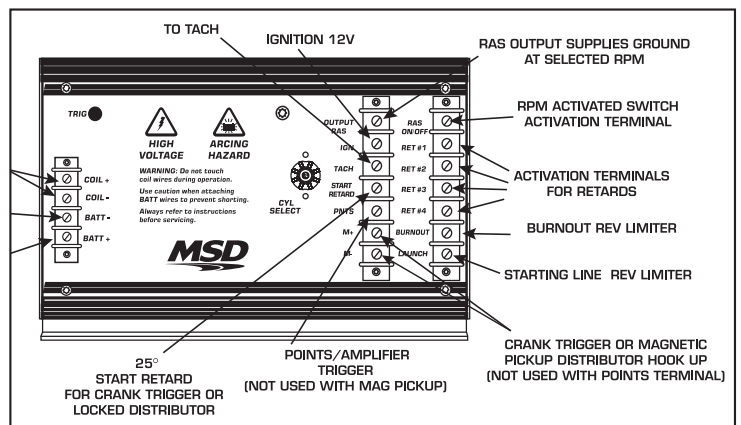
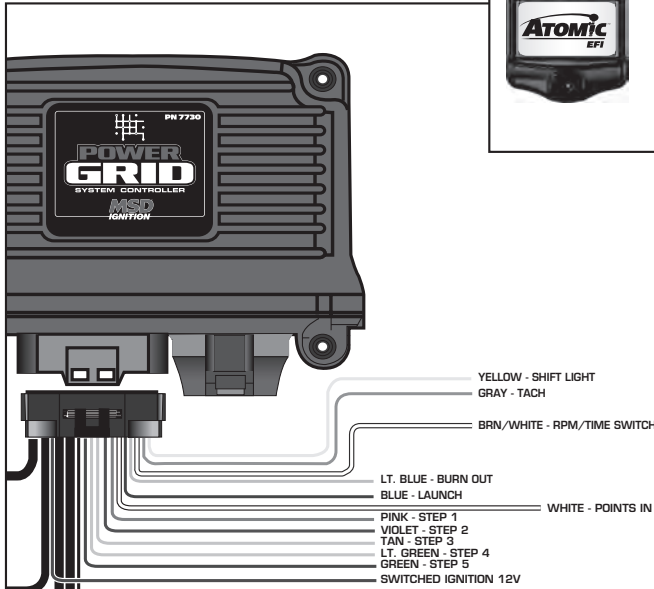
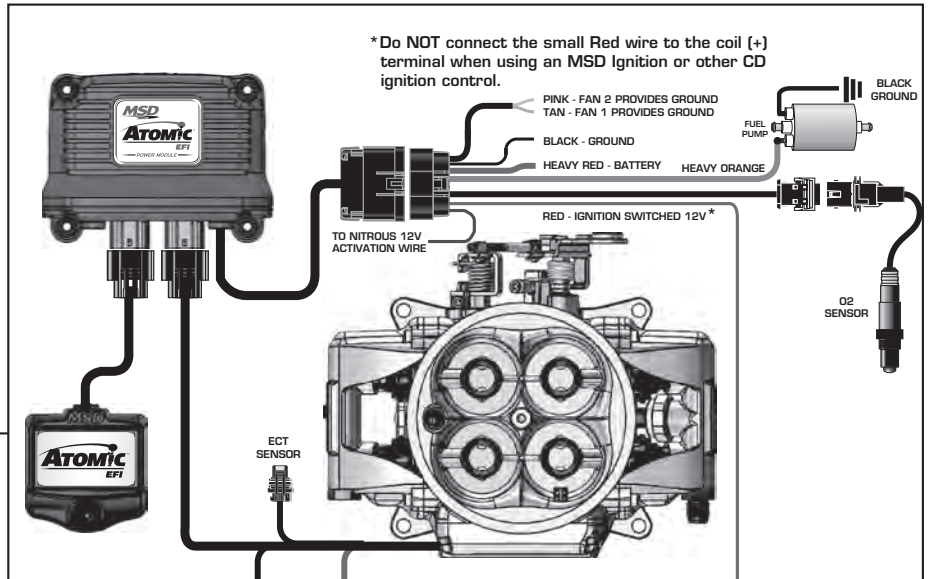
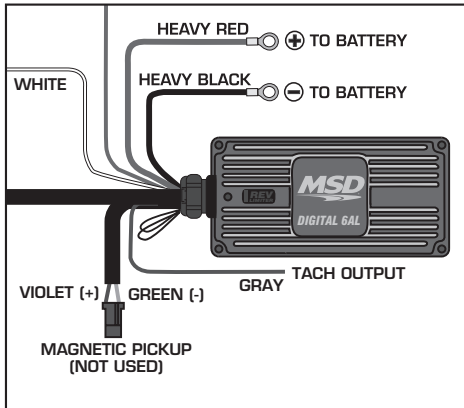


MSD

WIRING DIAGRAMS AND TECH NOTES





Wiring Diagrams and Tech Notes

MSD believes that customer service does not end at just producing the best performance components available, helping our customers is also a number one priority. That is why we have assembled the MSD [Ignition](#) Wiring Diagrams and Tech Notes Book. This book is a collection of component installation procedures, applications and technical information.

Once you buy an MSD Ignition, you will never be alone. We stand behind our products with a highly trained customer service staff that is more than willing to answer your questions and give you component recommendations. Our Customer Support Technicians are available by phone, fax and email.

Good luck in your performance and racing endeavors and remember, technical assistance is only a few pages, key strokes or a phone call away.

Repair and Service

In case of malfunction, this MSD component will be repaired free of charge according to the terms of the warranty. When returning MSD components for warranty service, Proof of Purchase must be supplied for verification.

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 using Ground shipping methods (ground shipping is covered by warranty).

Limited Warranty

MSD warrants this product to be free from defects in material and workmanship under its intended normal use*, when properly installed and purchased from an authorized MSD dealer, for a period of one year from the date of the original purchase. This warranty is void for any products purchased through auction websites. If found to be defective as mentioned above, it will be repaired or replaced at the option of MSD. Any item that is covered under this warranty will be returned free of charge using Ground shipping methods.

This shall constitute the sole remedy of the purchaser and the sole liability of MSD. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representation whether expressed or implied, including any implied warranty of merchantability or fitness. In no event shall MSD 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. Any modifications to this item or if it is used on an application other than what MSD 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 will accept no liability for custom applications.

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Coil Compatibility List

This chart lists the compatibility of various coils with MSD Ignition Controls. It is impossible to list every coil combination and it is recommended to check with the coil manufacturer before installation.

	MSD 5/ BLASTER	MSD 6- SERIES	7AL-2, 7AL-3 SERIES	DIGITAL-7 SERIES
★ - Indicates preferred coils for model indicated.				
YES - Coil is compatible with the model indicated.				
NO - Coil is NOT compatible. Do not use.				
MSD Blaster 2 Coil PN 8200 Chrome	★	★	YES	YES
MSD Pro Power Coil PN 8201 (Drag Race Only)	NO	NO	★	NO
MSD Blaster 2 Coil PN 8202 Red	★	★	YES	YES
MSD Blaster 2 Coil PN 8203 w/hardware Red	★	★	YES	YES
MSD Blaster 2F Coil PN 8205 (Ford style)	★	★	YES	YES
MSD Blaster High Vibration Coil PN 8222	★	★	YES	YES
MSD Blaster 3 Coil PN 8223	★	★	YES	YES
MSD HEI Coil PN 8225	NO	YES	YES	YES
MSD Blaster Ford TFI Coil PN 8227	YES	YES	YES	YES
MSD Blaster GM Dual Connector Coil PN 8226	YES	YES	YES	YES
MSD Blaster SS Coil PN 8207	YES	YES	YES	YES
MSD 6 HVC Coil PN 8250 (Use only with 6 HVC Series Ignitions)	NO	NO	NO	NO
MSD Blaster HVC Coil PN 8252	YES	YES	YES	YES
MSD Blaster HVC II Coil PN 8253	YES	★	YES	YES
MSD Pro Power HVC Coil PN 8251	NO	NO	★	★
MSD Pro Power HVC II Coil PN 8261	NO	NO	★	★
MSD 10 Plus Coil PN 8208 (Use only with MSD 10-Plus PN7502)	NO	NO	NO	NO
Accel BEI 140004 (Race use only)	NO	NO	YES	NO
Accel HEI Super Coils 140003, 140005	NO	YES	YES	NO
Accel BEI 140004 (Racing use only)	NO	NO	YES	NO
Accel Super Coil 140008, 140001	YES	YES	NO	NO
Accel 140108	YES	YES	YES	NO
Accel 140205	YES	YES	YES	NO
Accel 140207	YES	YES	YES	NO
Accel 140305	YES	YES	YES	NO
Accel 140306	NO	NO	NO	NO
Accel 7750	YES	YES	YES	NO
Accel 7751	YES	YES	YES	NO
Accel 7752	YES	YES	YES	NO
Accel 7753	YES	YES	YES	NO
Accel 8140, 8140C	YES	YES	YES	NO
Allison PS-10	NO	NO	NO	NO
Allison PS-15	NO	NO	NO	NO
Allison PS-20	YES	YES	YES	NO
Allison PS-30	YES	YES	YES	NO
Bosch (Blue Coil)	NO	YES	YES	NO
Bosch (Red Coil)	YES	YES	YES	NO
Bosch 0221 121001	NO	NO	YES	NO
Chrysler 2875004	NO	NO	NO	NO
Chrysler 3690560	NO	NO	NO	NO
Chrysler E12495531	YES	YES	YES	NO
Chrysler OEM12V Coil*	YES	YES	YES	NO
Crane PS-20, PS-40	YES	YES	NO	NO
Crane PS-91	YES	YES	NO	NO
Crane PS-92	NO	NO	NO	NO
Crane LX-91	YES	YES	NO	NO
Crane LX-92	NO	NO	YES	NO
Crane LX-93	NO	NO	NO	NO
Crane PS-20	YES	YES	NO	NO
Crane PS-40	YES	YES	NO	NO
Crane PS-60	NO	YES	YES	NO
Delco 190-12V	YES	YES	YES	NO

	MSD 5/ BLASTER	MSD 6- SERIES	7AL-2, 7AL-3 SERIES	DIGITAL-7 SERIES
Ford TFI Coil	YES	YES	YES	NO
Ford OEM 12V Coil*	YES	YES	YES	NO
GM Transistor	NO	NO	NO	NO
GM HEI Coil	NO	YES	YES	NO
GM OEM 12V Coil	YES	YES	YES	NO
Mallory 28880	NO	NO	YES	NO
Mallory 29212 HEI-Low rpm	YES	YES	YES	NO
Mallory 29213 Ford TFI Low rpm	YES	YES	YES	NO
Mallory 29214	YES	YES	YES	NO
Mallory 29215	YES	YES	YES	NO
Mallory 29216	YES	YES	YES	NO
Mallory 28675	YES	YES	NO	NO
Mallory 28720	YES	YES	NO	NO
Mallory 29150	YES	YES	YES	NO
Mallory 29217	YES	YES	YES	NO
Mallory 29440	NO	YES	YES	NO
Mallory 29620	YES	YES	NO	NO
Mallory 29625	YES	YES	NO	NO
Mallory 29901	NO	NO	YES	NO
Mallory Super Mag 28900	NO	NO	NO	NO
Moroso 72350	YES	YES	YES	NO
Moroso 72380	YES	NO	NO	NO
Moroso 72381	NO	YES	YES	NO
Nology 151991500	NO	NO	NO	NO
Nology 151991600	NO	NO	NO	NO
Nology 15199170	YES	YES	NO	NO
Nology 151991750	YES	YES	NO	NO
Nology 151991800	NO	NO	NO	NO
Pertronix Flame-Thrower 40,000 Volt Canister Coil	YES	YES	YES	NO
Pertronix Flame-Thrower 45,000 Volt Canister Coil	YES	YES	YES	NO
Pertronix Flame-Thrower 50,000 Volt E-Core Coil	NO	YES	YES	NO
Pertronix Flame-Thrower HV 60,000 Volt Coil	NO	NO	NO	NO
Any foreign or domestic 12V Coil*	YES	YES	YES	NO
Street Fire MSD Brand, PN 5527				
Street Fire MSD Brand, PN 5526				
Street Fire MSD Brand, PN 5525				
Street Fire MSD Brand, PN 5528				
Street Fire MSD Brand, PN 5529				
Street Fire MSD Brand, PN 5524				

* The factory coil from any vehicle that has a 12 volt negative ground electrical system and has a ballast resistor or resistance wiring in the original ignition key wire will work with the MSD.

NOTE: For MSD 8-Series Ignitions use Pro Power Coil, PN 8201, Pro Power HVC, 8251, or Pro Power HVC II, PN 8261.

Helpful Coil Information

- A ballast resistor is not necessary with any MSD Series Ignition but can be left in-line if originally equipped.
- The MSD Blaster Coils and any other oil-filled, canister style coils should be mounted so that the high voltage coil tower is pointed upward. Also, mount the coil so the coil wire is as short as possible to keep resistance low.
- Use of any coil that is not compatible may damage the MSD and void the warranty.

General Installation Tips

Mounting

MSD Ignition Controls are designed to withstand under-hood temperatures but should be mounted away from direct engine heat sources such as headers or manifolds. The ignition control can be mounted in most positions except upside down. Mounting the unit in an enclosed area such as the glovebox is not recommended. When running, the housing of the MSD will be hot to the touch.

When a suitable location is found, make sure the wires and harness will reach the coil and battery. Use the ignition as a template and mark the mounting hole locations. Remove the ignition and drill the mounting hole locations. If extremely high vibrations and shocks are expected, use a set of MSD Vibration Mounts to help protect the ignition. The mounts come in sets of four; PN 8823 for the Blaster Ignition, MSD 5 and 6 Ignitions, PN 8800 for MSD 7, 8 or 10 Ignitions.

Sealing MSD Units

While applying some type of sealant between the MSD case and base plate would seem to be a good thing, it is not recommended. All MSD Ignitions have a special water resistant treatment to help prevent water damage. By sealing the base plate to the case the condensation and water that seeps past the cables is trapped in the unit which may result in corrosion. Always allow the unit to drain by not sealing the base plate.

Wiring Tips

When making permanent electrical connections it is imperative that proper terminals, connectors and soldering be used. Using connectors such as MSD's Weathertight or Deutsch connectors provide positive locking, sealed connections. Never simply "twist and tape" wires together. Faulty wiring will result in ignition and electrical problems.

MSD Power Cables

The Power Cables of the MSD 6, 7, 8 and 10 Ignitions are the heavy (12 gauge) Red and Black wires. The Black wire connects to battery negative (-) or ground and the Red goes to battery positive (+). No switch or fuse should be used.

The Red wire must be connected directly to the battery positive terminal or to the constant positive side of the starter solenoid.

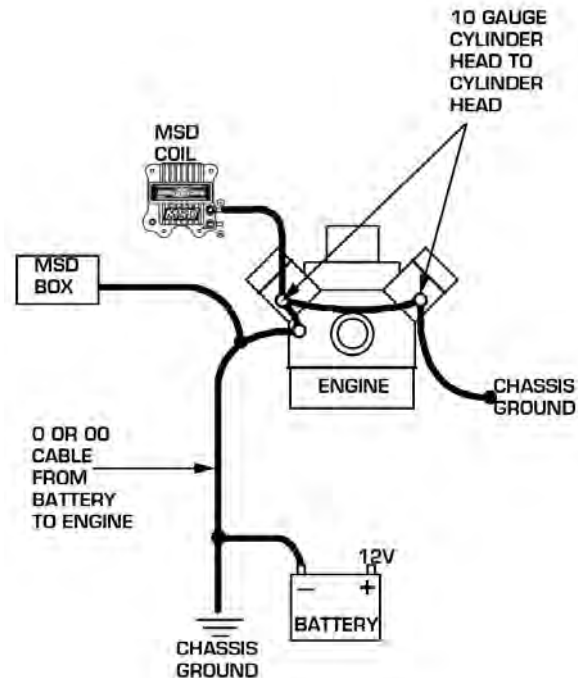
The Black wire must be connected to the battery negative (-) terminal or to a good engine or chassis ground.

MSD offers a Noise Filter, PN 8830, for the Power Leads. This Filter goes inline on the power cables and will protect the Ignition from voltage spikes or battery failure. The Filter will also help eliminate a major cause of radio noise that may affect engine or other on-vehicle electronics.

NOTE: If you ever need to turn the engine over with out starting it, disconnect the small Red wire on the MSD 6, 7, 8 or 10-Series.

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 a common solid ground on the chassis. Always connect the ground to a clean, paint free metal surface and always have a ground strap between the engine and the chassis. Do not rely on solid engine mounts as a ground between the chassis and engine. For higher output ignitions and on vehicles with EFI, high volume fuel pumps, fans, etc... the heavy ground wire should be connected to the block or cylinder head.



Wire Length

The power leads and the wires of the MSD can be shortened, however the correct connectors should be properly installed and soldered in place. If the wires of your MSD Ignition are not long enough for your application, they can be lengthened if properly done. If lengthening the heavy Power Cables, the next size larger (10 gauge) must be used. For the 14 gauge wiring, use the same size or 12 gauge. Always take the time to solder and insulate these connections. Doing it right the first time will save you frustration later!

Ballast Resistors

When using an MSD 5 or Blaster Ignition, if a ballast resistor was originally used in the coil wiring, it should be bypassed. If a ballast resistor was not used, it is not necessary to install one. When an aftermarket coil is used with the Blaster Ignition or MSD 5, follow the coil recommendation for a resistor. A factory ballast resistor does not need to be bypassed with an MSD 6, 7, 8 or 10 Ignition.

General Installation Tips

Battery

The battery is one of the most important parts of the automotive electrical system. A MINIMUM battery rating, when used with an alternator, should be no less than 25 amp/hours. If no alternator is used, allow at least 15 amp/hour for every 1/2 hour of MSD operation. If the engine is cranked using the same battery or other accessories such as fuel pumps and electric fans are used, the rating should be more.

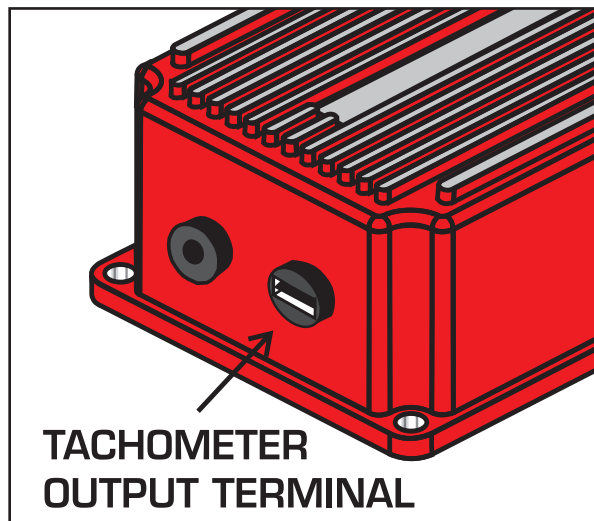
In all cases, to ensure adequate running time, the battery should be fully charged at the start of operation. A fully charged 12 volt battery will read around 12.6 volts on a voltmeter and should not drop below 8 volts when cranking. Each cell of a fully charged battery will read 1.260 on a hydrometer.

An MSD Ignition Control will operate at full strength with 11-18 volts.

Here are a few battery tips on charging and jump starts:

- When charging the battery, DO NOT run the engine. Some chargers may produce potentially damaging high voltage spikes that could damage the ignition control.
- It is not necessary to disconnect the MSD when charging the battery, as long as the charger is making good contact with the battery.
- Receiving a jump from another battery or car will not damage the MSD Ignition.

Tach Output and Adapters



The MSD 6, 7, 8 and 10 Ignition Controls all feature a Tach Output terminal or wire to provide a trigger signal to tachometers, an MSD Shift Light, or rpm activated switches. The Tach Output Terminal produces a 12 volt square wave signal with a 30% duty cycle. A standard female faston terminal is supplied for easy installation. Most factory and aftermarket tachometers will accept this signal, however there are exceptions (see the chart on page 10).

Some factory and "budget" tachometers may require a Tach Adapter to operate correctly. MSD offers a couple different adapters for various applications. Before purchasing an Adapter, try connecting the tachometer's trigger wire directly to the MSD's tach output terminal. If the tach still does not operate (and is properly wired) you may need a Tach Adapter. There are two main Tach Adapters available for single channel, MSD Ignitions:

PN 8920: If you are using the magnetic pickup connector (Green and Violet wires) to trigger the MSD, you need the PN 8920 Adapter.

PN 8910: If your tachometer was originally triggered from the coil negative terminal (you are using the White wire of the MSD), you need the PN 8910 Adapter.

The chart on page 10 lists common tachometers.

General Installation Tips

Tachometer Compatibility List		
AFTERMARKET TACHOMETER	WHITE WIRE TRIGGER	MAGNETIC TRIGGER CONNECTOR
AUTOGAGE	8910	8920
AUTOMETER	NONE	NONE
FORD MOTORSPORTS	NONE	NONE
MALLORY	NONE	NONE
MOROSO	NONE	NONE
STEWART	8910	8920
S.W. & BI TORX	NONE	NONE
SUN	8910	8920
VDO	8910	8920
AMC (JEEP)	8910	8920
CHRYSLER	8910	8920
FORD (Before 1976)	8910	8920
FORD (After 1976)	8910	8920
GENERAL MOTORS	Bypass In-Line Filter	Bypass In-line filter
IMPORTS	8910	8920

NOTE: On the list above, the trigger wire on tachometers that are marked NONE may be connected to the Tach Output Terminal on the MSD 6-Series Ignition Unit using the supplied Female Faston Receptacle.

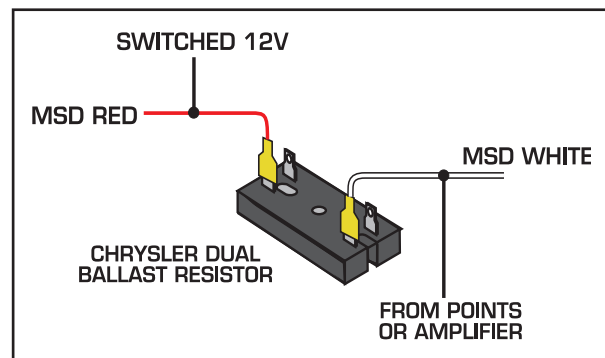
No Run on Some Foreign Vehicles

There is a chance that some electronic fuel injected import vehicles may require an MSD PN 8910 OR PN 8910-EIS Tach Adapter in order to start and run. This is because some fuel management systems use the same trigger source for the EFI and the MSD. With both components connected, the voltage signal is not strong enough to accurately trigger the EFI. The MSD PN 8910 Adapter will boost this signal and generally remedy the problem.

NOTE: If the PN 8910 Adapter does not fix the no-run situation, MSD offers a few "special application" adapters. Call our Customer Support Department for the correct Adapter for your application. The PN 8910-EIS Adapter is designed for later model applications.

Current Triggered Tachs

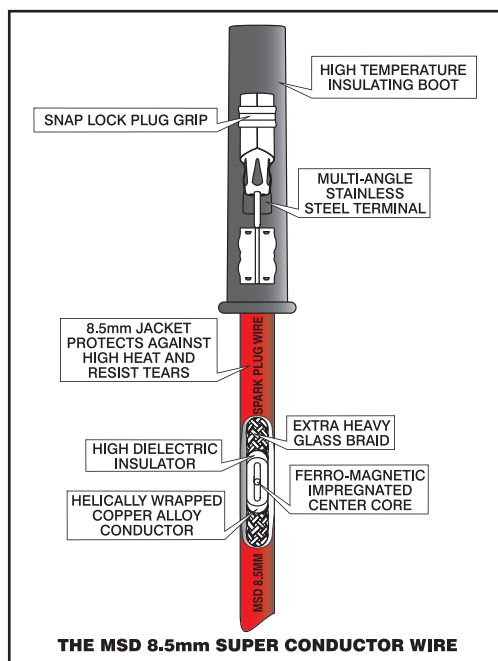
If you have a current triggered tachometer (originally triggered from coil +) and are using the White wire of the MSD as a trigger, a Chrysler Dual Ballast Resistor (used from '73-'76) may be used to cure the tachometer. The diagram below shows the correct wiring.



Spark Plug Wires and Spark Plugs

Spark Plug Wires

Spark plug wires have two main objectives; transfer the spark energy to the plugs and suppress the Electro Magnetic Interference (EMI) that the spark voltage projects. Too high of resistance decreases the spark energy, yet too low of resistance may generate too much EMI noise which will interfere with the operation of other electronics on the vehicle. A good quality wire, proper routing and routine inspection are all important in getting the most performance out of your ignition system.

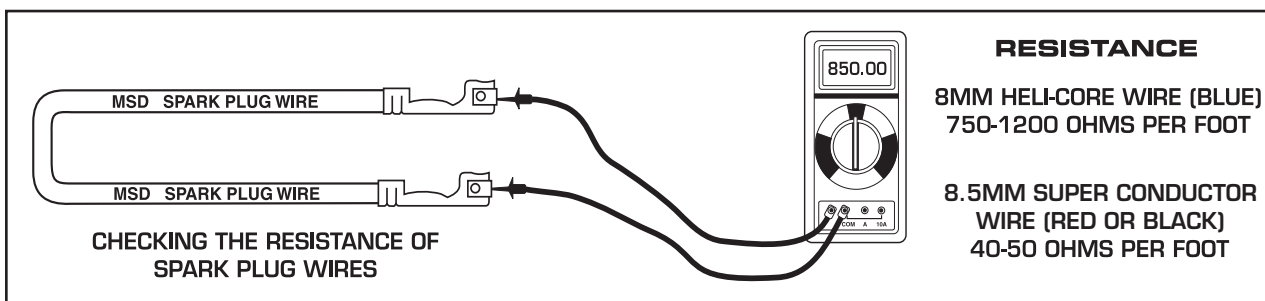


MSD offers two great spark plug wires; Heli-Core Wire and the 8.5mm Super Conductor Wire. The Heli-Core Wires are a performance wire upgrade for any car or truck. For serious performance, the 8.5mm Super Conductor Wire is the wire of choice. Both sets of wires feature a conductor that is helicly wound around a special center core that is designed to suppress, or choke, EMI. Helicly wound, sometimes called spiral core, must be used with an MSD Ignition Control. Solid core wires do not suppress EMI so there could be interference with the ignition or other electronics on the vehicle.

The Super Conductor Wire has less than 50 ohms per foot, the lowest available in a helicly wound wire. A special copper-alloy conductor is wrapped very tightly around a ferro-magnetic impregnated center core which gives the wire extremely high EMI suppression. This design ensures that optimum spark energy will reach the spark plugs while EMI noise is held at a minimum.

NOTE: Solid Core spark plug wires cannot be used with any MSD Ignition Controls or Pro Mags.

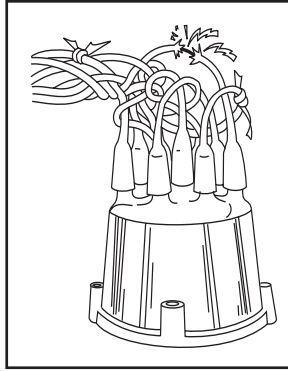
Just like tires, oil or spark plugs, the spark plug wires are a maintenance item. Service of the wires hinges on your application and ignition control. If you have a 6AL Ignition and use the car as a daily driver, the wires will last for thousands of miles. Conversely, if you are racing a high compression engine with nitrous and an MSD 10, the wires should be inspected and even replaced during the race season. When checking wires, closely inspect for signs of burning or arc-through. Look at the boots for signs of cracking or burning and using an ohm meter to check resistance of each wire is a good idea. Also, keep in mind that the coil wire is delivering eight times the spark so it should be checked closely. When checking resistance of the wires note that the longer wires will have more total resistance, but their values should average out. If one wire stands out among the others, it should be replaced.



Spark Plug Wires and Spark Plugs

Plug Wire Tips

To keep your engine's spark plug wires in tip-top condition there are a few simple steps you can take. For starters, apply a small amount of MSD Spark Guard, PN 8804, a dielectric grease, to each wire terminal. This keeps any moisture out of the boot while lubricating and insulating the terminal-to-plug connection. It also aids in pulling the plug socket off without tearing the boot or wire.



Extra protection from heat is always a good idea. MSD wires have a very durable sleeve but in applications with tight engine compartments and close exhaust systems, additional protection is a benefit. MSD offers Pro-Heat Sleeve, PN 3411, a silicone coated woven glass sleeve that slides over your wires for added protection. If you're looking for protection around the boot MSD's Pro-Boot Guard, PN 3412, is the answer. This is an extra thick sleeve of woven glass with a silicone coating and will protect the boot from excessive heat.

Another important point to consider is the way the plug wires are routed. Using good wire separators such as MSD's Pro-Clamps, PN 8843, are a key in securing the wires from heat sources. MSD offers a variety of Separators that will help position the wires away from exhaust manifolds and sharp edges while keeping the engine compartment looking good.

NOTE: Distributor caps that re-route the wires to the left and right are not recommended with an MSD Ignition Control.

Coil Wire Routing

In some applications, the coil is mounted in the passenger compartment of the car. In this case, the coil wire must be routed through the firewall. To prevent voltage leaks, use an MSD Firewall Feed-Thru, PN 8211. This provides 1/2" of insulation and keeps the spark from jumping to ground.

Spark Plugs

Choosing the correct spark plug design and heat range is important when trying to get all the performance possible. Since there are so many engine combinations and manufacturers, MSD cannot recommend which plug or what size gap is exactly right for your car. It is recommended to follow the engine builder's or manufacturer's recommendations for plug heat range and gap.

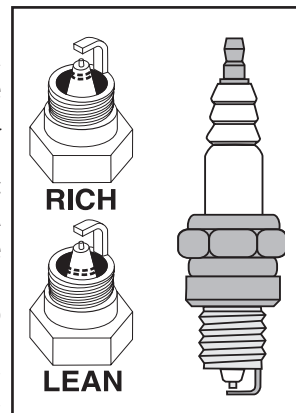
Once a proper plug is selected, you can experiment with the gap to get the best performance. By using these recommendations as a starting point, you can experiment by opening the gap in 0.005" increments then test. When the performance falls off, the gap is too large. Carbureted or fuel injection engines can use larger gaps, but turbo or supercharged engines should stick with the smaller gap. If no significant gains are achieved, go with the smaller gap. Remember, the larger gap taxes the plug, wires, cap and rotor.

Rule of Thumb Plug Gap

COMPRESSION	GAP
UP TO 10.5:1	.040 - .045
10.5:1 - 13:1	.032 - .040
OVER 13:1	.025 - .032

Note: These are recommended for normally aspirated engines only. Reduce the gap for blower, turbo or nitrous applications.

After changing the gap, reading the spark plugs is a helpful tool in getting the right tune up. The air/fuel ratio and how it's burning can be read on the ceramic portion of the spark plug. A ring can be seen where the effective heat transfer takes place. The closer this ring is to the tip, the richer the mixture. Closer to the base of the plug means the engine is running more lean.



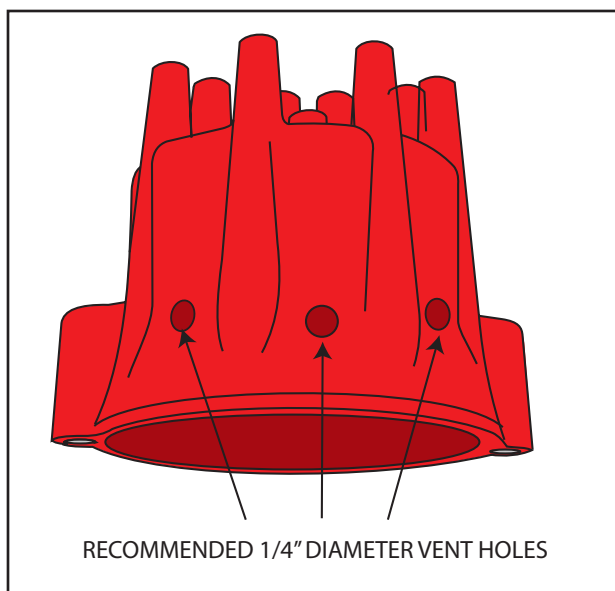
Distributor Setup Tips

Distributor Setup

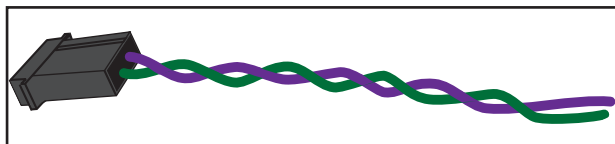
MSD offers a variety of distributors designed for different applications ranging from low profile and small diameter models to a front drive distributor. You can have the most powerful ignition available, but if you are not accurately triggering all of that energy or not getting it to the right spark plug at the precise moment, all of that power is being wasted. Due to the increased energy output of an MSD Ignition Control, proper setup of the distributor is very important. A good quality cap and rotor should always be used and inspected on a regular basis. Note that areas with higher humidity are more susceptible to carbon tracking or spark scatter due to condensation build up. Another problem that can arise within a distributor cap is called ionization.

Ionization occurs when the air inside the cap becomes electrically charged resulting in spark scatter or crossfire. It is more prevalent in smaller caps and again in areas with higher humidity. MSD rotors are designed with high vanes to help stir up the air preventing a charged area from building up. For more prevention, you can drill vent holes in the cap to release the pressure and to introduce fresh air. The holes should be at the height of the rotor skirt and at least 1/4" in diameter. Also, position the holes opposite the intake manifold and in dusty climates, it is a good idea to epoxy screens over the holes.

If clearance is not an issue on your application, use as large a cap as possible such as the MSD Cap-A-Dapt, PN 8420 and PN 8445 or the Pro-Cap, PN 7445.



Magnetic Pickup Wires



MSD Distributors use a magnetic pickup to trigger the ignition. This pickup is maintenance-free and extremely reliable. There are two wires that come out of the pickup and are routed into a 2-pin connector that mates with the connector from the . The Black/Violet wire is negative (-) while the Black/Orange is positive (+). The wires that come out of the MSD are Violet(+) and Green (-). The 2-Pin connectors are designed to only connect one way so the wiring cannot be switched. If for some reason the connectors are changed, be sure the wires are connected with matching polarity. If they are not, the engine may or may not start, but if it does the timing will be inconsistent and it will run rough and not accelerate.

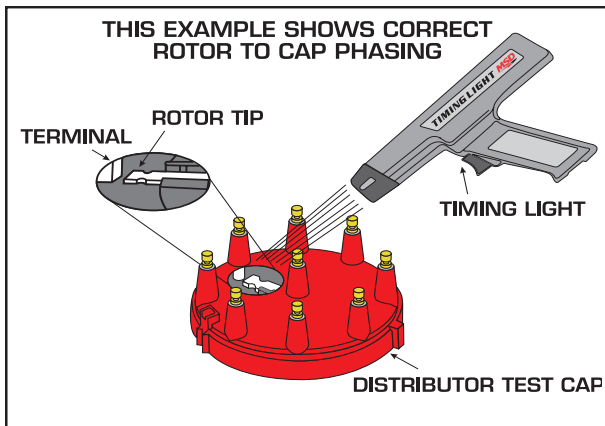
The magnetic pickup wires should always be routed clear of the spark plug wires and coil wires. It is ideal to route the wires near the frame or engine because there is less electrical activity near these surfaces. The wires should always be twisted to help prevent any EMI interference. In applications with a lot of wiring such as electrical fuel injection systems, a shielded harness is recommended. MSD offers a shielded magnetic pickup harness, PN 8862, that ensures an EMI-free trigger signal to the MSD Ignition.

Distributor Setup Tips

Rotor Phasing

Rotor phasing is the alignment between the rotor tip and the distributor cap terminal when the spark occurs. If the rotor tip is not aligned with the post when the spark occurs, the spark may find another path to ground resulting in scattered timing or a missfire. On engines with extreme cylinder pressures such as nitrous or superchargers the rotor phasing becomes even more important.

To check rotor phasing, you need an extra cap that you can drill or cut a hole in to expose a terminal. It may help to mark a reference center line on the rotor tip and the terminal post with white correction fluid. Connect a timing light to the wire of the exposed terminal. With the engine running, the phasing can be observed. It is correct when the center line reference marks are aligned.



If the distributor has vacuum advance, leave it connected and check the phasing at your average driving rpm and at a lower rpm. At high rpm, note the rotor position and mark it on the cap terminal, then check it at low rpm and again mark the rotor position. The phasing should be set in the middle.

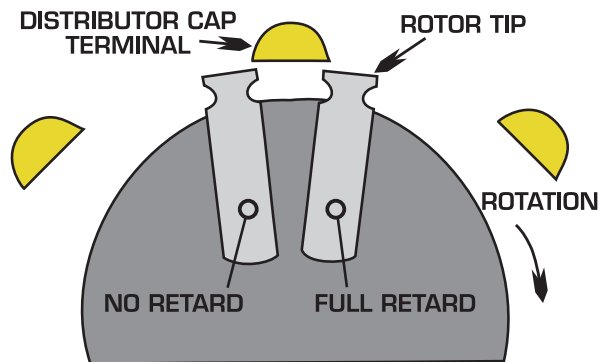
If the phasing is not correct on a points or electronic triggered distributor, the trigger device must be moved until rotor/terminal alignment is achieved. (MSD magnetic pickup distributors are set at the factory and should not require adjusting.) If your application does require adjustment MSD offers a Cap-A-Dapt with an adjustable rotor, PN 8420. This compensates for the phasing without having to move the trigger mechanism.

If you are using a Crank Trigger system to trigger the ignition, rotor phasing is easy to set by adjusting the housing of the distributor.

For applications that advance or retard the timing electronically, rotor phasing must be taken into consideration. If a multiple stage nitrous engine removes 16° of timing at top end, the rotor tip will be past the cap terminal when the spark is triggered.

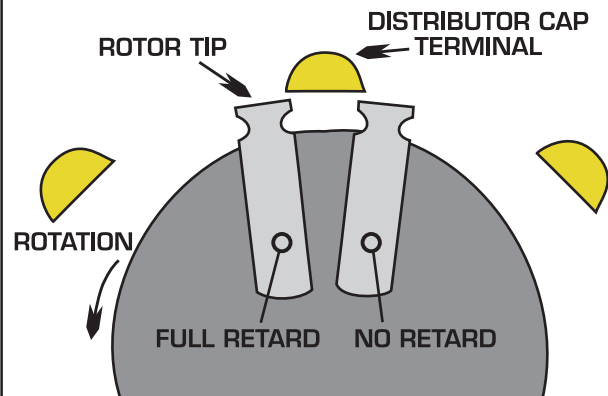
Clockwise Rotation

ROTOR PHASE WITH TIMING RETARD



Counter Clockwise Rotation

ROTOR PHASE WITH TIMING RETARD



NOTE: MSD offers two adjustable rotors; PN 84211 (to replace PN 8467) and the PN 8421 (to replace the PN 8423). These will help you adjust the rotor phasing when not using a Crank Trigger.

Mechanical Advance Setup Tips

Most MSD Distributors with a magnetic pickup features an adjustable mechanical advance assembly. The distributors with this feature are supplied with three sets of advance springs and four stop bushings.

The advance assembly is made up of weights, springs, an advance cam and an advance stop bushing. The distributor can be used in a wide selection of applications by changing the springs and stop bushing only. There is no need to change the weights or advance cam.

Timing Functions

There are several different timing specifications that are used when referring to the ignition timing.

Initial Timing: This is the base or idle timing. It is the amount of timing set in the engine before any advance begins.

Mechanical Advance (Centrifugal): This is a mechanical feature on most distributors that advances the timing as engine rpm increases. The amount of advance is determined by the stop bushing and the rate of advance is determined by the tension of the springs.

Vacuum Advance: Some of the MSD Distributors are equipped with a vacuum advance canister. Under partial throttle (high vacuum) conditions this vacuum advance increases the timing to increase the economy.

Total Timing: This is the total of the Initial Timing, Centrifugal advance and if equipped, the vacuum advance. For example: 8° Initial + 21° Centrifugal = 29° Total Timing.

Tips on Choosing an Advance Curve

The function of the advance curve is to match the ignition timing to the burning rate of the fuel and speed (rpm) of the engine. Any factor changing the burning rate of the fuel or the engine speed can cause a need for an ignition timing change. These factors range from fuel octane to the shape of the combustion chamber. Check with your engine builder to determine what ignition curve will best suit your engine and driving habits. Page 16 shows the different curves you can select with an MSD distributor.

Selecting the Advance Springs

The advance springs determine how quick the advance comes in. The starting point of the advance curve is controlled by the length and tension of the spring. The slope, or how fast the curve comes in is determined by spring tension.

To change the advance springs, simply use a set of needle nose pliers and pull the spring off.

SPRING COMBINATION	RATE OF ADVANCE
2-Heavy Silver	SLOWEST
1-Heavy Silver 1-Light Blue	↑
1-Heavy Silver 1-Light Silver	
2-Light Blue 1-Light Silver	
1-Light Blue 2-Light Silver	
	FASTEST

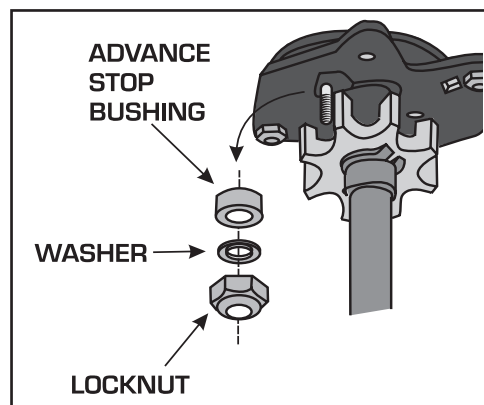
Selecting the Advance Stop Bushings

The advance stop bushing determines the amount of advance available to the centrifugal assembly. There are four different bushings with their amounts shown below.

