



# ***BD X-MONITOR***

## **1994-2007 Dodge Ram 5.9L Cummins Installation Manual**

Date Purchased \_\_\_\_\_

Purchased from \_\_\_\_\_

Installed by \_\_\_\_\_

**READ THIS MANUAL COMPLETELY BEFORE INSTALLING THIS PRODUCT.**

**OWNER'S MANUAL - LEAVE IN GLOVE BOX**

Installation Manual Part # I1085200

Printed in Canada

BD Engine Brake Inc

A10 – 33733 King Rd, Abbotsford, BC, Canada V2S 7M9

Ship: 88 – 446 Harrison St, Sumas, WA 98295 Mail: PO Box 231, Sumas, WA 98295

Ph: 604.853.6096 Fax: 604.853.8749 Internet: www.bd-power.com

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# Kit Contents



**1830030**

### Universal Installation Kit

Includes thermocouple, bushing, a vacuum boost tube connection (for the control module), 6ft of 1/8" air tubing, and a fused power wire with ground wire.



**1300837**

**1/8" Boost Fitting**



**1820210**

**Control Module**



**Display Kit (Side Button)**



**1830010**

**Sensor Wire Kit**

## Welcome

Thank you for purchasing the BD X-Monitor. Your kit should have the above-mentioned items for your installation. This manual is divided into different areas to assist you with your installation and operation of your unit.

## Pre-Installation

If you have existing gauges installed, you may have to determine where to reposition them to accommodate the X-Monitor. The X-Monitor mounts on the driver's side A-pillar panel, or, a custom dash-top universal kit can be purchased as well.

This X-Monitor comes with all the programming to measure exhaust temperature and boost pressure, plus the option of adding one of the following: automatic transmission temperature (using the OEM sensor), remote temperature sender (for use with differentials for example), exhaust brake backpressure, fuel pressure and aftermarket fuel tank levels.

Here are the standard list measurements:

Exhaust Gas Temperature	<b>(PYRO)</b>
Turbo Boost Pressure	<b>(TURBO)</b>

The above two measurements can be displayed by themselves or you can add one of these options along with them:

Description	Value	BD P/N#
Transmission Temperature	<b>(TRANS)</b>	<b>INCLUDED</b>
Remote Oil Temp	<b>(OIL)</b>	<b>1080125</b>
Exhaust Brake Back Pressure	<b>(B-PSI)</b>	<b>1080135</b>
Fuel Pressure	<b>(F-PSI)</b>	<b>1080156</b>
Auxiliary Tank Level	<b>(FUEL)</b>	<b>1080160 *</b>

*\* The fuel tank level accessory kit interfaces with an aftermarket level sender with a range of 240ohms (Empty) to 33ohms (Full). Sender is not included.*

The standard kit comes with all the components and wiring to hook up the exhaust temperature, turbo boost pressure and automatic transmission temperature (using the trucks OEM sensor) - all other applications will require one of the accessories above to install.

Once the components have been installed, the X-Monitor will have to be programmed to match the application and the measurements being monitored. This will be done via the buttons on the display and will be explained further in this manual. If you wish to change from one optional measurement to another, the X-

Monitor can be reprogrammed to that application but an additional accessory kit may be required.

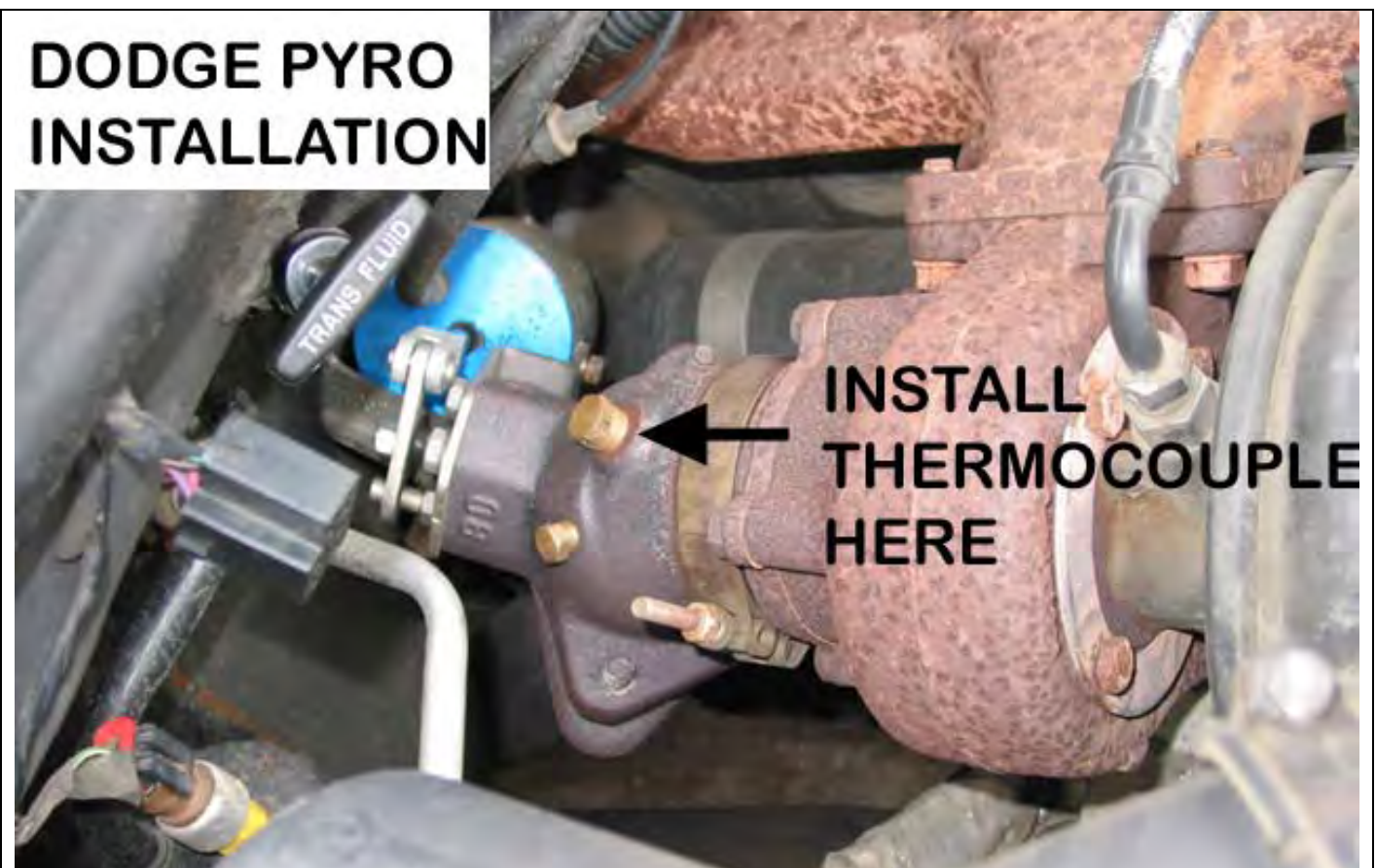
The following sections will give detail on the install of each measurement available but not all will apply to your installation.

## *Installation*

**NOTE:** The ground terminals of the vehicle's batteries should be disconnected before performing any welding or taping onto any ECM/PCM wire.

### *Pyrometer Sending Unit Assembly*

If your existing exhaust does not have a fitting to install a pyrometer sender unit (thermocouple), you will have to install the bushing supplied in this kit. The best place to locate the thermocouple is in the turbocharger down pipe.



If you have a TURBO-MOUNT EXHAUST BRAKE or an after market down pipe installed, there may be a 1/4" NPT plug already in the system. Remove this plug and install the supplied thermocouple into the 1/4" NPT hole and tighten with an open-ended wrench. We recommend using an anti-seize compound on the threads of the thermocouple.

If you have an OEM or stock down pipe, then you will have to drill a hole and then weld the bushing that is supplied with this kit in place. It is recommended that you remove the existing down pipe for ease of drilling and welding but it is possible to

install with this pipe in place. Install the thermocouple into the ¼” pipe plug and tighten it with an open-ended wrench. We recommend using an anti-seize compound on the threads of the thermocouple.

**Pre-Turbo:** The thermocouple can be installed before the turbo by drilling and tapping a 1/4” NPT port in the exhaust manifold. Special attention is required with these installations to make sure drilling and tapping are not being done on points that could cause cracking of the manifold or that debris does not enter the turbo or engine. It is recommended that the manifold be removed to perform this work. Age and condition of the manifold should be taken into consideration before performing this type of installation.

