



BULLY DOG

#1 IN PERFORMANCE

INSTALLATION MANUAL



Pyrometer Probe Kit

Part #

PCH with Pyrometer Lead

40390

Works with the following products

40410 Triple Dog GT Gas

40420 Triple Dog GT Diesel

40400 Watch Dog (white)

40402 Watch Dog (black)

40300 Performance Management Tool

INTRODUCTION

The Pyrometer Probe Kit includes all the parts necessary to obtain exhaust gas temperatures and transmit those exhaust gas temperatures to a Triple Dog GT, a Watchdog or PMT. This product is not meant for use with any other monitoring units.

What does a pyrometer probe measure?

A pyrometer probe is used to measure the temperature of the exhaust gas in the exhaust manifold or shortly after the turbo charger. This information helps the driver determine if their vehicle is operating at safe temperatures. With that information the driver can prevent damage to a engine or turbo charger by safely backing out of the throttle before any real damage occurs.

This instruction manual is meant to help make the decision of where to install the pyrometer probe; in which that location will be either pre or post turbo charger. It will also help make the decision of what temperatures are deemed "safe" for the vehicle application.

Installation Difficulty

This installation can be difficult depending on the level of knowledge of the installer. This installation does require that the exhaust manifold or the post turbo exhaust downpipe is drilled and tapped. It is recommended that professional assistance is utilized if the installer does not have experience with drilling and tapping.

BILL OF MATERIALS

The list below includes by name the major parts included in the Pyrometer Probe kit. The tools list indicates all of the tools necessary to complete the install.

BILL OF MATERIALS

PCH Board
Pyrometer Cable
(2) self-tapping sheet metal screws
Zip ties
Velcro pad