Red - 28°
Silver - 25°

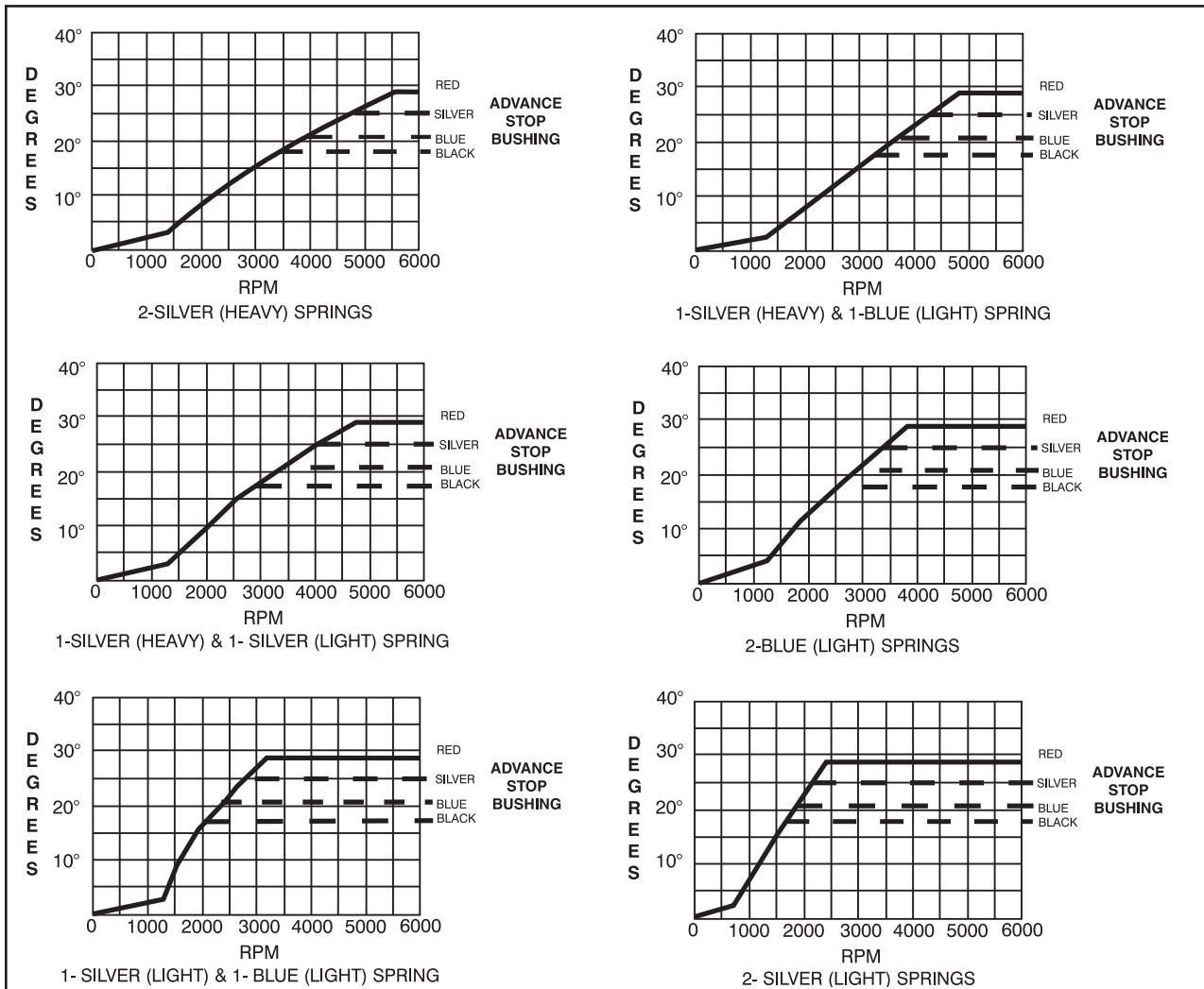
Blue - 21°
Black - 18°

To change the advance stop bushing, remove the locknut and washer on the bottom of the advance assembly. Remove the bushing and install the new one.



Distributor Advance Graphs

The following charts show the variety of ignition curves you can achieve with an MSD Distributor.

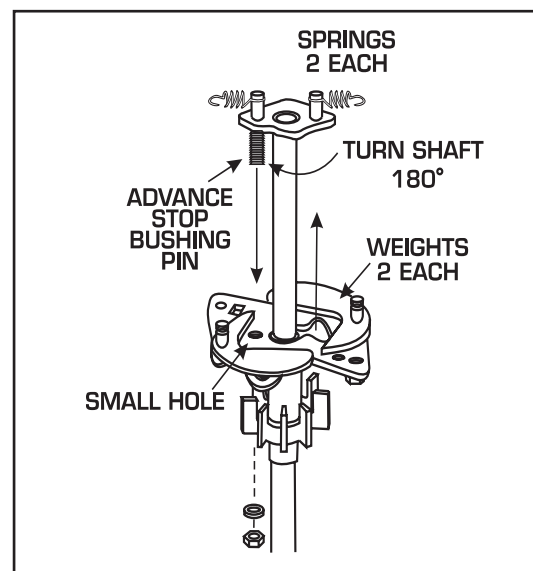


Locking Out the Centrifugal Advance

If you would like to lock out the centrifugal advance or are converting to a Flying Magnet Crank Trigger, the MSD centrifugal advance can easily be locked out.

To begin, remove the advance springs and weights. Next, remove the roll pin from the end of the shaft so the shaft can be pulled out of the advance assembly about two inches. Rotate the shaft 180° and position the stop bushing pin in the small hole on the advance assembly. Install the locknut and washer to the stop bushing pin, then install the roll pin.

NOTE: This is a general overview of locking-out the mechanical advance. Refer to your distributor's instructions for specific applications.



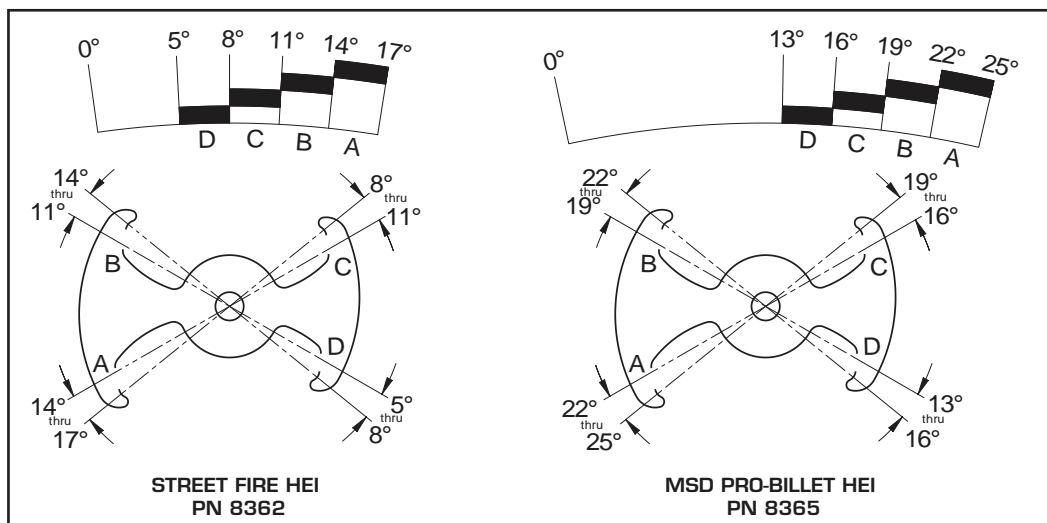
Locking Out the Centrifugal Advance.

Distributor Setup Tips

HEI Vacuum Advance Stop Plate, PN 84281

For MSD Pro-Billet HEI, PN 8365 and Street Fire HEI, PN 8362

The HEI Vacuum Advance Stop, allows you to limit the amount of vacuum advance that occurs while driving. It is designed for use on the Street Fire HEI, PN 8362 and the MSD Pro-Billet, PN 8365. The two are easy to distinguish; the Street Fire has a cast aluminum housing while the MSD model is billet, polished aluminum. There are four positions that the Stop can be installed as shown.



Flying Magnet Crank Trigger Tips

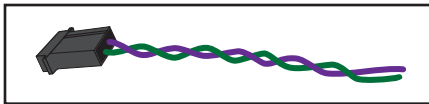
The MSD Flying Magnet Crank Trigger System is the most accurate way possible to trigger the ignition. This is due to the fact that the trigger signal is coming directly from the source of piston position in the cylinder; the crankshaft.

Distributors are accurate, but the piston position is derived through the timing chain, the camshaft, cam gear and finally to the distributor shaft. There are no mechanical variables in piston position when using a crank trigger system.

Non-Magnetic Pickup

The MSD Crank Trigger System uses a non-magnetic pickup to trigger the ignition. Magnets are embedded in the flywheel to produce the trigger signal. The non-magnetic pickup can only be triggered by the magnets in the flywheel. This design prevents the chance of false triggering.

When installing the pickup, it is recommended to twist the wires together and route the wires near the frame or engine. These areas act as an electrical shield against electrical interference in the air. Also keep the wires away from any spark plug wires, coil wires and ignition wires. MSD offers a shielded harness, PN 8862, that is recommended for high powered engines or EFI systems.



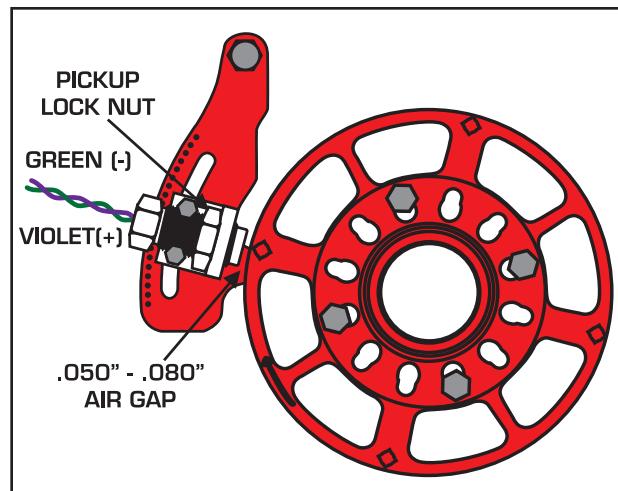
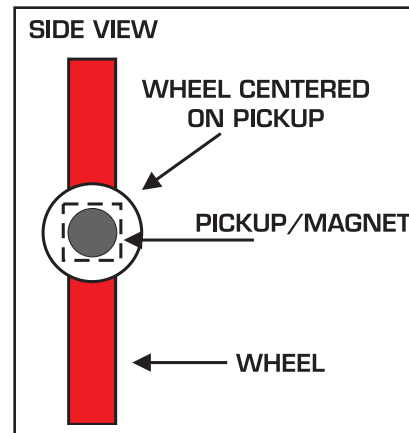
Pickup Mounting

The MSD Crank Trigger Kits come with all of the hardware needed to mount the pickup. Many kits feature a bracket that can be installed on either side of the engine block. Some kits are also supplied with several spacers to help obtain the correct alignment of the pickup and wheel. Due to the variety of balancers and pulleys, some modifying may be required to achieve the correct positioning of the bracket and pickup.

Trigger Wheel Mounting

Unlike conventional crank trigger systems using a magnetic pickup, the MSD trigger wheel must be mounted in the proper position. This is due to the polarity of the magnets in the wheel. If the wheel is reversed, the trigger signal will be affected and may advance the timing and cause inconsistent triggering accuracy. On the wheel there is an arrow which must point in the same direction as the engine rotation. Make sure this is installed correctly.

When the wheel and trigger pickup bracket are mounted, make sure the pickup is positioned in the center of the trigger wheel. If it is not, the trigger signal can be affected. If they are not aligned, the bracket may require different spacers.



Setting the Air Gap

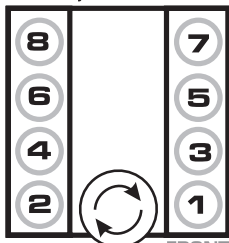
The air gap between the pickup and trigger wheel is important, however it does not affect the performance in regards to your ET or mph. It affects the strength of the trigger signal. The farther away the pickup is from the wheel the weaker the trigger signal becomes. This could come into effect at cranking rpm.

The minimum air gap is 0.050" and any closer the chance of the wheel hitting the pickup at high rpm comes into play. Some big cubic inch engine builders (600-800ci) recommend 0.060"-0.080" air gap due to the flexing of the crankshaft.

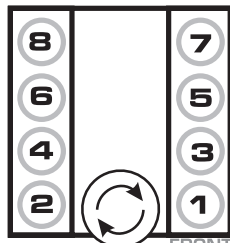
A good rule of thumb is to run the pickup all the way in until it contacts the trigger wheel. Then, back the pickup out one full turn. This will set approximately 0.060" airgap, but always check the gap with a set of feeler gauges and in different areas of the wheel.

Common Firing Orders

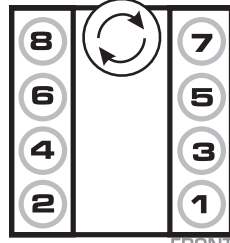
AMC, MOST V8s



FRONT
1-8-4-3-6-5-7-2

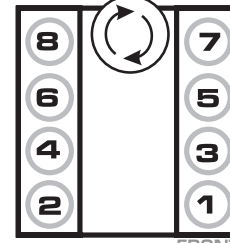
BUICK, MOST V8
EXCEPT NAIL HEAD

FRONT
1-8-4-3-6-5-7-2

BUICK NAIL HEAD
401, 425

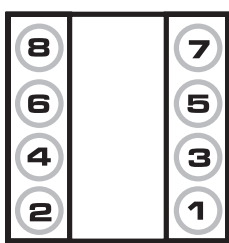
FRONT
1-2-7-8-4-5-6-3

CHEVY (EXCEPT LS)

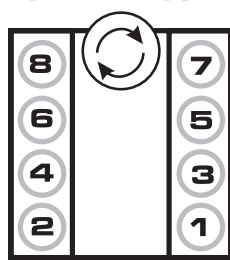


FRONT
1-8-4-3-6-5-7-2

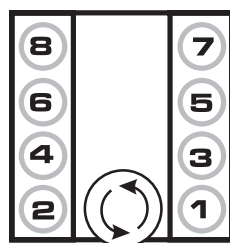
GM LS-ENGINE



FRONT
1-8-7-2-6-5-4-3

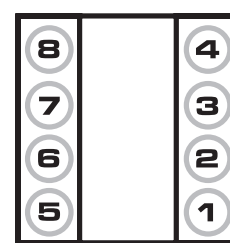
CHRYSLER
SMALL BLOCK

FRONT
1-8-4-3-6-5-7-2

CHRYSLER BIG
BLOCK AND HEMI

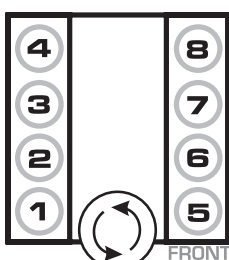
FRONT
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MODERN HEMI



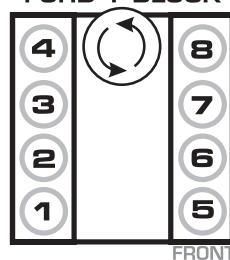
FRONT
1-8-4-3-6-5-7-2

FORD FLAT HEAD

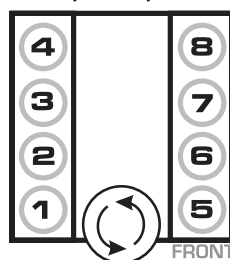


FRONT
1-5-4-8-6-3-7-2

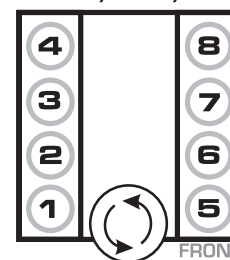
FORD Y BLOCK



FRONT
1-5-4-8-6-3-7-2

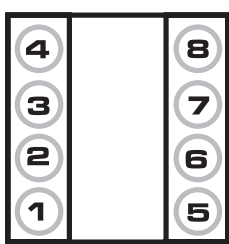
FORD 289, 302
FE, 429, 460

FRONT
1-5-4-2-6-3-7-8

FORD 5.0L EFI
351W, 351, 400

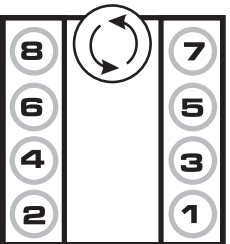
FRONT
1-3-7-2-6-5-4-8

FORD MOD MOTOR



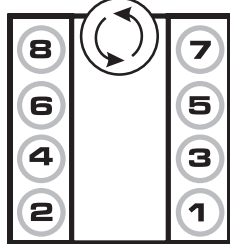
FRONT
1-3-7-2-6-5-4-8

OLDSMOBILE



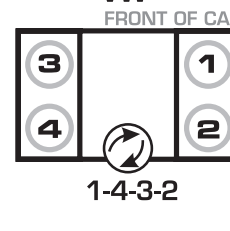
FRONT
1-8-4-3-6-5-7-2

PONTIAC MOST V8



FRONT
1-8-4-3-6-5-7-2

VW



FRONT OF CAR
1-4-3-2

Atomic EFI

PN 2910 - Throttle Body Kit

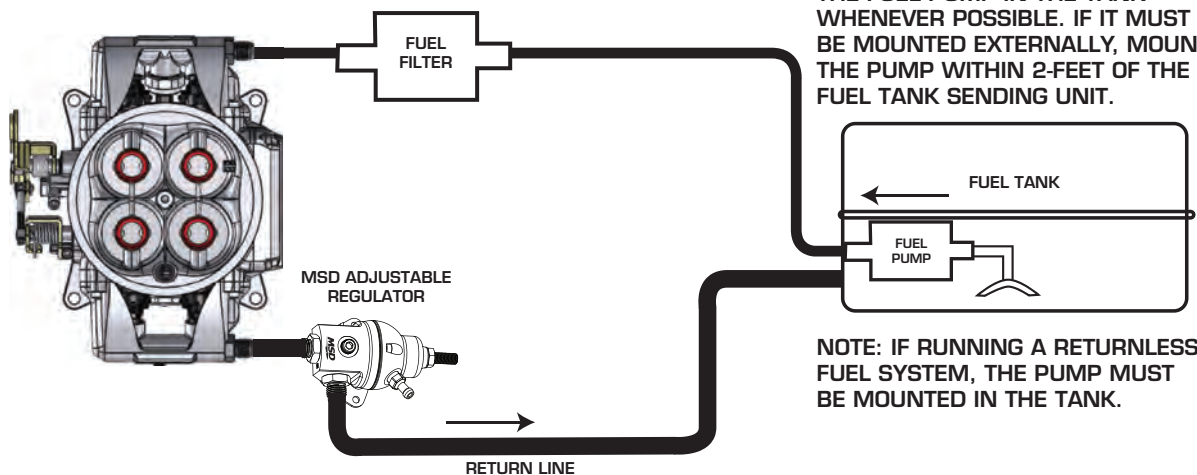
Wire Functions

There are several wires and connectors on the throttle body. Not all of these wires will be connected on every application. Following is a chart of each wire.

REQ. / OPT.	Wire Color	Description
REQ	Yellow Black	This connects to the Engine Coolant Temperature Sensor.
REQ	White	This is the tach input wire for the EFI responsible for triggering the system. It connects to the tach output of an MSD Ignition Control or Ready-to-Run Distributor. It can also be connected to the coil negative terminal when using a stock type ignition such as points or a GM HEI distributor. Note: This wire is not used when the magnetic pickup wire is being used for ignition timing.
OPTIONAL	Yellow	This is a tach output wire. Connect this wire to the White points input wire on an MSD ignition unit only when using the Atomic to control timing. If the Atomic is not controlling timing this wire can be used as a 12 volt square wave trigger to a tachometer.
OPTIONAL used with timing control	Orange	This is an AC kick-up wire. When 12 volts are supplied to this wire it will provide a small rpm "kick-up" in the idle to compensate for an added load to the engine from the air conditioner compressor. It will also activate the primary cooling fan (when two are used).
OPTIONAL used with A/C	Violet (+)	This is the input for a magnetic pickup, such as from an MSD distributor. This connector is only used when the Atomic is controlling ignition timing.
REQ used with timing control	CAN-Bus Green (-)	The 6-pin connector must connect to the Power Module. Do NOT cut this harness. MSD

Atomic Return Style Fuel System

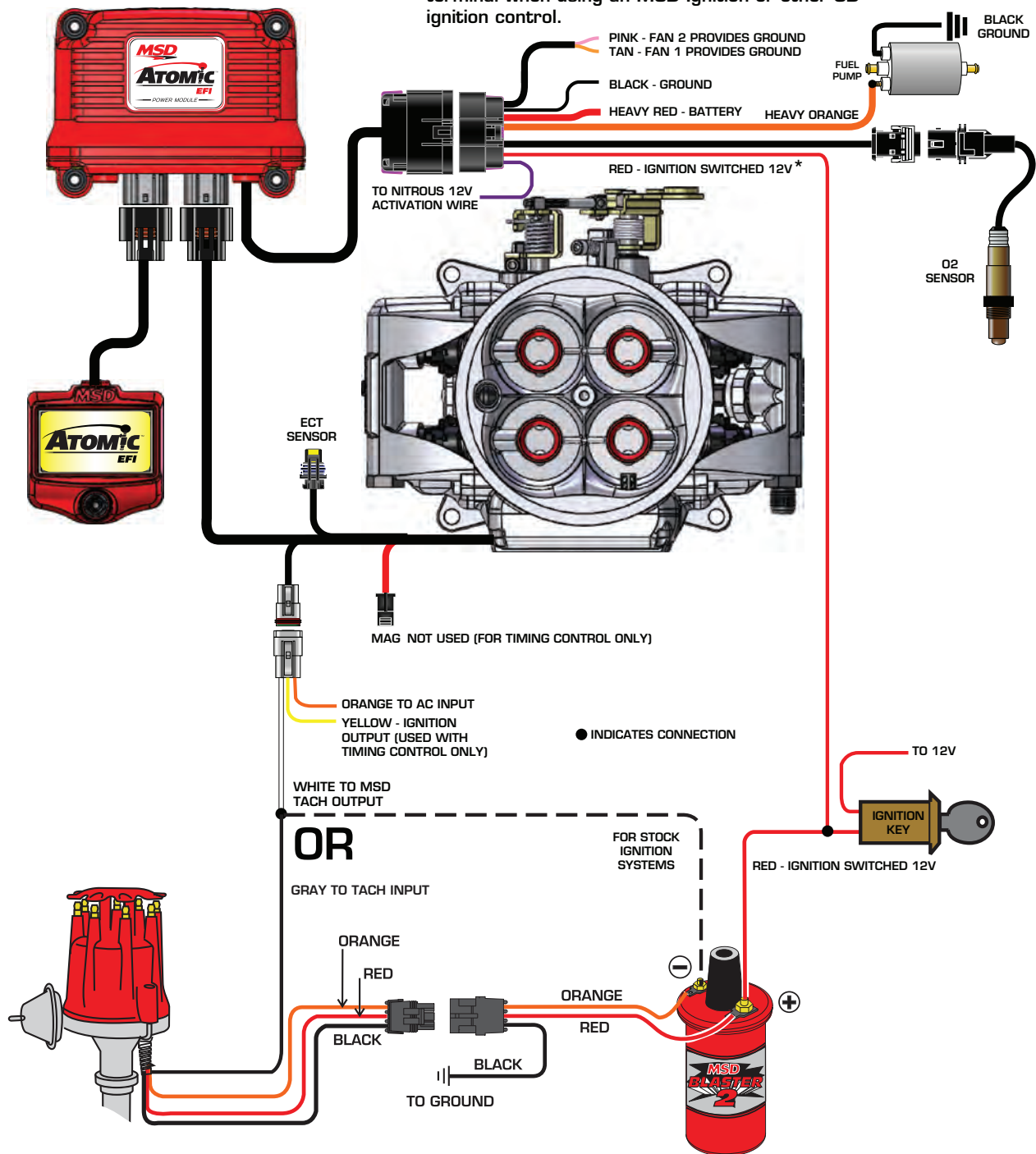
FUEL SYSTEM EXAMPLE



NOTE: DO NOT USE TUBING (HARD FUEL LINES) WITH THE ATOMIC EFI SYSTEM.

Atomic Wiring with MSD Ready-to-Run Distributor or MSD HEI Distributor

*Do NOT connect the small Red wire to the coil (+) terminal when using an MSD Ignition or other CD ignition control.



Atomic Wiring with an MSD Ignition Control

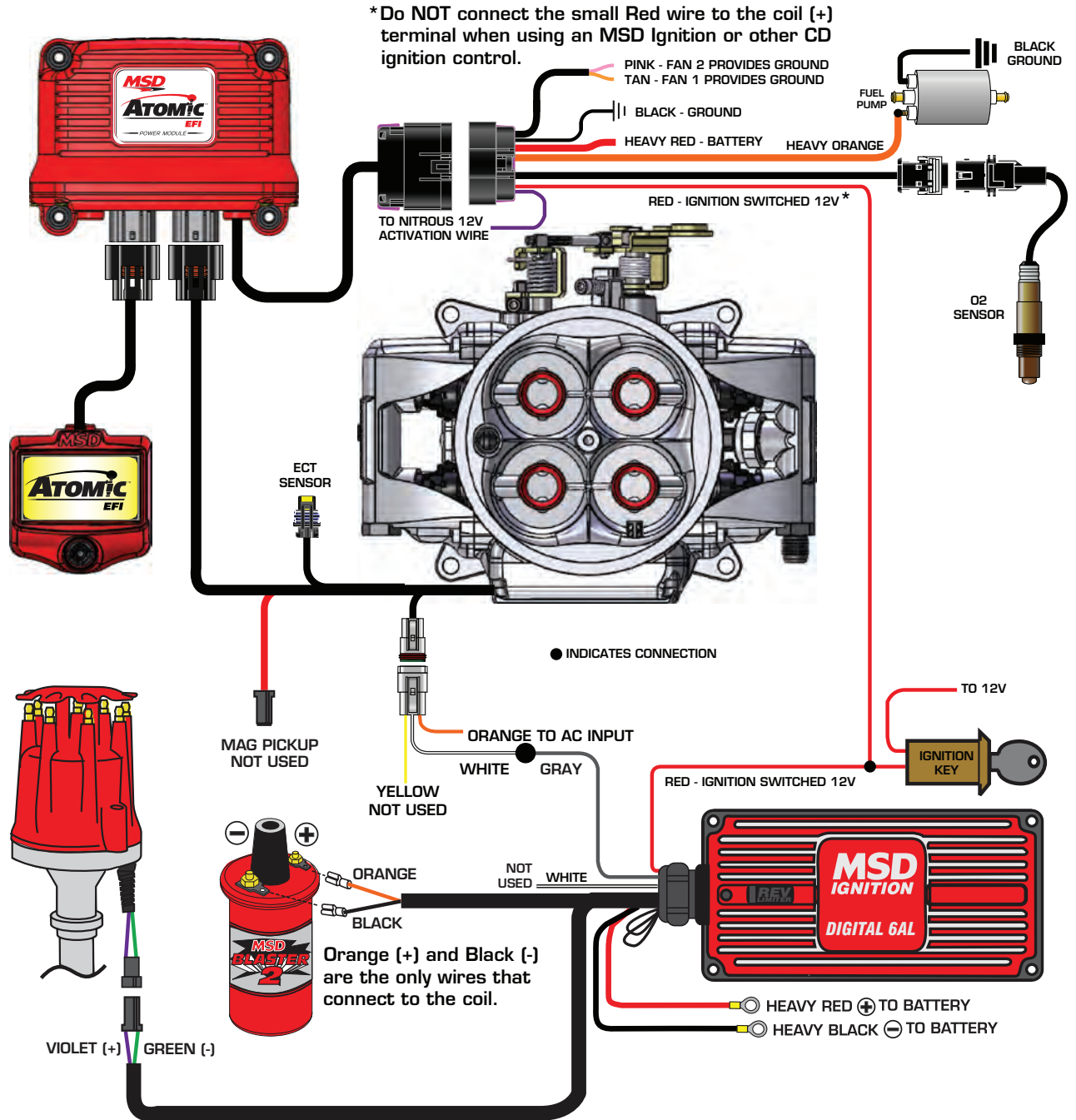
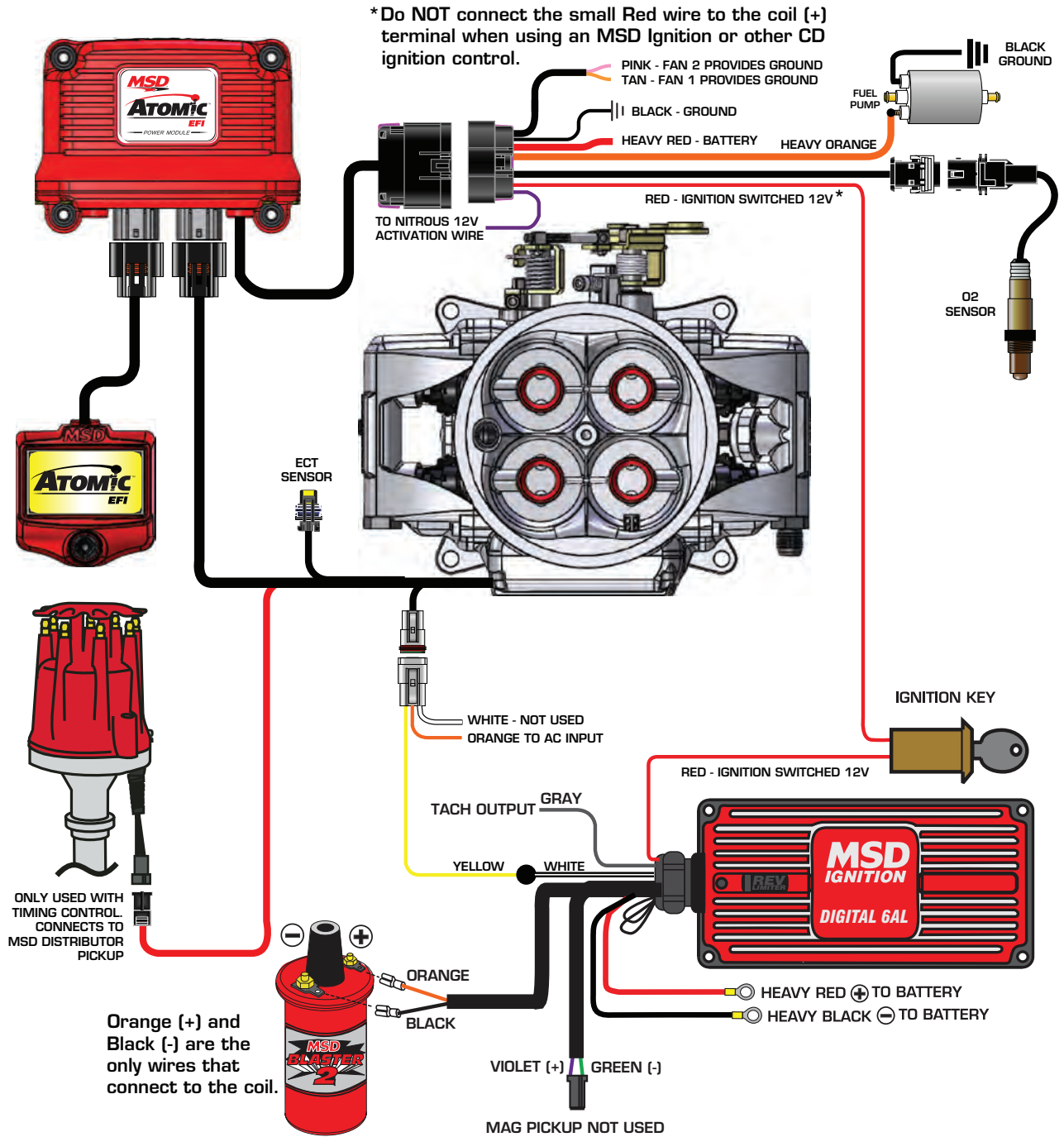
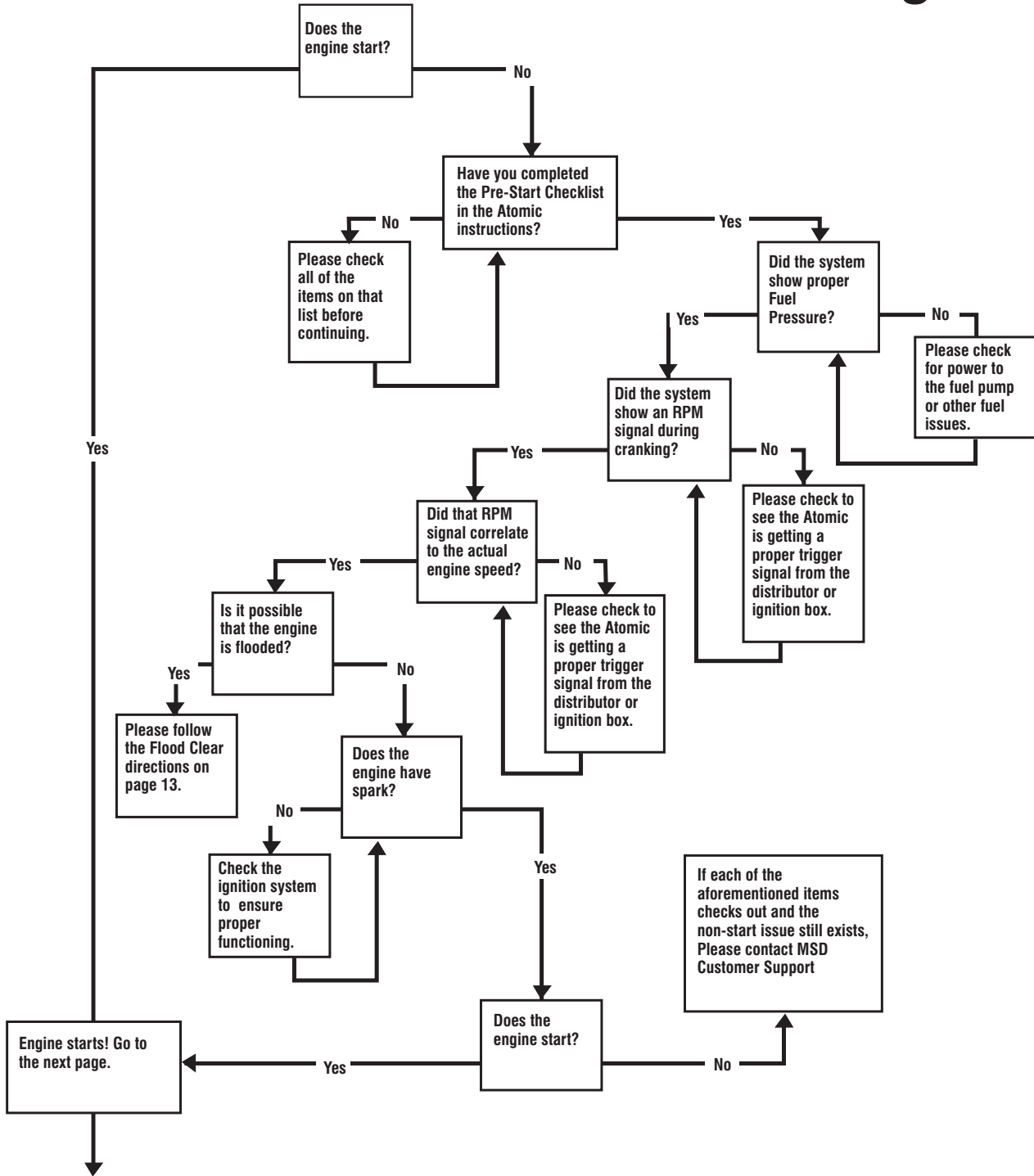


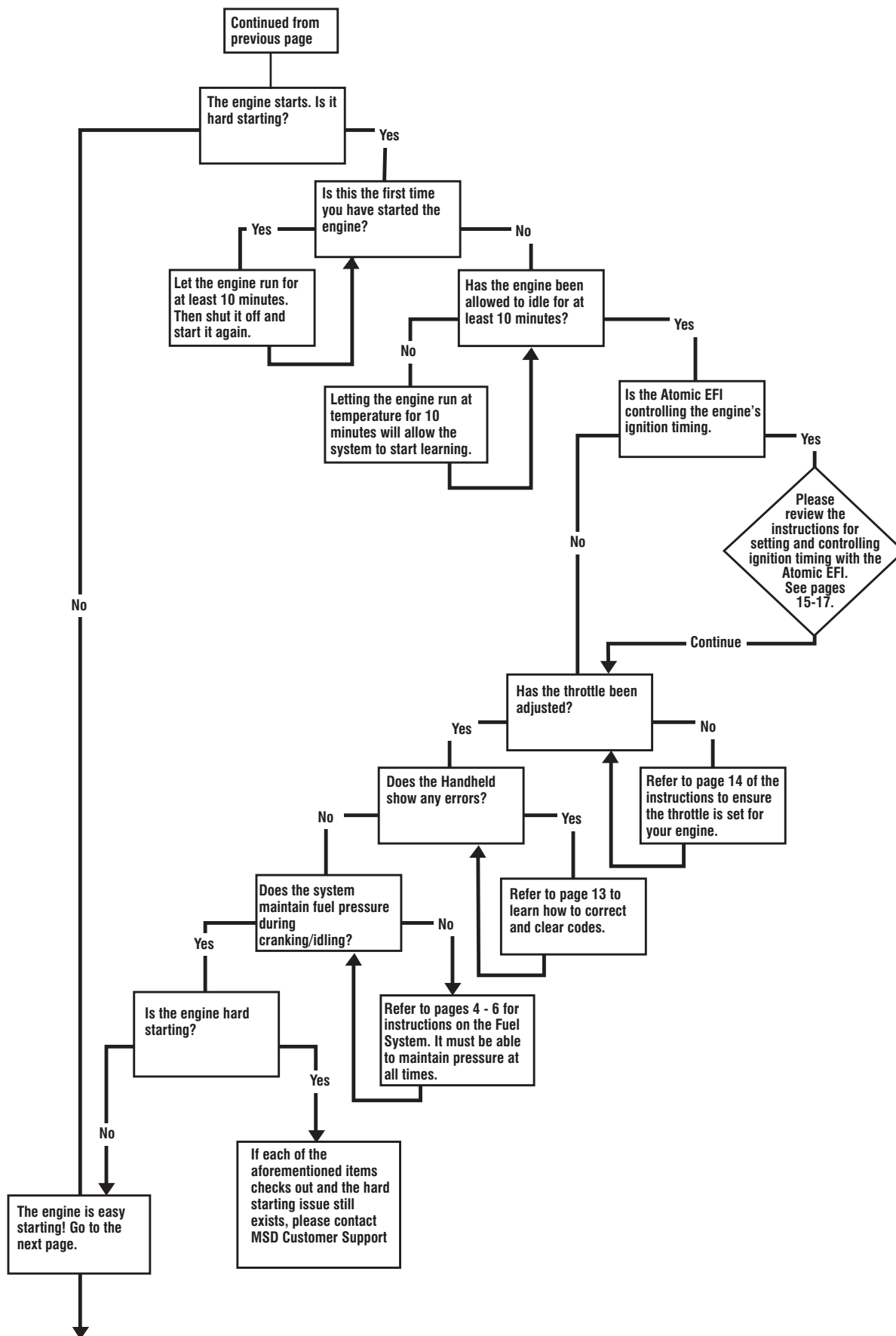
Figure 19 Atomic Wiring to use Timing Control.

