



INSTALLATION INSTRUCTIONS

Nitro Ignition for Harley-Davidson® Motorcycle PN 15-04-4215/PN 4215

Parts Included:

| | | |
|--------------------------------|--------------------|---------------------|
| 1 - CD Ignition Control | 5 - Wire Harnesses | 8 - Mounting Screws |
| 1 - Inductive Ignition Control | 5 - Wire Caps | 7 - Wire Ties |
| 1 - Pro-Data+ Disk | 2 - 20 Amp Fuses | |
| 2 - 3 Amp Fuses | 1 - 1 Amp Diode | |

Parts Not Included:

Coil Pack - PN 4285
Pickup/Rotor - PN 4216
Kill Lanyard - PN 4379

WARNING: During installation, disconnect the battery cables. When disconnecting the battery always remove the Negative cable first and install it last.

Note: Solid Core spark plug wires cannot be used with the Nitro Ignition. We recommend only the MSD 8.5mm Super Conductor Wires.

Note: The engine must be equipped with an electric starter.

OPERATION

The MSD Programmable Nitro Ignition system combines the benefits of a Capacitive Discharge Ignition with the best features of an Inductive ignition. The result is an incredible spark with high voltage and long spark duration. There are two ignition controls, the main control with the CD and programming controls and another with the inductive circuitry. The two controls are triggered and send their unique power characteristics to two hybrid coils. These coils must be used with the Nitro Ignition and combine the two sparks to work as one. The CD side is primarily responsible for ionizing the spark plug gap while the current from both coils produce a high level of current and sustained spark.

DIGITAL OPERATION

The Programmable Nitro Ignition uses a high speed RISC microcontroller to control the ignition's output while constantly analyzing the various inputs such as supply voltage, trigger signals and rpm. The high speed controller can make extremely quick compensations to the timing and rpm limits while maintaining accurate timing signals to within +/- 0.1° and +/- 10 rpm. The circuits and controller of the ignition have been thoroughly debounced and suppressed to create protection against Electro Magnetic Interference (EMI).

Note: The Nitro Ignition can be removed from power and still retain its programmed settings.

HIGH ENERGY CD/INDUCTIVE SPARK

The Nitro Ignition produces full power sparks for each firing of a plug. The spark always lasts about 400 microseconds and delivers 800 millijoules of spark energy at the plug gap.

PROTECTION

The Programmable Nitro Ignition has a built in reverse polarity protection circuit. This will protect the ignition in the event of wrong connections. It will also shut off for protection from a surge in power. The ignition will still operate once the surge or polarity is corrected.

LED INDICATOR

There is an LED that monitors the status of the Ignition. The LED will verify trigger inputs and will flash trouble codes such as a Code 2 for Low Battery supply voltage and Code 3 for improper input trigger signal.

SHIFT COUNTING

The Nitro Ignition uses state of the art computer circuitry to determine when a shift has occurred. This eliminates having to wire in separate external switches. The ignition will sense the normal rpm drop of the engine to determine that a shift has been made. The rpm drop is programmable so it can be matched to the specific engine combination being used. In addition the engine rpm has to increase by 200 rpm before the next gear can be selected to prevent double shifting.

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CRANKING RPM

The Nitro Ignition will not produce a spark until the engine spins at least 500 RPM for safe startup.

PROGRAMMABLE FEATURES

The Nitro Ignition has many features that give you more control over your timing and rev limits. For more information on programming these features, consult the supplied Programming Instructions located on page 11 of these instructions.

OPTIONAL HAND HELD PROGRAMMER, PN 7550

The Hand Held Programmer (Figure 1) allows you to select and program the different features of the Programmable Ignition. The ignition does not need to be connected to the programmer in order to operate because the program values are stored in an erasable memory circuit in the Ignition Control. The Programmer only needs to be connected when you want to check or change programs or to monitor different operating parameters. It connects to the Ignition with a six foot harness with a molded 9-pin connector.



Figure 1

LAUNCH SELECTOR/SHIFT LIGHT WITH GEAR INDICATOR

This Module, PN 4360, connects to the Ignition through the 9-pin harness and works as a Shift Light and Gear counter. A cluster of LEDs illuminates the shift rpm while individual LEDs indicate each gear change.

PRO-DATA+ (INCLUDED)

MSD has a software package for your PC that allows you to create timing and rpm programs for this ignition. All of the adjustable parameters can be reviewed and set, then uploaded to the ignition. This program is included to allow the upload and download of programs for the Ignition Control as well as monitoring and editing of all the ignition's parameters. It will work with any PC running Windows '95, '98, NT, 2000 and Millenium. More information is available in the Programming instructions. Visit our website to download the current version at www.msdpowersports.com.

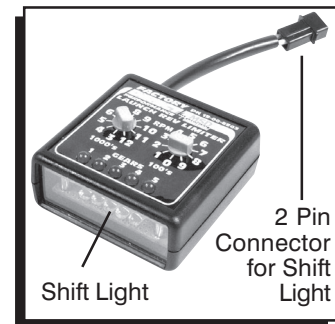


Figure 2

TRIGGER PICKUP

The Nitro Ignition can only be used on V-Twin engines with a special three magnet pickup rotor kit, PN 4216.

RPM FEATURES

REV-MAX CONTROL

The Programmable Ignition uses a unique "Smart Touch™" Circuitry that learns the exact firing distance from one cylinder to the next to ensure the rev limiters are the smoothest available. The Smart Touch™ rev limiter will learn the small difference between each cylinder as well as large differences such as the Harley engines.

If the Rev-Max limit is exceeded, the ignition will be turned off. The ignition will then need to be cycled off then back on to start again. This rev limiter should only be used to prevent excessive engine damage.

RPM/TIME DELAY ACTIVATED SWITCH

This feature can be programmed to activate and deactivate a circuit by rpm or time. It will supply a ground path to a circuit through the Purple/Blue wire and remove it to deactivate the circuit. It is capable of handling up to 3 amps continuous.

When programmed for rpm activation, it can be set from 2,000 to 8,000 in 100 rpm increments.

When programmed for time operation there are two settings, one as delay to turn On after the launch and another for Time On. These are set in 0.1 second increments up to 25 seconds combined.

SEQUENCED SHIFT LIGHT/GEAR SELECTOR

MSD offers a Shift Light/Gear Selector, PN 4360, that easily connects to the 2 - Pin connector of the Ignition Control (Figure 2). Two different gear selected rpm points can be programmed to turn the shift light On from 2,000 – 8,000 rpm in 100 rpm increments. This feature can also be attached to an air shifter to automatically shift the bike. The Red/Green +12V output wire is fused for 3 amp maximum fuse size.

TIMING FEATURES

Note: All retards will be added together to determine the final timing setting.

START RETARD

This program will retard the timing from cranking through 800 rpm. It is automatically enabled and is adjustable from 0°-30° of retard. This eases the load on the starter and prevents backfires. The retard will be active from 500 to 800 rpm.

Note: The Ignition must be used on engines with an electric starter and cranking speed of at least 500 rpm to enable spark output.

AUTO-TIMING COMPENSATION

This feature allows the ignition to compensate for inherent retard from the trigger pickups and coils.

MULTI-STAGE RETARD

This Ignition offers three stages of retard that can be activated at different times via three control wires and/or an rpm programmed value. Each retard is adjustable from 0°-25° in 0.1° increments (from 800 - 8,000 rpm). When used together the retard stages are added together. The total maximum amount of the retards is 35°.

Each stage is activated when 12 volts are supplied to the corresponding wire and the engine speed is above the rpm value. The retard value will remain active until 12 volts are removed from the wire, or the engine speed drops below the rpm value.

Pink Wire – Stage 1

Violet – Stage 2

Tan Wire – Stage 3

Ramp Operation: Step Retard 1 and Retard 2 can also be programmed for ramped function. The timing will Ramp down to the programmed Step amount by selecting a time value up to 2.5 seconds in 0.01 second increments.

Step Retard Deactivation Delay: This program allows you to select a delay time when a stage of retard is deactivated. The delay time can be set from 0 – 2.5 seconds.

STAGE 3 RETARD RAMP

The Stage 3 retard also has a timed ramp function for progressive retard applications. This time is programmable from .1 to 9.9 seconds. (Note: If this is set to zero the third stage functions exactly like stages 1 and 2.) If a value above zero time is entered then the third retard stage will progressively retard the timing over this time frame. The start point for the progressive retard can be activated by the release of the launch rev limiter, by rpm or by the Stage 3 activation wire that can be connected to a timer or other devices.

LAUNCH RETARD TIMING CURVE

This program can be set from 800 – 8,000 rpm (every 100 rpm) in steps as small as 0.1° up to 25°. It is rpm dependent. When 12 volts are applied to the Dark Blue wire this program is activated. It will override the Run Timing Program until the bike is shifted to second gear where the Run Timing Curve is activated and in for the duration of the run.