### Thermocouple Wiring

Route the thermocouple wire towards the firewall, taking precaution to keep it away from hot and moving parts, and then pass it through the firewall by piercing a large rubber grommet in the firewall beside the brake booster canister.

**NOTE: Do NOT cut or splice the thermocouple lead wire, as it is special wire that provides correct reading to the gauge. Simply coil any excess wire out of the way. If the thermocouple wire is too short, call factory for longer leads.**

From under the dash, route the thermocouple to the X-Monitor Control Module. Install the wires onto the Control Module as shown in the diagram.

**CAUTION: DO NOT MIX UP THESE WIRES, ENSURE YELLOW TO YELLOW AND RED TO RED OR DAMAGE WILL RESULT AND WARRANTY WILL BE VOIDED.**

## Boost Pressure Sender Assembly



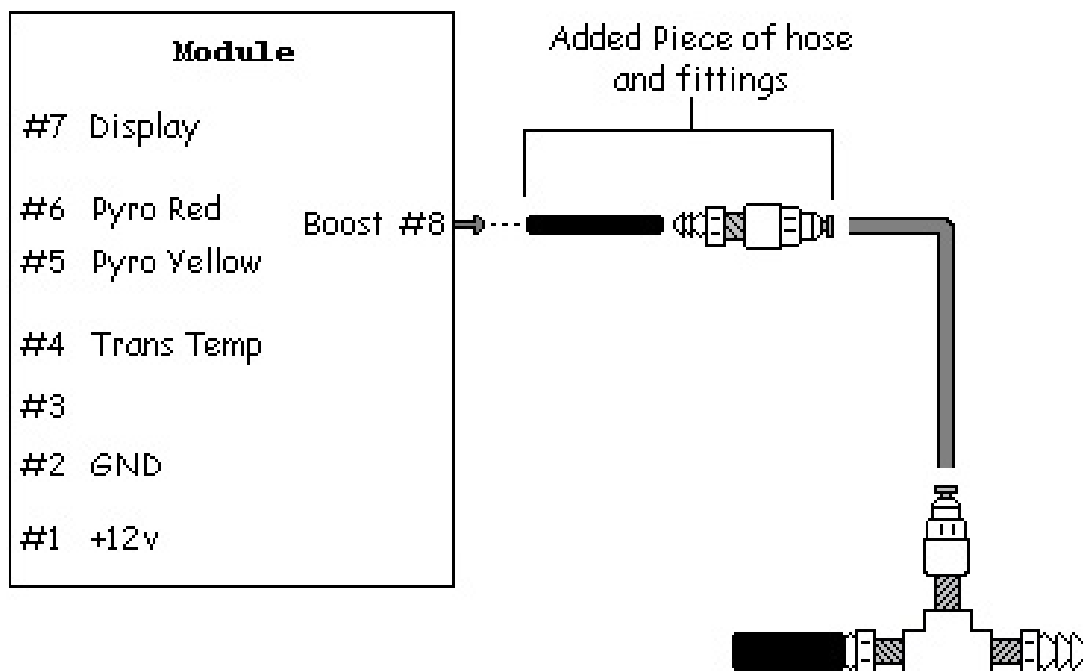
Locate and remove one of the intake plenum-to-manifold bolts and install the drilled bolt provided with this kit and tighten to the proper specifications. (These bolt holes all open into the intake manifold)

Attach one end of the supplied 6' piece of 1/8" plastic air hose onto the open fitting and route it through the firewall by piercing a large rubber grommet beside the brake booster canister.

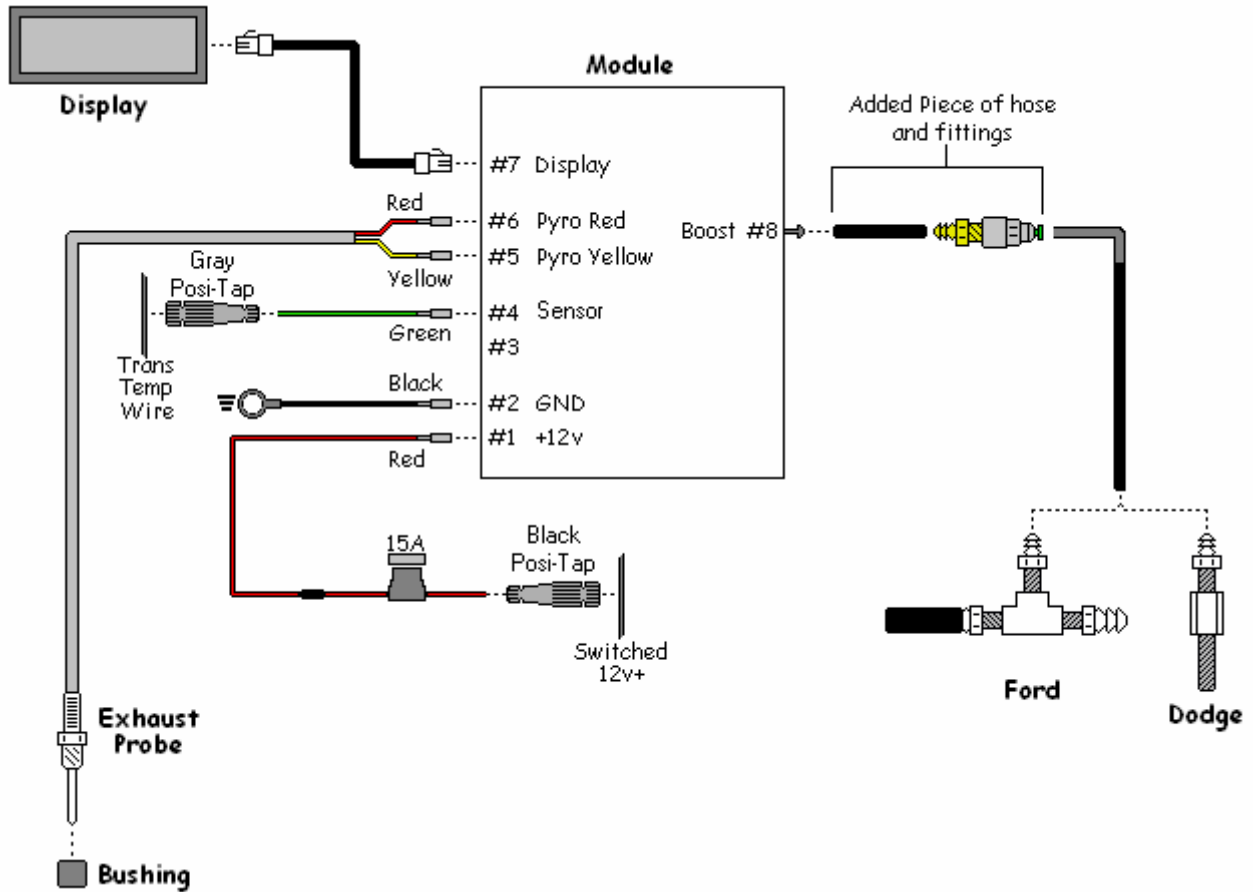
Route the hose into the cab under the dash taking care not to kink the tubing and to keep it away from hot and moving parts.

Push this end into the supplied fitting (see diagram below) and connect the rubber hose to the pressure sensor on the back of control box. **MAKE SURE TO USE THE RUBBER HOSE AND NOT THE PLASTIC TUBING WHEN MAKING THIS CONNECTION.**

NOTE: The module should be mounted with the boost fitting pointed down.



