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BTI 3.5 and 4.3 TFT multi-integration display Installation Manual Doc version 1.4

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**

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General installation / wiring:

MKIV Supra specific installation (Series 1 only) :

- **1. Remove the 3 screws holding in the OEM clock**
 - 2. Remove the OEM Clock
- 3. Install the BTI bracket included with the 4.3 display



- 4. Attach the BTI bracket with the OEM screws. If you do not have these screws, 3 stainless steel screws are included with these display.
- 5. Mount the 4.3 display into the OEM clock hole and use the supplied brass thumb screws to secure the display to the bracket.



In the event your dash has a carbon fiber overlay, you will need spacer discs listed above (right) in order to keep the proper distance and tension on the clock mount bracket. These may be ordered at: <u>www.btigauges.com</u> These come in a pack of 3: 1mm, 2mm, and 3mm discs.



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).



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: <u>http://www.molex.com/mx_upload/family//MX123UserManual.pdf</u>

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.

R	Orientation	0.64mm Orientation	Fig. 3-4	4
	Correct Orientation Lock-out	Orientation Tab As per the AEM Infinity 8,	, 10, a	ign terminal orientation tab ith slot in grommet cap bening to install the terminal and 12 documentation:
C1-31	CANL_A_Out	Dedicated High Speed CAN Transceiver	Rec ter inf	commend twisted pair (one twist per 2") with minating resistor. Contact AEM for additional ormation.
C1-32	CANH_A_Out	Dedicated High Speed CAN Transceiver	Red ter inf	commend twisted pair (one twist per 2") with minating resistor. Contact AEM for additional ormation.
As per the	AEM Infinity 6 a	and 8h documentation:	-	•
C1-34	CANL_A_Out	Dedicated High Speed CAN Trans	sceiver	Recommend twisted pair (one twist per 2") with terminating resistor. Contact AEM for additional information.
C1-35	CANH_A_Out	Dedicated High Speed CAN Trans	sceiver	Recommend twisted pair (one twist per 2") with terminating resistor. Contact AEM for additional information.



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.

2 Pin Analog Out Connector (Brown and Blue Wires)

The termination of these two wires is dependent on the inputs that are assigned in the Infinity Tuner software. These inputs are assigned in the software under **Wizards > Advanced Setup > "ModeSwitch Input Setup" or "Traction Control Slip Target Trim Input Setup".** The Input used will be defined here. Connect the blue and brown wires to the corresponding inputs that are selected for your application. There are more details regarding this under "BOOST and PWM STEPS" below.

Notice: The gender of the 2 pin plug may be reversed on newer models in order to prevent the improper connection to the "Flash Enable" connector.

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.



AEM Infinity TRAC and BOOST PWM Steps:

Use these two buttons to configure how many steps are to be programmed in the Infinity Tuner software for Boost and Slip. Typically the scale is from 0-5 volts and the max amount of steps allowed is 7 which give you 8 settings (0-7). Example: a value of 7 here would make each step would have a value of .71 volts. A value of 1 here would give the step a value of 5 volts. It is **imperative** to view each step in the infinity tuner software when configuring this as there could be a potential difference with regard to ground.

** Note that these two settings should be configured by

competent personnel. Raising the BOOST too much or reducing the SLIP too much can have severe consequences. **

Both the Boost and Traction Control settings must be configured in the AEM Infinity Tuner software under: Wizards > Advanced Setup > "ModeSwitch Input Setup" or "Traction Control Slip Target Trim Input Setup".

It is imperative to configure these inputs correctly. This is what that setup looks like in the Infinity Tuner software: (if you are uncomfortable here, please take your vehicle to a competent shop)

Example Boost Setup:

finity-506 v96.2	and the second se				
Basic Setup A A A Can/Crank Injector Setup	Input Function Assignments Use the selections below to configure hardware Analog 0-5V & Modes Switches Speed & Free	inputs. Juency Temps Axis			
Basic Sensors	Function	Channel	Pin	Raw	Scaled
DBW Tuning	Charge Out Pressure Setup	Analog16 [V]	C1-71	5.00	345.00
Set Throttle Range	Gear Position Input Setup	GearRatio		0.00	7.03
Ignition Sync	Lambda 3 Input Setup	Disabled		0.00	0.68
Advanced Setup 🔺	Lambda 4 Input Setup	Analog10 [V]	C1-75	5.00	0.00
Accel and Decel Fuel	ModeSwitch Input Setup	ModeSwitch [V]	1	4.99	9.00
Advanced Trims 👳	Barometeric Pressure Sensor Setup	Analog10 [V]	C1-75	5.00	101.00
Boost Control	Exhaust Pressure Sensor Setup	Analog11 [V]	C1-74	5.00	101.00
Engine Protection	Traction Control SlipTargetTrim Input Setup	TC_Switch_Latched		0.00	205.00



Example Trac Setup:

Basic Setup A A Engine Tuning Preferences Cam/Crank	Input Function Assignments Use the selections below to configure hardware	inputs.				
Injector Setup	Analog 0-5V & Modes Switches Speed & Free	quency Temps Axis				
Basic Sensors	Function	Channel	Pin	Raw	Scaled	
DBW Tuning	Charge Out Pressure Setup	Analog16 [V]	C1-71	0.58	7.31	
Set Throttle Range	Gear Position Input Setup	GearRatio		0.00	7.03	
Ignition Sync	Lambda 3 Input Setup	Disabled		0.00	0.68	
Advanced Setup 🔺	Lambda 4 Input Setup	Analog10 [V]	C1-75	5.00	0.00	
Accel and Decel Fuel	ModeSwitch Input Setup	ModeSwitch [V]		0.59	1.00	
Advanced Trims	Barometeric Pressure Sensor Setup	Analog10 [V]	C1-75	5.00	101.00	
Boost Control	Exhaust Pressure Sensor Setup	Analog11 [V]	C1-74	5.00	101.00	
Engine Protection	Traction Control SlipTargetTrim Input Setup	TC_Switch_Latched		0.00	205.00	
Idle						
Input Function Assign_	(Fin Out					
Knock Setup	rin out					



** Note that all GPS, G-force and Yaw readings are derived from the AEM Vehicle Dynamics Module (<u>PN 30-2203</u>). 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 0	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: AEMer	at connector nineut

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.

		CAN1L (Green wire)	CAN1H (White wire)
EMS	Adapter p/n	LOCATION	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



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.

Adapter p/n

30-3430

30-3432

30-3432

30-3432

30-3432

EMS

30-6030

30-6050

30-6051

30-6052

CAN1L (Green wire)

LOCATION

C22

D14

D14

D14

CAN1H (White wire)

LOCATION

C21

D10

D10

D10

Figure 8: Wire-side view of pinout for 6050, 6051, 6052, 6053, and 6060 EMS

A	В	С	D
		,ՄԳԴՂ	
1 2 3 4 5 6 7 8 9 10 11 12 13	31 32333435363738	51 52 53 54 55 56	71 72737475767778798081
14 15 16 17 18 19 20 21 22 23 24 25 26	3940414243444546	575859606162	8283848586878889909192

Figure 9: Wire-side view of pinout for 6310 and 6311 EMS

ſ	1	2	1	3	4	1	ſ	_		_	1	ſ	5	6	1	7	8		41	42	4	34	4	Γ				1	45	46	47	71	7.	2	73	8 74	ł	Г			1	75	76	77
1	9	10	11	12	21:	3 1	4	15	16	17	71	8	19	20)2	12	22	3	48	49	50	5	15	25	53	54	55	56	57	58	59	78	379	8	8	82	8	384	18	5 86	8	788	89	90
	24	25		26	2	72	8	29		30	03	31	32	33	3	3	435	5	60	61		6	26	36	54		65	66	ò	67	68	91	9,	2 93	3	94	95	5	96	6 97	79	3	99	100

Figure 10: Wire-side view of Pinout for 6320 EMS

EMS-4 CAN Bus wiring:



2 Pin Analog Out Connector (Brown and Blue Wires)

The termination of these two wires is dependent on the inputs that are assigned in the AEM Tuner software. If you are using one of these gauge outputs for boost control, tie the output to the V2 "**ModeSwitch Input**". Either output may be connected to a different input on V2 (5 volt low current) or used with a 5 volt relay for Nitrous Arm / Purge or a line lock if desired. We offer both 1 channel and 2 channel optically isolated 5 volt relay for these scenarios listed on page 19 of this manual.



