

**banks**

with Installation Instructions  
**Owner's Manual**

# **Banks Six-Gun® Diesel Tuner**

**Compatible with Optional Banks PowerPDA®  
Vehicle Command Center**

*For use with Palm® Tungsten™ E2 only*

**2001-2005 Chevy/GMC 6.6L Duramax  
Turbo-Diesel Pickups**

THIS MANUAL IS FOR USE WITH SYSTEMS

63717, 61026, 61031, 63767



**THIS IS A HIGH PERFORMANCE PRODUCT. USE AT YOUR OWN RISK.**

**Do not use this product until you have carefully read the following agreement.**

**This sets forth the terms and conditions for the use of this product. The installation of this product indicates that the BUYER has read and understands this agreement and accepts its terms and conditions.**

## **Disclaimer of Liability**

Gale Banks Engineering Inc., 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 there are no liabilities which 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 installer'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.

## **Limitation of Warranty**

Gale Banks Engineering Inc. (hereafter "**SELLER**"), gives Limited Warranty as to description, quality, merchantability, fitness for any particular purpose, productiveness, or any other matter of **SELLER's** product sold herewith. The **SELLER** shall be in no way responsible for the product's open use and service and the **BUYER** hereby waives all rights except those expressly written herein. This Warranty shall not be extended or varied except by written instrument signed by **SELLER** and **BUYER**.

The Warranty is Limited to two (2) years from the date of sale and is limited solely to the Gale Banks Engineering parts contained within the products kit. Parts or devices outside the products kit, such as the Palm® Tungsten™ E2, are not covered under Gale Banks Engineering warranty. The warranty for

the Palm Tungsten E2 is determined by the manufacturer's warranty terms and conditions, and limited to a period of 90 days from purchase. All products that are in question of Warranty must be returned shipping prepaid to the **SELLER** and must be accompanied by a dated proof of purchase receipt. All Warranty claims are subject to approval by Gale Banks Engineering Inc.

**Warning: The PDA may be susceptible to damage as a result of extended exposure to sunlight, heat or extreme cold. It is highly recommended that the PDA be removed from its mounting location if the vehicle will be subjected to high concentrations of sunlight, heat or cold for an extended period of time. Gale Banks Engineering is not responsible for damage to PDAs resulting from exposure conditions.**

Under no circumstance shall the **SELLER** be liable for any labor charged or travel time incurred in diagnosis for defects, removal, or reinstallation of this product, or any other contingent expense.

Under no circumstance shall the **SELLER** be liable for any damage or expenses incurred by reason of the use or sale of any such equipment.

**In the event that the buyer does not agree with this agreement:**  
**The buyer may promptly return this product, in a new and unused condition, with a dated proof-of-purchase, to the place-of-purchase within thirty (30) days from date-of-purchase for a full refund:**  
**The installation of this product indicates that the buyer has read and understands this agreement and accepts its terms and conditions.**

## Table of Contents

<b>General Installation Practices . . . .</b>	<b>5</b>
<b>Section 1 . . . . .</b>	<b>7</b>
Installation of Wiring Harness, Connections and Six-Gun Diesel Tuner	
<b>Section 2 . . . . .</b>	<b>10</b>
Mounting the Docking Station and Connecting the Banks PowerPDA Vehicle Command Center	
<b>Section 3 . . . . .</b>	<b>13</b>
Installation of the Six-Gun Selector Switch and Speed-Loader Module	
<b>Section 4 . . . . .</b>	<b>17</b>
Optional Thermocouple Installation (Required for Optional Banks PowerPDA or Speed-Loader Module)	
<b>Section 5 . . . . .</b>	<b>18</b>
Speed-Loader Learning Sequence (Applies to Six-Gun Switch Installations Only)	
<b>Section 6 . . . . .</b>	<b>19</b>
Automatic Transmission Learning	
<b>Section 7 . . . . .</b>	<b>20</b>
Checking Engine Performance	
<b>Section 8 . . . . .</b>	<b>21</b>
Troubleshooting	
<b>Section 9 . . . . .</b>	<b>24</b>
Clearing Learned Information	
<b>Section 10 . . . . .</b>	<b>24</b>
Updating Your Banks PowerPDA Software & Banks Six-Gun Diesel Tuner Firmware	
<b>Section 11 . . . . .</b>	<b>25</b>
Placement of the Banks Power Decals	
<b>Section 12 . . . . .</b>	<b>27</b>
Removal of the Six-Gun Diesel Tuner	

The Banks Six-Gun Diesel Tuner has six power levels adjustable by the supplied Six-Gun switch, or seven power levels adjustable by the optional Banks PowerPDA.

The optional Banks PowerPDA is a versatile touch-screen interface to the Six-Gun tuner and your truck that also increases the Six-Gun's power output by up to 27 hp and 40 lb-ft of torque. With the push of a button, you can change power levels on-the-fly-just one of the numerous Six-Gun parameters Banks PowerPDA lets you custom-tune. It displays four engine functions at a time, two of which are user-selectable (over a dozen to choose from). It will clock your 0-60 mph, 1/8-mile and 1/4-mile performance runs, recording peak boost and EGT values. Performance runs are automatically stored for later retrieval with a time-and-date stamp. With the Banks PowerPDA, you can also scan and clear OBD II diagnostic codes. It gives you the endless functionality of a Palm® Tungsten™ E2 PDA, and fits in a custom dash-mounted docking station using infrared wireless connectivity.

The Six-Gun Diesel Tuner comes with a Six-Gun switch that has six selectable

power levels. The Six-Gun switch is included in the Six-Gun Diesel Tuner. The optional Speed-Loader module can be added to the Six-Gun for off-road use only to increase the power output of Levels 2-6. Level 1 is stock with or without Speed-Loader installed. Each additional higher level adds approximately 20% of the available power increase.

To prevent damage to the factory transmission, Banks recommends that both automatic and manual transmission vehicles do not exceed Level 4 or Level 3 with optional PowerPDA or Speed-Loader while the vehicle is experiencing load (towing, climbing a steep grade, carrying a load, etc.).

To use the higher levels of the Six-Gun Diesel Tuner while towing or climbing, airflow improvements must be made to lower the exhaust gas temperature (EGT) entering the turbo. The EGT should not exceed 1400° F for more than a few seconds. Elevated EGT can damage the turbocharger and the engine.

**Attention! Before proceeding with these instructions, please carefully read the DISCLAIMER OF LIABILITY and LIMITATION OF WARRANTY statement located on page 2 of this manual.**

**Warning: The PDA may be susceptible to damage as a result of extended exposure to sunlight, heat or extreme cold. It is highly recommended that the PDA be removed from its mounting location if the vehicle will be subjected to high concentrations of sunlight, heat or cold for an extended period of time. Gale Banks Engineering is not responsible for damage to PDA's resulting from exposure conditions.**

**Notice:** A Pyrometer (EGT) probe must be installed in conjunction with the Six-Gun Diesel Tuner in order to enable the Six-Guns EGT limiting function. Using the Six-Gun Tuner without a pyrometer probe can lead to detrimental damage to the engine due to excessive EGT temperatures.

## General Installation Practices

### TOOLS REQUIRED:

- Inch and metric sockets
- Inch and metric combination and open-end wrenches
- Pliers
- Wire cutters
- Scissors
- Drill motor
- 1/8" drill bit
- 13/32" drill bit
- 7/16" drill bit
- Tap handle
- 1/4" NPT tap
- Foot-pound torque wrenches
- Penetrating oil or light lubricant spray
- Anti-seize compound
- Heat gun

**1.** Before starting work, familiarize yourself with the installation procedure by reading all of the instructions.

**2.** The exploded views provide only general guidance. Refer to each step and section diagram in this manual for proper instruction.