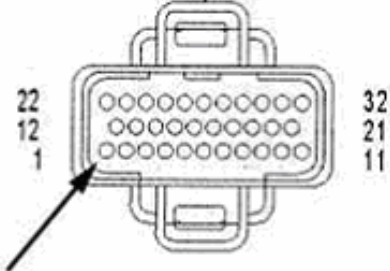
# Basic Installation with Transmission Temperature

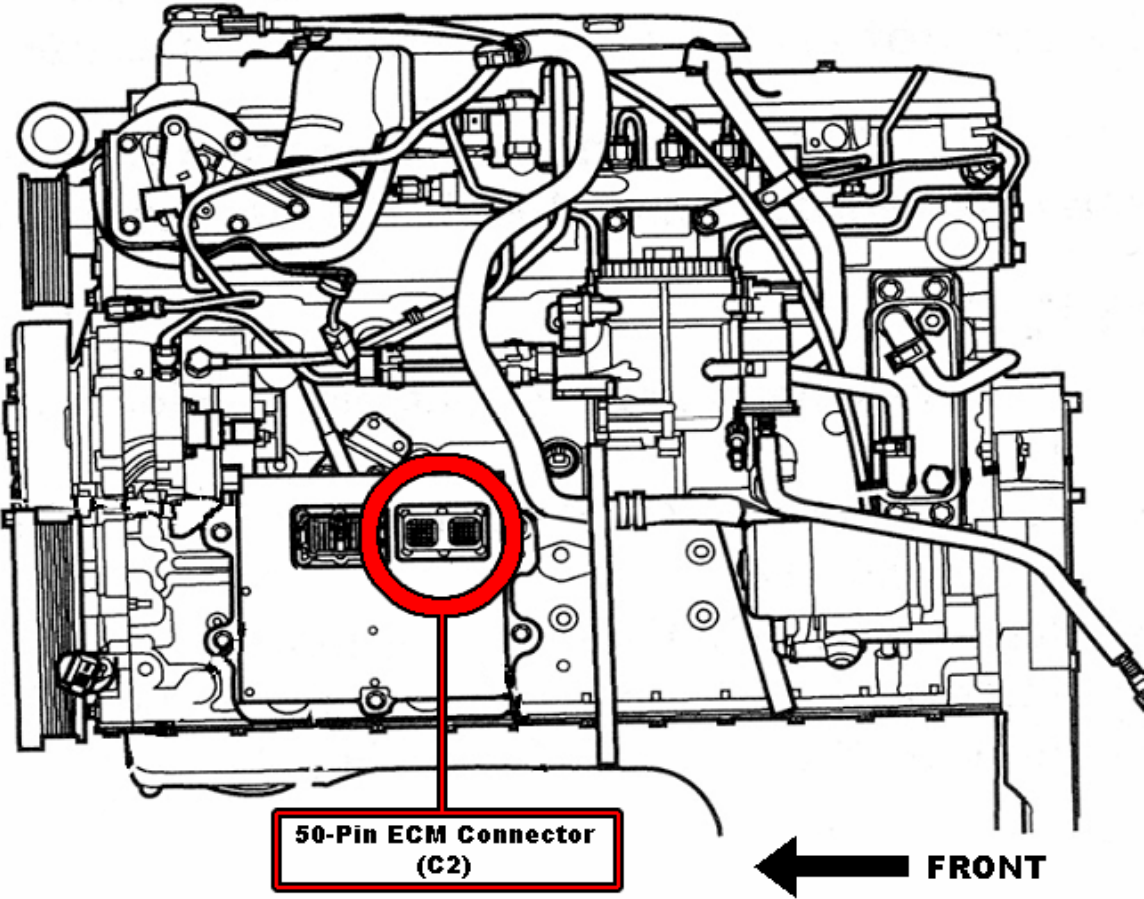


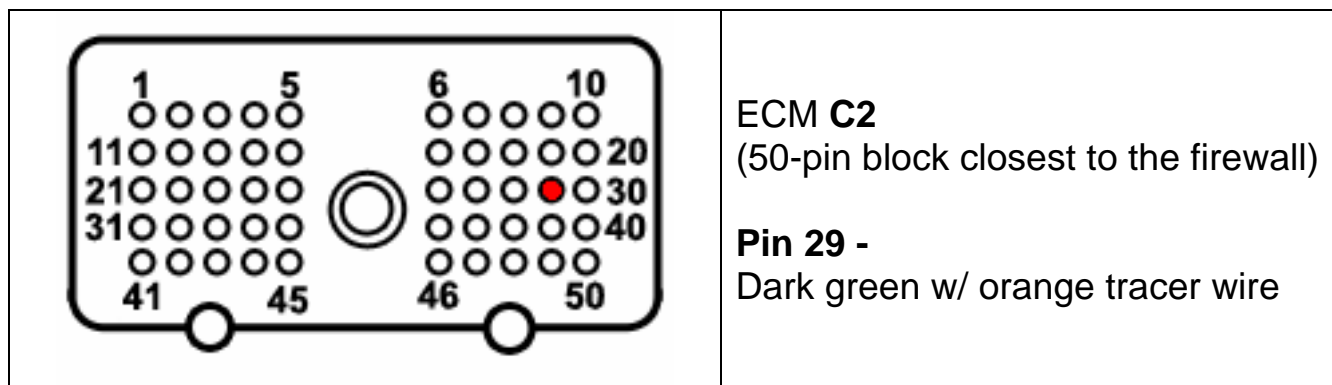


## Automatic Transmission Temperature Sensor

Locate the transmission temperature monitor wire at the PCM connector on 1998-2003 and the ECM on 2004-07 model years.

<b>1996-2003</b>	<b>PCM C2 (Center Block) Pin 1 – Violet Wire</b>
<p><b>Black</b> (Older Models) <b>White</b> (Newer Models)</p>  <p>POWERTRAIN CONTROL MODULE C2 (DIESEL)</p>	
<p><b>Pin 1 – Transmission Temperature Sensor Signal (Violet)</b></p>	

<b>2004-2007</b>	<b>ECM C2 (50-pin block closest to the firewall) Pin 29 - Dark green w/ orange tracer wire</b>
 <p><b>50-Pin ECM Connector (C2)</b></p> <p><b>FRONT</b></p>	



*NOTE for 1999 model year*

In some of the 1999 model year vehicles, Dodge had a different PCM that would give a lower reference voltage output than what the conventional PCM used for the transmission temperature sender throughout the 1998-2003 model years. To ensure that the proper program is being used, measure the voltage on the **violet** wire on **Pin 1** of **plug C2** on the PCM at an ambient temperature of 40-100°F:

<b>2 - 2.75 Volts</b>	Conventional Sender	<b>Use Program # 1085010 *</b>
<b>1 - 1.75 Volts</b>	Low Voltage Sender	<b>Use Program # 1085012 *</b>

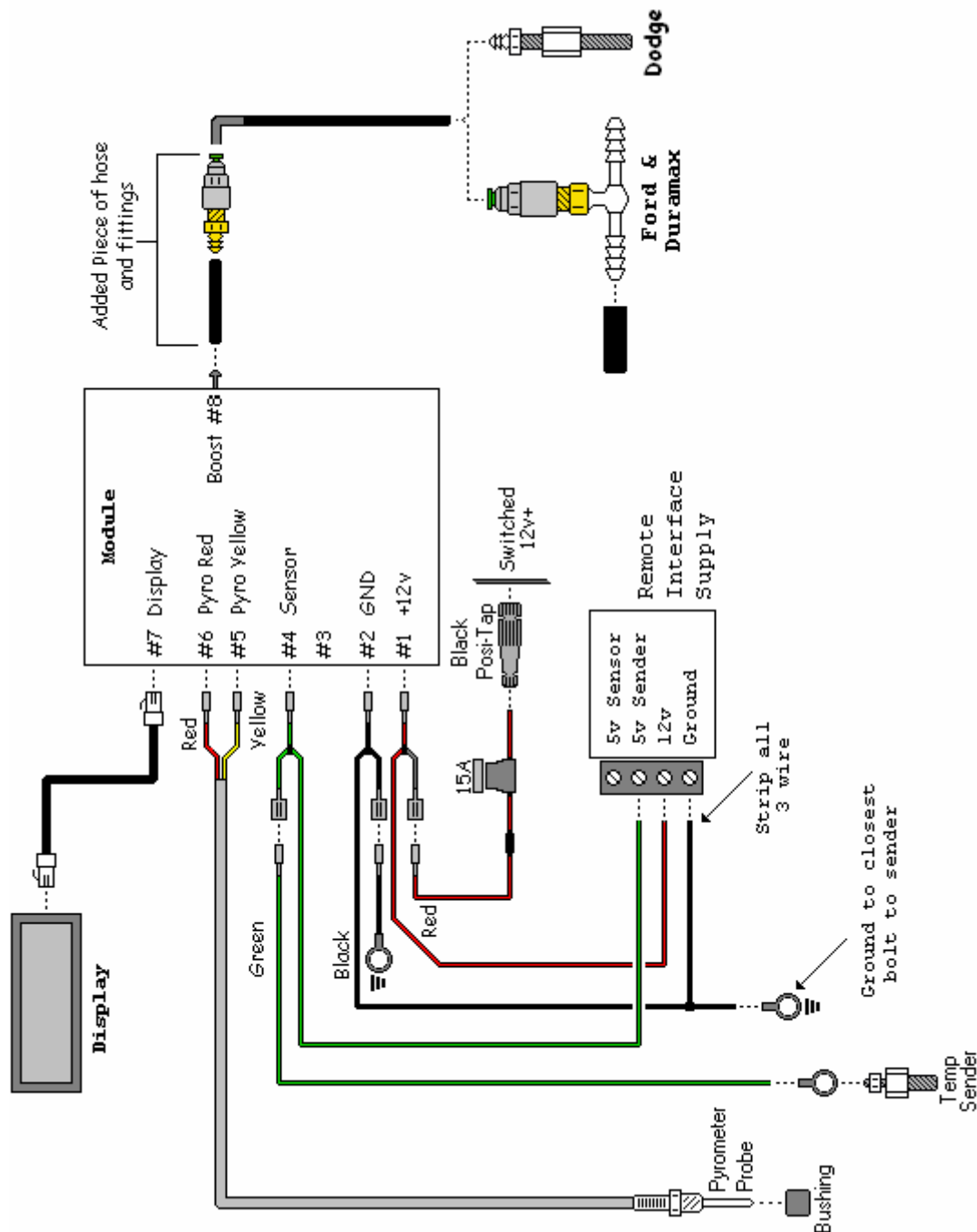
\* Programming is explained in the "Programming and Set-up" section later in this install manual.