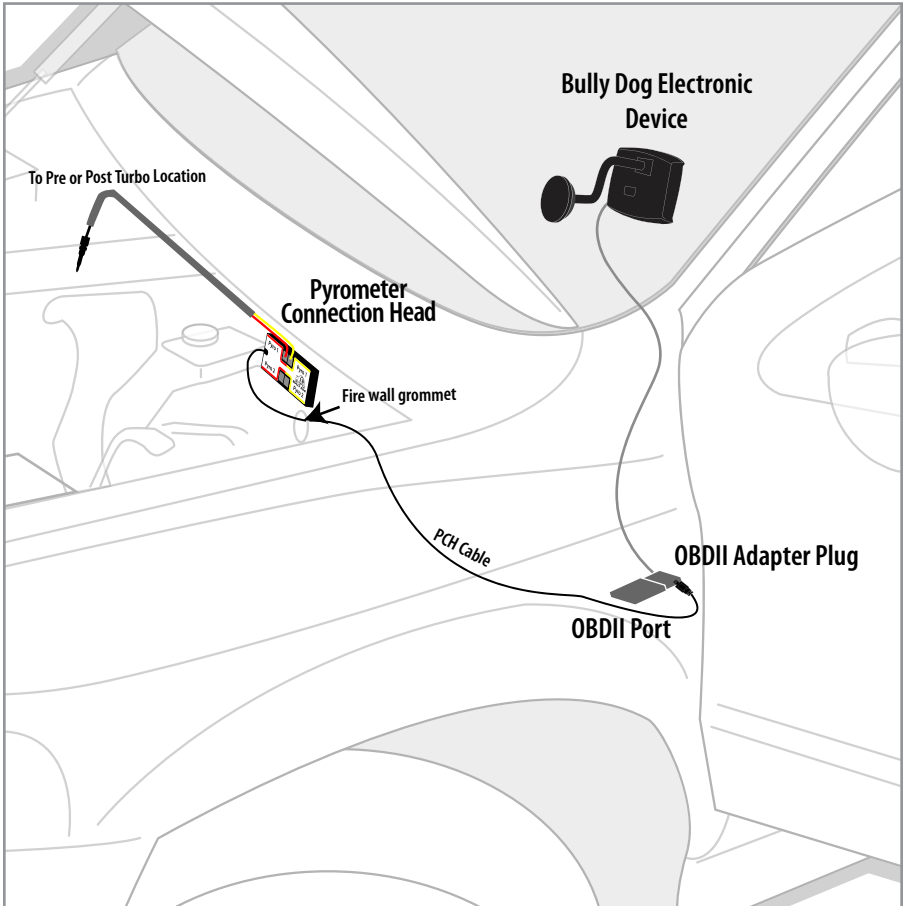
TOOLS NEEDED

- Flat Head Screwdriver
- Phillips Head Screwdriver
- Electric Drill
- $\frac{5}{16}$ " Drill Bit
- $\frac{1}{8}$ " Pipe Tap
- $\frac{9}{16}$ " Wrench
- $\frac{5}{8}$ " Wrench



INSTALLATION OVERVIEW

Illustrated below is a visual overview of the installation of a Pyrometer Probe Kit and how the kit ties in with the OBD II block of a Triple Dog GT, a PMT, or a Watchdog. The rest of this manual will provide specific instructions on the installation of these parts.



POST-TURBO VS. PRE-TURBO

What are the determining factors in deciding whether to install the pyrometer probe in a pre-turbo location or a post-turbo location?

The location of the pyrometer probe along the stream of exhaust gas will make a considerable difference in the temperatures that will display on the GT or PMT. An incorrect interpretation of the readings can lead to vehicle damage, so it is very important to have a clear understanding of the differences between Pre-turbo and Post-turbo.

Consider these factors:

1. Difficulty of the install: Before installing inspect the exhaust manifold and the turbo down pipe of the vehicle and determine which location will make for the easiest install. Consider while inspecting these locations that the pyrometer probe should be installed 3" from the turbo inlet or exit give or take 1". Many vehicles will have an obviously easier position for installation.

2. What is the vehicle engine configuration: If the vehicle is a V8, and the intention is to install a pre-turbo pyrometer, then really two pyrometers should be installed, one pyrometer in each exhaust manifold bank to detect any difference between each bank of cylinders. If the vehicle engine is a strait six like the Dodge Cummins then installing pre-turbo or post turbo can be done easily and mounting in both locations is also very possible.

3. How much horsepower is the vehicle running: If the vehicle is running significantly more horsepower than stock (100+ horsepower) it is strongly advised that both a pre-turbo pyro probe and post-turbo pyro probe be installed. Both pyrometers should be installed within the recommended parameters distances from the turbo charger.

What is a safe temperature range when watching either pre-turbo or post-turbo temperatures?

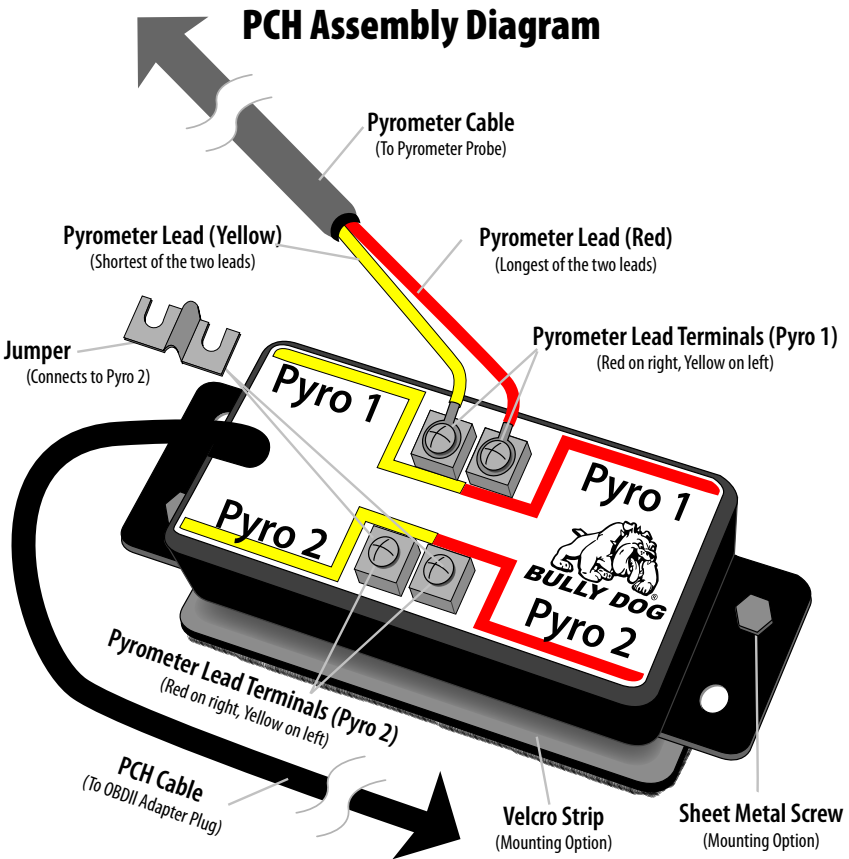
We always recommend that the driver use our pyrometer calibration procedure to determine safe temperatures for their vehicle. The pyrometer calibration procedure allows the driver to see the maximum temperatures achievable with a stock vehicle and from there helps determine a safe range of temperatures to use while the vehicle has performance enhancing tunes installed. The pyrometer calibration procedure would also be used to determining where to set safety defueling points if using the pyrometer on a GT diesel or PMT.

