Preface To Tuning 101
It' All About "Control"

In the following Three chapters you are going to be learning all of the techniques that will give you really big and sustainable Mileage Gains.

Since the original writing of Tuning 101, we have learned how important it is to be able to take **CONTROL** and we do mean control of everything that is within your power to control. The First, and one of the most important steps in your HHO, Hydroxy, Browns Gas, installation is exercising control over the amperage draw and gas output of your electrolyzer. One common and well known characteristic of all electrolyzers is the fact that as they are running they become warmer and rise in temperature. With the rise in temperature they draw more amperage. When they draw more amperage they increase the out put of gas. This cycle keeps repeating it's self until you are facing the distinct possibility of Thermal Runaway. The following charts show what happens when you are not using an amperage limiting device to control both the amperage draw but also the gas output.

The Following test done 12/16/09 Using 28% KOH solution. Brute force DC. Ambient 70F.

Temperature	Voltage	Amperage	Out Mlpm	MMW	Elapsed
73	13.8	7.13	818	8.313	0
85	13.8	9.05	1285	10.289	20
105	13.8	11.49	1565	9.869	40
115	13.8	12.70	1714	9.779	60
125	13.8	12.98	1800	10.048	75
130	13.8	13.20	2040	11.198	80

The Following test done 12/17/09 Using 28% KOH solution. Brute Force DC. Output measured in LPM by a Coriolis Mass Flow Meter. Ambient temp 69F

Temperature	Voltage	Amperage	Output Liters per minute	MMW	Elapsed Time
73.1	13.8	7.21	1.07976	10.852	8
85.2	13.8	9.15	1.70905	13.535	29
105	13.8	11.50	2.09713	13.214	48
115.2	13.8	12.76	2.29676	13.043	67
125.0	13.8	13.00	2.43035	13.547	83
130.1	13.8	13.22	2.75402	15.096	88

This is a chart showing a Mighty Mite Electrolyzer running without an amperage

limiting device, in what is commonly called Brute Force Mode. The left hand column represents the temperature of the electrolyzer throughout the test. The second column from the left shows the pre-set voltage of 13.8 volts, which is the typical voltage your electrical system is putting out with the engine running. The third column from the left shows the amperage draw at various temperatures in column number one. The fourth column from the left shows the amount of Hydroxy being produced. The fifth column shows the efficiency rating MMW (Milliliters per Minute per Watt of electricity consumed). The sixth column represents the elapsed time from the beginning of the test.

The top chart represents gas output as measured by a well designed water displacement device. For more precise measurements and greater accuracy, the bottom chart represents the gas output as measured by an electronic Coriolis Mass Flow Meter programmed for a vaporous gas with the specific gravity of Hydroxy (HHO, Browns Gas).

Notice in both charts, that the amperage draw almost doubles during the test period, and the gas output increases by over 150%. Your supply of gas is constantly increasing through out the test. Eventually when the electrolyzer become hot enough it will stabilize, but usually not before you have a thermal melt down.

I want you to carefully analyze what is happening and what effect it will have on your ability to produce mileage gains. It is an accepted fact that in order to run Hydroxy on an EFI (electronic fuel injection) vehicle. That you MUST use an EFIE (electronic fuel injection enhancer) to offset the additional oxygen that is being added to your intake air by your electrolyzer. The question in this scenario is HOW. It is virtually impossible to tune or dial in an EFIE to a specific setting when you have a constantly increasing amount of additional oxygen being introduced into the system. The same holds true for your MAF/MAP controller. It is of EXTREME IMPORTANCE to control the amount of Hydroxy being introduced into your air intake. Keeping it as constant as possible. There are several methods available to do this. The best methods are the use of Our **Black Box Controller**, or a very good quality CCPWM (constant current pulse width modulator), or a Hall Effect Circuit. The Fouth and less preferable choice is the use of a PWM (pulse width modulator) or sometimes more commonly referred to as a DC. Motor speed controller. The disadvantage of the PWM is that it requires constant monitoring of an ammeter and constant adjustment of the duty cycle to maintain a somewhat constant amperage draw. **The Black Box Controller** and the CCPWM, or a Hall Effect Circuit are automatic. You set the desired amperage, and these units will automatically maintain that pre-set amperage constantly . No adjustment by you is needed. The next chart you are going to see is the same electrolyzer with an amperage limiting device pre-set at 10 amps of current.