## Remote Oil Temperature (Diff / Manual Trans / Etc)

Using the parts supplied with the remote temperature accessory kit, insert the temperature sender into the large bushing. This will replace the rear differential housing fill plug on the back cover. To use this feature to monitor the temperature of your manual transmission, locate the appropriate location for the sender to fit.

NOTE: Not all locations will accommodate the size of the sender or the bushings supplied in the kit. An alternative location, sender, or bushing may have to be purchased to be installed in the desired location.

### Remote Temp Wiring Diagram

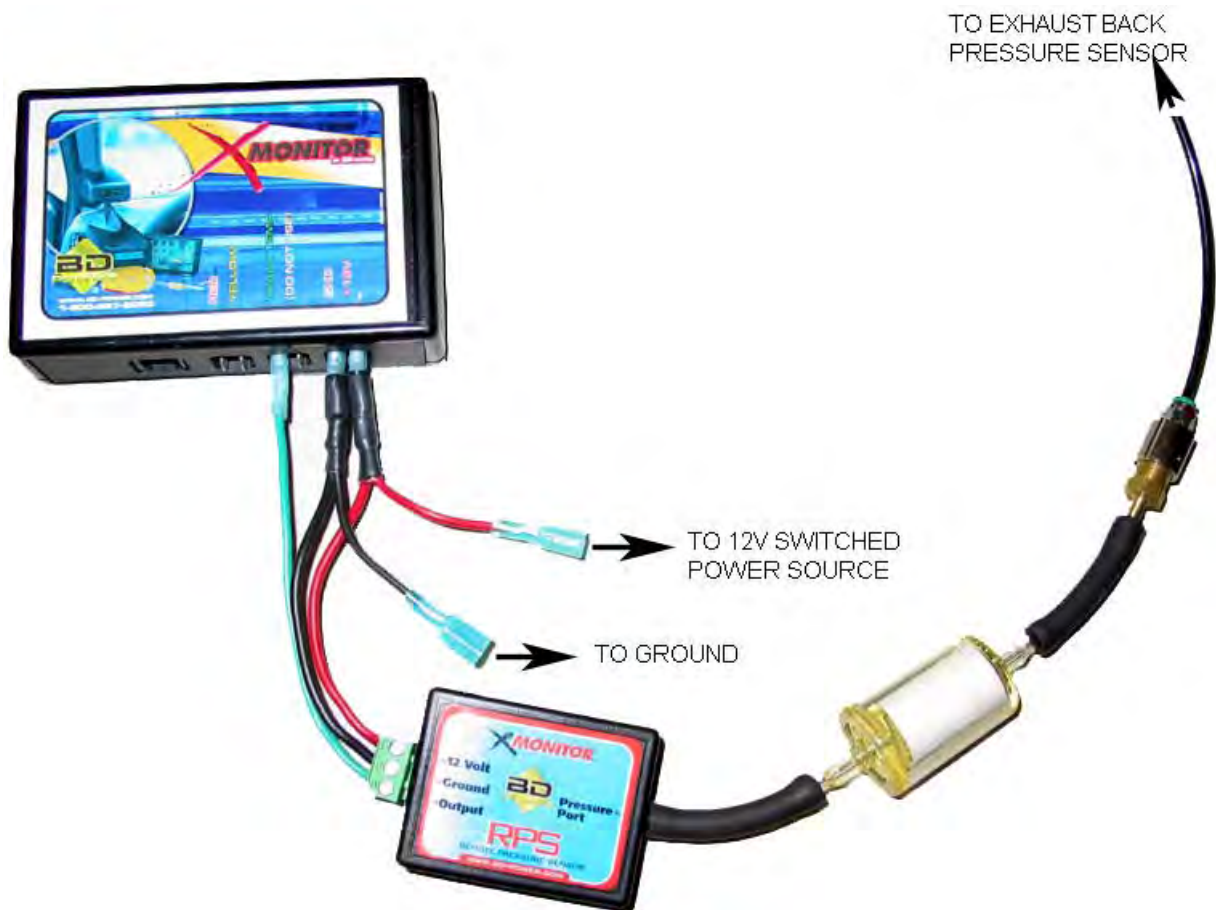


## Brake Back Pressure

On the BD Exhaust Brake valve there is a 1/8" NPT plug used for measuring brake back pressure. Remove this plug and install the tube fitting with 1/8" NPT male threads. One end of the formed piece of stainless tube has a fitting attached and other end is bare - Insert the bare end into the fitting on the brake valve.

Secure the stainless tube to one of the manifold studs using the supplied hardware in the brake pressure kit. Connect the plastic tubing to the fitting on the end of the stainless tube, run it into the cab and connect it to the filter attached to the RPS module.

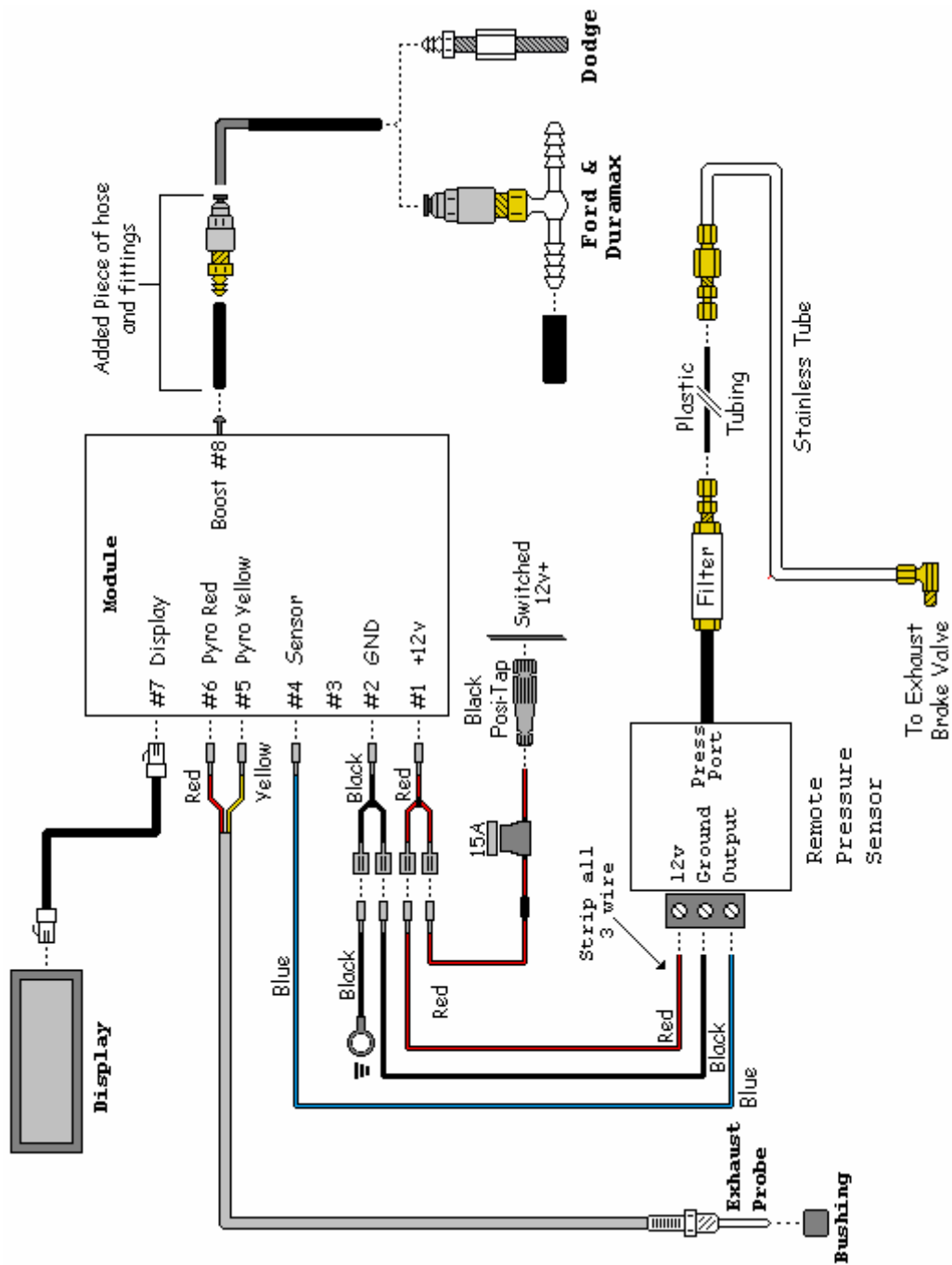
Connect the RPS module to the X-Monitor module as per diagrams and secure all wires and tubing, keeping them away from heated or moving components.



