

Owner's Manual

with Installation Instructions

Banks Bus Modules

THIS MANUAL IS FOR USE WITH THE
FOLLOWING PART NUMBERS:

66420- Ambient Air Density (AAD) Module

61300- 4 CH Thermocouple Module

61301- 4 CH Analog Module

Gale Banks Engineering
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Section 1

BANKS BUS

DOCUMENTATION

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Intro

1.1 BANKS BUS DOCUMENTATION: INTRODUCTION

Welcome to the World of Banks Bus Expansion Modules

Congratulations on your Banks Bus (B-Bus) Module purchase. You're about to discover how B-Bus Modules are designed to help you get the most out of your iDash 1.8. The unlimited expansion capabilities of the B-Bus system will open a new world of sensor data and powertrain control capabilities. Updates to this manual are posted online at bankspower.com/manuals.

Ambient Air Density (AAD) Module

Your power potential is affected by ambient air conditions surrounding your engine. Banks' AAD Module monitors the pressure, temperature, and humidity of the air entering your intake with extreme accuracy. You will gain a new understanding of how elevation, temperature, and humidity affect your engine's performance.

Derringer Tuner

Adding the Banks Derringer Tuner with iDash 1.8 will result in torque and power gains across the full operating rpm range, providing control of all features through one amazing "gauge."

4-Channel Analog Sensor Module*

Did you ever want to monitor your transmission's fluid temperature or engine's oil pressure but the manufacturer was unwilling to include that sensor? Now you can do something about it. Banks' 4-Channel Analog Sensor Module allows you to add additional sensors to view almost any data you can dream of. The system is plug-and-play and user configurable. Own your vehicle's performance with a variety of

pressure and temperature sensors for air, fluid, exhaust measurements, and more.

4-Channel Thermocouple Module

Monitor up to 4 temperatures using a single module. Thermocouples can be used to read EGT temperatures as high as 1800°F as well as read Oil Temp, Coolant Temp, Trans Temp and more. Use two modules to read individual runner EGTs on a v8 engine.

Water Methanol Module*

The iDash 1.8 interfaces with the all-new Banks Water Methanol Injection Systems, allowing you to quickly change calibration settings and tune how much fluid is used on-the-fly. You can also monitor/datalog flow rate, pump activity, and more with the iDash 1.8.

Don't forget, we're always working on expansions, upgrades, and new applications that will make your iDash 1.8 do even more. Be sure to register at www.bankspower.com/contact/productregistration to receive important e-mail alerts regarding warranty, updates, and upgrades for your iDash 1.8 device or call us with questions at:

1-800-GET POWER.

NOTE: To ensure that your Banks Bus system is operating as designed, it is recommended that you check if there are any firmware updates for your iDash 1.8 gauges or B-Bus Modules.



WARNING

BEFORE INSTALLING, please review Sections 4.0, 4.1, and 4.2 to familiarize yourself with your product's safe operating procedures.

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1.2 BANKS BUS DOCUMENTATION: BANKS BUS HARDWARE CONFIGURATION

BANKS BUS

The iDash 1.8 Gauge is equipped with an expansion port called the Banks Bus (B-Bus) port, which allows your iDash 1.8 to interface with and control a variety of modules. These B-Bus Modules increase the capabilities of the system by allowing you to read additional sensors that might not exist on your vehicle with higher accuracy and faster update rates. They also allow you to control Banks tuning devices such as the Derringer Tuner and other control modules that will be available soon.

CONNECTING B-BUS DEVICES

This communication network allows you to connect a multitude of different modules. Based on your specific needs, custom tailor your data acquisition and performance tuning.

The B-Bus network is designed to be extremely scaleable allowing you to easily add new modules as they are needed.

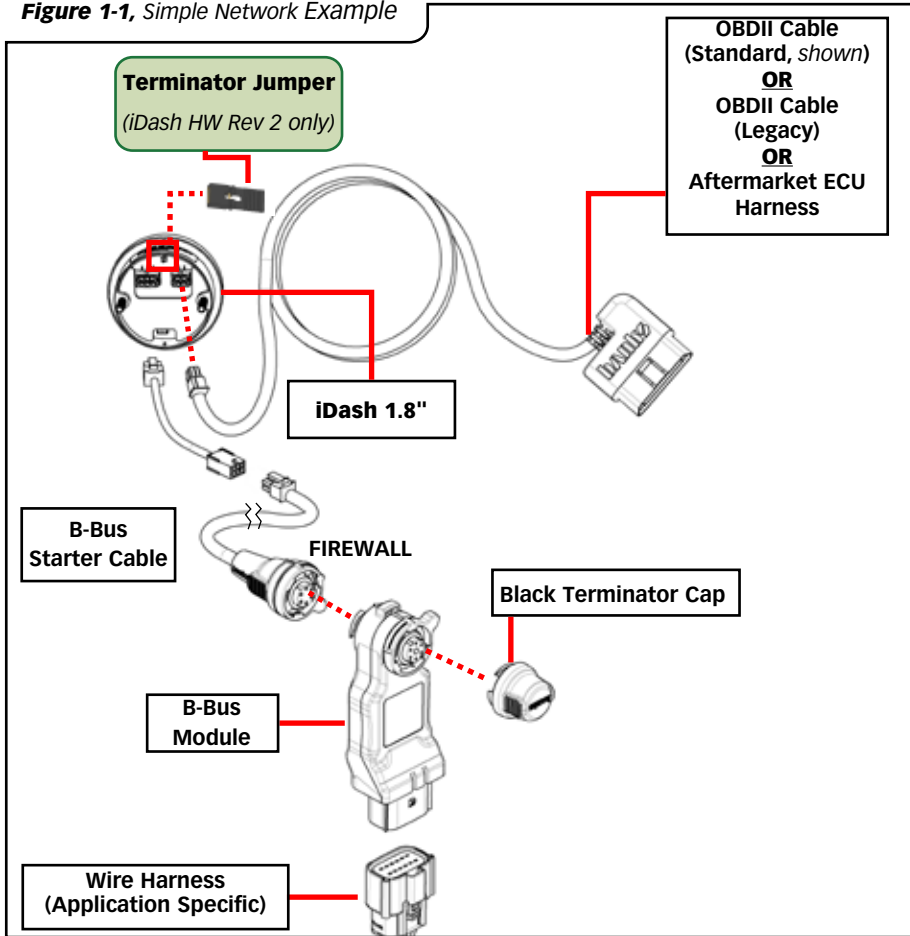
The first module you connect to the B-Bus network requires a Starter Cable, and a Black Terminator Cap.

Every additional B-Bus Module requires just the module itself, since it stacks onto the existing network in the engine bay. Only a single cable is required to be routed through the firewall, making installation both easy and clean.

B-BUS SIMPLE NETWORK

The network requires a minimum of one iDash 1.8 Gauge, Termination Jumper installed on back of iDash, a B-Bus Starter Cable, a B-Bus Module, and a Black Terminator Cap.

Figure 1-1, Simple Network Example



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Secondary iDash 1.8 Gauges

Any additional iDash 1.8 gauges connected other than the primary iDash 1.8.

Adding More Modules

Additional B-Bus Modules can be added to the system simply by stacking them onto existing Modules. The maximum number of a particular module allowed in the network varies based on the Module type and can be found in **Figure 1-2**.

Adding an AAD Module

If using an AAD Module, the module will replace the terminator cap.

Adding More Gauges

Up to three additional iDash 1.8's can be added to the network (a maximum of four iDash units). Each additional iDash 1.8 requires a B-Bus Y-Cable.

NOTE: Only one Terminator Jumper is required. Uninstall extra Terminator Jumpers from iDash gauges

Primary iDash 1.8 Gauge

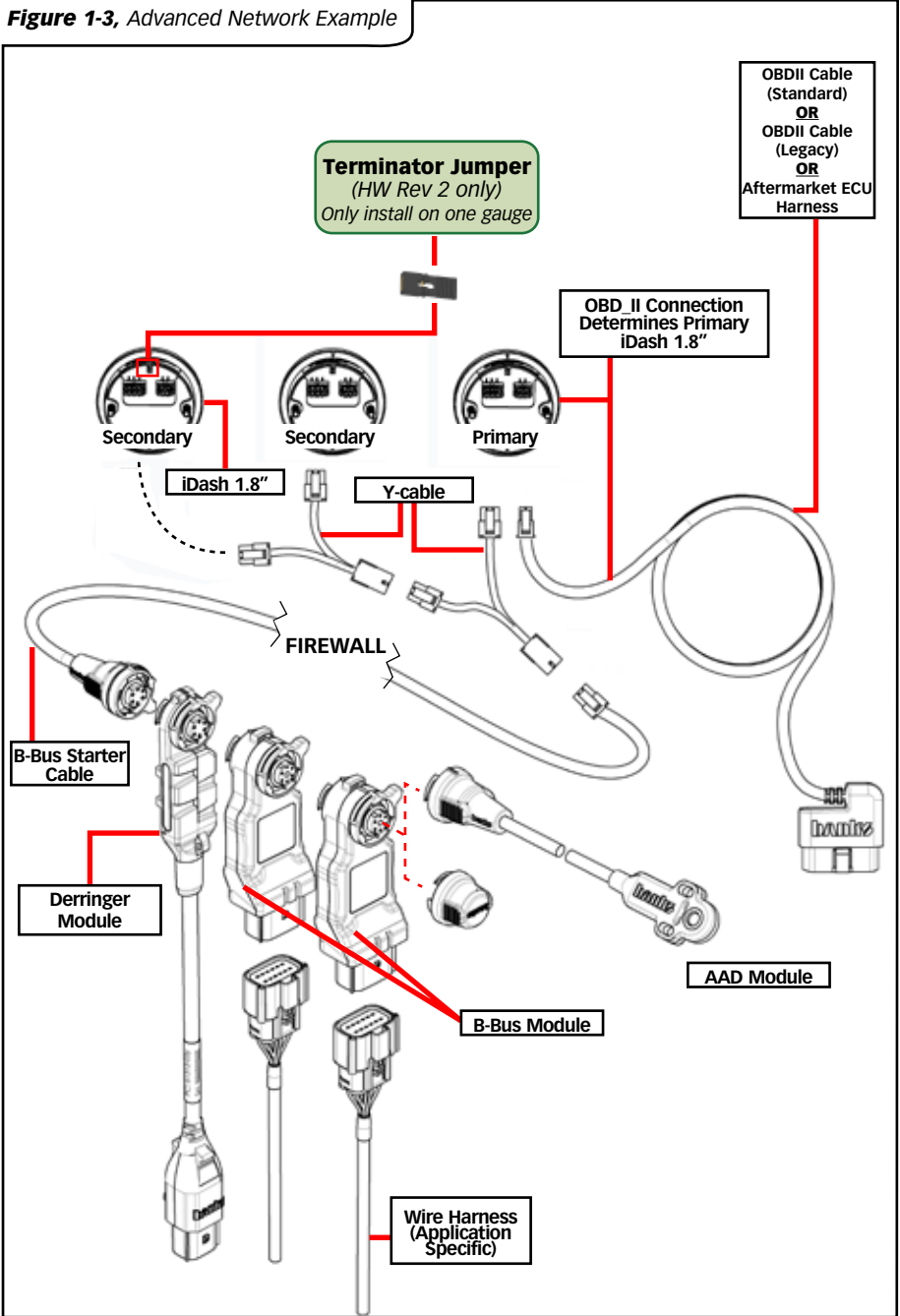
The iDash 1.8 that has the OBD-II cable or aftermarket ECU cable plugged into it is referred to as the primary iDash 1.8. Some functionality, such as data logging and vehicle diagnostics, can only be performed on the primary iDash 1.8.

Figure 1-2. Max number of Modules Allowed

Name	P/N	Max Allowed
iDash 1.8 Gauge	62882	4
4-Channel Analog Sensor Module	61301	6
4-Channel Thermocouple Module	61300	4
Ambient Air Density Module	61303-11	1
Water-Methanol Module*	61306	1
Derringer Tuner	61312	1

*Module Coming Soon

Figure 1-3, Advanced Network Example



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1.3 BANKS BUS DOCUMENTATION: GENERAL BANKS BUS HARDWARE INSTALLATION

STARTER CABLE INSTALLATION

Required Tools & Materials

For Wire Routing:

- Zip Ties (4" or longer)*
- Cutting tool (i.e. Diagonal Cutters)

*(Included in kit)

For Firewall Access (Need based on type of access through firewall):

- Carpenter's Knife or Razor Blade
- Silicone Sealer (Recommended)
- Wire Coat Hanger (Recommended)
- Screwdriver
- Power Drill
- Step Drill Bit (Recommended)
- Grommet (1/4" Inner Diameter)



WARNING

BEFORE INSTALLATION:



Ensure that the engine bay is cool.



Disconnect iDash 1.8 from OBDII. This will prevent accidental damage to electronics.

To locate any possible passage for wire routing, inspect the firewall from under the dash (in the foot well) and from under the hood. See Figure 1-4,1-5.

Firewall routing options:

1. Preferred method: Some vehicles provide an extra harness access point in the firewall. See **Figure 1-4**.

A. Remove Cap sealing access point (if available). See **Figure 1-4**.

B. Install a properly sized grommet.

C. Feed the smaller terminal of the Starter Cable through the hole.

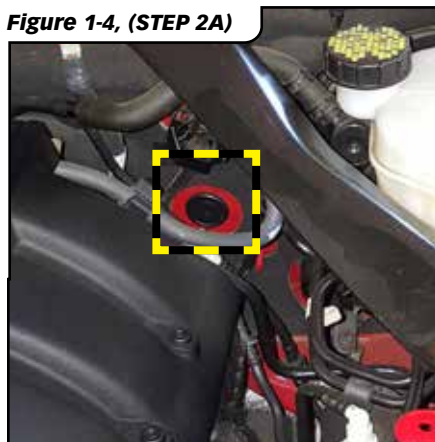
2. Secondary Method: Route the Starter Cable through the firewall using the OEM wire harness gasket. See **Figure 1-5**.