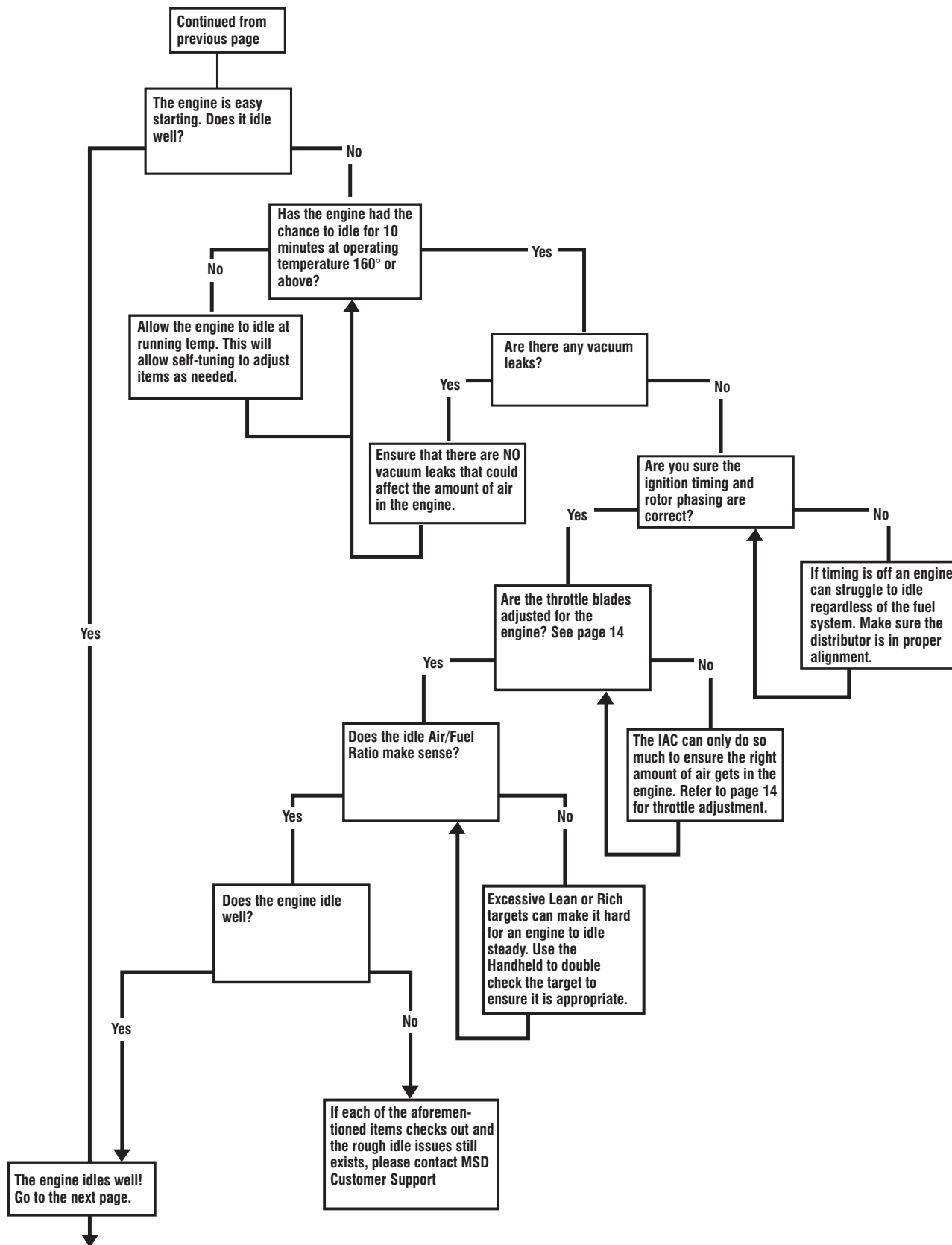
Atomic Wiring with an MSD Ignition Control

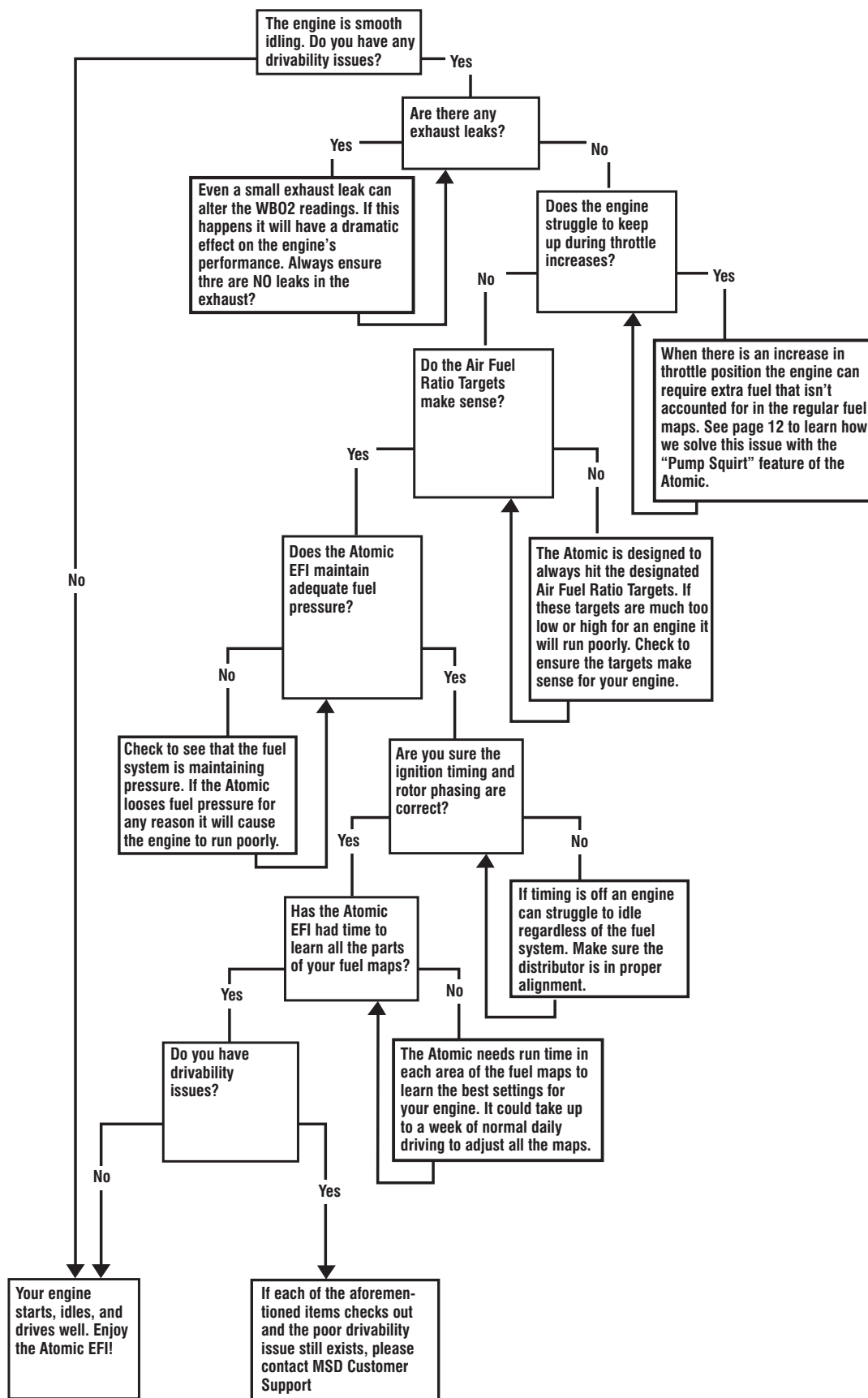


MSD Atomic EFI Trouble Shooting



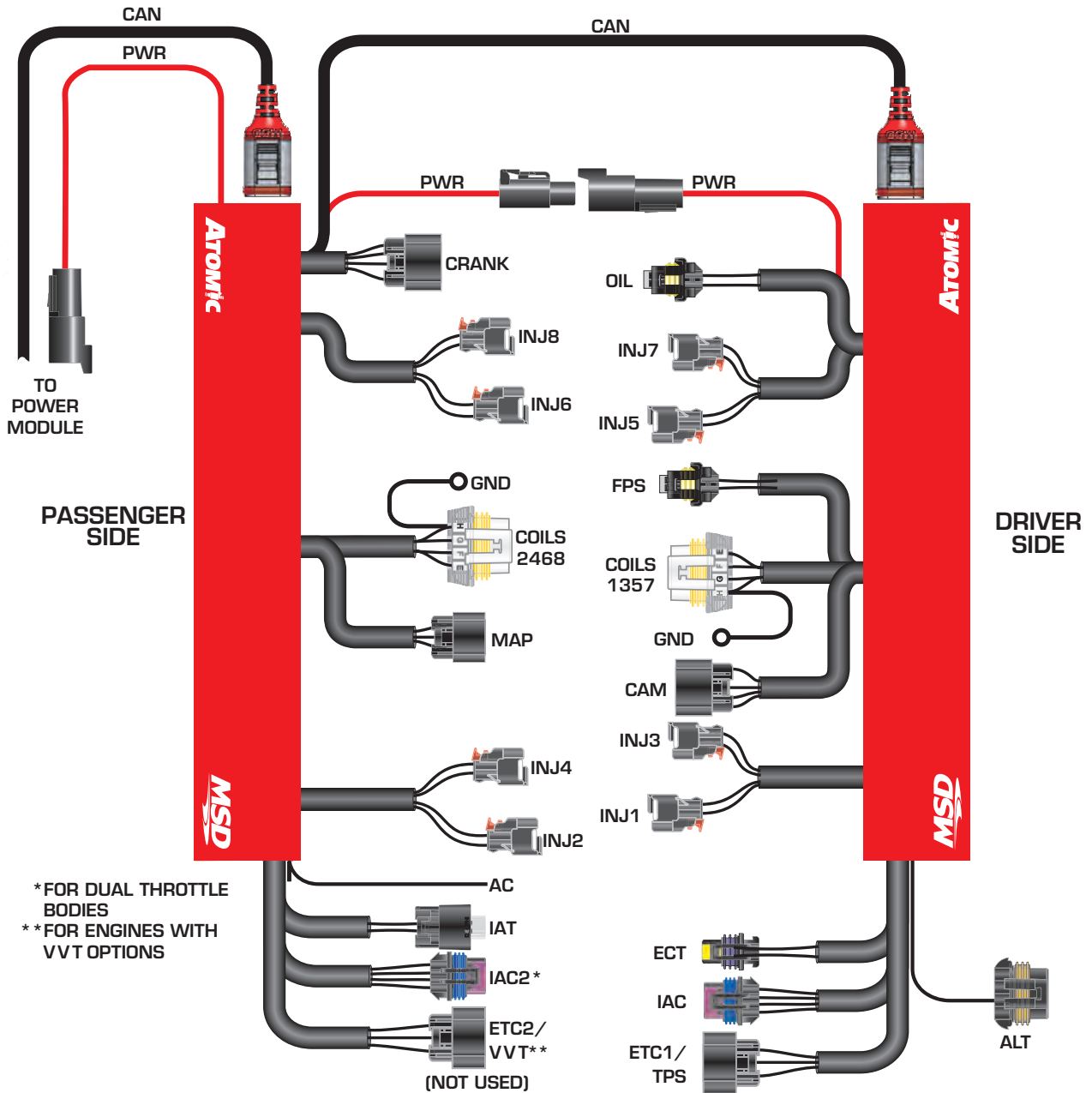






Atomic LS EFI PN 2950 - Master Kit LS2/LS3

Atomic LS EFI Rails and Connections



* FOR DUAL THROTTLE BODIES
** FOR ENGINES WITH VVT OPTIONS

Pinouts for the Coil Connector and IAC

The following charts show the color, function and location on each connector in case you need to remove or extend the wiring for relocated coils or a reversed intake manifold mount.

COIL CONNECTOR, CYLINDERS 2, 4, 6, 8		
BLACK	Pin-A	Ground
TAN	Pin-B	Coil-2
LIGHT GREEN	Pin-C	Coil-4
BROWN	Pin-E	Sensor Ground
WHITE	Pin-F	Coil-6
LIGHT BLUE	Pin-G	Coil-8
PINK	Pin-H	12 Volts Supply
	Pin-D	NOT USED
COIL CONNECTORS, CYLINDERS 1, 3, 5, 7		
BLACK	Pin-A	Ground
BLUE	Pin-B	Coil-7
BROWN WHITE	Pin-C	Coil-5
BROWN	Pin-E	Sensor Ground
GREEN	Pin-F	Coil-3
TAN	Pin-G	Coil-1
PINK	Pin-H	12 Volts Supply
	Pin-D	NOT USED
THROTTLE POSITION SENSOR (TPS)		
ORANGE	PIN-1	5V Reference
BLACK	PIN-2	Ground
BLUE	PIN-3	Signal out
IDLE AIR CONTROL (IAC)		
ORANGE	Pin-A	Coil 1B
GRAY	Pin-B	Coil 1A
BLUE	Pin-C	Coil 2A
BLACK	Pin-D	Coil 2B
INTAKE AIR TEMPERATURE (IAT)		
BLACK	Pin-A	Ground
VIOLET	Pin-B	Signal

The following chart gives the most likely solution(s) to each possible error.

Clearing History Errors

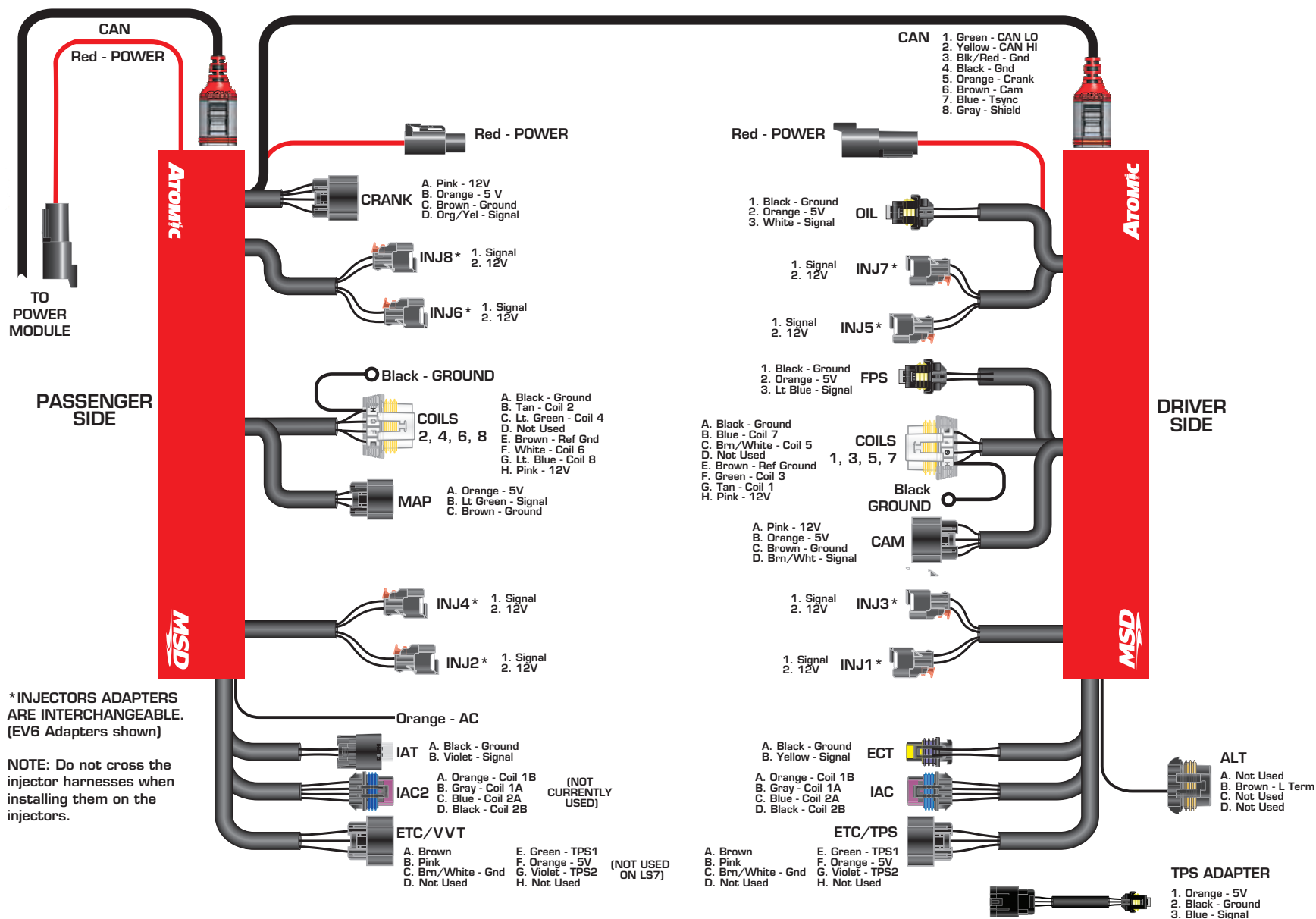
There are two ways to clear an error. First, the code will erase after 10 key cycles. Second, is to simply navigate to the message screen and push the joystick down to clear the codes.

CODE NAME	WHAT IT MEANS	PROBABLE CORRECTION(S)
TPS	There is no reading for the Throttle Position Sensor.	The sensor may be at fault.
MAP	There is no reading for the Manifold Absolute Pressure Sensor.	The sensor maybe at fault.
IAT	There is no reading for the Inlet Air Temperature Sensor. The ECU will default to 275°F when shorted or -40°F when open.	Check to see that the sensor is properly installed and plugged in. If the sensor is connected but there is no signal, it will need to be replaced.
ECT	There is no reading for the Engine Coolant Temperature Sensor. he ECU will default to 275°F when shorted or -40°F when open.	Check to see that the sensor is properly installed and plugged in. If the sensor is connected but there is no signal, it will need to be replaced.
BATT	The Atomic is receiving the wrong voltage. The unit is measuring either less than 9 volts or greater than 16 volts.	Check that the Atomic has power and ground directly from the battery. Also be sure the vehicle's battery and charging system are in proper working order.
INJ DC	Excessive Injector Duty Cycle	If you are running a returnless fuel system your engine's needs may exceed the Atomic's maximum capabilities. If you are running a return system check to see that you are maintaining the recommended fuel pressure. If you have adequate fuel pressure the engine's needs may exceed the Atomic's system capabilities.
FUEL PRESSURE	There is no reading for the Fuel Pressure Sensor.	The sensor will need to be replaced.
WBO2	A. "NOT CONNECTED" indicates that no sensor is detected. B. "ERROR" indicates that the sensor has failed.	A. Check to see that the sensor is securely plugged into the system. B. The sensor will need to be replaced. Note that 'warming up' is normal during start-up for the first 20 seconds.
FP CAV	This code will set if there is an issue with Fuel Pump Cavitation (similar to vapor lock). It can only set when running a returnless fuel system. This may occur when the commanded fuel pressure (from the ECU) is different than the fuel pressure (at the sending unit).	This means you need to review your fuel pump system and confirm that your application meets the requirements to run a returnless (PWM) system. Also check the filters, the sock in the tank and inspect the lines for any kinks or pinches that would affect the fuel flow and pressure of the system. If everything checks okay and the code continues, you may need to move to an in-tank pump, or use a regulated (return) fuel system.
MAP SELECT	ECU compares the MAP reading with the Baro reading on key up. If these are different by more than 5kPa, the code is activated.	Double check your MAP selection and make sure that you selected the correct P/N of sensor. It could also mean a problem with the Baro or MAP sensor itself (see above codes).
BARO	The baro sensor on the board is out of range. It will use the last know good value.	Turn the key off, wait 10 seconds and turn back on to see if the code remains. If so, call customer service. As long as the vehicle has not changed altitude by a large amount since the last key off (towed somewhere), everything will function normally.

Atomic LS EFI

PN 2960 - Master Kit LS7

Atomic LS EFI Rails and Connections



*INJECTORS ADAPTERS ARE INTERCHANGEABLE. (EV6 Adapters shown)

NOTE: Do not cross the injector harnesses when installing them on the injectors.

The following chart gives the most likely solution(s) to each possible error.

Clearing History Errors

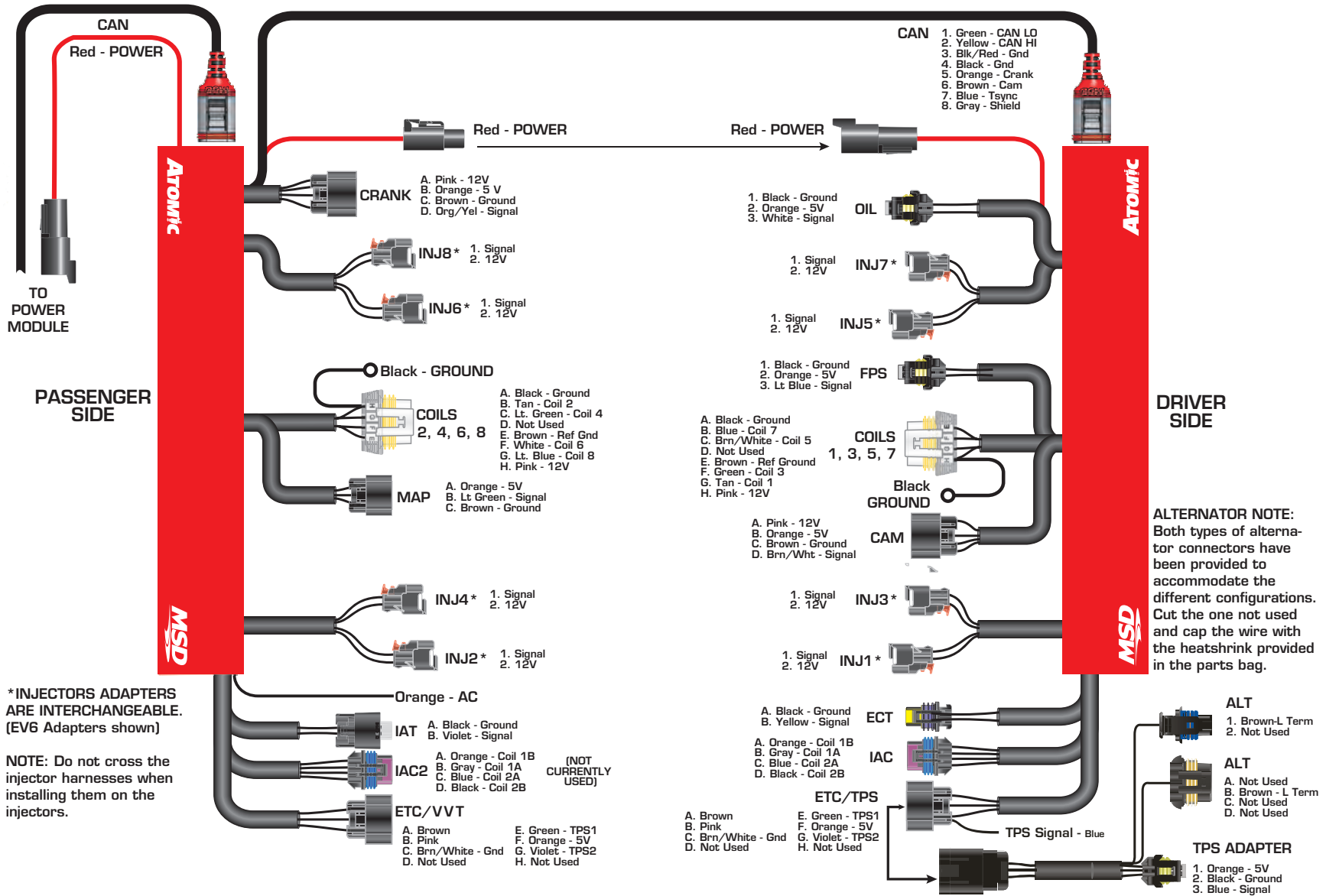
There are two ways to clear an error. First, the code will erase after 10 key cycles. Second, is to simply navigate to the message screen and push the joystick down to clear the codes.

CODE NAME	WHAT IT MEANS	PROBABLE CORRECTION(S)
TPS	There is no reading for the Throttle Position Sensor.	The sensor may be at fault. Check wiring and/or replace sensor.
MAP	There is no reading for the Manifold Absolute Pressure Sensor.	The sensor maybe at fault. Check wiring and/or replace sensor.
IAT	There is no reading for the Inlet Air Temperature Sensor. The ECU will default to 275°F when shorted or -40°F when open.	Faulty sensor; loose or no connection. Check wiring and/or replace sensor.
ECT	There is no reading for the Engine Coolant Temperature Sensor. he ECU will default to 275°F when shorted or -40°F when open.	Faulty sensor; loose or no connection. Check wiring and/or replace sensor.
BATT	The Atomic is receiving the wrong voltage. The unit is measuring either less than 9 volts or greater than 16 volts.	Check the battery connection from the Power Module to the battery. Ensure that the battery and alternator are working correctly.
INJ DC	Excessive Injector Duty Cycle	If you are running a returnless fuel system your engine's needs may exceed the Atomic's maximum capabilities. If you are running a return system check to see that you are maintaining the recommended fuel pressure. If you have adequate fuel pressure the engine's needs may exceed injector flow rate.
FUEL PRESSURE	There is no reading for the Fuel Pressure Sensor.	Faulty sensor; loose or no connection. Check wiring and/or replace sensor.
WBO2	A. "NOT CONNECTED" indicates that no sensor is detected. B. "ERROR" indicates that the sensor has failed.	A. Check to see that the sensor is securely plugged into the system. Inspect wiring if it is plugged into the system. B. The sensor will need to be replaced. Note that 'warming up' is normal during start-up for the first 20 seconds.
FP CAV	This code will set if there is an issue with Fuel Pump Cavitation (similar to vapor lock). It can only set when running a returnless fuel system. This may occur when the commanded fuel pressure (from the ECU) is different than the fuel pressure (at the Fuel Pressure Sensor).	Check the fuel system and determine that it meets the requirements to run a returnless (PWM) system. Check the filters, the sock in the tank, and inspect the lines for any kinks or pinches that would affect the fuel flow and pressure of the system. If the code continues, the fuel system may need to be converted to an in-tank fuel pump and/or regulated (return) fuel system.
MAP SELECT	ECU compares the MAP reading with the Baro reading on key up. If these are different by more than 5kPa, the code is activated.	Double check your MAP selection and make sure that you selected the correct P/N of sensor. It could also mean a problem with the Baro or MAP sensor itself (see above codes).
BARO	The Baro sensor voltage is out of range, and the ECU has defaulted to the last known good Baro value.	Turn the ignition off. Wait 10 seconds, and turn the ignition back on. If the code remains, call customer service. Unless the vehicle has been through a large change in altitude since the last ignition on/off cycle (towed somewhere), everything will function normally.

Atomic LS EFI

PN 2957 - Master Kit 3-Bolt Manifold

PN 2958 - Master Kit 4-Bolt Manifold



The following chart gives the most likely solution(s) to each possible error.

Clearing History Errors

CODE NAME	WHAT IT MEANS	PROBABLE CORRECTION(S)
TPS	There is no reading for the Throttle Position Sensor.	The sensor may be at fault. Check wiring and/or replace sensor.
MAP	There is no reading for the Manifold Absolute Pressure Sensor.	The sensor maybe at fault. Check wiring and/or replace sensor.
IAT	There is no reading for the Inlet Air Temperature Sensor. The ECU will default to 275°F when shorted or -40°F when open.	Faulty sensor; loose or no connection. Check wiring and/or replace sensor.
ECT	There is no reading for the Engine Coolant Temperature Sensor. he ECU will default to 275°F when shorted or -40°F when open.	Faulty sensor; loose or no connection. Check wiring and/or replace sensor.
BATT	The Atomic is receiving the wrong voltage. The unit is measuring either less than 9 volts or greater than 16 volts.	Check the battery connection from the Power Module to the battery. Ensure that the battery and alternator are working correctly.
INJ DC	Excessive Injector Duty Cycle	If you are running a returnless fuel system your engine's needs may exceed the Atomic's maximum capabilities. If you are running a return system check to see that you are maintaining the recommended fuel pressure. If you have adequate fuel pressure the engine's needs may exceed the Atomic's system capabilities.
FUEL PRESSURE	There is no reading for the Fuel Pressure Sensor.	Faulty sensor; loose or no connection. Check wiring and/or replace sensor.
WBO2	A. "NOT CONNECTED" indicates that no sensor is detected. B. "ERROR" indicates that the sensor has failed.	A. Check to see that the sensor is securely plugged into the system. Inspect wiring if it is plugged into the system. B. The sensor will need to be replaced. Note that 'warming up' is normal during start-up for the first 20 seconds.
FP CAV	This code will set if there is an issue with Fuel Pump Cavitation (similar to vapor lock). It can only set when running a returnless fuel system. This may occur when the commanded fuel pressure (from the ECU) is different than the fuel pressure (at the sending unit).	Check the fuel system and determine that it meets the requirements to run a returnless (PWM) system. Check the filters, the sock in the tank, and inspect the lines for any kinks or pinches that would affect the fuel flow and pressure of the system. If the code continues, the fuel system may need to be converted to an in-tank fuel pump and/or regulated (return) fuel system.
MAP SELECT	ECU compares the MAP reading with the Baro reading on key up. If these are different by more than 5kPa, the code is activated.	Double check your MAP selection and make sure that you selected the correct P/N of sensor. It could also mean a problem with the Baro or MAP sensor itself (see above codes).
BARO	The Baro sensor voltage is out of range, and the ECU has defaulted to the last known good Baro value.	Turn the ignition off. Wait 10 seconds, and turn the ignition back on. If the code remains, call customer service. Unless the vehicle has been through a large change in altitude since the last ignition on/off cycle (towed somewhere), everything will function normally.

Installing an MSD 5, PN 5200, or Blaster Ignition, PN 5900

The MSD 5 and Blaster Ignitions are inductive ignitions which enhance the spark of the vehicle's stock ignition. The MSD 5 is a multiple spark ignition, while the Blaster is a single spark, long duration design. Both are designed for entry level and budget build-ups and can be triggered with points or electronic ignitions. The Blaster can also be triggered by a magnetic pickup distributor such as the MSD Pro-Billet Distributors.

Ballast Resistors: If the vehicle has a ballast resistor or resistor wiring leading to the coil, leave it inline and connect the Red wire of the ignition before the resistor. If there are no resistors originally, the Blaster Ignition and MSD 5 do not require it. For aftermarket coils, use the coil manufacturer's recommendations.

NOTE: Not recommended for use with a GM HEI Internal Coil Distributor.

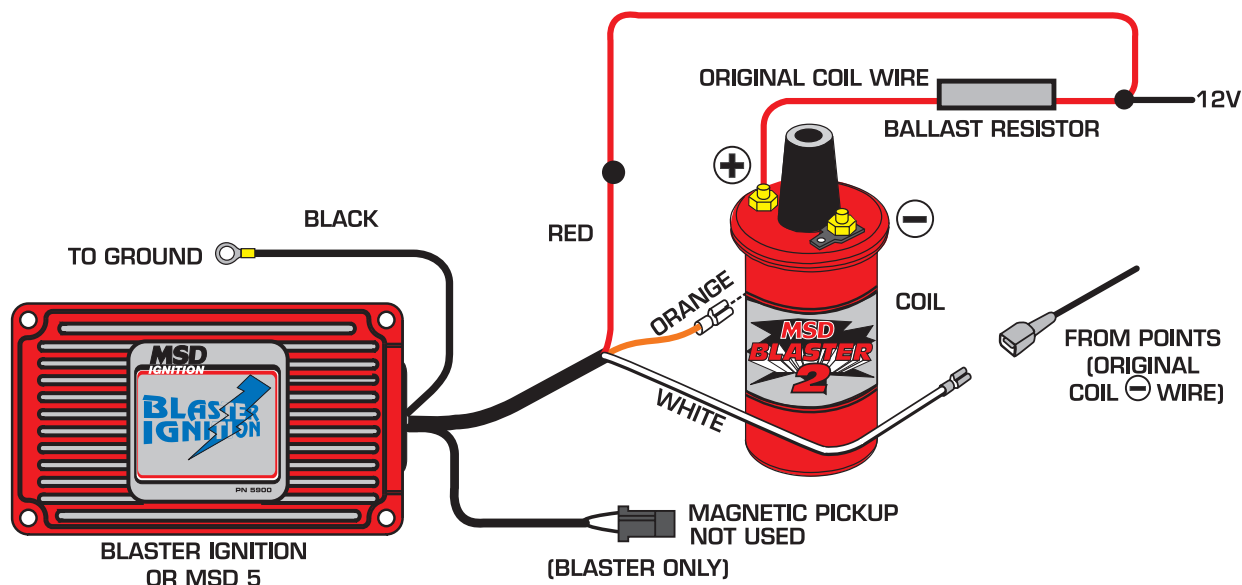
Wire Functions

Red: Connects to the positive (+) terminal of the coil, or a switched 12v.
Black: Connects to ground.
Orange: Connects to the negative (-) terminal of the coil.
White: Connects to the points or electronic ignition amplifier output.

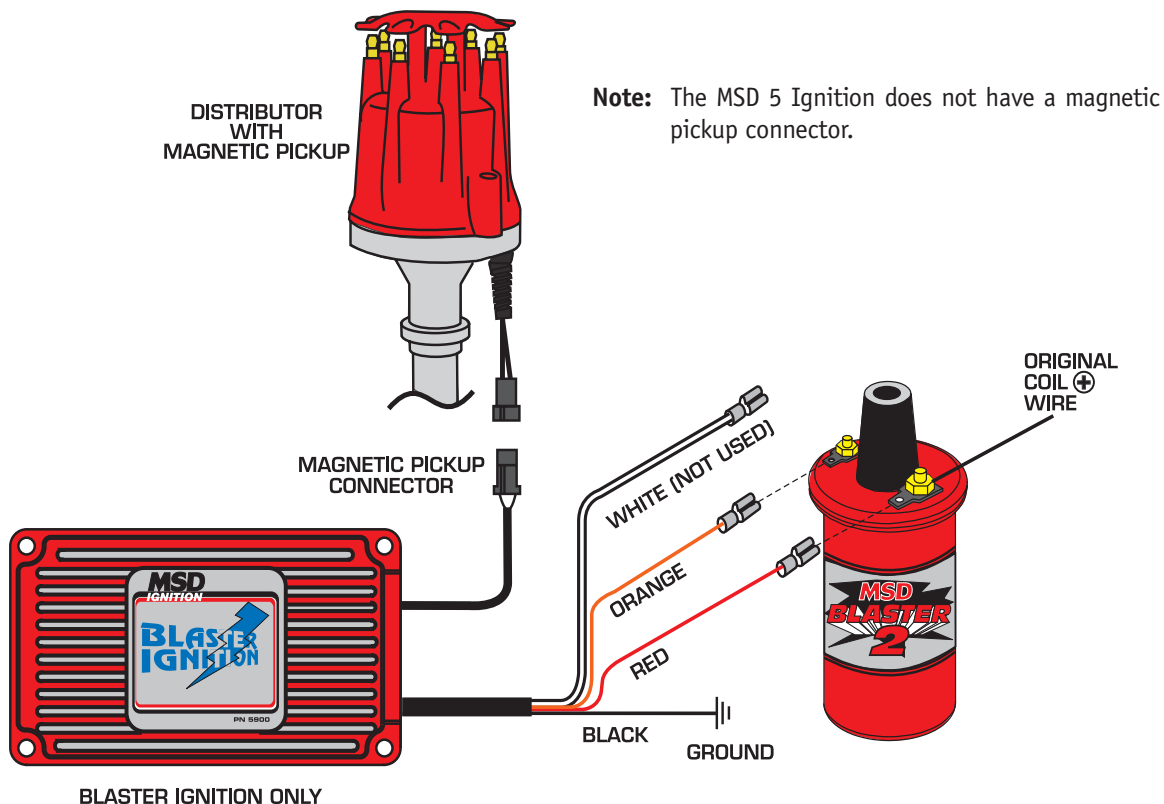
Blaster Ignition Only

Green: Magnetic pickup negative (-).
Violet: Magnetic pickup positive (+).

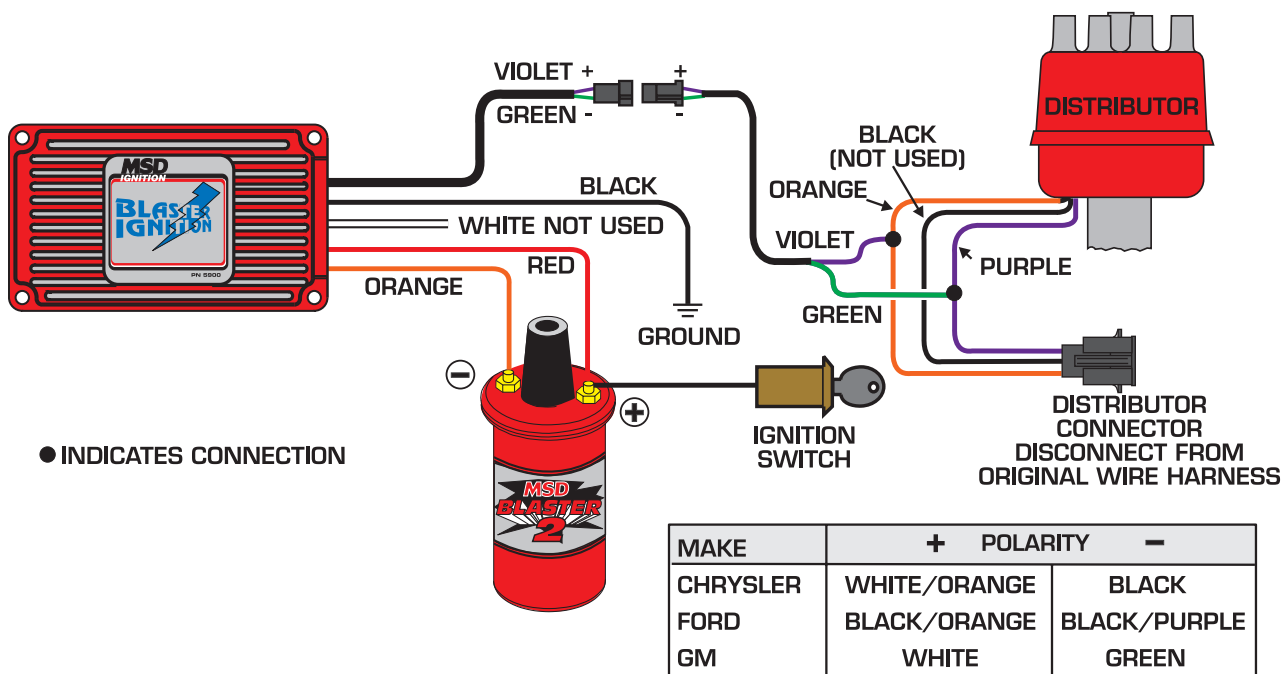
Original Ballast Resistor Wiring with a Blaster Ignition or MSD 5 Ignition



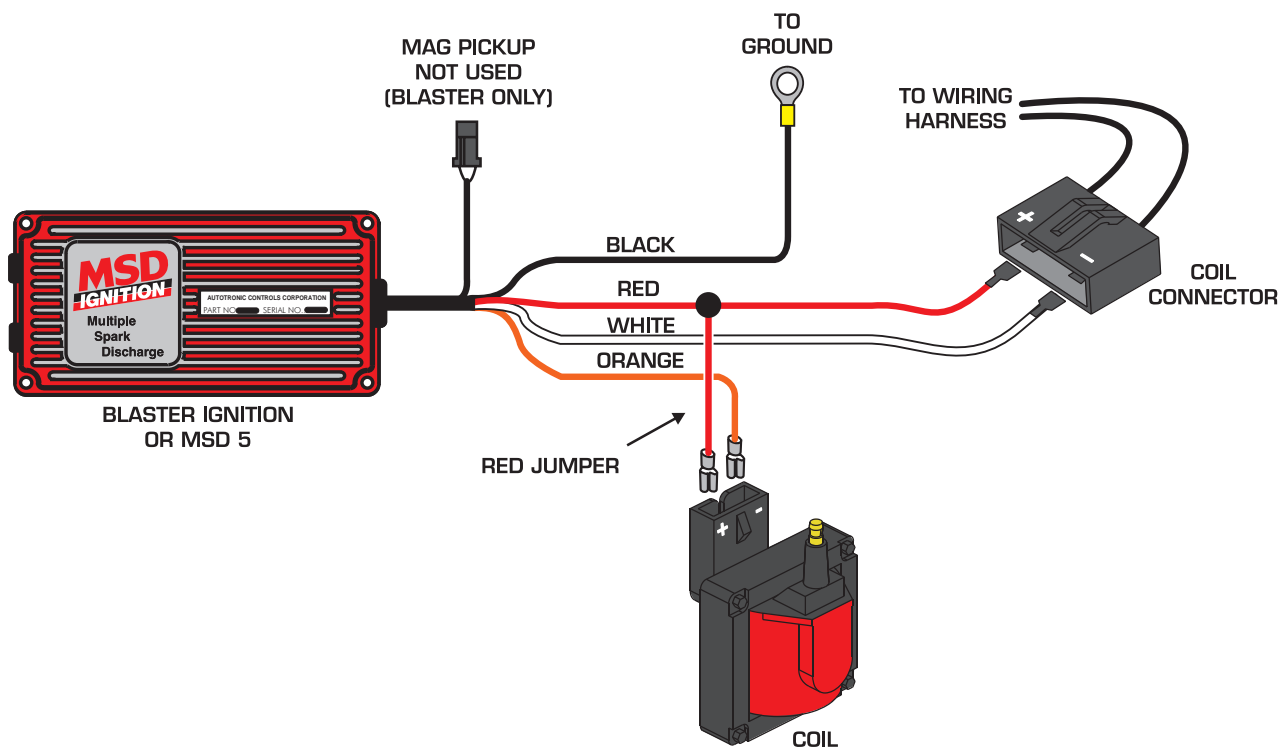
Blaster Ignition to Magnetic Pickup



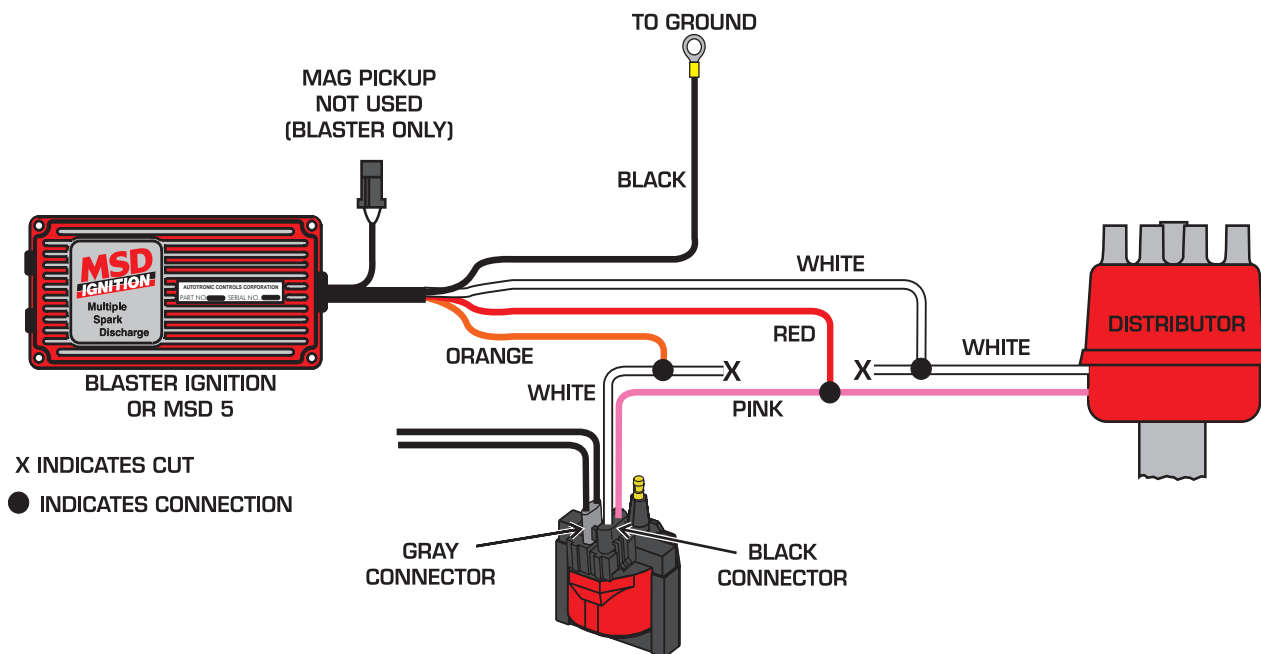
Blaster Ignition to Stock Magnetic Pickup Distributor



Blaster/MSD 5 to Ford TFI Ignition



Blaster/MSD 5 to GM Dual Connector, External Coil



Installing a Street Fire CDI Ignition, PN 5520

The Street Fire CDI is a base model CD, multiple spark ignition offered by MSD Ignition. The wiring colors and functions are shared with the 6-Series Ignitions. If you don't see your application, go to the 6-Series Ignition section of this book.

Operating Specifications

Spark Energy:	95 mJ Per Spark
Primary Voltage:	435 Volts
Secondary Voltage:	45,000 Volts
Spark Series Duration:	20° Crankshaft Rotation
RPM Range:	15,000 RPM with 14.4 Volts
Voltage Required:	10-18 Volts, Negative Ground
Current Draw	.7 Amp per 1,000 RPM
Weight and Size:	1.5 lbs., 6"L x 3.5"W x 1.75"H

Wire Functions

- Power Leads:** These are the two heavy gauge wires (14 gauge) and are responsible for getting direct battery voltage to the Ignition.
- Heavy Red:** This wire connects directly to the battery positive (+) terminal or to a positive battery junction or the positive side of the starter solenoid.
- Note:** Never connect to the alternator.
- Heavy Black:** This wire connects to a good ground, either at the battery negative (-) terminal or to the engine.