**The plastic filter housing will need to be changed out after 6-12 months of use.** The replacement time is dependant on air humidity and the amount of moisture that is trapped in the actual filter. The replacement filter part # is **1800135**. This filter should be mounted in a visible, easy to access location.

Because of the moisture accumulating in the line and filter, it is highly recommended that the RPS unit be mounted at the highest point of the air line causing all the moisture to run back down the line into the exhaust.

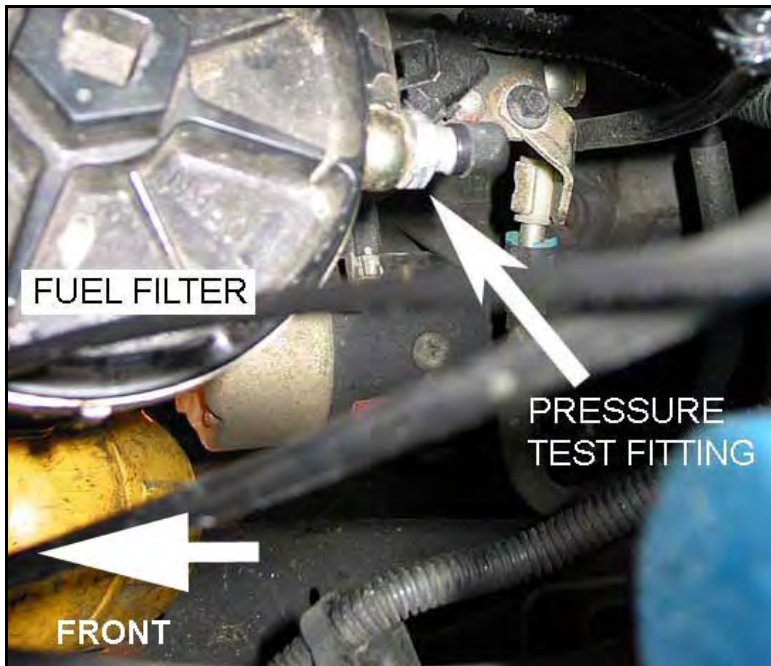
# Back Pressure Wiring Diagram



## Lift Pump Fuel Pressure (1998½-2002)



Apply some pipe 'dope' or Teflon tape to the supplied pressure sender, and then insert and tighten the sender into the brass banjo bolt fitting supplied.



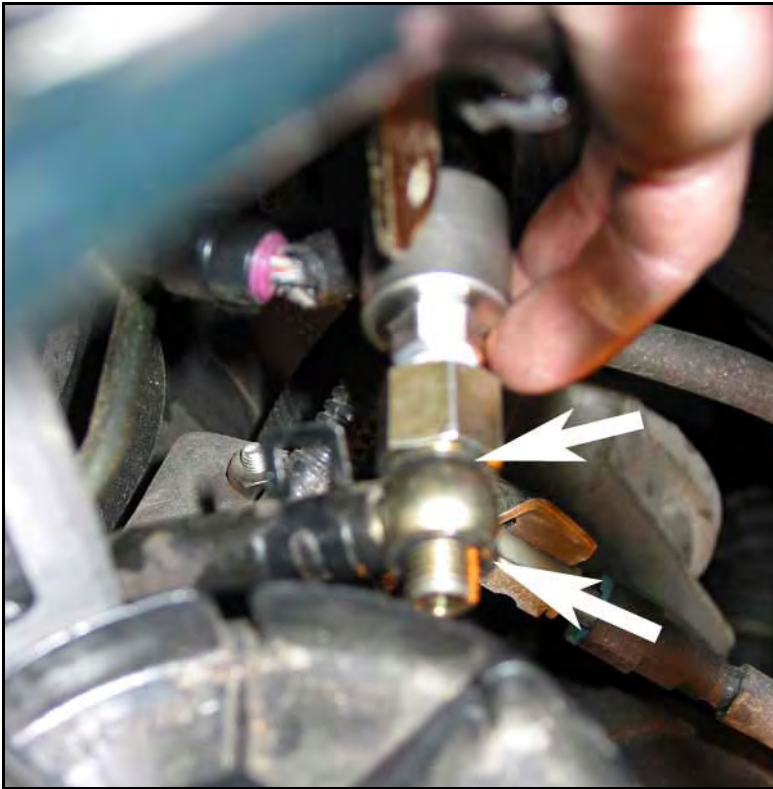
Locate the fuel filter on the left hand side of the engine just in front of the fuel lift pump.

At the rear of the filter housing is a fuel inlet line and pressure test fitting. Remove the test fitting and then remove the washers.

**CAUTION: Fuel will escape from this line, ensure a small drip pan or some rags are in place to prevent excessive fuel from leaking.**



Install one of the new washers (supplied in the kit) onto the supplied banjo bolt fitting.



Insert the banjo bolt fitting through the fuel line.

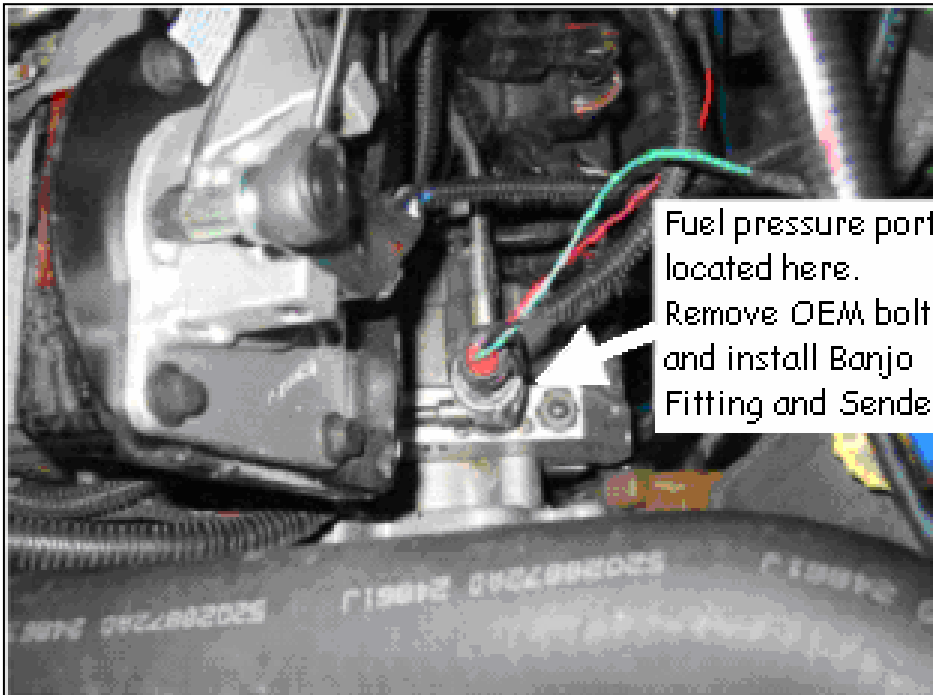
Install the other washer, and then insert the fitting into the fuel filter housing.

Start threading the fitting with your fingers to prevent cross-threading, and then secure it hand tight before tightening with a wrench.

**When installation is complete, run the engine and check for leaks.**

### Lift Pump Fuel Pressure (2003-2007)

The sensor mounts on the high-pressure pump located on the driver's side of the engine, top/front section. There are two different styles of throttle linkages on the 2003-2007 Dodge Ram pick-ups.