Note: All retards are added together when activated. If a stage of retard is activated at the same time as the Launch Retard or Launch Timing Curve, the programmed retards are added together. It is recommended to view the Retard Sum using the Handheld Programmer or the MSD Pro-Data+ Graph View.

LAUNCH RETARD RAMP

This feature allows the ignition timing to ramp back to the Launch Timing Curve over a programmable amount of time from 0 – 2.5 seconds in 0.010 second increments. The retard is programmable from 0° - 30° degrees in .5° increments. This Ramp time is activated when the 12 volts are removed from the Dark Blue (Launch Retard/Reset) wire.

RUN TIMING CURVE

This is the program for the full ignition timing curve from 800–8,000 rpm. The curve is adjustable in 0.1° increments every 100 rpm with 25° maximum. The Run Timing Curve is the default program and remains active at all times unless the Launch Timing Curve is activated at which point it is overridden until the first shift when the Launch Timing Curve is deactivated.

Note: The Run Timing Curve will be added to any Stage Retards and Gear Retards that are activated throughout the run. Maximum retard using the Run Curve is 25°.

TIMED RETARD CURVE

This program will produce a timing curve that will begin when the Launch wire is removed from 12 volts. The timing can be programmed to retard in 0.1° increments at 0.050 second increments. The maximum retard is 25° and a time period of 12.5 seconds. This retard amount is summed with any other retards.

INDIVIDUAL CYLINDER MANAGEMENT (ICM)

This program allows you to select a retard for each cylinder. Each cylinder can be programmed to have up to 10° of timing removed and is adjustable in 0.1° increments. This amount is added to any retard amount being used with the Run Curve or Step Retards.

LATCHING OVERREV SHUT OFF

When the engine rpm exceeds the Rev-Max value, the ignition will shut off all sparks until the ignition is turned Off to reset.

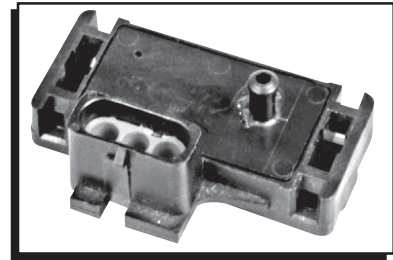


Figure 3

OPTIONAL BOOST RETARD CURVE

The Nitro Ignition has an external 3 - pin connector (Figure 3) that will attach to one of two optional Map Sensors PN 23121 (2 Bar) 2-29 psia or PN23131 (3 Bar) 2-44 psia. When this sensor is used, a timing curve can be programmed into the Ignition based on the pressure within the intake manifold. This is especially useful for turbo applications. This feature is programmable from 2 to 45 psia in 0.25 psia increments, from 0-25° retard in .1° increments.

PICKUP PLATE INSTALLATION

Before you begin installing the MSD pickup assembly, the front cylinder must be positioned at TDC. Use the inspection hole to align TDC. This is the reference position used for installing the new pickups.

1. From inside the cam/ignition housing, feed the free end of the MSD pickup harness through the wire access port.

Note: The harness includes a heat-resistant acrylic sleeve that fits snugly inside the port opening. Do not pull the sleeve completely through the port. It must be positioned to protect the wires as they pass through the port opening.

2. Mount the MSD pickup plate inside the housing (Figure 4). Note the “adjusting notch” on the edge of the plate. This notch must be located over the series of “steps” inside the housing (about the 7 o’clock position as you face the housing). One of the sensor units will be at approximately 12 o’clock.

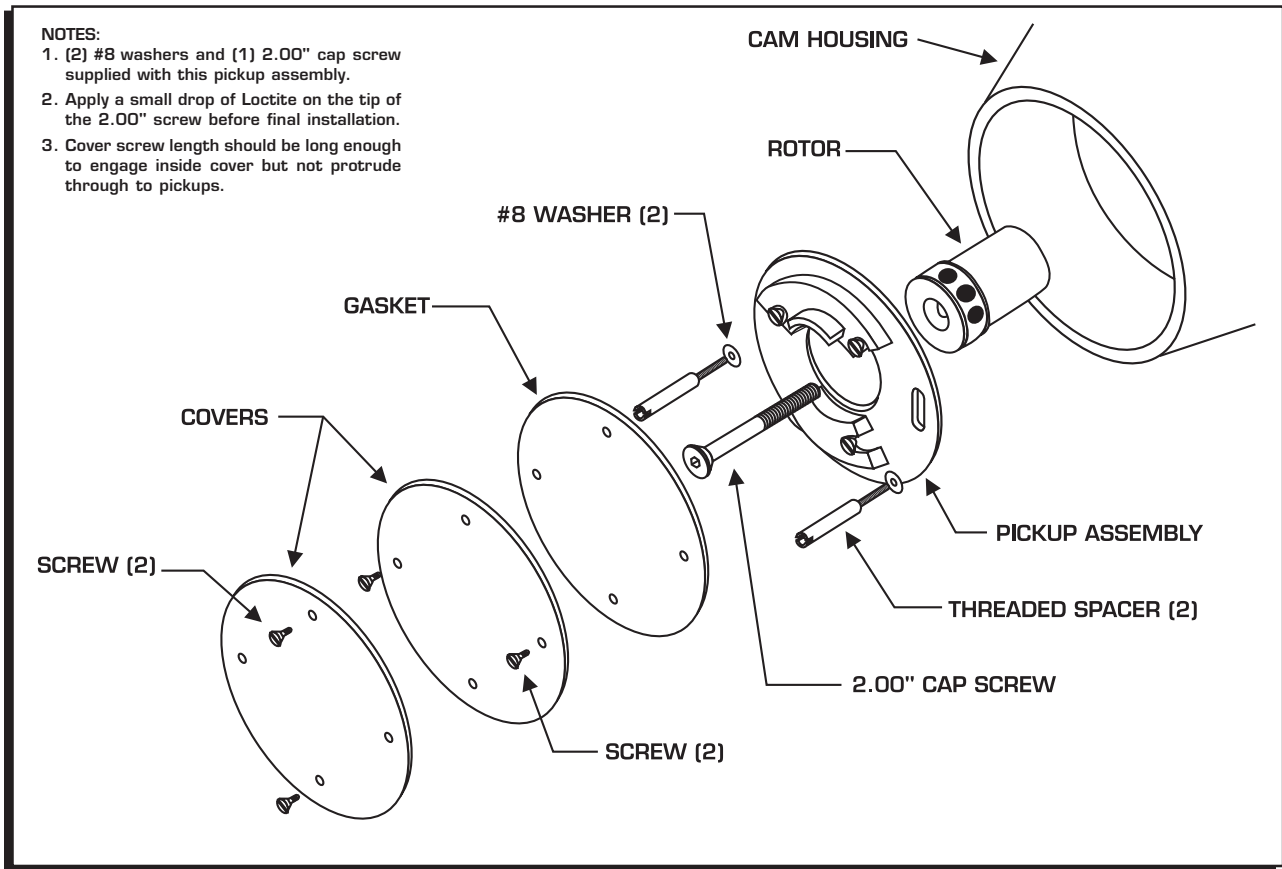


Figure 4 Installing the Pickup Plate Retainers.

3. Install the hold-down/standoff screws with flat washers and turn them snug, **do not tighten at this time** (Figure 4).
4. Put the MSD rotor in place on the end of the camshaft. The locating pin in the rotor bore must align with the groove in the cam. **Do not force the rotor on the camshaft.** Slowly rotate the rotor until the pin aligns with the groove and gently push the rotor tightly against the end of the cam and snug the retaining screw.

5. Check the distance from the outer surface of the pickup plate to the end of the installed rotor (Figure 5). If necessary, add shims until the measured rotor height is $9/16$ -inch (+/- $1/32$ -inch).
6. When the rotor height has been verified, remove the retaining screw, place a drop of red Loctite on the threads and re-install the screw to the factory recommended torque.

Note: If shims are used, make sure the rotor runs true. The shims may ride on the cam shoulder radius if not properly installed.

7. The trailing magnet of the rotor should align just to the left of the slight bulge on the inner surface of the upper pickup. If the alignment is not correct, the engine has been rotated from top dead-center or the pickup plate is improperly installed. Verify this alignment before you progress any farther.
8. The housing cover should not be reinstalled until the timing procedures are completed.