Red: Connects to a switched 12 volt source, such as the ignition key or switch.

Orange: Connects to the positive (+) terminal of the coil. This is the only wire that makes electrical contact with the coil positive terminal.

Black: Connects to the negative (-) terminal of the coil. This is the only wire that makes electrical contact with the coil negative terminal.

Gray: Tach output wire. Connect to the tachometer or other rpm device.

Trigger Wires: There are two circuits that can be used to trigger the Street Fire Ignition; a Points circuit (White wire) and a Magnetic Pickup circuit (Violet and Green wires). The two circuits will never be used together.

White: This wire is used to connect to the points or electronic ignition amplifier output.

Violet and Green: These wires are routed together in one harness to form the Magnetic Pickup connector. The connector plugs directly into an MSD Distributor. It will also connect to factory magnetic pickups or other aftermarket pickups. The Violet wire is positive (+) and the Green is negative (-). When these wires are used, the White wire is not.

(Magnetic Pickup Connector)

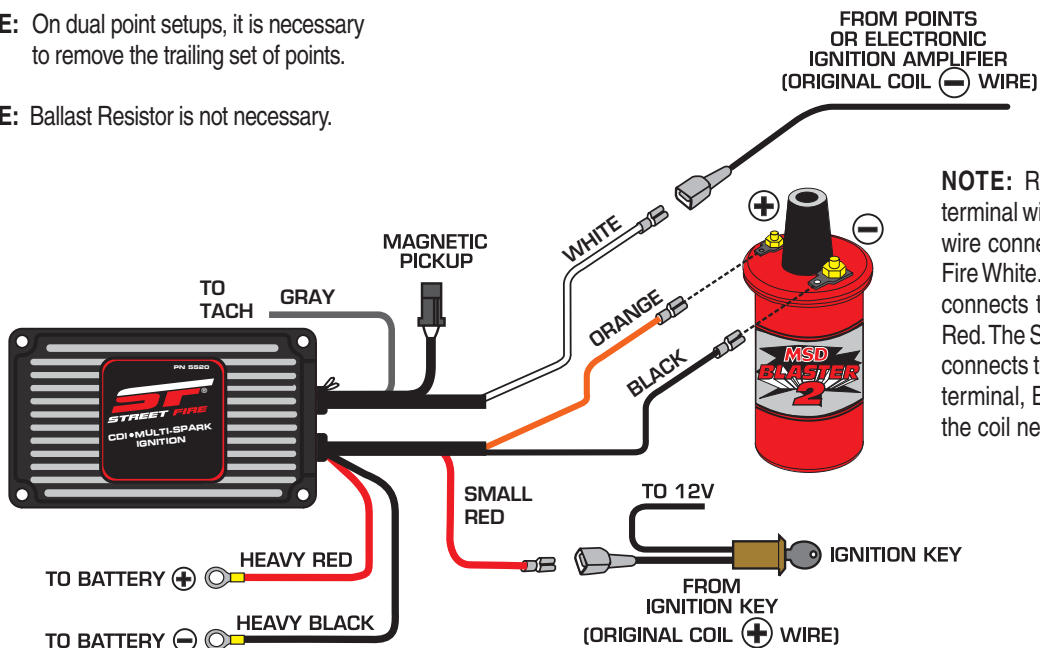
WARNING: When using a capacitive discharge ignition control, there is high voltage present at the coil primary terminals. Never touch the coil or connect test equipment to these terminals.

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

Street Fire CDI, PN 5520, to Points/Amplifier Style Ignition

NOTE: On dual point setups, it is necessary to remove the trailing set of points.

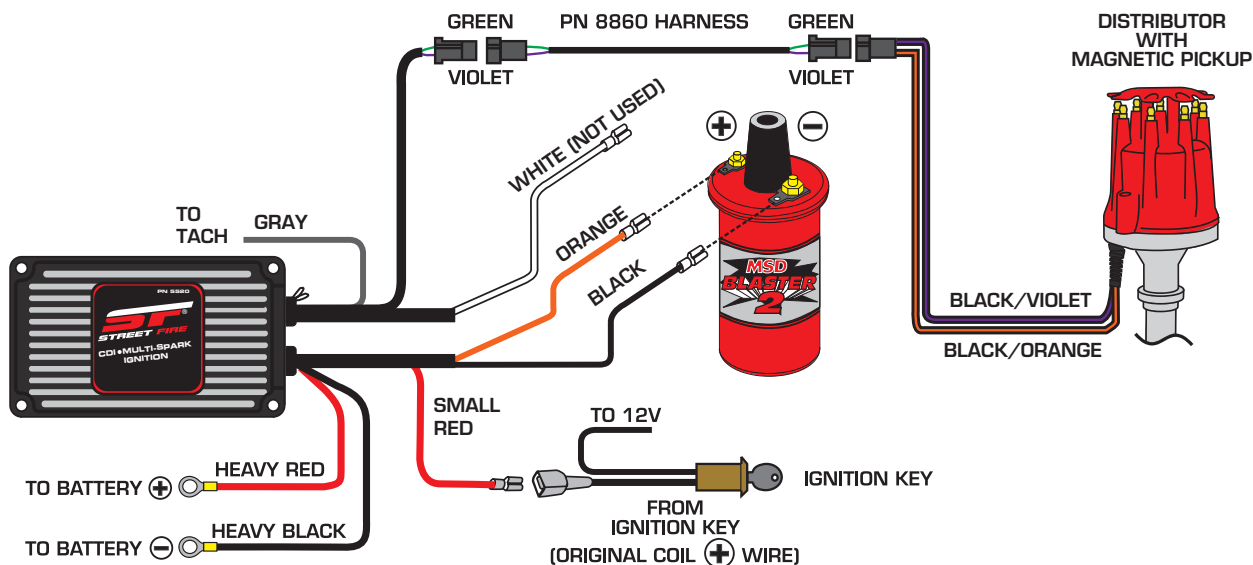
NOTE: Ballast Resistor is not necessary.



NOTE: Remove the coil terminal wires. The negative wire connects to the Street Fire White. The positive wire connects to the Street Fire Red. The Street Fire Orange connects to the coil positive terminal, Black connects to the coil negative terminal.

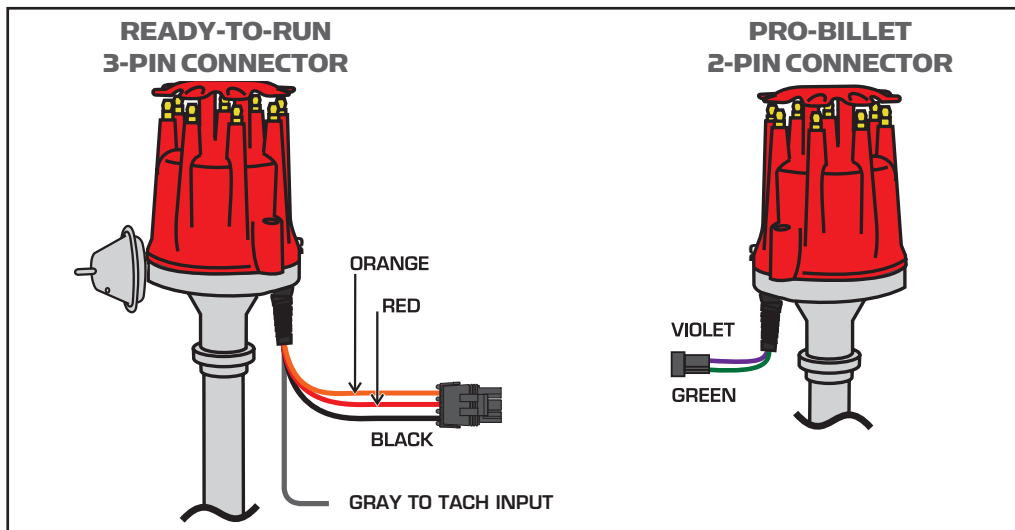
NOTE: Wiring of Street Fire Ignitions is the same as MSD 6-Series with the exception of the Gray Tach wire.

Street Fire CDI, PN 5520, to an MSD Distributor



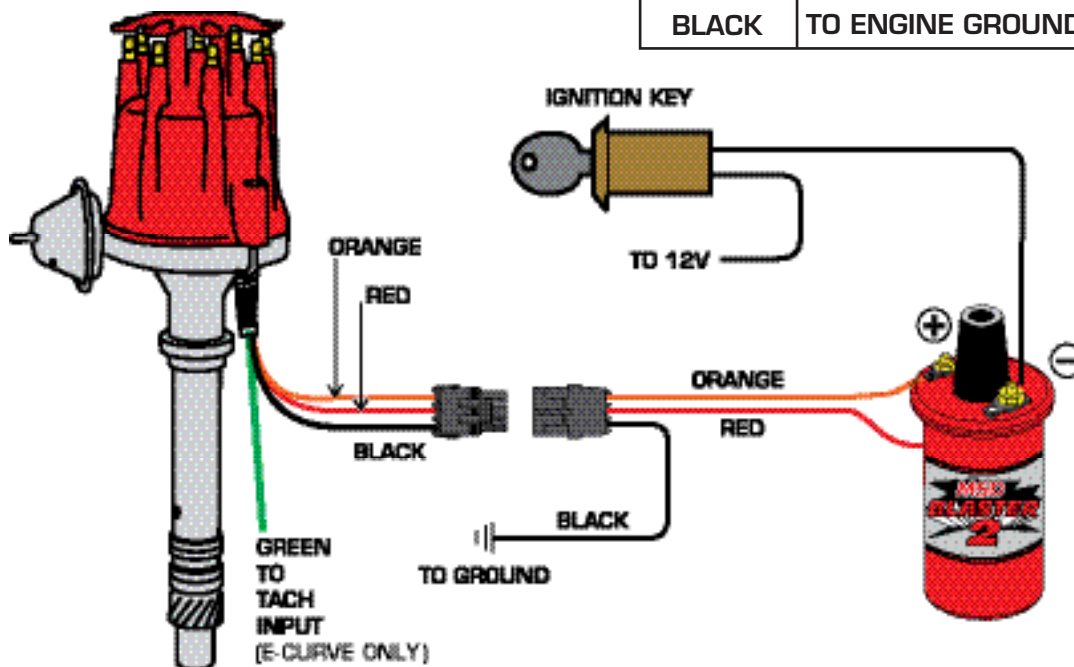
Ready-to-Run Distributors

The Ready-to-Run line of Distributors from MSD are designed as a stand-alone distributor. They feature an ignition module built into the base of the unit that produces a high output, single spark. These distributors are easy to recognize as they have a 3-pin weathertight connector with a Red, Orange and Black wire. MSD Pro-Billet distributors with two wires require an MSD Ignition Control.



Wiring the Ready-to-Run Chevrolet Distributor

RED	TO COIL POSITIVE + 12 VOLTS
ORANGE	TO COIL NEGATIVE -
BLACK	TO ENGINE GROUND

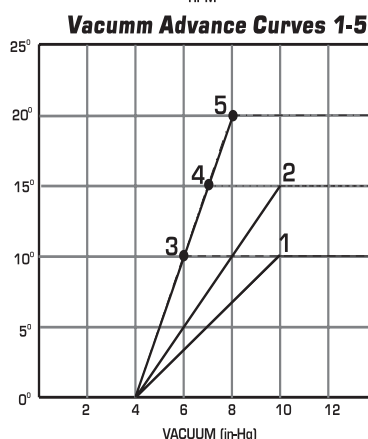
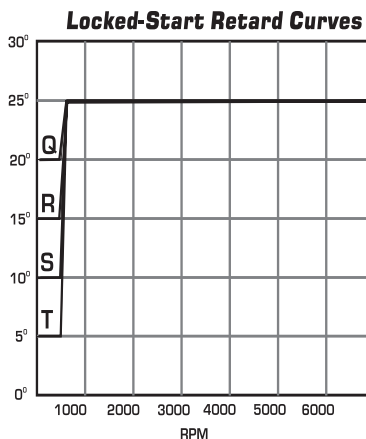
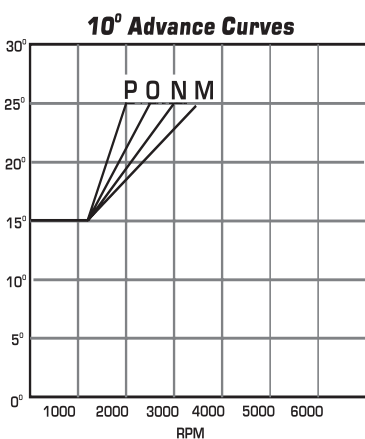
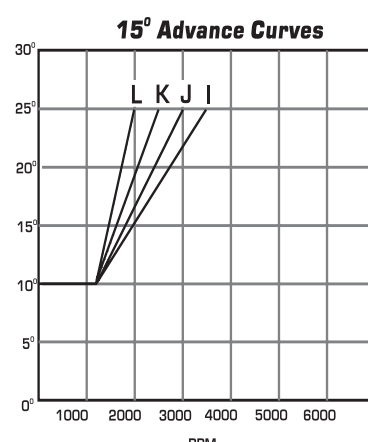
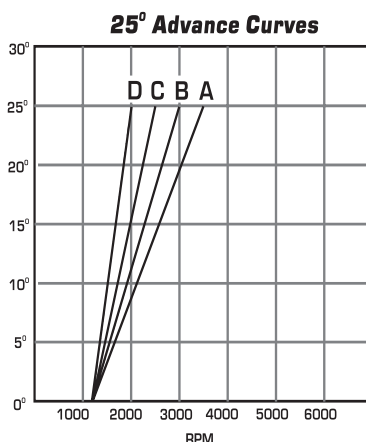
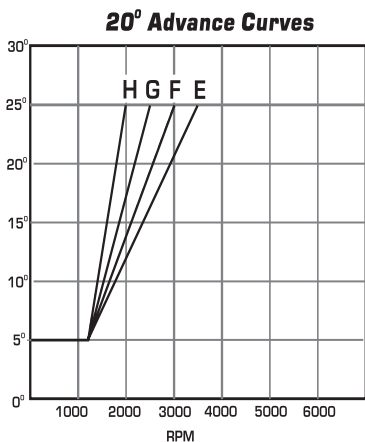


E-Curve

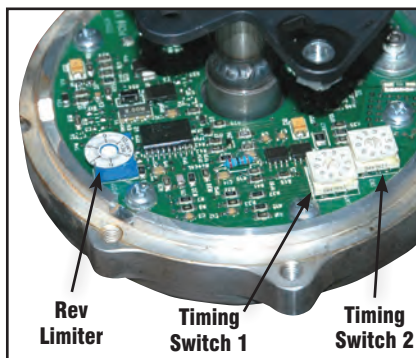
The E-Curve Ready-to-Run Distributors are identified by the same three wire connector with the addition of a separate Green wire for the tach. These distributors feature a timing advance that is digitally controlled as well as an adjustable rev limiter. Both are adjusted via rotary dials under the cap. The diagrams on the next page show the variety of timing curves available.

E-Curve Distributor Timing Curves

ELECTRONIC 'CENTRIFUGAL' ADVANCE CURVES



Rotary Dial Location



ELECTRONIC 'MECHANICAL' ADVANCE CURVE

VACUUM ADVANCE	Switch																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
1	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
2	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
3	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
4	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
5	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00

Installing an MSD 6A, 6T, 6AL or 6 BTM Ignition Control

This section covers the installation of the MSD 6A, 6AL, 6 BTM, 6T and the SCI Ignition Controls. These Ignition Controls feature capacitive discharge circuitry and multiple sparks. They will install to most vehicles with a 12 Volt electrical system and a distributor that is triggered with points, electronic amplifiers or magnetic pickups.

NOTE: An MSD 6-Series Ignition Control cannot be used with distributorless ignition systems. The DIS-2 and DIS-4 Ignition controls are designed for these systems.

Operating Specifications

Operating Voltage:	+12-18 volts, will run down to 5 volts
Current Requirements:	5 amps @ 5,000 rpm 10 amps @ 10,000 rpm
RPM Range:	15,000 rpm with 14.4 volt supply
Spark Duration:	20 degrees (crankshaft rotation)
Primary Voltage Output:	460-480 volts
Weight and Size:	6A and SCI: 2.75lbs., 8"L x 3.5"W x 2.25"H 6T: 3lbs., 8"L x 3.5"W x 2.25"H 6AL and SCI-L: 3lbs., 8"L x 4"W x 2.25"H 6 BTM: 3lbs., 8"L x 4"W x 2.25"H

NOTE: MSD SCI Ignitions share the same wiring as the 6-Series.

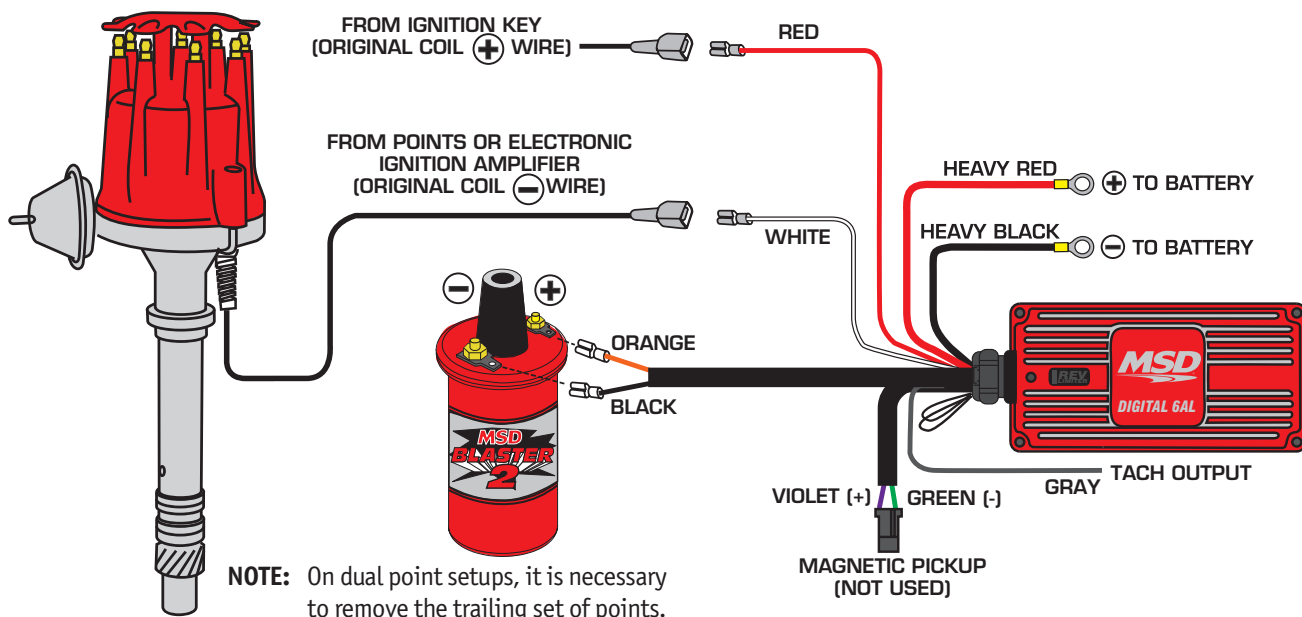
Wire Functions

Power Cables:	The heavy Red connects to the battery positive (+) terminal. The heavy Black connects to the battery negative (-) terminal or other good engine ground.
Red:	Connects to a switched 12 volts source.
Orange:	Connects to the positive (+) terminal of the coil. This is the only wire that makes electrical contact with the coil positive terminal.
Black:	Connects to the negative (-) terminal of the coil. This is the only wire that makes electrical contact with the coil negative terminal.
White:	This is one of the wires that provides a trigger signal for the MSD. It connects to the breaker points, electronic ignition amplifier output or to the Yellow wire of an MSD timing accessory. When this wire is used, the Magnetic connector is not (Violet and Green wires).
Violet and Green:	These wires are routed together in one harness to form the magnetic pickup connector. They plug directly into an MSD Distributor or Crank Trigger. The Violet wire is positive (+) and the Green wire is negative (-). When they are used, the White wire is not.

WARNING: When using a capacitive discharge ignition control, there is high voltage present at the coil primary terminals. Never touch the coil or connect test equipment to these terminals.

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

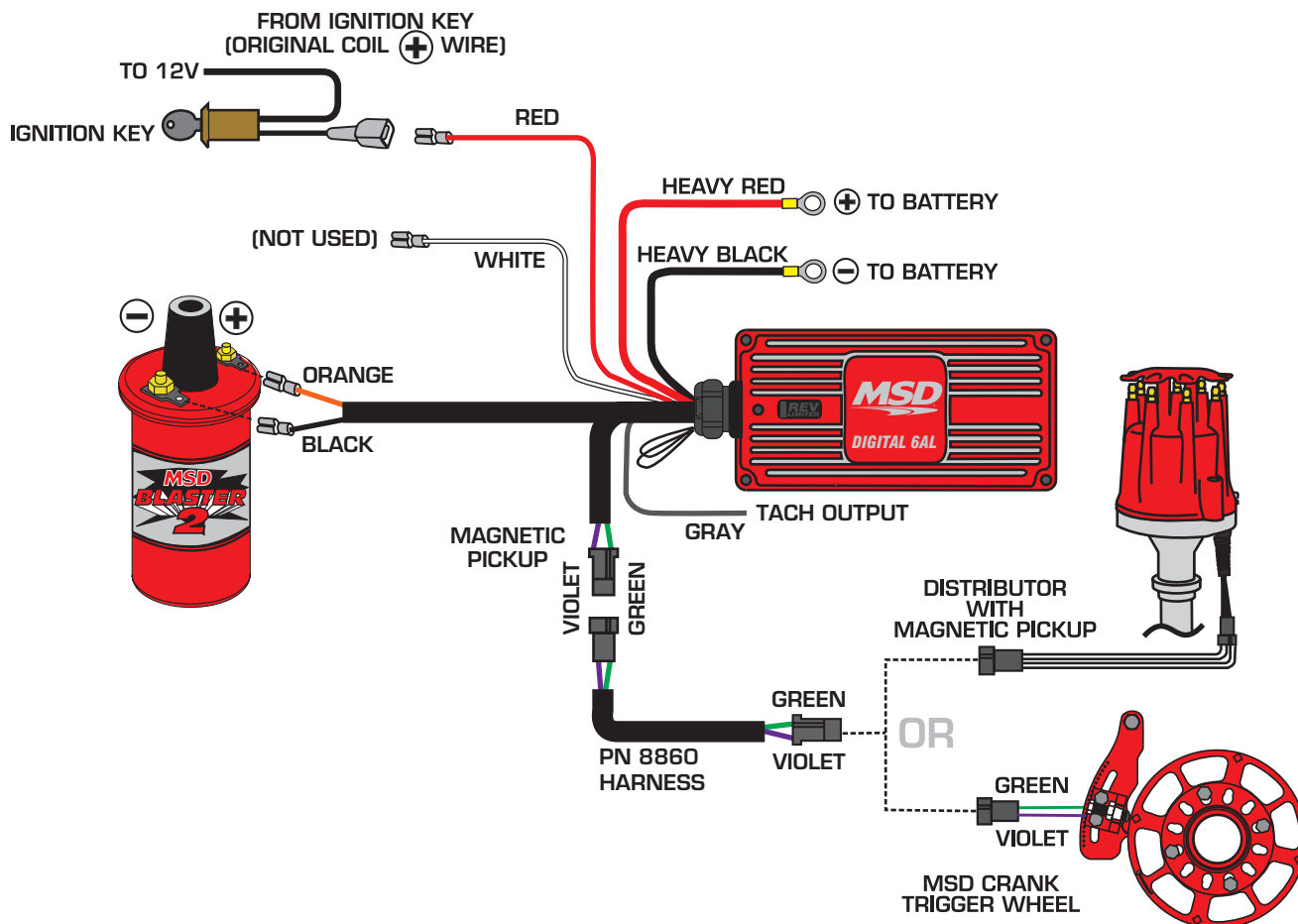
MSD 6-Series to Points/Amplifier



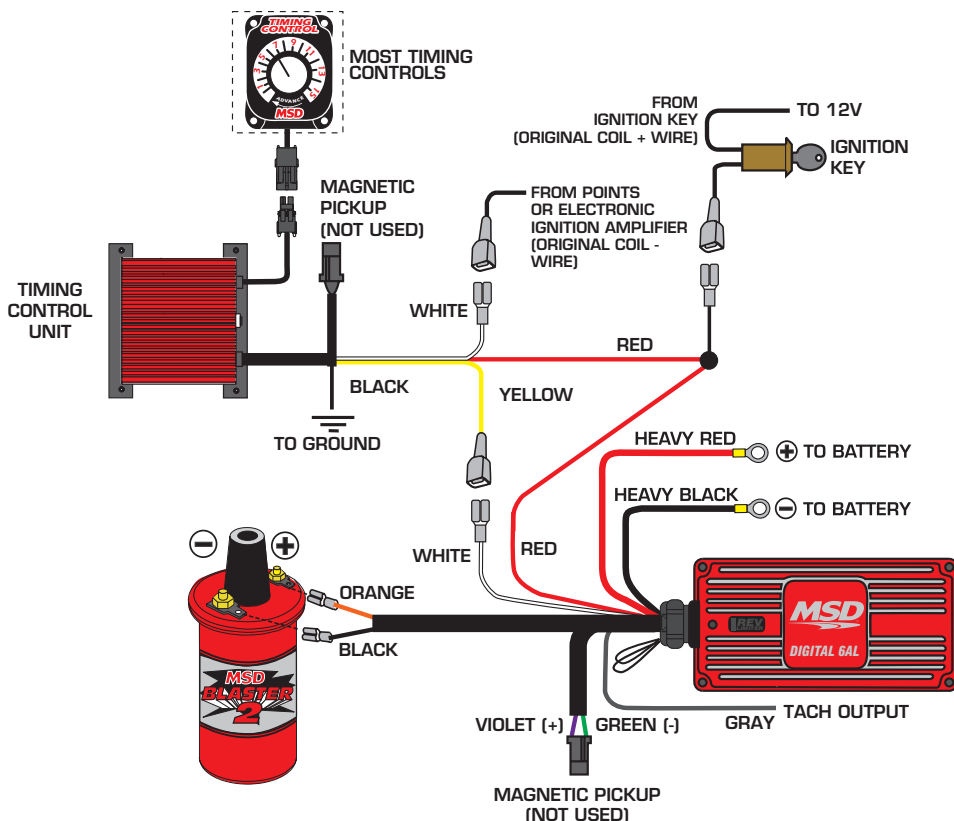
NOTE: On dual point setups, it is necessary to remove the trailing set of points.

NOTE: Ballast Resistor is not necessary.

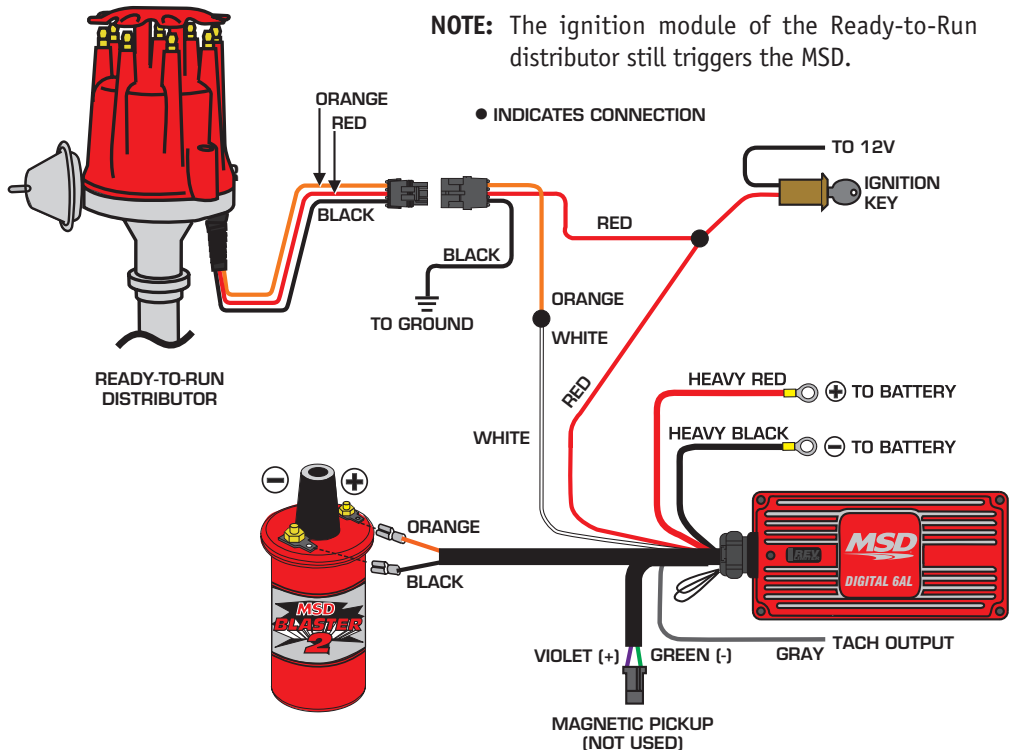
MSD 6-Series to an MSD Distributor or Crank Trigger



MSD 6-Series with an MSD Timing Accessory

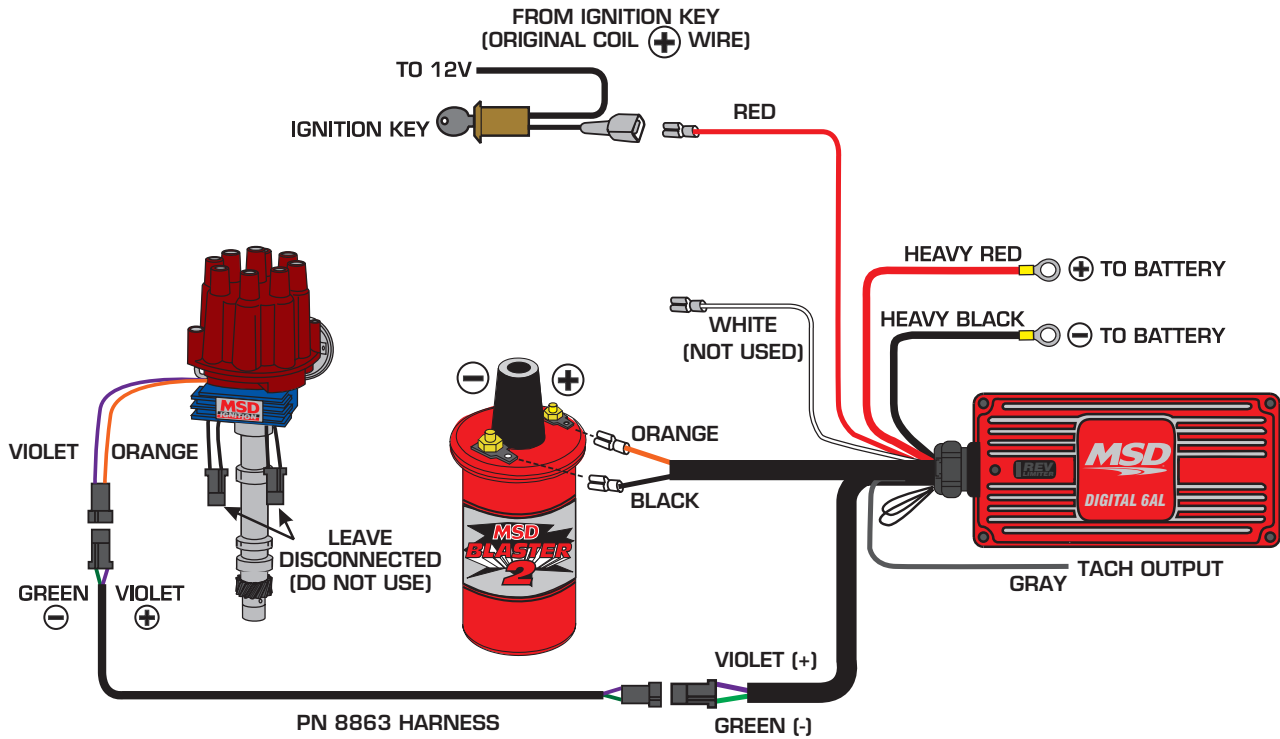


MSD 6-Series to an MSD Ready-to-Run Distributor



MSD 6-Series to an MSD PN 8460 Distributor

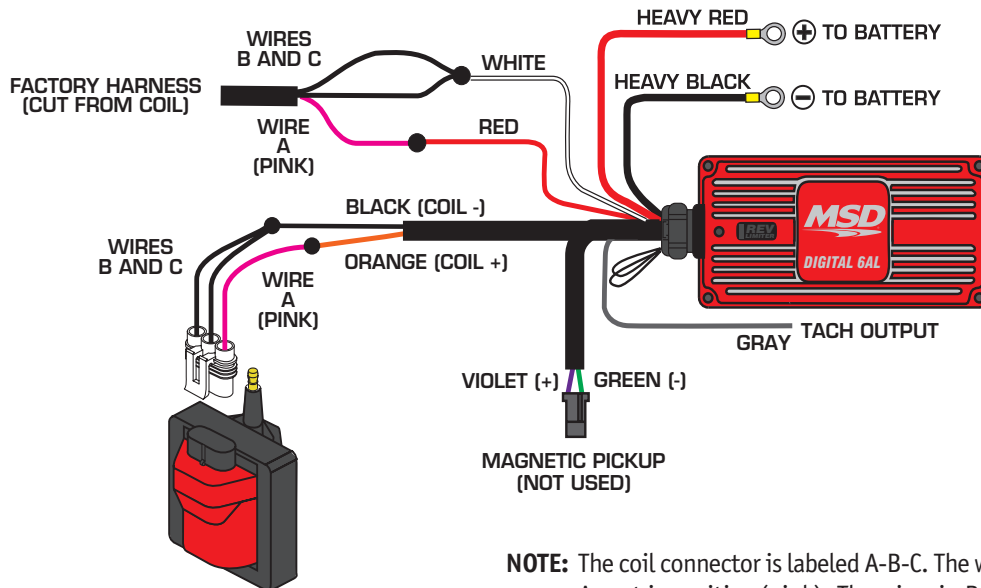
NOTE: The PN 8460 distributor has been discontinued.



MSD 6-Series to '96 and On GM Single Connector Coil

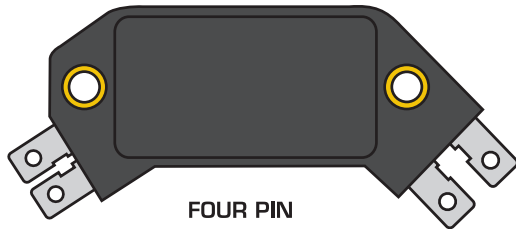
NOTE: MSD offers a direct plug-in harness, PN 8877 for a splice-free installation.

● INDICATES CONNECTION

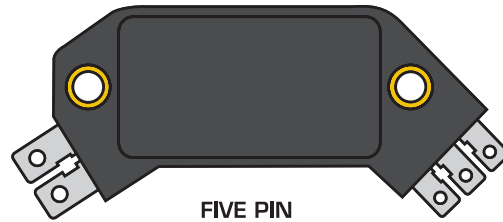


NOTE: The coil connector is labeled A-B-C. The wire in the A port is positive (pink). The wires in B and C are coil negative wires, color will vary by application.

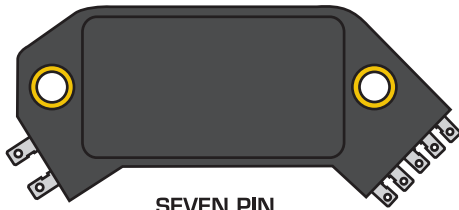
MSD and Large Cap GM HEI Distributors



FOUR PIN



FIVE PIN



SEVEN PIN

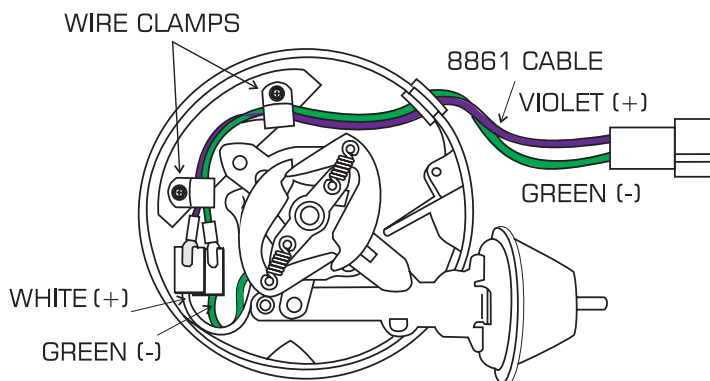
There are three different large cap HEI distributors. To identify which of the following diagrams fit your specific application, remove the distributor cap and rotor and locate the ignition module at the base of the distributor. Count the number of terminals on both ends of the module and follow the corresponding diagram. GM used 4, 5, and 7-pin modules in these distributors.

NOTE: Some 5-pin models may experience a hesitation or stall on deceleration. If this occurs, contact MSD Tech Line for the required bolt-in diode to correct the problem.

The MSD 6-Series to GM HEI 4-pin Module

If the distributor has a 4-pin module, the module must be removed and the MSD will use the magnetic pickup to trigger the ignition. A harness, PN 8861, is required for this installation (supplied with most 6-Series Ignitions).

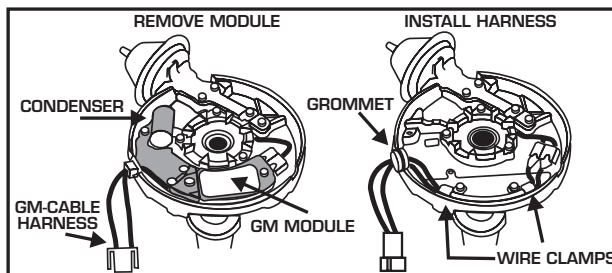
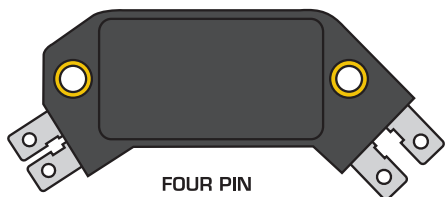
Connecting the PN 8861 Cable to the GM HEI Magnetic Pickup



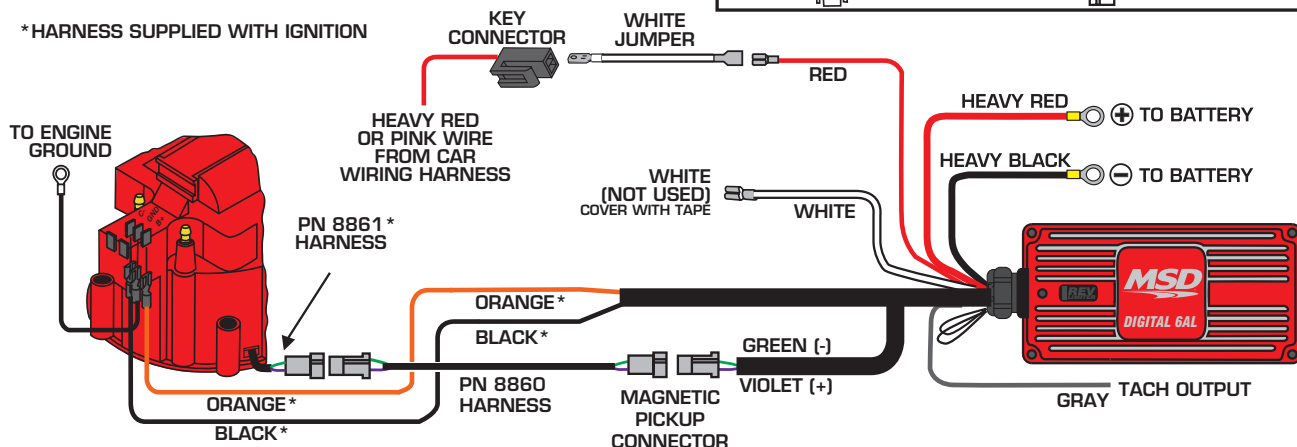
NOTE: The PN 8861 cable is supplied with the MSD 6-Series.

1. Remove the distributor cap and rotor.
2. Disconnect the connector with the white and green wires from the module, and remove the module, condenser and cable from the distributor.
3. Install the PN 8861 cable as shown using the module mounting screws and the wire clamps supplied in the MSD Parts kit. Push the two tabs on the PN 8861 cable into the connector from the HEI magnetic pickup (Green to Green, Violet to White). Notice that the tabs are different sizes so they can be installed one way only.
4. Reinstall the cap and rotor and connect the MSD Ignition control.

MSD 6-Series to GM HEI 4-pin Module



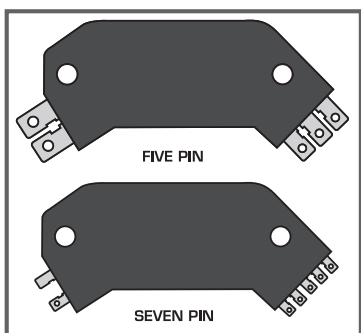
*HARNESS SUPPLIED WITH IGNITION



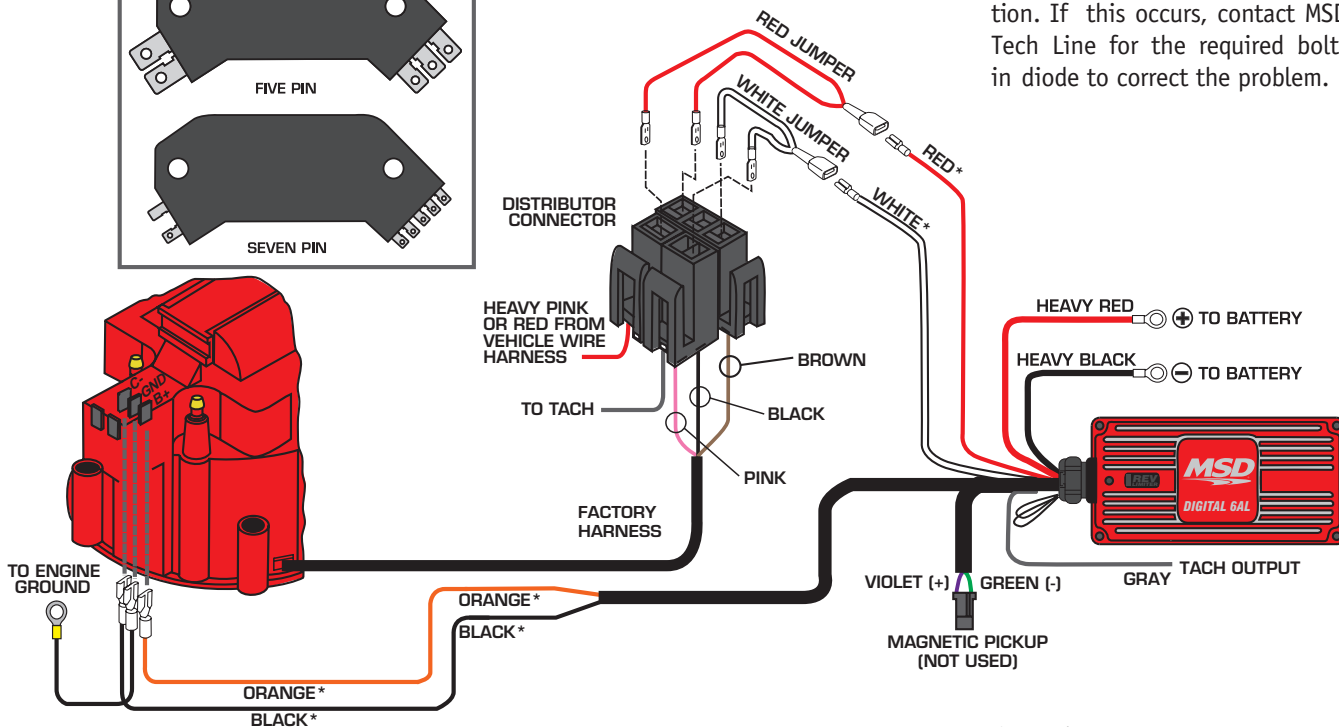
*ORANGE - CONNECTS TO B+
*BLACK - CONNECTS TO C-

NOTE: The GM Ignition Module is removed and replaced with the MSD PN 8861 Wire Harness.