Is mounting the pyrometer in the Pre-turbo location recommended over the post-turbo location?

Mounting the pyrometer probe pre-turbo is generally recommended because it provides more accurate EGT readings. Mounting the pyrometer probe pre-turbo actually provides closer to real time temperatures and more accurate temperatures because it is closer to the actual combustion event taking place inside the engine. Pre-turbo temperatures will display the intensity of the heat coming out of the engine and will indicate the temperature of the exhaust gas that is entering the turbo charger. A post turbo pyrometer probe will only indicate the temperature of gas exiting the turbo charger.

INSTALLING THE PYROMETER AND THE PYROMETER CONNECTION HEAD (PCH)

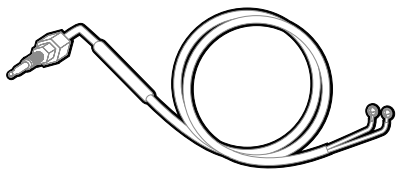
The PCH Assembly Diagram provides a quick visual description of all parts and pieces needed to acquire pyrometer temperatures. The parts described in the diagram below will be referred to in this section of the installation instructions.



Installation Step 1

STEP 1: INSTALLING THE PYROMETER PROBE

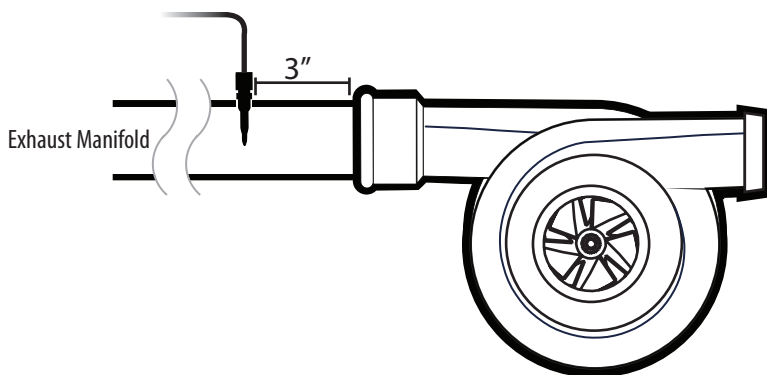
In this section you will drill and tap the pyrometer probe in the exhaust, either pre-turbo or post-turbo as a means to collect exhaust gas temperatures (EGT). Exhaust gas temperatures indicate how hot the engine is getting and can be used to set safety defueling parameters for diesel vehicles.



PRE-TURBO MOUNTING:

1. Drill a $\frac{5}{16}$ " hole into the exhaust manifold where all the exhaust runners of the manifold come together, 3" in front of the turbo charger exhaust inlet. Try to be within plus or minus 1" of the 3" target. Then tap the hole with a $\frac{1}{8}$ " pipe tap and mount the pyrometer probe in the hole. Use a $\frac{9}{16}$ " wrench to tighten the probe holder or tube fitting to the exhaust manifold. Then tighten the pyro probe Cap to the holder using a $\frac{5}{8}$ " wrench.
2. Run the pyro cable up to engine bay; let the end of the cable sit while installing the PCH Board.