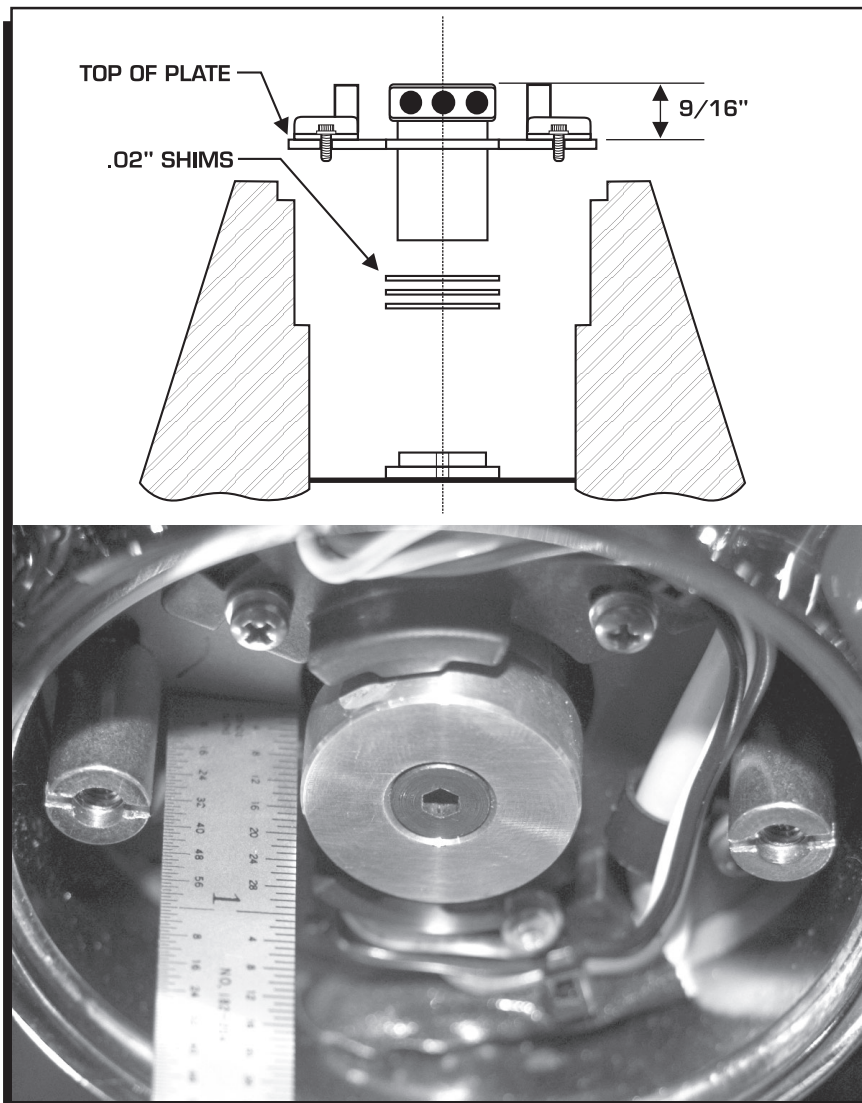


Figure 5 Checking Rotor Height.

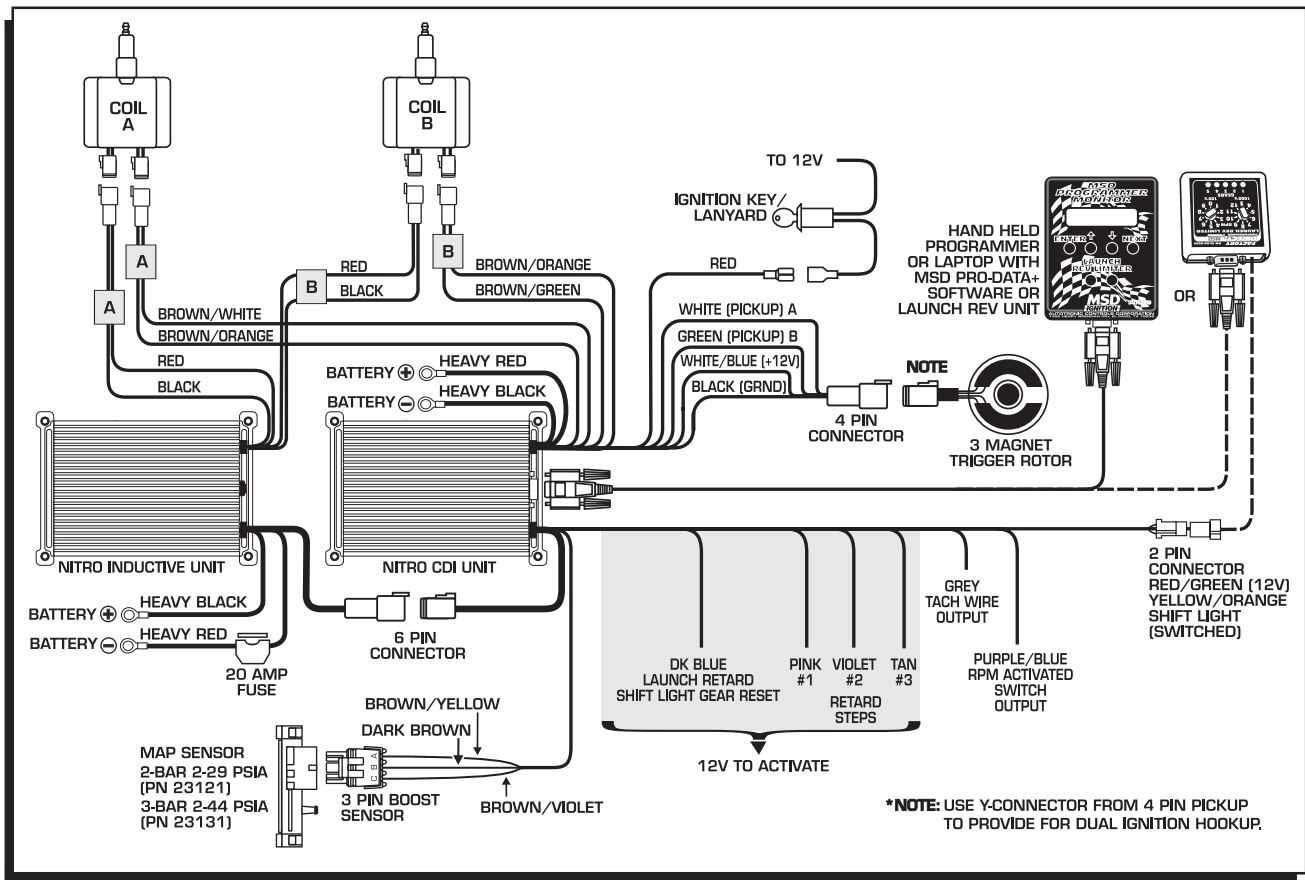
WIRING FUNCTIONS

| | | |
|---|------------------------|---|
| | Power Leads | These are the two heavy 12 gauge wires and are responsible for getting direct battery voltage to the ignition. The Ignition is load protected from reverse battery connections and will automatically shut down if there is over 27 volts input. Do not connect to batteries over 16 volts! |
| CDI Unit HEI Unit | Heavy Red | This wire connects directly to the battery positive (+) terminal or a positive battery junction such as the starter solenoid. Minimum 10V to Maximum 16V. Note: Do not connect to the alternator. |
| | Heavy Black | This wire connects to a good ground, either at the battery negative (-) terminal or to the engine. Note: Engine must be grounded to battery negative. |
| | Ignition Switch | |
| | Red | This wire is responsible for turning the Nitro-Harley Ignition On and Off as well as supplying power to the triggers. Connect to a switched 12 volt source such as the ignition key or switch. Also recommended for lanyards. |
| CDI | Coils | |
| Two Pin Connector Coil A | Brown/Orange | This wire connects to the coil A positive (+) terminal. |
| | Brown/White | This wire connects to the coil A negative (-) terminal. |
| Two Pin Connector Coil B | Brown/Orange | This wire connects to the coil B positive (+) terminal. |
| | Brown/Green | This wire connects to the coil B negative (-) terminal. |
| Inductive | Coils | |
| Two Pin Connector Coil A | Red | This wire connects to the Inductive coil A positive (+) terminal. |
| | Black | This wire connects to the Inductive coil A negative (-) terminal. |
| Two Pin Connector Coil B | Red | This wire connects to the Inductive coil B positive (+) terminal. |
| | Black | This wire connects to the Inductive coil B negative (-) terminal. |
| | Trigger Pickups | |
| 4 - Pin Connector | White/Blue | + 12V to Trigger Pickups |
| | Black | Ground to Trigger Pickups |
| | White (Coil A) | This wire connects to the trigger pickups (*3-Magnet Rotor Only PN 4216). |
| | Green (Coil B) | This wire connects to the trigger pickups (*3-Magnet Rotor Only PN 4216). |
| | 6 Pin Connector | Provides power and triggers from CDI to HEI unit. |
| | Accessories | |
| | Launch Control | |
| | Dark Blue | When 12 volts are applied, this wire activates several features including; Launch Retard value, Launch Timing Curve and will reset the Shift Light sequence to 1 st gear & Step 3 slope. |
| | Tach Output | |
| | Gray | Used to provide a tach signal to rpm sensing devices. 12 volt square wave with 30° duty cycle. |