**3.** Throughout this manual, the left side of the vehicle refers to the driver side, and the right side to the passenger side.

**4.** Disconnect the negative (ground) cable from the battery (or batteries, if there are two) before beginning work.

**5.** Route and tie wires and hoses a minimum of 6" away from exhaust heat, moving parts and sharp edges. Clearance of 8" or more is recommended where possible.

**6.** When raising the vehicle, support it on properly weight-rated safety stands, ramps or a commercial hoist.

Follow the manufacturer's safety precautions. Take care to balance the vehicle to prevent it from slipping or falling. When using ramps, be sure the front wheels are centered squarely on the topsides. When raising the front of the vehicle, put the transmission in park (automatic) or reverse (manual), set the parking brake, and block the rear wheels. When raising the back of the vehicle, be sure the vehicle is on level ground and the front wheels are blocked securely. **Caution: Do not use floor jacks to support the vehicle while working under it. Do not raise the vehicle onto concrete blocks, masonry or any other item not intended specifically for this use.**

**7.** During installation, keep the work area clean. Do not allow anything to be dropped into intake, exhaust, or lubrication system components while performing the installation, as foreign objects will cause immediate engine damage upon start-up.

**8.** Save this Owner's Manual as a reference for system maintenance and service.

**9.** Banks recommends either a Banks PowerPDA or a Pyrometer (EGT) gauge and Boost gauge be installed with the Six-Gun Diesel Tuner to help monitor performance and exhaust gas temperature of the vehicle (see part numbers next page). To further increase engine life by lower EGT's, Banks also recommends installing a Monster Exhaust® system (see next page).

### **Banks Power-PDA System**

Banks PowerPDA	
Docking Station Kit . . . . .	61028
Palm Tungsten E2 PDA . . . . .	61004

### **Banks Monster® Exhaust System**

Std. Cab Long Bed . . . . .	48632
Ext./Crew Cab Short Bed . . . . .	48633
Ext./Crew Cab Long Bed . . . . .	48634
Std. Cab Long Bed, w/o Cat . . . . .	48628
Ext./Crew Short Bed w/o Cat . . . . .	48629
Ext./Crew Long Bed w/o Cat . . . . .	48630
Head pipe kit w/o cat . . . . .	48631

### **Additional Equipment**

Ram-Air Intake Sys. LLY . . . . .	42135
Ram-Air Intake Sys. LB7 . . . . .	42132
Ram-Air® Filter . . . . .	41518
Ram-Air® Service Kit . . . . .	90094
Techni-Cooler Sys. ('01) LB7 . . . . .	25976
Techni-Cooler Sys. ('02-04) LB7 . . . . .	25977
Techni-Cooler Sys. ('04-05) LLY . . . . .	25978

### **Gauges Assembly**

Boost and Pyro . . . . .	64507
Thermocouple . . . . .	63042
Leadwire LLY . . . . .	63062
Leadwire LB7 . . . . .	63061
Speedloader LLY . . . . .	63718
Speedloader LB7 . . . . .	62958
Banks BigHead® Actuator LB7 . . . . .	24396

# Section 1

## INSTALLATION OF WIRING HARNESS, CONNECTIONS AND SIX-GUN DIESEL TUNER

**1.** Disconnect the battery ground cables from each of the batteries. Secure the cables so that they do not come in contact with the battery posts during the installation.

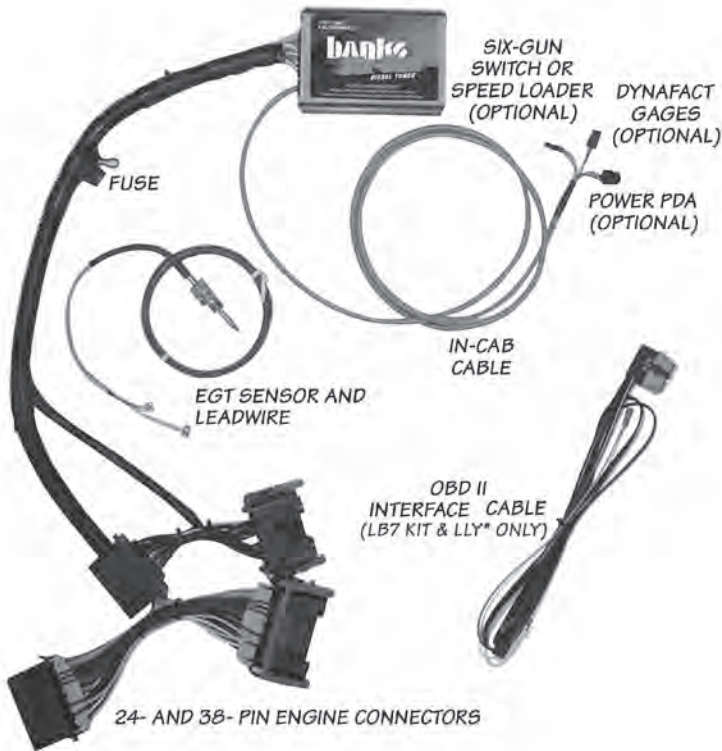
**2.** From the engine compartment, locate the rubber grommet high on the driver's side of the vehicle firewall. The grommet is about 3" in diameter. Make a 1" x 1" cross-shaped incision in the grommet (see **Figure 2**).

**3.** From the engine compartment, feed the grey three-connector cable

through the incision made in the firewall grommet and into the cab. From inside the cab, remove the lower dash panel under the steering column to allow access to these three connectors.

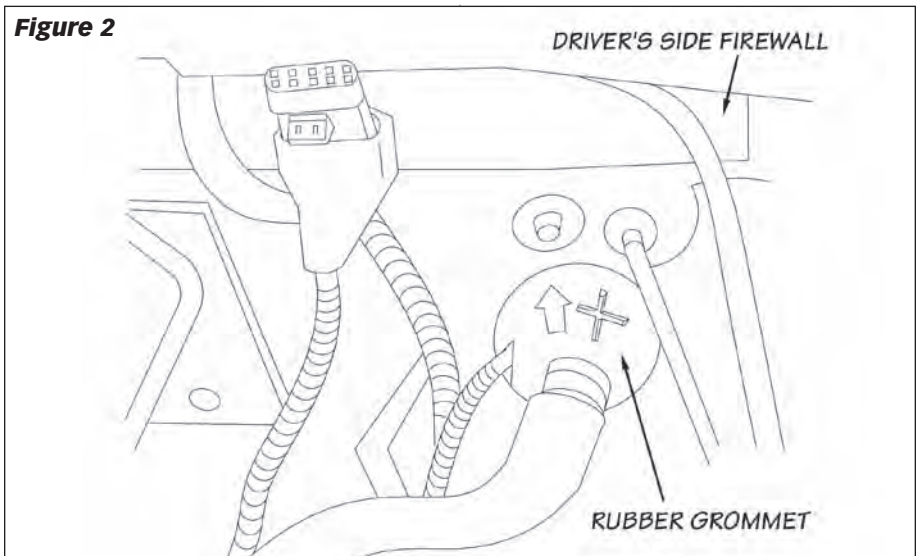
**4.** Locate the two black wire harness locking connectors between the brake fluid reservoir and the air conditioning compressor. Lift the gray connector locks and disconnect the 38-pin connector pair and the 24-pin connector pair (see **Figure 3**).