A. Cut a small "X" away from the edge of the harness.

B. Check for penetration through the gasket.

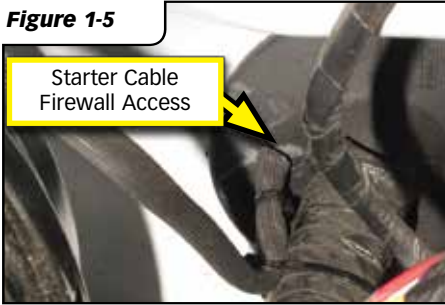
C. Be careful not to cut wires. Feed the smaller terminal of the Starter Cable through the hole.

Figure 1-4, (STEP 2A)



TIP: A wire coat hanger is helpful for pulling the harness through the OEM wire harness gasket. Be careful not to damage the OEM gasket or harness.

Figure 1-5



3. Tertiary Method: Only use this method if the Primary or Secondary methods are not possible. Create a new access point through the firewall if no other options are available.

A. Inspect potential drilling location from both sides of the firewall. Ensure that you will not drill into anything.

B. Drill a hole to the size your grommet requires.



WARNING

AVOID any Starter Cable slack in the footwell to prevent foot getting caught while driving.

C. After drilling a new hole, install a properly sized grommet.

D. Feed the smaller terminal of the Starter Cable through the grommet hole.

4. Route the Starter Cable from the firewall access point to the iDash 1.8 and zip-tie the cable to a secure location. See **Figure 1-6**

NOTE: You may need to loosen or remove the dash panel or trim to install the cables between dash crevices or behind dash panels.

5. On the engine bay side of the firewall, pull excess wire and secure the Starter Cable to an easily accessible point for connection. See **Figure 1-12**.

Recommended: Apply black silicone sealer around the access point used by the Starter Cable.

Figure 1-6



Recommended to Route Along the Firewall and Fender

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Figure 1-7

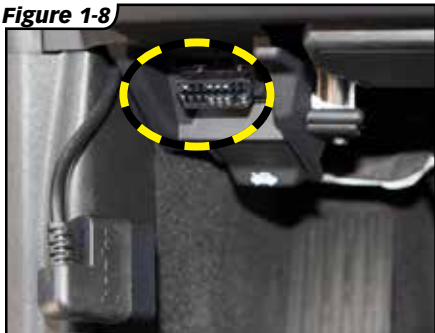


OBDII CABLE INSTALLATION

If installing into vehicle with OBDII communication (Standard):

1. Locate the OBDII port in your vehicle. The OBDII port is located under the dash panel and can be found on either side of the steering wheel. Refer to your vehicles owner's manual if you are having difficulty locating the OBDII port. See **Figure 1-8**.

Figure 1-8



2. Connect the Banks OBDII Cable to the vehicle's OBDII port.

NOTE: For some vehicle models the OBDII port may need to be disconnected from its mounting location.

Unclip or remove factory screws/bolts to relocate the OBDII port and allow the Banks OBDII cable to plug into the vehicles OBDII connector without bending or putting stress on the Banks OBDII cable. Secure the OBDII port under the dash

3. Route the Banks OBDII Cable to reach the iDash 1.8. See **Figure 1-9**.

You may need to loosen or remove dash panel or covers to install the interface cable between dash crevices or behind dash panels.

4. Connect the Banks OBDII Cable to the 4-pin port on the iDash 1.8. See **Figure 1-10**.

5. Secure the Banks OBDII Cable away from any moving parts or sharp edges using the supplied cable ties.

Figure 1-9



Figure 1-10



iDASH HARDWARE REVISION

When using multiple iDash 1.8 gauges and/or Banks Modules it is very important that there be **ONLY one (1) termination in the cabin.** Otherwise, your iDash 1.8 may have trouble communicating to other devices on the network.

Check which iDash 1.8 Hardware Revision you have. Look behind the iDash 1.8 as shown in **Figure 1-11** & **Figure 1-12** to visually confirm the **Jumper Block Termination.** Alternatively you can check the **"Hardware Rev:"** in the **"System Information"** menu, as shown in **Figure 1-13.**

If you have **Hardware Revision 1**, you **must use** the **In-Cab Terminator** cable.

If you have **Hardware Revision 2**, you **will have** the **pre-installed Jumper Block Termination.**

Figure 1-12

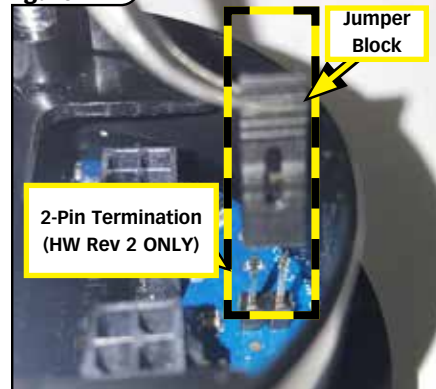


Figure 1-13

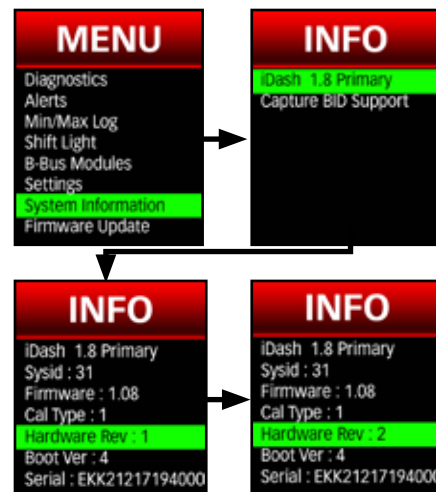
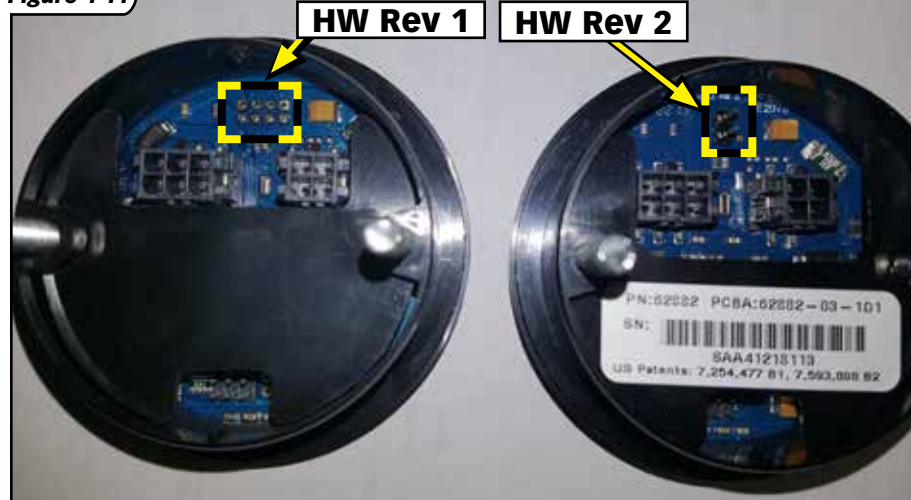


Figure 1-11



SINGLE iDASH 1.8" INSTALL

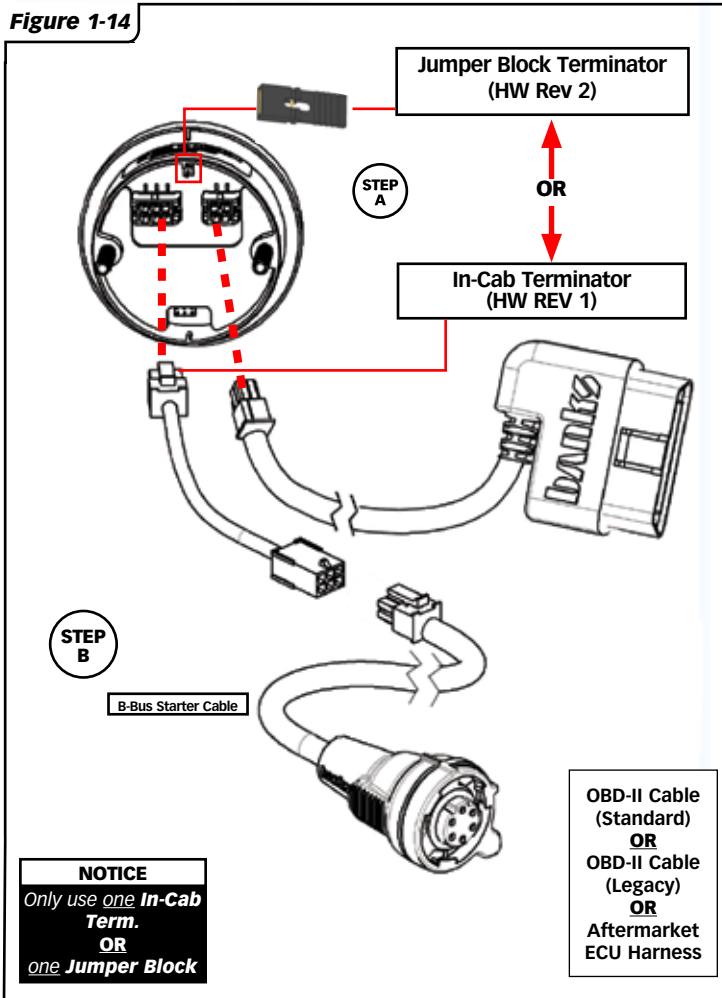
If you have a HW Rev 1 iDash 1.8:

1. Connect the **In-Cab Terminator** to the **iDash 6-Pin Port**. See **Figure 1-11, Step A**.
2. Connect the **Starter Cable** to the **In-Cab Terminator**. See **Figure 1-14, Step B**.

If you have a HW Rev 2 iDash 1.8:

1. Confirm that the **Jumper Block** is connected to the **iDash 2-Pin termination**. See **Figure 1-14, Step A**.
2. Connect the **Starter Cable** to the **iDash 6-Pin Port (Without the In-Cab-Terminator)**. See **Figure 1-14**.

Figure 1-14



MULTIPLE IDASH 1.8" INSTALL

If you ONLY have HW Rev 1 iDash 1.8's

1. Connect the **In-Cab Terminator** to the **iDash 6-pin port**. See **Figure 1-16, Step A**.

2. Connect the **Y-Cable** to the **In-Cab Terminator** and the second **iDash 1.8**. See **Figure 1-16, Step B**.

3. For each additional **iDash 1.8**, a **Y-Cable** is used, as shown in **Figure 1-16**.

4. Connect the **Starter Cable** to the **Y-Cable**. See **Figure 1-16, Step C**.

If you have ONLY HW Rev 2 iDash 1.8's:

1. Remove extra **Jumper Blocks** from the added iDash 2-Pin terminations. See **Figure 1-16**.

NOTE: Only one Jumper Block Terminator is required.

2. Connect the **Y-Cable** to the **iDash 6-pin port** of the first and second **iDash 1.8 (Without the In-Cab Terminator)**. See **Figure 1-16, Step B**.

3. Connect the **Starter Cable** to the **Y-Cable**. See **Figure 1-16, Step C**.

If you have BOTH, HW Rev 1 AND Rev 2 iDash 1.8's

Follow either instructions for **HW Rev 1 OR Rev 2**, but **only use a single terminator**.

CONNECTING BANKS MODULES

1. To connect modules, the orientation and order should be followed as shown in **Figure 1-16**.

2. Rotate the locking ring towards the 12 o'clock position then connect the mating ends together ensuring proper alignment using the 12 o'clock alignment marks. See **Figure 1-14**.

NOTE: Highlighted features for clarity only.

Figure 1-14

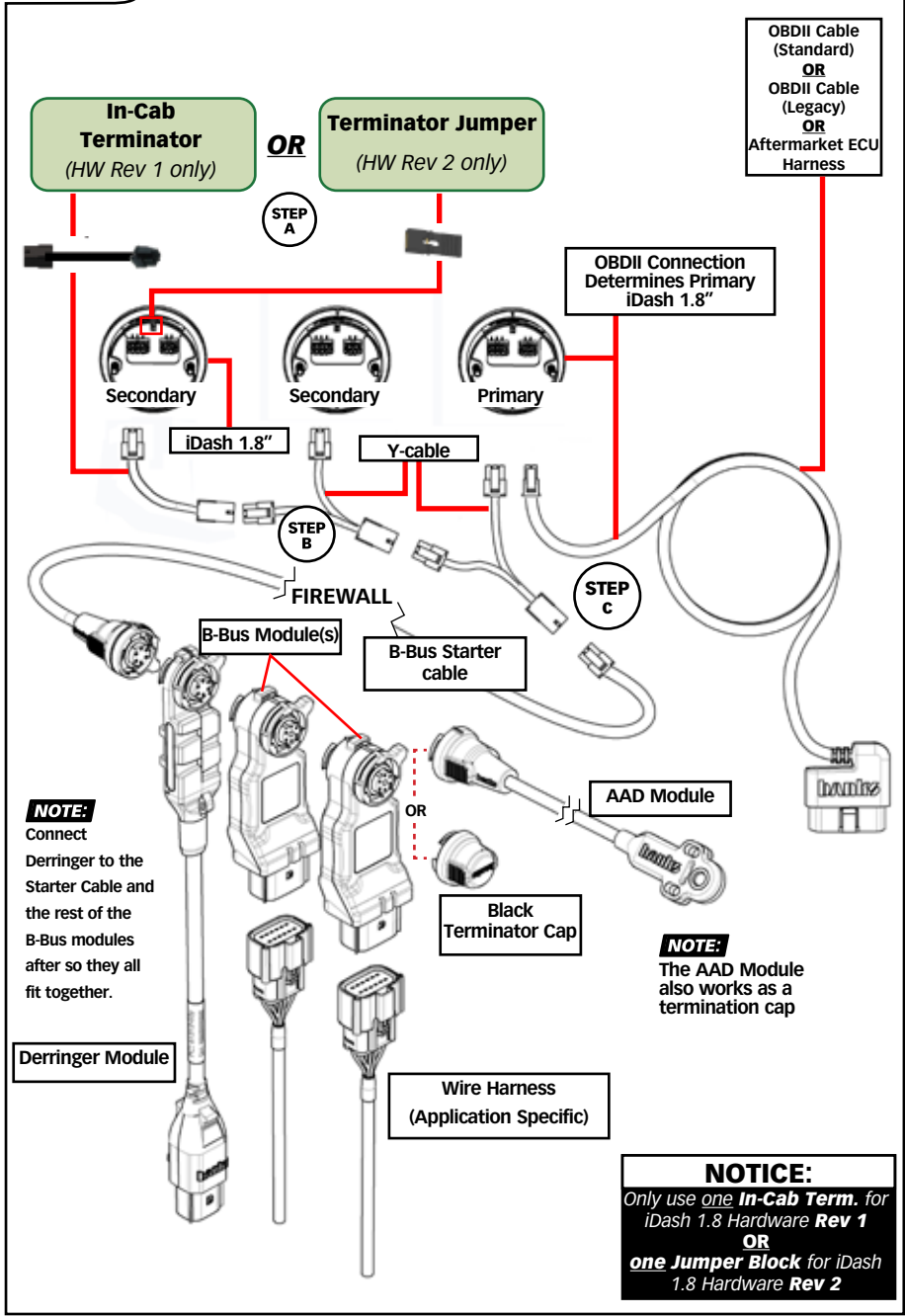


3. Rotate the locking ring towards the "lock" icon until you feel a click. See **Figure 1-15**.

Figure 1-15



Figure 1-16



B-BUS MODULE MOUNTING

1. Find a location to mount your B-Bus Module(s).

It is recommended to mount along the fire-wall within reaching distance of the Starter Cable.