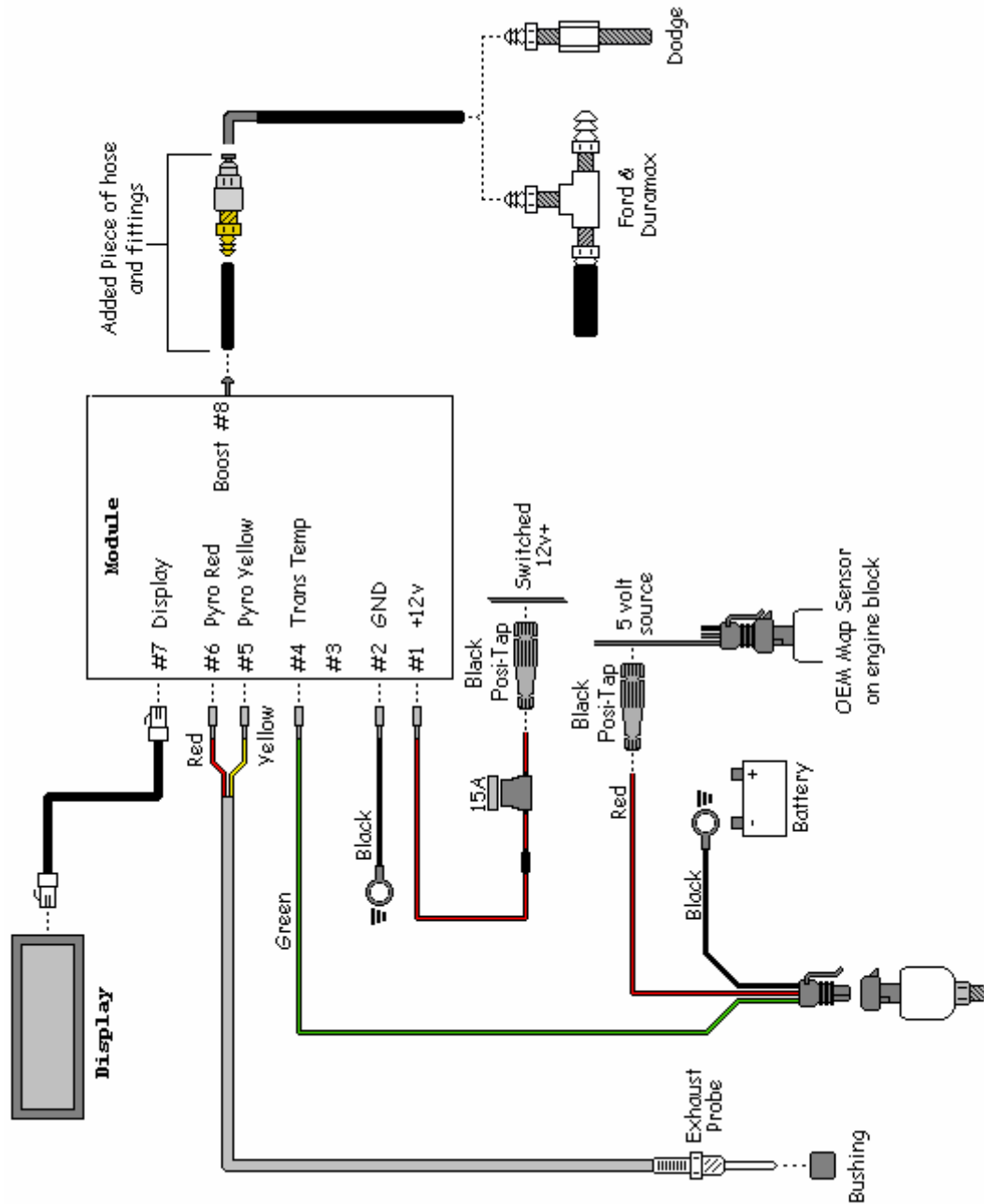
If the throttle linkage is located near the top of the engine, remove the throttle linkage plastic cover before proceeding.

Once the fuel pressure port is located, remove the existing factory banjo bolt and install supplied banjo bolt in X-Monitor kit.

**When installation is complete, run the engine and check for leaks.**

Run the wiring along the driver’s side of the engine and through the firewall near to the control box and connect the wiring as per the “Lift Pump Pressure” wiring diagram.