WARNING: If any debris such as drill bits and metal shavings drop inside the exhaust manifold, it is strongly advised that the manifold be removed from the vehicle so that the debris can be removed before starting the vehicle again. Such debris can cause damage to a turbo charger.

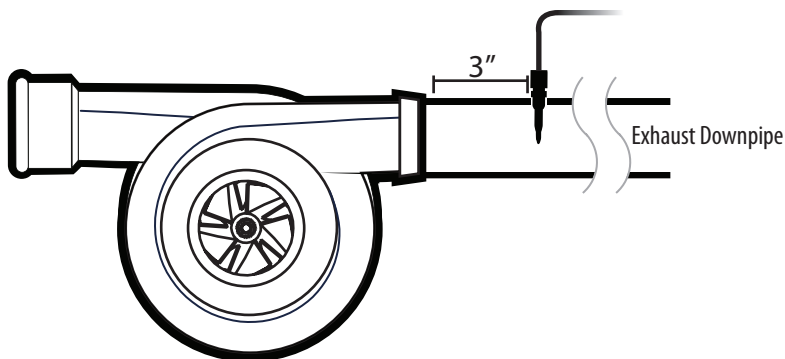


TOOL TIP, PRE-TURBO MOUNT

When drilling into the exhaust manifold, metal spews, shavings, and broken drill bits can fall inside. Try following these steps to prevent debris from falling into the manifold: 1. Use a high quality twist bit and a slow speed drill, about 500-800 rpm. 2. Start with a small pilot bit about $\frac{1}{8}$ ", then use the full $\frac{5}{16}$ " bit after the smaller one has punched through. 3. Grease your drill bit in addition to the normal lubricant, this will catch flying spews as they are cut. 4. Just prior to punching through into the inside of the manifold, start the engine and build up exhaust pressure on the inside of the manifold (blows spews outside the manifold instead of letting them fall inside). 5. Also magnetize the drill bit so any excess shavings will be magnetically drawn to the drill bit.

POST-TURBO MOUNT

1. Find a location on the post turbo exhaust pipe or "down tube," that is 3", plus or minus 1", downstream from the turbo charger exhaust outlet. Drill a $\frac{5}{16}$ " hole and run a $\frac{1}{8}$ " pipe tap into the hole. Mount the Pyrometer Probe in the threaded hole using a $\frac{9}{16}$ " wrench to tighten the probe holder or tube fitting to the down tube. Then tighten the Pyro Probe Cap to the holder using a $\frac{5}{8}$ " wrench.
2. Run the Pyro Cable along the brim of the engine bay, and then let the end sit when installing the PCH Board.



TOOL TIP, POST-TURBO MOUNTING

For some vehicles it will be impossible to reach the turbo downpipe with a drill and a pipe tap. The downpipe may have to be removed. The ideal time to install a post turbo pyrometer is when a new exhaust is being installed on the vehicle.

Installation Step 2

STEP 2: INSTALLING THE PCH BOARD

In this step the PCH Board needs to be mounted in a secure location within the reach of the end of the pyrometer cable. Then the end of the pyrometer cable will need to be attached to the PCH board. Lastly, to complete step 2, the PCH cable will need to be directed into the cab of the vehicle.

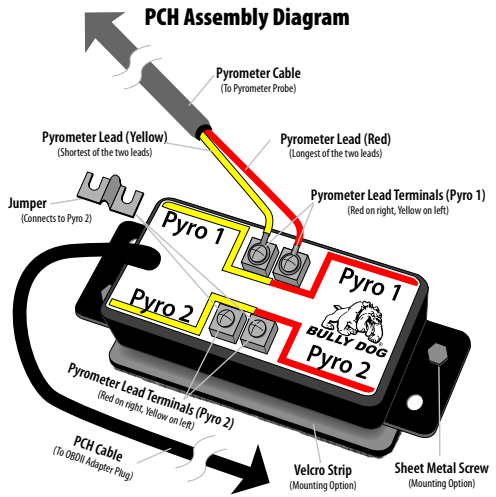
1. Gather the rest of the parts included in the Pyrometer Probe Kit:

- Pyrometer Connection Head with attached cable
- Self-tapping Sheet Metal Screws
- Velcro
- Jumper • Zip Ties

2. The PCH Board needs to be mounted in a location that is secure (away from extreme heat and moving parts), and in a location in which the end of the Pyrometer Cable(s) can easily reach.