***Note:** Use Y-connector from 4 pin pickup to provide for dual ignition hookup.

WIRING FUNCTIONS CONT.

| | |
|---|---|
| 3-Step Retard | |
| Pink | This wire activates the first retard stage when it is applied to 12 volts. When 12 volts are removed the retard is deactivated. |
| Violet | This wire activates the second retard stage when it is applied to 12 volts. When 12 volts are removed the retard is deactivated. |
| Tan | This wire activates the third retard stage when it is applied to 12 volts. When 12 volts are removed the retard is deactivated if ramp value = 0. Step 3 retard ramp can be activated by this wire providing a progressive retard ramp that is programmable from .1 to 9.9 seconds. |
| Shift Light/Shifter 2 Pin Connector | |
| Red/Green Yellow/Orange | Shift Light activation wire. Connects to the Shift Light PN 7552 or PN 4360 to any air shifter with a 3 amp or less current draw. A 3 amp fuse is in line on the Red/Green wire. |
| RPM/Time Switch | |
| Purple/Blue | RPM/Time Activation Switch. This wire will supply a ground to complete a circuit at a desired rpm. It will handle up to 3 amps continuous. |
| Map Sensor 3 Pin Connector | |
| Brown/Violet Brown/Yellow Dark Brown | Three Pin Connector - Used for an optional external pressure sensor for turbo applications. (2-Bar/2-29 psia - PN 23121) (3-Bar/2-44 psia - PN 23131). |



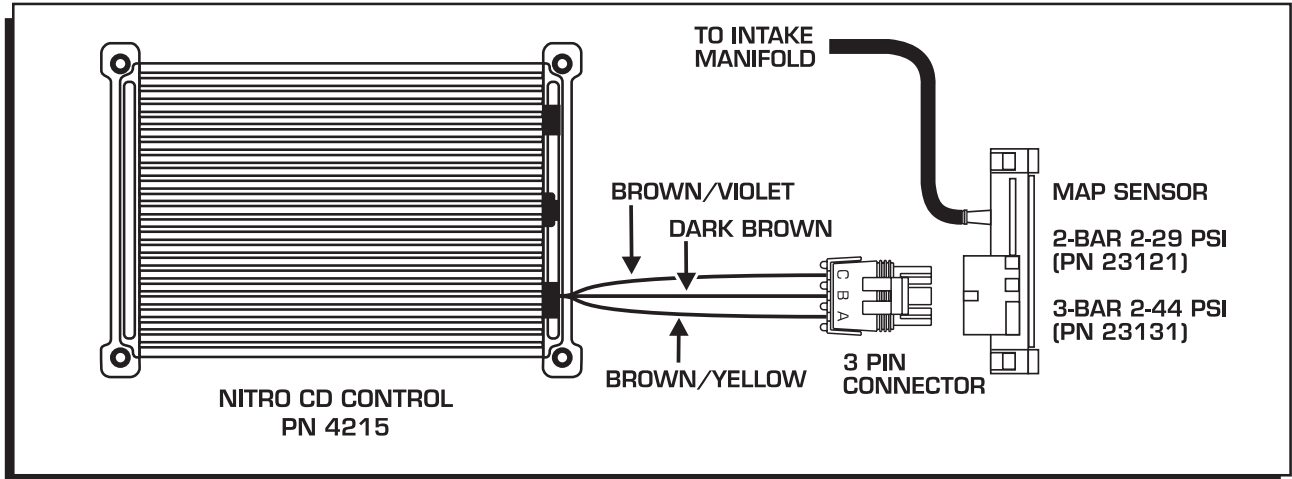


Figure 7 - MSD SYSTEMS Using a Map Sensor.

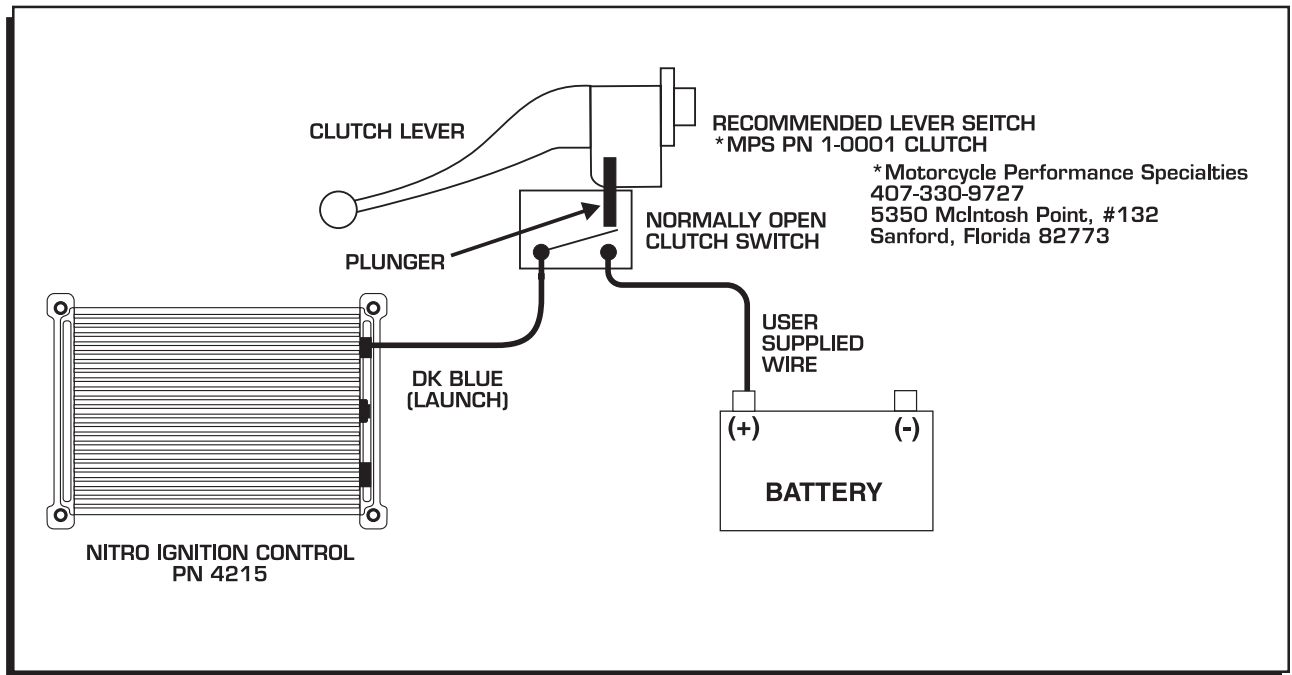


Figure 8 - MSD SYSTEMS Wiring Diagram for the Launch Control.

GENERAL INFORMATION

BATTERY

The Nitro Ignition Control will operate on any negative ground, 12 volt electrical system. The Ignition can be used with 16 volt batteries. The Ignition will deliver full voltage with a supply of 11- 16 volts and will operate momentarily with a supply voltage as low as nine volts.

Note: Do not operate this ignition with more than 16 volt battery or may result in ignition/coil failure.

If your application does not use an alternator, allow at least 15 amp/hour for every 15 minutes of operation. The Ignition uses about 2 Amps for every 1,000 rpm. If the engine is cranked with the same battery or other accessories such as an electric fuel or water pump are used, the amp/hour rating must be higher. For Dual Ignitions a larger amp/hour battery is recommended.

COILS

The MSD Nitro Coil Pack, PN 4285, must be used. This coil will produce 50Kv and 2 amps for up to 500 micro-seconds.

Note: Coil Ground wire must be connected to the cylinder heads.

TACHOMETERS

The Ignition features a Tach Output Wire (Gray). This wire provides a trigger signal for tachometers, a shift light or other add-on rpm activated devices. The Tach Output Terminal produces a 12 volt square wave signal with a 30° duty cycle.

SPARK PLUGS AND WIRES

Spark plug wires are very important to the operation of your ignition system. A good quality, helically wound wire and proper routing are required to get the best performance from your ignition, such as the MSD 8.5mm Super Conductor Wire. Helically wound wires provide a good path for the spark to follow while keeping Electro Magnetic Interference (EMI) to a minimum. Excessive EMI, such as the amount that solid core wires produce, will interfere with the operation of the Ignition. **Solid Core spark plug wires cannot be used.**

Spark Plugs: Choosing the correct spark plug design and heat range is important when trying to get the best performance possible. Since there are so many engine combinations and manufacturers, MSD cannot recommend which plug or gap is exactly right for your application. It is recommended to follow the engine builder or manufacturer's specification for spark plugs. With that, you can then experiment with the plug gap to obtain the best performance. The gap of the plugs can be opened in 0.002" increments, then tested until the best performance is obtained. As a starting point for Top Fuel engines, start with a .020" gap.

