Velocity Devices: Copperhead (Engine Control Unit) ECU

by

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Introduction:

When I purchased my 2007 Grizzly 700 EFI I was immediately impressed with the vast improvements that had been made to it. One area that I was immediately disappointed in though was the lack of low-end grunt. To say that after just a few rides I noticed that the new Grizzly 700 EFI seemed somewhat tame would be a gross understatement. This is where Velocity Devices (VDI) came to the rescue and allowed the "fire" of the 700 EFI to be ignited.

Velocity Devices has an outstanding reputation among ATV enthusiasts. This reputation is thanks to their second to none customer service and their incredible performance gains found in their devices for the Suzuki King Quad / Arctic Cat 700 and Kawasaki Prairie respectively. It was with this history and knowledge in Velocity Devices that I was extremely excited to see what results I gained from the VDI Copperhead GEN2 for the Yamaha Grizzly 700 EFI.

Talking to Lyle the owner of Velocity Devices I discovered that he was an Electrical Engineer by trade and started the company after a friend had asked him to make a ECU for his ATV. Lyle stated that the VDI Copperhead GEN2 should produce the same power increases that owners of King Quad saw for the Yamaha Grizzly 700. This to say the least got me very excited for this product review!

The VDI Copperhead GEN2 is (L x W x H) 5.7x4.5x1.7 and around 17.6 ounces and is water resistant. Some of the other key features of the VDI Copperhead:

- Plug and Play installation which allows for quick installation, with no modifications to the machine
- Dual timing maps and configurations. Have one map for inexperienced riders, and one for performance to unleash the power of your machine. Both maps are fully configurable via our optional USB Memory Interface
- Multi-Spark Discharge (MSD) allows for maximum power and virtually eliminates misfire, while giving you easy starts and crisp throttle response
- Using the performance map allows machines to run cooler, produce more horsepower and more torque, while minimizing fuel consumption. Also, you'll benefit from better throttle response
- Incorporates part throttle timing advance that increases the part throttle horsepower
- Speedometer can recalibrated for different tire sizes via optional USB Interface
- Fully integrates with OEM speedometer
- Multi-spark discharge allows for maximum power and eliminates misfires / stalls
- Replaceable harness allows for platform changes with a single harness change and a firmware upgrade using our USB Memory Interface (sold separately).

General Installation / Info:

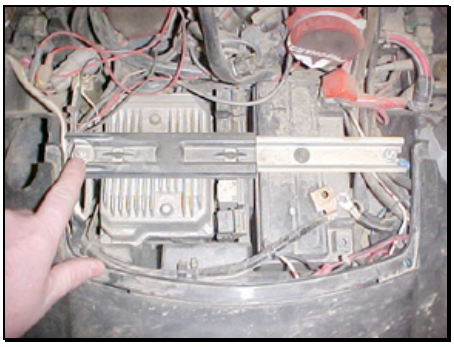
Installation is straightforward and takes less then an hour. The first step is removing the four bolts for the front rack and then removing the battery cover. Once the battery cover is off you then remove the battery strap and EPS mounting screw and move the EPS out of the way. Once it is slid to the side you now have access to the Grizzly 700's ECU and now it can be removed completely. Now before I go on with the installation I must clarify what I mean about "removed completely" in regards to the OEM ECU.

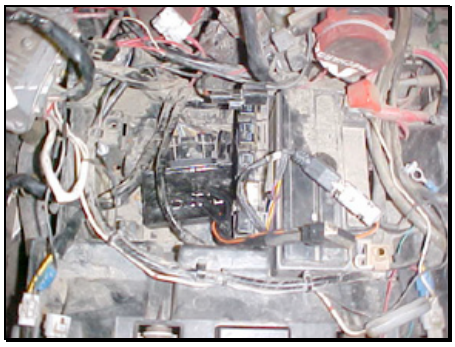
When I say completely this is what I mean. The Copperhead ECU is a "FULL" replacement ECU, not the normal piggyback add-on that you find with so many other brands of controllers.

This is also why the VDI Copperhead has some huge technological advantages over piggybacks controllers. Unlike most piggyback controllers that use the TPS (Throttle Position Sensor) to do fuel metering. The VDI Copperhead uses the MAP (Manifold Air Pressure) sensor instead.

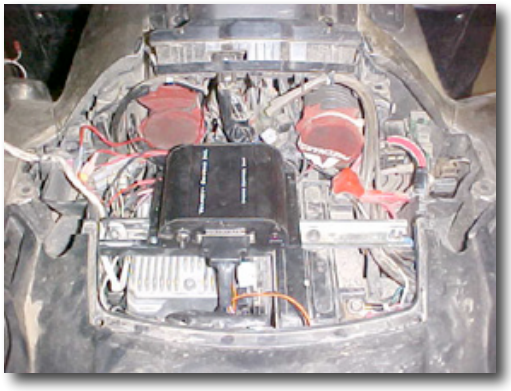
The advantage of this is that when a piggyback system uses the TPS sensor to do fuel mapping, performance can vary from day to day. Depending on air pressure changes, weather, or even altitude it can basically mean what power you had yesterday, may not be the same power you have today. As you can see, you have virtually just added a carburetor to your EFI system in that it is affected by these daily variations and may require constant tuning.

Now with the VDI Copperhead using the MAP instead of the TPS sensor means that performance will be much more consistent and more efficient because those variables have been virtually eliminated!





So now that he OEM ECU is completely removed I could now connect the VDI Copperhead's wiring harness to the OEM ECU's wiring harness and re-install the EPS and mount the Copperhead as the directions guide you to do.



