

POWER



MSD'S NEW IGNITION CONTROL

BY JOHN DIBARTOLOMEO

For the last three decades, MSD has been the leader in ignition systems, firing the winning cars in a multitude of motorsports events. And while their original product was a fuel injection induction system, the company's multiple spark discharge (MSD) concept came about as a necessity to fire their own lean-burn fuel product than anything else.

However, that ignition system has gone on to be one of the most popularly used systems in all of motorsports. Not willing to rest on their laurels, the team located just north of the Mexican border in Texas has built on those successes and come up with the newest concept in the ignition line, their new Power Grid System.

With the popularity of turbocharger-equipped cars, the

MSD Ignition has now taken ignition control to the next level with the introduction of the new Power Grid Ignition System.



R FROM THE GRID

TAKES TIMING ONE STEP FURTHER

amount of ignition system requirements necessary to fire the methanol fuel used by a number of those competitors began to tax the current Digital 7 ignition boxes.

First a little primer on just what is digital ignition.

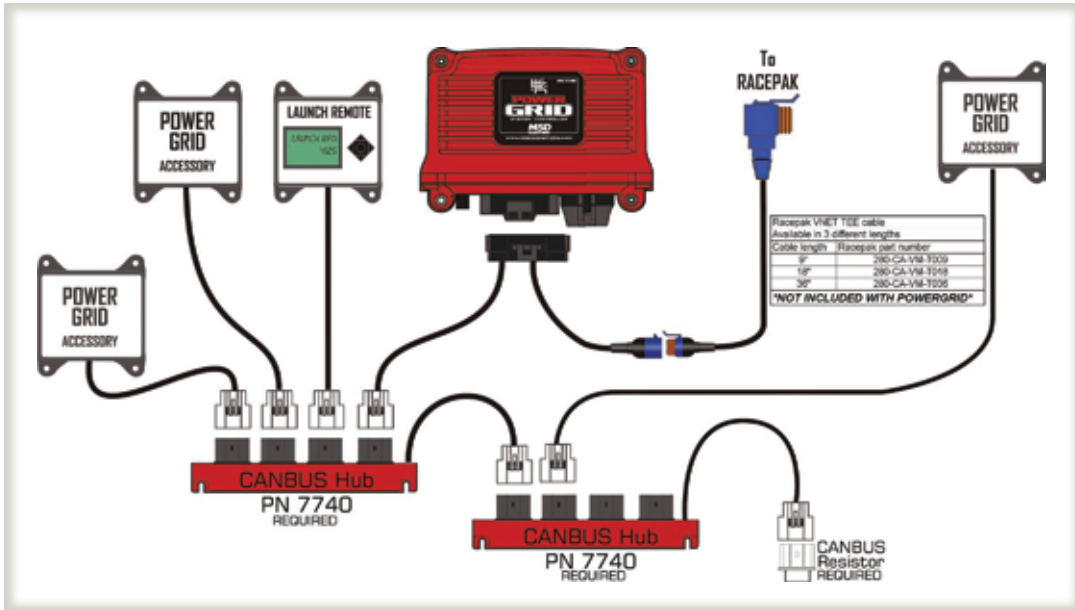
Joe Pando of MSD Ignition said, "Digital ignition uses a microprocessor to control the spark, while our popular 6 and 7AL boxes use analog components. Our programmable Digital 7 boxes use a combination of both analog and microprocessor components.

"The Power Grid uses just microprocessor technology, which is continually analyzing various inputs such as trigger, launch and step wires used for timing retards," Pando added. "The system itself can make very fast updates to the ignition output based on a number of those inputs.

"The turbo racers were using our Digital 7 ignition boxes, but they needed more spark. So we suggested to them to marry the Digital 7 box to an MSD 8, which gave them the spark energy they needed."

The Digital 7 box can very easily be married to any of MSD's other ignition box for increased spark output. The benefit of the Digital 7 is its programmability that enabled the racer to custom program their ignition system needs from retards, rev limiters, timing curves and other assorted uses. While the Digital 7 in itself will provide the necessary spark output, it can be added to MSD's 8 or 10 ignition boxes for added spark.