2. **If not using the mounting brackets**, connect all the B-Bus Modules (Refer to "**Locking Ring Connection Procedure**" on page 18) and use the mounting hole on the top of the module to zip-tie into place. See **Figure 1-18**.

3. **If using the mounting brackets**, place a bracket between every 2 modules before locking the modules together. See **Figure 1-20**.

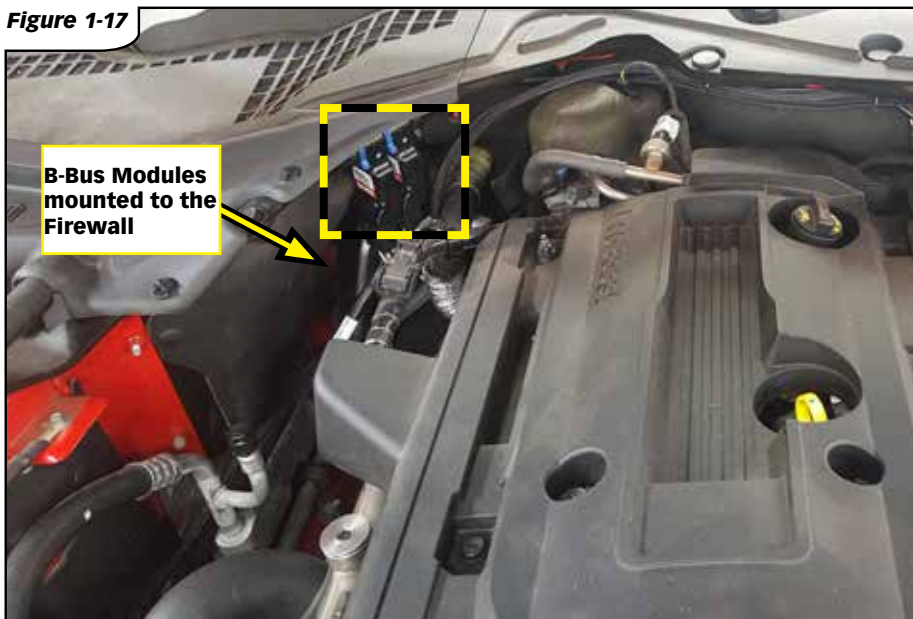
Mount the brackets as to ensure that the locking ring is not covered by the bracket. See **Figure 1-20**.

A. Mark the locations of the first mount.

B. Use a #21 drill to make a pilot hole for the provided #10 sheet metal screws.

C. Mount the B-Bus Modules to the first bracket and then mark the holes for the next bracket. Repeat **Steps A** and **B** for each additional bracket installed.

Figure 1-17



**B-Bus Modules
mounted to the
Firewall**

Figure 1-18

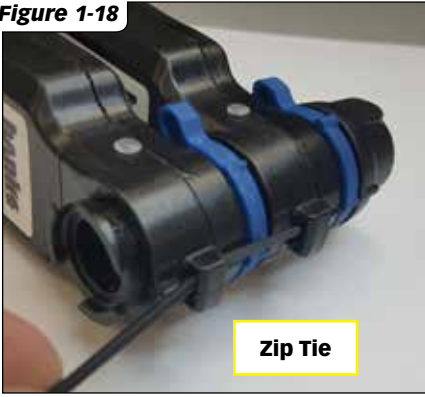


Figure 1-19

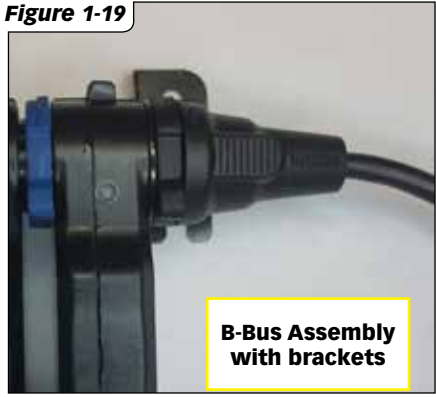
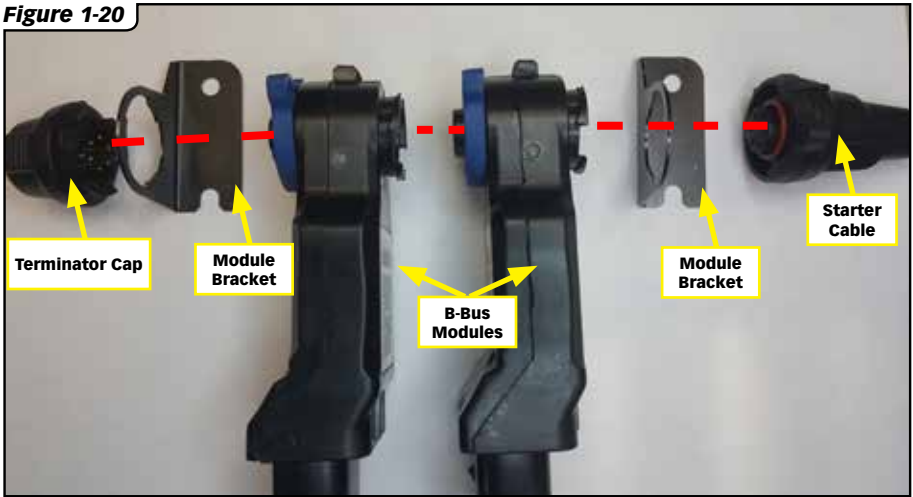


Figure 1-20



Section 2

MODULE SPECIFIC

INSTRUCTIONS

2.1 AMBIENT AIR

DENSITY MODULE

2.1.1 AMBIENT AIR DENSITY MODULE: INTRODUCTION

INTRODUCTION

Why you need Banks' Ambient Air Density (AAD) Module?

An engine's power potential is directly affected by ambient air conditions. The Banks AAD Module allows you to monitor the pressure, temperature, and humidity of the air entering your engine with extreme accuracy. You will gain a new understanding of how elevation, temperature, and humidity affect your vehicle's performance.

What information does this module provide?

- Ambient Air Density Mass (lb./1kft³)
- Ambient Air Density %
- Ambient Air Pressure (psi, kpa)
- Ambient Air Pressure (in Hg)
- Ambient Air Temperature (C, F)
- Relative Humidity (%)
- Grains H₂O (grain/lb. air)
- Density Altitude (ft)
- Pressure Altitude (ft)
- SAE J607 Correction Factor
- SAE J1349 Correction Factor
- Saturation Pressure (in Hg)
- Vapor Pressure (In Hg)
- Dew Point (C,F)

What can I do with the sensor?

Measure air density of ambient air around your vehicle.

Measure air density of the airbox inlet to evaluate how effective your "cold air" intake really is.

Measure the "Ram-Air" effect of an airbox duct location.

Data log ambient conditions at the racetrack to compare data between different days.

Ambient relative humidity can be used to evaluate if air will condense out during the intercooling stage.

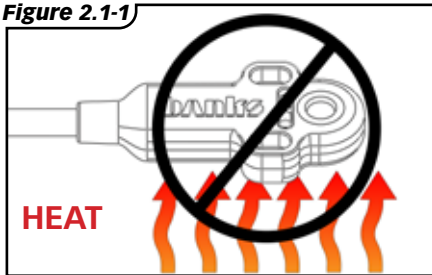
OPERATION

Considerations When Locating AAD Module:

1. Difficulty of installation.
2. Potential for damage.
3. Potential for non-ideal readings from vehicle emitting heat, dynamic pressure changes when driving, and water on Gore-Tex™ film. Sensor accuracy is best when Ambient Temperature is correct (not heat soaked).

NOTE: Heat soak may be a problem encountered when at idle. Temperature readings may increase due to installation location.

Figure 2.1-1



For best Ambient condition readings, place the AAD Module near the front of the vehicle, in the path of air flow, and where installation is simple.

EXAMPLE Attached to the grill, in front of the radiator.

- The AAD Module can easily be zip-tied to the grill.
- Temperature readings may skew from ambient at idle, due to radiating and convecting heat from radiator.

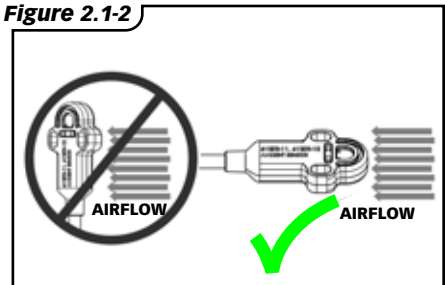
- There is always airflow through the grill while driving.

What orientation is best for the AAD Module?

Avoid having the AAD Module oriented with the membrane installed facing against the direction of air flow. Pressure readings may be skewed due to static pressure buildup when driving, resulting in incorrect Air Density readings. This will reduce life of the membrane, leading to potential damage of the sensor within the AAD Module.

The AAD White Gore-Tex™ membrane should be faced towards the ground or to the side to keep water off the membrane.

Figure 2.1-2



2.1.2 AMBIENT AIR DENSITY MODULE: INSTALLATION

NOTE: If you have *not installed* the Starter Cable on your vehicle, refer to "Starter Cable Installation" on page 10

Required Products & Tools

- AAD Module PN: 61303-11*
- Zip Ties (4" or longer)*
- Cutting tool (i.e. Diagonal Cutters)
- Coat Hanger (Recommended)

*(Included in kit)

For other mounting location ideas, refer to "2.1.1 AMBIENT AIR DENSITY MODULE: Introduction & Operation" on page 23. Route AAD module to your vehicle grill. See **Figure 2.1-4**.


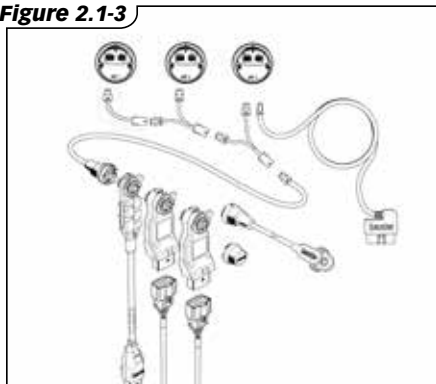
	WARNING
	BEFORE INSTALLATION:
	Ensure that the engine bay is cool.
	Disconnect iDash 1.8 from OBDII. This will prevent accidental damage to electronics.

Figure 2.1-3



A. Route the cable along the fender.

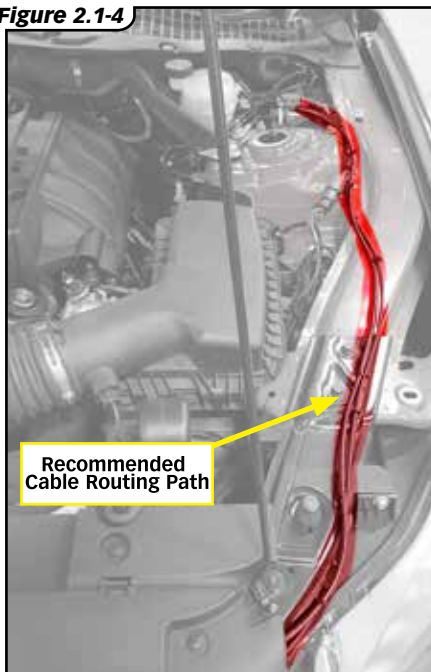
B. Zip-tie the cable to ensure it will stay in place.



CAUTION

DO NOT mount to heat emitting objects.
DO NOT mount to rotating and moving components.
DO NOT mount to high voltage sources.
DO NOT mount to sharp edges.

Figure 2.1-4

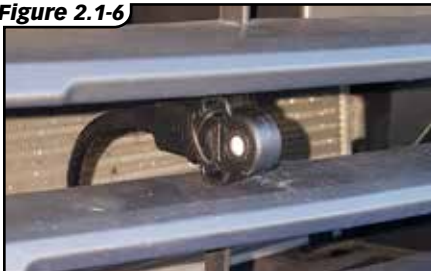


1. Fasten the AAD Module to the grill with the Gore-Tex™ face unobstructed and parallel to the airflow direction. See **Figure 2.1-5**, **Figure 2.1-6**, **Figure 2.1-2**.