TEMP	VOLTS	AMPS	WATER DISP	MMW	FLOW METER	MMW	TIME IN MIN
76	12.5	10	1091	8.728	1462	11.696	0
82	11.6	10	1161	10.008	1556	13.414	15
89	10.8	10	1200	11.111	1620	15.000	30
96	10.4	10	1200	11.538	1624	15.616	45
102	10.2	10	1216	11.922	1642	16.098	60
108	10.0	10	1216	12.160	1641	16.410	75
113	9.9	10	1221	12.333	1649	16.657	90
118	9.7	10	1221	12.588	1653	17.041	105
123	9.4	10	1333	14.181	1802	19.170	120

The Above test conducted 8/8/2010 on The Monster. Ambient Temp. 76F. 28% KOH

5 cell as pictured , and described in email to George & John. Unexplainable jump in output and voltage drop between 118F. And 123F.

The above test chart was conducted using **The Black Box Controller**. On this test, we increased the number of column's but still used the same two measuring devices. Column One again represents the temperature of the electrolyzer. Column Two represents the voltage used at any designated temperature in column one. Column Three represents amperage draw which is pre-set for a constant 10 amps. Column Four represents the gas output as measured by the water displacement measuring device. Column Five represents the MMW based on the measurements from the water displacement device. Column Six represents the more accurate measurement of gas output by the Coriolis Mass Flow Meter. Column Seven represents the MMW based on the more accurate measurements of the Mass Flow Meter. Column Eight represents the elapsed time of the test. Study both charts and compare. There are many different factors that come into play. One of the most important being that once the Mighty Mite electrolyzer attained its operating temperature range (85 F to 125 F.) There is only a 1.1% change in gas output. Not the over 150.0% increase with Brute Force DC. Most EFIE's have a +/- 1.75% tolerance variance, so your 1.1% is actually better stats than those of your EFIE. This allows you to fine tune your EFIE for a fixed amount of hydrogen and oxygen, and never have to change it unless you decide to increase or decrease your gas output as a matter of choice.

So that you may better understand how a Black Box Controller works, take careful note of the voltage at the different temperatures. Notice how the Black Box Controller is constantly dropping the voltage as the temperature of the

electrolyzer rises to maintain the constant 10 amp setting, and this is all being done automatically for you. Notice that with the use of the Black Box Controller that the electrolyzer is running cooler. In the top chart, it took only 80 minutes for the electrolyzer to reach 130 F. Had it been allowed to run for a longer period of time it would have experienced thermal runaway, and most certainly thermal melt down. In the bottom chart the electrolyzer had only reached 123 F. in 120 minutes. Although it is not shown on the chart the temperature stabilized at 127F. And maintained that temperature for an additional 3 hours when the test was totally concluded.

The next thing I would like for you to compare is the efficiency ratings comparison of the two charts. If you will note carefully the bottom chart using a Black Box Controller has significantly higher MMW (efficiency numbers) a large portion of this has to do with the fact that the Black Box Controller is changing Brute Force direct current into controlled pulsating direct current. The effect this has on an electrolyzer is a faster release of the gas bubbles from the plates and faster replacement. Thus greater production with less amperage. The Black Box Controller has an adjustable frequency range for your pulse rate. When tuned properly with an oscilloscope to the resonant frequency of your electrolyzer, you can gain as much as 15% in gas out put with the same amperage and voltage draw.

There are many other bits of important information to be gained in studying and analyzing both charts. Take your Time. Go over and over them until you understand everything they are telling you.

In the upcoming chapters you will once again learn the importance of CONTROL. This time, taking control of your various sensors that control your AFR (air fuel ratio). We want to teach you how to take control over your ECU (Electronic Control Unit “computer”) Instead of it keeping control of you and your vehicles mileage.