The last step once everything is reinstalled and the ATV is started, you will have to readjust the idle screw for proper idle RPM's.

Initial Tuning:

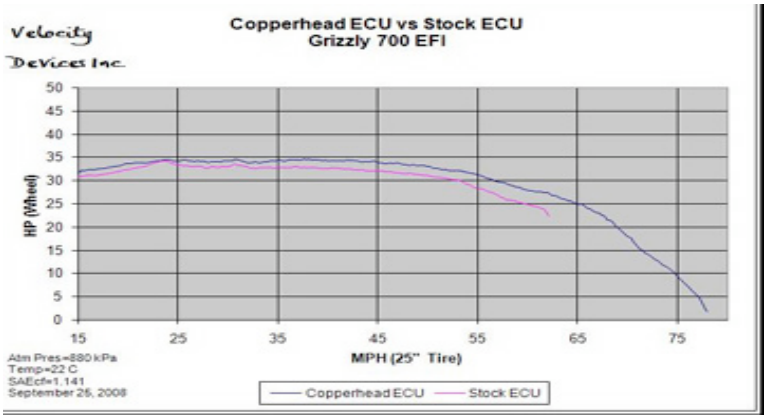
Here is the beauty of the Copperhead ECU! Once you have completed the above installation and adjustment of the idle screw you are set. This truly is as close to plug and play as you are going to get on an aftermarket EFI remapper / tuner. For those that are simply looking to improve performance with a stock ATV, you won't be disappointed. VDI's Copperhead ECU comes with two maps preloaded.

One map setting (can be changed by the flip of a switch found on the VDI unit in the photo below) keeps the OEM rev-limiter and other safety features enabled.

However it does advance the timing, but is generally used for beginners and general use. The second setting is for complete performance. Both settings allow the machine to run cooler, produce more horsepower and yet improve fuel consumption.

The difference is that in performance mode disables the reverse rev-limiter, advances the timing, along with allowing the RPM to be increased to 8,500 maximizing the performance of the Grizzly 700 EFI. Generally one is going to see about a 6% increase in power from idle to redline. Partial throttle power increases 25% over stock.

In addition the top speed limiter has been increased by about 10 mph and the throttle response has been dramatically improved throughout the power band. Words like "crisp", "snappy" and "wow" are now in your vocabulary and more importantly part of your experience with your Grizzly 700!



Now for those with aftermarket tires and exhausts we have even better news for you. The Copperhead ECU allows you to recalculate your speedometer for any size of tire you may install. You can also have VDI pre-install this or any fuel map you want to match to your ATV as well. For those of you that want even more control VDI offers an optional USB Memory Interface that allows you create and install your very own custom maps.

For instance I live in interior Alaska and cold starting is a real issue in Fairbanks Alaska where temperatures can get as cold as -60. Due to the incredible temperatures we reach it tends to lean out the EFI system, especially during startup. Thanks to the optional USB Memory Interface I was able to do the following:

- Able to richen the cranking pulse which allows for easy and consistent startups
- Was able to change Volumetric Efficiency Table. This is how the ECU is determining fuel delivery for various engine loads and a perfect way for adjusting the EFI system for an aftermarket exhaust system.

Some other options that I have yet to play with, but have the option of experiencing later with my Copperhead ECU due to the additional six optional wires that allows you to potentially:

- Provide ground to a device when a certain RPM is reached. Potential uses are shift lights, external controllers, and NOS solenoid triggers.
- Add a tachometer that requires one pulse per revolution
- Add a tether switch input

As you can see the VDI Copperhead ECU is a Plug and Play unit or can be as customizable as anyone wants to make it. The incredible amount of versatility that the Copperhead allows is breathtaking.

Ride Review:

The first thing I noticed was the improved throttle control throughout the power band. The throttle responsiveness and ability of the motor to rev is improved dramatically over OEM. The "tameness" was gone and the "fire" was now found in my 700 Grizzly.

I noticed the low-end lag was completely removed from the power band and is on par in my opinion with my highly modified big-bore 660. It has increased the performance of my Grizzly 700 to the extent that I now have a more difficult time getting the tires to hookup and I question whether my suspension is in need of upgrade to help with the increased performance!

These are not bad problems to have, especially for those looking for more power out of the Grizzly 700 EFI.

In the video below you will see me on snow packed road hitting 70mph with 27" tires and riding two-up for filming. The sick thing was, it had more left in regards to speed and I figured it was time to let off for obvious reasons ☺

****CLICK LINK BELOW TO WATCH ACTION VIDEO****

http://hk.youtube.com/watch?v=EM2fxT5_UXw

The increased performance in regards to accelerations, throttle responsiveness, and overall usability of the power band is very apparent.

I can't say enough about how impressed I am with the VDI Copperhead ECU. This has really taken the Grizzly 700 to the next level in regards to performance and refinement.

Conclusion:

I can't say enough about how impressed I am with the entire unit and not to mention the customer service I've received from VDI. The plug and play ability of this unit for most riders is exactly what many will love about it. For those that want to become more involved in custom tuning of their machine though, it has the capability for endless adjustments and refinements to keep them busy.

The quality of the unit, installation instructions and most importantly the power gains speak for themselves. The VDI Copperhead is priced very competitively for a unit that is an EFI tuner and ECU all in one. Where as with other competitors on must buy multiple units to get what the VDI Copperhead GEN2 does. This is truly an all in one unit to bring the FIRE out of your Grizzly 700.