Figure 2.1-5



Figure 2.1-6

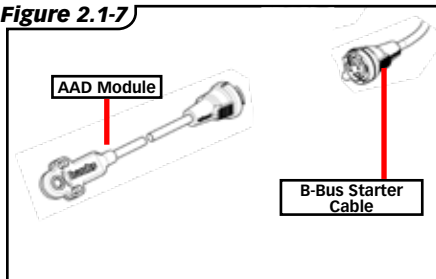


1. Connect AAD Module to the Banks Bus System.

NOTE: For locking ring connection operation, refer to "**Locking Ring Connection Procedure**" on page 18.

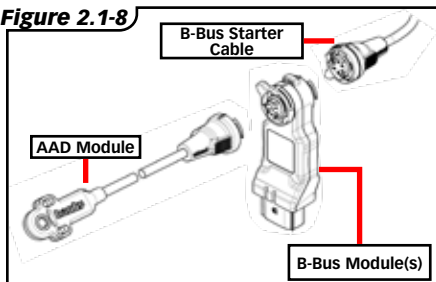
A. If adding the AAD Module to an iDash 1.8 system with no B-Bus Modules, connect the AAD Module directly to the Starter Cable. See **Figure 2.1-7**.

Figure 2.1-7



B. If adding the AAD Module to an existing B-Bus Network, Connect the AAD Module to the B-Bus/Derringer Module (**replaces Black Terminator Cap**). See **Figure 2.1-8**.

Figure 2.1-8



AAD MODULE INSTALLATION CHECK

1. After installation, the AAD Module will add the following parameters:

- Ambient Air Density Mass (lb/1kft3)
- Ambient Air Density %
- Ambient Air Pressure (psi, kpa)
- Ambient Air Pressure (in Hg)
- Ambient Air Temperature (C, F)
- Relative Humidity (%)
- Grains H2O (grain/lb. air)
- Density Altitude (ft)
- Pressure Altitude (ft)
- SAE J607 Correction Factor
- SAE J1349 Correction Factor

NOTE: If your vehicle possesses OEM temperature and pressure sensors, this data will be overwritten by the more accurate and faster-responding AAD Module data.

2. To change iDash 1.8's displayed parameters (See **Figure 2.1-9**):

A. Go to "Menu" and select "Gauge Selection".

B. Select a "Field #" to change the parameter.

NOTE: Consider layout selected when choosing field to change.

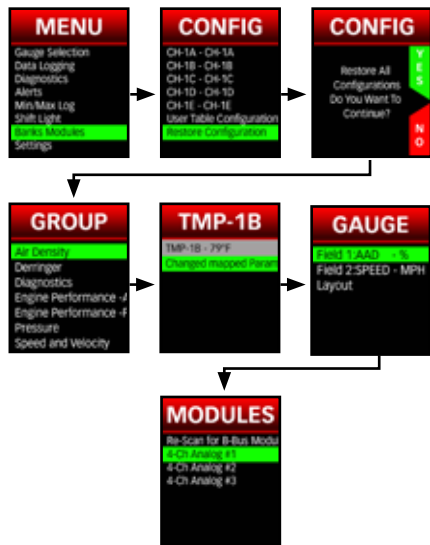
C. Select a "Group"

D. Select an "Item" to display the parameters.

E. Hold the **BACK** button to return to the gauge screen and your new parameter will be displayed.

TIP: Gauge units can be changed in "Settings".

Figure 2.1-9



2.1.4 AMBIENT AIR DENSITY MODULE: DIAGNOSTICS

CHECK FOR IDASH 1.8 CONNECTION TO AAD MODULE

Figure 2.1-10



Identify AAD Module connection on the iDash 1.8.

1. Go to "Menu" and select "System Information." See Figure 2.1-10, A.

2. In "system information" any Module(s) connected will be displayed. Look for "61303-11 Ambient Sensor" and select it. See Figure 2.1-10, B.

3. When looking at the Module information, if all data values are filled with dashes, (Figure 2.1-10, C2) check physical connections. (Refer to "3.2 BANKS BUS OPERATION: General Diagnostics" on page 46).

TIP: It is easier to have all relevant parameters displayed at once. See Figure 2.1-11

Figure 2.1-11



1. Pressure

Ensure the AAD Module is placed in a stable environment. Not in a windy area.

Compare Ambient Air Pressure (AAP) value to atmospheric pressure in your area. Refer to your local weather station.

2. Temperature

Ensure the AAD Module is placed in a stable environment. Not in a windy area.

Not next to any heating/cooling source.

Allow your vehicle to cool overnight if mounted.

Compare Ambient Air Temperature (AAT) values to atmospheric temperature. Refer to your local weather station.

3. Relative Humidity

NOTE: Make sure to check the AAD Module's temperature accuracy before checking relative humidity. Relative humidity is a function of moisture content and temperature.

A. Ensure the AAD Module is placed in a stable environment.

- Not in a windy area.
- Not next to any heating/cooling source
- The sensor is dry (specifically on the Gore-Tex™ mesh).

B. Compare Relative Humidity (RH) values to atmospheric relative humidity. Refer to your local weather station. **Read Fault**

SENSOR FAULT CODES

Refer to "3.2 BANKS BUS OPERATION: General Diagnostics" on page 46 regarding how to read codes

Figure 2.1-12

Fault Code	Trigger
1.1, BBIII Communication Error	CAN Bus Errors
1.2, BBus VIGN Low Error	VIGN < 7V
1.3, Module Temperature High Error	Module Temperature > 185°F
1.4, Sensor Component Error	Sensor IC Fault
2.1, Pressure High Error	Pressure > 15.95psi
2.2, Temperature High Error	Temperature > 185°F
2.3, Humidity High Limit	Humidity = 100%
2.4, Pressure Sensor Error	Pressure Sensing Element Fault
3.1, Temperature Sensor Error	Temperature Sensing Element Fault
3.2, Humidity Sensor Error	Humidity Sensing Element Fault
3.3, Pressure Low Error	Pressure < 4.35psi
3.4, Temperature Low Error	Temperature < 32°F
4.1, Humidity Low Error	Humidity = 0%

Troubleshooting

- For fault 1,1: BBIII communication error refer to section 3.2
- For fault code 1.3 and 2.2: Temperature > 185°F, make sure the module is not located in a very hot environment (ie: under hood and near exhaust components)
- For all other faults: Make sure Gortex vent is not soaked in water. If it recently got wet let the module dry overnight and test again. If fault ensues, please contact Banks Technical Support.

Figure 2.1-13

General Operating Ranges	
Temperature:	-40 to 185 °F
Pressure:	4.35 to 15.95 PSI
Relative Humidity:	0 to 100% RH

Figure 2.1-14

Sensor Absolute Accuracy		
Temperature:	± 1.8 °F	@ -40 to 149 °F
Pressure:	± 0.0145 psi	@ 4.35 to 15.95 psi & -40 to 149 °F
Relative Humidity:	±3 %RH *	±3 %RH *

*Including Hysteresis: ±1 %RH @ 10→90% →10% & 77 °F

2.2 4-CHANNEL ANALOG MODULE

2.2.1 4-CHANNEL ANALOG MODULE: INTRODUCTION

INTRODUCTION

1. What is the 4-Channel Analog Module?

This B-Bus Module allows you to add four analog output sensors and one frequency sensor to your vehicle and display them to the iDash 1.8 or record the data (if using the iDash 1.8 with datalogging).

2. What are the capabilities of this module?

- Reads 0-5v analog signals into B-Bus Network so that they can be displayed and/or data logged by the iDash 1.8
- Reads variable resistance sensors
- Reads one frequency input sensor (if purchased with frequency input harness)
- Chain up to 6 modules for a total of 24 sensor inputs
- Provides 5v sensor supply
- Internal configurable pull-up resistor.
- Preconfigured calibration tables for Banks' sensors
- User configurable sensor calibration tables.
- On-board memory stores user sensor configurations and calibration tables.

3. What sensors are compatible with this module?

- A.** Banks' Plug-and-Play sensors. Refer to **Figure 2.2-1** table below.
- B.** Any 0-5Vdc analog output sensor
- C.** Any resistive type sensor
- D.** Frequency output sensors

SENSOR SELECTION

Plug & Play Sensor Kits: The following sensor kits below come with plug and play adapter and pre-calibrated configuration in the iDash 1.8 to properly read them.

- **Air temperature sensor**
Recommended for Intake air temperature measurements up to 275°F where fast response is critical (Manifold Temp, Compressor Outlet Temp (low boost), etc.).
- **Fluid Temperature sensor**
Recommended for liquid temperature measurements up to 300°F. Sensor is fully enclosed to protect the sensor element. This sensor is available in two different thread sizes (Oil Temp, Transmission Temp, Coolant Temp, etc.).
- **Analog EGT Sensor**
Recommended for exhaust gas temperature readings up to 1800°F. Also used for measuring compressor outlet temperature of engines with over 20 psi of boost where temps exceed the max of the air temperature sensor (Exhaust Gas Temp, Compressor Outlet Temp (high boost), Exhaust Gas recirculation temp, etc.).
- **Turbo Speed Sensor**
Recommended for reading rotational speed of the compressor wheel. Sensor can detect speeds anywhere from 5,000-400,000 RPM. This reading is a key input parameter for the efficiency and safety of a turbocharged system.

2.2.1 4-CHANNEL ANALOG MODULE: INTRODUCTION

- **Hall Effect RPM Sensor**
Recommended for picking up rotational speed of any magnetic surface with slits and/or protruding pieces. This sensor can be used on a wide range of applications such as shaft speed, transmission speed, differential speed, etc.
- **Pressure Sensors (PSIA)**
Stainless Steel 1/8NPT sensor compatible with both air and liquid. Recommended for air pressure measurements that go into vacuum. Sensor is available in multiple ranges. Select a sensor range so that your maximum expected value is below the sensor's max reading. Data can be read as absolute or gauge scaling on the iDash if Ambient pressure is available (Manifold pressure, Compressor Outlet Pressure, etc.)
- **Pressure Sensors (PSIG)**
Stainless Steel 1/8NPT sensor compatible with both air and liquid. Recommended pressure readings that are typically reported in Gauge scaling. Sensor is available in multiple ranges. Select a sensor range so that your maximum expected value is below the sensor's max reading. Data can be read as absolute or gauge scaling on the iDash if ambient pressure is available (Oil pressure, Transmission Line Pressure, etc.)

2.2.1 4-CHANNEL ANALOG MODULE: INTRODUCTION

Figure 2.2-1

Analog Temperature Sensors				
Item #	Description	Thread Size	Min	Max
63901	Air Temperature Sensor Kit	3/8 NPT	-40 °F	275 °F
63902	Fluid Temperature Sensor Kit	3/8 NPT	-40 °F	300 °F
66559	Fluid Temperature Sensor Kit	1/8 NPT	40 °F	300 °F
63065	Analog EGT Sensor Kit	1/8 NPT	0 °F	1800 °F
Pressure Sensors				
63085-50A	50 PSI Absolute Pressure Sensor	1/8 NPT	0 psia	50 psia
63085-150A	150 PSI Absolute Pressure Sensor	1/8 NPT	0 psia	150 psia
63085-232A	232 PSI Absolute Pressure Sensor	1/8 NPT	0 psia	232 psia
63085-15G	15 PSI Gauge Pressure Sensor	1/8 NPT	0 psia	15 psig
63085-50G	50 PSI Gauge Pressure Sensor	1/8 NPT	0 psia	50 psig
63085-100G	100 PSI Gauge Pressure Sensor	1/8 NPT	0 psia	100 psig
63085-150G	150 PSI Gauge Pressure Sensor	1/8 NPT	0 psia	150 psig
Universal Sensor Input Pigtail Harnesses				
61301-15	Universal Analog Input Pigtail			
61301-18	Universal Frequency Input Pigtail			
Module Harnesses				
61301-12	4-Ch Analog Module Harness			
61301-16	4-Ch Analog with Frequency Module Harness			
61301-28	4-Ch Analog Extension Harness (3 feet)			
61301-29	4-Ch Analog Extension Harness (6 feet)			
Frequency Sensors				
66566	Turbo Speed Sensor Kit			
63095	Hall Effect RPM Sensor Kit			

2.2.1 4-CHANNEL ANALOG MODULE: INTRODUCTION

WIRE IN YOUR OWN SENSOR

The following are pigtails that allow you to wire in your own sensors to the module. You can configure the voltage to frequency table for each sensor on the iDash to properly scale the sensor.

- **Universal Analog Input Pigtail (61301-15)** – 12 inch loose wire pigtail with 5V, GND and Signal wires used to wire your own 5V analog or variable resistance sensor.
- **Universal Frequency Input Pigtail (61301-18)** – 72 inch loose wire pigtail with 5V, 12V, GND and Signal wires used to wire in a frequency sensor or frequency input sensor. Pigtail is only compatible with the 4-ch analog with frequency module kits. If you do not have the module harness with the frequency input connector, you will need to purchase 61301-16 modules harness to utilize a frequency input.

UNIVERSAL ANALOG SENSOR WIRING

NOTE: It is recommended to use Banks Plug and Play Sensors where possible to guarantee the best sensor accuracy, performance and ease of use.

If you are wiring your own 5V analog or variable resistance sensor to the 4. Ch Analog Module you will need to use a 61301-15 Universal Analog Module Pigtail Harness. One pigtail harness is required for each custom sensor used. See **Figure 2.2-2**

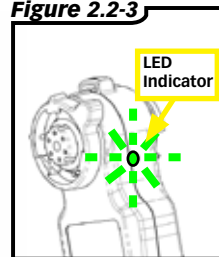
If wiring a 5V analog sensor:

- Connect the **Red** wire to **5V** input of your sensor.
- Connect the **Black** wire to the **Ground** input of your sensor.
- Connect the **White** wire the **Signal** output of your sensor.
-

Figure 2.2-2



Figure 2.2-3



IMPORTANT: the sensor used must require less than 60 mA of current power draw and be a 5V sensor. The pigtail will not work with 12V, or 3.3V sensors

If wiring a variable resistance type sensor:

- Connect the Black wire to the Ground input of your sensor
- Connect the White wire the Signal output of your sensor

NOTE: If your resistance sensor does not specify which wire is signal and ground then you can connect any wire to the black wire and any wire to the white wire.