"In the Digital 7 software," Pando says, "there is a check box for Spark On or Off. When it's On, the spark energy comes directly from the Digital 7 box. When it's Off, the box



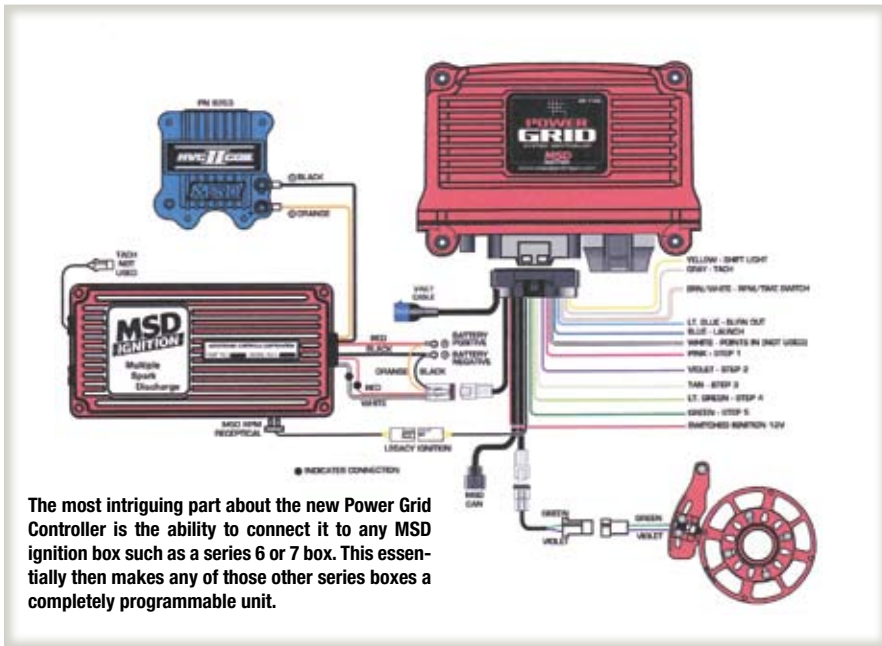
In addition to its own internal programming features, the new Power Grid System Controller can also be easily connected to several other power accessories by way of CAN-Bus technology in addition to the ability to connect directly to a Racepak data logger.

There are two components to the actual Power Grid System. The first is the Power Grid 7 Ignition Control, which is the actual component that fires the ignition coil to supply spark. The second portion is the Power Grid System Controller, which houses the microprocessor that is programmable and

controls all the various functions through software programming. In simple terms, think of the Ignition Control as your computer display screen, while the System Controller is your actual computer hard drive and memory.

The System Controller can be married to any of MSD's other non-programmable ignition boxes in much the same fashion as your computer tower can be attached to any display screen. This in effect means you could attach the System Controller to, for example, an MSD 7AL-2 ignition box and benefit from all the features of a programmable box.

Noted nitrous Pro Mod racer and engine builder Pat Musi was experiencing a troubling problem of ignition coils going bad. With five stages of nitrous oxide, ignition timing retards and 800-some-odd cubic inches, quite a bit of spark energy and timing changes is required to run in the five-second elapsed time zone which was all accomplished with the use of the programmable 7531 Digital 7 ignition box. "We'd notice the car not running well," Musi said, "and we'd change just the coil and it would pick the car right up."



The most intriguing part about the new Power Grid Controller is the ability to connect it to any MSD ignition box such as a series 6 or 7 box. This essentially then makes any of those other series boxes a completely programmable unit.

is strictly a timing control. The power converter inside isn't used.

"The next thought was to build a programmable 8," Pando added, "but in doing so, we thought it better to simply build a programmable Power Grid that could be added to any of our ignition boxes. And then we got to thinking about modules, adding them to the Power Grid along a CAN-Bus system by the racer as necessary. In addition, we were able to allow communication from the ignition directly to a Racepak data logger, which allows all of the ignition events to be logged. The Power Grid Controller also has its own data acquisition system that can be viewed with the supplied MSD Review software."

Controller Area Network, more commonly known as CAN-Bus technology, utilizes a system whereby certain devices

can communicate with one another along a network. As an example, a typical street vehicle might have numerous systems such as ignition, transmission, power windows, radios, etc., all of which need to communicate with one another. The CAN system was designed to accomplish that task.

The Power Grid Ignition Control uses a different spark profile than other programmable boxes which use a negative firing pattern as viewed on an oscilloscope. The Power Grid utilizes a sinusoidal wave much like a series 7 ignition control.