MSD 6-Series to GM HEI 5 or 7-pin Module



NOTE: Some 5-pin models may experience a hesitation or stall on deceleration. If this occurs, contact MSD Tech Line for the required bolt-in diode to correct the problem.



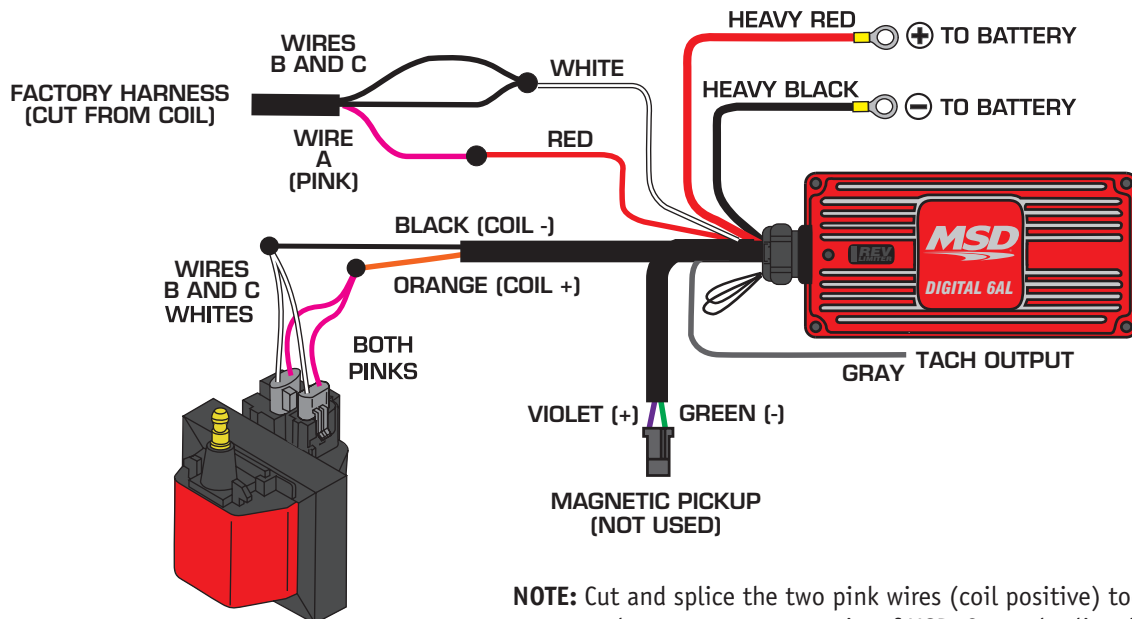
*ORANGE - CONNECTS TO B+
*BLACK - CONNECTS TO C-

*WHITE - CONNECTS TO BROWN AND TACH
*RED - CONNECTS TO 12 VOLTS AND PINK

NOTE: Direct Plug-In Harness available, PN 8875.

MSD 6-Series to GM Dual Connector Coil

● INDICATES CONNECTION



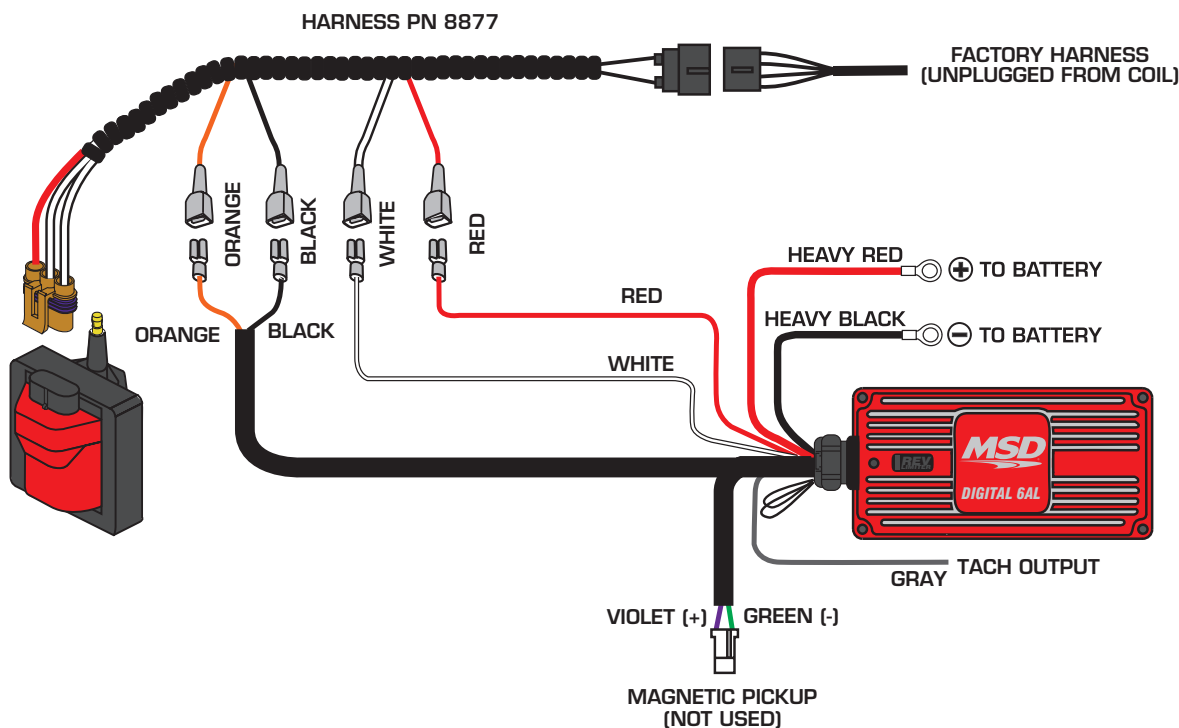
NOTE: MSD offers a direct plug in harness, PN 8876, as well as a performance coil, PN 8226.

NOTE: Cut and splice the two pink wires (coil positive) together and connect to orange wire of MSD. Cut and splice the two white wires (coil negative) together and connect to the white of MSD. If the vehicle is not equipped with a factory tach, there will only be one white wire.

MSD 6-Series with GM Harness

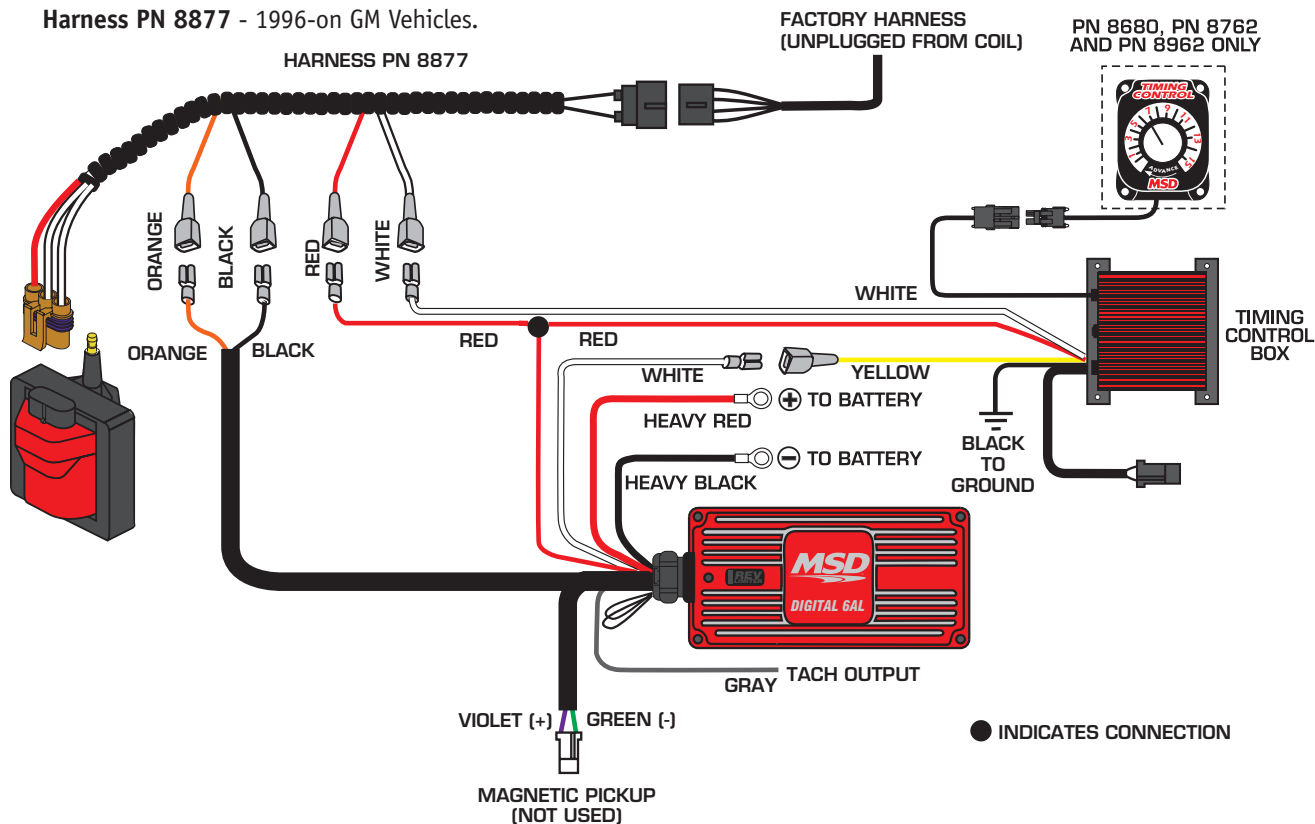
Harness PN 8876 - Dual Connector Coil.

Harness PN 8877 - 1996-on GM Vehicles.

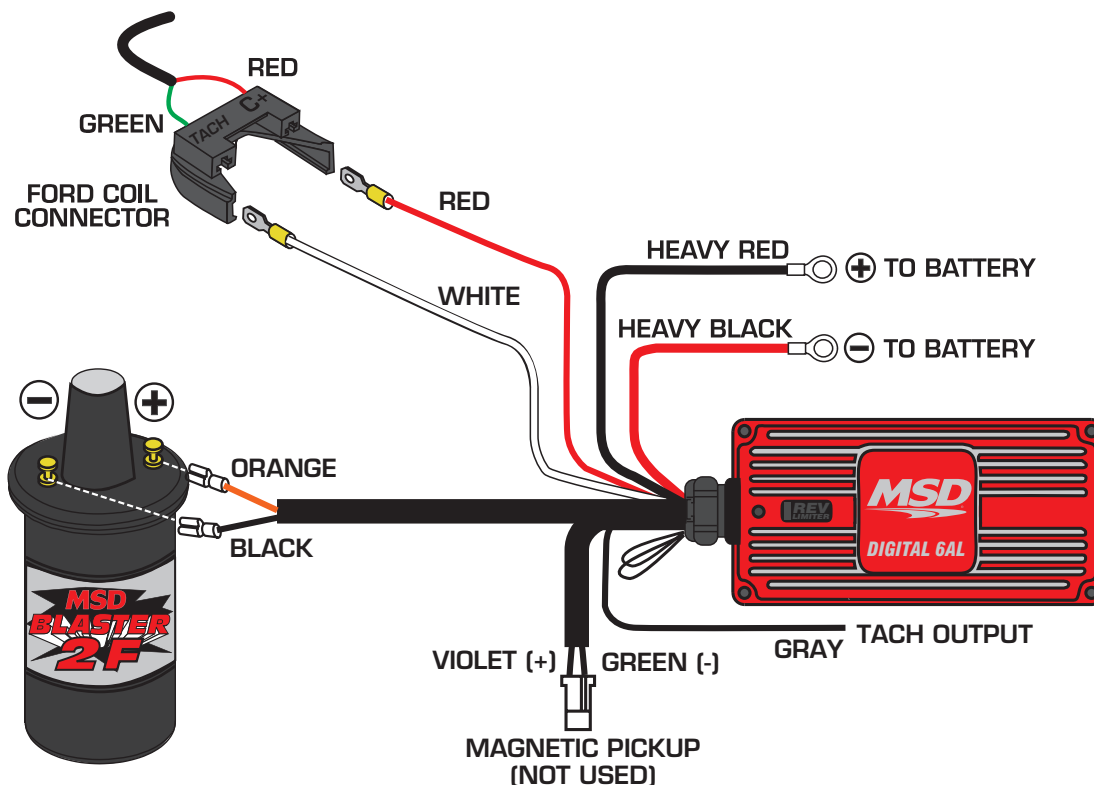


MSD 6-Series with GM Harness and Timing Control

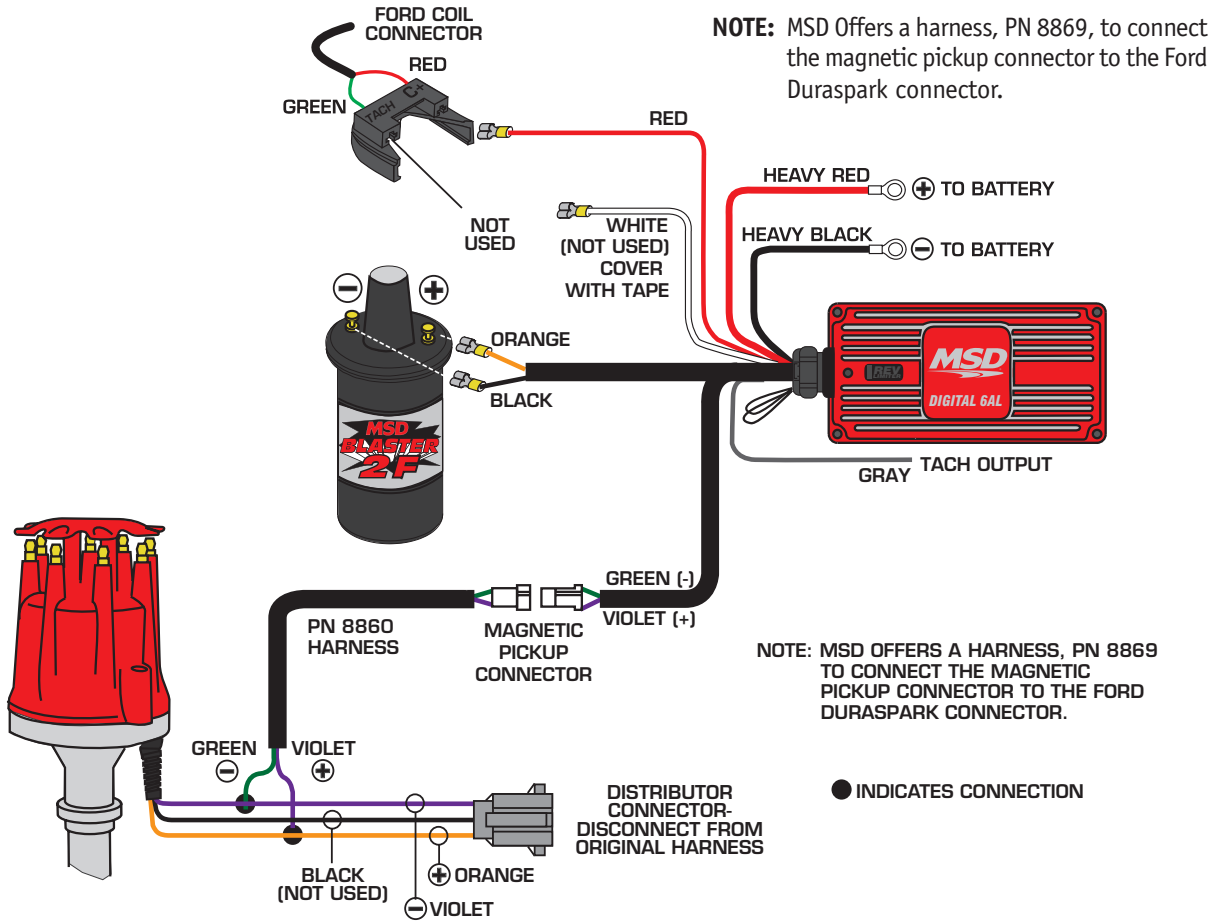
Harness PN 8876 - Dual Connector Coil.
 Harness PN 8877 - 1996-on GM Vehicles.



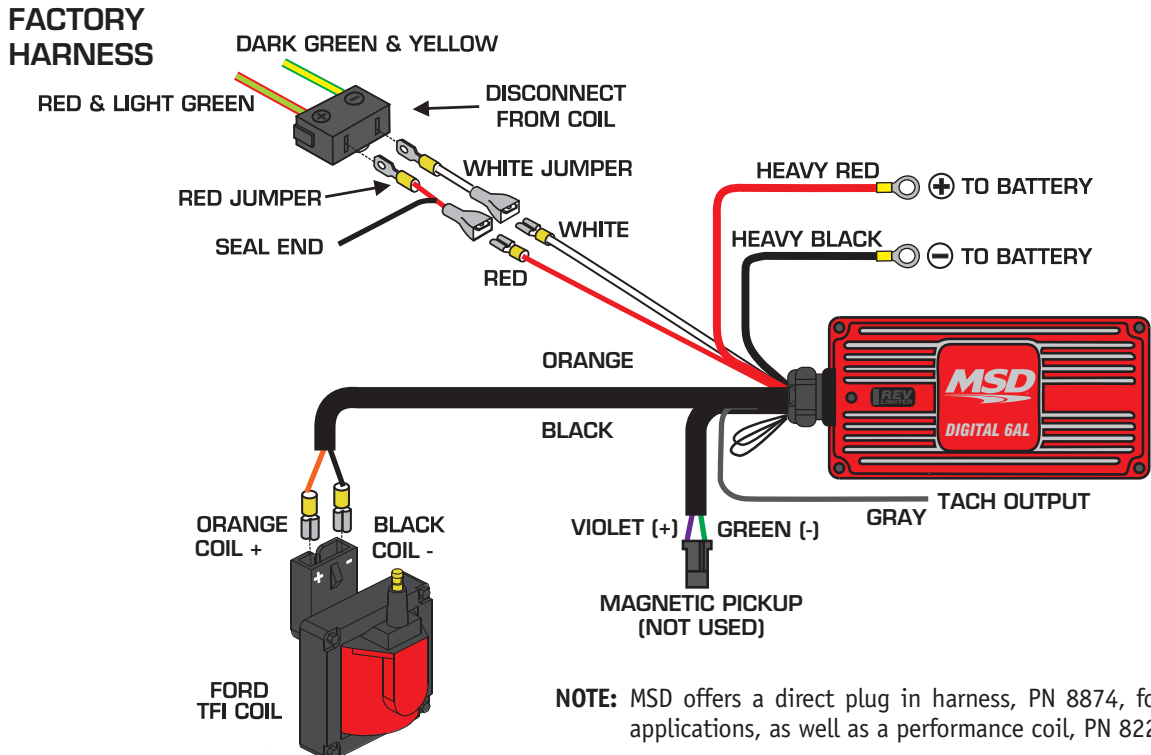
MSD 6-Series to Ford Duraspark using White Wire Trigger



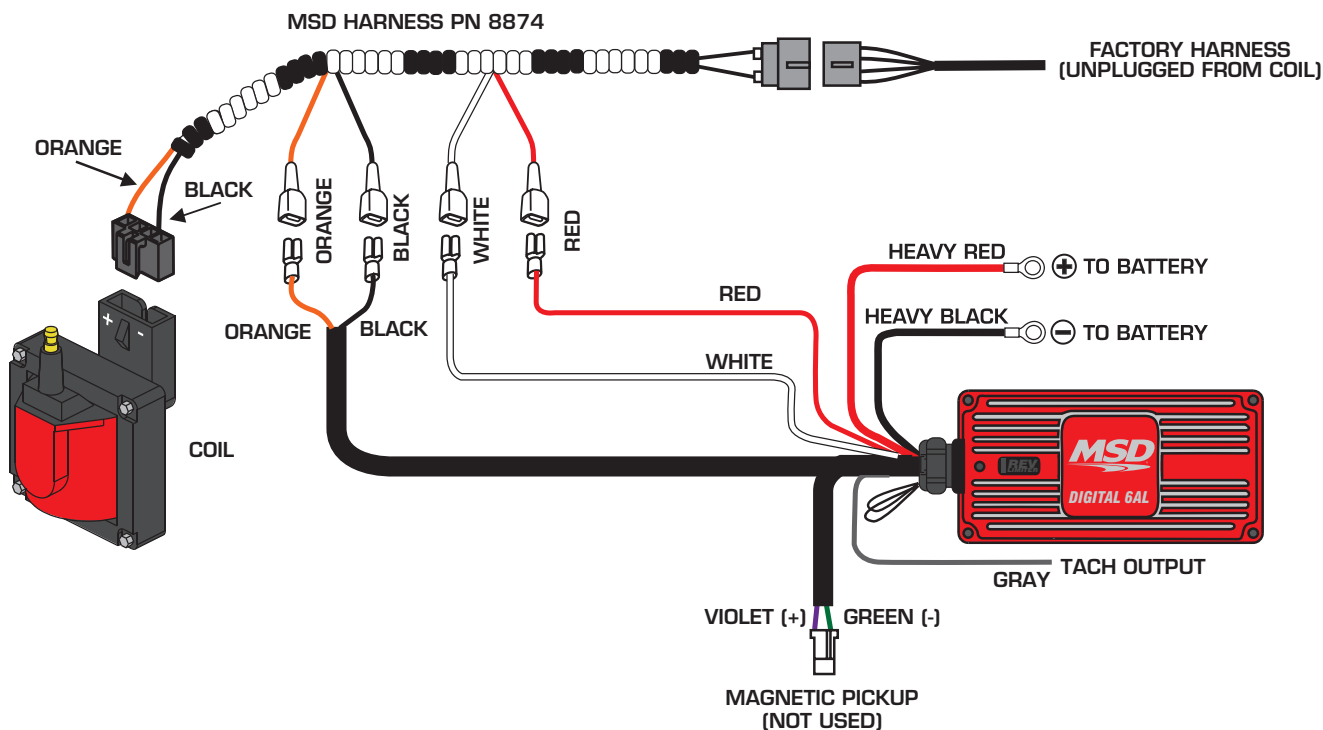
MSD 6-Series to Ford Duraspark using Magnetic Pickup



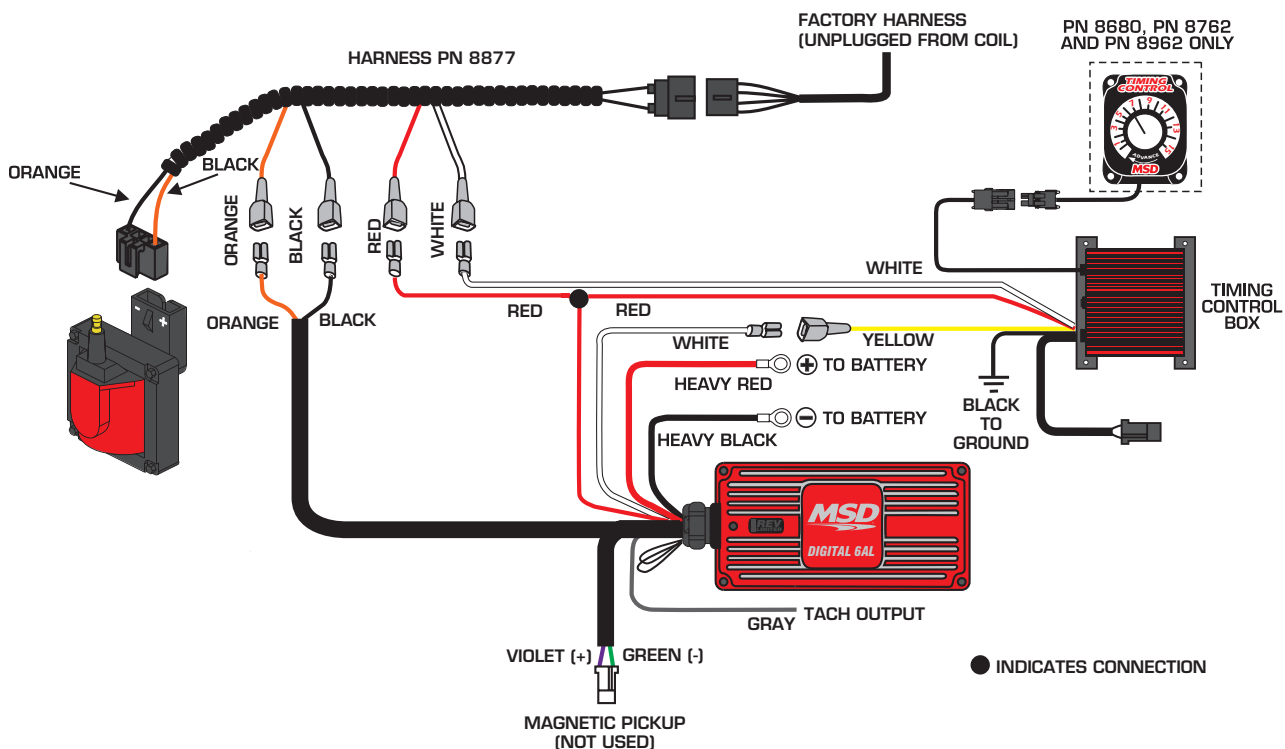
MSD 6-Series to Ford TFI Coil (without harness)



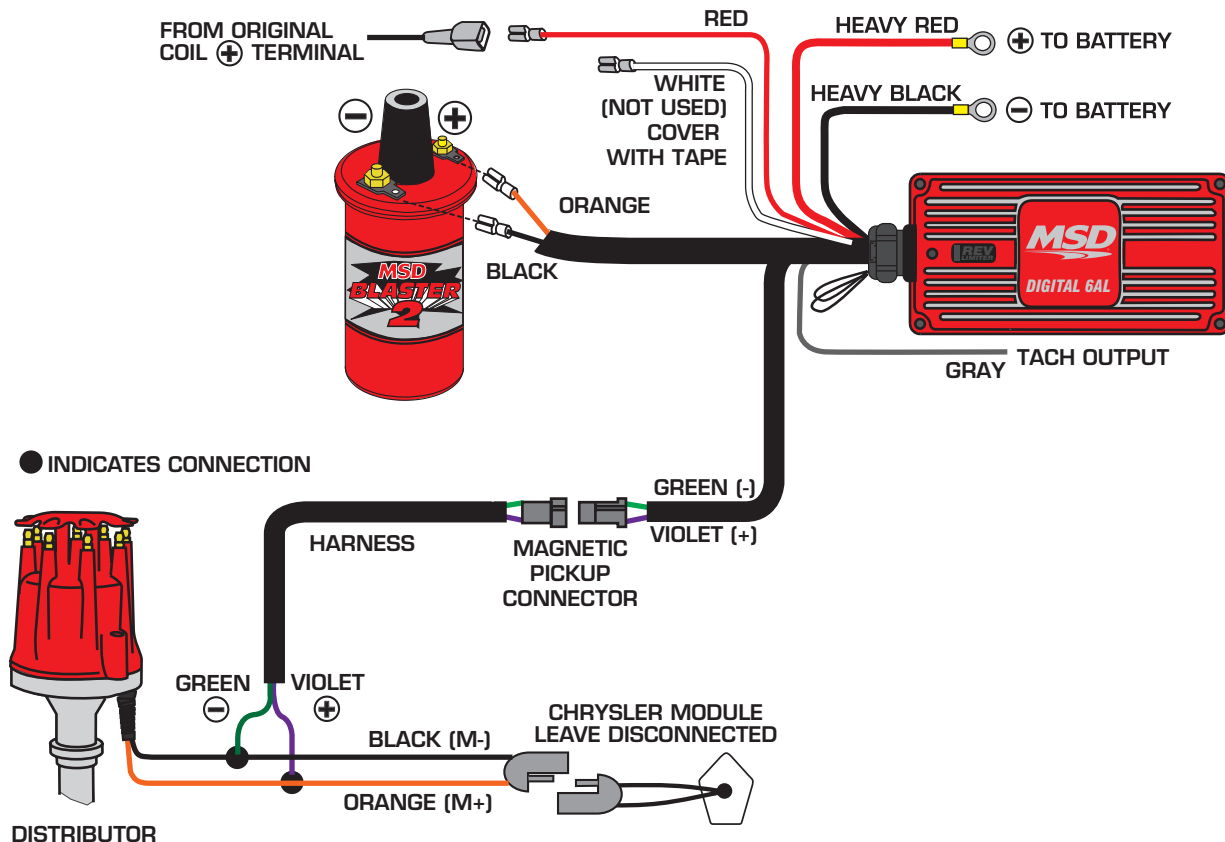
MSD 6-Series to Ford TFI Coil (with Harness, PN 8874)



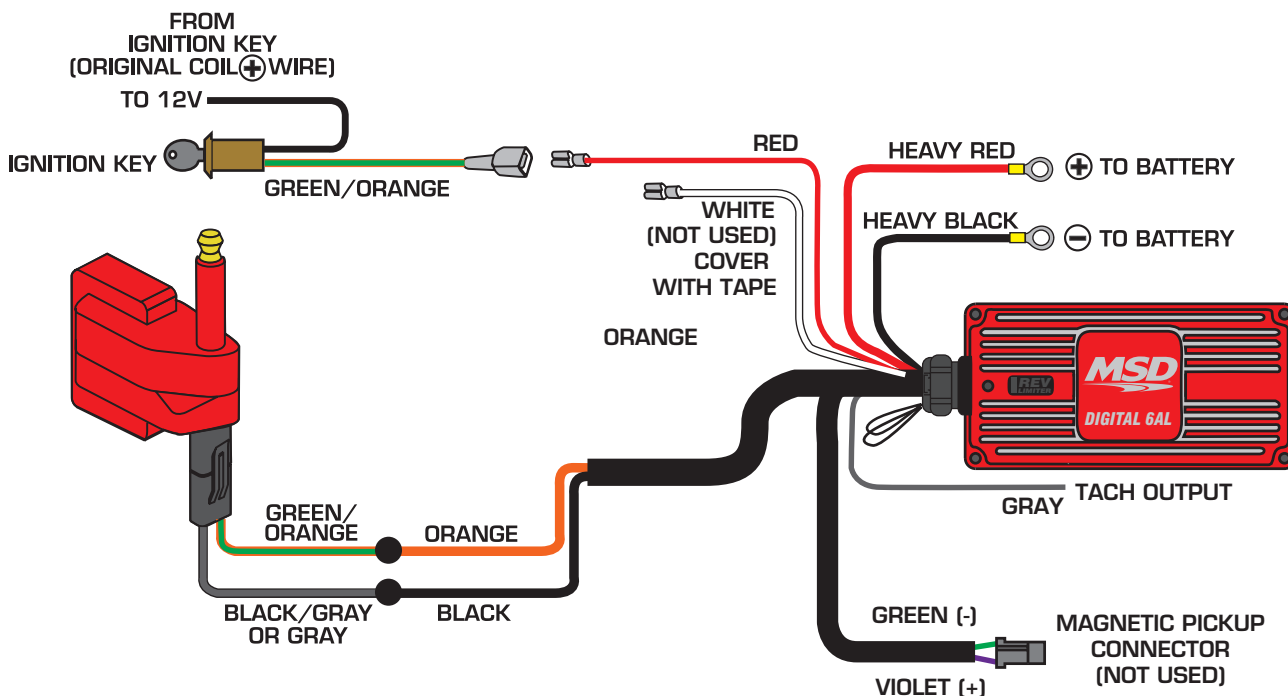
MSD 6-Series with Ford TFI Harness and Timing Control



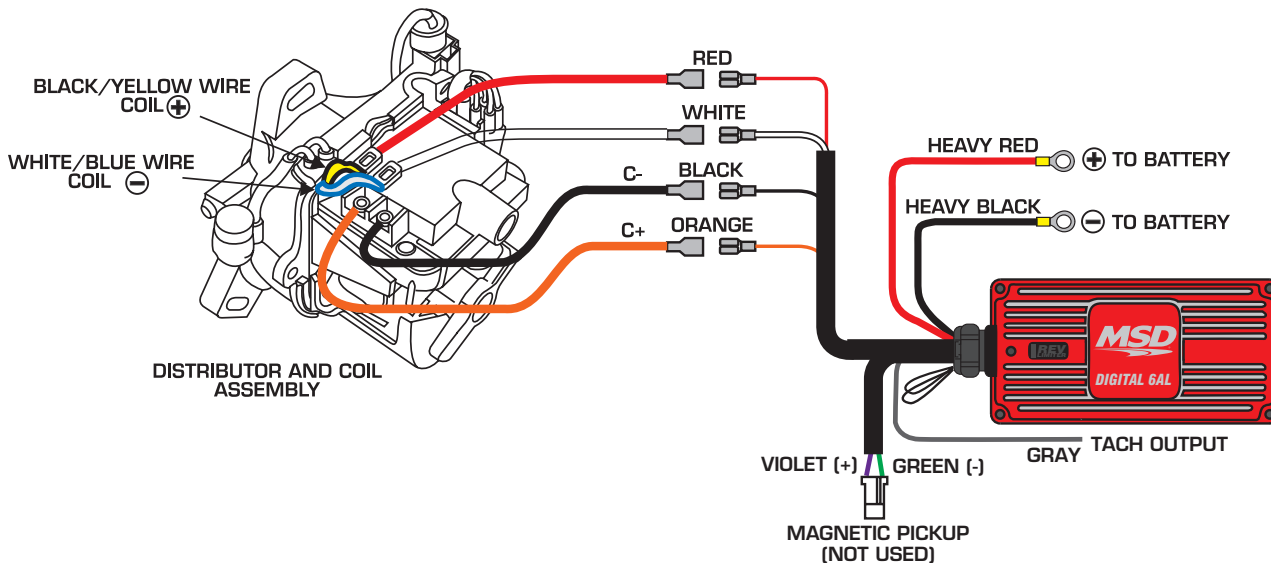
MSD 6-Series to Chrysler Electronic Ignition Using Magnetic Pickup



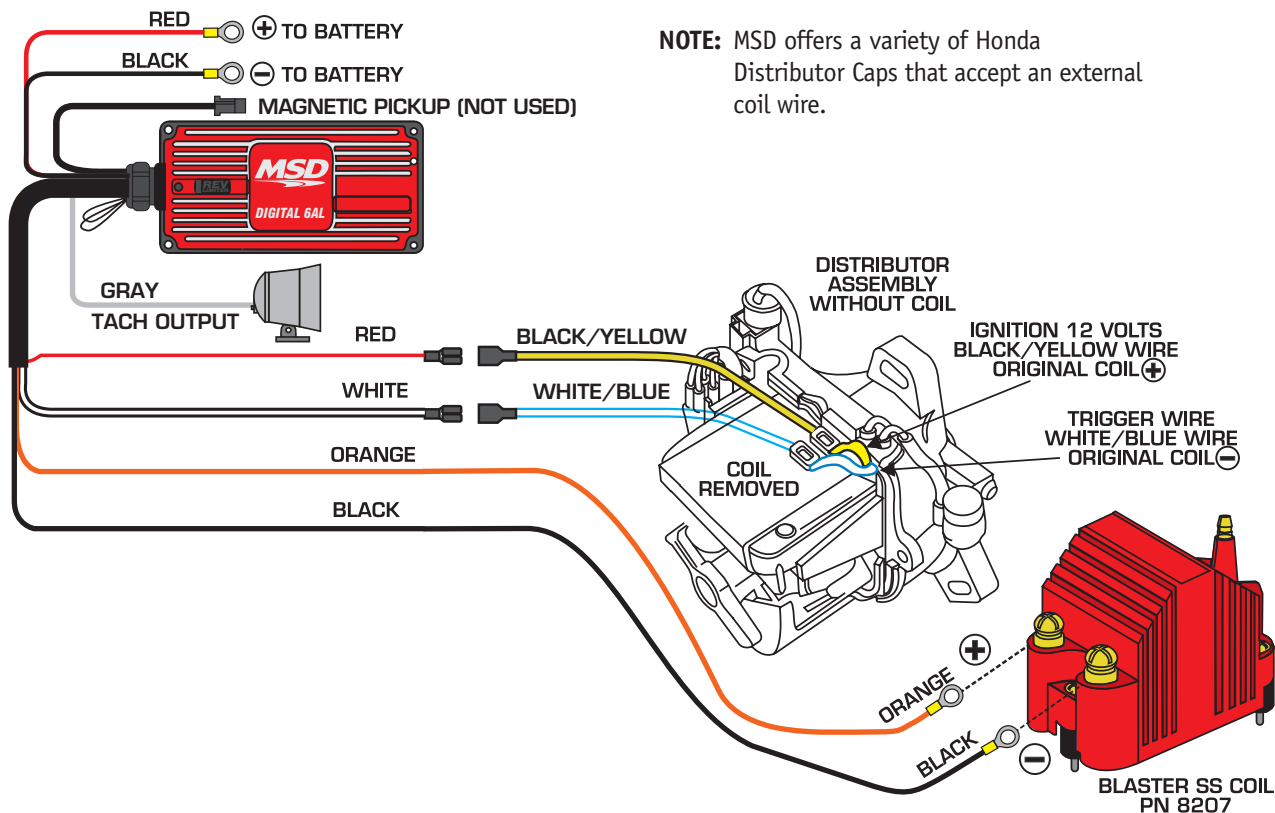
MSD 6-Series to Late Model Dodge with 2-pin Coil



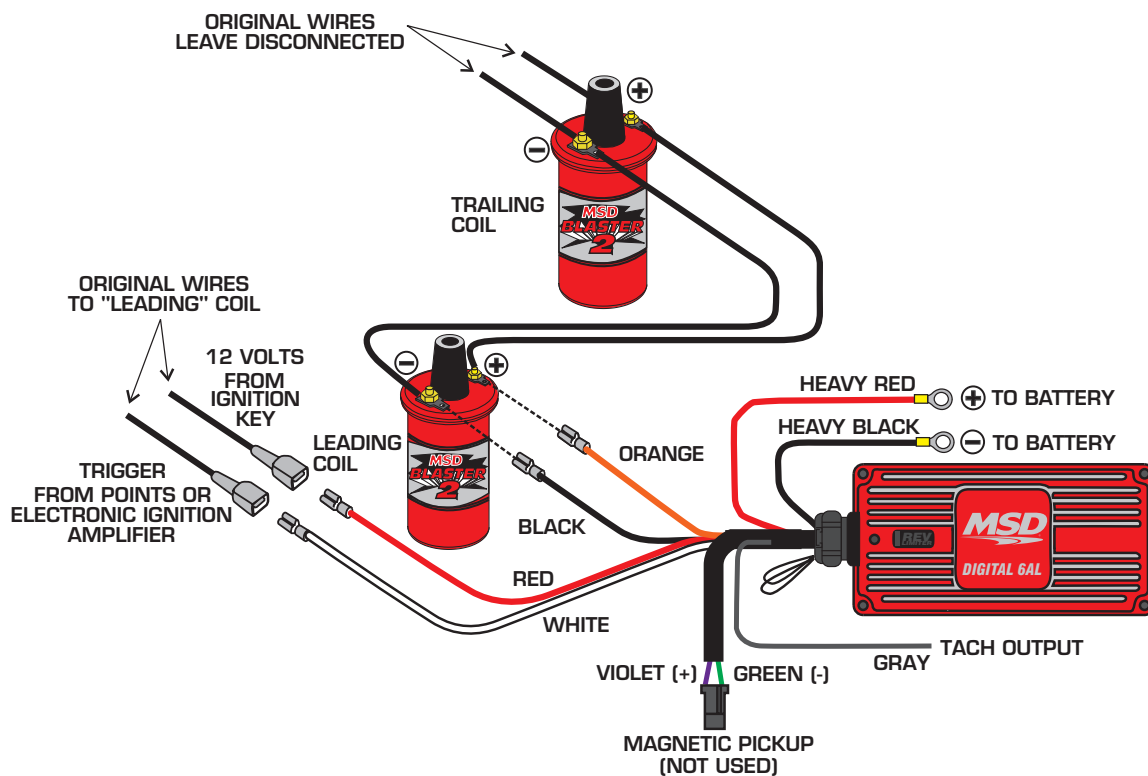
MSD 6 and SCI-Series to Honda/Acura with Internal Coil