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:

🖋 AEMTuner v3.2 -	C:\Program Files	(x86)\AEM	AEMTu	ner\Calibr	ations\AEM Up	dates\Toyota\6100
File Edit Displa	y Tabs ECU	Logging	Tools	Wizards	Live Tracing	Help
🖄 Tuning Break	cpoints 🚫 Limit	ers 🎟 St	art Fle	Set	up Wizard	
Channels - Tuning				Set	Throttle Range	Wizard
Name	Value		U	Ign	ition Timing Sync	Wizard
Engine Speed			η	Ch	ange Injector Flo	w/Pressure
Engine Load			F	Co	nfigure Gear Rat	io Wizard
Throttle			9	Sta	ged Injection Wi	izard
Coolant Temp			F			S ANK K
Air Temp			F			S A UU

1. Now select "Telemetry: AEMNet" and click on the space under "Matched". This should insert the word "Matched" if the datastream is not linked.

zard Types:	Configuration Name	Matched	
Inton: Coll Dwell ectors: Primary ectors: Staged v Limit: 2Step v Limit: Main nsor: Air Temperature (AIT) nsor: Cam/Crank Position ((nsor: Coolant Temperature) nsor: Chaust Gas Temp (E nsor: Fuel Pressure nsor: Manifold Pressure (MAF) nsor: 02 #1 (AFR) nsor: 02 #2 (AFR) nsor: 02 #2 (AFR) nsor: Spare Pressure 1 nsor: Spare Pressure 1 nsor: Spare Pressure 2 nsor: Spare Temp 1	AEMNet Datastream	Matched	
nsor: Spare Temp 2 nsor: Vehicle Speed (VSS)	Configuration Notae		
tup: AEMNet Receive tup: Automatic Transmissior tup: Variable Valve Control emetry: AEMNet emetry: Serial	This wizard will enter in the default CAN for a CAN Datastream Gauge. WARNING: Settings from other Series firmware version, this wizard must be us	N Telemetry settings into the 2 firmware versions will not w sed if CAN telemetry will be e	calibration file A

Now that the datastream is matched, this will build the basis for the standard transmit and save some time in configuration.

 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:

🖉 AEMTuner v3.2 - (C:\Program Files	(x86)\AEM\/	AEMT	uner\Calibra	tions\AEM Up	dates\T	oyota	6100 Supra MT 3.5 Ba	r MAP.0
File Edit Display	Tabs ECU	Logging	Tools	Wizards	Live Tracing	Help			
🖄 Tuning Break	oints 🔇 Limit	ers 🌆 St	÷	Configure Ou	tputs		Fuel	🍇 Trims 🍇 Acce	
Channels - Tuning			(Configure Tel	emetry	•		Serial Telemetry	
Name	Value			Compare Wit	h Calibration			CAN Telemetry	
Engine Speed			33 (Convert Curr	ent Calibration.			CAN Receive	.9
Engine Load			F	Preferences.	Ctr	I+P	A.		
Throttle		R.		%		Ш	11X		
Coolant Temp				F		MA	HX.		

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:

				50011		
AN Te	elemetry 🗹 En	able	Speed	500 kbps	~	
AN M	essage 1 CAN Mess	sage 2 CAN Messag	e 3 CAN Me	ssage 4		
D· F	01504000		Farmet			
υ. [XUIFUAUUU		Format			
Data						
Byte 1	Channel Engine Speed	Channel Alias				
2	Used by Last Byte					
3	Engine Load					
4	Used by Last Byte					
5	Throttle					
6	Used by Last Byte					
7	Air Temp					
8	Coolant Temp					
		1				

Message 1 CAN Message 2 CAN Message 3 CAN Message 4 Ox01F0A000 Use Extended Format	
Message 1 CAN Message 2 CAN Message 3 CAN Message 4 0x01F0A000 Image: Use Extended Format ata	
0x01F0A000 Use Extended Format	
ata	
ata	
vte Channel Alias	
Engine Speed	
Used by Last Byte	
MAP Volts V	
Used by Last Byte	
Throttle	
Used by Last Byte	
Air Temp	
Air Temp Coolant Temp	
Air Temp Coolant Temp	
Air Temp Coolant Temp	
Throttle Used by Last Byte	

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

ienera			C 1	500 Julian	
AN I	elemetry 🗹 Ena	able	Speed	OUU KDPS V	
AN M	essage 1 CAN Mess	ane 2 CAN Message	3 CAN Me	eane A	
D· D	20160000		ament.		
U. [XUTFUAUUU		format		
Data					
Data Bvte	Channel	Channel Alias			
Data Byte 1	Channel Engine Speed	Channel Alias			
Data Byte 1 2	Channel Engine Speed Used by Last Byte	Channel Alias			
Data Byte 1 2 3	Channel Engine Speed Used by Last Byte ADCR02	Channel Alias MAP Volts			
Data Byte 1 2 3 4	Channel Engine Speed Used by Last Byte ADCR02 Used by Last Byte	Channel Alias MAP Volts			
Data Byte 1 2 3 4 5	Channel Engine Speed Used by Last Byte ADCR02 Used by Last Byte Throttle	Channel Alias MAP Volts			
Data Byte 1 2 3 4 5 6	Channel Engine Speed Used by Last Byte ADCR02 Used by Last Byte Throttle Used by Last Byte	Channel Alias MAP Volts			
Data Byte 1 2 3 4 5 6 7	Channel Engine Speed Used by Last Byte ADCR02 Used by Last Byte Throttle Used by Last Byte Air Temp	Channel Alias MAP Volts			

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

enera	JI			
AN T	elemetry 🗹 En	able	Speed	500 kbps V
AN M	lessage 1 CAN Mes	sage 2 CAN Message 3	CAN Mes	sage 4
D. [7	201504001	🔽 Llas Extended Form	-4	
D. [DO IFUAUU I		at	
Data				
Dara				
Byte	Channel	Channel Alias		
Byte 1	Channel Flex Fuel Content	Channel Alias Flex Fuel Freq, Flex Fue	Per	
Byte 1 2	Channel Flex Fuel Content Used by Last Byte	Channel Alias Flex Fuel Freq, Flex Fue	Per	
Byte 1 2 3	Channel Flex Fuel Content Used by Last Byte Flex Fuel Temp	Channel Alias Flex Fuel Freq, Flex Fue	Per	
Byte 1 2 3 4	Channel Flex Fuel Content Used by Last Byte Flex Fuel Temp Timing Errors	Channel Alias Flex Fuel Freq, Flex Fue	l Per	
Byte 1 2 3 4 5	Channel Flex Fuel Content Used by Last Byte Flex Fuel Temp Timing Errors Fuel Pressure	Channel Alias Flex Fuel Freq, Flex Fue	l Per	
Byte 1 2 3 4 5 6	Channel Flex Fuel Content Used by Last Byte Flex Fuel Temp Timing Errors Fuel Pressure Oil Pressure	Channel Alias Flex Fuel Freq, Flex Fue	l Per	
Byte 1 2 3 4 5 6 7	Channel Flex Fuel Content Used by Last Byte Flex Fuel Temp Timing Errors Fuel Pressure Oil Pressure EGT 1	Channel Alias Flex Fuel Freq, Flex Fue	l Per	