**Figure 1** Six-Gun and supplied wiring harness



\* ONLY FOR LLY WITH POWERPDA

**Figure 2**



**5.** Insert the male 38-pin connector on the Six-Gun harness into the female 38-pin connector on the factory harness. Insert the female 38-pin connector on the Six-Gun harness onto the male 38-pin connector of the factory harness. Repeat this process with the 24-pin connectors (see **Figure 3**).

**6.** The Six-Gun is to be installed under the hood on the outside of the fuse box, with the wire harness facing towards the rear of the vehicle (see **Figure 4**). Make sure the outside of the fuse box is free of oil, grease and dirt.

**7.** With the Six-Gun Diesel Tuner positioned next to the fuse box, peel the protective backing from the hook and loop interlocking fasteners attached to the Six-Gun Diesel Tuner. Position the bottom edge of the Six-Gun Diesel Tuner approximately a half inch above the main wiring harness exiting the fuse box, then press the adhesive onto the outside of the fuse box. Apply light pressure to the Six-Gun Diesel Tuner by hand for

60- seconds to create a strong bond between the fuse box and hook & loop interlocking fasteners. Using the supplied cable ties, secure the wire harness away from any heat sources or moving components.

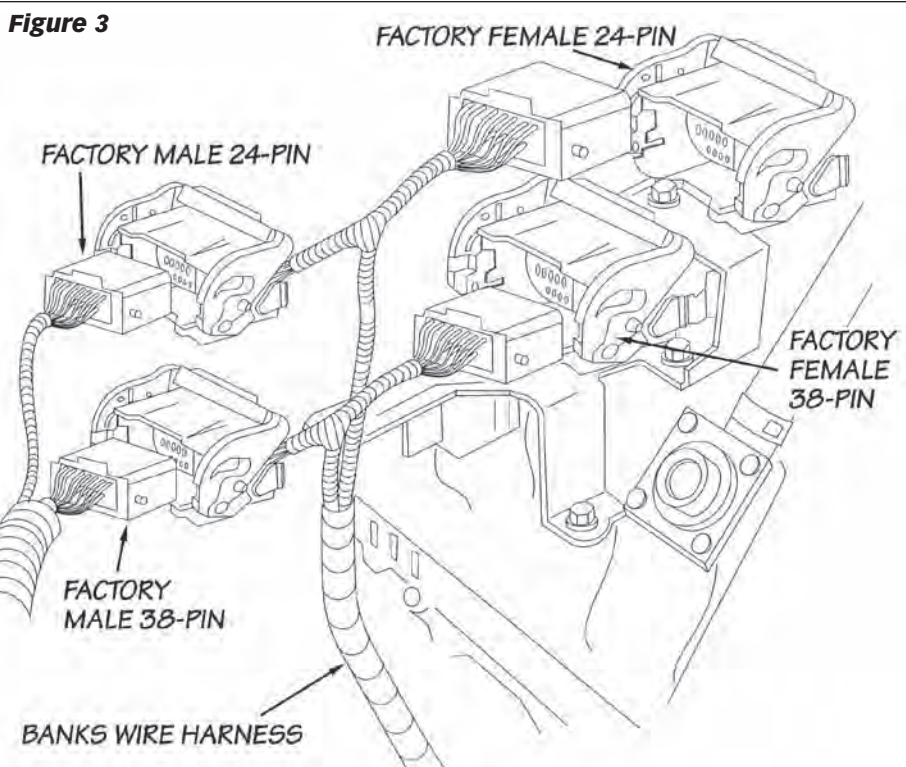
**8.** ALL 2001 thru (early) 2004 LB7 & (late) 2004 thru 2005 LLY(with PowerPDA ONLY) Vehicles:

Locate the Banks OBDII Interface Cable and the 11" cable tie in your kit. Connect the OBDII Interface Cable to the vehicle OBDII connector. Use the 11" cable tie as shown in **Figure 6** to secure the Banks interface cable to the vehicle OBDII connector. Now, connect the 6-pin connector from the Banks OBDII Interface Cable to the 6-pin connector on the Six-Gun Tuner incab cable.

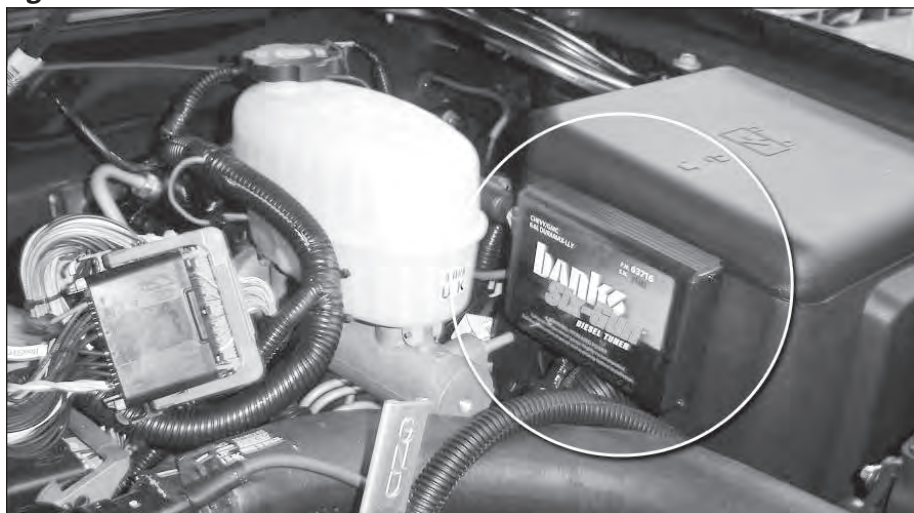
*Note: For LB7 only, if you are not installing the optional Banks PowerPDA then coil up and secure the cable with the RJ12 (telephone style) connector end.*

-END, SECTION 1-





**Figure 4** Six-Gun module mounted on fusebox



## Section 2

### MOUNTING THE DOCKING STATION AND CONNECTING THE BANKS POWERPDA VEHICLE COMMAND CENTER

All 2001 thru (early) 2004 LB7 vehicles will have an OBD II Interface Cable in the kit. The OBD II Interface Cable must be connected in order for the Six-Gun tuner to function.

All (late) 2004 thru 2005 LLY vehicles will require an OBD II Interface Cable if connecting to an optional Banks PowerPDA .

All Vehicles: If not installing the optional Banks PowerPDA, skip to Section 3.

**Note:** This system has been designed for use with the Palm Tungsten E2 PDA.

**Warning:** The PDA may be susceptible to damage as a result of extended exposure to sunlight, heat or extreme cold. It is highly recommended that the PDA be removed from its mounting location if the vehicle will be subjected to high concentrations of sunlight, heat or cold for an extended period of time.