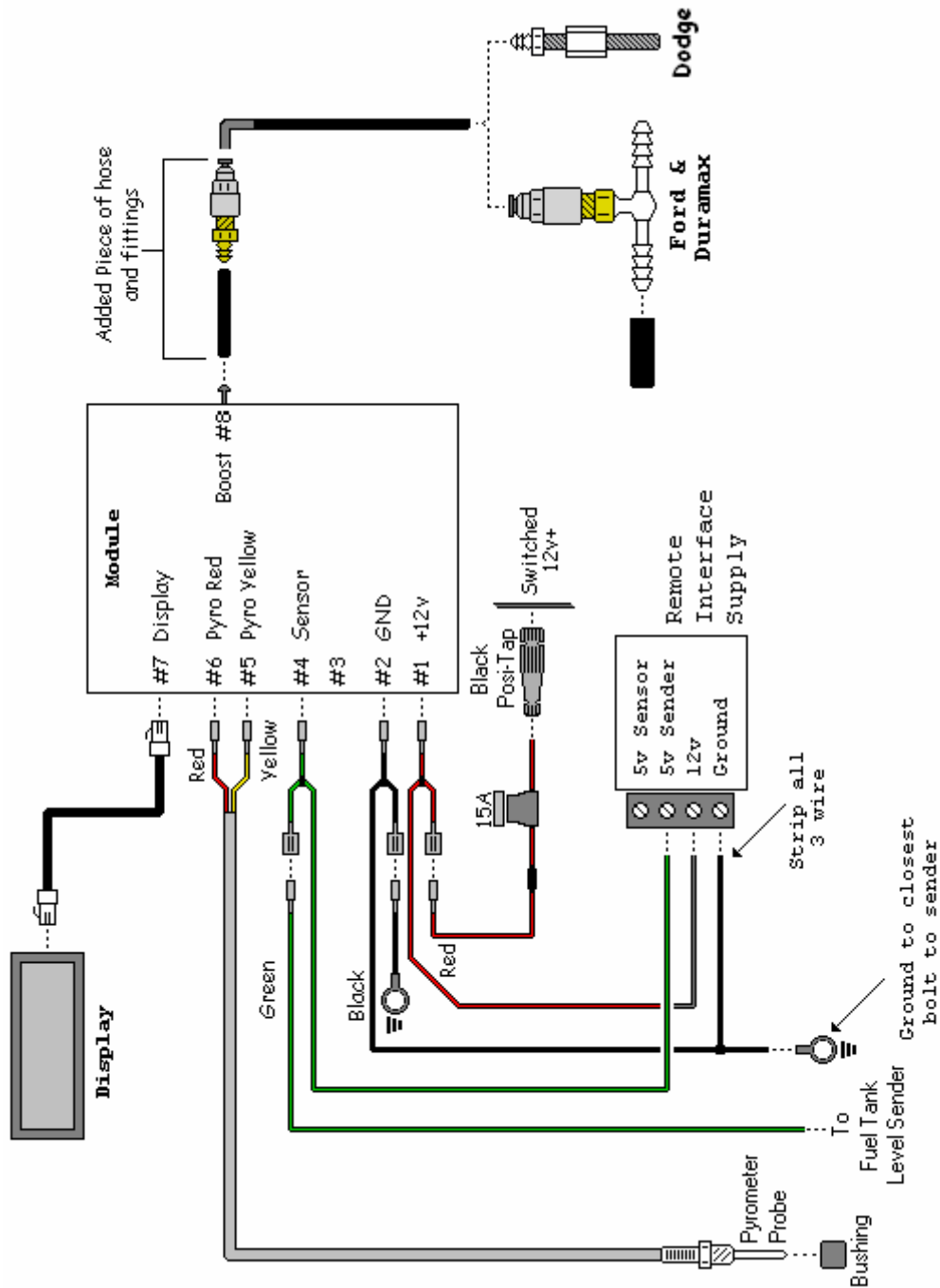
Wiring Diagram – Lift Pump Pressure





# Auxiliary Fuel Tank Level

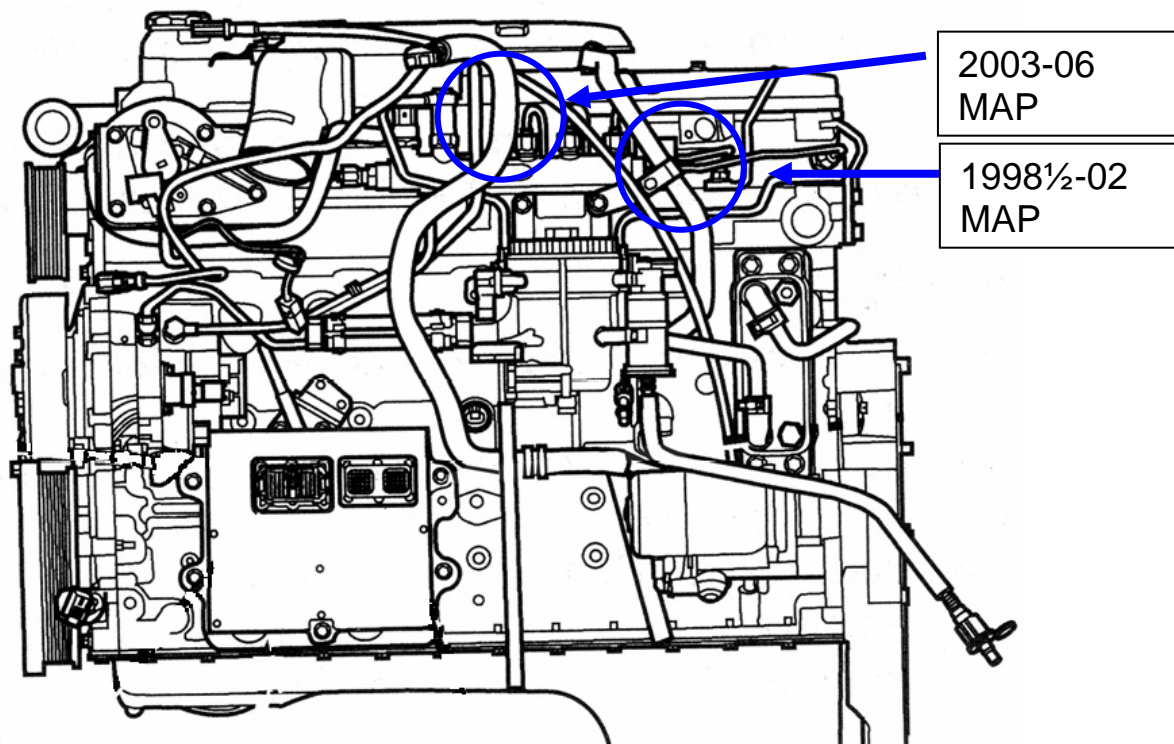
Consult this diagram for correct hook-up of the auxiliary fuel tank level sender kit. Notice that the green wire from the control module connects to the output of the auxiliary fuel tank's fuel sender. Consult the literature for the sender for the correct terminal or wire for the output.



## Fuel Pressure Sensor Power and Ground

A 5V source is needed to power the auxiliary fuel pressure sensor. A recommended location to tap onto is the MAP (Manifold Absolute Pressure) sensor located near the driver's side rear portion of the engine block. On 1998½-2002 model trucks it is located on the side of engine at the rear; on 2003-2007 model trucks it is located on the top of the engine, near the rear. Use the supplied Posi-Tap to pierce this wire and use the red wire to route power to the sensor connector assembly.

The ground connection can be routed back towards and connected to the battery.



### **5 Volt Supply – Located at the MAP Sensor**

Model Year	Wire Color	Pin
1998½-2001	Orange	A
2002	Violet w/ White tracer	3
2003	Dark Green w/ Orange tracer	C
2004-2007	Pink w/ Yellow tracer	C

## X-Monitor Power and Ground

Locate a switched 12-volt power source under the dash and install the Red wire to it.

Install the other end to the Power connector of the control box.

Install the Black ground loop to a good ground and install the other end to the Ground connector of the control box.

## Display Assembly Installation

**\* \* \* EXTREME CAUTION \* \* \***

*THE DISPLAY IS VERY FRAGILE AND IS INSTALLED AND TESTED AT THE MANUFACTURER. IF YOU MUST REMOVE THE DISPLAY IN ORDER TO PAINT THE PILLAR MOUNT TAKE EXTREME CARE DURING RE-INSTALLATION. DO NOT OVER-TIGHTEN THE MOUNTING SCREWS OR THE DISPLAY WILL BE DAMAGED AND YOUR **WARRANTY WILL BE VOIDED.***

### A-Pillar Mounts

These mounts go over top of your existing OEM A-Pillar. Place the display assembly onto the A-pillar to determine the best mounting location and mark this location on the pillar. Remove the A-pillar for ease of installation.

While holding the display assembly on top of your A-Pillar (in the place where you would like to mount it), drill 3/16" holes into the corners of the display assembly mount and through the A-pillar.

Drill a hole through the A-pillar, large enough for the display control wiring connector to pass through (*Optional - This hole is NOT required if you decide to run wiring along the outside of the A-pillar*).

Install the telephone type communication cable into the back of the display circuit board and route the wiring through the drilled hole or along the outside of the pillar as preferred.

Insert the supplied ratchet fasteners through the drilled holes and into the A-pillar securing the X-Monitor display assembly to the A-pillar. Install the A-pillar into place and route the control wiring down to the control box.

Insert the telephone type connector in the socket of the control box. Once all connections are made, secure the box in place under the dash and away from any moving parts.

### Programming and Set Up

Press both buttons in on the X-Monitor display and set your ignition into **KOEO mode** (Key On / Engine Off). The X-Monitor screen should light up and after the boot-up has completed, the words "SIDE OR TOP BTN?" should appear and the bottom line should read "SIDE". Let go of both buttons. Press the bottom button (if using the A-Pillar mount) to go to the next screen (if you are installing a universal (top) mount, hit the top button).



You will now get a screen that will read "**PART:**" on the top line and "**1080000**" on the bottom line. Using the programming chart located on the next page, find the program number that matches the application and measurements you are going to program the X-Monitor for. Press the top button until the program number appears, then press the bottom button to activate that program (see diagram below). The display will now cycle through the normal start-up screens that will appear every time the truck is started.



After the program has been set, the boot-up screen should display the following:



# X-Monitor Programming Chart

Application	Pyro	Turbo Boost	Trans Temp	Remote Temp	Brake Press	Oil Press	Fuel Press	Fuel Level	Program #
All Years	•	•							1085000
1996-1998 12V	•	•	•						1085015
1998½-2002 24V	•	•	•						1085010
Late 1999*	•	•	•						1085012
2003	•	•	•						1085011
2004 (305hp)	•	•	•						1085013
2004½-07 (325hp)	•	•	•						1085014
All Years	•	•		•					1085020
All Years	•	•			•				1085030
All Years	•	•					•		1085050
All Years**	•	•						•	1085060
All Years	•	•							1087000
1999-2002	•	•	•						1087010
2003 (7.3L)	•	•	•						1087011
2003-2007 (6.0L)	•	•	•						1087012
All Years	•	•		•					1087020
1999-2007	•	•			•				1087033
All Years**	•	•						•	1087060
All Years	•	•							1086000
All Years	•	•		•					1086020
All Years	•	•			•				1086030
2001-2002	•	•				•			1086040
2003-2007	•	•				•			1086041
All Years*	•	•						•	1086060
Universal	•	•							1080000
Universal	•	•		•					1080020
Universal	•	•			•				1080030
Universal	•	•					•		1080050
Universal**	•	•						•	1080060

\*\* Connects to an aftermarket fuel level sender with a ranger of 240 ohms at empty and 33 ohms at full; optional senders are available.

\* Late 1999 Dodge with 1-1.75V on sensor wire at 40-100°F transmission temperature (Ref. TB#30803)

## Operation

Once the display has gone through the startup cycle it should end up with the following, default display.



To change the settings and set alarm values there are 2 buttons on the side/top of the display: the bottom (**MENU**) button cycles through the different modes and the top (**MODIFY**) button controls the setting of the values.