IMPORTANT: It is recommended to heat shrink or electrical tape the red wire lead to prevent it from shorting out.

2.2.1 4-CHANNEL ANALOG MODULE: INTRODUCTION

UNIVERSAL FREQUENCY SENSOR WIRING

NOTE: The frequency input is only available if you purchased the 4-Ch Analog With Frequency Module kit. If you do not have the module harness with the frequency input connector, you will need to purchase 61301-16 modules harness to utilize a frequency input. See **Figure 2.2-4**

The frequency input pigtail (61301-18) is used to wire in a frequency signal or frequency sensor to the 4-ch analog module. Depending on the sensor that you are using, an external pull-up or pull-down resistor may be required.

- **Ground – Black/Green**
- **5V – Red/White**
- **12V – Red/Black**
- **Frequency Signal – Yellow**

Figure 2.2-4



IMPORTANT: It is recommended to heat shrink or electrical tape the red wire leads to prevent it from shorting out.

MOUNTING AND CONNECTING THE 4-CH ANALOG MODULE

- 1.** Install the Starter Cable and iDash 1.8. Refer to **“Starter Cable Installation”** on page <?>.
- 2.** Determine a mounting location for your 4-Ch Analog Modules.

TIP: Consider sensor harness length and Starter Cable length. Extension harnesses are available if necessary.

- 3.** Mount the B-Bus modules. Refer to **“B-Bus Module Mounting”** on page <?>.
- 4.** Install your sensors in the desired location.

Check that the Sensor Harness length is sufficient, otherwise harness extensions could be used (**Banks P/N: 61301-28, 61301-29**)

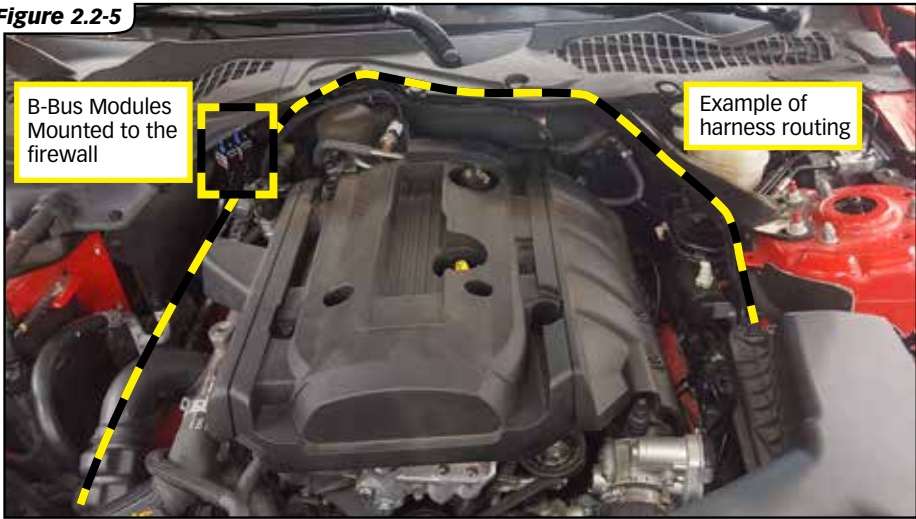
- 5.** Route the Sensor Harness from the 4-Ch Analog Module to the individual sensors. See **Figure 2.2-5**.

⚠ CAUTION

DO NOT mount to heat emitting objects.
DO NOT mount to rotating and moving components.
DO NOT mount to high voltage sources.
DO NOT mount to sharp edges.

2.2.2 4-CHANNEL ANALOG MODULE: INSTALLATION

Figure 2.2-5



6. Write down which sensor is connected to which branch of the Sensor Harness. See **Figure 2.2-6**.

Example 100psia pressure sensor to CH-C of 4-Ch Analog Module #1

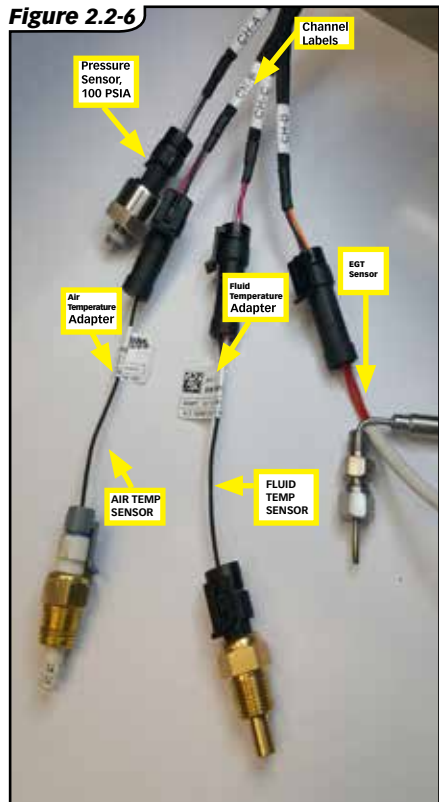
NOTE: Keep track of which module the harness is connected to if using more than one 4-ch Analog Module.

CONNECTION CHECK

Start up your iDash 1.8, then inspect the LED indicator for a green flashing light.

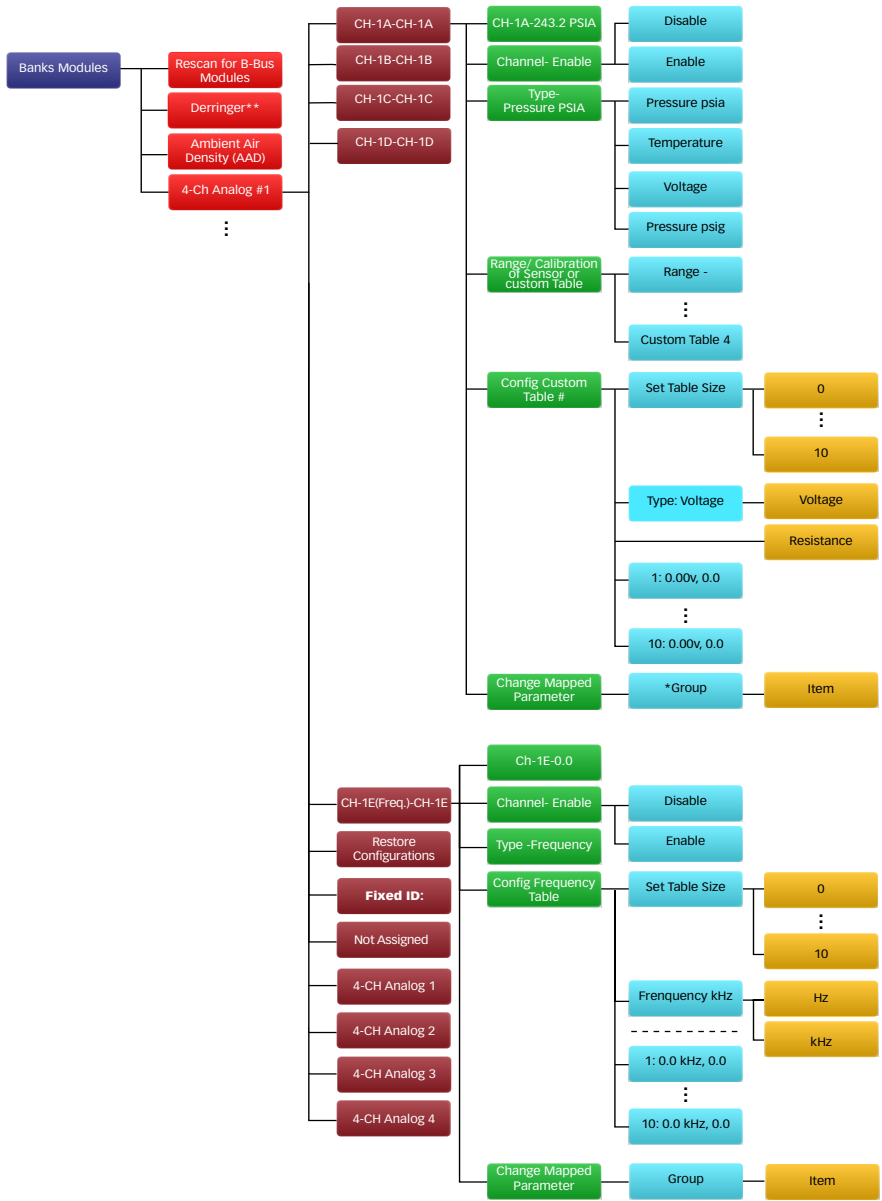
A green flashing light indicates good communication. Otherwise, the module will be off or it will be flashing red with a diagnostic trouble code. Refer to **"LED Error Code"** on page 42 for trouble code glossary.

Figure 2.2-6



2.2.3 4-CHANNEL ANALOG MODULE: CHANNEL CONFIGURATION

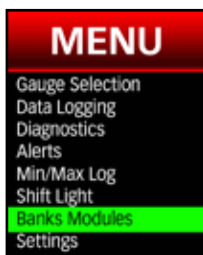
MENU TREE



2.2.3 4-CHANNEL ANALOG MODULE: CHANNEL CONFIGURATION

CONFIGURING SENSOR CHANNELS

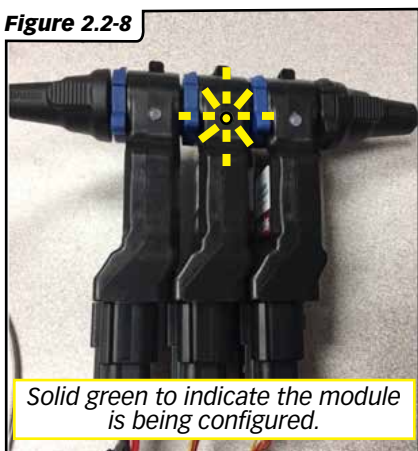
Figure 2.2-7



1. Go to "Menu" and select "Banks Modules." See Figure 2.2-7.

2. Select the module which you want to configure (See Figure 2.2-8). When you select the module on the iDash 1.8, the corresponding module's LED indicator will appear **solid green for 60 seconds** instead of blinking green to indicate which module you have selected.

Figure 2.2-8



NOTE: The modules numbers auto generate may not start off with module 1 and may not be consecutive.

Figure 2.2-9

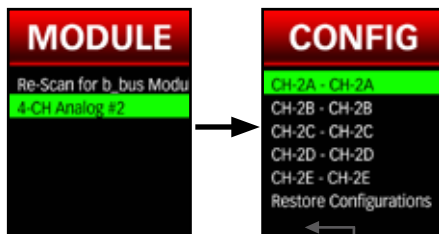


Figure 2.2-10

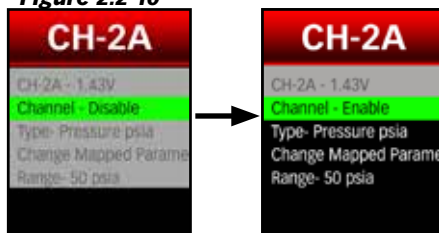
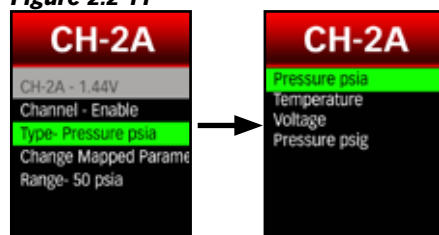


Figure 2.2-11



3. Enable the selected channel if set to "Disabled." See Figure 2.2-9.

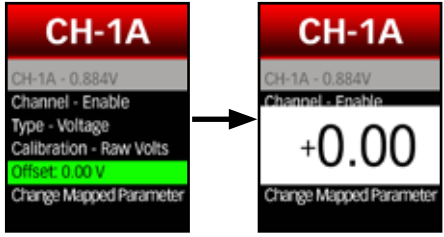
4. Select the sensor "Type" (Pressure [psia], Temperature, Voltage, Pressure [psig]). See Figure 2.2-10.

5. Select a "Range" (sensor calibration) from the pre-populated list or select a "custom table" (user configured calibration table). See Figure 2.2-11.

6. If your frequency is scaling correctly but the value itself is incorrect, you can offset the value to be higher or lower. Select "Offset" and enter the amount by which you would like it to be offset. See **Figure 2.2-12**.

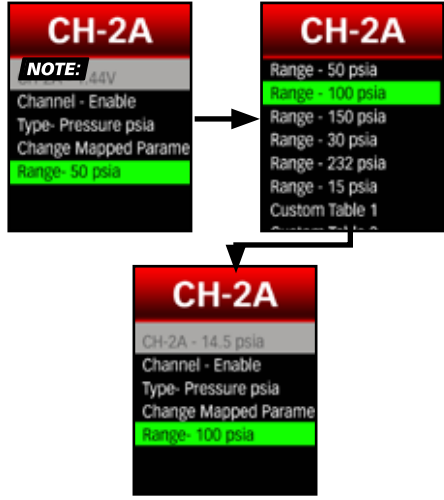
NOTE: This adjusted, offset value cannot go below 0 when reading raw voltage.

Figure 2.2-12



Refer to "**Create a New Calibration Table**" on page 36 for information on how to configure the custom tables.

Figure 2.2-13

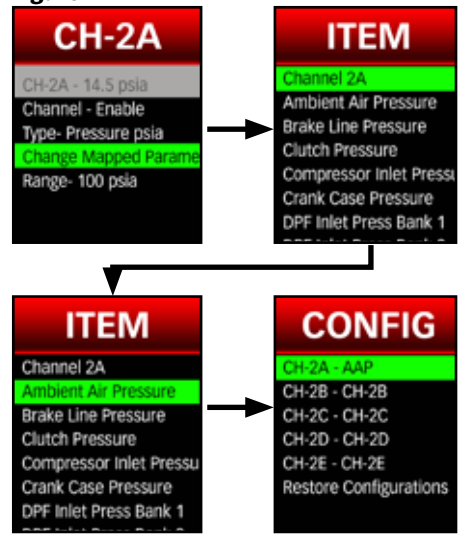


7. Map a parameter on the iDash 1.8 to the sensor connected. See **Figure 2.2-13**.

NOTE: The Banks 4-Ch Analog Module sensor overwrites the data from OBD-II.