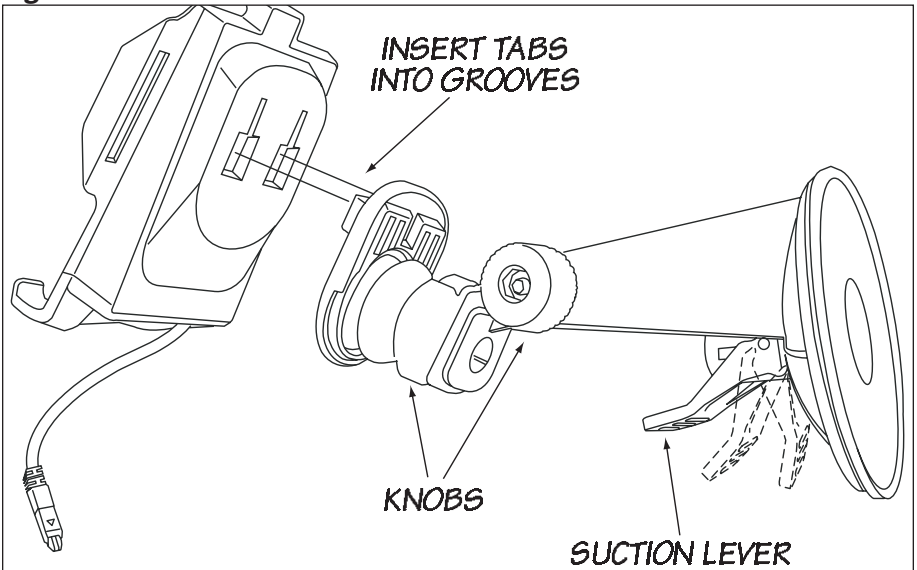
**Gale Banks Engineering is not responsible for damage to PDAs resulting from exposure conditions.**

1. Locate the universal mount and docking station in your kit. Interlock the docking station to the universal mount by inserting and sliding the universal mount tabs into the docking station grooves. See Figure 5.
2. Find a smooth, flat surface suitable for ease of access and viewing of the PowerPDA. Loosen both knobs and move the swivel suction plate and docking station to achieve desired viewing angle of the PowerPDA screen. Do a test fit and note the angle necessary to achieve the correct viewing angle.

*Note:* There may be a snug fit when installing the PowerPDA into the docking station. Take care not to force this process.

3. Tighten both knobs to lock in the position (Figure 5).

Figure 5



*Note: If the universal mount swivel does not move or is tight after loosening the hold down knob, then remove the previously inserted docking station and slightly loosen the tension screw. See Figure 7.*

**4.** Locate the alcohol swab in the kit. Clean the suction cup and the mounting area and let dry. With the suction lever in the up position ensure the suction cup is flat against the windshield or smooth, flat surface. Then, push the suction lever down to secure in place.

**5.** Connect the Cab Harness connector to the PDA Cable. Plug the RJ12 connector (phone like connector at one end of the PDA Cable) into one of the receptacles in the base of the PDA docking station.

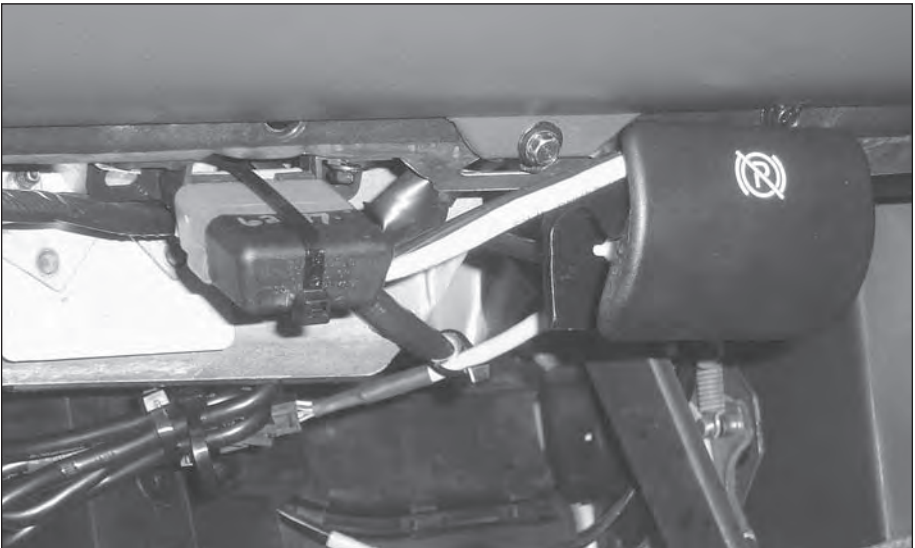
**6.** Install the Banks PowerPDA into the docking station. Be sure the PowerPDA is completely seated in the docking station against the lower support bracket.

*Note: There may be a snug fit when installing the PowerPDA into the docking station. Take care not to force this process.*

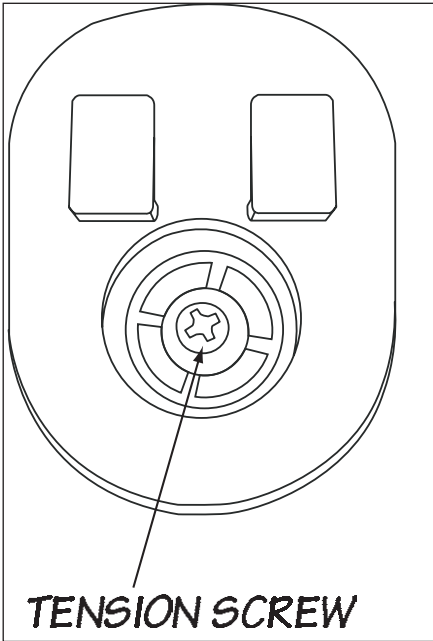
**7.** Plug the docking station's charging cable (seen in Figure 5) into the charging receptacle on the lower edge of the PowerPDA. Attach the PDA hub to a smooth, flat surface suitable for ease of access and viewing.

**WARNING: The charging cable on the docking station is designed to supply a constant low-voltage power source (+5vdc) to the Banks PowerPDA and is "live" as long as the system's Diagnostic Port Cable is completely installed and the RJ12 connector is plugged into the docking station. Although this charging cable is short and its circuitry is fuse protected, the user is expected to take appropriate measures to prevent small children and/or pets from contact with any part of this system.**

**Figure 6**



**Figure 7**



**8.** Route all wiring away from any pedals or other moving components. Using the cable ties supplied, secure the wiring under the dash.

**9.** Double check everything to make sure it is securely fastened and it is not near any hot or moving parts before starting engine.

**10.** Set up the Banks PowerPDA according to it's instructions.

**11.** Locate the Banks OBD II Interface Cable in your kit. This cable has three connection points. Connect the RED OBD II connector on the Banks interface cable to the vehicle OBD II connector. Use a cable tie as shown in **Figure 6** to secure the Banks interface cable to the vehicle OBD II connector. Next, connect the 6-pin connector on the Banks OBD II interface cable to the 6-pin connector on the Six-Gun Tuner harness.

**WARNING: The PDA may be susceptible to damage as a result of extended exposure to sunlight, heat or extreme cold. It is highly recommended that the PDA be removed from its mounting location if the vehicle will be subjected to high concentrations of sunlight, heat or cold for an extended period of time. Gale Banks Engineering is not responsible for damage to PDA's resulting from exposure conditions.**

-END, SECTION 2-

# Section 3

## INSTALLATION OF THE SIX-GUN SELECTOR SWITCH AND SPEED-LOADER MODULE

Not needed if optional Banks PowerPDA is installed.

**CAUTION: Do not use force when working on plastic parts. Permanent damage to the part might result.**

**1.** The Six-Gun switch will be installed on the driver's side of the instrument panel (IP) next to the steering column (see **Figure 8**). Carefully remove the IP from the dashboard by slowly pulling outwards from the dashboard around the edges of the IP, allowing the mounting pins to pull free from their dashboard sockets. Automatic transmission equipped vehicles will need to set the parking brake and move the shift lever down to the lowest gear to allow clearance for instrument panel removal.

