



Kit DC8000 Installation Manual

October 2011

Safety Precautions

Basic Information

Read and follow these safety precautions to avoid hazards. **If you do not understand these instructions or do not like/know to work on vehicles, please have a qualified mechanic do the installation for you.** Incorrectly installing or using the HHO Hydrogen System may result in serious damage to you and/or your vehicle.

It should take approximately 2,5 hours to install this unit, so ensure that you have enough time to complete the installation. Be sure to work outside, no smoking at any time during the installation; make sure the engine is off and very importantly, NOT HOT.

Your HHO Generator System does not store hydrogen, and

subsequently there is no fire hazard when installed properly. However water electrolysis generates Hydrogen, an explosive gas, which means that **never light a match or smoke near or in front of the generators output** - the generator could explode!

Be careful with the generator working when the car is not moving. A small amount of hydrogen can accumulate in the air intake of the motor and could explode if you smoke or use an open flame near it.

Safety Equipment

Be sure to wear goggles and rubber gloves and only use professional tools; use common sense and general safety procedures used for any work

carried out on automotive installations and maintenance.

Enjoy your System

Be safe and enjoy your new Hydrogen on Demand Dual Fuel Generator System, read and understand these instructions before and during the installation and you will benefit from your new system for years to come.



Installation of the hydraulic components

General configuration

Your system is composed of the two individual drycells to be connected in parallel to the water tank according to the illustration below:

HHO System Schematics



In the end pages of this manual you will be able to check each one of the individual connections to be made and parts to be used regarding the installation of the hydraulic. We will now only focus on the main aspects of the installation now.

Positioning the Generator Dry-Cells

You will need to find a good place in the back of the driver's cabin to mount your new HHO system. **The dry-cells can be mounted in a horizontal position** (upright and level to the ground with the tube fittings facing directly

upwards) or in a vertical position. Please remember that the water tank should be placed at least 30 cm above the generator Dry-Cells in order to guarantee a sufficient water head for the water to flow.

Make sure to install the Dry-Cells in a place

that can easily be accessed and cleaned or inspected from time to time. It should be mounted and secured in such a manner as to ensure it does not move or bounce around while the vehicle is in motion, even over rough terrain. Securing it with a permanent bracket should be sufficient to secure it to the engine chassis and to operate perfectly.

Important Information:
When making the installation never make changes in the generator dry-cell for mounting purposes. Never open it, loosen/tighten the nuts or cut the screws. You will damage the generator and it will not work properly after.

Positioning the Water Tank

Make sure that water tank is installed with the same care as described for the generator. As mentioned before the tank needs to be placed higher than the HHO dry-cell to accomplish the gravity head needed for the water to flow into the generator.

Positioning the water and HHO hoses

Please refer to the illustration below for typical installation of the hoses coming and going from the water tank:



Please verify that the bottom of the water tank is connected to the lower entry in the drycell and the upper connection to the higher entry in the drycell.

HHO injection point

Please verify that the bottom of the water tank is connected to the lower entry in the drycell and the upper connection to the higher entry in the drycell.

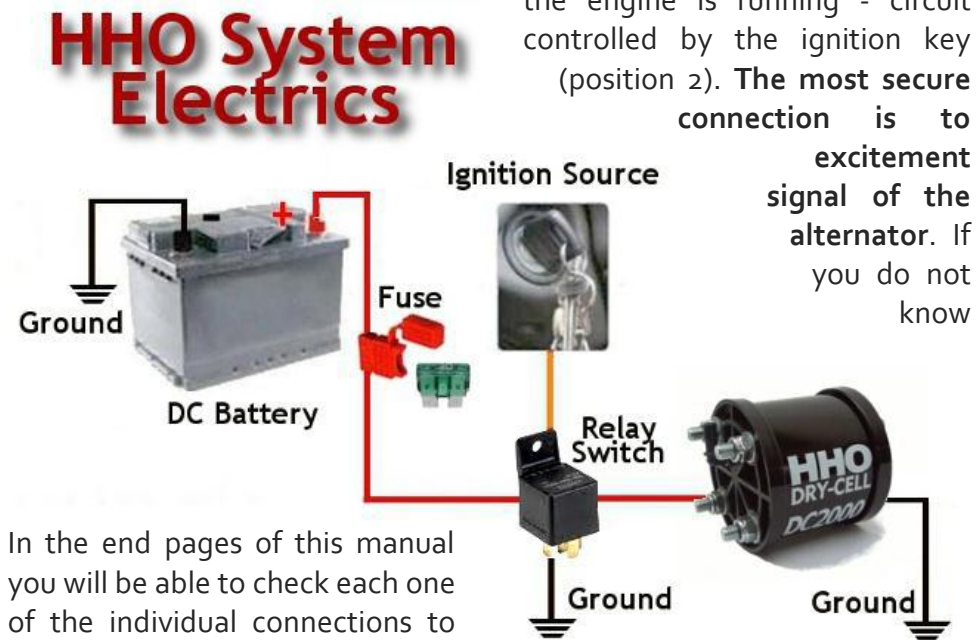
The system is operated by vacuum suction from your truck's air intake which takes the HHO directly to the combustion chamber mixing it with the air/fuel. The injection point must be done right after the air filter box and, in modern trucks, after the MAF sensor, that measures the air flow going into the engine's chamber.