MSD 6 and SCI-Series to Honda/Acura with Blaster Coil and Power Cap

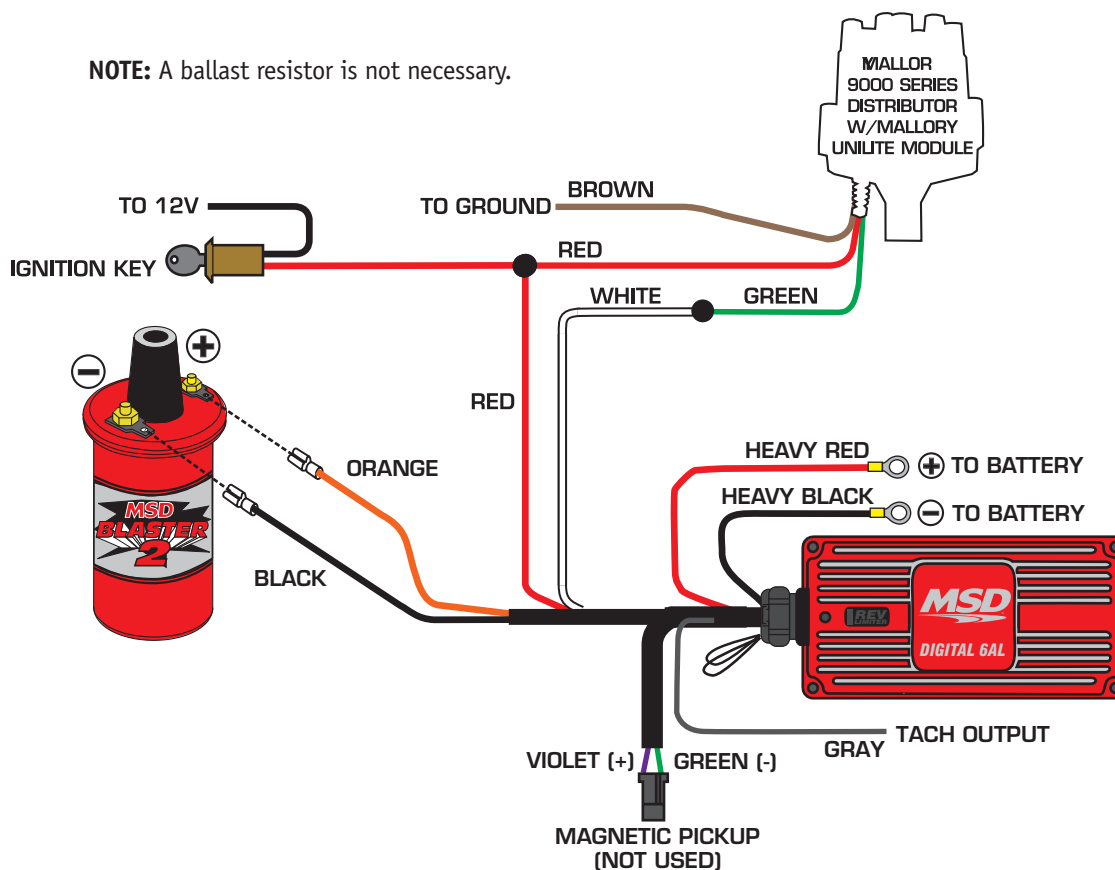


MSD 6-Series to Mazda Rotary with Single MSD Unit

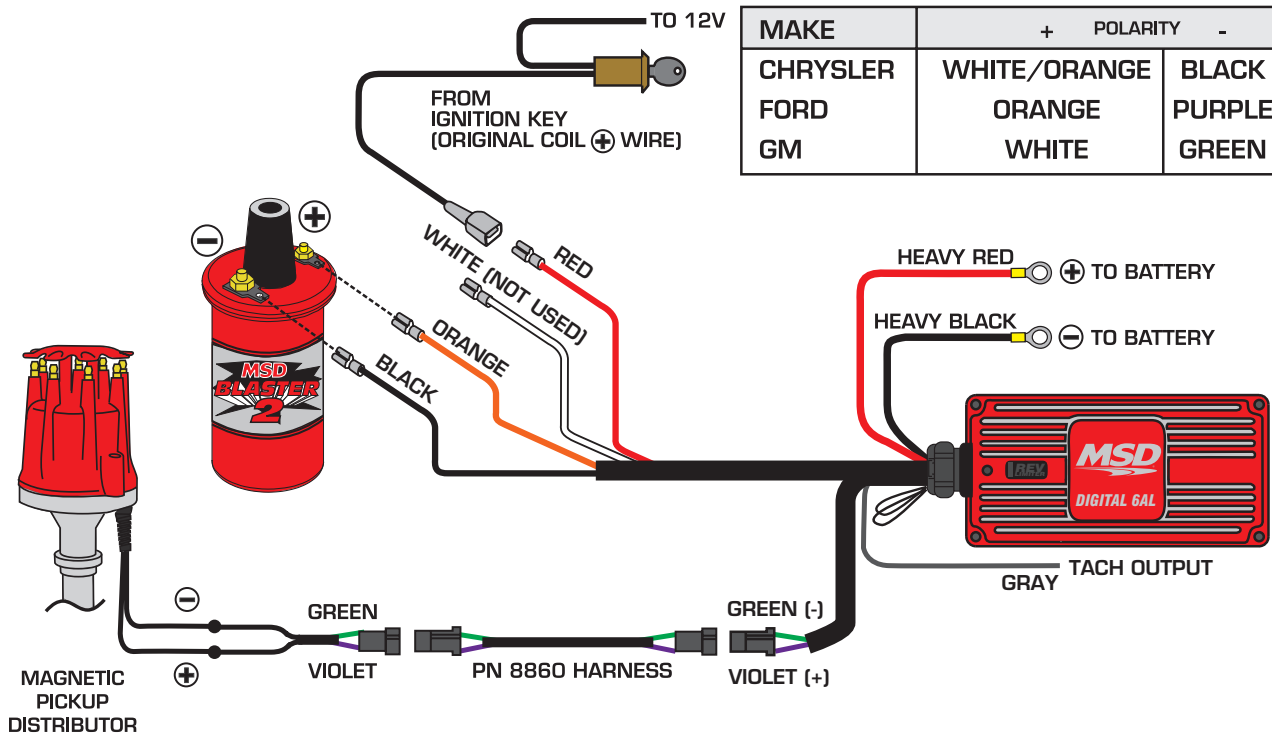


MSD 6-Series to Mallory Unilite Distributor

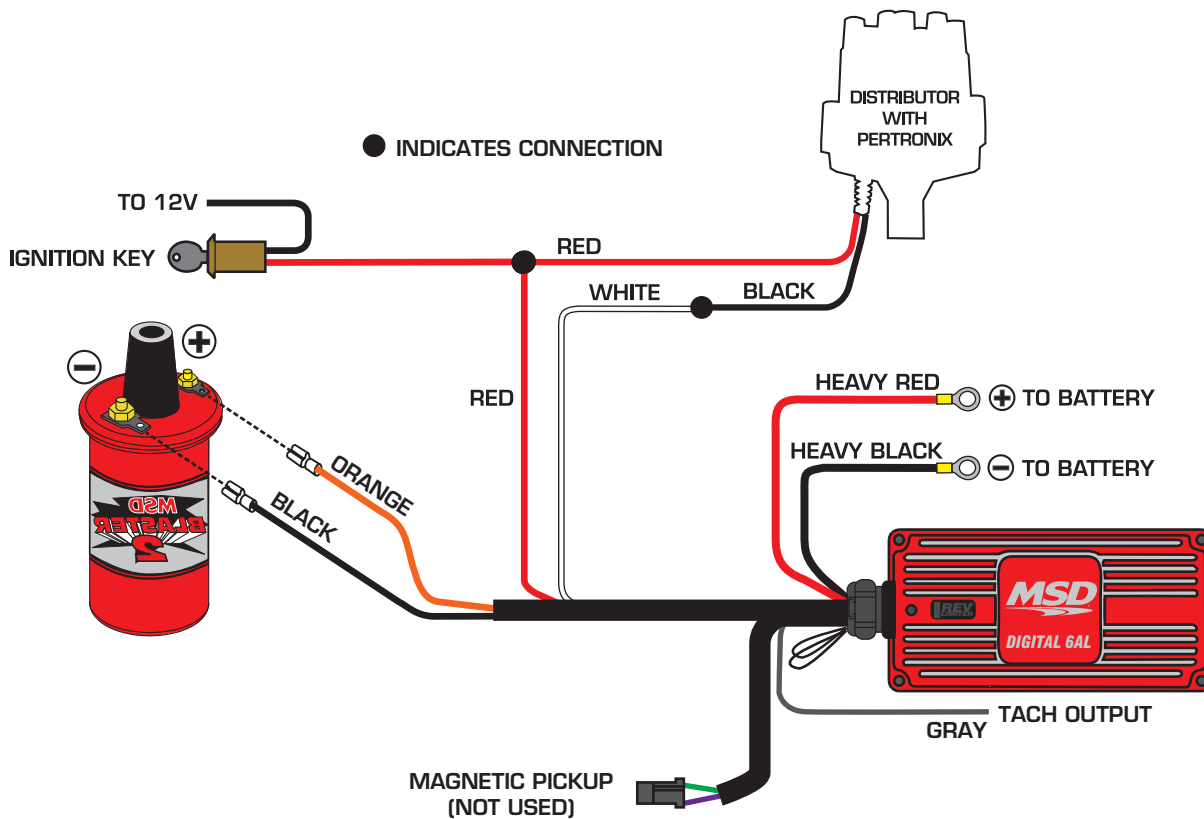
NOTE: A ballast resistor is not necessary.



MSD 6-Series to Other Magnetic Pickup Distributors



MSD 6-Series to Pertronix Kit



Wiring an MSD Marine Ignition System, PN 6460, and PN 6560

MSD offers several ignition components designed for marine applications; the MSD 6M-2 Ignition Control, PN 6460, 6M-2L, PN 6560, and several Pro-Billet Distributors. The Distributors are for use with boats equipped with automotive style engines. All of the Marine Ignition components are equipped with Weathertight connectors and the corresponding connectors.

The 6M-2 and 6M-2L are capacitive discharge, multiple spark ignitions and will install to points, electronic ignitions and magnetic pickups. Both ignitions are U.L. approved for Marine use.

NOTE: The 6M-2 and 6M-2L cannot be used with distributorless ignition models.

Specifications:

6M-2 and 6M-2L

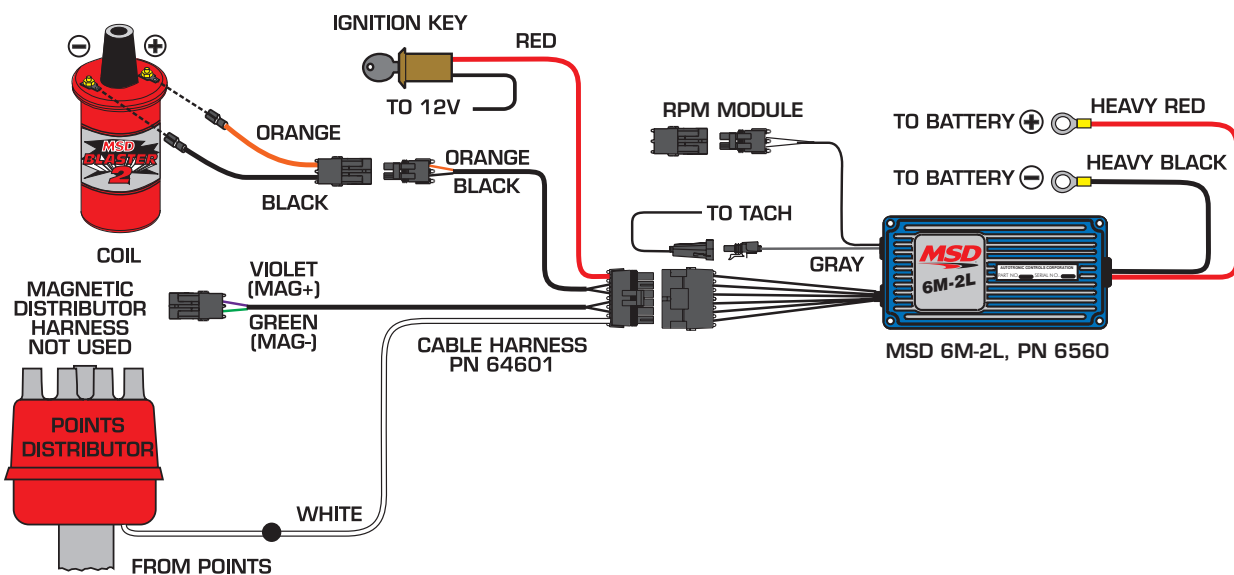
Operating Voltage:	11-18 volts
Current Requirements:	1 Amp per 1,000 rpm
RPM Range:	15,000 rpm with 14.4 volt supply
Spark Duration:	20° (crankshaft rotation)
Primary Voltage Output:	460-480 volts
Spark Energy Output:	105-115 milliJoules
Weight and Size:	2.75lbs., 8"L x 3.5"W x 2.25"H

Wire Functions

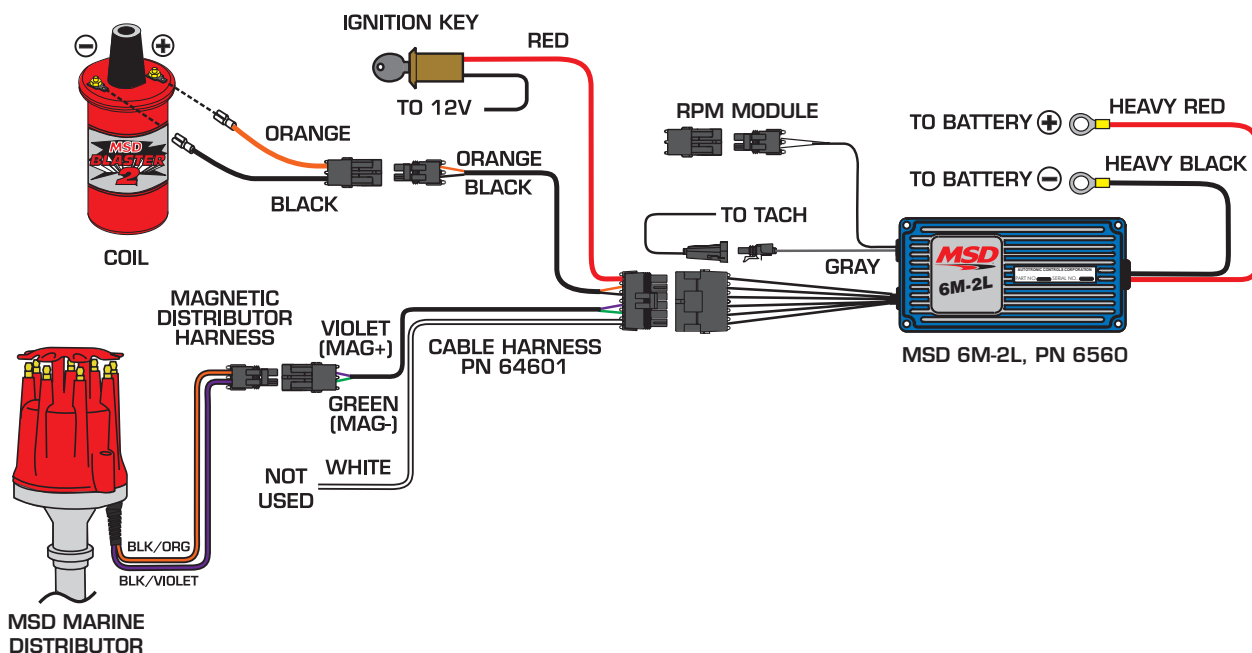
Power Cables:	The heavy Red connects to the battery positive (+) terminal. The heavy Black connects to the battery negative (-) terminal or other good engine ground.
Red:	Connects to a switched 12 volt source.
Orange:	Connects to the positive (+) terminal of the coil. This is the only wire that makes electrical contact with the coil positive terminal.
Black:	Connects to the negative (-) terminal of the coil. This is the only wire that makes electrical contact with the coil negative terminal.
White:	This is one of the wires that provides a trigger signal for the MSD. It connects to the breaker points or electronic ignition output. When this wire is used the Magnetic pickup connector is not (Violet and Green).
Violet and Green:	These wires are routed in the same 2-pin connector. They plug directly into the 2-pin connector of the MSD Marine Distributors. The Violet wire is positive (+) and the Green wire is negative (-). When they are used, the White wire is not.
Gray:	This is the tach signal wire and connects directly to the tachometer. It produces a 12 volt square wave signal.
4-Pin Connector:	This connector, only on the 6M-2, PN 6460, plugs directly into the MSD Marine Rev Limiter, PN 8768.
Rev Limiter:	The 6M-2L, PN 6560, features a 2-pin connector that accepts a marine rpm module to set an rpm limit.

WARNING: When using a capacitive discharge ignition control, there is high voltage present at the coil primary terminals. Do not touch the coil or connect test equipment to these terminals.

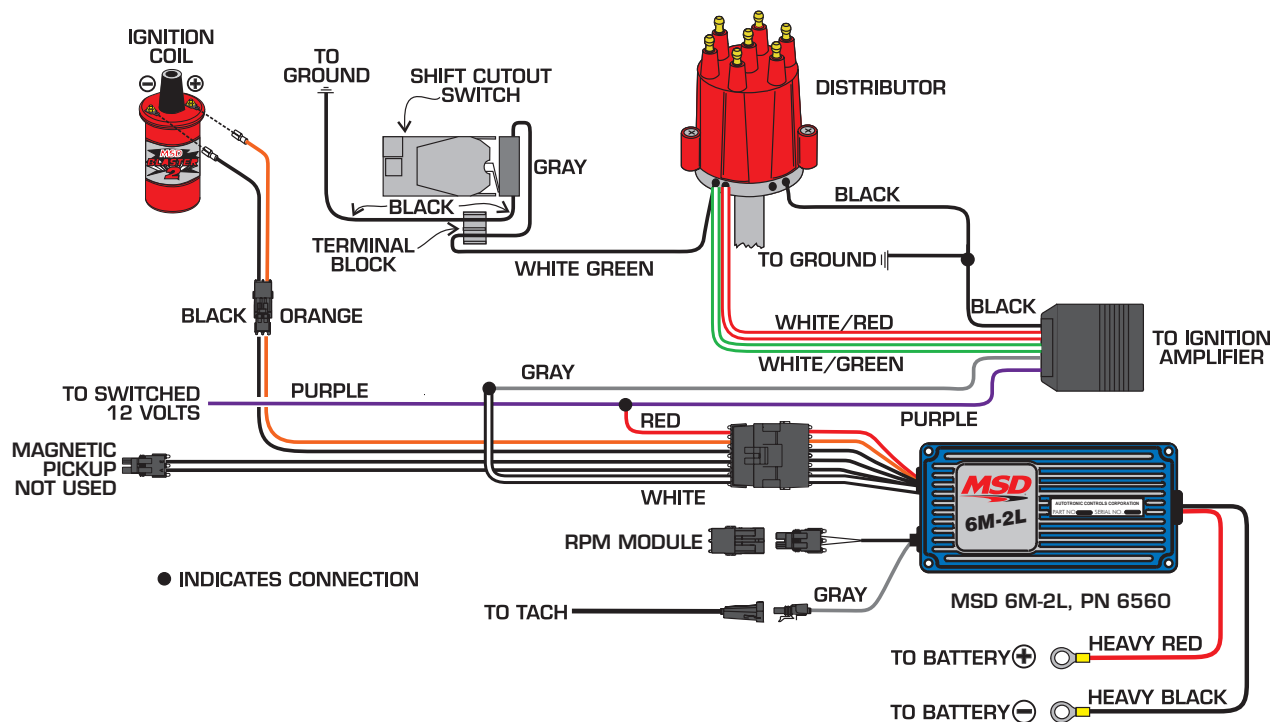
MSD 6M-2L Marine Ignition to Points Ignition System



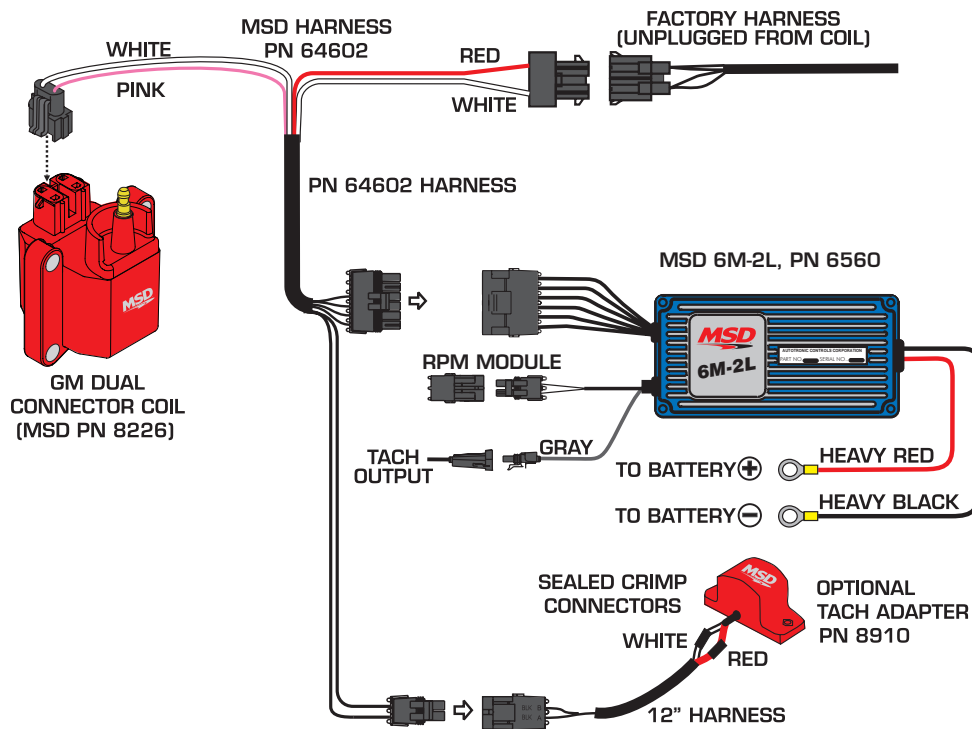
MSD 6M-2L Marine Ignition to Magnetic Pickup Distributor



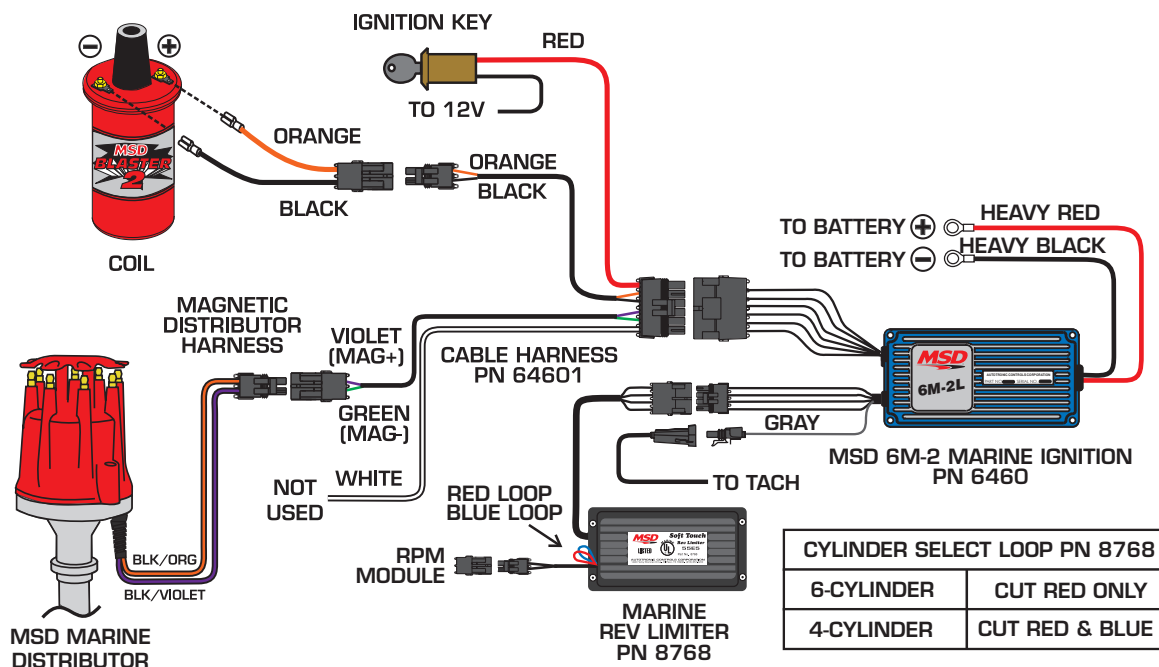
MSD 6M-2L Marine Ignition to Mercruiser Electronic Ignition



MSD 6M-2L Marine Ignition to GM Dual Connector Coil



MSD 6M-2 Marine Ignition to Magnetic Pickup Distributor



Wiring a Marine Engine Protector, PN 5468

The Marine Engine Protector is a universal rev limiter that can be used with inductive ignition controls. The rpm limit is adjusted with a potentiometer from 3,000 to 8,000 rpm. It can be used on 4, 6 and 8-cylinder automotive style engines. It cannot be used with an MSD Ignition.

Wire Functions

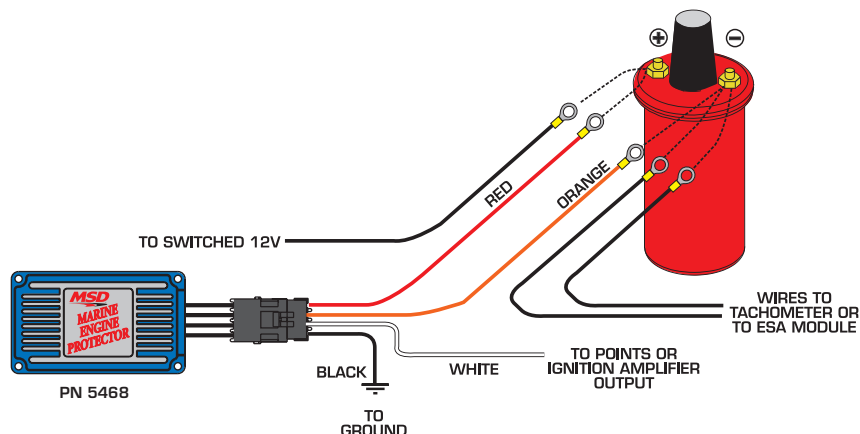
- Red:** To the coil positive (+) terminal.
- Black:** Connects to engine ground.
- Orange:** Connects to the coil negative (-) terminal.
- White:** Connects to the points output or electronic amplifier trigger wire.

Adjusting the Rev Limit

When the potentiometer is turned to the full counterclockwise position there is no rpm limit.

When the potentiometer is turned to the full clockwise position the limit is approximately 8,000 rpm for an 8-cylinder, 10,000 on a 6-cylinder and 16,000 on a 4-cylinder.

General Installation of the MSD Marine Engine Protector



Installing an MSD Digital 6AL-2, PN 6421, and Programmable 6AL-2, PN 6530

The Digital 6AL-2, PN 6421, and Programmable 6AL-2, PN 6530, Ignitions share the same housing and wiring features. The PN 6421 features a built-in 2-step rev limiter that is adjusted with rotary dials. The Programmable unit connects to a PC for adjustments to its features. Both are outlined in the following pages.

Operating Specifications

Spark Energy:	135 mJ Per Spark	RPM Range:	12,500 RPM with 14.4 Volts
Primary Voltage:	535 Volts	Voltage Required:	12-18 Volts, Negative Ground
Secondary Voltage:	45,000 Volts	Current Draw:	.7 Amp per 1,000 RPM
Spark Series Duration:	20° Crankshaft Rotation	Weight and Size:	3 lbs., 7"L x 4"W x 2"H

Wire Functions

Power Leads:	These are the two heavy 14 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 28 volts input.
Heavy Red:	This wire connects directly to the battery positive (+) terminal. 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.
Red:	This wire is responsible for turning the MSD On and Off. Connects to a switched 12 volt source such as the ignition key or switch.
Orange:	This wire connects to the coil positive (+) terminal. This is the ONLY wire that makes electrical contact with the positive coil terminal.
Black:	This wire connects to the coil negative (-) terminal. This is the ONLY wire that makes electrical contact with the negative coil terminal.
Trigger Wires:	There are three circuits that can be used to trigger the MSD Ignition; a Points circuit (the White wire), a Magnetic Pickup circuit (the Green and Violet wires), and a Hall-effect wire (White/Blue). Only one circuit will be used at a time.
White:	This wire is used to connect to breaker points, electronic ignition amplifier output or to the Yellow wire of an MSD Timing Accessory. When this wire is used, the White/Blue wire and Magnetic Pickup connector are not used.
White/Blue:	Hall-effect Trigger. This wire connects to the trigger wire of a Hall-effect pickup. When used, the White and Magnetic Pickup wires are not used.
Violet and Green:	These wires are routed together in one harness as the magnetic pickup connector. The connector plugs directly into an MSD distributor or crank trigger. It will also connect to aftermarket pickups. The Violet wire is positive (+) and the Green wire is negative (-). When these wires are used, the White or White/Blue wires are not.
Blue:	This wire activates the 2-Step Rev Control. When 12 volts is applied to this wire, the low rpm limit is activated. When 12 volts is removed, the rev limit returns to the high limit.
Gray:	Tach output wire. Connects to the tachometer trigger wire or other rpm activated device.

ADDITIONAL WIRING FOR THE PROGRAMMABLE 6AL-2, PN 6530

Dark Blue:	Launch Rev Limit. When 12 volts are applied to this wire it will activate the Launch Rev Limit and reset the Launch Retard. This overrides other rev limits.
Light Blue:	Burnout Rev Limit. When 12 volts are applied the Burnout Rev Limit is active.
Pink:	Retard Step. This retard is activated when 12 volts are applied and rpm is above the Step1 Rpm value.

3-PIN CONNECTOR, MAP SENSOR: Connects to an external MAP or gauge pressure sensor.

Brown/Violet:	+5 volt supply
Brown/Yellow:	Ground
Dark Brown:	Map Signal

Programming the Digital 6AL-2

Cylinder Select

The 6AL-2 is programmed for operation on 8-cylinder engines. If installing the Ignition on a different style engine, the number of cylinders will need to be selected on the Cylinder Select Rotary Switch.

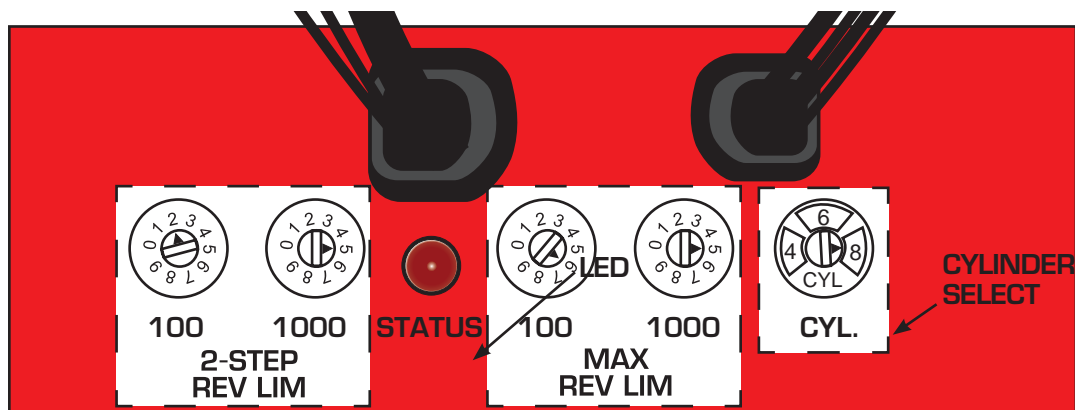
Rev Limiter

There are two adjustable rev limits that you can adjust; the Max Limit and the 2-Step Limit. Both limits are adjusted in 100 rpm increments by turning the rotary switches on the side of the Ignition, see figure on right. **Note:** The engine can be running as you make adjustments to the rev limiter function.

Max Rev Limiter: Adjustable from 2,000 to 11,900 rpm.

2-Step Rev Limiter: This limit is active when the Blue wire is connected to 12 volts. It is generally connected to a clutch switch or transbrake. It is adjustable from 2,000 to 11,900 rpm.

No Limits: If no rev limits are desired, position the dials at Zero.



These settings are an example of:

5200
2-step Rev Limit

5600
Max Rev Limit

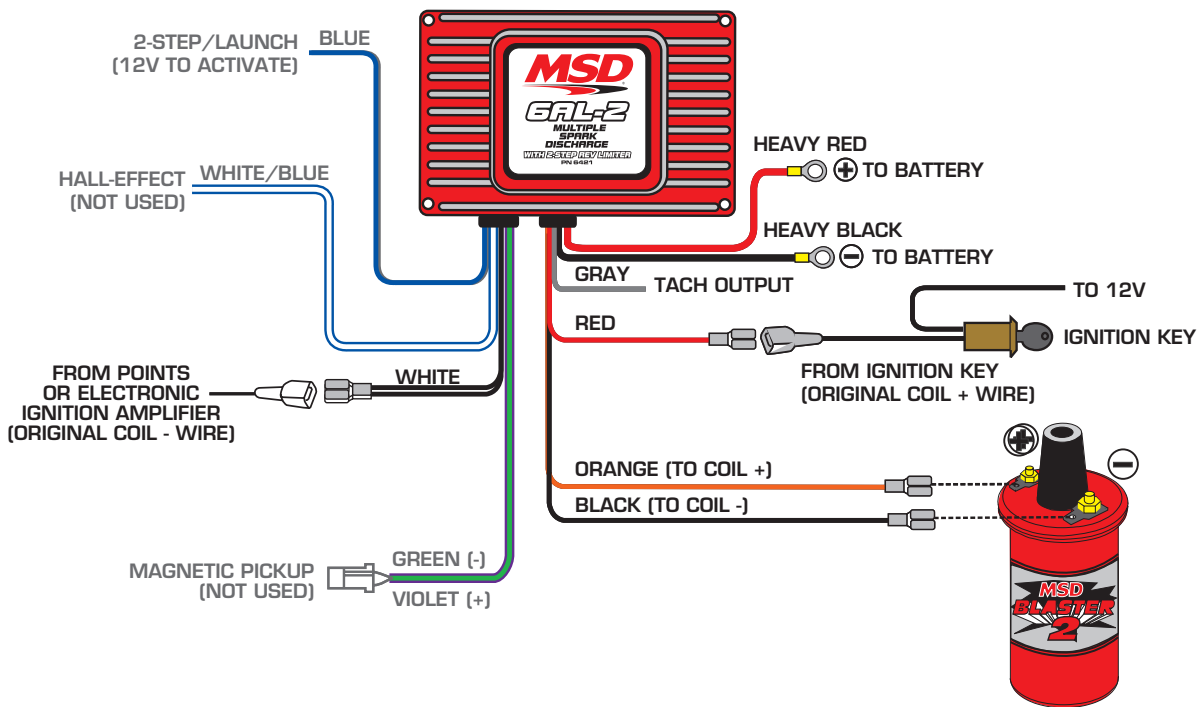
8
Cylinder

LED

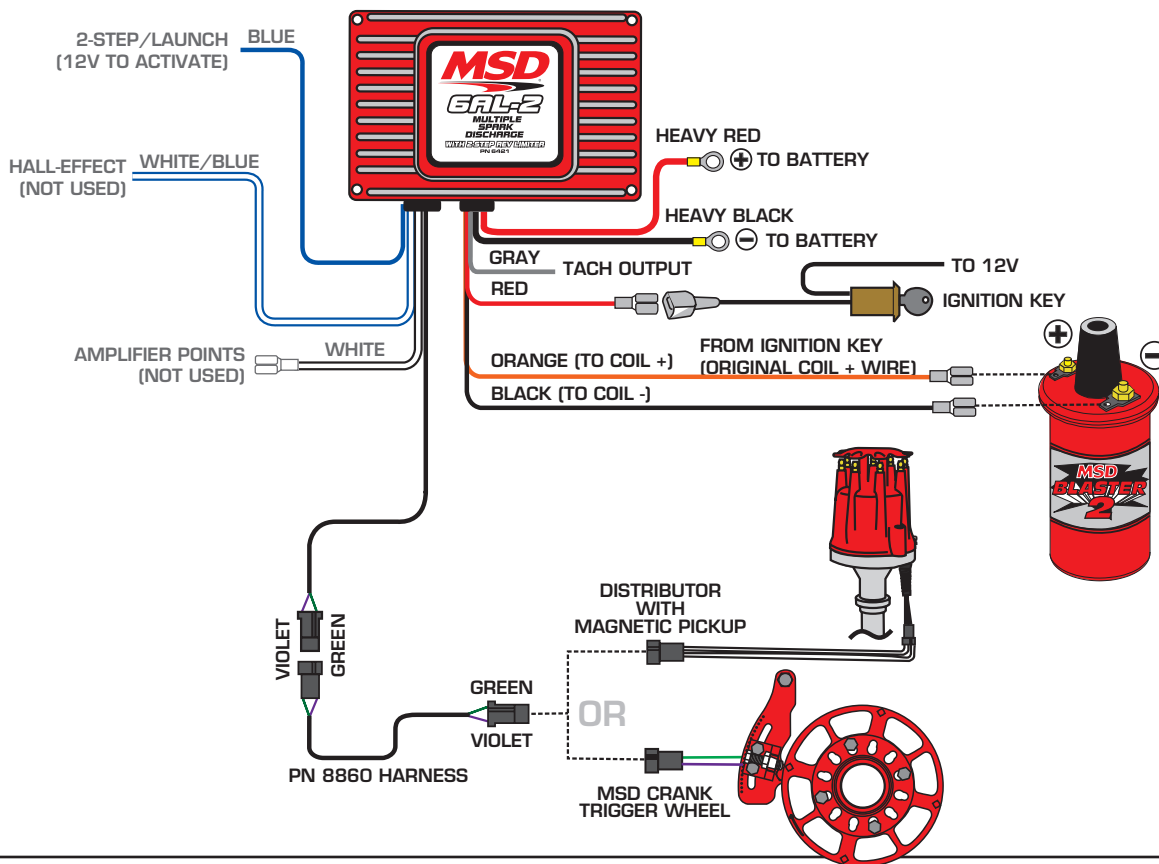
The LED on the side of the MSD monitors several operating conditions of the MSD. If the LED indicates that there is a problem with the ignition system, follow the steps through the Troubleshooting section. The LED will appear to be on steady above idle speeds when everything is functioning properly.

- Flashes once per second if the battery supply voltage is low when under 3,000 rpm (while multiple sparking). This indicates a charging problem or poor connection.
- It will flash approximately once per second if the battery input voltage is above 28 volts for a sustained amount of time.
- The LED will flash for every trigger signal from the distributor or crank trigger. You can take advantage of this when statically setting the timing when using the White or White/Blue wire to trigger.
- The LED will remain solid as RPM goes up.

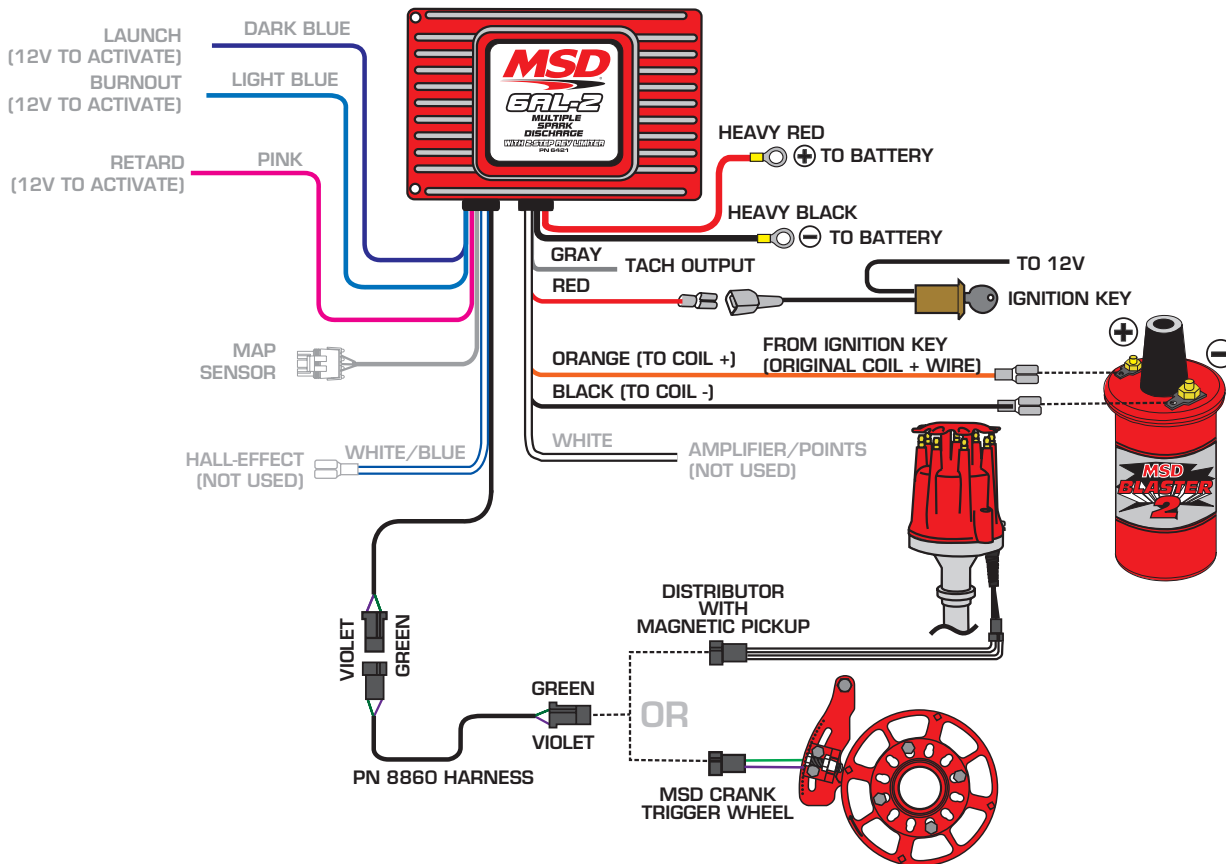
Digital 6AL-2, PN 6421, with Points/Amplifier Style Ignition



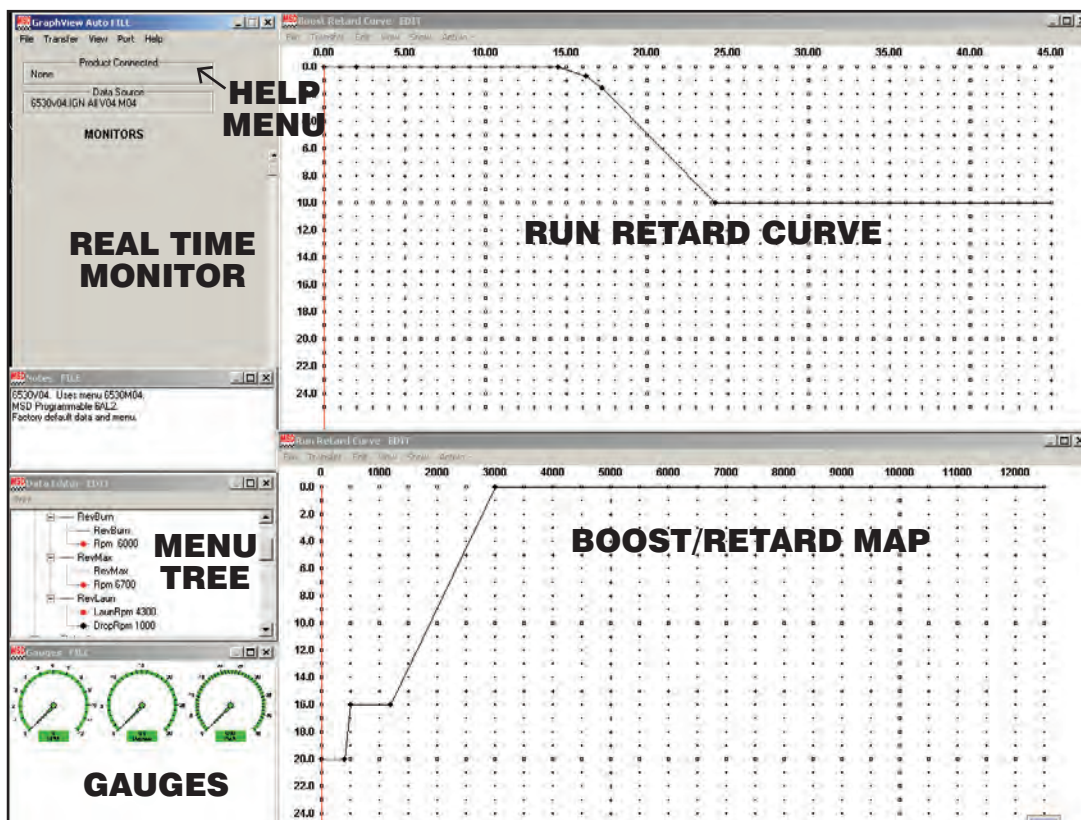
Digital 6AL-2, PN 6421, with an MSD Distributor/Crank Trigger



Wiring the MSD Programmable 6AL-2, PN 6530



Pro-Data+ Screen and Program Windows



Programming Features, PN 6530

The following explains the programmable features of the PN 6530 Ignition. These instructions serve as an overview of the features and their operation. The Pro-Data+ software also has a Help Menu that explains many features in great detail. The features are listed in the same order that they show on the Data Editor list in the software.