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

	,			
Genera	al			
CAN T	elemetry 🛛 En	able	Speed	500 kbps ~
CAN M	essage 1 CAN Mes	sage 2 CAN Messa	age 3 CAN Mes	ssage 4
ID: C	x01F0A002	Use Extended	d Format	
Data				
Data Byte	Channel	Channel Alias		
Data Byte 1	Channel O2 #1 FB Value	Channel Alias		
Data Byte 1 2	Channel O2 #1 FB Value Used by Last Byte	Channel Alias		
Data Byte 1 2 3	Channel O2 #1 FB Value Used by Last Byte O2 Target	Channel Alias		
Data Byte 1 2 3 4	Channel O2 #1 FB Value Used by Last Byte O2 Target Spare Temp 1	Channel Alias		
Data Byte 1 2 3 4 5	Channel O2 #1 FB Value Used by Last Byte O2 Target Spare Temp 1 Boost Target	Channel Alias		
Data Byte 1 2 3 4 5 6	Channel O2 #1 FB Value Used by Last Byte O2 Target Spare Temp 1 Boost Target Used by Last Byte	Channel Alias		
Data Byte 1 2 3 4 5 6 7	Channel O2 #1 FB Value Used by Last Byte O2 Target Spare Temp 1 Boost Target Used by Last Byte Fuel Inj Duty Pri	Channel Alias		

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

	al	able	Sneed	500 kbps 🗸
		IdDie	opeeu	000 1000
	ARESTA 1 CAN Mar	eane 2 CAN Meesan	a 3 CAN Mes	sage 4
). [-01E0A002		Format	
. [KUTFUAUUS		Format	
)ata				
Byte	Channel	Channel Alias		
Byte	Channel	Channel Alias		
Byte 1	Channel O2 #1	Channel Alias		
Byte 1 2	Channel 02 #1 02 #2	Channel Alias		
Byte 1 2 3	Channel O2 #1 O2 #2 Vehicle Speed	Channel Alias		
Byte 1 2 3 4	Channel O2 #1 O2 #2 Vehicle Speed Used by Last Byte	Channel Alias		
Byte 1 2 3 4 5	Channel O2 #1 O2 #2 Vehicle Speed Used by Last Byte Gear Calculated	Channel Alias		
Byte 1 2 3 4 5 5	Channel O2 #1 O2 #2 Vehicle Speed Used by Last Byte Gear Calculated Ign Timing	Channel Alias		
Byte 1 2 3 4 5 6 7	Channel O2 #1 O2 #2 Vehicle Speed Used by Last Byte Gear Calculated Ign Timing Battery Volts	Channel Alias		

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:

N Telen	netry			
Genera	ı			
CAN Te	elemetry 🗹 Ena	able	Speed	500 kbps 🛛 🗸
CAN M	essage 1 CAN Mess	sage 2 CAN Message 3	CAN Mes	ssage 4
ID. E				
ID: [0x01F0A000	Use Extended For	nat	
Data				
Byte	Channel	Channel Alias		
1	Engine Speed			
2	Used by Last Byte			
3	MAP Volts 🗸 🗸	MAP Volts		
4	MAP Volts	A		
5	Miss Time			
6	Missed			
7	Motor 1 Error			
8	Motor 1 Position Motor 1 Target			

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

ienera	al				
AN T	elemetry 🗹 En	able		Speed	500 kbps
AN M	essage 1 CAN Mess	sage 2	CAN Message 3	CAN Mes	sage 4
D:	0x01F0A000		Use Extended Fom	nat	
Byte	Channel	Chan	nel Alias		
1	Engine Speed				
2	Used by Last Byte				
3	ADCR02	MAP \	/olts		
4	Used by Last Byte				
5	Throttle				
6	Used by Last Byte				
-					
7	Air Temp				

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

CAN T	elemetry 🔽 Enable	3	Speed	500 kbps V
CAN N	lessage 1 CAN Message	e 2 CAN Message 3	CAN Mes	sage 4
ID: [x01F0A001	Use Extended Form	nat	
Ľ				
Data				
Byte	Channel	Channel Alias		
Byte 1	Channel Spare Temp 2	Channel Alias		
Byte 1 2	Channel Spare Temp 2 A/T Gear Change Rqd	Channel Alias A/T Gear Manual, A/	/T Gear O\	ver Drive, A/T Gear Ready, A/T Gear
Byte 1 2 3	Channel Spare Temp 2 A/T Gear Change Rqd A/T Gear Selector	Channel Alias A/T Gear Manual, A/	T Gear Ov	/er Drive, A/T Gear Ready, A/T Gear
Byte 1 2 3 4	Channel Spare Temp 2 A/T Gear Change Rqd A/T Gear Selector Timing Errors	Channel Alias A/T Gear Manual, A/	T Gear Ov	/er Drive, A/T Gear Ready, A/T Gear
Byte 1 2 3 4 5	Channel Spare Temp 2 A/T Gear Change Rqd A/T Gear Selector Timing Errors Fuel Pressure	Channel Alias A/T Gear Manual, A/	Т Gear Ov	/er Drive, A/T Gear Ready, A/T Gear
Byte 1 2 3 4 5 6	Channel Spare Temp 2 A/T Gear Change Rqd A/T Gear Selector Timing Errors Fuel Pressure Oil Pressure	Channel Alias A/T Gear Manual, A/	T Gear Ov	/er Drive, A/T Gear Ready, A/T Gear
Byte 1 2 3 4 5 6 7	Channel Spare Temp 2 A/T Gear Change Rqd A/T Gear Selector Timing Errors Fuel Pressure Oil Pressure EGT 1	Channel Alias A/T Gear Manual, A/	T Gear Ov	/er Drive, A/T Gear Ready, A/T Gear

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

rielei	metry			
Genera CAN T	al Telemetry 🗹 En	nable	Speed	500 kbps V
CAN M	lessage 1 CAN Mes	sage 2 CAN Message 3	CAN Mes	ssage 4
ID: T	01504002		nat	
. L	DKUTFUAUU2		nat	
_				
Data				
Data Byte	Channel	Channel Alias		
Data Byte 1	Channel O2 #1 FB Value	Channel Alias		
Data Byte 1 2	Channel O2 #1 FB Value Used by Last Byte	Channel Alias		
Data Byte 1 2 3	Channel O2 #1 FB Value Used by Last Byte O2 Target	Channel Alias		
Data Byte 1 2 3 4	Channel O2 #1 FB Value Used by Last Byte O2 Target Spare Temp 1	Channel Alias		
Data Byte 1 2 3 4 5	Channel 02 #1 FB Value Used by Last Byte 02 Target Spare Temp 1 Boost Target	Channel Alias		
Data Byte 1 2 3 4 5 6	Channel O2 #1 FB Value Used by Last Byte O2 Target Spare Temp 1 Boost Target Used by Last Byte	Channel Alias		
Data Byte 1 2 3 4 5 6 7	Channel O2 #1 FB Value Used by Last Byte O2 Target Spare Temp 1 Boost Target Used by Last Byte Fuel Inj Duty Pri	Channel Alias		

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".

CAN T	elemetry 🗹 En	able		Speed	500 kbps
AN M	lessage 1 CAN Mes	sage 2	CAN Messa	ge 3 CAN M	essage 4
ID: (0x01F0A003		Use Extended	Format	
D					
Data					
Byte	Channel	Chann	el Alias		
Data Byte 1	Channel O2 #1	Chann	el Alias		
Byte 1 2	Channel O2 #1 O2 #2	Chann	el Alias		
Byte 1 2 3	Channel O2 #1 O2 #2 Vehicle Speed	Chann	el Alias		
Byte 1 2 3 4	Channel O2 #1 O2 #2 Vehicle Speed Used by Last Byte	Chann	el Alias		
Byte 1 2 3 4 5	Channel O2 #1 O2 #2 Vehicle Speed Used by Last Byte A/T Gear ~	Chann	el Alias		
Byte 1 2 3 4 5 6	Channel O2 #1 O2 #2 Vehicle Speed Used by Last Byte A/T Gear ~ Ign Timing	Chann	el Alias		
Data Byte 1 2 3 4 5 6 7	Channel O2 #1 O2 #2 Vehicle Speed Used by Last Byte A/T Gear ~ Ign Timing Battery Volts	Chann	el Alias		

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.