Sealing: The Ignition is potted completely with a polyurethane compound for vibration and water resistance.

Welding: If you are welding on your motorcycle, to avoid the chance of damage always disconnect all power and ground cables of the Ignition (You should also disconnect the tach ground wire too).

MOUNTING

The Ignition can be mounted in any location as long as it is away from direct engine heat sources. Mount the Ignition boxes at least one foot away from the ignition coils. It is not recommended to mount the unit in an enclosed area.

GENERAL WIRING INFORMATION

Wire Length: All of the wires of the Nitro Ignition may be shortened as long as quality connectors are used or soldered in place. To lengthen the wires, use one size bigger gauge wire (10 gauge for the power leads and 16 gauge for the other wires) with the proper connections. All connections must be sealed.

Grounds: A poor ground connection can cause many frustrating problems. When a wire is specified to go to ground, it should be connected to the battery negative terminal, engine block or chassis. There should always be a ground strap between the engine and the chassis. Always securely connect the ground wire to a clean, paint free metal surface.

Routing Wires: The Ignition wires should be routed away from direct heat sources such as exhaust manifolds and headers and any sharp edges. The trigger wires should be routed separate from the other wires and spark plug wires. It is best if they are routed along a ground plane such as the block or frame.

PRESTART CHECK LIST

- The only wires connected to the coil terminals are the Ignition wires to coil positive and coil negative.
- The small Red wire of the Ignition is connected to a switched 12 volt source and, if used, the lanyard is installed.
- Confirm the cylinder select is in the proper position for your application.
- The power leads are connected directly to the battery positive and negative terminals.
- The battery is fully charged.
- The engine is equipped with at least one ground strap to the chassis.

If you experience difficulties when installing your MSD, contact our Customer Support Department at (915) 858-3365 (8 - 5 Mountain time) or e-mail us at: tech@msdpowersports.com

Pro-Data+ Programming Instructions

These instructions will walk you through the different programming features of the Ignition using the Pro-Data+ Software.

INSTALLATION

1. Insert the installation disk into your disk drive.
2. In Windows click "Start" then Select "Run".
3. In the box type "A:\Setup" Press Enter.
4. Follow the on screen instructions.
5. At this point you should have two new icons on your desk top.
6. Select the one that says "MSD Graph View".
7. At this point you should see several timing graphs.
8. In the upper left corner of your screen select "File".
9. Scroll down and select "Open".
10. Select the folder that says "4215".
11. Highlight the file that says "4215vxx.IGN" (xx = The latest version #; Example "03").
12. Click Open.

At this point you are in the default setting for the Nitro Ignition. When you make a change to this file always select the "Save As" option and rename the new file.

MONITOR

The rpm meter is a graphical interface that allows you to monitor the rpm, boost pressure and retard functions of the Ignition while the engine is running. The dial on the left side will indicate the total rpm and boost pressure of the engine in real time. The dial on the right side will show the total degrees retard sum while the bar graph in the lower right corner will show you the total degrees for each cylinder.

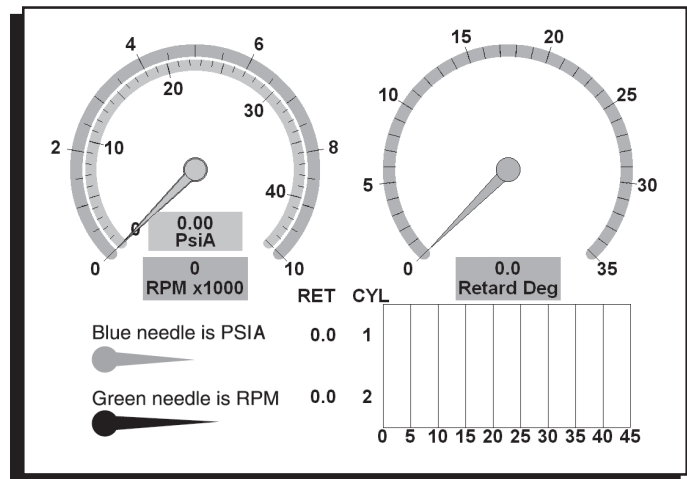


Figure 9 RPM and Retard Monitor.

INITIAL TIMING

Due to the advanced circuitry of the MSD Ignition, it is necessary to set the initial timing statically by using the LED. It is recommended to have the spark plugs removed from the engine, connected to the wires and grounded to prevent any spark from occurring in the cylinder.

Turn the ignition On and rotate the engine until the TDC mark appears in the observation hole. The LED should turn Off when the TDC mark is lined up. Rotate the pickup assembly clockwise until the LED turns Off. This point produces approximately 50° BTDC maximum timing. Once this is set, you can program a timing retard into the Ignition and start the engine to verify timing with a timing light. A good starting point would be to program a 10° or 15° retard to begin setting the ignition timing and curves.

TRANSMISSION CONFIGURATION

The First thing you need to configure is how the transmission is setup to determine the correct shift kill procedure as well as shift light points.

Last Gear – (Default 2 Gears)

This tells the Ignition how many gears your transmission has.

The options are: 2 or 3 – Select the appropriate number of gears for your transmission.

Drop RPM – (Default 600 RPM)

This will tell the Ignition how far the engine rpm will drop in order to recognize a shift. Keep in mind the engine speed has to increase by at least 200 rpm before the next gear change can be made to prevent double shifting. The options are: 200 – 1,500 rpm in 100 rpm increments.

INDIVIDUAL CYLINDER MANAGEMENT

If you are going to take advantage of the Harley-Nitro's Individual Cylinder Management timing control then you will need to complete the following:

This ignition requires that both pickups be connected and functioning using both the White and Green trigger wires. This will reference the White trigger pickup wire as the number one cylinder.

Note: Must use the 3 Magnet Rotor mounted on camshaft with this ignition.

The Nitro Ignition will only operate if both pickups are correctly functioning with the correct magnet rotor.

CylDeg – (Default 0°)

This is where you actually program the individual retard for each cylinder. These are labeled by spark sequence since the firing order may vary between engines. There are two adjustment sequences. These are labeled SparkSEQ1 thru 2.

Cyl-1 (A) SparkSEQ1 is going to refer to the cylinder/coil pickup attached to the White wire. This should be cylinder #1.

Cyl-2 (B) SparkSEQ2 is going to be the next cylinder that is under compression and ready to fire. This should be cylinder #2.

The options for both are: 0°-10° in .1° increments.

```
Cyl Deg
Spark SEQ1
* (1) Deg .0
* (2) Deg .0
```

BOOST CURVE CONFIGURATION

If you are using a turbo or supercharger and you would like to map out a timing curve based on the intake manifold pressure then you will need to complete the following steps.

BoostSensor – (Default 3Bar)

The BoostSensor tells the Ignition which Boost Sensor range you are using. There are two options for you to choose from.

```
BoostSensor
BoostSensor
* Range 3Bar
```

2Bar – This is our part number PN 23121 Pressure sensor. This unit will range from 2 psia up to 29 psia. Use this sensor if you want a timing curve between these two pressure extremes.

3Bar – This is our part number PN 23131 Pressure sensor. This unit will range from 2 psia up to 44 psia. Use this sensor if you want a timing curve between these two pressure extremes.

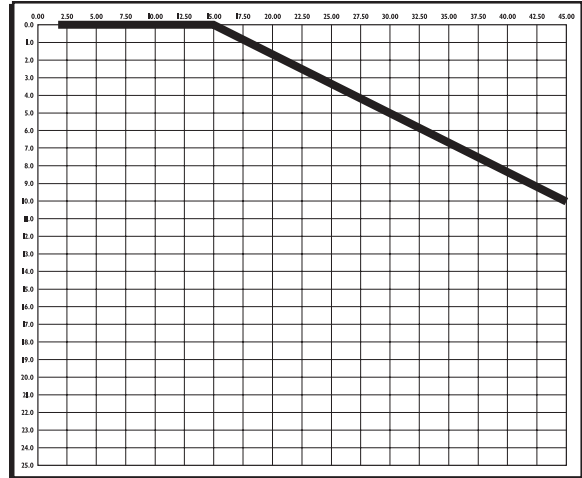
BoostCurve – (Default - See Map on Page 13)

The Boost curve is a graphical map that allows you to drag the timing curve to the different settings in order to achieve the desired curve.

The easiest way to achieve this is to maximize the box that contains the Boost Curve. In order to move the curve you will need to place your mouse pointer over the portion of the graph that you would like to move. Right click your mouse and

```
BoostCurve
*PsiA      2.00
Boost
Copy@
Ret Deg     .0
```

select "Add Dot". This will give you a red dot that you will be able to position any-where along the curve. Continue to do this until your curve is completely mapped out. After the curve is edited, then transfer it to the Ignition by selecting "Plot to MSD" to load the new curve into the Nitro Ignition, or File-Save As to save the change in a file on the PC.



