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Variable Inline Enrichment Device (Buell ViED®)

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Fits XB model 2008-2009 Buell®

XB9/12 Model Buell with OEM O2 sensors

Made in the USA

A simple upgrade designed to let the engine equipped with an OEM oxygen sensor run at a richer air fuel ratio in closed loop mode ranging from 14.3:1 to 13.7:1. The improved air fuel mixture has generally shown one of more of the following positive results:

- lower engine temperature
- decreased exhaust heat
- improved throttle response
- less engine 'ping'

Tools Needed:

Buell Tool Kit
Philip's Head Jeweler's screwdriver
Tie wraps

You remove the…

- seat
- air box cover
- negative terminal of the battery

It is recommended you have the Owner's Manual or Service Manual available to refer to during installation.

General VIED Installation Instructions

If there are not specific instructions for the model bike, all model bikes follow these basic installation procedures.

- Locate the O2 sensor
- Follow wiring generally 6-8" to a black connector
  - Cut any tie wraps holding the connectors in place
- Unplug weather-tight connector
- Plug the VIED **between** O2 sensor and wiring harness like a short extension cord
- Make sure the connectors lock into each other
- Locate the long black ground wire on the VIED
  - Run this wire to the ground terminal of the battery or other suitable ground location.
  - The ¼" Female connector on the VIED is a second ground connection. If needed, a wire can be fabricated to connect to this for quick disconnect.
- Tie wrap the VIED and ground wire in place to prevent movement.
- Re-install any parts removed from the bike.
- Installation is complete

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Adjustment Instructions

- Use a Jeweler's screwdriver to make adjustments to the VIED
- Do not force the ViED dial adjustment
- Set the initial value based on the table of known working Air Fuel Ratio (AFRs)
- If you get transient Check Engine light, set the AFR approximately .05 to .1 AFR leaner

Tuning Notes:

Do not expose the ViED to high pressure water stream. Keep ViED out of direct water spray. Wire loom can be used to help protect the dial from water spray.
Richer closed loop AFR values can not be achieved if any exhaust leaks exist. Even a smaller exhaust leak can cause check engine lights to occur. It is common for leaks to occur after slip-on-muffler or exhaust system upgrades have been done on the bike.

The Buell closed-loop range appears to be under 5000 RPMs and under 40% throttle. When riding in this RPM range, the DDFI ECM will make adjustments to the Adaptive Fuel Value (AFV). The AFV is a global percentage adjustment applied to all fuel calculations made by the ECM. When the ECM is constantly adding fuel in closed-loop mode because of a VIED, the AFV percentage can get high enough to cause some engines to get overly rich at high RPMs. Prior experience indicates that VIED settings in the 14.0:1 are generally most effective for overall performance and fuel ratios.

After making a richer setting on the VIED, the engine may run rough during its learning cycler. This learning cycle can last for approximately 10-15 minutes. If the engine does not smooth out, lean out the VIED setting.

Settings richer than 14.2 may be prone to causing a temporary CE light while the engine is running. This is more likely with free flowing exhaust systems.

The CE light is triggered by a temporary low voltage seen by the ECM from the O2 sensor. This is because of the way the Buell VIED intercepts the O2 sensor signal and alters it before the ECM gets the new signal. Bikes with upgraded, free flowing exhaust systems may also see CE lights triggered more often due to reversion pulling fresh air into the exhaust.
Typically the ECM will recover automatically and the CE light is nothing more than a reminder to check for engine codes to see if anything of importance occurred. The Buell ECM will 'blink' the CE light for serious engine issues.

These comments are specific to Buell's earlier than 2007 and earlier (DDFI-2 ECM):

If a Check Engine light occurs while riding, the mixture adjustment is set too rich. Adjust the mixture slightly leaner by .05 AFR or ½ a tick mark at a time until the CE lights are not occurring. Transient CE lights can be ignored.

The Buell Check Engine (CE) Light will not go off once it is set on, even if the error condition goes away. To clear the CE light, you must recycle the ignition.

