN2 H	White
4	NC	Grey
5	+14V	

To learn more about CAN see PCLink help.

Notice! The Drop-in ECU connectors only have power on the "CAN 2" connector. There will be a RED wire coming off of the connector that must be terminated to a switched on power source. This may be used on the CAN 2 connector with the included pigtail or CAN 1 may be used but the red wire will need to be removed from the connector or cut and wired into a 12 volt switched ignition source.

MoTeC M1 Integration

MoTeC M130 Connector Pin-out:

B17	CAN_HI	CAN Bus 1 High
B18	CAN_LO	CAN Bus 1 Low
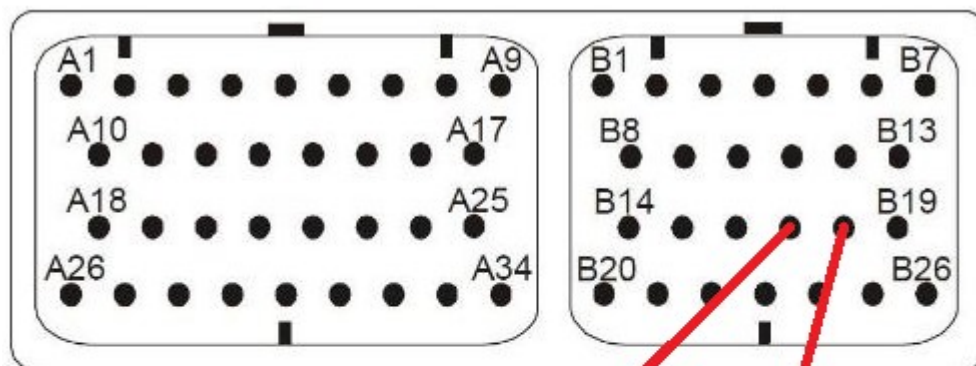
B17 CAN High (white)

B18 CAN Low (green)

MoTeC M142 and M150 Pin-out:

D17	CAN1_HI	CAN Bus 1 High
D18	CAN1_LO	CAN Bus 1 Low
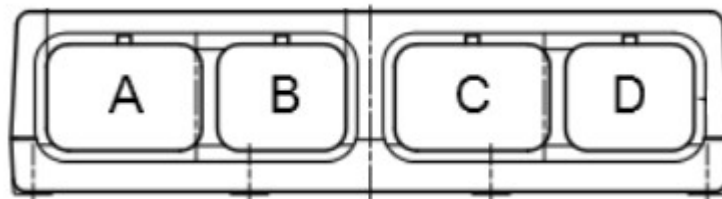
MoTeC M170 Pin-out:

| A31 | CAN_LO | CAN Bus 1 Low |
| A40 | CAN_HI | CAN Bus 1 High |

A
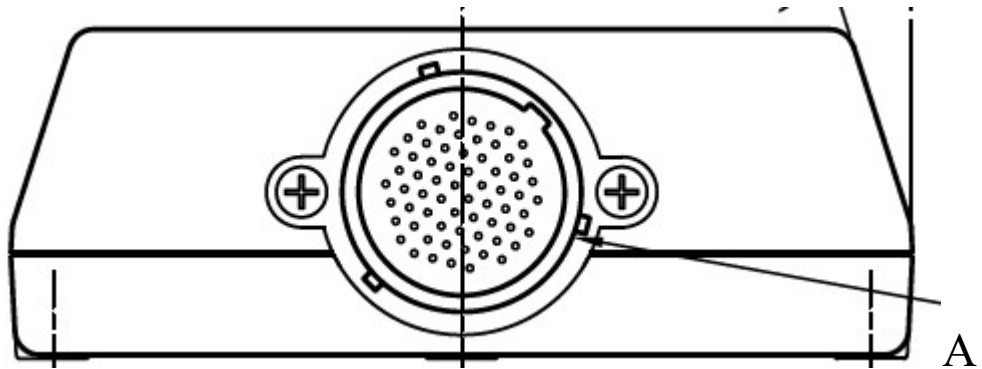
MoTeC M182 & M190 Pin-out:

| C24 | CAN1_HI | CAN Bus 1 High |
| C31 | CAN1_LO | CAN Bus 1 Low |

A   B   C
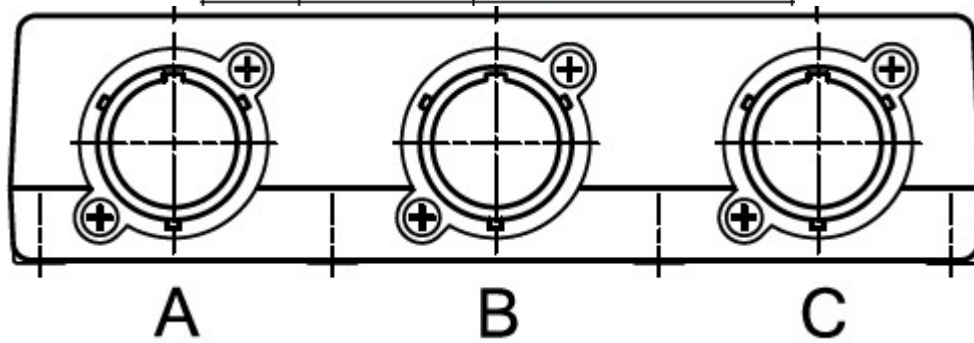
Making the connections:

The terminations to the Motec CAN bus are relatively simple as it only consists of two wires: CAN High and CAN Low. These connections can be soldered to the CAN bus or you may use the supplied 3M T-Tap connectors.

Note that the Yellow 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.
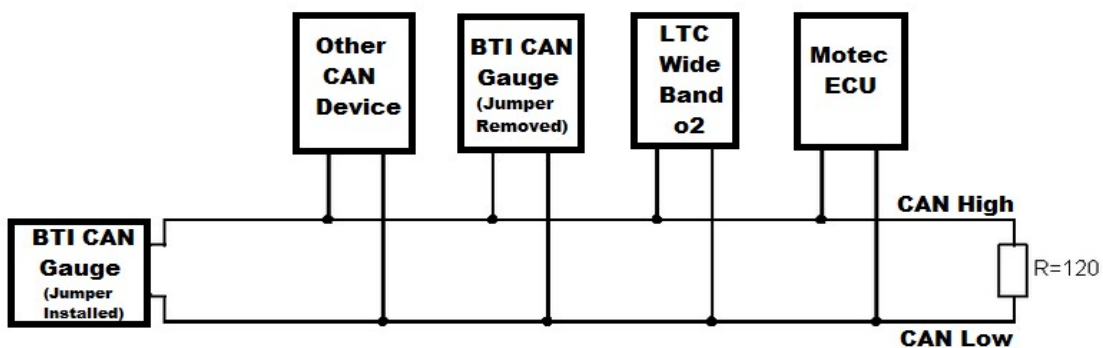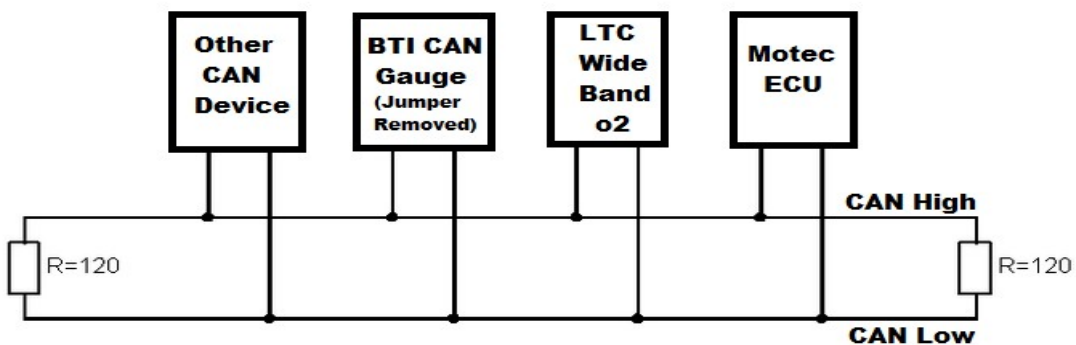
Upon powering up a properly terminated gauge, the Gauge will display the interface and version number.
M1 CAN bus options:
This gauge is designed to read the O2 sensor data from an LTC wideband controller.
The gauge will look for sensor #1 data on 0x460 and sensor #2 data on 0x461 which should be default values. In the event that you do not have an LTC, some of the more popular packages will output the analog O2 sensor data on the first byte of 0x651.
The gauge will look for O2 sensor #1 data there if no LTC modules are detected.

Torque and Horsepower are not standard parameters in the M1 CAN protocol. The John Reed package outputs this data on CAN address 0x647 and this display is designed to read those parameters.
Horsepower is a 16 bit word starting at byte 0 where one bit = .1 Watt. Torque is a 16 bit word starting at byte 16 where one bit = 1 Nm.