**2.** Cut out the supplied template (see **Figure 9** on page 27) and align the template onto the rear of the IP, squarely seating it on the top of the IP mounting pin (see **Figure 10**).

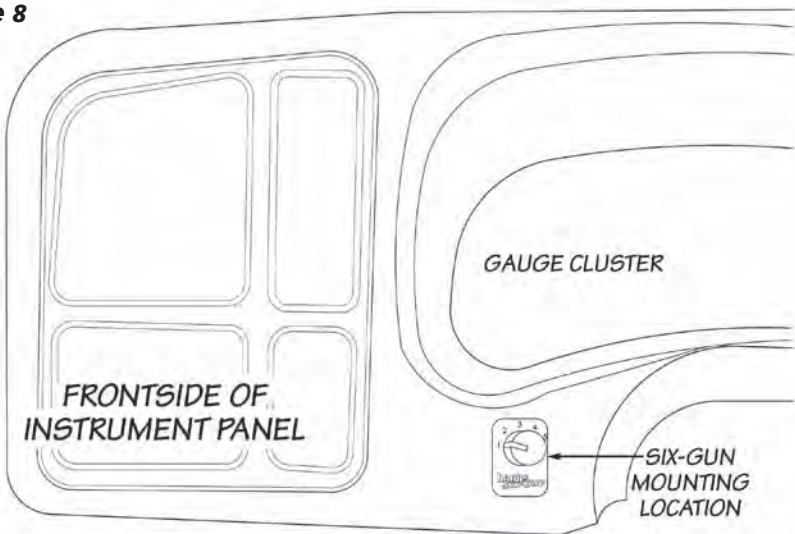
**3.** Using a 3/8" Uni-drill bit, center the bit onto the 3/8" drill location on the template and slowly drill through the IP. Using a 1/8" drill bit, center and drill through the 1/8" location on the template. Remove and discard the template and any plastic shavings.

**4.** On the front side of the IP, align the Banks Six-Gun label onto the previously drilled hole (see **Figure 11**).

**5.** Remove the nut and internal tooth washer from the Six-Gun Switch. Rotate the shaft counter clockwise until the shaft stops. Verify the locating washer tab is inserted into the #6 position on the switch (see **Figure 12**).

*NOTE: If the washer is in any position other than the #6, your Six-Gun Diesel Tuner will not select power levels properly.*

**Figure 8**



**6.** After confirming the locating washer is in the #6 location, install the switch through the  $\frac{3}{8}$ " hole on the backside of the instrument panel. The alignment pin should rest in the  $\frac{1}{8}$ " hole and with the switch fully rotated counter clockwise; the shaft's flat side should be facing the steering column. Secure switch with internal tooth washer and nut. Snug the washer; be careful not to over torque the nut and damage the plastic threads.

**7.** Install the knob onto the shaft facing the #1 Level on the Six-Gun label. On the knob, snug the two (2) set screws with the supplied 0.050" hex key wrench.

**8.** Route the Six-Gun Switch cable down to the Six-Gun Diesel Tuner's three-connector cable underneath the dashboard, and reinstall the IP to the dashboard.

**9.** Connect the Six-Gun Switch Cable's 2-pin receptacle to the 2-pin plug on the Six-Gun Diesel Tuner's grey three-connector cable.

## **For installation of the Speed-Loader option:**

**CAUTION: When a Speed-Loader is installed, Level 6 is re-calibrated for maximum possible power output—this includes removal of the 5th gear power de-rate, and a raised EGT limit (to 1500 °F). With a Speedloader installed, Level 6 should only be used in unloaded, off-road conditions for short amounts of time, NEVER on-road or under heavily loaded conditions**

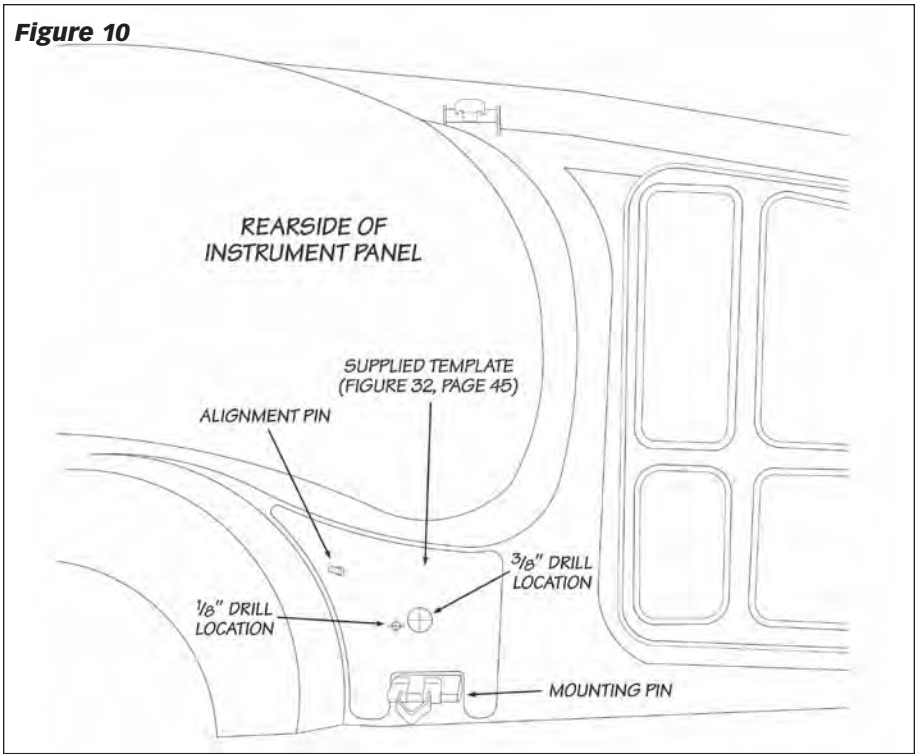
**where extremely high exhaust gas temperatures could lead to turbocharger and engine damage.**

**Warning: if excessive torque converter slip is detected then a Limp Home Mode override will be set by the ECU. This LHM will be active until torque slippage is no longer detected or is reset by Diagnostic Tool.**