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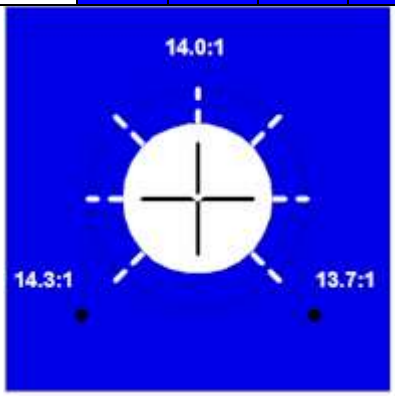
Approximate AFR range for the ViED's are as follows in the shaded cells:

14.7	14.6	14.5	14.4	**14.3**	**14.2**	**14.1**	**14.0**	**13.9**	**13.8**	**13.7**
Stock	Stock						**Best**			

Full Counter Clockwise is 14.3:1

Leaner



Full Clockwise is 13.7:1

Richer

Estimated maximum rich AFR for various model bikes and years

Buell Series	**1999-2002**	**2003-2007 DDFI-2 ECM**	**2008-2009 DDFI-3 ECM**
	Not Tested	**Not Recommended**	**Approved**
XB9		14.2	14.0
XB12		14.2	14.0
1125			Not Tested
X1 **M2** **S3**	14.2		
Testing Notes		Limited success has been achieved with the DDFI-2 ECM bikes.	

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Disclaimer

This product is intended for race vehicles used on closed courses, and not for use on roads or vehicles otherwise subject to emission control requirements. In California, this product must not be used on any vehicle that is registered or licensed for use on public roads.

Actual results from the installation of VIED's may vary between individual bikes. S&P MULLEN Enterprises, Inc. warrants Nightrider.com Performance Products against defects in factory workmanship and material for 30 days from the date of purchase with proof of purchase or until ownership in the part is transferred. The manufacturer and seller make no warranties express or implied which extend beyond the description of the goods contained herein. Any description of this product is for the purpose of identifying it and shall not be deemed to create an express warranty. S&P MULLEN Enterprises, Inc. shall not be responsible for any consequential, special or incidental damages of any nature, including but not limited to the loss of use of any vehicle on which the unit may be installed and the cost of obtaining substitute components.

Check Engine Codes and Historic Engine Codes 131/151 or similar 'low voltage/lean run' situations are not unusual on engines with VIED's installed because of the voltage shift created by the device.

Buell is a registered trademark of Harley-Davidson, Inc. Model designations for Buell Motorcycles are used for reference purposes only. This part is not manufactured or endorsed by Harley-Davidson or Buell.

Acknowledgement: Certain information and illustrations in this Installation Manual were derived from sources other than Nightrider.com. These sources include Techlusion.com , www.ecmspy.com and www.steveturnbull.co.uk. Information from these sites may have been used in whole or paraphrased. This information was used to facilitate creation of this manual or provide additional documentation to assist riders in the tuning process. The Buell VIED is a Patent Pending product of S&P Mullen Enterprises, Inc.

Installation Instructions (XB9/XB12 Series)