You will need to remove the air duct, to ensure that you do not leave any residue from the drilling you are about to do. Drill a 19 mm hole close to the intake manifold. Clean out any drill shavings, insert the high pressure fitting using goop glue or teflon tape and tighten. Connect the high pressure hose.

Installation of the electrical components

General configuration

Please refer to the illustration below for typical wiring configuration for powering the system:



In the end pages of this manual you will be able to check each one of the individual connections to be made regarding the installation of the electrical circuits. We will now only focus on the main aspects of the installation now.

Battery

The system is powered by the 12/24V battery and controlled by the relay switch. The system will only work if there is a signal from the ignition source. The positive circuit (red wire) should be connected to the Relay Switch position 30.

Identifying the ignition source

This is an important connection to be made in order to have the

generator working only when the engine is also working.

Identify a point in your vehicle's electrical system which has 12/24 Volts (positive) present only when the engine is running - circuit controlled by the ignition key (position 2). **The most secure connection is to excitement signal of the alternator.** If you do not know

how to do this connection please ask you usual mechanic to do it for you. Connect this electric source to the **Relay Switch position 85**. This circuit will control the HHO production.

Dry-Cell electric connections

Inside each one of the Dry Cells we have 45 plates with a configuration that allows the insertion of yellow female spade connectors.

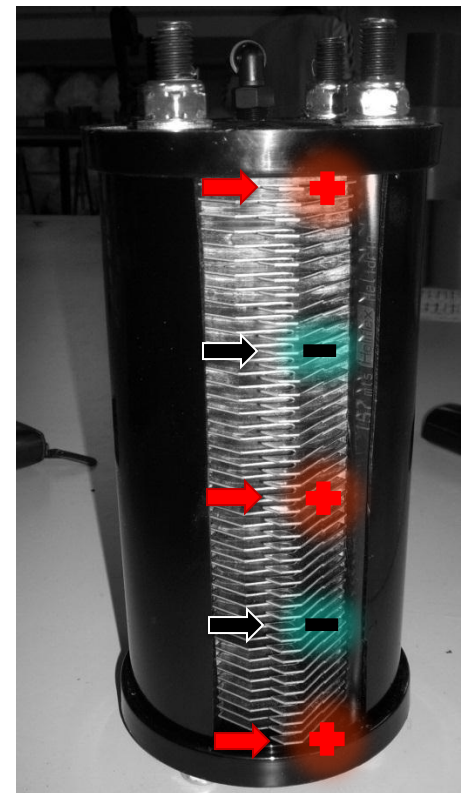
Not all of them should be connected because electrolysis would, in this case, be very intense and damage the surface of the plates. We have to leave

between the positive (+) and the negative (-) some plates without connections – **Neutral plates** - in order to break the voltage and increase the electrolysis efficiency with less heat production.

The neutral plates without any connections should be the following:

12 V - 3 neutral plates
24 V - 10 neutral plates

Please refer to the picture below for typical wiring connection of the dry-cells using 24v.



The positive circuit (red wire) should be connected to the Relay Switch position 87. Connect the negative circuit (black wire) of the Generator to a good ground source.

Water and electrolyte setup

Principles of the water electrolysis

Electrolysis of water is the decomposition of water molecule (H_2O) into oxygen (O_2) and hydrogen (H_2) gases due to an electric current passing in the water.