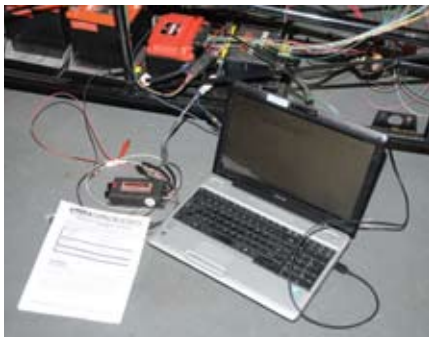


Pando said, "We had other racers running the same type engines but they were running the new Power Grid ignitions. The 7531 Digital 7 has 190 millijoules of spark energy. The Power Grid has 200, which by the numbers is not much different. However, there is a spark profile difference in the two boxes."

Pando said, "The spark profile of the Digital 7 is one that fires negatively, whereby it has something like 480 negative volts, which is like a 6-series ignition box. The original 7-series boxes had a sinusoidal wave that is like a sine wave in that it goes positive then negative/positive/etc. The new Power Grids are built on that same technology."

It's very common for racers to run various different add-on boxes to their ignition control. Things like retards, shift timers, etc., are all now built into the Power Grid System Controller. However, there will always be things in the future which will require hooking a separate box to your ignition that will require its own power supply. The Power Grid was designed with the CAN-Bus technology so that future controls can simply be plugged into the CAN-Bus terminal strip with programming through MSD's View software.

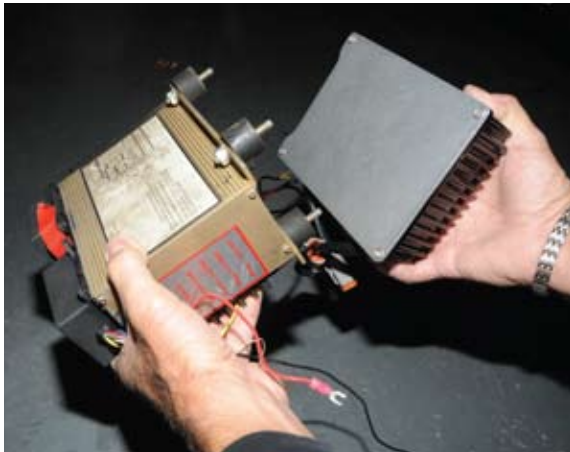
As an example, to presently change the Launch rpm, it's required that you hook up a PC to the Power Grid and reprogram the unit through the software. In the works presently is a Launch Control box that can



All timing features including rpm limits and timing retards are programmable through the use of MSD's View PC software.



A connection for a computer USB cord is located directly next to a memory card slot which holds an SD card which stores ignition system data logging information. Rather than connect the Power Grid Controller directly to a PC through a USB cable, the card can be removed and the information uploaded to the PC with the use of MSD's ReView software.



Replacing a Series 7 ignition system with the new Power Grid is an extremely easy affair with the Power Grid taking up no more room than the Series 7 or even 6 boxes.

be mounted in the driver's compartment in which Launch rpm can be easily changed. In fact, with this technology, any number of Power Grid accessories can be plugged in and easily read by the Power Grid itself and adjusted either through the software or the accessory such as in the case of the Launch Control.

What intrigued us about the new Power Grid was its ability to attach to any Series 7 ignition boxes and turn that system



Once we installed the Power Grid system we chose to test fire it using MSD's Digital Ignition Tester.

are made in the software, they are made in "Real Time," meaning that as you make the change, it immediately transfers the change to the Controller.

Because the entire system

is controlled through the software, it is mandatory that you understand and be able to use simple PC commands. Is it hard or complicated? No. The software is designed very simply for even those who are a little computer-illiterate. There are some "tricks," but it's nothing you can't learn as you go.

Two things stood out once we started the engine. First, with the crank trigger set to fire at 34 degrees, which is where we ran it with the 7-AL2, the timing changed to read only 30 degrees. Pando said, "Any time you install any programmable box or even one of our Timing Controls, it will retard the timing mark roughly four to five degrees due to the timing compensation circuitry."

Previously, to initially start an engine with a crank trigger, you would simply set the timing mark to the required setting and line the trigger up to the magnet trigger wheel. Once the engine starts, and with the wiring from the trigger to the ignition box set in the correct polarity, the timing should be at the exact setting. Not so with the programmable or Timing Controls. This required us to "lead" the trigger somewhat to attain the 34 degrees we required; however, that led to another discovery.

With a timing light connected, you can actually see the timing have a tendency to retard slightly. Pando said, "This is due to the characteristics of the trigger pickup itself."