3. Use the sheet metal screws or Velcro, or both to securely attach the PCH Board to a safe location within the engine bay.

4. To connect the end of the Pyrometer Cable to the PCH Board, first remove the screw and nut on the end of the pyrometer leads, then remove the screws from the Pyro 1 heads on the PCH Board. Use those screws to secure the Pyrometer Cable leads to the PCH Pyro 1 heads, see the PCH Assembly Diagram for a visual reference when connecting the pyrometer leads to the PCH Board.



Notice: Do not remove the jumper from the Pyrometer 2 location unless installing a second pyrometer.

The pyrometer location labeled on the PCH will display in the same location on the GT, PMT, or Watchdog.

5. Once the PCH Board is secure and the pyrometer(s) is/are connected to the PCH Board, use zip ties to secure the pyrometer cables away from extreme heat and moving parts.

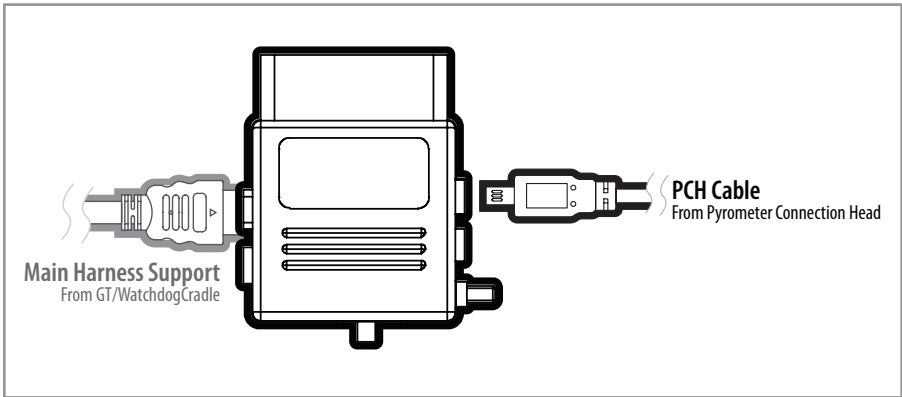
6. Run the end of the PCH Cable through the fire wall. It will need to be connected to the OBDII Adapter Plug. Use zip ties to secure all remaining cable left inside the engine bay.

STEP 3: INSTALLING THE OBDII ADAPTER PLUG

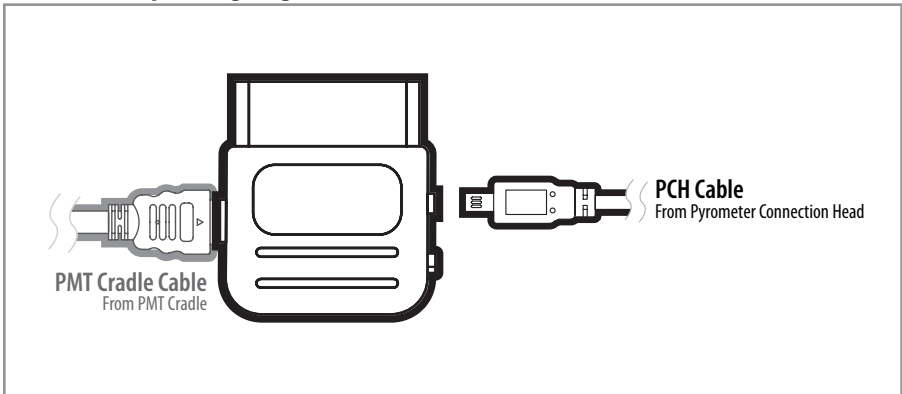
This step simply involves connecting the cable coming from the PCH board to the OBD II Adapter plug for the GT, PMT, or WatchDog. Note that the GT and Watchdog OBD II adaptars are the same, however the PMT will have a different style of plug. The illustrations below indicate where to insert the PCH cable.