<i>Recommended Alarm Settings</i>	
<b>PYRO</b>	900
<b>TURBO</b>	40
<b>TRANS</b>	200
<b>OIL</b>	Dependant on location of sender
<b>B-PSI</b>	User Defined – Consult Exhaust Brake manual for safe ranges
<b>F-PSI</b>	3
<b>FUEL</b>	25

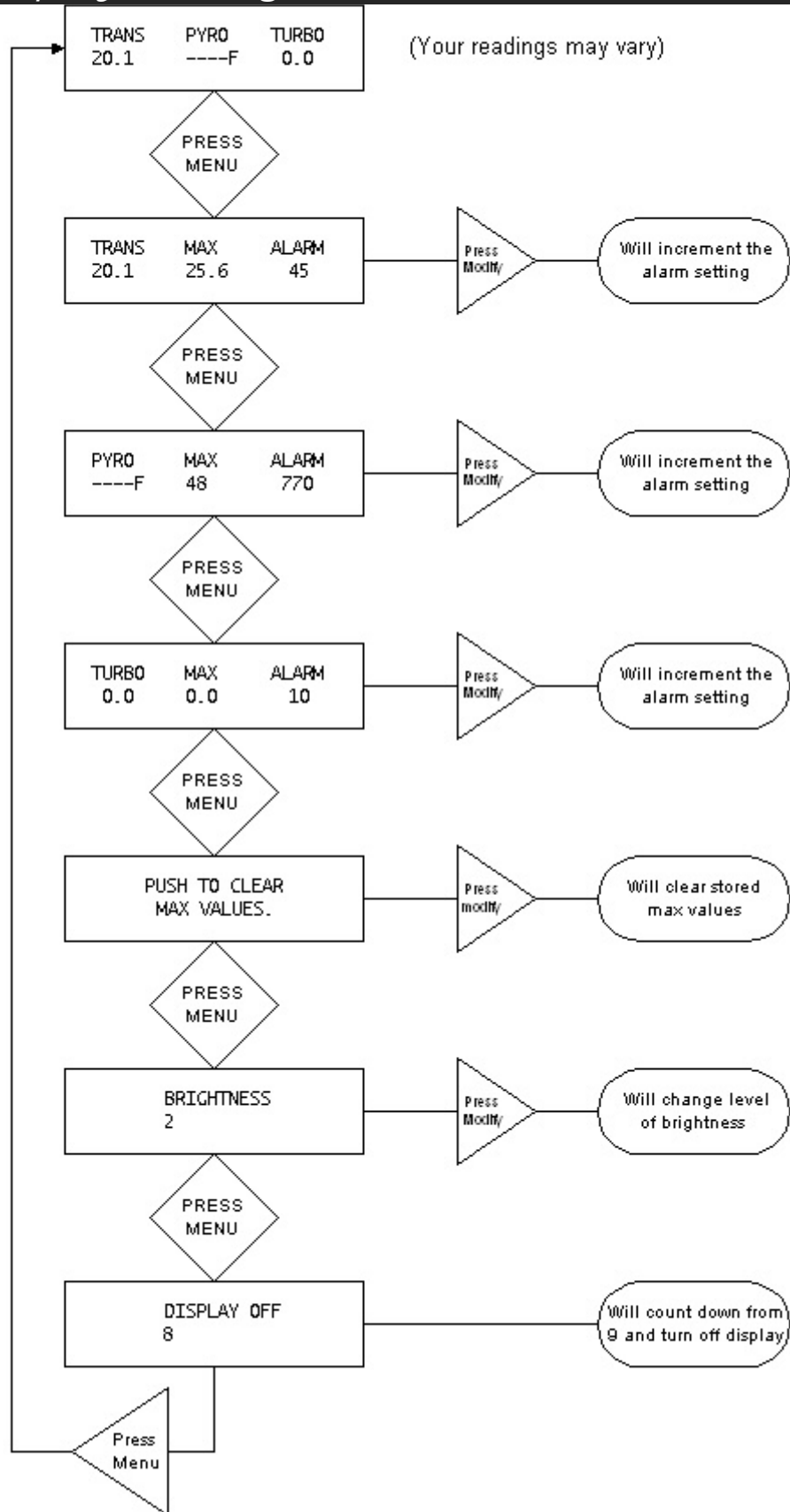
These are only suggested settings and will vary depending on vehicle condition, performance enhancements and driving techniques.

NOTES: All temperature readings are in Fahrenheit (°F), pressures are in pounds-per-square-inch (PSI) and fuel level is displayed in percentages. All readings are approximate and may vary due to the characteristics of the sensor, sender or probe, and certain conditions can cause interference or sway the reading.

The alarm settings for fuel pressure (F-PSI), oil pressure (O-PSI) and fuel level (FUEL) will display an alarm when the measurement drops below the set value; all other measurements will alarm when the value is above the set value. The history value also works the same where it records the lowest achieved value on (F-PSI), (O-PSI) and (FUEL) and the highest value on all others.

The X-Monitor is calibrated to the thermocouple that is supplied with the kit and may not register accurately if an existing or different thermocouple is used. If the thermocouple was installed post-turbo (in the exhaust pipe), then all temperatures will indicate to be lower, and the maximum safe temperature would be 900°F.

## X-Monitor Display Settings



### **IN DISPLAY SHUTDOWN MODE:**

- Counts down from 9 to shut off display only.
- All functions continue to work in the background.
- Press MENU (lower) button to turn display on.



**\*\*CAUTION\*\*:** DO NOT RUN ENGINE AT HIGHER THAN 900 DEG INDICATED FOR EXTENDED PERIODS OR ENGINE DAMAGE MAY RESULT. DO NOT run the transmission higher than 250 degrees for prolonged periods or transmission damage may result.

THE X-MONITOR IS A VERSATILE GAUGE PACKAGE THAT CAN BE PROGRAMMED TO MONITOR DIFFERENT SYSTEMS OF THE VEHICLE. THESE INSTRUCTIONS ARE FOR GENERAL INSTALLATION AND SPECIFIC APPLICATIONS WILL RECEIVE INDIVIDUAL APPLICATION INFORMATION.

NOTE: It is recommended that when mounting/securing the X-Monitor module (or RPS module used in Back Pressures applications), the barb of the pressure sensor on the modules point downwards to prevent any condensation from the tubing collecting inside the modules.

## *Maintenance & Troubleshooting*

Following the diagrams in this manual, tracing hoses and wiring, checking continuity through electric components or checking for any lines that are disconnected should solve any problems that may arise.

NOTE: Analog signals are naturally affected by RF (radio frequency) noise. To eliminate any possible chance of an erratic signal please choose a clean ground signal for the X-Monitor, that is clearly mounted away from the alternator wires or any other voltage sources (positive battery cables, etc.). If for some reason you still have erratic sensor readings try a direct ground connection to the battery.

Thermocouple wires should also be clear from any RF noise sources as well (i.e. alternator, positive battery cables, etc.). If the thermocouple signal is erratic then the copper ground wire that is contained inside of the lead wire can be connected to ground to reduce a small amount of noise. Be sure to connect only one end of this copper wire to eliminate any ground loops from forming.

If you have any problems or need replacement parts, call us at 1-800-887-5030, between 8:30am and 4:30pm Pacific Time.



## BD ENGINE BRAKE, INC. *LIMITED WARRANTY STATEMENT*

THE INSTALLATION OF THIS PRODUCT INDICATES THAT THE BUYER HAS READ AND UNDERSTANDS THIS AGREEMENT AND ACCEPTS ITS TERMS AND CONDITIONS.

### DISCLAIMER OF LIABILITY

BD Engine Brake Inc., its successors, distributors, jobbers, and dealers (hereafter "**BD**") shall in no way be responsible for the product's proper use and service. THE BUYER HEREBY WAIVES ALL LIABILITY CLAIMS.

**BD** disclaims any warranty and expressly disclaims any liability for personal injury or damages. **BD** also disclaims any liability for incidental or consequential damages including, but not limited to, repair labor, rental vehicles, hotel costs, or any other inconvenience costs by reason of use or sale of any such equipment. 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 **BD** and to hold **BD** harmless from any claim related to the item of any equipment purchased.

This warranty shall not apply to any unit that has been improperly stored or installed, or to misapplication, improper operation conditions, accidents, neglect, or which has been improperly repaired or altered or otherwise mistreated by the **BUYER** or his agent. **BD** also 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.

### LIMITATION OF WARRANTY

BD Engine Brake Inc. (hereafter "**BD**") warrants to the **BUYER** that any parts purchased shall be free from defects in material workmanship. A defect is defined as a condition within the product that would render the product inoperable. **BD** gives Limited Warranty as to description, quality, merchantability, fitness for any product's purpose, productiveness, or any other matter of **BD's** product sold herewith. **BD** shall be in no way responsible for the product's open use and service and the **BUYER** hereby waives all rights other than those expressly written herein. This Warranty shall not be extended or varied except by a written instrument signed by **BD** and the **BUYER**.

**The Warranty is Limited to one (1) year from the date of sale and labor costs incurred by the removal and replacement of the BD product, while performing warranty work, will be covered for 1 (one) year, payable at BD rates, at authorized centers and with prior approval. Until BD has approved the claim, the consumer may be responsible for these costs.**

A Return Authorization (WA) number, obtained in advance from **BD**, must accompany all products returned for warranty consideration. All products must be returned, shipping prepaid, to **BD** and must be accompanied by a dated proof of purchase receipt. All Warranty claims are subject to approval by **BD** and repaired or replaced product will be returned to the customer freight collect. Accepted warranty units, which have been replaced, become the sole property of **BD**.

This warranty is in lieu of all other warranties or guaranties, either expressed or implied, and shall not extend to any consumer or to any person other than the original purchaser residing within the boundaries of the continental U.S. or Canada.

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.