AN M	essage 1 CAN Mes	sage 2 CAN Message 3 CAN Message 4
D		
	x01F0A000	Use Extended Format
Data		
Byte	Channel	Channel Alias
1	Engine Speed	
2	Used by Last Byte	
3	ADCR02	MAP Volts
4	Used by Last Byte	
5	Throttle	
6	Used by Last Byte	
7	Air Temp	
8	Coolant Temp	

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 F	ailed: Abort=(Quit, Retry=Debug, Ig	nore=Continue		
g 🚫	at AEM.Sha at 0.A.0(Htr at 0.A.Gene at AEM.AEM at System.V at System.V at System.V at System.V at System.V	red.Calibration.CCali nlTextWriter, CANTe rateHTMLReport(CA 4TunerUI.CANTelem Vindows.Forms.Cont Vindows.Forms.Butto Vindows.Forms.Cont Vindows.Forms.Cont Vindows.Forms.Cont	brationItemDef.GetUsed lemetrySettings , String NTelemetrySettings sett etryForm.h(Object , Eve rol.OnClick(EventArgs e) m.OnMouseUp(Mousea rol.WmMouseUp(Messa rol.WmMroc(Message& mBase.WndProc(Message	dScalar(CCalibration pCalibrat , Int32 , String , Boolean) ings) ntArgs) :) :ventArgs mevent) age& m, MouseButtons butto : m) ge& m)	tion) n, Int32 clicks)
		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	
'() indic	ates 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 [Ish]							

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:

E Flex Fuel		
🗄 法 Other	📃 Ext. port - EMU CAN Da	ta 🗖 🗖 🖾 🛛
Timers		
🖃 🎥 Ext. port		
General	EMU CAN Data	
EMU CAN Data	ID 0x600	1536
	ID 0x601	1537
	ID 0x602	1538
	ID 0x603	1539
	ID 0x604	1540
	ID 0x605	1541
	200 350	🗞 🕄 6.0 الم.0 🐑

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.



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.

	1 = = 4 = = 27 = =		= 1 3		1 • • •	
5 5	1	Ignition coil #5	14	Ignition coil #4	27	Power Ground
8.5	2	EGT in #1	15	EGT in #2	28	Ecu Ground
ñğ	3	Knock Sensor in #1	16	Knock Sensor in #2	29	Sensor Ground
Χō	4	Analog In #2	17	Analog In #3	30	Analog In #4
o a	5	CLT In	18	TPS In	31	Analog In #1
m	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:



ECM keyboard PMU keyboard

> 🚺 Log Gauges

>

Double clicking on the ECM switch board will yield the following options:



CAN, Serial - ECM switch bo	ard 🗖 🗖 🔀
ECM switch board	
Enable	
Enable Ain#1 (@AIN CAN#7)	
Enable Ain#2 (@AIN CAN#8)	
Switch 1	CAN SW1
Switch 1 type	Non latching
Switch 1 LED	None
Switch 2	CAN SW2
Switch 2 type	Non latching
Switch 2 LED	None
Switch 3	CAN SW3
Switch 3 type	Non latching
Switch 3 LED	None
Switch 4	CAN SW4
Switch 4 type	Non latching
Switch 4 LED	None
Switch 5	CAN SW5
Switch 5 type	Non latching
Switch 5 LED	None

NOTE: The default CAN address for the ECU switch board is 0x666 in HEX or 1638 in decimal. The CAN transmit address is entered by pressing the yellow cog wheel on the CAN transmission screen.



The CAN Transmit data stream is as follows:

Analog Input CAN # 7 : Boost steps in millivolts. Analog Input CAN # 8: Traction control slip steps in millivolts. CAN Switch 1: Rolling Antilag CAN Switch 2: Launch Control CAN Switch 3: Nitrous CAN Switch 4: Flat Shift CAN Switch 5: Traction Enable / Disable

Example Configurations in the EMU software. Note that tuning strategies may differ and require additional configuration to complete the setup. BT Innovations, LLC will not be held responsible for tuning configurations or damage caused by misusing said tuning configurations

Note that the CAN value comes in as a voltage and the peak voltage is 5 volts. The Boost PWM steps and Trac PWM steps will determine how many positions will be used and the voltage value for each position will be the total of 5 volts divided by the number of steps.

> 🍬 Fueling > 🔒 Ignition	Boost - Parameters	_ • •
> 👩 Knock sensors		
> 🕘 Idle	Parameters	
> / Outputs	Enable boost control	✓
Parameters	Boost control type	Open loop
PID parameters	Solenoid output	Aux 1 (5A, G21)
Gears scale #1	Invert output	
Gears scale #2	Solenoid frequency	30 Hz
🥁 Boost tbl. blend	Solenoid min DC	15 %
Boost blend cal.	Solenoid max DC	85 %
VSS scale	Disable output under	100 kPa
IAT scale	Boost switch type	Blend tables
CLT scale	Boost switch/blend input	Analog input CAN#7 🗸 🗸
EGI scale	Disable solenoid input	None
DC ref #1	MAP based DC REF table	
DC ref #2		





CAN SW4	\sim
5500 RPM	
100 %	
0 %	
0 deg	
0 km/h	
0 %	
0 ms	
	CAN SW4 CAN SW4 5500 RPM

 Diff control Gear Cut 	Nitrous - Parameters	
> Launch ctrl.	🖻 🔒 🗖 🛛	
> Pit limiter	Parameters	
	Nitrous control active	
Parameters	Activation input	CAN SW3
🚘 Fuel add.	Activation output	None
Ignition mod.	Activate min. load	90 kPa
E Fuel scale	Deactivate max. load	160 kPa
> 🐧 Flex Fuel	Reactivate load	140 kPa
> 🗑 Engine protection	Activate min. RPM	3000 RPM
> O Timers	Deactivate max. RPM	7000 RPM
> K Other	Reactivate RPM	6000 RPM
Serial	Activate TPS	85 %
CAN	Deactivate TPS	75 %
ECM switch board	Activate VSS	0 km/h
ECM keyboard	Minimal gear	0
PMU keyboard	Minimal CLT	60 °C
> 🚺 Log	Disable during LC	
> 🕲 Gauges	Disable during FS	

Troubleshooting tips for CAN transmissions:

In order to verify the ECU is receiving the CAN transmissions from the touch screen, use the logging screen to setup logs for Analog CAN #7, Analog CAN #8, CAN Switches 1-5



EMTRON configuration:

Software Configuration:

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

 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.*

🔤 EMtu	ine							
File	Tuning	Config	Diagnostics	Loggi	ng Utilites	Live Data	Help	
E <u>n</u> gine S	Setup Fue <u>l</u>	Ignition	C <u>h</u> annels I	Functi <u>o</u> ns	Communic <u>a</u> tion	5		
CAN Bu	ıs 1 Setup							
CAN 1	Baud Rate					1 Mb	ps	0: 1 Mbps 1: 500 kbps 2: 250 kbps
2. 3	Select a	Channe	el with CA	N1 or C/	AN2			2.230 Kups

- 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

🖼 EMtune			
File Tuning	Config	Diagnostics Logging Utilites Live Data Help	
E <u>ng</u> ine Setup Fue <u>l</u>	Ignition	C <u>h</u> annels Functi <u>o</u> ns Communic <u>a</u> tions	
CAN 1 - Channel 1			
Enable		ON	0: OFF
DATA Set		Pre-defined Tx Data Set 1	1: UN
CAN Base Address		1250	
Addressing		Sequential (11-BIT)	(4.)
Direction		Receive & Transmitt	Enable
Transmit Rate		20 Hz	Press F1 for Help

Plug and Pin termination:

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



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

Gauge side wiring:

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

Table 3.0. ETC4 Power and CAN Deustch Connector Pinout

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:



The data stream is as follows:

HEX CONVERSION:

0x 578

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



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.