1. Remove the seat and tank shell (Figures 1 & 2)

Figure 2

2. Disconnect tank vent hose at the frame (Figures 3 & 4)

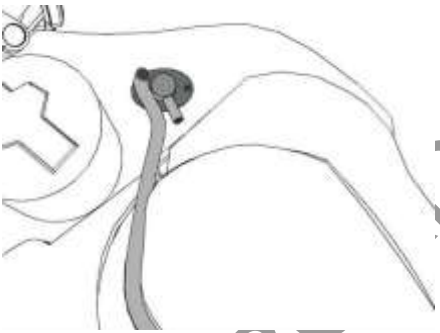

Figure 3

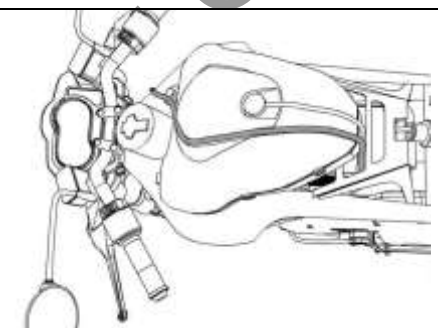

Figure 4

3. Lift exhaust power valve from air box lid and set aside. No need to disconnect it (Figure 5)

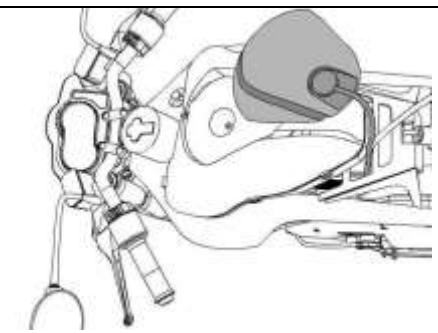

Figure 5

4. Undo the clips and remove the air box lid and filter. (Figure 6)

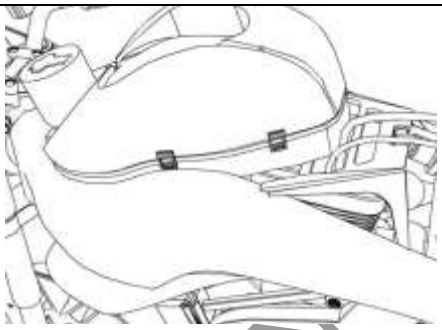

Figure 6

5. Remove the 4 screws that attach the air box floor. (Figure 7)

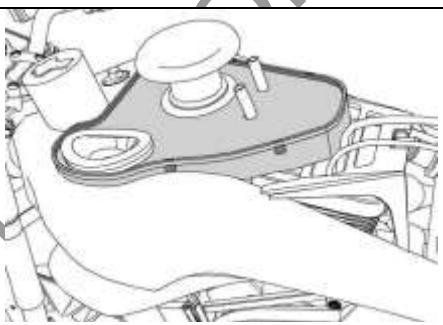

Figure 7

6. Beginning at the intake snorkel, work the snorkel flange through the air box floor, slowly lifting the air box floor as you go. (Figure 8)

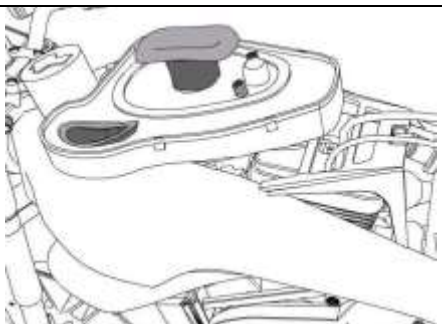

Figure 8

7. Do the same with the flange on the velocity stack. Push both crankcase vent hoses through the air box floor. Reach under the air box floor and disconnect the IAT sensor connector. It has a push-to-release type lock.

8. Locate the O2 sensor connector. Remove the tie wrap and open the connector (Figure 9).

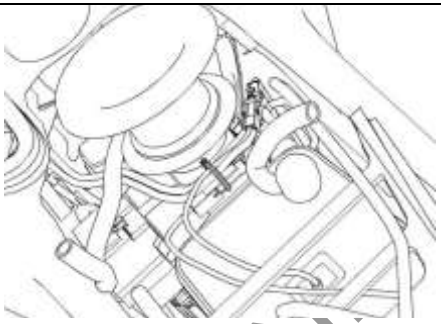

Figure 9

9. Connect the VIED O2 leads between the stock connectors like a short extension cord. Make sure the connections lock into each other. Use tie wraps to hold the VIED in place. (Figure 10)

   There is enough wire to locate the VIED on the left side of the frame under the seat for easy adjustments. There is a small, plastic panel that the VIED can be located behind.

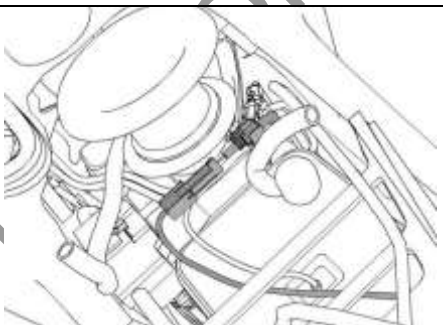

Figure 10

10. Work any slack in the VIED harness back to the seat well area. Lube the breather hoses, velocity stack and snorkel flanges with spray silicone or liquid soap. Place the air box floor over the velocity stack and reconnect.

11. Connect the single black ground VIED lead to the Black battery ground. (Figure 11)

Figure 11

12. Push the breather hoses through the air box floor. Carefully work the velocity stack flange through the air box floor. Do the same with the snorkel. Install the retaining screws in the air box floor, air filter and lid. Replace the power valve servo and reconnect the tank vent hose.