1. Locate the OBDII Adapter Plug.
2. Plug the Cradle Cable and the PCH Cable into the OBDII Adapter Plug. See the OBDII Adapter Plug Diagram for a visual description.

GT/WatchDog OBD II Adapter Plug Diagram



PMT OBD II Adapter Plug Diagram



Installation Step 4

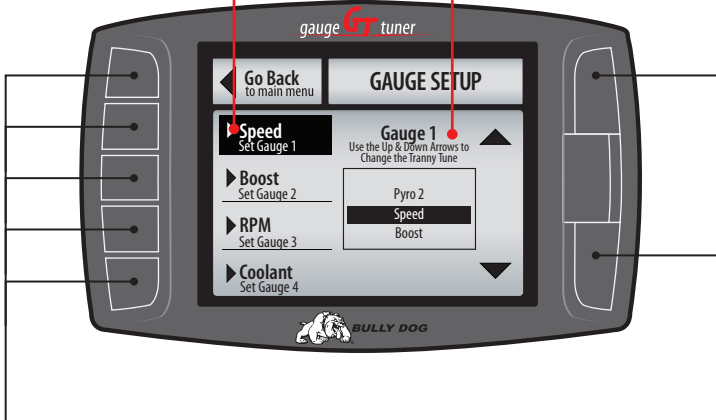
STEP 4: SETTING THE PYROMETERS UP TO VIEW ON THE DEVICE

Once the Pyrometer Probe Kit is completely installed it is an easy two step process to display pyrometer temps on the Bully Dog Triple Dog GT, Watchdog, or PMT.

1. Start up the Bully Dog device in use and navigate from the Main Screen into the main menu and then into the Gauge Setup Menu.
2. Once in the Gauge Setup Menu highlight any gauge location on the left side of the screen, then use the up/down buttons on the right side of the device to highlight either pyro 1 or pyro2. Simply highlight the particular pyrometer to display in that location.

Once the pyrometer temperatures are displayed in any gauge location navigate back out to the main screen of the device and prepare to perform the Pyrometer Calibration Procedure to determine a safe temperature ceiling for that vehicle which will also help determine a defueling level for diesel vehicles.

Notice that upon entering the gauge setup menu that, Set Gauge 1, is highlighted in black. When a gauge location is selected it is highlighted in black on the left and it also appears above the vehicle parameter selection box.



To highlight a different gauge location press the button adjacent that on screen gauge location.

Use the large Up▲ Down▼ Buttons to highlight a particular vehicle parameter for any of the gauge locations.

STEP 5: PYROMETER CALIBRATION PROCEDURE

1. Vehicle must be set to Stock HP/TQ levels-meaning no HP/TQ modifications of any kind (downloader or plug-in modules).
2. Engine must be put under 100% load during driving to establish a maximum temperature that the vehicle is able to reach at a stock horsepower rating. A good way to establish that the vehicle is reaching a maximum exhaust gas temperature is to drive up a high or pull a trailer under heavy acceleration on a hot day.
3. While performing step 2 record the highest exhaust gas temperature that was reached during the test.
4. The exhaust gas temperature recorded during the pyrometer calibration procedure is the highest temperature that that vehicle should reach to remain in the safe region. This is also the temperature that can be used as the safety defuel temperature on GT diesels and PMTs.

ATTENTION: It is generally OK to venture above this temperature range, but do not go more than 200 degrees above this temperature and do this at your own risk.

PCH/PYROMETER TROUBLESHOOTING

CONDITION	POSSIBLE SOURCES	ACTION
PMT will not display proper temperature EGTs	Pyrometer Probe Connections Incorrect	Check the orientation of the Pyrometer connections on the PCH to ensure that the Pyrometer leads are properly connected.
Pre-turbo temperature readings are extremely high, above 1500° fahrenheit	The Pyrometer probe may be too close to the cylinder exhaust exit, combusting fuel can touch the probe causing temperatures to be unusually high.	Change pre-turbo mounting location, move closer to the turbo charger.