Positi	Parameter		^	Group	First Byte	Multi	Offset	
1	CAN AN Volt 1	1		Voltage (V)	ISB V	1.000	0.000	
2	CAN AN Volt 2	578h		voltage (v)				
3	CAN AN Volt 3		EGT (°C)	EGT (°C)	LSB 🗸	1.000	0.0	
4	CAN AN Volt 4	۷.		Frequency (Hz)	ISB V	1.000	0.0	
5	CAN AN Volt 5	1		requercy (nz)				
6	CAN AN Volt 6	579h		Distance (m)	LSB 🗸	1.000	0	
8	CAN AN VOIL 7			Speed (kph)	LSB 🗸	1.000	0.0	
9	CAN AN Volt 9				LCD	1.000		
10	CAN AN Volt 10			Lambda (La)	LSB V	1.000	0.000	
11	CAN AN Volt 11			E STATE DE STATE				
12	CAN AN Volt 12			Function Description				
13	CAN AN Volt 13			CAN Receive Dataset 1				
14	CAN AN Volt 14							
15	CAN AN Volt 15							
16	CAN AN Volt 16							
1/								
10								
12			*					
Add	Delete	Move U	р					
	Delete All	Move Dov	wn					

hannel						
Name	Lau	unch Enable Switc	h			
Abre <u>v</u> iatio	n Lch	hENSw				
Input <u>S</u> ou	rce CA	N Voltage 2				
Sensor T O Mag O Hall O Mor	ngs ype gnetic I mentary tch	Active Edge Rising Falling Both Off	<u>F</u> ilter 0			
Arming Thr	esholds					
Arming Three	esholds I Mode:	2 Point		~		
Arming Thre Threshold 2 Point	esholds I Mode:	2 Point		~		
Arming Thre Threshold 2 Point On	esholds I Mode: Greater	2 Point Than ∽	0.000 V	~		
Arming Thre Threshold 2 Point On Off	esholds I Mode: Greater Less Tha	2 Point Than V	0.000 V 0.001 V	~		
Threshold 2 Point On Off	esholds I Mode: Greater Less Tha	2 Point Than V	0.000 V 0.001 V	~		

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



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



Elite DTM06 Connector:



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 > "CAN" > "Haltech CAN System" and check "Dash"> "Generic Dash".

Generics Connections	Connections - CAN - Haltech CAN System				
I CAN	Displays				
Vehicle CAN System	🔘 Dash				
Haltech CAN System Wi-Fi	Dash Type	Generic Dash			

Output options for Haltech:

In the past, we were limited to using the two built-in analog outputs to control functions in the ECU, but as of firmware revision: 1.8.7.0 we can now output to the ECU over the CAN bus with 4 user defined outputs.

Using the user defined CAN outputs:

1. Touch the Settings cog wheel and touch the "Config Info" button.



2. Select the "CAN output" option:

Now touching a Boost target hotspot will forward you to the user defined CAN output screen instead of the standard analog output screen. You may also just select the CAN output screen in the screen selector as well.





The Haltech CAN output looks as follows:

Touching the yellow cog wheel will allow you to Set up the CAN output name, the number of steps, and whether that output is saved to memory for when the vehicle is turned off and re-started. Below each of the 4 outputs shows what step you are on vs how many steps are available. 0 / 0





The name may be 6 characters.

The number of steps determines what the value of voltage is transmitted to the ECU. The max value of Volts is 5 volts. In the first example: 5 steps will yield a value of 1 volt per step. The "Memory" bit will determine if that value is stored in the gauge when the vehicle is restarted. In the first example you may wish to keep the boost target when the car is started verses un-checking that bit may revert the boost target to the

waste gate when the vehicle is restarted.

This output is transmitted as a Haltech Input/Output expander box. Haltech has the option for 2 of those boxes. (I/O #1) and (I/O #2). Select the channel you wish to use and do the same in the Haltech software:

DTC Severity is not used.

Input/Output Expander Boxe	5	
💽 I/O Expander 12 (Box A)		
Description	BTI Gauge	
DTC Severity	None	-
I/O Expander 12 (Box B)		
Description		

The CAN values will now be transmitted into the Haltech ECU as voltage and may be viewed when configuring the inputs.

In our example we setup a rotary switch and tied the input to the "Wiring" of IO A AVI 1. When "Assigning" the input, the raw voltage of the input voltage may be verified in order to configure the steps when building your boost table in this example.

Name	Boost up/down	
State/Switch/Button Input	Settings	
input Style	Single Input	•
Max Position	2	
Max Position Input Light Mode	Dot	

Engine Configuration Sensors	Sensors - Rotary 1	rim Module 1 - Wiring			
Manifold Pressure	Options				
Intake Air Temperature Coolant Temp Bias	Input Type	Analogue - Voltage			
Coolant Temperature	Connections				
 Knock Detection Wideband O2 	Input		Assign	IOA AVI 1	
🚽 Boost up/down (Rotary Trim Module			Clear		[O/G], P20
Calibration	Pull Up				
Wiring	Disable	¥ 17			

Pictured below is an example of the input selection from the gauge when the ECU is connected to the software. Note that the voltage output from the gauge is visible on the input

re	Analogue Volta	Analogue Voltage Inputs on I/O Expander Box A (BTI Screen) :						
tion	0	[O/G], P20	IOA AVI 1	1.02 V) Off				
Rotary Trir		[O/B], P19	IOA AVI 2	0.00 V Off				
		[O/R], P18	IOA AVI 3	0.00 V Off				
		[O/I], P17	IOA AVI 4	0.00 V Off				

In our example we then tied the Boost up / down rotrary switch that we previously configured as one of Axis used by our boost table.

osition)			RPN	1 (RPM)					
	2000	3000	4000	5000	6000	7000	8000		
5	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
4	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
3	10.2	Boost (Control Ta	rget Pres	sure : Tab	le Axis Se	tup		
2	10.2								
1	10.2	(En	able Axis	RPM				Select	w
0	10.2								
		Valu	es: RPM						
		2000	3000	4000	5000	6000	7000	8000	
		🔘 En	able Axis	Boost u	p/down			Select	W
		Valu	es: Positio	n					
		Valu	es: Positio	n	2	4	E		



output for channel #1

2 Pin Analog Out Connector (Brown and Blue Wires) (Not needed if you are using the CAN transmission listed above) The termination of these two wires is dependent on the inputs that are assigned in the Haltech Tuner software. These two outputs may be configured for **Boost Control and Traction Control** or may be used for **Nitrous arm and Purge** if that option is selected in the settings screen Either output may be connected to a different ECU input (5 volt low current) or used with a 5 volt relay for Nitrous Arm / Purge if desired.



analog or

switched output for channel #2

> Use these two buttons to configure how many steps are to be programmed in the Infinity Tuner software for Boost and Slip. Typically the scale is from 0-5 volts and the max amount of steps allowed is 7 which give you 8 settings (0-7). Example: a value of 7 here would make each step would have a value of .71 volts. A value of 1 here would give the step a value of 5 volts. It is **imperative** to view each step in the infinity tuner software when configuring this as there could

be a potential difference with regard to ground.

** Note that these two settings should be configured by competent personnel. Raising the BOOST too much or reducing the SLIP too much can have severe consequences. **

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.