ProEFI Integration

ECU Connections:

ProEFI 48:

Install a Blue T-Tap or solder wire B17 and plug in the Black ground wire form the 10 foot gauge cable.
Install a Blue T-Tap or solder wire B08 and plug in the Red power wire form the 10 foot gauge cable.
Install a Red T-Tap or solder wire B21 and plug in the Green CAN low wire form the 10 foot gauge cable.
Install a Red T-Tap or solder wire B20 and plug in the White CAN high wire form the 10 foot gauge cable.

ProEFI 48

Pin 1

Switched +12V (Red)
B8

Plug A   Plug B   Pin 24

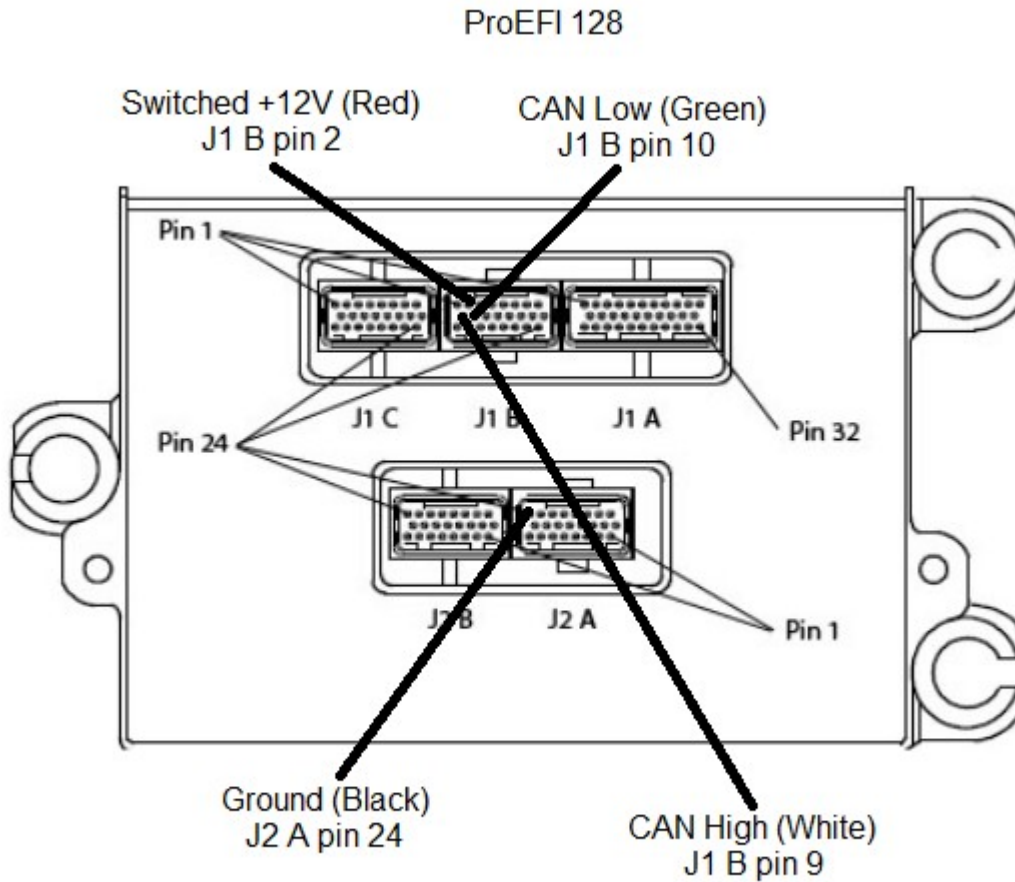Ground (Black)   CAN High (White)
B 17   B 20