8. Repeat process for each channel

Figure 2.2-14

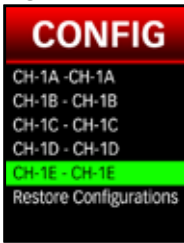


CONFIGURING FREQUENCY INPUT CHANNEL

Configuring the module's frequency input channel is very similar to configuring the previously discussed analog sensor channels; unlike the analog sensor channels, the frequency input channel's type will always be frequency and it will always be mapped to the "Frequency Table".

1. Navigate to the desired module's "CONFIG" menu as shown on the "Configuring Sensor Channels" section on page 35 and select "Channel E".

Figure 2.2-15



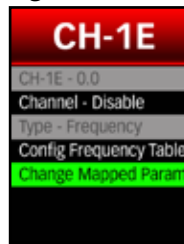
2. Enable or Disable the Channel by selecting the "Channel - Enable/Disable" options and selection "Enable" or "Disable" accordingly.

Figure 2.2-16



3. Map the frequency input channel to the desired parameter on the iDash 1.8.

Figure 2.2-17



4. The Frequency Table can be used to input a calibration curve of the sensor/signal being measured. See the "Frequency Table" section on page 37 for more details.

5. To designate how the channel interprets the reading, select "Capture Mode." See Figure 2.2-18. Select "Average," "Minimum," "Maximum," or "Summation." See Figure 2.2-19

Figure 2.2-18

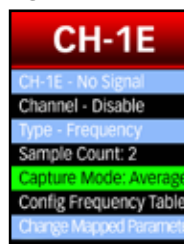


Figure 2.2-19



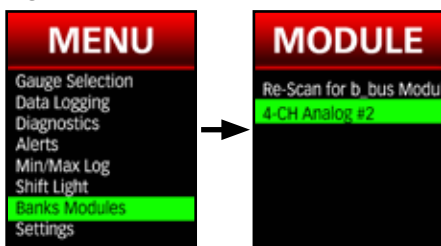
CREATE A NEW CALIBRATION TABLE

Custom calibration tables are used to convert your custom 5v analog or variable resistance sensor reading into properly scaled data. For example, it allows you to convert a 0v-5v throttle position sensor to read as 0%-100%. Refer to your sensors data sheet for what values to input into the calibration table. The sensor table can be based on volts or as resistance in ohms.

1. Go to "Menu" and select "B-Bus Modules." See **Figure 2.2-20**.

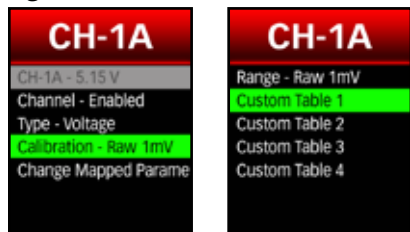
2. Select the module which you want to configure. See **Figure 2.2-21**.

Figure 2.2-20



3. Select the channel to create a custom table for; then, select "Calibration" and choose a "Custom Table" to be used.

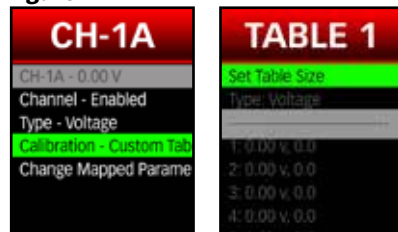
Figure 2.2-21



4. Select "Custom Table" to edit the table.

NOTE: Custom Tables can simultaneously be used by multiple channels

Figure 2.2-22



5. Get your sensor's calibration table.

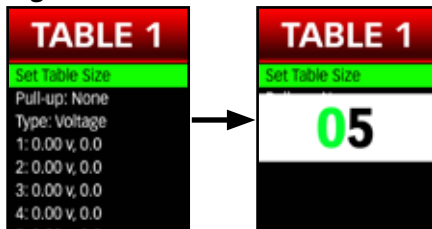
6. Select "Set Table Size" to enter points from your sensor's calibration curve.

See **Figure 2.2-22**.

A. If the calibration curve is linear (a straight line on a graph) then set the table size to two points at minimum.

B. If the calibration curve is non-linear, set the table size to 10 points for maximum accuracy.

Figure 2.2-23



7. If your sensor is of a resistive type such as a thermistor or a potentiometer, then a pull-up resistor is required in order to read the sensor. Select "Pull-up" and choose an appropriate pull-up resistor value.

NOTE: Pull-up resistor value should be close to the sensor's reading at the midpoint of the desired range in order to achieve better resolution over that range.

8. Select "Type" in order to choose the desired table type. Selecting "Voltage" type means that the x-axis/first column of the table represents voltage values; selecting "Resistance" type means that the x-axis/first column of the table represents resistance values.

9. Enter the points from the calibration curve of your sensor.

All “X” axis points inputted will be either voltage or resistance depending on the “**Type**” selected on the previous step. “Y” points are the information of interest (Ex. Temperature or pressure).

Figure 2.2-24



Figure 2.2-25



Figure 2.2-26



FREQUENCY TABLE

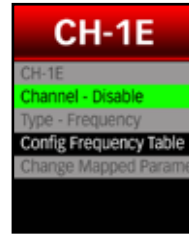
Check your sensor’s datasheet for a calibration curve/table and setup information. The Frequency Table is exclusively used for the frequency input channel.

NOTE: Some frequency output type sensors may require a pull-up resistor on their output line; if this is the case for your sensor, the pull-up resistor must be added externally as no

configurable pull-ups are available for the Frequency Input Channel.

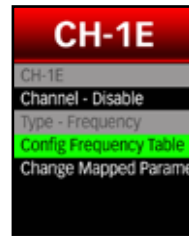
1. Navigate to the Frequency Channel’s configuration menu (“**Channel E**”) as described in the “**Configuring Frequency Input Channel**” section on page 36.

Figure 2.2-27



2. Select “**Config Frequency Table**” to enter the frequency table configuration menu.

Figure 2.2-28



3. Select “**Set Table Size**” to enter point’s from your sensor’s calibration curve.

A. If the calibration curve is linear (a straight line on the graph), then set the table size to two points at minimum.

B. If the calibration curve is non-linear, set the table size to 10 points.

NOTE: The minimum table size is 2 points and the maximum table size is 10 points.

Figure 2.2-29



4. Set the frequency range of the table by selecting “**Frequency: Hz/KHz**” and choosing “**Hz**” or “**KHz**” accordingly. This determines the range of the x-axis of your table. If “**Hz**” is selected, the x-axis can range from 0 – 9999Hz; when “**KHz**” is selected, the x-axis can range from 0 – 9999KHz.

Figure 2.2-30



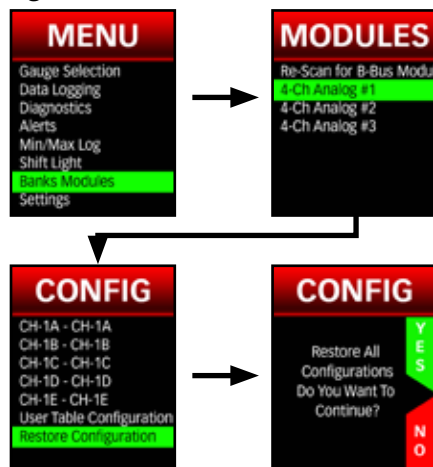
5. Enter the points from the calibration curve of your frequency output

RESTORE MODULE CONFIGURATION

The module configuration, which is stored in the module’s own on-board memory can be restored to factory defaults.

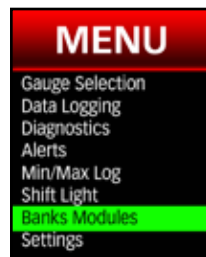
1. Go to “**Menu**” and select “**Banks Modules**”. See **Figure 2.2-31**
2. Select “**Restore Configurations**” and confirm by selecting “**yes**” when prompted for confirmation.

Figure 2.2-31



ASSIGN FIXED MODULE ID

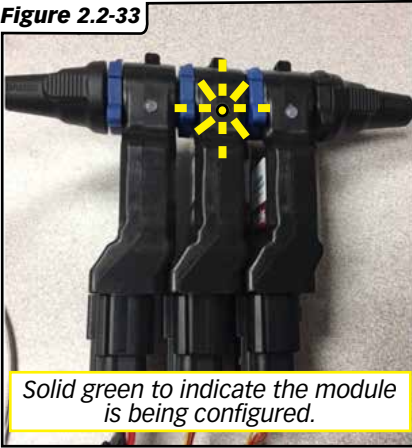
Figure 2.2-32



1. Go to “**Menu**” and select “**Banks Modules**.” See **Figure 2.2-32**.

2. Select the 4 Channel module that you want to configure (See **Figure 2.2-33**). When you select the module on the iDash 1.8, the corresponding module's LED indicator will appear **solid green** for **60 seconds** instead of blinking green to indicate.

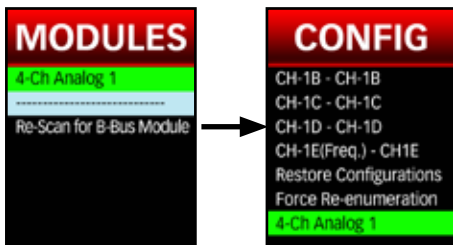
Figure 2.2-33



NOTE: The modules numbers auto generate may not start off with module 1 and may not be consecutive.

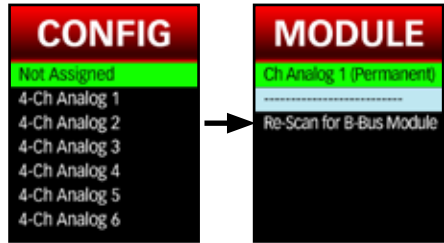
3. Once in the configuration section of your selected module, select **"Fixed ID."** By default, every module will be **"Not Assigned."** See **Figure 2.2-34**.

Figure 2.2-34



4. Select what number you'd like to assign to the selected module, from 1-6. Once a number is selected, the word **"Permanent"** will be visible in the **Modules** menu, indicating that the module has been assigned a number. See **Figure 2.2-35**.

Figure 2.2-35



2.2.4 4-CHANNEL ANALOG MODULE: DIAGNOSTICS

LED ERROR CODE

When faults are detected, the B-Bus Module will flash a diagnostic code. These diagnostic codes are comprised of 2 digits. Each digit is expressed by the flashing red LED and is separated by a flash of green light.

EXAMPLE

Trouble Code: 1:4
LED off (4 sec) - Red (0.5 sec) - Green (1 sec) - Red (0.5 sec) - Red (0.5 sec) - Red (0.5 sec) - Red (0.5 sec) - LED off (4 sec)
 - [Displays next code if any, then repeat after cycling through all triggered codes]

Once you have written down all diagnostic codes displayed, note the following table for a description of the code.

Refer to "3.2 BANKS BUS OPERATION: General Diagnostics" on page 54 for diagnosing the problem.

Or call customer support for assistance: (888) 839-5600

Figure 2.2-29

Trouble Code:	Description:
1.1	BBIII Communication Error
1.2	BBus VIGN Low Error
1.3	Module Temperature High Error
1.4	5V Supply Error
2.1	5V Sensor Supply Error
2.2	12V Sensor Supply Error

2.2.5 4-CHANNEL ANALOG MODULE: TECHNICAL SPECIFICATIONS

Figure 2.2-30

Output Data Rate	20 Hz
Temp. Range:	-40 to 105°C
5V Sensor Supply Current (Overall):	240 mA
5V Sensor Supply Current (per Channel):	60 mA
Module Current Consumption:	25 mA
Analog Channels Resolution:	12 bit
Analog Input Range	0-5v
Configurable Pull-ups	2.08k Ω 10.2k Ω 1.7k Ω

2.3 4-CHANNEL THERMOCOUPLE MODULE: INTRODUCTION

2.3.1 4-CHANNEL THERMOCOUPLE MODULE: INTRODUCTION

INTRODUCTION

1. What is the 4-Channel Thermocouple Module?

This B-Bus Module allows you to add four thermocouple temperature sensors to your vehicle and display them to the iDash 1.8 or record the data (if using the iDash 1.8 with datalogging).

2. What are the capabilities of this module?

- Reads 4 thermocouple sensors capable of 0 °F - 1800 °F
- Chain up to 4 modules for a total of 16 thermocouple readings
- Assign each sensor to any pre-defined temperature parameter
- On-board memory stores user configurations
- On-Board diagnostics to detect thermocouple open circuits and other faults

3. What sensors are compatible with this module?

A. Banks' Plug-and-Play Closed junction thermocouple, 0-1800 F (PN 63064)

2.3.2 4-CHANNEL THERMOCOUPLE MODULE: INSTALLATION

MOUNTING AND CONNECTING

1. Install the Starter Cable and iDash 1.8. Refer to “**Starter Cable Installation**” on page 10.

2. Determine a mounting location for your 4-Ch thermocouple Module(s).

NOTE: Consider sensor harness length and Starter Cable length

3. Mount the B-Bus modules. Refer to “**B-Bus Module Mounting**” on page 20.

4. Install your sensors in the desired location. The Banks thermocouple sensor comes with a self-crimp ferrule. Make sure the tip of the thermocouple is inserted into the fluid, air or exhaust stream. The depth of the sensor is adjustable from 0” to 1”. Once the sensor is fully installed the ferrule is crimped and the depth is no longer adjustable.

NOTE: Check that the Sensor Harness length is sufficient. If it is not you may need to relocate your Banks module using a B-Bus Under Hood Extension Cable (61300-23 , 61300-24 or 61300-25)

5. Route the Thermocouple leads from the 4-Ch Thermocouple Module harness. See **Figure 2.2-2**.



CAUTION

DO NOT mount to heat emitting objects.
DO NOT mount to rotating and moving components.
DO NOT mount to high voltage sources.
DO NOT mount to sharp edges.