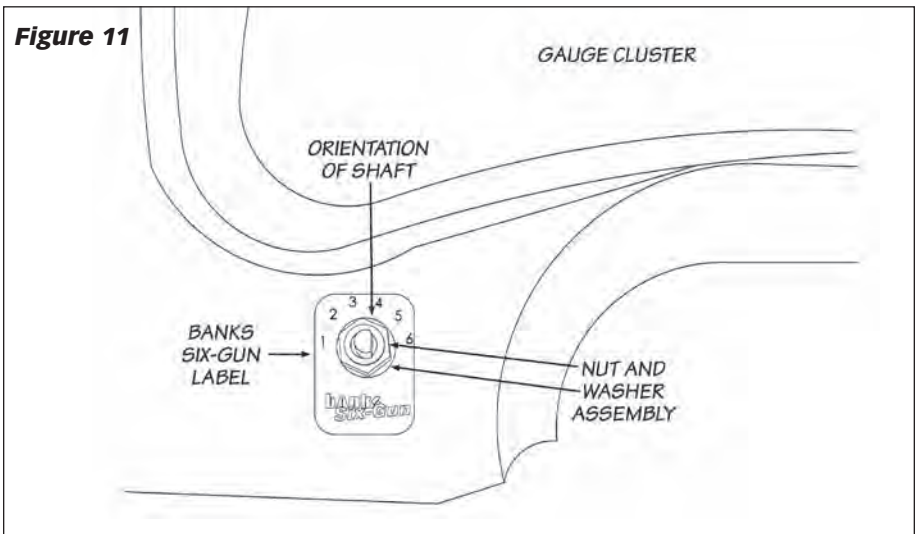
- a.) Install the 4-pin connector of the Speed-Loader harness to the 4-pin connector on the Speed-Loader module.
- b.) Verify the Banks wire harness, Six-Gun Diesel Tuner and Six-Gun switch are installed as specified in the Owners Manual. Disconnect the Six-Gun Switch from the 2-pin plug on the Six-Gun Diesel Tuner's grey three-connector cable.
- c.) Connect the Six-Gun switch's 2-pin receptacle to the Speed-Loader's 2-pin plug. Connect the Speed-Loader's 2-pin receptacle to the 2-pin plug on the Six-Gun Diesel Tuner's grey three-connector cable.
- d.) If necessary, wire tie the Speed-Loader module and harness under the dash away from pedals or any moving components.

*NOTE: The optional Speed-Loader provides access to an additional power level of the Six-Gun Diesel Tuner. Installing the Speed-Loader will allow levels 2 through 6 to experience an increase in power above that of the Banks Six-Gun Diesel Tuner*

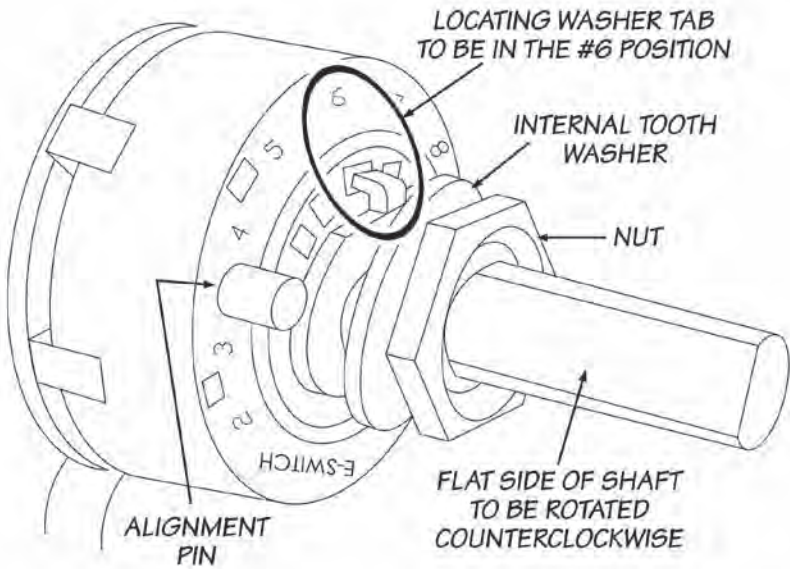
**Figure 10**



**Figure 11**



**Figure 12**



alone. Level 1 remains at stock power output regardless if the Speed-Loader is installed. Once the Speed-Loader is installed and detected, the green LED on the Six-Gun connector will flash twice at power up. Refer to the following "SPEED-LOADER LEARNING SEQUENCE" section for more details.

-END, SECTION 3-



## Section 4

### OPTIONAL THERMOCOUPLE INSTALLATION (REQUIRED FOR OPTIONAL BANKS POWERPDA OR SPEED-LOADER MODULE)

**1.** The thermocouple monitors the temperature of the exhaust gases entering the turbocharger at the turbine housing. Installation requires that the exhaust manifold be drilled near the manifold outlet. It is recommended that the manifold be removed from the engine to thoroughly clean out all metal chips from drilling. If manifold is not removed from the vehicle, all chips must be removed from the manifold. This may be accomplished by using a magnet to extract the chips after drilling. The tap should be greased before use and the chips again removed with a magnet. All metal shavings must be cleaned from the manifold to avoid turbine damage.

**2.** To access the exhaust manifold, remove front passenger wheel well by removal of plastic retainers.

**3.** On the passenger side, remove the hardware retaining the turbine inlet exhaust pipe to the exhaust manifold using a 12mm, 12pt socket along with a 12mm, 12pt wrench, then remove the exhaust manifold from vehicle. Pay special attention to the orientation of the manifold outlet gasket. Retain the hardware and gaskets for re-assembly.

**4.** Center punch and drill through the passenger side exhaust manifold into the rear passage at the location shown (see **Figure 13**). Use a  $\frac{7}{16}$ " drill, keeping the drill perpendicular to the manifold surface.

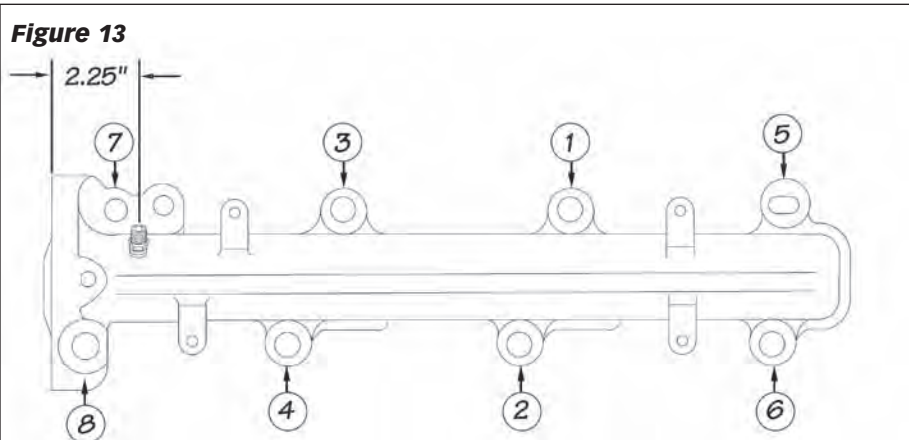
**5.** Tap the drilled hole with a  $\frac{1}{4}$ " NPT pipe tap. Check the thread depth as you tap by periodically removing the tap and screwing the thermo-couple insert into the tapped hole.

**6.** Install the thermocouple insert into the manifold using anti-seize compound on the threads. Install the probe in the thermocouple insert.

**7.** Make sure to remove all shavings from inside the exhaust manifold. Reinstall the exhaust manifold. Torque to 28 ft-lb in the sequence shown **Figure 13**.

**8.** Attach the thermocouple to the supplied thermocouple leadwire extension with the supplied nuts and bolts. Cover this joint with the supplied heat shrink tubing and heat until the tubing conforms to the joint. Make sure the entire joint is insulated.