SHIFT LIGHT/SEQUENTIAL SHIFTER OPTIONS

The shift light output wires can be used one of two ways.

- It can be attached directly to the MSD Powersports PN 7552 Shift light or the PN 4360 Launch Selector/Shift light and then programmed to turn on at a different rpm for each gear.
- It can also be connected directly to an air shifter which will shift the bike automatically into each gear at different rpms if desired.

The programmable options are:

Gear1 - with an adjustable RPM value from 2000 rpm to 8000 rpm (Default 5,000).

Gear2 - with an adjustable RPM value from 2000 rpm to 8000 rpm (Default 5,500).

```
ShiftLights
*ShiftLight 1
*(1) RPM5000
*(2) RPM5500
```

REV LIMITER

RevMax – (Default 5,500)

This is the Max rev limiter. The options are from 2,000 rpm to 8,000 rpm in 100 rpm increments. This is an overrev shutdown limiter. Once the engine RPM exceeds the value programmed all output sparks are shut down until the ignition is turned off.

```
RevMax
RevMax
*RPM 5500
```

START RETARD OPTION

Start retard is used to ease the load on the starter and to prevent backfires. This option is in effect from 500 to 800 rpm on start up.

Start Retard (Default 10°)

The options are: 0° to 30° in 1° increments

```
Retads
Start
StartRetard
* Deg10
```

PROGRAMMABLE LAUNCH RETARD RAMP BY TIME

This feature allows you to program from 0° - 30° of retard that will be active when the Dark Blue launch wire is active. When this Dark Blue wire is deactivated this retard will be progressively removed over the time period that is programmed into the Ignition. This is especially useful for controlling tire spin at the line. The options are:

Deg – (Default .0°)

This is the total retard that will be taken out when the Dark Blue wire is active. This is programmable from 0° - 30° in .5° increments.

Ramp – (Default .50 seconds)

This is the total time it takes for the timing to be progressively put back in. This is programmable from 0 to 2.5 seconds in .010 second intervals.

```
Launch
LaunchRetard
* Deg .0
* Ramp .50
```

THREE STEP RETARD

There are three separate steps of retard that can be activated by rpm or an external 12 volt source. The third step can also progressively retard the timing over time by the release of the launch wire (Dark Blue), by rpm or by the external 12 volt source on the Tan wire. The options are:

```
Step1
Step1
* Rpm 800
* Sec .00
* Deg 2.0
```

Step1 – (Default 2° - 800 RPM)

This is the first step retard. The programmable values are from 0° - 25° in .1° increments from 800 to 8,000 rpm. The external activation wire is the Pink wire. This step retard can also be programmed to ramp to the retard value from 0 - 2.5 seconds.

```
Step2
Step2
* Rpm 800
* Sec .00
* Deg 3.0
```

Step2 – (Default 3° - 800 RPM)

This is the second step retard. The programmable values are from 0° - 25° in .1° increments from 800 to 8,000 rpm. The external activation wire is the Violet wire. This step retard can also be programmed to ramp to the retard value from 0 - 2.5 seconds.

```
Step3
Step3
* Rpm 800
* Sec .00
* Deg 5.0
```

Sec, Step 1 and Step 2- This program allows a time to be selected to ramp the Step 1 and Step 2 retard to their programmed value. The time is adjustable in .01 increments from 0 - 2.5 seconds.

Step3 – (Default 5° - 800 RPM)

This is the Third step retard. The programmable values are from 0° - 25° in .1° increments from 800 to 8,000 rpm in 100 rpm. The external activation wire is the Tan wire.

Ramp – (Default .0 seconds)- This is only for the Step 3 retard. By putting a value from .1 to 9.9 seconds this option will progressively increase the timing retard set in Step 3 over the course of the time value programmed. This is useful for progressive retard applications. This feature is reset when the Launch wire (Dark Blue) is activated. This feature will also pause the timing if the power is interrupted from the Tan wire or the rpm drops below the Step 3 rpm value, and will pick up where it left off when power is reapplied to the Tan wire, or if the rpm climbs above the Step 3 rpm value.

Note: Each step is independent and can be activated in any order.

Note: All step retards are added together for the total timing retard.

GEAR SELECTABLE RETARD

This option will retard the timing a different value in gear 3.

Gear3 – (Default 0 Degrees)

When a retard value between 0° and 5° in .1° increments is programmed the timing will retard by that setting in this gear.

STEP OFF DELAY BY TIME

StepOff Delay – (Default .50 Seconds)

The Step Off Delay feature is active when any of the step retards (3-Step Retards) are deactivated. This option will provide a time delay from 0 to 2.50 seconds in .010 second increments before the timing returns to normal. This allows holding a step retard value before the timing returns to normal.

```
StepOffDelay
StepRetards
* OffDelay .50Sec
```

LAUNCH TIMING CURVE

The Nitro Ignition allows you to program a timing curve that is only active when in first gear. When this curve is active the word active appears on the bottom of this graph. This curve is programmable by the graphical map. When this curve is activate the word ACTIVE appears at the bottom of the graph.

```
LaunchCurve
* Rpm 800
Run
Copy@
RetDeg .0
```

The easiest way to achieve this is to maximize the box that contains the Launch Curve. In order to move the curve you will need to place your mouse over the portion of the graph that you would like to move. Right click your mouse and select "Add Dot". This will give you a red dot that you will be able to position anywhere along the curve. Continue to do this until your curve is completely mapped out. After this curve has been edited, save it in the Ignition with a transfer - Plot to MSD or File-Save As to save it in a file on the PC.

RUN TIMING CURVE

The Nitro Ignition gives you the ability to map out a complete timing curve from 800 rpm all the way to 8,000 rpm. This timing curve can increase or decrease at any point along the graph. When this curve is activate the word ACTIVE appears at the bottom of the graph.

```
RunCurve
* Rpm 800
Run
Copy@
RetDeg .0
```

The easiest way to achieve this is to maximize the box that contains the Run Timing Curve. In order to move the curve you will need to place your mouse over the portion of the graph that you would like to move. Right click your mouse and select "Add Dot". This will give you a red dot that you will be able to position anywhere along the curve. Continue to do this until your curve is completely mapped out. After this curve has been edited, save it in the Ignition with a transfer - Plot to MSD or File-Save As to save it in a file on the PC.

Note: Any graph can be printed by selecting Transfer-Print. Also all other parameters can be printed from the Data Editor-Select-Print.

TIMED RETARD

A retard curve can also be programmed based on time starting at the launch when 12 volts is removed from the Launch wire. This curve can be programmed in 0.05 second increments from 0.1° - 25°. The programmable time period is 12.5 seconds maximum.

```
TimeCurve
* Sec .00
Time
Copy@
RetDeg .0
```

Note: This timing retard is summed with all other active retards.

RPM ACTIVATED SWITCH

RPMSW – (Default - On: 2,000 RPM; Off: 6,000 RPM)

This feature will supply ground to the Purple/Blue wire when the On rpm value is reached, then it will remove the ground when the Off rpm value is reached. This wire will handle a maximum 3 amp continuous draw.

- The options are: ON 2,000 - 8,000 in 100 RPM increments.
- OFF 2,000 - 8,000 in 100 RPM increments.

```
RpmTimeSw
* SwSel RPM
RPMsw
* RpmOn 2000
* RpmOff 5000
```

RPM Time Sw- This feature allows you to activate and deactivate a circuit at a desired engine RPM or TIME.

- Sw Sel_RPM** - Select source for Rpm Time Switch output.
 - RPM selects the RpmSw output.
 - TIME selects the TimeSw output.
 - User selectable RPM, TIME.

RpmSw

RpmOn 2000 - Turn ON the RpmSw output wire above the rpm.

User adjustable from 800 rpm to 12,500 rpm (100 rpm increments).

RpmOff 6000 - Window switch: If the ON value is less than the OFF value, the RpmSw output turns OFF below the RpmOff rpm. Hysteresis switch: If the ON value is greater than the OFF value, the RpmSw output turns OFF below the RpmOff rpm. User adjustable from 800 to 12,500 rpm (100 rpm increments).

TimeSw

OnDelay 1.0 - Seconds after launch to turn TimeSw ON. User adjustable from 0.0 to 25 sec (0.1 sec increments).

OnTime 2.0 - Seconds to keep TimeSw ON. The total of OnDelay plus OnTime is 25 seconds after launch. User adjustable from 0.0 to 25.0 sec (0.1 sec increments).

ALERTS

Alerts – (Default - (1) Scan - (2) Scan)

The alerts will provide a flash code to the LED on the outside of the Ignition.