An electrical power source is connected to two electrodes, or two plates (typically made from some inert metal such as stainless steel) which are placed in the water. In a properly designed cell, hydrogen will appear at the cathode (the negatively charged electrode, where electrons enter the water), and oxygen will appear at the anode (the positively charged electrode). The amount of hydrogen generated is twice the number of moles of oxygen, and both are proportional to the total electrical charge.

Electrolysis of pure water requires excess energy in the form of overpotential to overcome various activation barriers. Without the excess energy the electrolysis of pure water occurs very slowly or not at all. This is in part due to the limited self-ionization of water. The efficacy of electrolysis is increased through the addition of an electrolyte (such as a salt, an acid or a base).

Electrolyte concentration

The electrolyte should be added to the water only the first time that you use the system. After for refilling we only use distilled water.

The electrolyte concentration to use in the HHO system depends on the type of electrolyte and the purity of the product. The best electrolytes are KOH (Potassium hydroxide) and NaOH (caustic soda).

Using KOH as electrolyte, with a 98% purity, we should start using a concentration around 0,012% in the water solution (12 g/liter). Then you should measure the current intensity going into the generator and increase slowly the concentration until you reach the standard operation amperage:

30A 24V or 60A 12V

Warning: Do not fall in the temptation of not measuring the current or increase the electrolyte concentration more than is advised in this manual, because in long term, the generator will not work properly and you will not save any fuel.

Also it is **false to assume that a higher HHO gas production will mean a higher fuel saving**. There is an optimum point for all

internal combustions engines. The system should provide around 0,3 liter/min of HHO per each 1000 cm^3 of engine displacement (ex: a 12000 cm^3 engine will need around 3,60 liter/minute). You will be meeting this standard running your generator with 30A 24V.

Water is getting a brown color after only a few hours working?

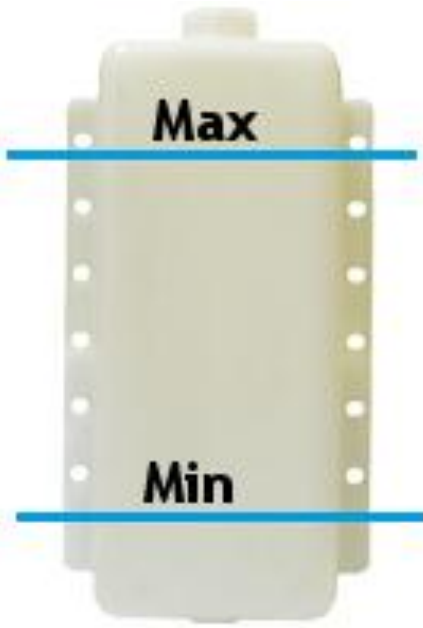
You have a too high electrolyte in the system that is "eating" the generator plates too fast. Remove the water immediately and start all over again.

Another thing that should consider is steam. Some of the early cell developers would run their units with so much amperage that the unit was producing more steam than anything else. If your unit runs hot to the touch, you must suspect that at least part of your output is steam. One way to test for steam is to run your gas outlet over some ice. If you get significant amounts of fog forming (water droplets), you know that at least part of your output is steam.

Water levels in the tank

Once you have your mixture ready, pour it into the top of the water tank, up to the water level line shown in the picture bellow. Try to only fill your unit about 70% full. This is imperative to allow the HHO produced to enter

the gap left in the Tank and avoid any risks of some water getting into the engine.



The standard tank is a 6 liter unit which will provide you with approximately 1500 kilometers of driving. Be sure to make your maintenance plan with that in mind and refill the tank when it is required.

In our store we have a new product that can help you to control better the water levels in the tank and reduce the problems regarding the management of the system. It is called the:

WATER LEVEL CONTROL SWITCH



Description

The Water Level Control System Indicates and stops the HHO gas production when the Water Level gets low in the Dry Cell Tank.

How does the Water Level Control System Works?

In the water tank we will install a water level switch that will send an electric signal whenever the water drops below a certain level. This electric signal will be connected to an alarm indicator light and to a 5 pin relay that will stop the HHO system from working. Please check the illustrative diagrams above for more information.

The indicator light can be installed in the Interior of your vehicle allowing you to see immediately when the water Level gets Low. Now you don't have to stop at all the times to check the water level in your hydrogen generator.

The amperage in the HHO Generator system will remain stable and with a small variation of value.