le	Streams	Test Calculator	CAN Devices					
AN	Configurat	tion						
	CAN Modu		Mode	Bit Pate		OBD		
	CANIMOUU		Mode	Die Ruce		Outo		
(CAN 1	O CAN 2	User Defined	✓ 1 Mbit/s	· ~	O ISO 1	5764-4 on	CAN 1
						O ISO 1	5764-4 on	CAN 2
ata			Mode			CANUD		
ata Cha	nnel 1: Tra	nsmit User Stream	Mode Transmit User Str	ream 1	~	CAN ID	- 50	mat
ata Cha Cha	nnel 1: Tra nnel 2: OF nnel 3: OF	nsmit User Strear F	Mode Transmit User Str Transmit User Str	ream 1 ream 1	~	CAN ID	Fo	rmat
ata Cha Cha Cha	nnel 1: Tra nnel 2: OF nnel 3: OF nnel 4: OF	nsmit User Strear F F	Mode Transmit User Str Transmit User Str Transmit User Str	ream 1 ream 1 ream 2	~	CAN ID	Fo	rmat Normal
ata Cha Cha Cha Cha	nnel 1: Tra nnel 2: OF nnel 3: OF nnel 4: OF nnel 5: OF	nsmit User Strear F F F	Mode Transmit User Str Transmit User Str Transmit User Str Transmit User Str Transmit User Str	ream 1 ream 1 ream 2 ream 3	~	CAN ID ID 1000	Fo	rmat Normal Extended
Cha Cha Cha Cha Cha Cha	nnel 1: Tra nnel 2: OF nnel 3: OF nnel 4: OF nnel 5: OF nnel 6: OF	nsmit User Strear F F F F	Mode Transmit User Str Transmit User Str Transmit User Str Transmit User Str Transmit User Str	ream 1 ream 1 ream 2 ream 3 ream 4	~	CAN ID ID 1000		rmat Normal Extended
Cha Cha Cha Cha Cha Cha	nnel 1: Tra nnel 2: OF nnel 3: OF nnel 4: OF nnel 5: OF nnel 6: OF	nsmit User Strear F F F F	Mode Transmit User Str Transmit User Str Transmit User Str Transmit User Str Transmit User Str Transmit User Str Transmit User Str	ream 1 ream 1 ream 2 ream 3 ream 4 ream 5	~	CAN ID ID 1000		rmat Normal Extended
cha Cha Cha Cha Cha Cha	nnel 1: Tra nnel 2: OF nnel 3: OF nnel 4: OF nnel 5: OF nnel 6: OF	nsmit User Strear F F F F	Mode Transmit User Str Transmit User Str	ream 1 ream 2 ream 3 ream 4 ream 5 ream 6 ream 7	~	CAN ID ID 1000	Fo	rmat Normal Extended

Ensure that the "Transmit Rate" is set to "20 Hz"

	CAN Module	Mode	Bit Rate	OBD OFF
	● CAN 1 ○ CAN 2	User Defined V	1 Mbit/s 🗸 🗸	○ ISO 15764-4 on CAN 1 ○ ISO 15764-4 on CAN 2
ata	nnel 1: Transmit User St	Mode		CAN ID
Cha	12.055	Transmit User Stream 1	~	Format
Cha Cha Cha Cha	innel 2: OFF innel 3: OFF innel 4: OFF			Normal

Proceed to the "Streams" tab, select "Stream 1" in the left hand pane and click "Load Stream". Select the BTI_Gauges LCS file.

G4 CAN Setup				- 🗆 ×		
Mode Streams	Test Calculator CAN Device:	5				
> Stream 1	Stream	Frame		Parameters		
Stream 2	Add Frame Loa	d Stream Frame Size ID Position	ID	Add		
Stream 3 Stream 4 Stream 5	Delete Frames Sav	8 V		Delete		
Stream 6 Stream 7	Parameter	Start Width Byte Or Type	Multi	Divider Offset		
Stream 8 Stream 9		G4" Open				
Stream 10		$\leftarrow \rightarrow \vee \uparrow$ _ « Local Disk (C:) → Link G	4 > PCLink G4+ > CAN	✓ ひ Search CAN	
		Organize 🔻 New folder				== -
		This PC	* ^	Name	Date modified	Туре
0123456789	10 11 12 13 14 15 16 17 18 19 20 21 22 23 2	🔥 Google Drive	*	AEM X-Series UEGO Gauge Receive	1/11/2016 10:51 AM	LCS File
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 2	2016 Taxes		BTI_Gauges	3/13/2018 10:23 AM	LCS File
		Documents		Ecotrons ALM Dual Type: LCS File	parcontemp6 AM	LCS File
		Labels		Ecotrons ALM Size: 5.04 KB	2:32	LCS File
		V2		Link - Vi-PEC Altezza Date modified	: 3/13/2018 10:23 AM 38 AM	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:



Notice that the red wire in the harness must be terminated to a switched on 12 volt power source.

Plug and Pin termination:

_						피			
Inj Brown/0	j 4 Inj Orange Brown	j 3 In n/Red Br	ij 2 In _. own Brown	j 1 +1 /Black R	4V DI Red Red/	4 Shie White G	I d/Gnd Tr i _{reen Bl}	ig 1 lack	Trig 2 Red
	Ign 4 Blue/Orange	Ign 3 Blue/Red	lgn 2 Blue/Brown	Ign 1 _{Blue}	An Volt 4 White/Black	Temp 1 Yellow	Temp 2 Yellow/Brown	An Volt Yellow/Blu	1 e
	Aux 4 Orange	Aux 3 Orange/Red	Aux 2 Orange/Brown	Aux 1 Orange/Black	An Volt 2 White/Brown	DI 3 Grey/Red	Gnd Out _{Green}	Ground Black	i.
Au: Drange	x 6 Aux	x 5 CA e/Blue Orang	NH CA e/Green Orange	NLD /Yellow Grey/	l 1 D /Black Grey/I	2 H Brown Re	H5V An V d/Blue Yellov	/olt 3 G w/Black	Black

Vie

Drop-in ECU Connector:

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



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	CAN 1/RS232 Connector					
Pin	Function	Colour				
1	Comms GND	Brown				
2	CAN1L	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'.

C	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.

Can Xmit: Enabling this function will the display to send data back to the ECU over the CAN bus. This function is better suited for the G4 X series ECUs as they do not have the CAN transmission size limit that the G4 + ECUs have. This function may be used with the G4 + series, but some of the standard transmission data may have to be omitted from one of the frames in the transmission data stream.



Navigate into the CAN Setup under the ECU Controls

In this example we created a Data Channel 2 set to Receive User Stream 5 on CAN ID 1001:

de	Streams	Test Calculator	CAN Dev	rices						
	Configurat CAN Modu CAN 1	lie O CAN 2	Mode User D	efined	× E	iit Rate 1 Mbit/s	~	OBD OFF ISO 15 ISO 15	765 on C	CAN 1 CAN 2
Data Chan 1: Tr	nnel ansmit Use	er Stream 1	^	Mode Receive User St	rream 5			AN ID		
Data Chan 1: Tr 2: R 3: O 4: O 5: O 6: O	nnel ansmit Use eceive User FF FF FF FF	er Stream 1 r Stream 5	^	Mode Receive User St	ream 5		- CA 	AN ID D 1001	F	ormat Normal Extended

The Stream will then need to be configured. In this example we used Stream 5. Frame 1 will need to look like this:

Stream 2	Add Second		Traine					
Stream 2		1 1 7 1	_				Farameter	3
- Stream 3	Add Frame	Load Stream	Frame Size ID Position ID				Add	
Stream 4	Delete Frame	Save Stream	8 ~	None	~ 0		Delet	e
Frame 1 Stream 6	Parameter	Start P	Width	Byte Or	Туре	Multi	Divider	Offset
Stream 7	CAN Analog 1	0	8	MS First	Unsign	1	1	0
- Stream 8	CAN Analog 2	8	8	MS First	Unsign	1	1	0
- Stream 9	CAN Analog 3	16	8	MS First	Unsign	1	1	0
- Stream 10	CAN DI 2 (Status)	24	1	MS First	Unsign	1	1	0
	CAN DI 3 (Status)	25	1	MS First	Unsign	1	1	0
	CAN DI 4 (Status)	26	1	MS First	Unsign	1	1	0
	CAN DI 5 (Status)	27	1	MS First	Unsign	1	1	0

CAN Analog 1:	8 bit width	Boost Control (Value of 1-10 Boost PWM step dependant)
CAN Analog 2:	8 bit width	Slip Control (Value of 1-10 Slip PWM step dependant)
CAN Analog 3:	8 bit width	AWD Bias (Value 0-100)
CAN DI 2 :	1 bit width	Antilag (Value 0-1)
CAN DI 3 :	1 bit width	Launch Control (Value 0-1)
CAN DI 4 :	1 bit width	Nitrous (Value 0-1)
CAN DI 5 :	1 bit width	Flat Shift (Value 0-1)

Note the potential values that may be sent with each Parameter. These parameters may be tested by adding the relevant CAN parameters to the log viewer and testing the outputs:

Tuning Mixture Map Configuration PC Log = Record Time Plot × Parameter Value Units **File Time** 52:10.353 m:s:n 0.5 -0.5 101 -MAP (kPa) 100.0 100.5 BAP 101.0 kPa 100 99.5 -80 °C <u>8</u>9 -50.5 Injector Duty Cycle 0.0 % 50 0.000 ms Injection Actual PW 49.5 Injection Timing 0 BTDC 49 52:06.000 52:06.500 52:07.000 52:07.500 52:08.000 52:08.500 52:09.000 52:09.500 52:10.000 m:s:ms Batt Voltage 1 **Dwell Time** 0.0 ms Logged Values List Lambda 1 Temperature. Lambda Ave 0.000 lamb IAT (°C) 101 Time (s) En MAP (kPa) ECT (°C) colour = Lambda Avg 100.8 52:10.279 80 ... 0.78 Active 0.85 52:10.307 100.0 80 52:10.329 80 .93 CAN DI 5 Inactive 1.07 52:10.353 0:01.561 CAN Analog 3 32.000 1000 2000 3000 4000 5000 6000 7000

Once the parameter communication has been verified, it is up to the user / tuner to take the available data received and create a strategy in the PC Link software to perform the desired function.