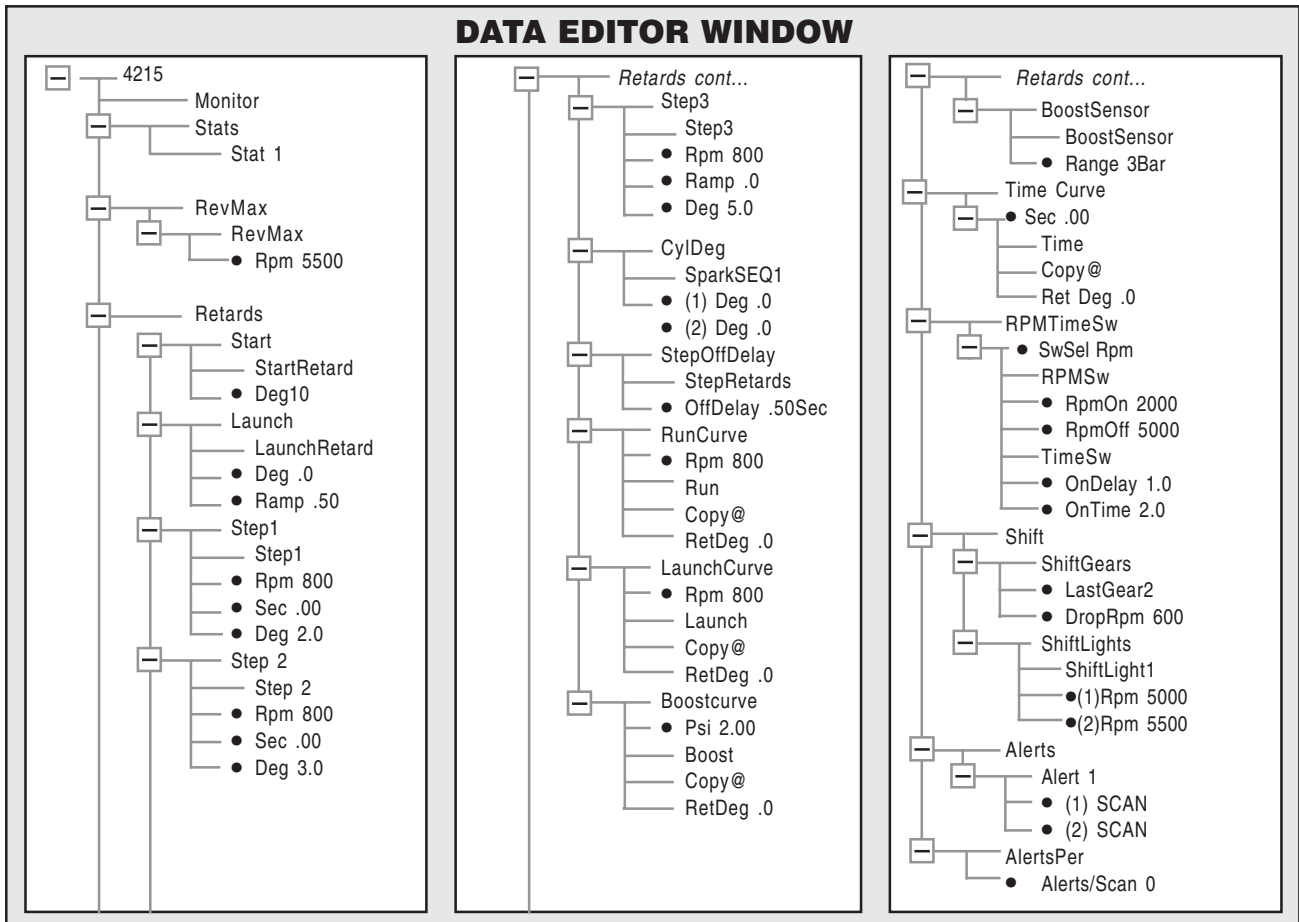
Alert 1 - This indicates a Low Battery situation. This will blink the LED two times.

Alert 2 - This indicates a problem with trigger input signals. This will blink the LED three times.

The Options are: **Scan** (to enable)
Skip (to disable)

```

Alerts
Alert1
* (1) SCAN
* (2) SCAN
    
```



DEFAULT SETTINGS AND ADJUSTMENTS

The following list shows all of the default values and adjustable increment of the Harley-Nitro Ignition.

| Display | Default | Data Low-High (step by) |
|-----------------------|---------|-------------------------|
| AlertsPer # | 0 | 0-1 (1) |
| BoostSensor #Bar | 3 | 2-3 (1) |
| BoostCurve Psia### | 2.0 | 2.0-45.0 (.25) |
| BoostCurve RetDeg### | 0 | 0.0-25.0 (.1) |
| Drop Rpm##00 | 600 | 200-1,500 (100) |
| LastGear# | 2 | 2-3 (1) |
| LaunRet Deg### | 0 | 0-30.0 (.5) |
| LaunRet Ramp #.### | .50 | 0-2.50 (.01) |
| RevMax ###00 Rpm | 5,500 | 2,000-8,000 (100) |
| RpmTimeSw Sel\$\$\$\$ | RPM | RPM-TIME |
| RpmSw RpmOn####00 | 2000 | 2000-8,000 (100) |
| RpmSw RpmOff####00 | 5000 | 2000-8,000 (100) |
| RunCurve Rpm####00 | 800 | 800-8,000 (100) |
| RunCurve RetDeg### | 0 | 0.0-25.0 (.1) |
| ShiftLight# | 1 | 1-2 (1) |
| ShiftLt1 Rpm####00 | 5,000 | 2,000-8,000 (100) |
| ShiftLt2 Rpm####00 | 5,500 | 2,000-8,000 (100) |
| SparkSEQ# | 1 | 1-2 (1) |
| Spark1 Deg### | 0 | 0-10.0 (.1) |
| Spark2 Deg### | 0 | 0-10.0 (.1) |
| StartRetard Deg## | 10 | 00-30 |
| Step1 Deg### | 2.0 | 0-25.0 (.1) |
| Step2 Deg### | 3.0 | 0-25.0 (.1) |
| Step3 Deg### | 5.0 | 0-25.0 (.1) |
| Step1 Rpm####00 | 800 | 800-8,000 (100) |
| Step2 Rpm####00 | 800 | 800-8,000 (100) |
| Step3 Rpm####00 | 800 | 800-8,000 (100) |
| Step1 Sec### | 0 | 0-2.50 (.01) |
| Step2 Sec### | 0 | 0-2.50 (.01) |
| Step3 Ramp### | 0 | 0-9.9 (.1) |
| StepOffDelay#.#Sec | .50 | 0-2.50 (.01) |
| LaunchCurve Rpm####00 | 800 | 800-8,000 (100) |
| Launch CurveRetDeg### | 0 | 0.0-25.0 (.1) |
| TimeCurve Sec### | 0 | 0.0-12.50 (.05) |
| TimeCurve RetDeg### | 0 | 0.0-25.0 (.1) |
| TimeSw OnDelay### | 1.0 | 0.0-25.0 (.1) |
| TimeSw OnTime### | 2.0 | 0.0-25.0 (.1) |
| ScanTime #Sec | 1 | 1-9 |
| ShiftLt \$\$\$ | | OFF/ON |
| Rpm##### | | monitor |
| RetSum### | | monitor |
| Gear # | | 1-3 |
| RpmTimeSw \$\$\$ | | OFF/ON |
| Pressure ### | | monitor |
| BoostRet### | | monitor |
| Step1In \$\$\$ | | OFF/ON |
| Step2In \$\$\$ | | OFF/ON |
| Step3In \$\$\$ | | OFF/ON |
| LaunchSec### | | monitor |
| TimeRet### | | monitor |

TROUBLESHOOTING

Every MSD Ignition undergoes numerous quality control checks including a four hour burn-in test. If you experience a problem with your Nitro Ignition, our research has shown that the majority of problems are due to improper installation or poor connections. The Troubleshooting section has several checks and tests you can perform to ensure proper installation and operation of the Nitro Ignition. If you have any questions concerning your Ignition, call our Customer Support Department at (915) 858-3365, 8 - 5 Mountain Time, or e-mail at: tech@msdpowersports.com.

LED

The LED on the side of the Ignition monitors several operating conditions of the Ignition. If the LED indicates that there is a problem with the ignition system, follow the steps through the Troubleshooting section. The LED will appear to be on steady at above idle speeds when everything is functioning properly.

- A Code 2 (flash flash) will flash if the supply voltage drops below 10 volts, when operating below 3300 rpm.
- The LED will flash for every trigger signal from the crank trigger. You can take advantage of this when statically setting the timing of the engine.
- A Code 3 will flash if the input trigger signal is not correct.