Now with the programmable Power Grid hooked up, that timing mark stayed rock solid at 34 degrees because the timing is controlled by the Power Grid and not necessarily by the trigger pickup.

Our original premise was to do just that but rather we installed both the Power Grid Ignition control and the Power Grid Controller together because they easily plug into one another. However, should you want to just the Controller to your Series 7 ignition box, it's just as simple.

After installation, the supplied MSD View and MSD Review software must be loaded onto your PC, after which you attach the PC to the Controller by way of the supplied micro to USB cable. The Controller does come pre-programmed to start your car, but changes to the software can further tune it to your particular combination. As changes

Using the MSDView software is as easy as any other PC program. In the case of this Ignition Timing screen, changes in ignition timing are done by creating points on the graph to specify timing retards as indicated by time from launch. Or, hard numbers can be inputted on the left side of the screen.

With five different Step Retards, each one can either be triggered to retard the ignition a set amount when its corresponding wire is powered, or it can be done at any rpm as programmed through the software. Automatic shifting can also be accomplished at an rpm or time level.

The ability to program a certain amount of ignition timing retard based on any number of parameters should delight super category racers who can take timing out in order to transverse tricky race tracks during throttle stop conditions.

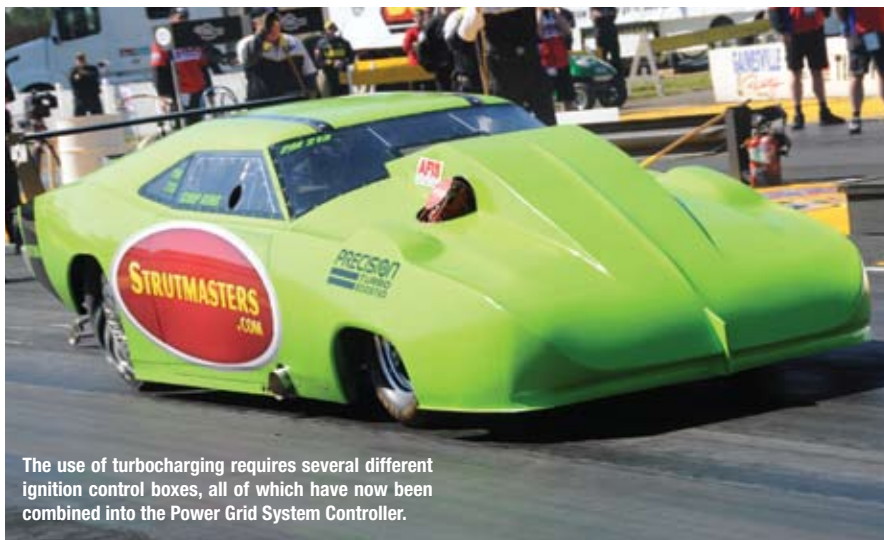
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One thought with regards to super category racing comes in when the throttle is reopened wide open further down track. Oftentimes with powerful engines, it can cause the tires to spin, creating at the very least an inconsistency issue. The Power Grid can be programmed to retard the ignition timing (taking power out of the engine) at a time point slightly before the throttle stop is to reopen and then advanced back to its original setting once the car has settled down. And in fact, that return to full advance can be programmed to come back in at a progressive rate.

Pando said, "The unit also contains a Safety Rev Limiter that is adjusted so that at a certain time after the car launches, the engine will hit a low rev limit. An example of this is if the car hits the wall and the driver gets knocked out and the engine is at wide open throttle. Based on the default setting in the Power Grid, at nine seconds after the Launch Control wire is deactivated, the engine rpm will drop to 2000. It's quite a safety feature."

Individual cylinder timing can also be adjusted to further extract as much power as possible from your combination. A fiber optic input is attached to the number one plug wire, after which you program the Power Grid for your particular firing order. Each cylinder's ignition timing can



The use of turbocharging requires several different ignition control boxes, all of which have now been combined into the Power Grid System Controller.

then be advanced or retarded.

And of course with any ignition system of this type, there is always the talk of its illegal use. Pando said, "We have made available a Scan Tool to each of the sanctioning bodies as well as in NHRA's case, each Division's Tech Director. That Scan Tool will enable the user to locate any added accessory and/or its respective part and serial number.

It really is amazing the things which can be done with the new Power Grid System

and it sure is a long way from the days when a set of ignition points triggered a coil to fire a spark plug.

DRA

SOURCES

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