Amperage variation in the system

When operating the system the water molecule will be "brocken" into HHO gas to be used by the engine. The water level in the tank will slowly go down but the electrolyte will continue in the system with an increase of the concentration and, therefore, amperage being drawn into the generator. This means that when you start using the system, with the tank full (Max level), you have 30A and after some time when the tank is at the lower point (Min level) you will have 35A

If you put too much electrolyte, there are a combination of heating factors at work and can cause a situation called Thermal Runaway, where an increase in ambient temperature combined with excess electrolyte mix leads

to a overheating in the generator shortnening the "life" of system.

When applying a direct current to the HHO generator, a high resistance will be present in the water (electrolyte mixture). High resistance generates heat causing the water to heat up.

As the temperature rises, the resistance in the water goes down, allowing more current to pass through the fuel cell. By the end of the day, the current will be higher than the value you started with at the beginning of the day.

One way to control this is using a:

PWM PULSE WIDTH MODULATOR



Pulse Width Modulation, is a method of transmitting information on a series of pulses, changing the frequency, rather than a continuously varying analog signal. It will allow you to control the amperage going into the generator in a very easy way. This ability keeps the cell running at cool operating temperatures and prolongs the life of the cell while increasing the HHO output

Main advantages

Efficiency: HHO generators will run cooler than standard linear power amps, requiring substantially less heat sink mass;

Amperage control: the control of the amperage going into the generator will be very easy to control. The ability to control the amperage keeps the cell running at cool operating temperatures and prolongs the life of the cell while increasing the HHO output.

Electronic fuel injection

Basic Information

When adding a HHO gas to the engine of an older carbureted truck, we will see immediate economies in fuel consumption.

However, this is not the case for some electronic fuel injected vehicles equipped with an engine control unit (ECU), because the fuel burned inside the cylinders has significantly improved, but the sensors continue expecting the same amount of un-burnt oxygen to come out of the exhaust of the engine.

This causes a signal to be fed back to the ECU, that give order to inject more fuel increasing the

Wish trucks we need to make changes in the sensors?

Normally, the only trucks that need some modifications in order to increase fuel savings are modern diesels with Euro module IV and V.

air/fuel mixture (Richer), which counter acts the fuel gains you may be expectecting.

Components

An Electronic Control Unit (ECU) controls the internal combustion operation of the engine. The simplest ECUs only control the quantity of fuel injected into each cylinder per engine cycle. The more advanced ECUs also control the ignition timing, variable valve timing (VVT), the level of boost

maintained by the turbocharger, and other engine peripherals.

ECUs determine the quantity of fuel, ignition timing, and other parameters by monitoring the engine through sensors. In trucks the most important sensors are the MAP/MAF (airflow) and temperature sensors.



Mass Air Flow Sensor

For an engine with fuel injection, the ECU will set the quantity of fuel to inject based on a number of parameters.

For example: If the accelerator pedal is pressed further down, this will open the throttle body and allow more air to be pulled into the engine. The ECU will inject more fuel according to how much air is passing into the engine.

A mass air flow sensor (MAP or MAF) is used to find out the mass of air entering a fuel-injected internal combustion engine. **The mass air flow information is the most important one** and

necessary for the engine control unit (ECU) to balance and deliver the correct fuel mass to the engine.

Older Trucks

Before electronics, most engine parameters were fixed. A carburetor or injector pump determined the quantity of fuel per cylinder per engine cycle. Like mentioned before, when adding a HHO gas to these trucks we will see immediate improvements in fuel consumption.

There are no special devices or requirements to fit the HHO System to these trucks, **but to improve the fuel savings the injection rate of the fuel pump should be tuned to the new air/fuel mixture conditions.**

Euro I, II and III trucks

The ECU of your truck is like its brain using mapped data to work out the optimum control conditions for the engine. According to the day to day driving conditions the ECU builds a memory data base that helps it to decide the course of action that should be taken by the engine to ensure an ideal drive.

Even though you have made modifications in your car with the HHO system, the ECU still continues to get an input of the old data which is stored in its memory. This old data is no longer credible as it pertains to conditions that existed before the modification.

This is the reason why **ECU resetting is essential** for

optimum performance after any modification has been carried out in your truck. The ECU has to operate on the newly acquired data as this new data reflects the true conditions post modification.