CAN Low (Green)
B 21
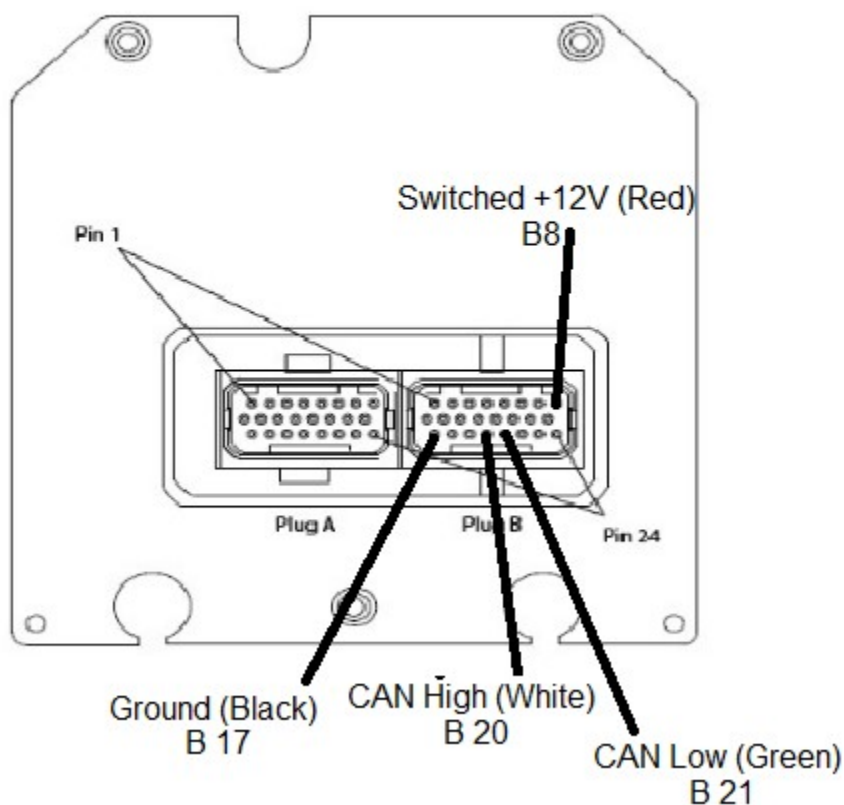
Install the T-Tap or solder wire J2 – A24 and plug in the Black ground wire form the 10 foot CAN gauge cable.
Install the T-Tap or solder wire J1- B02 and plug in the Red power wire form the 10 foot CAN gauge cable.
Install the T-Tap or solder wire J1- B10 and plug in the Green CAN low wire form the 10 foot CAN gauge cable.
Install the T-Tap or solder wire J1 B09 and plug in the White CAN high wire form the 10 foot CAN gauge cable.

ProEFI 128

Switched +12V (Red)
J1 B pin 2

CAN Low (Green)
J1 B pin 10

Pin 1

J1 C   J1 B   J1 A   Pin 32

Pin 24

J2 B   J2 A   Pin 1

Ground (Black)
J2 A pin 24

CAN High (White)
J1 B pin 9

Operation:

Gauge Setup Options:
Pressing the **Right** button **while energizing** the gauge will allow you to make the following changes:

Integration: Pressing the Integration button will allow the user to determine which ECU CAN data stream will be received and interpreted by the BTI CAN display.

Baud Rate: Select the proper baud rate used to transmit the CAN data stream by touching the speed specified. Note that having the wrong speed on the CAN bus will cause the entire CAN bus to fault causing all communications to fail.
Most integrations will use 1 Mb/s, but AEM Infinity, AEM v2 and any OBD2 communications will use 500 Kb/s.

UNITS: will allow the user to toggle between SAE and SI units. This applies to temperature,, speed, and distance.

Pressure Units will allow the user to toggle between PSI and Kpa units for all pressure parameters.

Shift Light Configuration:
Press and hold the **LEFT** button while energizing the gauge will allow for **Shift Light Configuration**.
If Shift Light by gear is not checked, only Gear 1 will be adjustable and the shift light will illuminate no matter what gear you are in.
If Shift Light by Gear is checked, touch the gear that you wish to change the shift light RPM on. That gear number will appear above the up and down arrows for verification. Use the up and down arrows to adjust the shift light RPM set-point of said gear. Press the back arrow button at the bottom right hand corner to save the settings. The shift light should flash once the settings are saved.
.
Display ECU Warnings: This setting will allow the screen to display warnings generated by some ECUs. Note that not all ECUs generate warnings.

Tire Pressure Monitoring System (TPMS):
This display is capable of monitoring TPMS over the CAN bus. Currently, either the BTI TPMS 1000, the BTI TPMS 500, or the Haltech TMS4 are compatible with this display.
The BTI TPMS 1000 or Halteh TMS4 modules are used for ECUs that comminicate at 1Mb/s baud rate. The BTI TPMS 500 is used for ECUs that comminicate at 500 Kb/s (Infinity and AEM V2 or anything tied to OBD2).
These modules must be connected to the CAN bus for BTI display operation.

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.