**9.** Route the thermocouple leadwire extension along the factory harness to the driver's side and connect it to



the Six-Gun harness with the supplied nuts and bolts. Cover this joint with the supplied heat shrink tubing and heat until the tubing conforms to the joint. **Make sure the entire joint is insulated.**

**10.** Reconnect the ground cables to the vehicles batteries.

**Note: Once the Six-Gun Diesel Tuner is powered up at key-on, it will 'learn' that a thermocouple is installed and automatically enable the EGT limiting function.**

*If the thermocouple is removed after being installed and run on the vehicle, the Six-Gun Diesel Tuner will assume that the sensor or connection has gone bad, and cease adding power while triggering the [2,3] diagnostic code (see Trouble Shooting **Section 8**). To ensure that the Six-Gun Diesel Tuner operates properly after removing a previously installed thermocouple, see the 'Clearing Learned Information' **Section 9. EGT limiting will not be operational and excessive EGTs may develop at higher power levels.***

-END, SECTION 4-

## Section 5

### **SPEED-LOADER LEARNING SEQUENCE (APPLIES TO SIX-GUN SWITCH INSTALLATIONS ONLY)**

Once the Speed-Loader Module is installed or removed from the vehicle, the following learning sequence will need to be performed so that the Six-Gun Diesel Tuner can correctly identify that the Speed-Loader is present or absent.

- 1.** Start the engine
- 2.** Turn the Six-Gun switch to the highest level (position 6) and stay there for five (5) seconds.
- 3.** Rotate the switch to the lowest level (position 1) and stay for five (5) seconds.
- 4.** Rotate the switch again to the highest level (position 6) and stay there for five (5) seconds.

*NOTE: To determine if the Banks Six-Gun Diesel Tuner is running the Speed-Loader programming, watch the GREEN LED on the tuner and turn the ignition switch to the ON position (BUT DO NOT START THE ENGINE). If the GREEN LED flashes, the Banks Six-Gun Diesel Tuner will run with the Speed- Loader programming. If the GREEN LED doesn't flash, the Banks Six- Gun Diesel Tuner will run the standard programming. If the GREEN LED does not indicate the same status as your Six-Gun and Speed-Loader setup, repeat the above steps.*

-END, SECTION 5-

# Section 6

## AUTOMATIC TRANSMISSION LEARNING

*Note: Please refer to the Banks PowerPDA Software & Installation Kit, Owners Manual for software installation and operation instruction before beginning Section 6, Automatic Transmission Learning*

The 6.6L Chevy Duramax Trucks equipped with the Allison 1000 5-speed automatic overdrive transmission use an adaptive shift control logic. This will require the transmission to adapt to the additional power created by the Banks Power products before it will shift properly. Failure to follow the sequence can result in damage to the transmission.

**Perform the following sequence at a location where it is safe to accelerate without exceeding the posted speed limit.**

- 1.** Set Six-Gun to level one power setting, start the truck and allow the engine to reach normal operating temperature.
- 2.** Adjust Six-Gun to level two, power setting.
- 3.** Drive vehicle for 5 to 10 miles ensuring a complete shift cycle through each gear. (The transmission shift adaptation learning process requires 15 to 30 complete shift cycles to learn new shift program.)

- 4.** Increase power level by one and repeat **Step 3** until the desired power level is achieved.

**WARNING: Take particular care not to do wide open runs in 5th gear when in Automatic transmission Learning Mode, especially if speed loader is installed.**

*The Allison 1000 5-speed automatic transmission will continually adapt to the power output of the engine to optimize shift quality. **The transmission will quickly adapt to the power setting if the driving cycle includes regular gear changes at high loads. The transmission learning procedure will need to be repeated when switching back to the higher power settings once the transmission adapts to the lower power settings.** It will be apparent when the transmission adapts to the lower settings by monitoring the feel of the gearshift. Gear changes will be noticeably harder when initially switching from a higher to lower power setting. This will soften as the transmission adapts to the new setting.*

-END, SECTION 6-

# Section 7

## CHECKING ENGINE PERFORMANCE

*The Six-Gun Diesel Tuner requires the engine coolant temperature (ECT) to be above 110° before it will add fuel.* If the optional Banks PowerPDA or DynaFact® gauges are installed, observe the operation of the boost and pyrometer (EGT) gauge values while driving under varying conditions. Turbocharger boost pressure will increase as a function of load and engine RPM, thus the engine will produce little boost while cruising at light throttle, with maximum boost while climbing hills heavily loaded during acceleration. Note the boost level seen during hard acceleration with a given load. If performance seems to have deteriorated sometime in the future, the maximum boost figures may be compared to see if boost has dropped off. Lower boost may be caused by turbo ducting leaks, a malfunctioning wastegate or fuel injection pump, or dirty air filter. Typical maximum boost pressure settings will vary considerably with stick or automatic transmission options, year model of vehicle and altitude. *Note: Before key-off, check tuner for error codes.*

Use your Banks PowerPDA or EGT gauge to monitor exhaust gas temperature (EGT) in the engine. At idle, exhaust gas temperature will be very low, perhaps only 300°F. As the engine is accelerated for higher speeds with greater loads, the EGT will rise. The highest EGT will be seen under maximum load at full throttle, such as climbing a steep grade with a heavily laden vehicle.

To avoid heat damage to various engine components it is recommended that the exhaust gases cool below 400° before the engine is shut down. Your Six-Gun Diesel Tuner is calibrated to maintain a maximum EGT of 1350°F. You may experience brief excursions slightly above 1350°F under acceleration. This is normal and EGT should return to 1350°F or below within a few seconds. If you find that EGT remains high for any length of time, check for boost leaks or a dirty air filter.

-END, SECTION 7-

# Section 8

## TROUBLESHOOTING

### Six-Gun Troubleshooting Using The Banks PowerPDA Vehicle Command Center

Check the Banks PowerPDA's Status Indicator for the "OK" icon. Any Six-Gun Tuner Tuner fault will be indicated by the "Banks Engine" icon (see **Figure 14**) and its cause can be investigated by going to the 'Self Diagnostics' screen and scrolling through the list of logged tuner events.

**Figure 14**



SIX-GUN TUNER ICON

1. Press the center button on the 5- way navigator to take you to the System Menu screen.
2. Touch the button labeled 'More>' to move to the second screen of the System Menu.

**Figure 15**

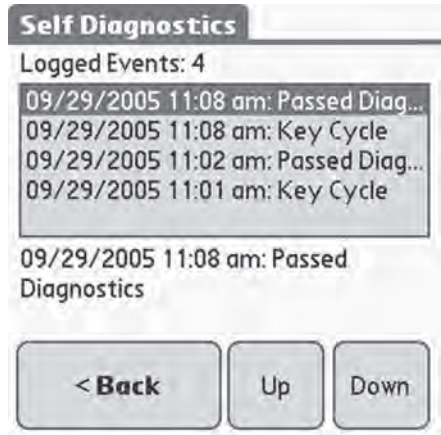


3. Next, touch the 'Self Diagnostics' button. (See **Figure 15**)

4. The 'Self Diagnostics' screen displays a log of diagnostic events related to the Six-Gun Tuner tuner (See **Figure 16**). The 'Logged Events' list takes a moment to update each time this screen is opened (as indicated by a slight flickering of the list). Once the list is updated, the most current event will appear at the top of the list. Each event has an associated timestamp and description, which will be displayed below the list when that event is highlighted. Each key cycle of the vehicle produces a minimum of two logged events.

5. Touch the button labeled 'Down' to scroll down through the recorded events.
6. Touch the button labeled 'Up' to scroll up through the recorded events.
7. Touch the 'Back' button to return to the System Monitor screen.

**Figure 16**



## Six-Gun Troubleshooting (No Banks PowerPDA Installed)

If you feel that your Diesel Tuner is not functioning properly, some diagnostics can be performed. Your Six-Gun Diesel Tuner is equipped with diagnostic features that will detect and display certain errors.