Resetting the ECU is important because it has a memory bank for octane. This means that if you've been using lower octane fuel, the response of ECU will correspond to lower octane, with the booster matching lower octane performance.

The ECU response will continue to correspond to lower octane even though you have started using higher-octane fuel. This is because the ECU has not been reset for higher octane.

Thus even though higher octane is in actual use, the data in ECU memory still corresponds to that of lower octane. This mismatch affects performance.

To reset the ECU you simply have to unplug the negative battery cable connection. Theoretically it is best to leave it in this disconnected condition for as long as you can.

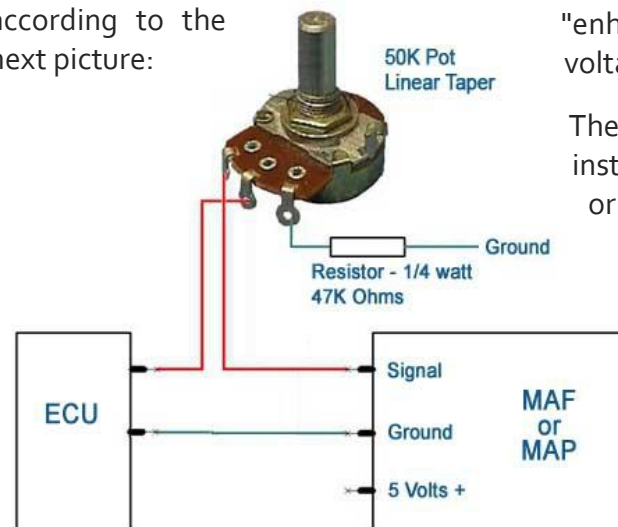
Practically leaving it disconnected overnight is more than enough. After having left the cable disconnected for sufficient time you have to connect back the cable. Start the car and keep it running so that it warms up. This would not take more than 10 minutes at the most in summers. Once you have done this you have accomplished the ECU resetting. Shut off the engine. You can now use your truck

whenever you feel like. ECU resetting is over.

Euro IV and V trucks

Besides resetting the onboard computer, In these modern trucks we have to make changes in the signal coming from the MAF.

For that we use a small electronic box called the MAF Enhancer, that is basically a potentiometer - variable resistor - which varies its value by turning the knob according to the next picture:



The Mass Air flow Sensor is a little though expensive device installed in your intake manifold. It has 5 Volts or 12 Volts coming in, and it simply senses the vacuum in the manifold and reduces this incoming voltage by a certain factor. In other words it reduces the supply voltage to a direct-current voltage in the range of 15% to 60% of the supply voltage (depending on the design these numbers will vary), and this varying (but non-pulsing) signal is then sent back to the computer.

The arrangement of resistors simply takes this already reduced, signal - and reduces it further.

Too much reduction kills the engine; it will simply shut off. Yet if you control it correctly, you can lean down the mixture from the balance of ingredients which is factory set at 14.7:1 (14.7 parts of air to 1 part petrol) - down to 20:1, maybe even 50:1.

INSTALLING AND TUNING

The tuning procedure calls for clockwise and counter-clockwise rotation of the knob. The idea is that turning knob will "enhance" or "reduce" the voltage.

The Enhancer can be installed on the dashboard or sit on the console, or under the bonnet if it can be fitted in a dry position. To eliminate the work and possible damage to the dashboard, and to enable better control, place the box beside the driver's seat. This makes tuning quite effortless.

Locate the wires connected to the MAF sensor. There will be one for the positive supply voltage, usually 5 or 12 volts. **The signal will be the wire with the weaker voltage and will change with RPM when the engine is started.**

There will also be a ground wire. You can solder or crimp these with electrical wire connectors.

If you cannot locate the sensor or the wires, or you're not sure, please find a auto-electrician to install it. **DO NOT IMPROVISE OR**

GUESS - you may damage your computer.

To find the MAF Sensor Signal Wire, use a Circuit Tester. Use the Tester to locate the ground with 0 volts and the supply voltage of 5 volts. The remaining wire is the MAF Signal wire.

Now cut the wire, and join the 2 red cables from the "enhancer". The third connection, the black cable with the "earth lug" already attached, needs attaching to bodywork to make the earth. Secure cables with cable ties supplied.