NOTE: If you are programming the timing functions of the ignition, the distributor will require being locked-out.

Rev Limits

Up to three different rev limits can be programmed in 100 rpm increments.

RevBurn: Burnout Rev Limit. This limit is activated when 12 volts are applied to the Light Blue wire. It is adjustable from 2,000 to 12,500 rpm.

RevLaunch: Launch Rev Limit. This limit is activated when 12 volts are applied to the Dark Blue wire. It is adjustable from 1,000 to 12,500 rpm.

RevMax: Max Speed Rev Limit. This is the over-rev limit and is active whenever the Launch and Burnout limits are off.

Drop RPM

This option is for Manual shift applications using the clutch between shifts. This RPM value will set up a window so the Launch limiter will not reactivate when using the clutch between shifts. This RPM will be set lower than Launch RPM.

Launch Retard

The launch retard can be activated multiple ways depending on the application. In order to customize this feature to your application there are 3 adjustments that need to be made (Figure 11).

1st Delay: This is a time delay that starts counting once 12 volts is removed from the Launch Wire (Dark Blue Wire). If this delay is set at 0 seconds, then the launch retard will become active as soon as 12 volts is applied to the Launch Wire. If you have anything other than 0 seconds (example: .10 or more), then the launch retard will not become active until 12 volts is removed from the Launch Wire and the Delay time is achieved.

2nd Retard: This is the amount of timing that will be retarded once 12 volts is removed from the Launch Wire. The retard amount will become active when 12 volts is applied to the Launch wire if the Delay is set to 0 seconds.

3rd Ramp: This adjustment determines the rate (over time) that timing will be ramped back into the motor until the run curve timing is met. When the Launch Wire is removed from 12 volts and the Launch Delay value is timed out then timing will begin ramping back into the motor. The Ramp determines how fast this is done.

Always remember all timing retards (Launch, Step, Boost and the Run Curve retards) are all added together in the total retard amount. When using multiple retards be sure to check the timing in order to insure that they don't overlap.

Step Retard

There is a single step retard that is controlled through the Pink activation wire or through rpm. It can also have an rpm point that the engine must reach before the retard becomes active (a minimum rpm can also be programmed that must be reached before a step becomes active). A time based ramp can be programmed to gradually bring the retard to its full On amount, or to ramp the retard amount out (back to no retard) from its setting.

Activation through Wiring: The retard is activated when 12 volts are applied to the Pink wire. The maximum retard allowed by the ignition is a total of 30° (including other retard amounts or a boost map).

Activation through RPM: The step retard can also be activated through rpm. In order to achieve this, 12 volts must still be applied to the Pink wire, and an rpm value must be selected from the Step RPM menu. When 12 volts are applied, the retard will not activate until the rpm value is reached. Note that the retard will remain active above this rpm. It will deactivate when the rpm drops below the set amount or when 12 volts are removed from the Pink wire.

NOTE: If you prefer to activate the step retard through the activation wire and not rpm, then the rpm value of the retard step menu must be set to 800 rpm.

Step Retard Ramp: The retard step can be ramped to and from its full retard amount over a time based program (Figure 12). It is adjustable from 0-2.5 seconds in 0.01 second increments. Default is zero for both On and Off.

RPM: The minimum engine rpm that must be reached before a step retard is activated.

On: The amount of time it takes for the step retard to reach its Retard Degree. Allows a gradual ramp On time to reach the Retard Degree. User adjustable from 0.00 to 2.50 sec. (0.01 sec. increments).

Off: The amount of time it takes for the step to retard to reach NO retard. Allows a gradual ramp Off time to reach NO Retard. User adjustable from 0.00 to 2.50 sec. (0.01 sec. increments).

Deg: The amount of retard.

NOTE: All of the retard amounts are cumulative and the maximum amount of retard is 30°.

Boost Retard Curve

This timing curve can be programmed in relation to boost/vacuum pressure within the intake manifold. The curve can be programmed from 2 psia-45 psia in 0.25 psia from 0°-25° in 0.1° increments. Up to 32 different points can be input on the Boost Chart. Also, all of these points are interpolated every millisecond to create a smooth (no steps) curve. This curve can easily be edited using the Boost Curve chart in the Pro-Data+ software. An MSD MAP sensor is required to use this feature and three are offered:

2-Bar, for 2-30 psia, PN 23121

3-Bar, for 2-45 psia, PN 23131

NOTE: The Boost Retard Curve default is 0° retard.

Rev Average: This allows you to program the number of engine revolutions that occur to produce an average boost value. It is adjustable in 2, 4, 6 or 8 crankshaft revolutions. This function is designed to help average the boost pressure to provide an accurate reading. The default is two revolutions which should be ideal for the majority of applications.

PSI Sensor: This allows you to input the specification of the MAP sensor. Select a 15 psia, 30 psia or 45 psia sensor. Default is 15 psia.

Run Retard Curve

This program provides the ability to create a timing curve. The curve can be programmed from 0-12,500 rpm in 0.1° increments for every 100 rpm. You can program up to 32 different points on the map. Also, all of these points are interpolated every millisecond to create a smooth (no steps) curve.

Cylinder Count

CylCnt: This is the number of cylinders of the engine. Programmable for 4, 6 and 8-cylinders. Once a change has been made, turn the ignition Off and On to reset.

Test

Can be set to spark On for normal operation. Set to spark Off to disable the output as an antitheft setting.

Installing MSD 6TN, 6ALN and 6 HVC-L Dual Race Ignitions

This section covers how to wire redundant ignition systems featuring the MSD 6TN, 6ALN and the 6 HVC Professional Ignition. These ignitions are designed primarily for circle track and road course racing where running a redundant ignition system is commonplace. Some of these Ignition Controls feature NASCAR approved Weathertight connectors, a clear base-plate for easy tech inspection and a clear silicone potting for added vibration protection.

There are many different options when running a redundant ignition. MSD also offers several components such as Dual Pickup Distributors and an Automatic Coil Selector for these systems.

Operating Specifications

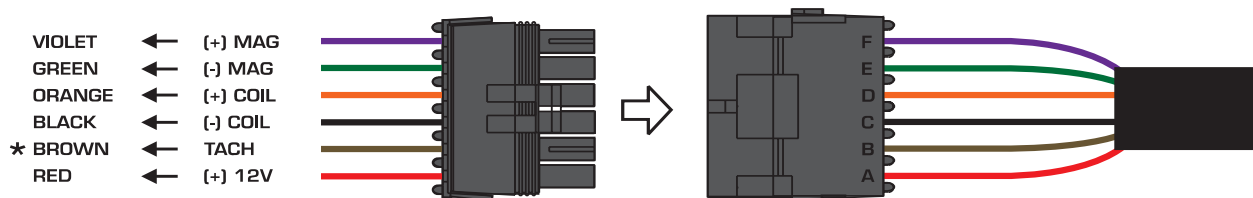
	6TN, 6ALN	6 HVC & 6 HVC-L
Operating Voltage:	10-18 Volts	10-18 Volts
Current Requirements:	1 Amp per 1,000 rpm	.7 Amps per 1,000 rpm
RPM Range:	15,000 w/14.4 Volts	15,000 w/14.4 Volts
Spark Series Duration:	20° Crankshaft	20° Crankshaft
Primary Voltage:	460-480 Volts	550 Volts
Energy Output Maxes:	105-115 Millijoules	150 Millijoules

NOTE: The 6 HVC Ignitions must be used with the HVC Coil, PN 8250.

NOTE: 6T Series Ignitions will accept the PN 8738 external rev limiter.

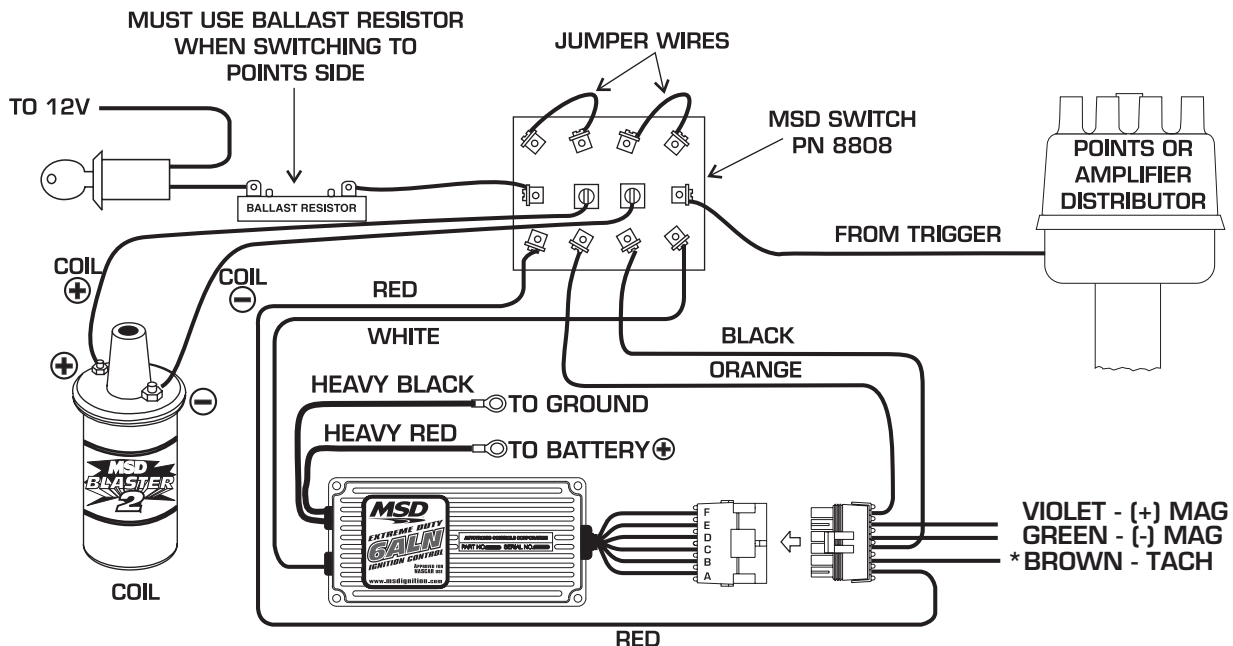
Wire Functions

- Power Cables:** The heavy red connects to the battery positive (+) terminal. The heavy Black connects to the battery negative (-) terminal or other good engine ground.
- Red:** Connects to a switched 12 volts source.
- Orange:** Connects to the positive (+) terminal of the coil. This is the only wire that makes electrical contact with the coil positive terminal.
- Black:** Connects to the negative (-) terminal of the coil. This is the only wire that makes electrical contact with the coil negative terminal.
- White:** This single wire provides a trigger signal for the MSD. It connects to the breaker points, electronic ignition amplifier output or to the Yellow wire of an MSD timing accessory. When this wire is used, the Magnetic pickup wires are not (Violet and Green wires).
- Violet and Green:** These wires are routed together in one harness to form the magnetic pickup connector. They plug directly into an MSD Distributor or Crank Trigger. The Violet wire is positive (+) and the Green wire is negative (-). When they are used, the White wire is not.

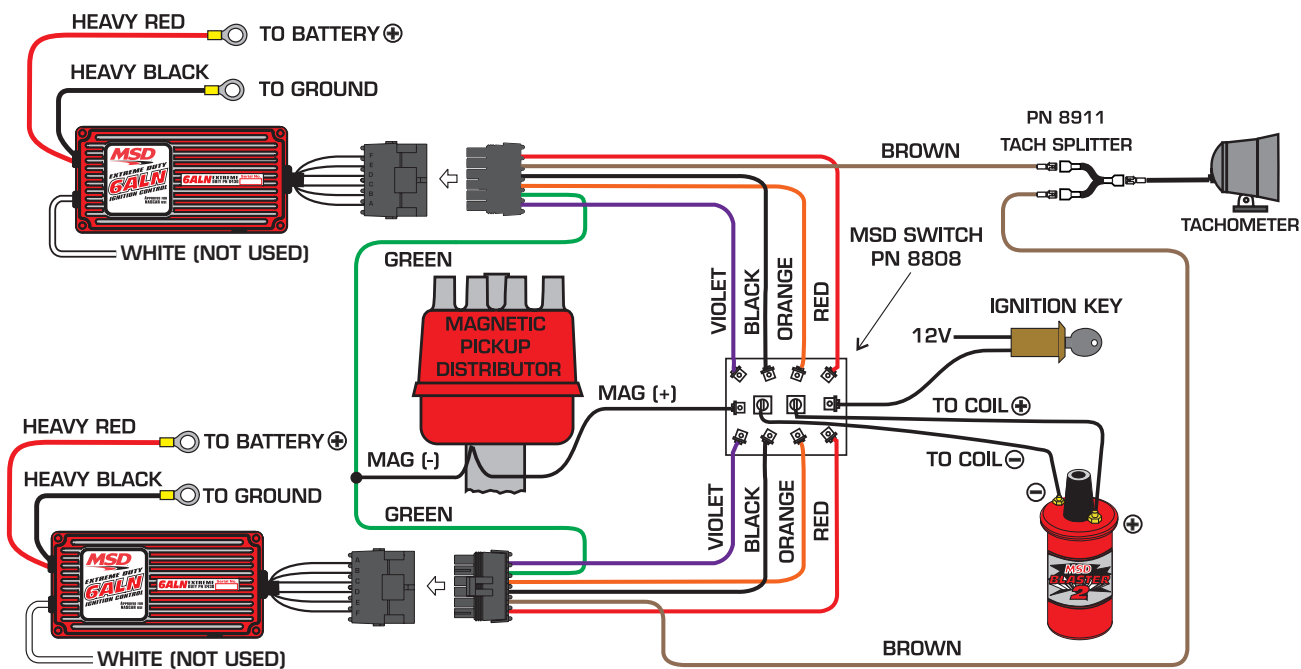


- * THIS WIRE IS WHITE ON GM IGNITIONS AND IS BROWN ON THE MSD. THIS WIRE GOES TO THE TACH.
* GM HEAVY DUTY IGNITIONS DO NOT HAVE A POINTS TRIGGER WIRE.

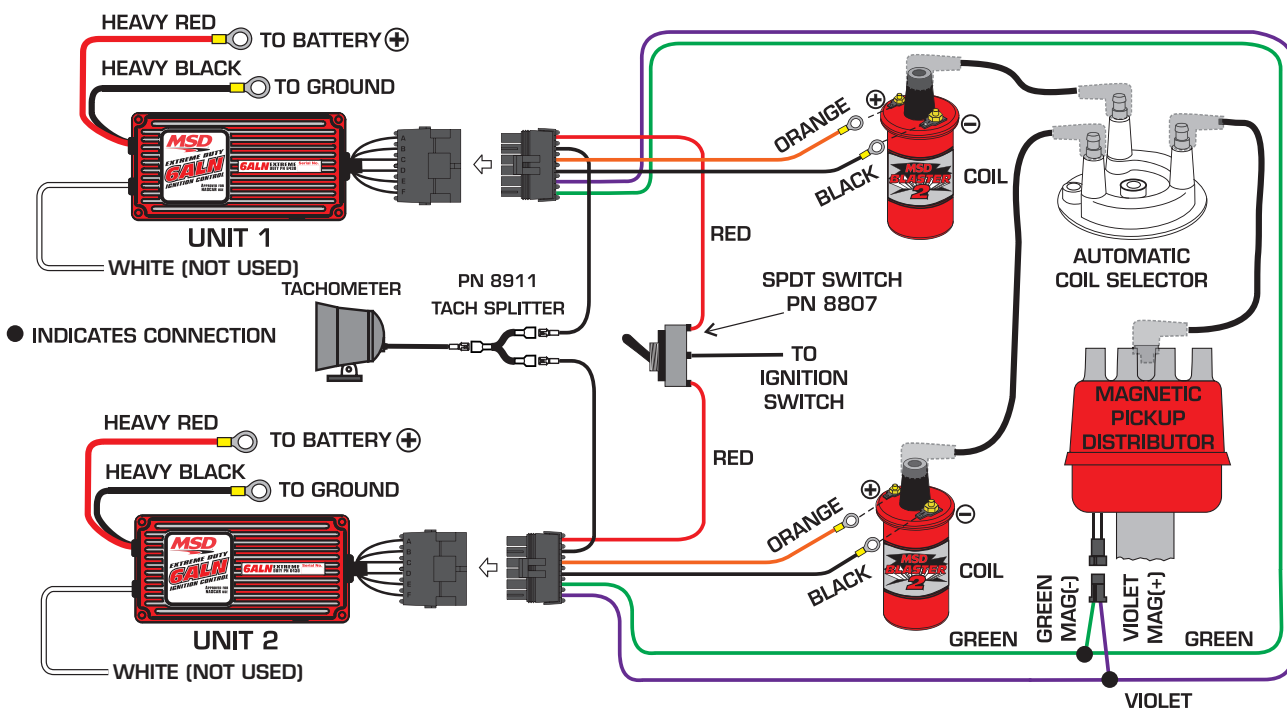
Switching Between Points/Amplifier and MSD



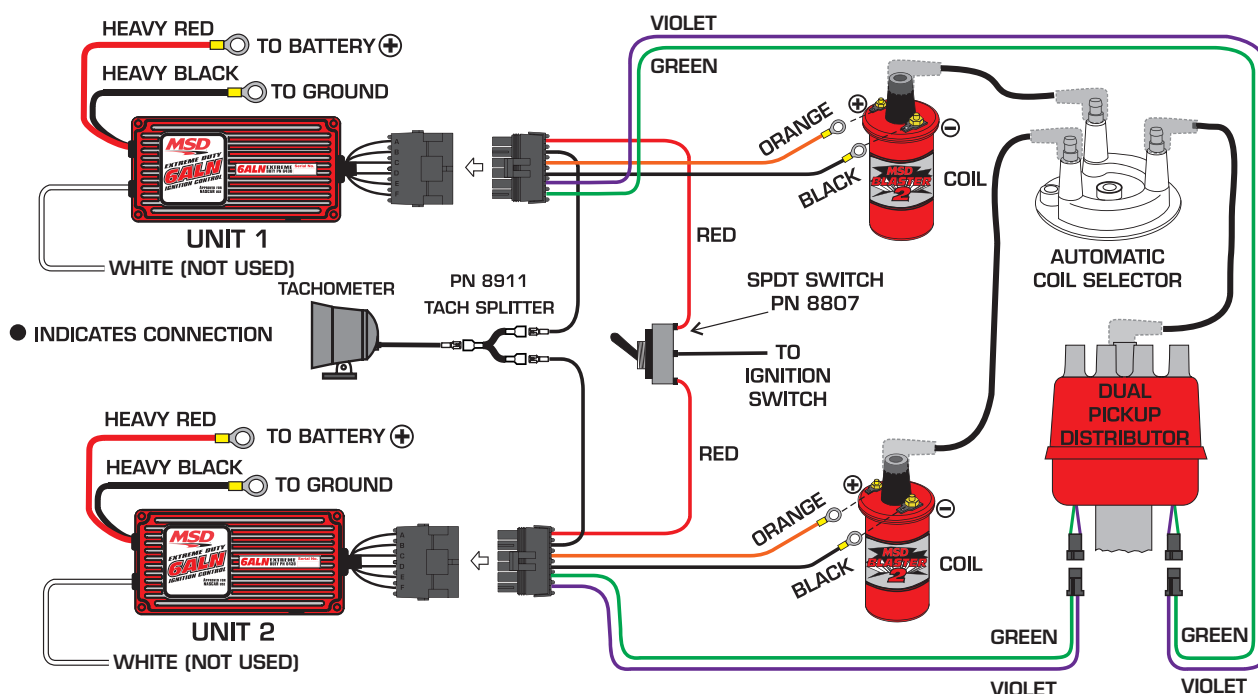
Two MSD 6-Series with a Single Magnetic Pickup Distributor and Coil



Two MSD 6-Series and Coils with a Single Magnetic Pickup Distributor



Two MSD 6-Series and Coils with a Dual Magnetic Pickup Distributor



MSD Digital-6 Plus, PN 6520, and Digital-7 Plus, PN 7520, Ignitions

This section covers the MSD Digital-6 Plus and the Digital-7 Plus. These ignitions share the same housing design, wiring and functions. The main difference is that the Digital-7 Plus produces more spark energy and is intended for racing applications only. The 6 Plus is designed for street/strip use and even carries a CARB Approval Number.

Both ignitions will install to most vehicles with a 12 volt electrical system and a distributor that is triggered with points, electronic amplifiers or magnetic pickups.

Operating Specifications

	Digital-6 Plus	Digital-7 Plus
Operating Voltage:	12-18 Volts	12-18 Volts
Current Requirements:	.7 Amp per 1,000 rpm	1.1 Amp per 1,000 rpm
RPM Range:	12,500 w/14.4 Volts	12,500 w/14.4 Volts
Spark Series Duration:	20° Crankshaft	20° Crankshaft
Primary Voltage:	535 Volts	535 Volts
Energy Output Max:	135 millijoules	190 millijoules
Weight and Size:	3.7 lbs, 8.5"x4.5"x2.2"	3.7 lbs, 8.5"x4.5"x2.2"

Wire Functions

- Power Cables:** The heavy Red connects to the battery positive (+) terminal. The heavy Black connects the battery negative (-) terminal or other good engine ground.
- Red:** Connects to a switched 12 volts source.
- Orange:** Connects to the positive (+) coil terminal. This is the only wire that makes electrical contact with the coil positive terminal.
- Black:** Connects to the negative (-) coil terminal. This is the only wire that makes electrical contact with the coil negative terminal.
- White:** Connects to a points or amplifier trigger source. When this wire is used, the Magnetic Pickup is not (Green and Violet).
- Green/Violet:** These wires are routed into a 2-pin connector. It connects to the magnetic pickup of an MSD Distributor or Crank Trigger. The Violet is mag positive (+) and the Green is negative (-). If this connector is used, the White wire will not be connected.
- Blue:** This wire is used to activate the 2-Step Rev Limit. When 12 volts are applied, the Launch rpm limit is activated.
- Pink:** This is the Retard activation wire. When 12 volts are applied, the Retard stage is activated.
- Green Loop:** Magnetic Pickup Compensation circuit adjusts for different style pickups.


Recommended Coils: The Digital-6 Plus Ignition may be used with most Blaster Coils such as the PN 8207 or PN 8253. The Digital-7 Plus Ignition should be used with Pro-Power HVC, PN 8251, or Pro-Power HVC-2, PN 8261.

NOTE: If you do not see your application, consult the 6-Series section. All MSD CD Ignitions share similar wiring.

WARNING: When using a capacitive discharge ignition control, there is high voltage present at the coil primary terminals. Never touch the coil or connect test equipment to these terminals.

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

Digital-6 or 7 Plus Ignition Programming




Cylinder Select	Cyl. Select w/ 20° Start Retard
0 = 4-cyl.	4 = 4-cyl.
1 = 6-cyl.	5 = 6-cyl.
2 = 8-cyl.	6 = 8-cyl.
3 = 6 odd	7 = 6 odd fire

Cylinder Select: The Digital Plus Series Ignitions are set at the factory for operation on an 8-cylinder engine. For other engines, use the cylinder select dial.

Note: Positions 8 and 9 cause the ignition NOT to run. Use as a theft deterrent.

Start Retard: There is also an optional 20 degree start retard that will occur during cranking. When selected, the timing will retard 20 degrees until the engine reaches 800 RPM.

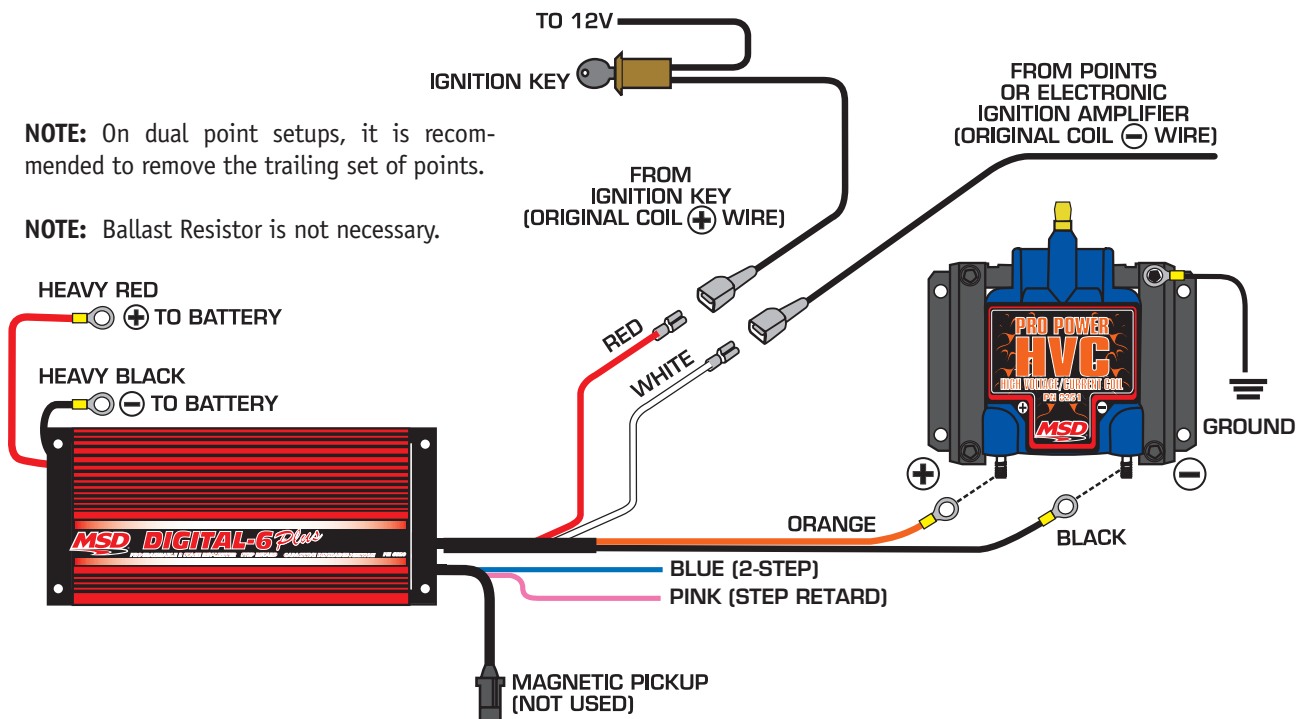


GREEN LOOP

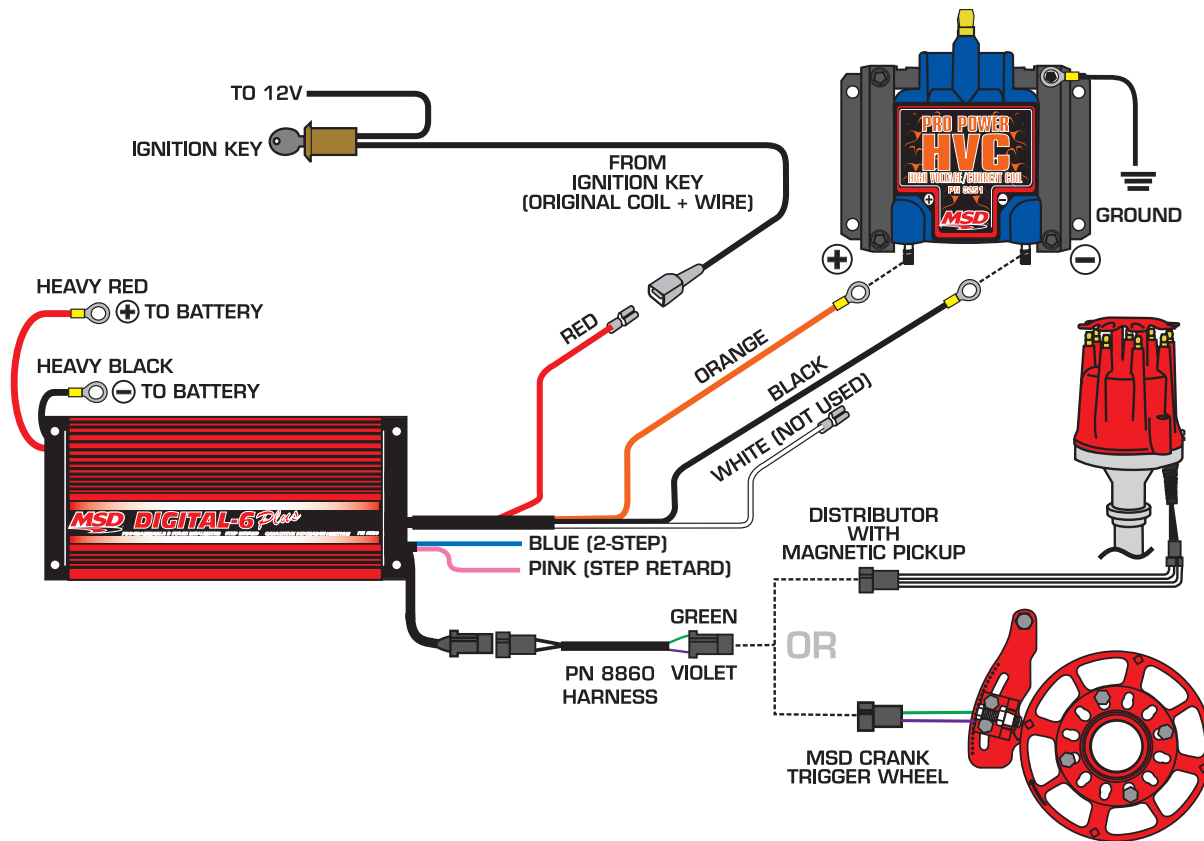
CUT LOOP	DO NOT CUT
MSD Distributors	Points (Stock, Mallory, Accel)
Factory Ford	Electronic Amplifiers
Chrysler	GM HEI
	MSD Crank Trigger

NOTE: If your application uses the MSD's white wire for the trigger input, the magnetic compensation circuit is not used.

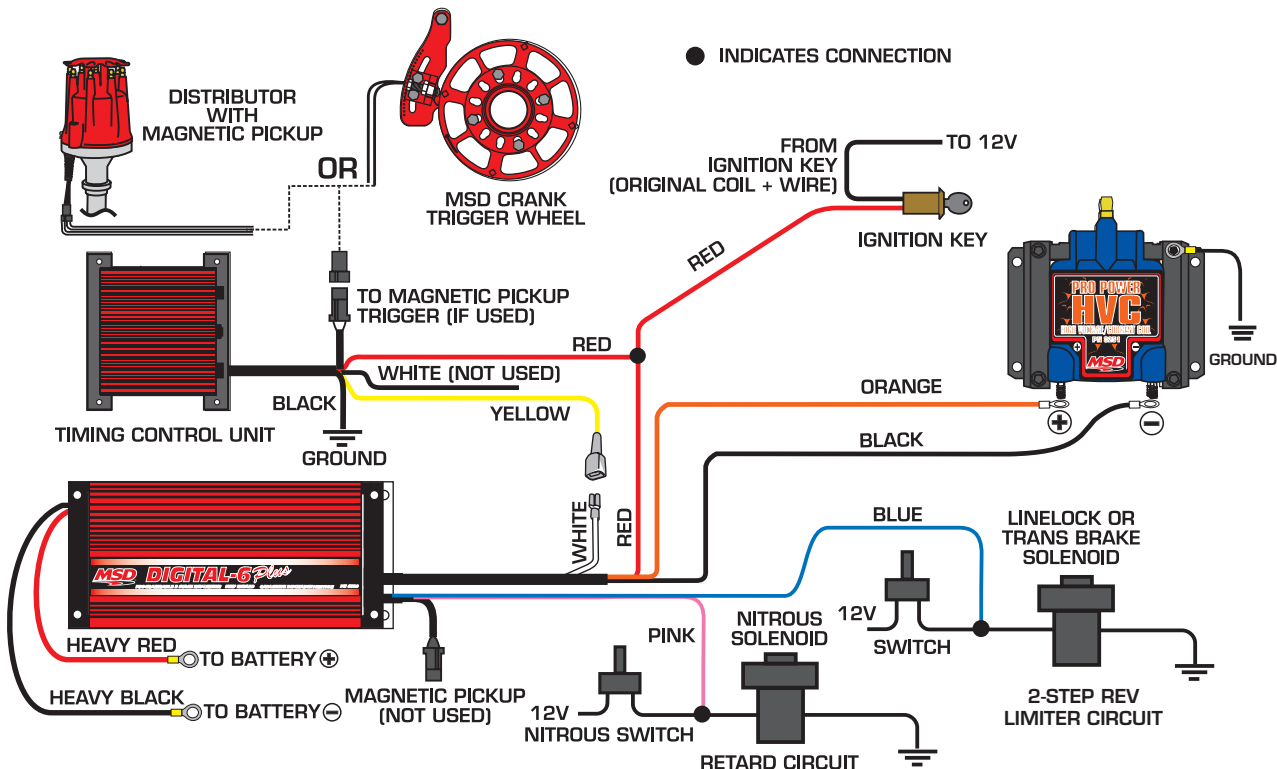
Digital-6 or 7 Plus Ignition with Points



Digital-6 or 7 Plus Ignitions with Magnetic Pickup



Digital-6 or 7 Plus Ignitions with Magnetic Pickup, Timing Control, Step Retard and 2-Step



Installing an MSD 7AL-2 Plus or 7AL-2 Ignition Control

The MSD 7AL-2 Plus, PN 7222, updates the original 7AL-2, PN 7220 with efficient internal components plus a 2-Step Rev Control and a useful diagnostic LED. The two terminal strips allow for easier wiring. The LED over the power connections comes in handy for troubleshooting, it flashes only when the coil fires.

Operating Specifications

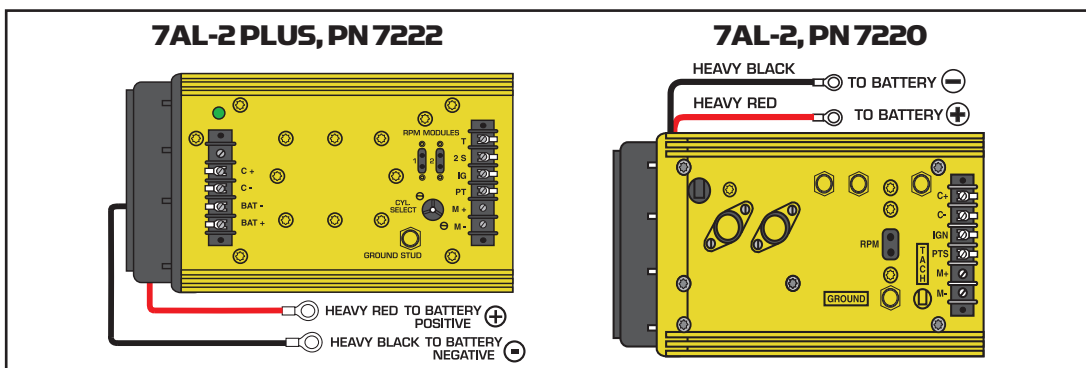
	7AL-2 Plus, PN 7222	7AL-2, PN 7220
Operating Voltage:	12-18 Volts, Negative Ground	12-18 Volts, Negative Ground
RPM Range:	14,000 RPM with 14.4 Volts	14,000 RPM with 14.4 Volts
Spark Series Duration:	20° Crankshaft Rotation	20° Crankshaft Rotation
Primary Voltage:	570 Volts	470 Volts
Energy Output Maxes:	160 Millijoules/Spark	155 Millijoules/Spark
Weight and Size:	4.85 lbs., 8.25"L x 8.75"W x 5.75"H	4.75 lbs., 8.25"L x 8.75"W x 5.75"H

Wire Functions

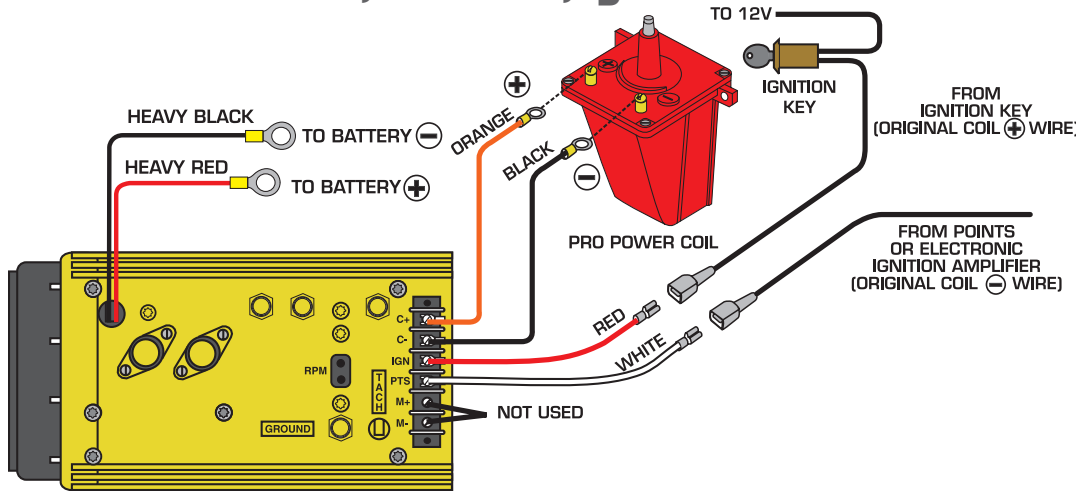
- Heavy Black:** This wire connects to a good ground, either at the battery negative (-) terminal or to the engine.
- Heavy Red:** This wire connects directly to the battery positive (+) terminal or to a positive battery junction or the positive side of the starter solenoid. **Note:** Never connect to the alternator.
- Red (Ignition):** Connects to a switched 12 volt source. Such as the ignition key or switch.
- Orange (Coil +):** Connects to the positive (+) terminal of the coil. This is the only wire that makes electrical contact with the coil positive terminal.
- Black (Coil -):** Connects to the negative (-) terminal of the coil. This is the only wire that makes electrical contact with the coil negative terminal.
- White (Points):** This wire is used to connect to the points, electronic ignition amplifier output or to the Yellow wire of an MSD Timing Accessory. When this wire is used, the Magnetic Pickup connector is not used.
- Red (Ignition):** Connects to a switched 12 volt source. Such as the ignition key or switch.
- White (Points):** This wire is used to connect to the points, electronic ignition amplifier output or to the Yellow wire of an MSD Timing Accessory. When this wire is used, the Magnetic Pickup connector is not used.
- Violet (Mag +)/Green (Mag -):** These wires are routed together in one harness from the Magnetic Pickup connector. The connector plugs directly into an MSD Distributor or Crank Trigger. It will also connect to factory magnetic pickups or other aftermarket pickups. The Violet wire is positive (+) and the Green is negative (-). When these wires are used, the Points Terminal is not.

THESE TWO TERMINALS ARE ONLY ON THE 7AL-2 PLUS, PN 7222

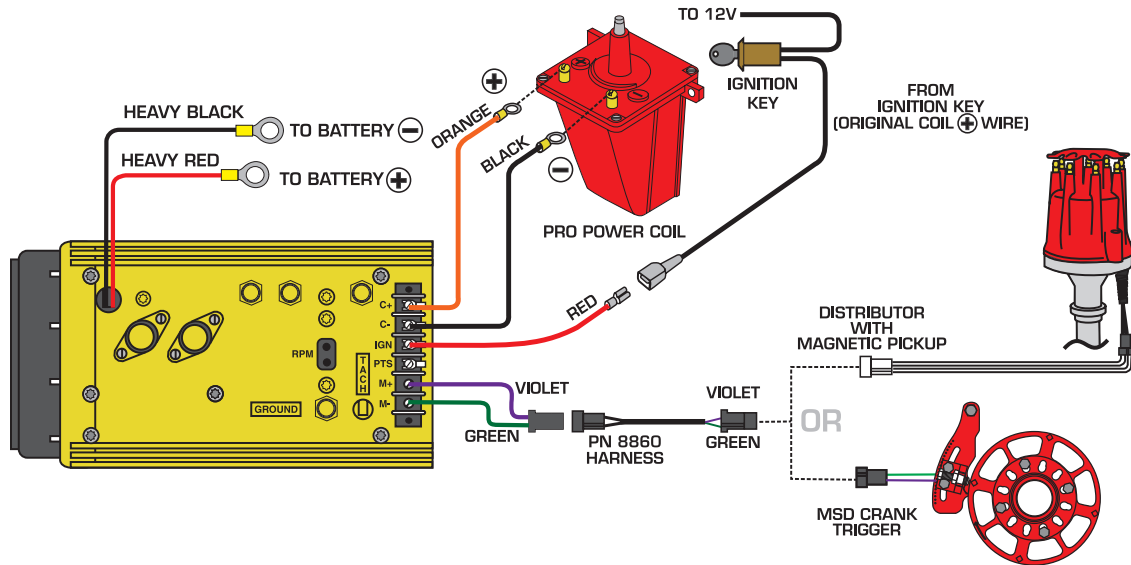
- Tach:** This terminal delivers a 12 volt square wave signal as an output for a tachometer or devices that require an RPM signal.
- Dark Blue (2-Step):** When this terminal is connected to 12 volts, RPM module 1 is active. When there is no 12 volts, RPM module 2 is active.