Maxx ECU Integration

MaxxECU STREET/SPORT/V1/RACE/PRO (48-pin connector 1)





Software Configuration:

ECU Tuning Shortcuts	CAN settings				
Start	MaxxECU WBO Modules		Not installed v		
Configuration	8 Output Module		Not installed 🗸 🗸	(discontinued m	odule)
	E-Torottle module		Not installed	~	(discontinued module)
n lenition			Nationallad		(discontinued module)
	Traction module	1	Not installed	~	(discontinued module)
Motorsport	Data transmission				
g Speed/Gear					
E CAN Bus	Default CAN output protocol		MaxxECU Default v1.3	~	
CAN settings	User Channel 1		TPS input voltage		
CAN OBD2 input	User Channel 2		TPS input voltage		
CAN Iools	User Channel 3		TPS input voltage		
CAN Test Output 1	User Channel 4		TPS input voltage		
- CAN Test Output 2	User Channel 5		TPS input voltage		
CAN Test Output 3	User Channel 6		TPS input voltage		
CAN Test Output 4	User Channel 7		TPS input voltage		
CAN Inputs	User Channel 9		TPS input voltage		
n Advanced			TPS input voltage		
nputs	User Channel 9		TPO:		
🖬 Outputs	User Channel 10		TPS input voltage		
n Diagnostics	User Channel 11		TPS input voltage		
🚊 Tuning	User Channel 12		TPS input voltage		
	OBD-2				
	CAN OBD-II		Disabled 🗸 🗸		
	OEM CAN Protocols				
Logger Real Time Shortcuts	OEM CAN protocol		Disabled		~
search value USER AIN4 i	CAN Powertrain controls				
- Analog Inputs Active boost User AIN1 Boostopenio	Powertrain control		Disabled		~
User AIN2 Boost Pressu - Analog Inputs (raw voltage) Boost soleno	CAN Peripheral controls				
CLT input voltage PID D Term IAT input voltage PID I Term TPS input voltage PID P Term	Peripheral control		Disabled		~
USER AIN1 input voltage Stage USER AIN2 input voltage Target MAP	CAN Bit Rate				
Collection - + Cruise Contro	CAN 1 Bitrate		500Kbit (default)	\sim	

Under the CAN Bus > CAN Settings tab, make sure that MaxxECU Default v1.3 is selected. The default baud rate for MaxxECU is 500 Kb/s. Ensure that the gauge has the same baud rate when the MaxxECU option is selected in the INTEGRATIONS screen

ECU Tuning Shortcuts	CAN input value 1	
CAN Test Output 2	CAN input value 1	
CAN Test Output 3	Epoble	Enable CAN Message Input
CAN Test Output 4		
a. CAN Inputs	CAN Bus	? CAN 1 ~
CAN input value 1	CAN Message ID	? <mark>0x7B .</mark>
CAN input value 2		
CAN input value 3	Timeout	
CAN input value 4	Timeout	
CAN input value 5		
CAN input value 6	Data	
CAN input value 7		
CAN input value 8	ByteOffset	?
CAN input value 9	Endian	? Little endian V
CAN input value 10	Туре	o unsigned 16 bit v
CAN input value 11	Maala	
	MIdSK	6
CAN input value 14	Value conversion (analog)	
CAN input value 15	value conversion (analog)	
CAN input value 16	Offset	? 0 Value = Resolution*(Indata+Offset)*Multiplier/Divider
CAN input value 17	Multiplier	? 1
CAN input value 18	Divider	2 1
CAN input value 19	Resolution	0.1 (-3276.8 to 3276.7)
CAN input value 20	hesolution	
CAN input value 21	Value usage (analog)	
CAN input value 22	Value deage (dilateg)	
CAN input value 23	Name	?
CAN input value 24	Unit	?
CAN input value 25	Destination	Not used ~
CAN input value 20 CAN input value 27 ✓	Current value	Disconnected
Longer Real Time Shortcuts		
	Value usage, Digital input 1	
search value USER AIN4 - Boost control	Bit mask 1	? 0x0
User AIN1 Boostopenio	Mode 1	? Momentary ~
User AIN2 Boost Pressu - Analog Inputs (raw voltage) Boost soleno	Input function 1	? No direct function \checkmark
CLI inputvoltage PID D Term IAT input voltage PID I Term TDD insutvoltage PID I Term	Value usage, Digital input 2	
USER AIN1 input voltage PID P Term	Bit mask 2	
USER AIN2 inputvoltage Target MAP USER AIN3 inputvoltage + Cruise Contro	Mode 2	Momentary
< >	Input function 2	No direct function V

CAN Message inputs may be setup, but that will be specific to each car.

Make note of the CAN message ID as that is configurable in the gauge. The address is configured in the CAN Output screen under the Yellow cog wheel.



Pro Tip: Note that the CAN Message ID is entered into the gauge as a DECIMAL value with a HEX conversion shown at the bottom. The Address listed in the MaxxECU software is shown in HEX.

If you don't know how to convert from DECIMAL to HEX, open the Widows calculator and click on the navigation button on the top left corner. Select "Programmer and a DECIMAL to HEX conversion will be shown.

In this case 0x7B is selected in the software. The conversion to DECIMAL will be "123" which would be the address entered into the gauge.

Calculator				
≡ Programmer				
HEX 78 DEC 123 OCT 173 BIN 0111 1011				7B
		QWORD		MS
D > Bitwise ∨ 🤌 Bit shift	~			
A	«	»	CE	Ø
В	()	%	÷
С	7	8	9	×
D	4	5	6	-
E	1	2	3	+
F	+/_	0		=

The CAN output is as shown:

CAN Analog 1:	8 bit width	Boost Control (Value of 1-10 Boost PWM step dependant)
CAN Analog 2:	8 bit width	Slip Control (Value of 1-10 Slip PWM step dependant)
CAN Analog 3:	8 bit width	AWD Bias (Value 0-100)
CAN DI 2 :	1 bit width	Antilag (Value 0-1)
CAN DI 3 :	1 bit width	Launch Control (Value 0-1)
CAN DI 4 :	1 bit width	Nitrous (Value 0-1)
CAN DI 5 :	1 bit width	Flat Shift (Value 0-1)

MoTeC M1 Integration



MoTeC M130 Connector Pin-out:

MoTeC M142 and M150 Pin-out:





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.

Note: In the event that Fuel Composition (E%) data is not available, Touch the white cog wheel to enter the settings and touch the "Integrations" button. MoTec M1 should be selected. Accept that setting and you will be taken to the following screen which allows for an alternate E% CAN address to be used.



Example CAN transmit configuration in M1 Tune

In order to transmit CAN commands over the CAN bus to the M1 ECU, the ADR CAN bus must be configured The ADR CAN ID is entered in the M1 Tune software as a decimal value.