TUNING ON THE ROAD

Turn the knob all the way to "rich" (The Dial should point to minimum on the scale or all the

DO THE NEXT STEP WITH CARE - JUST IN CASE YOUR ENGINE STOPS UNEXPECTEDLY.

way anticlockwise). Make sure your HHO Generator is operational. Warm up the engine and drive a while before experimenting with the knob.

1 Now, start turning the knob clockwise; the mixture will turn leaner and leaner until the car stalls or bucks as you drive. Back the knob off slightly after the bucking and chugging.

2 Keep the danger of overheating in mind. If your HHO Plus Generator device is non-operational, temporarily set the enhancer at or near original factory setting (rich).

3 Set points can change from one petrol station's fuel to another, weather conditions, cold engine, etc. The differences are not large, but if you're on the edge, then the car will buck or vibrate, and you'll need to change the set point a bit. Remember that this is a simple device.

NOTE: When this device turns on for the first time, sometimes the "check engine light" comes on and this needs resetting with a ScanGauge-II or an OBD-2 Connector (1996 cars or newer). When this has been done if your connections are correct, it will stop off.

MAXIMIZE BENEFITS

You will get improved reductions straight away. How much is dependant on your HHO generator performance. The better performance you get from this, the more lean your truck, but don't overwork the engine by leaning it too much - play around until you find the PERFECT BALANCE point. The way you drive also has quite an influence, if you need fast acceleration, you will not be able to "lean" it out as much, as driving normal.

Check-list for HHO debugging

Basic information

HHO will improve combustion efficiency. This is a scientific fact.

When introduced into the engine along with the petroleum based fuel, it causes the flame speed to increase. This allows more of the petrol to burn during the power stroke and it will be a dramatic increase over the combustion without the HHO.

After the combustion efficiency is improved, the ECU is often fooled by the reduced quantity of unburned hydrocarbons and increased oxygen content, and often will add fuel to compensate. This can ruin your mileage gains.

The simplicity of a successful HHO installation is to get some HHO into the engine and adjust the sensor inputs as necessary so the ECU is not blocking the gains. That's all.

If we can do those 2 things, we will always get vastly improved fuel economy and vastly improved (decreased) emissions. You should check out these items working from the top down.

Check-List

1. Is your device making HHO?

The most common bug we encounter trying to debug systems is that HHO is not being produced, or is not getting into the engine for some reason. Check your system. Measure the output of your HHO cell by doing

a water displacement test. Remember that the system should provide 0,3 liters/min of HHO per each 1000 cc in the engine. See if you are meeting that standard.

2. Is the HHO gas getting into the engine? We have seen cases where a leak in the system was keeping the hydrogen from getting into the engine. A split hose can cause this, or one that is not attached at all. A check valve oriented in the wrong direction can block the HHO from getting to the engine. One time we found that the lid to a dry cell's reservoir had a leak and when this was fixed the situation resolved completely. Spray your hoses and connections with soapy water to expose any leaks in your system. Fix any that you find.

3. Is the amperage on your generator too high? Another thing that should be checked here is whether your unit is making HHO or steam. Some of the early cell developers would run their units with so much amperage that the unit was producing more steam than anything else. If your unit runs hot to the touch, you must suspect that at least part of your output is steam.

4. Have you changed the electronic injection? Vehicles with carburetors and some diesels (Euros modules I, II and III) do not require any changes. But all other fuel injected engines will need to have its electronics

handled to get the gains of an HHO system installation. Usually the only sensors that require handling in trucks are the MAF - Mass Air Flow Sensor

5. Have you tuned the fuel injection pump rate? Vehicles with carburetors and some diesels (Euros modules I, II and III) do not require any changes except to tune the fuel injection rate to the new air/fuel mixture.

6. Have you reset your computer? Some computers are able to "learn" and adapt to the conditions that exist in your engine. Since you have made a major change by adding an HHO system and EFIEs, you may need to reset the computer to erase what it learned about the system when it was inefficient, and start over again with the new improvements installed. You can reset your computer by disconnecting your battery ground wire, and leaving it off overnight, then reconnecting it again.

7. Is there something else mechanically wrong with your engine? If your engine is working properly, adding an HHO system will not correct that. You will often find that if your engine is not working properly, just fixing it can give you a dramatic increase in fuel savings all by itself. If you had any kind of check engine light before starting the project, you should get this fault explored and handled. If you're not sure, reset your computer, turn off all of your HHO and any other added modifications, and see if you still get a fault code. If so, get it fixed.

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