6. Write down which sensor is connected to which channel of the Thermocouple Harness.

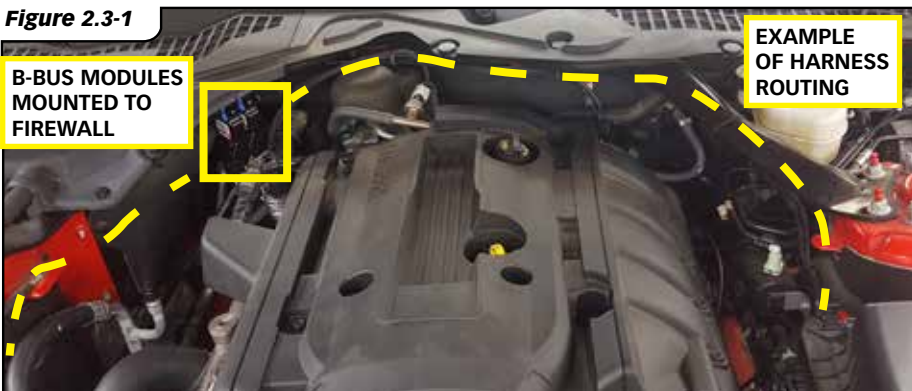
Example: Exhaust Gas Temp 1 to CH-B

NOTE: Keep track of which module the harness is connected to if using more than one 4-ch thermocouple Module.

CONNECTION CHECK

Start up your iDash 1.8, then inspect the LED indicator for a green flashing light. A green flashing light indicates good communication. Otherwise, the module will be off or it will be flashing red with a diagnostic trouble code. Refer to “**LED Error Code**” on page 40 for trouble code glossary.

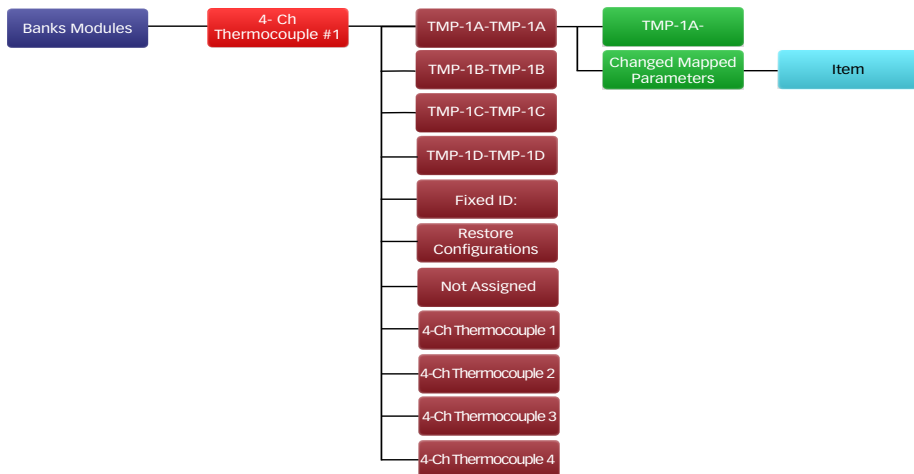
Figure 2.3-1



Intro	B-Bus Documentation
Configuration	
Install	
Intro	4-Channel Module
Install	
Tech Specs	
Diagnostics	
Firmware Updates	B-Bus Operation
General Diagnostics	
Safety	General Information
Disclaimer	

2.3.3 4-CHANNEL THERMOCOUPLE MODULE: CHANNEL CONFIGURATIONS

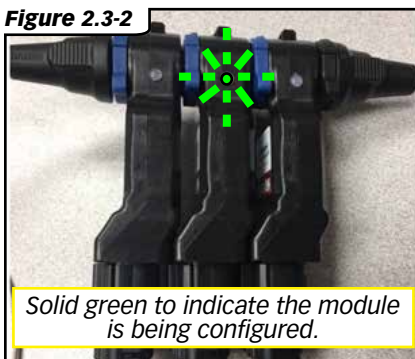
MENU TREE



CONFIGURING SENSOR CHANNELS

1. Go to “Menu” and select “Banks Modules.” See Figure 2.3-3.

Figure 2.3-2



2. Select the module which you want to configure (See Figure 2.3-3). When you select the module on the iDash 1.8, the corresponding module’s LED indicator will appear **solid green for 60 seconds** instead of blinking green to indicate which module you have selected.

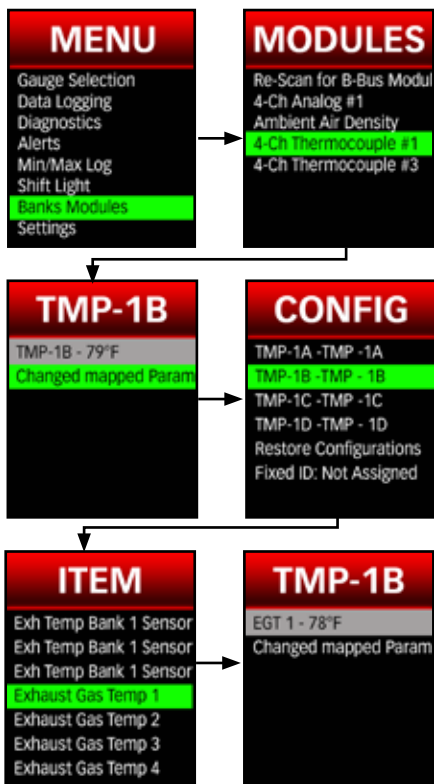
NOTE: The modules numbers auto generate may not start off with module 1 and may not be consecutive.

3. Select the channel that you want to configure.
4. The channel is auto enabled if a thermocouple is installed. Check the live value in the grey box to confirm thermocouple installation and that temperature value is reasonable. If you do not see the live value, see the 4 ch Thermocouple troubleshooting section.

5. Select “Change Mapped Parameter” to configure the channel to the specific location where the thermocouple is installed.

6. Select the installed sensor location from the pre-populated list or temperatures.

Figure 2.3-3

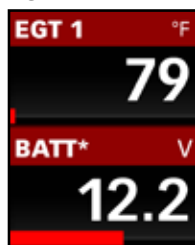


7. Press back to return to the Thermocouple Module setup screen and repeat configuration sequence for all channels and all modules.

NOTE: If selected parameter already exists on OBD-II, the Bank 4-CH Thermocouple sensor overwrites the original OBD-II data.

8. Recommended: Set your layout to display your newly configured sensor to confirm proper channel mapping and check for sensor accuracy.

Figure 2.3-4

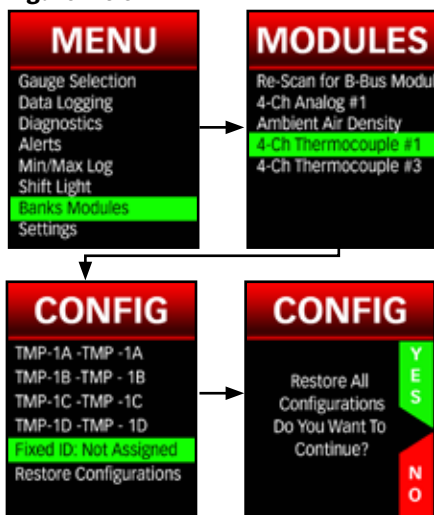


RESTORE MODULE CONFIGURATION

The module configuration, which is stored in the module's own on-board memory can be restored to factory defaults.

1. Go to **"Menu"** and select **"Banks Modules"**. See **Figure 2.3-5**
2. Select **"Restore Configurations"** and confirm by selecting **"yes"** when prompted for confirmation.

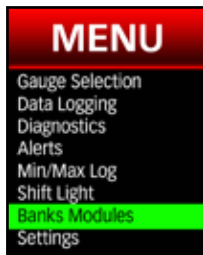
Figure 2.3-5



ASSIGN FIXED MODULE ID

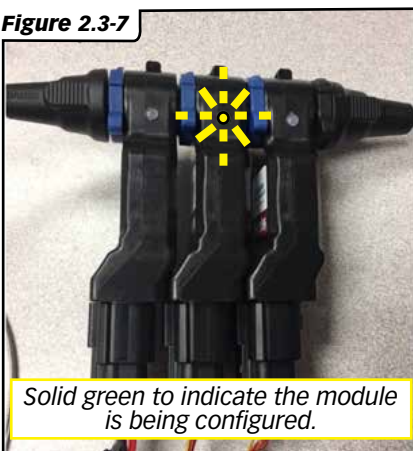
1. Go to "Menu" and select "Banks Modules." See **Figure 2.2-29**.

Figure 2.3-6



2. Select the thermocouple module that you want to configure (See **Figure 2.2-30**). When you select the module on the iDash 1.8, the corresponding module's LED indicator will appear **solid green for 60 seconds** instead of blinking green to indicate.

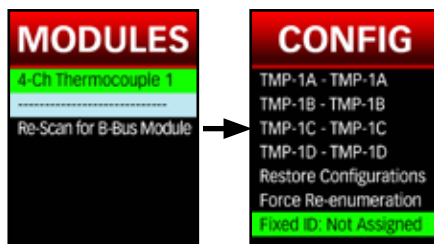
Figure 2.3-7



NOTE: The modules numbers auto generate may not start off with module 1 and may not be consecutive.

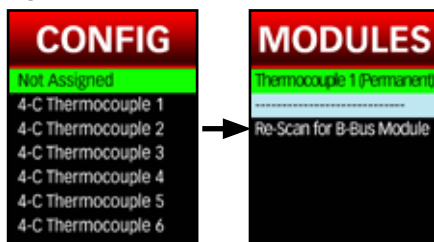
3. Once in the configuration section of your selected module, select "**Fixed ID.**" By default, every module will be "Not Assigned." See **Figure 2.3-8**.

Figure 2.3-8



4. Select what number you'd like to assign to the selected module, from 1-6. Once a number is selected, the word "**Permanent**" will be visible in the **Modules** menu, indicating that the module has been assigned a number. See **Figure 2.3-9**.

Figure 2.3-9



2.3.4 4-CHANNEL THERMOCOUPLE MODULE: DIAGNOSTICS

LED ERROR CODE

When faults are detected, the B-Bus Module will flash a diagnostic code. These diagnostic codes are comprised of 2 digits. Each digit is expressed by the flashing red LED and is separated by a flash of green light.

EXAMPLE

Trouble Code: 1:4

LED off (4 sec) - Red (0.5 sec) - Green (1 sec) - Red (0.5 sec) - Red (0.5 sec) - Red (0.5 sec) - Red (0.5 sec) - LED off (4 sec)

- [Display next code if multiple codes have triggered, they are displayed one by one, and then the cycle is repeated.]

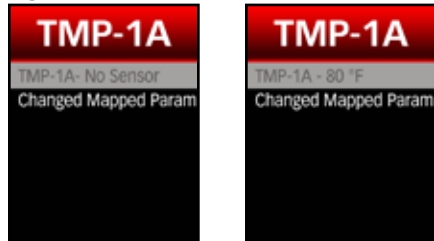
Once you have written down all diagnostic codes displayed, refer to the following table for a description of the code.

Refer to “**3.2 BANKS BUS OPERATION: General Diagnostics**” on **page 46** for diagnosing the problem or call customer support for assistance: (888) 839-5600

TROUBLESHOOTING

- Error code 1,1: refer to section 3.2.
- Error code 1,2: check the connections and ensure your Banks Bus system is adequately powered.
- Error code 1,3: make sure the module is not located in a very hot environment (ie: under hood and near exhaust components).
- Channel/reading not showing up: the Thermocouple Module can detect when no thermocouple is present on a specific channel. If your thermocouple is connected but no reading shows up, check connections and thermocouple for an open circuit.

Figure 2.3-6



- Temperature reading is not varying or incorrect: check the connections and the thermocouple itself for a short circuit.

Trouble Code:	Description:
1.1	BBIII Communication Error
1.2	BBus VIGN Low Error
1.3	Module Temperature High Error

Section 3

BANKS BUS

OPERATION

3.1 BANKS BUS OPERATION: FIRMWARE UPDATE:

To ensure that your Banks Bus system is operating as designed, we recommended checking for firmware updates for your iDash 1.8 gauges or B-Bus Modules.

1. Visit www.bankspower.com/update
2. Click on the corresponding product that you would like to update. See **Figure 3.1-1**.

Figure 3.1-1



3. Insert a microSD Card into your computer using a USB-to-microSD card reader or similar device. See **Figure 3.1-2**.

Figure 3.1-2

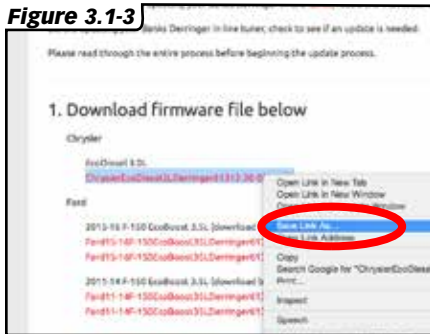


TIP: MicroSD card included if data logging option purchased. You can use any microSD card up to 32GB for firmware updates.

4. **Right click** on the appropriate firmware and select **"Save Link As..."** See **Figure 3.1-3**.

TIP: You can save several updates for multiple products on the same microSD card.

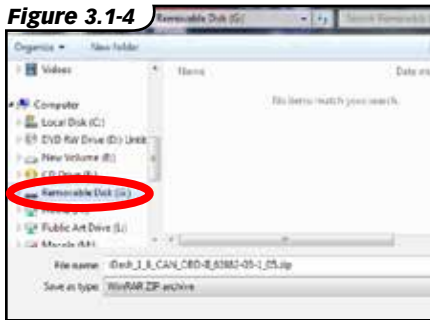
Figure 3.1-3



5. Navigate to the microSD card drive to save the file. This can be found under the **"Computer"** section on the left section of the window. The microSD card is typically labeled **"Removable Disk."**

NOTE: The disk letter will be different from computer to computer. See **Figure 3.1-4**.