											1	
🛅 1: Tuning	🔻 🚺 Fuel	2 Ignition	3 Fuel Mixture Aim	4 Boost Control	5 Fuel/Ign	n Trims	6 Knock	7 Camshaft	8 Fuel Timing	9 Fuel Film	0 All calibrat	е
				C	alibrate							2
□ - ~ ⊘	≠ <mark>can</mark>				8	2 ADR	CAN ID		_	_	_	
ADR CAN Bus			P	CAN Bus 1	•	The	CAN ID us	ed to receive	ADR messages.			
ADR CAN ID			<u> </u>	• 109 6		14	lidation					
Airbox Mass Fl	ow CAN			~	g/s	Min						
Airbox Mass Fl	ow CAN Voltage			~	V	Max	x. 2047					
Airbox Mass Fl	ow CAN Diagno	stic		~								
Airbox Mass Fl				~	ms	See Al	S 0					
Airbox Mass Fl	ow CAN Receive	e Time		~	ms	- (ADR					
Airbox Mass Fl	ow CAN Type			Calibrated								
					10 C							

The same value must be entered into the BTI touch screen as a decimal value as well:



**Note that CAN XMIT must be enabled in the setup screen.

Press the white cog wheel in order to enter the CAN control screen:

Press the yellow cog wheel in order to configure the ADR CAN ID



Once the ADR CAN ID is configured, the inputs for the control buttons must be configured in the M1 Tune software

The data stream is as follows: ** All values listed in decimal**



숣	NOT Connected 🔔 * JRR To	oyota 2JZ VVTi (M150) [01.02.0000, December 20	17] Supra ID 1000 Base C
Quio	🖶 1: Tuning 🛛 🔍 😾	7 Ignition Trims	8 Fuel Volume Trim	9 Camshaft 0
* La			Calibrate	
unch 🔲 Layou	System Engine Advance Vehicle Normal	Type d Diagnostic Pin Tune	i/O Input Output	Enable Feature Resource
str	📜 🛪 🔽 🧭 🗲 driver			
	E Rotary Switch 1			· · · · · · · · · · · · · · · · · · ·
	Resource	🏴 🔶	CAN 0 Off	set 0 📼
	Calibration		M	anual 📼
	Diagnostic			
	🗖 Low		-(0.200 V
	🗖 High	•	5	5.001 V
	🗖 Delay	0		0 ms
	Voltage			
	🗖 Filter	P		0.0 ms
	Position			
	Zero	Q	(V 000.0
	🗖 One	0 🔶	().714 V
	🗖 Two	0 🔶	1	.428 V
	🗖 Three	0 🔶	2	2.142 V
	Four 🖉	0 🔶	2	2.856 V
	🗖 Five	0 🔶		3.570 V
	Six	0 🔶	4	1.284 V
	💴 Seven	0 🔶	4	1.998 V
	🗖 Eight	Q	(V 000.0
	🗖 Nine	Q	(0.000 V
	Tolerance	0		0 mV
	Rotary Switch 2			and the second
	Resource		Not in	i Use 📼
	E Rotany Switch 3			

Example Boost control configuration using Rotary Switch 1.

Resource must be set to: CAN 0 Offset 0 Diagnostic high and low must be set outside of the potential values to be expected.

Note that the CAN value comes in as a voltage and the peak voltage is 5 volts. The Boost PWM steps will determine how many positions will be used and the voltage value for each position will be the total of 5 volts divided by the number of steps.

In this example we have Boost PWM steps set to 7 so each position is worth .714 volts.



Example Tire Size configuration using Driver Switch 1.

Resource must be set to: CAN 1 Offset 2

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.



60

ProEFI 128

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.



Operation:

Upon powering up a properly terminated gauge, the Gauge will display the splash screen with the display and the processor version number displayed.



Touching the target is a shortcut to boost control as well as other functions that are integration dependent.

Touching the actual target data will toggle boost target to display peak boost instead as some ECUs or tunes do not show target boost.



Touching the double arrows will change the screen to the gauge screen options.

Touching the yellow arrows on the end will scroll over to the next page of available screens.

Gauge Setup Options:



Touch the cog wheel on the touch screen in order to configure the gauge.

This will bring you into a screen where the Boost Control, Traction Control, and Settings can be accessed.

Press the **SETTINGS** button will allow you to make the following changes:

UNITS button 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.

O2 button will change how the Oxygen sensor data is displayed. The options are AFR and Lambda. **O2 Count:** Select "1X" if you are running 1 wideband O2 Sensor, select "2X" if you will be running 2 wideband O2sensors.

RPM Scale: Select "8000 RPM" if your redline is below 8000 RPM or select "10000 RPM" if redline is higher.



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.

Parameter	<mark>Scale</mark> Max	
Boost Pressure:	0	
Intake Air Temp:	0	
Coolant Temp:	0	
Oil Temp:	0	
Air Box Temp:	0	
Touch parameter to .	adjust scale 🛛 🧲	

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.



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.



Base Fuel Pressure configuration:

In order to calculate the base fuel pressure, the engine should be idling and at running temperature. Press the CALCULATE button and the base pressure will be calculated and displayed. This is used on the fuel screen in order to graph the fuel pressure vs. boost pressure for simple regulator function verification.

The Base Fuel calculation is used to verify that your rising rate fuel pressure regulator is working correctly as you should see your peak fuel pressure rise with your peak MAP pressure when you are one the Fuel screen. Warning Settings

5

Display ECU Warnings
 Display User Warnings

H2O Temp - 220 F IDC - 100 % Air Temp - 180 F Boost - 32 psi Oil Temp - 220 F Tire - 32 psi EGT - 1220 F Trns Tmp - 220 F

WARNING!			
RPM	5252	нго	230
Boost	32.5	IAT	185
AFR	13.2	Oil Tmp	230
Oil Pres	94	IDC%	100
Fuel Pres	- 94		Clear

Display ECU Warnings: This setting will allow the screen to display warnings generated by some ECUs. Note that not all ECUs generate warnings.

Display User Warnings: This setting allows the user to determine warning thresholds for the parameters pictured to the left. Touch the parameter to set the value. (Note that these values are absolute and to not convert when switching units so be sure to have your desired units selected before setting these values.) Tire pressure warnings only work when using a CAN TPMS.

In the event that a user warning does trigger, the warning will be display and the parameter highlighted. The warning may be cleared which will cause the display to resume normal operation. There is a warning counter that will re-trigger for a condition that may have been cleared and corrected but the error has reoccurred.



TRAC and BOOST PWM Steps:

Use these two buttons to configure how many steps are to be programmed in the Infinity Tuner software for Boost and Slip. Typically the scale is from 0-5 volts and the max amount of steps allowed is 10 which give you 11 settings (0-10). Example: a value of 10 here would make each step would have a value of .5 volts. A value of 1 here would give the step a value of 5 volts. It is **imperative** to view each step in the software when configuring this as there could be a potential difference with regard to ground.

** Note that these two settings should be configured by competent personnel. Raising the BOOST too much or reducing the SLIP too much can have severe consequences. **



Analog outputs:

Use this screen to out a 0-5v analog output on the Blue and Brown analog output wires from the display. These output voltages are directly tied to the PWM steps mentioned above. Most of the newer ECUs will allow these changes over the CAN bus, but older ECUs like ECU Master Classic, AEM V2, and AEM Infinity are limited to using these analog outputs tied to the ECU analog inputs.



CAN Xmit:

This screen is used to transmit commands over the CAN bus. Depending on which ECU Integration that you have selected will determine the behavior of this screen and the way that the CAN output data is transmitted.

The yellow cog wheel is used to set the CAN address that this data is transmitted on.



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.



Gear Screen Gear display:

The Gear display is set do display calculated gear by default, but touching the gear if you have either Haltech or ProEFI will change the color to orange and display the Auto Gear instead of calculated gear.





CAN sniffer:

This screen will show the raw CAN bus data that the display is reading.

Pressing the Sniff button will allow you to input a CAN address and see the raw data for that address. Touching the individual byte will display the binary value for that byte down in the bottom right This is used to see a bit field where errors or triggers may be viewed.

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.