TACH/FUEL ADAPTERS

If your tachometer does not operate correctly you probably need a Tach Adapter. The chart in Figure 10 lists common tachometers and if an Adapter is necessary.

| Tachometer Compatibility List | |
|-------------------------------|------------------------|
| AFTERMARKET TACHOMETER | WHITE WIRE TRIGGER |
| AUTOGAGE | REQUIRED |
| AUTOMETER | NO TACH ADAPT REQUIRED |
| MALLORY | NO TACH ADAPT REQUIRED |
| MOROSO | NO TACH ADAPT REQUIRED |
| STEWART | REQUIRED |
| S.W. & BI TORX | REQUIRED |
| SUN | REQUIRED |
| VDO | REQUIRED |

Figure 10 Common Tachometers and Adapters.

MISSES AND INTERMITTENT PROBLEMS

Experience at the races has shown that if your engine is experiencing a miss or hesitation at higher rpm, it is usually not directly ignition. Most probable causes include faulty wiring, a coil or plug wire failure, arcing from the boot plug to ground. Several items to inspect are:

WARNING: Do not touch the coil terminals during cranking or while the engine is running.

- Always inspect the plug wires at the plug for a tight connection and visually inspect for cuts, abrasions or burns. Dielectric grease such as Spark Guard, PN 8804, is also recommended.
- Inspect the Primary Coil Wire connections. **Caution:** There may be high voltage at the Coil Positive (+) terminal even with the key turned On. During cranking or while the engine is running, very high voltage will be present and no test equipment should be connected.
- Make sure that the battery is fully charged and the connections are clean and tight. If you are not running an alternator this is an imperative check. If the battery voltage falls below 11 volts during a race, the Ignition current draw will increase.
- Is the engine running lean? Inspect the spark plugs and complete fuel system.
- Inspect all wiring connections for corrosion or damage. Remember to always use proper connections followed by soldering and seal the connections completely.
- If you are using any inductive load on an ignition control wire, you may be getting a noise kick back which could cause stumbling of the ignition. Attach the supplied Diode to the solenoid.

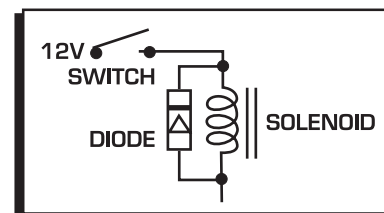


Figure 11

If everything checks positive, use the following procedure to test the ignition for spark.

MSD Powersports also offers a Nitro Ignition Tester, PN 43751. This tool allows you to check your complete ignition system while it is on the bike as well as the operation of rpm limits, activated switches and shift lights and the Cam Sync Signal. See Figure 12 on the following page.

CHECKING FOR SPARK

1. Make sure the ignition switch is in the "Off" position.
2. Remove the coil wires from the spark plugs and install test plugs to ground.
3. Disconnect the Nitro Ignition harness from the trigger pickups and connect to the tester.
4. Turn the ignition power On. Do not crank the engine. Select Top Fuel on display by pushing the red button.
5. Set the Tester to 1000-2000.
 - A. If there is spark, verify the HEI coil is functioning by unplugging the red/black wire to the HEI coil. The spark intensity should decrease. If there is no change, the HEI coil may be defective, or the fuse may be blown on the Inductive Ignition unit.
 - B. If spark intensity did not change, substitute another coil and repeat the test. If there is now a change in intensity, the coil is at fault.
6. If there is no spark:
 - A. Inspect all of the wiring.
 - B. Substitute another coil and repeat the test. If there is now spark, the coil is at fault.
 - C. If there is still no spark, check to make sure there are 12 volts on the small Red wire from the Ignition when the key is in the On position. If 12 volts are not present, find another switched 12 volt source and repeat the test.
 - D. If, after following the test procedures and inspecting all of the wiring, there is still no spark, the Nitro Ignition is in need of repair. See the Warranty and Service section for information.

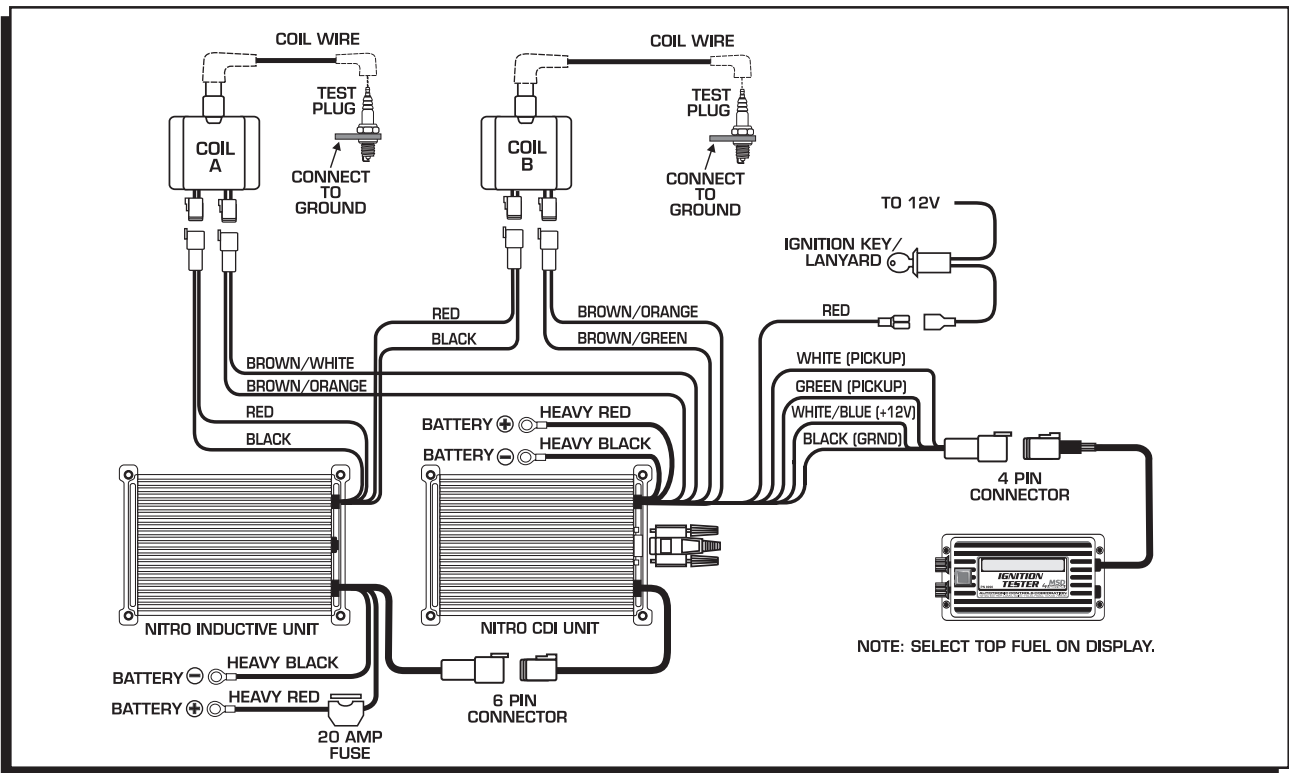


Figure 12 - Wiring the Tester.



INSTALLATION INSTRUCTIONS

TECH NOTES

Service

In case of malfunction, this component will be repaired free of charge according to the terms of the warranty. When returning components for service, Proof of Purchase must be supplied for warranty verification. After the warranty period has expired, repair service is charged based on a minimum and maximum charge.

All returns must have a Return Material Authorization (RMA) number issued to them before being returned. To obtain an RMA number please contact MSD Customer Service at (915) 855-7123 or fax a request to (915) 857-3344. Send the unit prepaid with proof of purchase to the attention of: **MSD Powersports, Customer Service - RMA #, 12120 Esther Lama, Dock 5, El Paso, Texas 79936.**

When returning the unit for repair, leave all wires at the length in which you have them installed. Be sure to include a detailed account of any problems experienced, and what components and accessories are installed on the vehicle.

The repaired unit will be returned as soon as possible after receipt, COD/Cashiers Check for any charges. For more information, call the MSD Powersports Customer Service Line **(915) 858-3365**. MSD Powersports technicians are available from 8:00 a.m. to 5:00 p.m. Monday - Friday (Mountain Time).

Limited Warranty

MSD Powersports warrants this product to be free from defects in material and workmanship under its intended normal use* and if properly installed, for a period of one year from the date of original purchase. If found to be defective as mentioned above, it will be repaired or replaced at the option of MSD Powersports. Any item that is covered under this warranty will be returned free of charge through standard shipping methods. If faster service is required the customer has the option of paying for this service.

This shall constitute the sole remedy of the purchaser and the sole liability of MSD Powersports. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations whether expressed or implied, including any implied warranty of merchantability or fitness. In no event shall MSD Powersports or its suppliers be liable for special or consequential damages.

*Intended normal use means that this item is being used as was originally intended and for the original application as sold by MSD Powersports. Any modifications to this item or if it is used on an application other than what MSD Powersports markets the product, the warranty will be void. It is the sole responsibility of the customer to determine that this item will work for the application they are intending. MSD Powersports will accept no liability for custom applications.