Figure 3.1-4



6. Click the **"Save"** button to save the firmware file to the microSD card. See **Figure 3.1-5**.

- DO NOT change the file name of the firmware.
- Take note of the file name so you can select the correct firmware later. See **Figure 3.1-5**.

NOTE: DO NOT save the file in a folder.

Figure 3.1-5

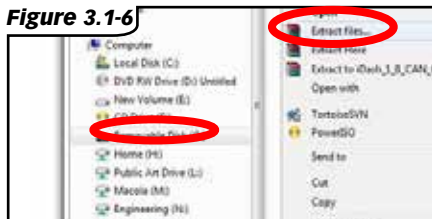


7. (iDash 1.8 step ONLY) Extract the firmware from the zip folder to your microSD card.

A. Open a file browser and navigate to your microSD card folder.

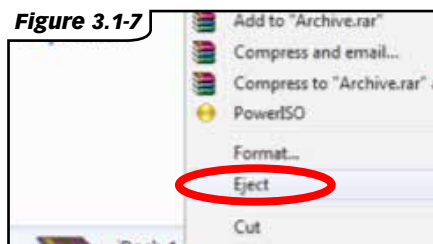
B. Right click on the **".zip"** file that you just downloaded, then click on **"Extract Here"**. See **Figure 3.1-6**.

Figure 3.1-6



8. Eject and remove the microSD card from the computer by **right-clicking** on the removable drive and clicking on **"Eject"**. See **Figure 3.1-7**.

Figure 3.1-7



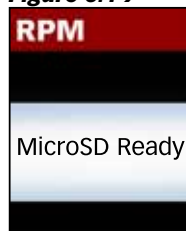
9. Insert the microSD into the iDash 1.8, and you will see a notification stating that the microSD card is synced. See **Figure 3.1-8**, **Figure 3.1-9**.

NOTE: Leave the microSD inserted during the update process.

Figure 3.1-8



Figure 3.1-9



NOTE: IF UPDATING B-BUS

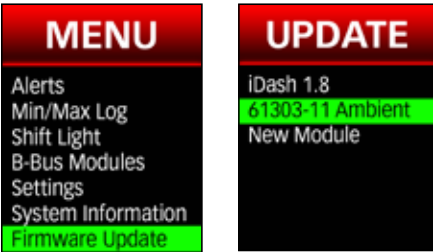
MODULE(S), any iDash 1.8 connected could be used for updating the B-Bus Module(s).

IF UPDATING THE IDASH 1.8, each iDash 1.8 must be updated separately.

10. Go to the main "MENU," then select "Firmware Update." See **Figure 3.1-10**.

11. Scroll down and select the B-Bus Module/iDash 1.8 that you want to update. See **Figure 3.1-10**.

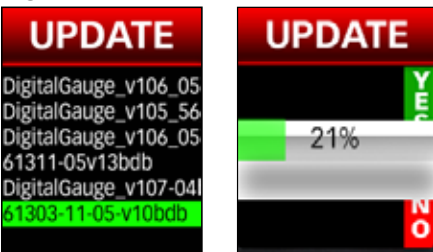
Figure 3.1-10



12. Scroll down and select the latest firmware version you downloaded. See **Figure 3.1-11**. The update process will begin and show a progress bar. See **Figure 3.1-11**.

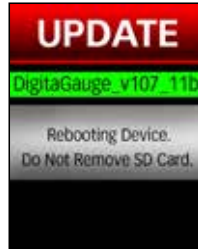
You will get an error if you select a firmware that is not compatible with the selected module.

Figure 3.1-11



13. If updating an iDash 1.8, it will need to reset. See **Figure 3.1-12**.

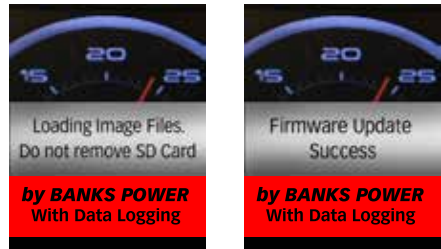
Figure 3.1-12



If engine is off during iDash 1.8 update, you may need to press a button to wake up the iDash 1.8 to finish the update.

When the iDash 1.8 wakes back up, it will begin to load new files (30-45 seconds). See **Figure 3.1-13**. Upon completion, a message box will state "Firmware Update Success." It is now safe to remove the microSD card. See **Figure 3.1-16**.

Figure 3.1-13



14. Repeat the process (**Steps 9-13**) for all iDash 1.8's or connected B-Bus Modules.

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General Diagnostics	B-Bus Operation
Safety	General Information
Disclaimer	General Information

3.2 BANKS BUS OPERATION: GENERAL DIAGNOSTICS



CAUTION



Disconnect iDash 1.8 from OBD-II. This will prevent accidental damage to electronics.

Inspect iDash 1.8 6-pin connector.

- Remove connector and lightly tug on each wire to ensure pins are properly seated in connector housing.
- Ensure connectors are properly mated to the iDash 1.8.

Check Module Diagnostics

To read module codes go to :

-Menu → Diagnostics → *Select module*

Reference your particular module in Section 2 to get more information about module fault codes.

Communication Error

CAN Termination

- Ensure only **one** in cab terminator (HW Rev1) or in cab jumper (HW Rev2) is installed on the iDash 1.8, and remove all extra termination jumpers.
- Ensure the Banks module has either a black Terminator cap or AAD module connected

Inspect B-Bus 6-pin connector.

- Ensure that connector is in the locked position.
- If not in the locked position, ensure that connectors are properly mated.
- Check for any damage to the key on the mating connectors.
- Check connector pins for any damage (i.e. bent pins).

Section 4

GENERAL

INFORMATION

4.1 GENERAL INFORMATION: SAFETY PRECAUTIONS

Always observe safety precautions!

Gale Banks Engineering urges you to always follow safety precautions. These pages include important information intended to prevent property damage and personal injury to yourself and/or others. *Always be sure you carefully read and understand each precaution before moving on to the rest of the manual.*

HANDLING PRECAUTIONS

- Never try to disassemble or modify the iDash 1.8 in any way.
- Do not wipe with a wet cloth.

The iDash 1.8 contains combustible and metal parts, so water and foreign substances can cause malfunction and create the risk of overheating due to wiring insulation failure, short circuiting, smoke, fire, combustion, and electric shock.

OUTDOOR PRECAUTIONS When outdoors, avoid using the iDash 1.8 anywhere it might get wet with rainwater or other moisture, and/or in dusty conditions. The iDash 1.8 is not water resistant or dust resistant. Water and dust create the risk of fire and smoke, combustion, electric shock, resulting in damage and malfunction. Never touch the iDash 1.8 or its electronic accessories with wet hands. This will create the risk of electric shock, short circuiting or insulation failure, fire, smoke and combustion. Also, never allow the connector plugs to become wet.

Keep microSD cards out of the reach of small children as they may be swallowed. If you think this might have happened, call 911 or consult your local emergency services (police, fire, or ambulance) immediately. Do not touch the iDash 1.8 or its OBDII cable if there is lightning in your area. Lightning strikes create the risk of electric shock.

IN-VEHICLE PRECAUTIONS

Use this unit in 12VDC negative-ground vehicles only. **WARNING:** Below 32° F (0° C) or above 140° F (60° C), the iDash 1.8 may be susceptible to damage as a result of extended direct exposure to sunlight, heat, or extreme cold. If the vehicle will be subjected to these conditions, we highly recommend that you remove the iDash 1.8 from its mounting location. Gale Banks Engineering is not responsible for damage to the iDash 1.8 resulting from exposure conditions. Always drive in accordance with traffic rules and regulations. Failure to do so may result in traffic accident and injury to yourself and/or others. Never take your eyes off the road to adjust the iDash 1.8 settings or change screens while driving. Doing so can result in a traffic accident. Always stop your vehicle in a safe place before operating the unit. Only look briefly at the iDash 1.8 screen images while operating your vehicle. Doing otherwise can take your mind off the road and create the risk of a traffic accident and injury to yourself and/or others. Do not set volume level too high. Blocking out the sound of other vehicles and traffic can create the risk of a traffic accident. Never install the iDash 1.8 in a location where it will interfere with operation of the motor vehicle, block the driver's view, or where it may endanger passengers. Installing the unit near the shift lever, brake pedals or other vehicle controls, or blocking front, side or rear vision, can create the risk of a traffic accident and cause injury to yourself and/or others. Never install the iDash 1.8 where it can interfere with airbag operation. Do not install in a location where deployment of the airbag might cause the iDash 1.8 or its parts to become projectiles. Also, be sure to check installation precautions for your exact vehicle model and year.

Make sure to install the iDash 1.8 mount so it does not come off or fall down. Clean off any dirt and wax from the installation location, and install securely.

4.2 GENERAL INFORMATION: DISCLAIMER

DISCLAIMER OF LIABILITY & WARRANTY

Gale Banks Engineering Inc. (GBE), and its distributors, employees, and dealers (hereafter "SELLER") shall in no way be responsible for the product's proper use and service. The BUYER hereby waives all liability claims.

The BUYER acknowledges that he/ she is not relying on the SELLER's skill or judgment to select or furnish goods suitable for any particular purpose and that no liabilities extended beyond the description on the face hereof and the BUYER hereby waives all remedies or liabilities, expressed or implied, arising by law or otherwise, (including without any obligations of the SELLER with respect to fitness, merchantability, and consequential damages) whether or not occasioned by the SELLER's negligence. The BUYER is responsible to fully understand the capability and limitations of his/her vehicle according to manufacturer specifications and agrees to hold the SELLER harmless from any damage resulting from the failure to adhere to such specifications.

The SELLER disclaims any warranty and expressly disclaims any liability for personal injury or damages. The BUYER acknowledges and agrees that the disclaimer of any liability for personal injury is a material term for this agreement and the BUYER agrees to indemnify the SELLER and to hold the SELLER harmless from any claim related to the item of the equipment purchased. Under no circumstances will the SELLER be liable for any damages or expenses by reason of the use or sale of any such equipment.

The BUYER is responsible to obey all applicable federal, state, and local laws, statutes, and ordinances when operating his/her vehicle, and the BUYER agrees to hold SELLER harmless from any violation thereof.

The SELLER assumes no liability regarding the improper installation or misapplication of its products. It is the BUYER's responsibility to check for proper installation and if in doubt, contact the manufacturer. The BUYER is solely responsible for all warranty issues from the automotive manufacturer.

The use of this device signifies automatic approval of these conditions.

GALE BANKS ENGINEERING LIMITED WARRANTY

Please see enclosed warranty information card, or go to www.bankspower.com/support/warranty, for warranty information regarding your product. THIS WARRANTY APPLIES ONLY TO THE ORIGINAL CONSUMER PURCHASER OF THIS PRODUCT.

In the event of a defect, SELLER will, at its discretion, repair or replace the hardware product with a product of like kind or quality, which may be new or reconditioned, with no charge to the purchaser for parts or labor. SELLER's limit of liability under this limited warranty shall be the actual cash value of the product at the time the purchaser returns the product to SELLER for repair, less a reasonable amount for usage, as determined by SELLER in its sole discretion. The repaired or replaced product will be warranted for 90 days from the date of return shipment, or for the balance of the original warranty, whichever is longer.

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	Intro

SELLER warrants that the software included in hardware products will be free from defects in the media for a period of 30 days from the date of shipment and will substantially conform to the then current user documentation provided with the hardware products (including updates thereto). SELLER's sole obligation shall be the correction or replacement of the media or the software so that it will substantially conform to the then-current user documentation. SELLER does not warrant the software will meet purchaser's requirements or that its operation will be uninterrupted, error-free or virus-free. The purchaser assumes the entire risk of using the software.

PURCHASER'S EXCLUSIVE REMEDY UNDER THIS WRITTEN WARRANTY OR ANY IMPLIED WARRANTY SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT, AT SELLER'S OPTION, OF ANY DEFECTIVE PART OF THE UNIVERSAL iDash 1.8 OR ACCESSORIES WHICH ARE COVERED BY THIS WARRANTY. REPAIRS UNDER THIS WARRANTY SHALL ONLY BE MADE BY SELLER AT ITS FACILITY. ANY REPAIRS BY ANYONE OTHER THAN SELLER WILL VOID THIS WARRANTY.

For repair or replacement of the SELLER iDash 1.8 product the purchaser must obtain a Return Materials Authorization (RMA) number from SELLER Technical Support, prior to shipping. The purchaser must return the product postpaid with a copy of the original sales receipt, purchaser's return address and the RMA number clearly printed on the outside of the package to the SELLER Service Center address provided by SELLER with the RMA number. SELLER reserves the right to refuse to provide service free-of-charge if the sales receipt is not provided.

If the information contained in it is incomplete or illegible or if the serial number has been altered or removed. SELLER will not be responsible for any losses or damage to the product

incurred while the product is in transit or is being shipped for repair. Insurance is recommended. SELLER recommends using a trackable shipping service like UPS or FedEx when returning a product for service.

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EXCLUSIONS. The following are excluded from the warranty coverage: **(a)** periodic maintenance and repair or replacement of parts due to normal wear and tear; **(b)** finishes; **(c)** installations or defects resulting from installation; **(d)** any damage caused by **(i)** shipping, misuse, abuse, negligence, tampering, moisture, fluids, proximity or exposure to heat, or improper use; **(ii)** disasters such as fire, flood, wind, and lightning; **(iii)** unauthorized attachments or modification; **(e)** service performed or attempted by anyone other than SELLER; **(f)** any product, components or parts not manufactured by SELLER; **(g)** that the receiver will be free from any claim for infringement of any patent, trademark, copyright or other proprietary right, including trade secrets; **(h)** The opening, dismantling or repairing of this product by anyone other than SELLER will void this warranty.

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SAFETY INFORMATION

DO NOT USE THE iDASH 1.8 NEAR WATER OR IN AN ELECTRICAL STORM AS THIS COULD LEAD TO AN ELECTRICAL SHOCK. DO NOT USE THE iDASH 1.8 NEAR A NATURAL GAS LEAK.

Check local regulations for disposal of electronic products.

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