Remove the Six-Gun Diesel Tuner from its mounting location while keeping all connectors plugged in, and position it in such a way that you can view the end of the Six-Gun housing that contains the LEDs from the driver's seat. Turn the vehicle key to the ON position. Observe the two LEDs mounted on the end of the Six-Gun Diesel Tuner:

- A steady GREEN LED will illuminate if all wire connections are correct, the engine is running, and the engine coolant temperature is within its normal operating range.
- The GREEN LED will flash if all wire connections are correct, the engine is running, but the engine coolant temperature is not within its normal operating range. The GREEN LED will stop flashing once the engine coolant temperature is within its normal operating range (not to be confused with Speed-Loader flash on power-up).
- No LEDs will illuminate if the fuse on the Six-Gun wiring harness is blown or the wiring harness is not properly connected. If the fuse and all connections are okay, contact Banks Technical Service.

• The RED LED will flash in a certain sequence if a connection is incorrect or if there is a problem with the system – this sequence will identify one or more diagnostic codes. A Six-Gun Diesel Tuner's diagnostic code is comprised of 2 digits. Each code is expressed in a sequence of 2 sets of the flashing red LED separated by a brief flashing of the green LED in between. Each set of a number of red LED flashes represents a digit. A longer flashing of the green LED separates the sequences. The LEDs will continue to flash to display all the errors, and then repeat. **Table 1** lists the common diagnostic codes. For example, if a faulty thermocouple is detected (code "2,3") by the Six-Gun Diesel Tuner, the following red and green LED flashing sequence is observed when the key is on:

- (1) Two times flashing RED LED
- (2) One time quick flashing GREEN LED
- (3) Three times flashing RED LED
- (4) One time longer flashing GREEN LED

The above flashing sequence will repeat continuously. When the problem is corrected, the diagnostic code will be eliminated and replaced by a steady green light. If problem persists, contact Banks Technical Service.

*NOTE: If multiple codes are set, they will be displayed in a series separated by the longer flashing green LED. When reading codes, make sure to watch the entire series until you see the first code repeat.*

-END, SECTION 8-

<b>Code</b>	<b>Event</b>	<b>Course of Action</b>
<b>1,1</b>	Fuel Rail Pressure (FPR) Input Voltage Out of Range	Turn ignition OFF and check the 24-Pin and 38-Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>1,2</b>	Manifold Absolute Pressure (MAP) Input Voltage Out of Range.	Turn ignition OFF and check the 24-Pin and 38-Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>1,3</b>	Six-Gun Switch Input Value Out of Range	Turn ignition OFF and make sure either Banks PowerPDA or Six-Gun switch is connected to Six-Gun tuner. If Six-Gun switch is connected (no Banks PowerPDA), check 2-pin connection on tuner's in-cab cable. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>1,4</b>	(LB7) Barometric Pressure Input Voltage Out of Range	Turn ignition OFF and check the 24-Pin and 38-Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
	(LLY) Barometric Pressure CAN Signal Not Available	
<b>2,1</b>	Fuel Rail Pressure (FPR) Output voltage Out of Range.	Turn ignition OFF and check the 24-Pin and 38-Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>2,2</b>	Manifold Absolute Pressure (MAP) Output Voltage Out of Range.	Turn ignition OFF and check the 24-Pin and 38-Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>2,3</b>	Exhaust Gas Temperature (EGT) Sensor Open Circuit.	Turn ignition OFF and check both thermocouple ring-terminal connections. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>2,4</b>	(LB7) OBD Signal Malfunction	Turn ignition OFF and check OBD connector and cable. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>3,1</b>	Crankshaft Position (CKP) Strand Fault or Internal Module Malfunction.	Turn ignition OFF and check the 24-Pin and 38-Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>3,2</b>	Power Up Error or Internal Module Malfunction	Turn ignition OFF and check the 24-Pin and 38 Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists call Gale Banks Engineering Tech Support.
<b>3,3</b>	Low Battery Voltage or Internal Module Malfunction.	Turn ignition OFF and check the 24-Pin and 38-Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>3,4</b>	CAN Communications Error with Vehicle.	Turn ignition OFF and check the 24-Pin and 38-Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>4,1</b>	Injection Control Signal Fault or Internal Module Malfunction	Turn ignition OFF and check the 24-Pin and 38-Pin connectors. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.
<b>4,2</b>	Transmission slippage Detected	Transmission is slipping excessively. Code will automatically clear once transmission stops slipping (repaired).
<b>5,1</b>	Internal Module Malfunction	Turn ignition off. Turn ignition back ON and re-check for presence of code. If problem persists, call Gale Banks Engineering Tech Support.

# Section 9

## CLEARING LEARNED INFORMATION

If the Six-Gun Diesel Tuner has been moved to a different vehicle, or you are instructed to do so by Banks Technical Staff, it is possible to reset all of the parameters that the Six-Gun has 'learned' - presence of an EGT thermocouple or Speed-Loader, etc.

**CAUTION: The following procedures can only be carried out with the engine OFF!**

**1.** Turn the vehicle key to ON but **DO NOT** start the engine.

**2.** Fully depress the throttle pedal and then release it completely. Repeat 5 times. The GREEN LED will flash when this is completed successfully.

**3.** Turn the key OFF. Wait 30 seconds, or until the GREEN LED goes off and stays off. Turn the key back to the ON position but **DO NOT** start the engine.

**4.** Fully depress the throttle pedal and then release it completely. Repeat 5 times.

-END, SECTION 9-

# Section 10

## Updating Your Banks PowerPDA Software & Banks Six-Gun Diesel Tuner Firmware

The Banks PowerPDA is designed such that new software updates can be easily installed. Check the BanksPower web site for the latest version of the Banks PowerPDA software. Once you have determined that your Banks PowerPDA should be updated, follow the instructions on the page for the appropriate software update.

The Banks Six-Gun Diesel Tuner is designed such that new firmware updates can be easily installed. Check the BanksPower web site for the latest version of the Banks Six-Gun Diesel Tuner firmware. Once you have determined that your Banks Six-Gun Diesel Tuner should be updated, follow the instructions on the page for the appropriate firmware update.

END, SECTION 10-



# Section 11

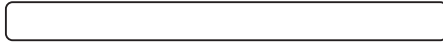
## PLACEMENT OF THE BANKS POWER DECALS

Figure 17

TYPICAL LEFT FENDER PLACEMENT

**banks  
POWER**

**DURAMAX DIESEL**



TYPICAL RIGHT FENDER PLACEMENT

**banks  
POWER**

**DURAMAX DIESEL**



-END, SECTION 11-

# Section 12

## REMOVAL OF THE SIX-GUN DIESEL TUNER

If the Six-Gun Diesel Tuner should ever need to be removed from the vehicle, perform the following:

- 1.** Disconnect the Six-Gun's 38-pin connector from the factory harness.
- 2.** Re-connect the vehicle's 38-pin connector back into the factory harness.
- 3.** Disconnect the Six-Gun's 24-pin connector from the factory harness.
- 4.** Re-connect the vehicle's 24-pin connector back into the factory harness.

**5.** Disconnect the 2-ring terminals from the EGT thermocouple.

**6.** Disconnect the 3 small connectors on the 'In-Cab Cable' and gently pull the cable back through the firewall.

**7.** Remove the Six-Gun Diesel Tuner. Failure to follow the above instructions when removing the module will result in a "Check Engine" light on the dash and a Diagnostic Trouble Code being stored in the factory computer, in addition to the engine not running.

-END, SECTION 12-

**Figure 9**