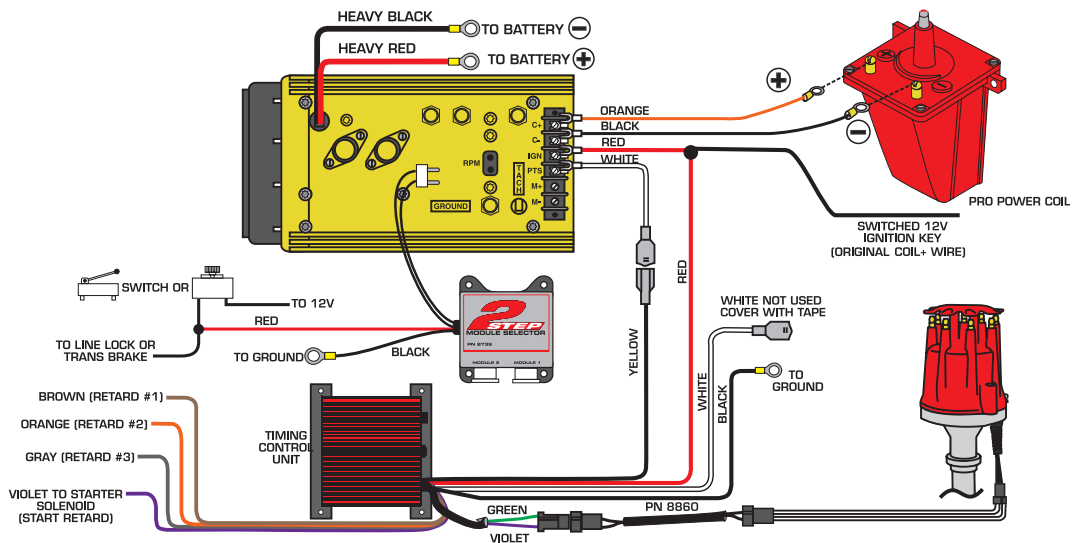
MSD 7AL-2, PN 7220, Ignition with Points



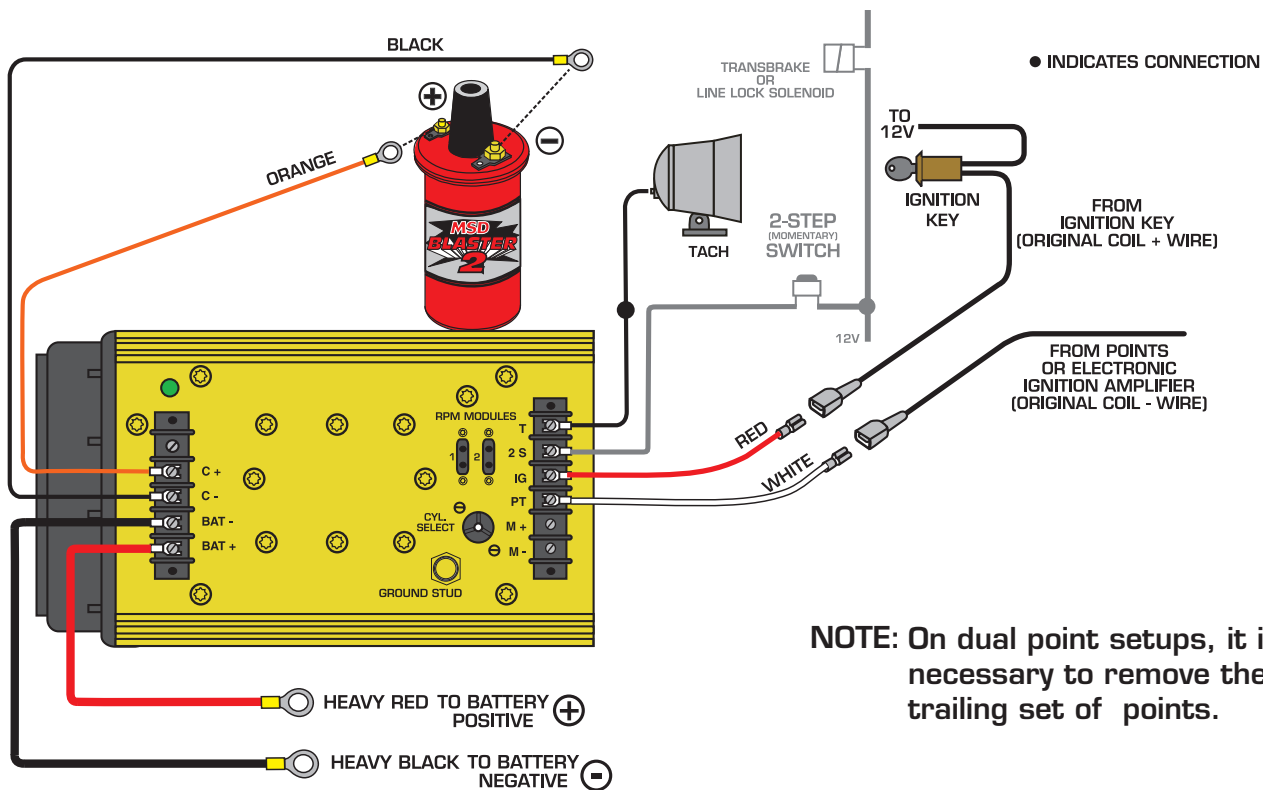
MSD 7AL-2, PN 7220, Ignition with Magnetic Pickup



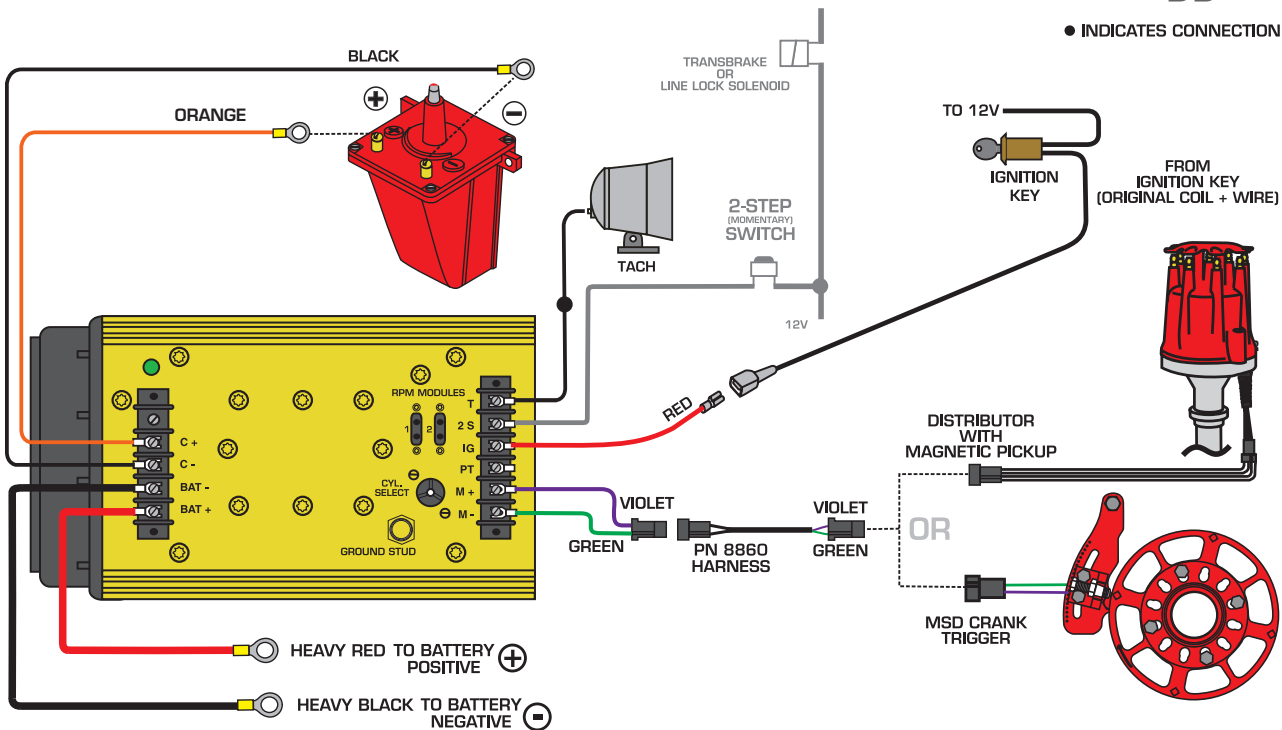
MSD 7AL-2, PN 7220, with Module Selector and Multiple Retard



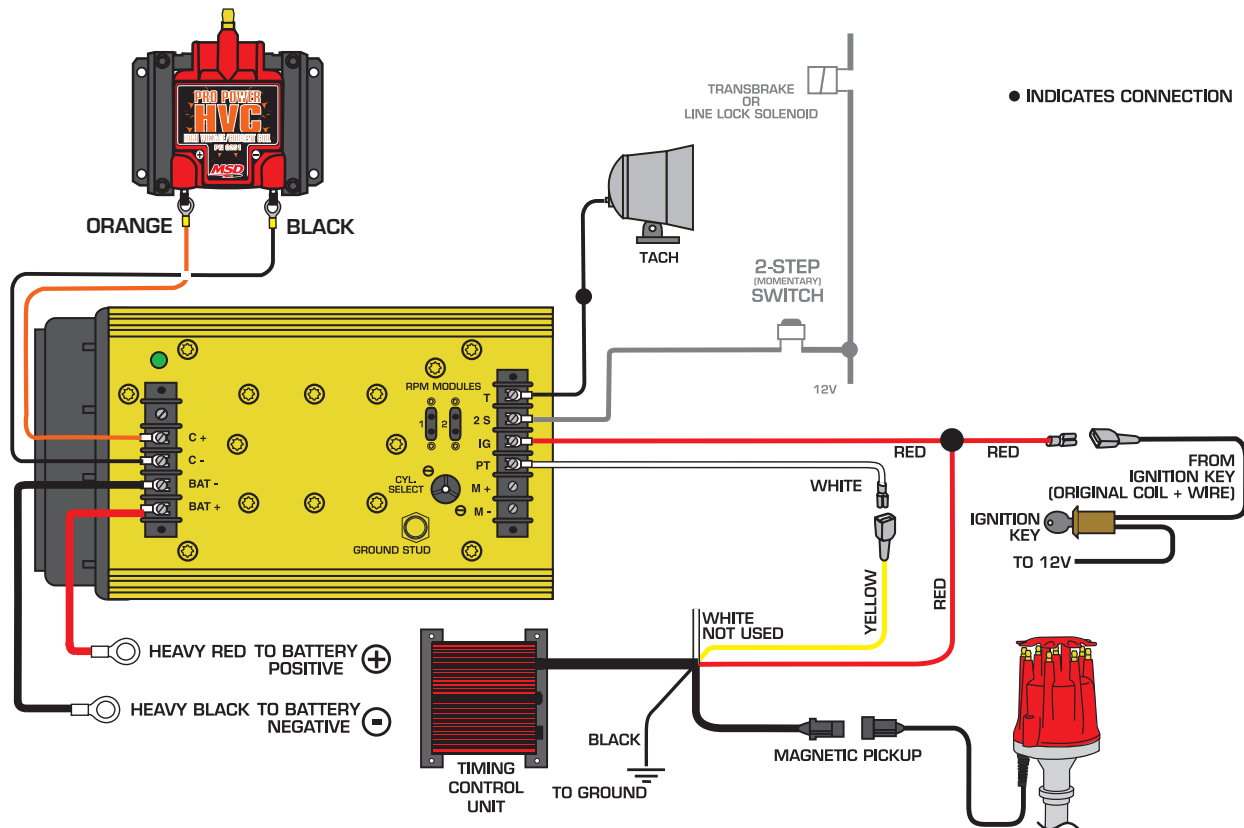
MSD 7AL-2 Plus, PN 7222, to Points/Amplifier Style Ignition



MSD 7AL-2 Plus, PN 7222, to MSD Distributor/Crank Trigger



MSD 7AL-2 Plus, PN 7222, to MSD Distributor/Crank Trigger and Timing Control

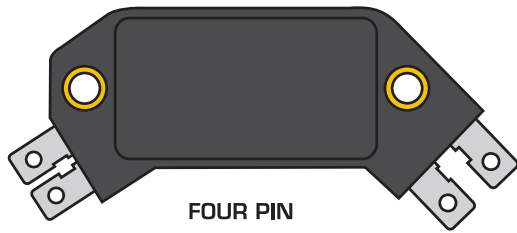


Cylinder Select

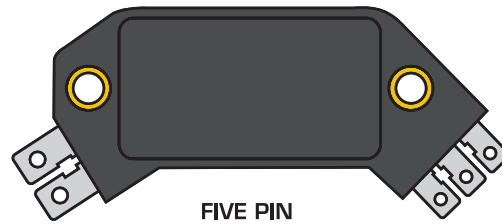
This ignition can be used on 2, 4, 6 (even-fire) or 8-cylinder engines. The ignition is set for 8-cylinder operation. To program the unit for other engines, remove the one screw that holds the cover to reveal three wire loops (Figure 1). Cutting a wire loop determines the cylinder selection.

Cylinders	Loops to Cut	Remove cap
8	None	
6	One	
4	Two	
2	Three	

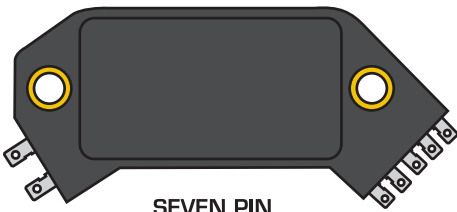
MSD 7-Series to GM Large Cap HEI Distributors



FOUR PIN



FIVE PIN



SEVEN PIN

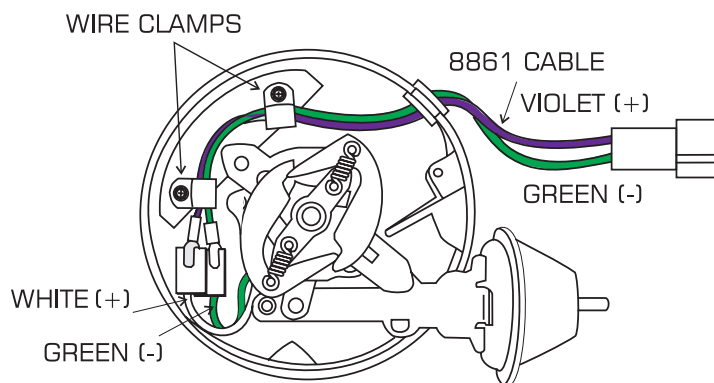
There are three different large cap HEI distributors. To identify which of the following diagrams fit your specific application, remove the distributor cap and rotor and locate the ignition module at the base of the distributor. Count the number of terminals on both ends of the module and follow the corresponding diagram. GM used 4, 5, and 7-pin modules in these distributors.

NOTE: Some 5-pin models may experience a hesitation or stall on deceleration. If this occurs, contact MSD Tech Line for the required bolt-in diode to correct the problem.

MSD 7-Series to GM HEI 4-Pin Module

If the distributor has a 4-pin module, the module must be removed and the MSD will use the magnetic pickup to trigger the ignition. A harness, PN 8861, is required for this installation.

Connecting the PN 8861 Cable to the GM HEI Magnetic Pickup

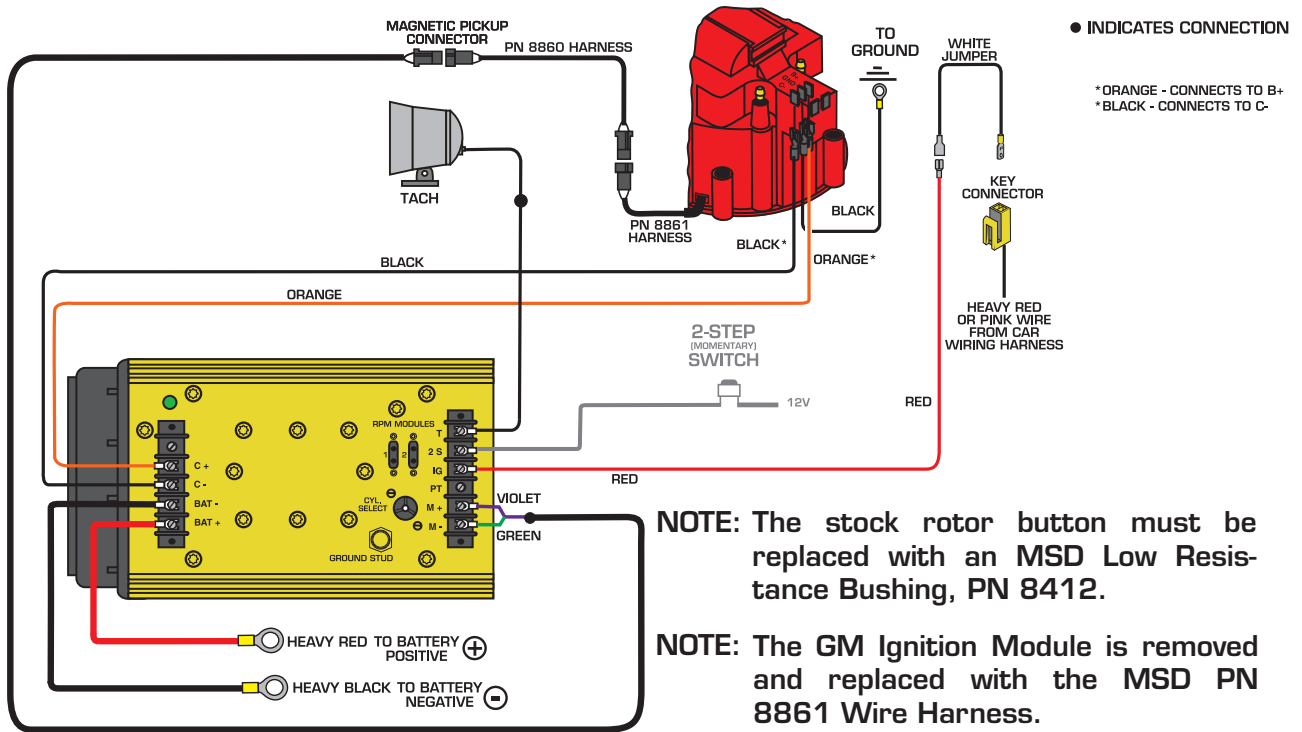


NOTE: The PN 8861 cable is not supplied with the MSD 7 Ignition.

NOTE: A Low Resistance HEI Rotor Bushing, PN 8412, must be used with an MSD 7AL Ignition.

1. Remove the distributor cap and rotor.
2. Disconnect the connector with the white and green wires from the module, and remove the module, condenser and cable from the distributor.
3. Install the PN 8861 cable as shown using the module mounting screws and the wire clamps supplied in the MSD Parts kit. Push the two tabs on the PN 8861 cable into the connector from the HEI magnetic pickup (Green to Green, Violet to White). Notice that the tabs are different sizes so they can be installed one way only.
4. Reinstall the cap and rotor and connect the MSD Ignition control as shown in the next diagram.

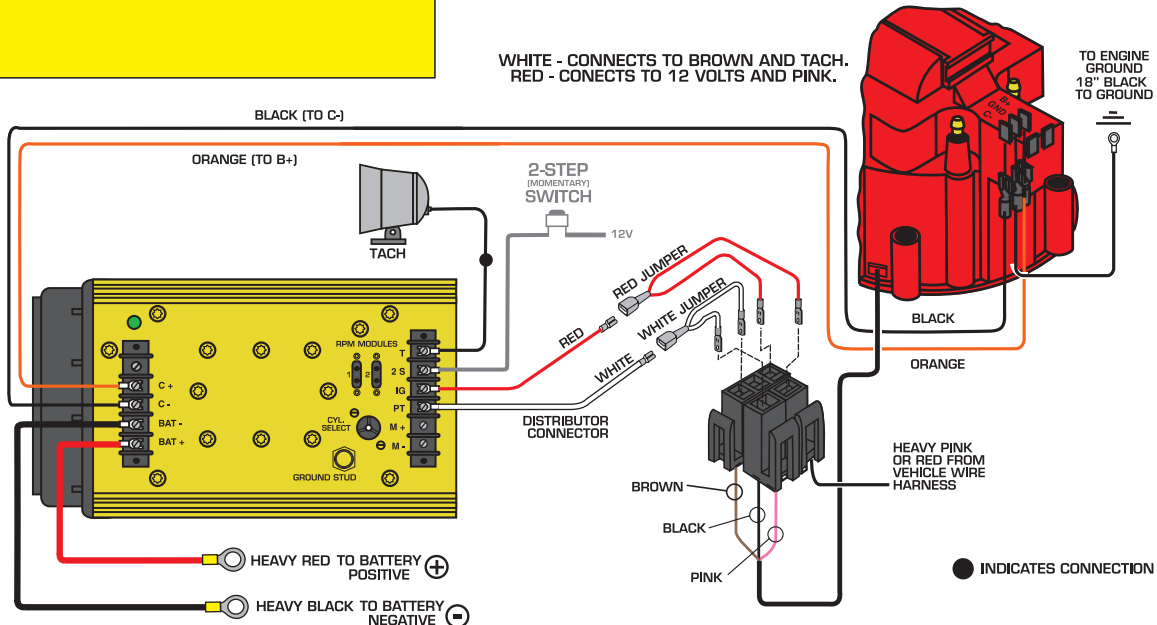
MSD 7-Series to GM HEI 4-pin Module Distributor



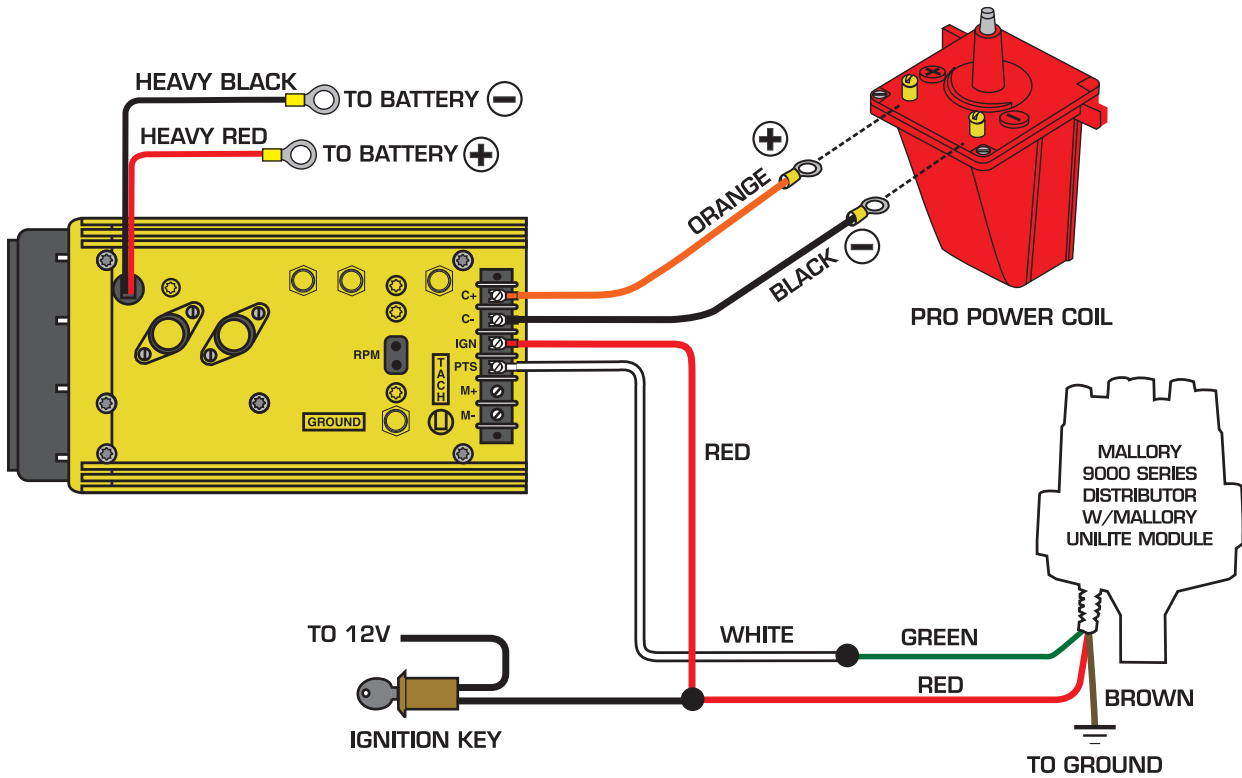
MSD 7-Series to GM HEI with a 5 or 7-pin Module (Amplifier Trigger)

NOTE: Some 5-pin models may experience a hesitation or stall on deceleration.

NOTE: The stock rotor button must be replaced with an MSD Low Resistance Bushing, PN 8412.

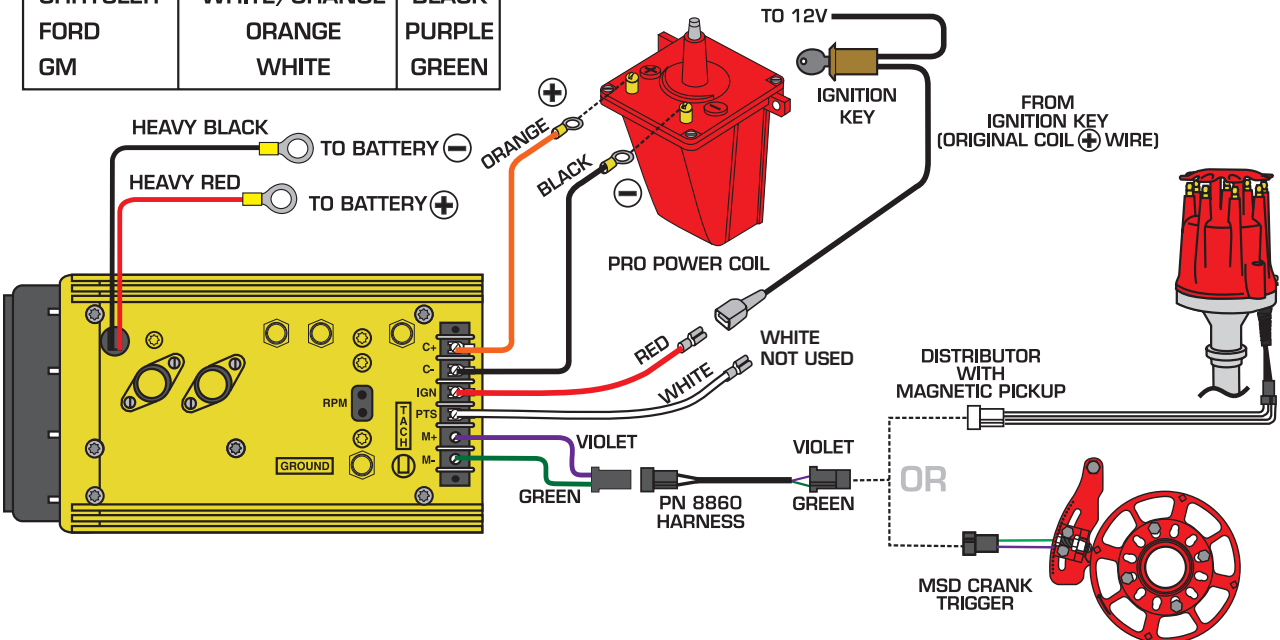


MSD 7-Series to Mallory Unilite



MSD 7-Series to Magnetic Pickup Triggers

MAKE	POLARITY	
	+	-
CHRYSLER	WHITE/ORANGE	BLACK
FORD	ORANGE	PURPLE
GM	WHITE	GREEN



Installing an 7AL-3 Ignition Control

This section covers the 7AL-3 Ignition Control. This ignition shares the same wiring to run the vehicle, but the 7AL-3 has several optional accessories that can be connected. The 7AL-2 Plus has a 2-Step rev limiter while the 7AL-3 has a 3-Step Rev Control along with other accessories which are explained on the next page.

This ignition will install to most vehicles with a 12 volt electrical system and a distributor that is triggered with points, electronic amplifiers or magnetic pickups.

Operating Specifications

	PN 7230 - Red	PN 7330 - Black
Operating Voltage:	12-18 Volts	12-18 Volts
Current Requirements:	1 Amp per 1,000 rpm	1 Amp per 1,000 rpm
RPM Range:	14,000 w/14.4 Volts	14,000 w/14.4 Volts
Spark Series Duration:	20° Crankshaft	20° Crankshaft
Primary Voltage:	550 Volts	570 Volts
Energy Output Max:	160 Millijoules	160 Millijoules
Weight and Size:	4.75lbs, 8"x 3.75"x5.75"	4.75lbs, 8"x 3.75"x5.75"

Wire Functions

Power Cables:	The heavy Red connects to the battery positive (+) terminal. The heavy Black connects to the battery negative (-) terminal or other good engine ground. On the 7AL-3 these are called out as Batt+ and Batt -.
Red (IGN):	Connects to a switched 12 volt source.
Orange (COIL +):	Connects to the positive (+) terminal of the coil. This is the only wire that makes electrical contact with the coil (+) terminal.
Black (COIL -):	Connects to the negative (-) terminal of the coil. This is the only wire that makes electrical contact with the coil negative terminal.
White (PNTS):	Connects to a points or amplifier trigger source. When this wire is used, the Magnetic Pickup is not (Green and Violet).
Violet (Mag +):	These wires are routed into a 2-pin connector. It connects to the magnetic pickup of an MSD Distributor or Crank Trigger. The Violet is mag positive (+) and the Green is negative (-). If this connector is used, the White wire will not be connected.
Green (Mag-):	

WARNING: When using a capacitive discharge ignition control, there is high voltage present at the coil primary terminals. Never touch the coil or connect test equipment to these terminals.

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

MSD 7AL-3 Accessories

3-Step Rev Control

Three rev limits can be set to be activated at different times. The over-rev rpm limit is active when the other limits are not activated. The Burnout or Launch rev limits are activated when 12 volts are applied to the corresponding terminal. If both limits are supplied with 12 volts, the Launch limit will override the Burnout limit.

NOTE: If no rpm module is installed, there will be no rev limit.

Start Retard

When 12 volts are applied to this terminal, the timing will be retarded 25° until the engine reaches 1300 rpm where it deactivates. This can be connected to the starter solenoid to receive 12 volts when cranking or can be connected directly to 12 volts such as from the IGN terminal.

Retard Stages

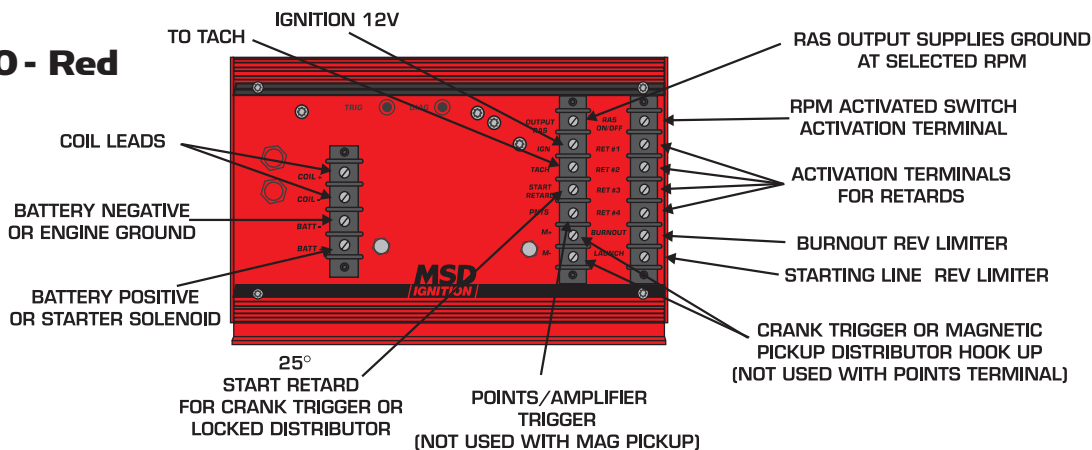
There are four stages of retard. The amounts are cumulative with a total of 20° being the max retard. On the 7230, each stage is activated when the corresponding terminal is REMOVED from ground. On the 7330, each stage is activated when the corresponding terminal is supplied with 12V. If a stage is not going to be used, a Zero degree module MUST be installed or the terminal(s) must be grounded.

RPM Activated Switch

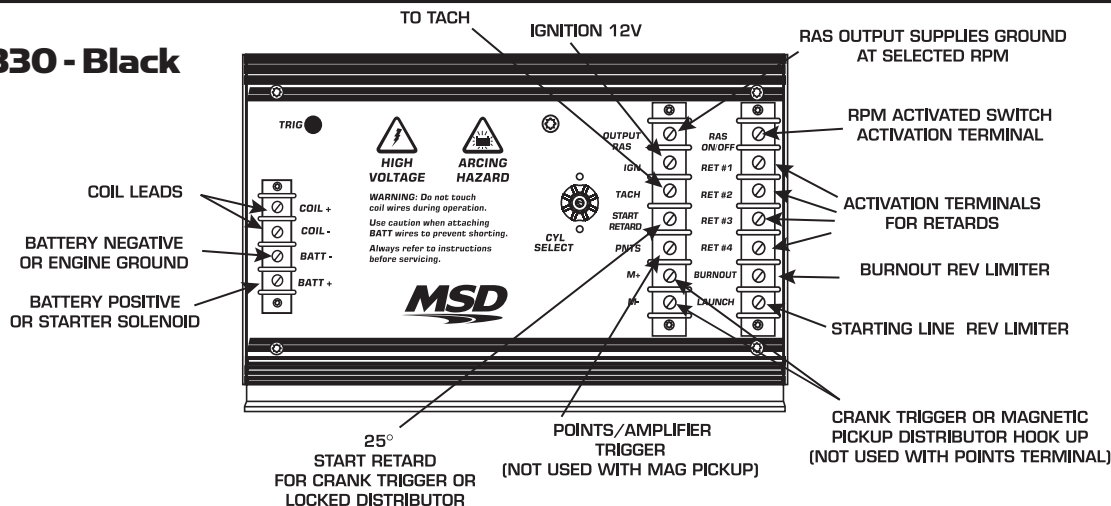
Two terminals are used to make up this circuit; RAS On/Off and Output RAS. The Output RAS terminal will supply a ground path to activate a circuit at a desired rpm (capable of up to 10 Amps). To use this circuit, 12 volts must be supplied to the RAS On/Off terminal.

7AL-3 Terminal Strips

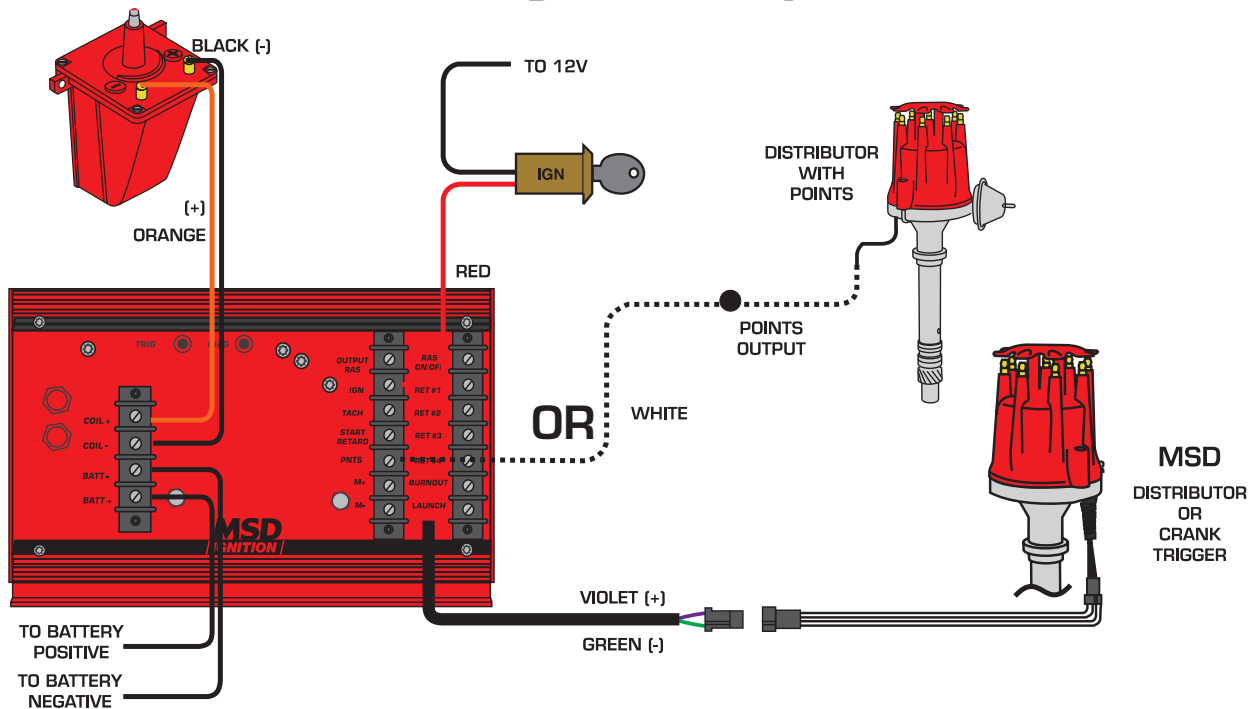
PN 7230 - Red



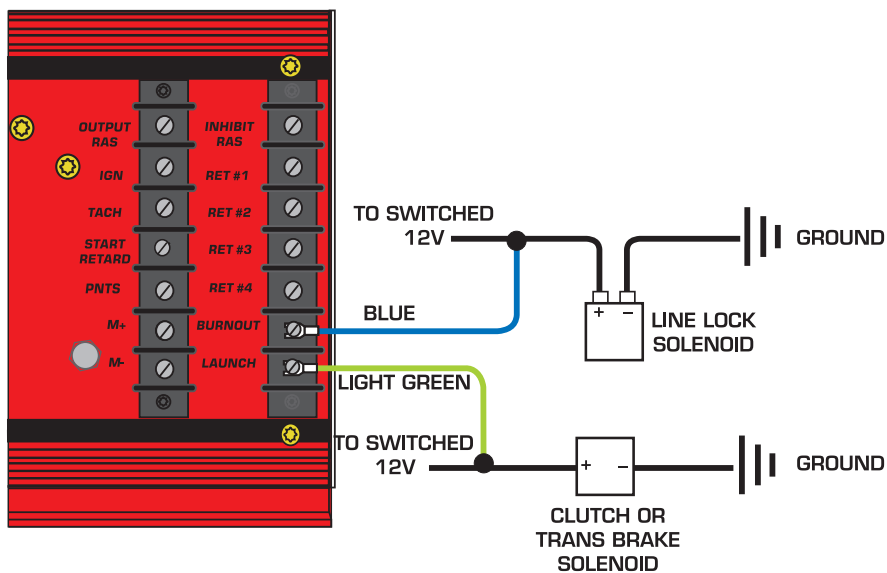
PN 7330 - Black



MSD 7AL-3 to Primary Side of the Ignition to Points or Magnetic Pickup

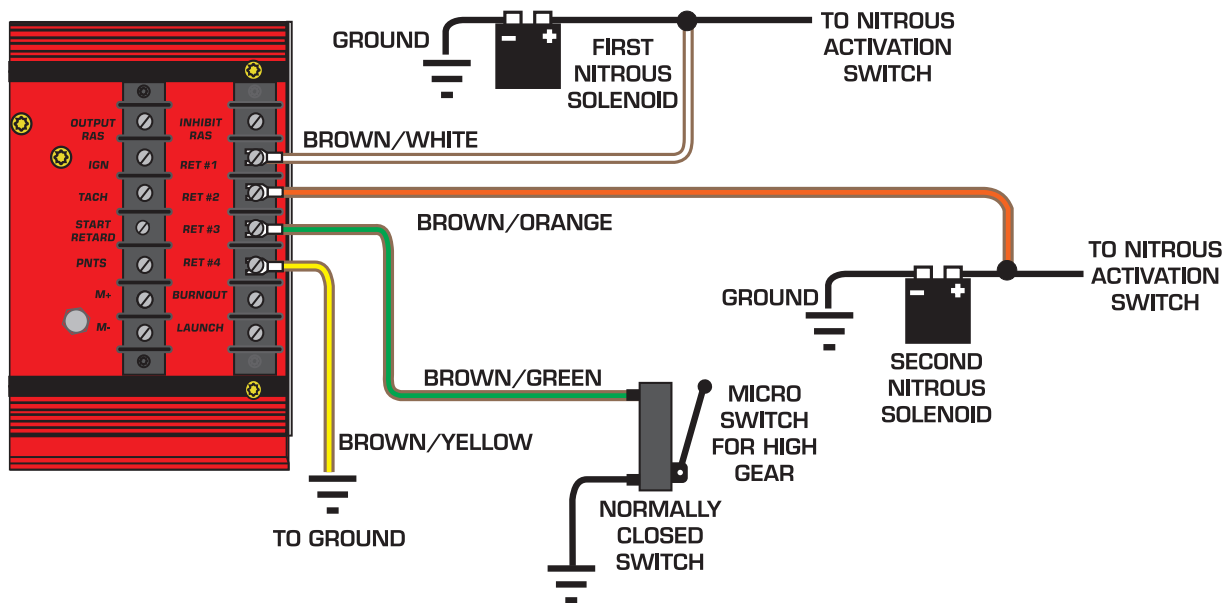


MSD 7AL-3 with Rev Limiters



NOTE: The rev limiter activates when 12 Volts are supplied to the "Burnout" or "Launch" terminal.

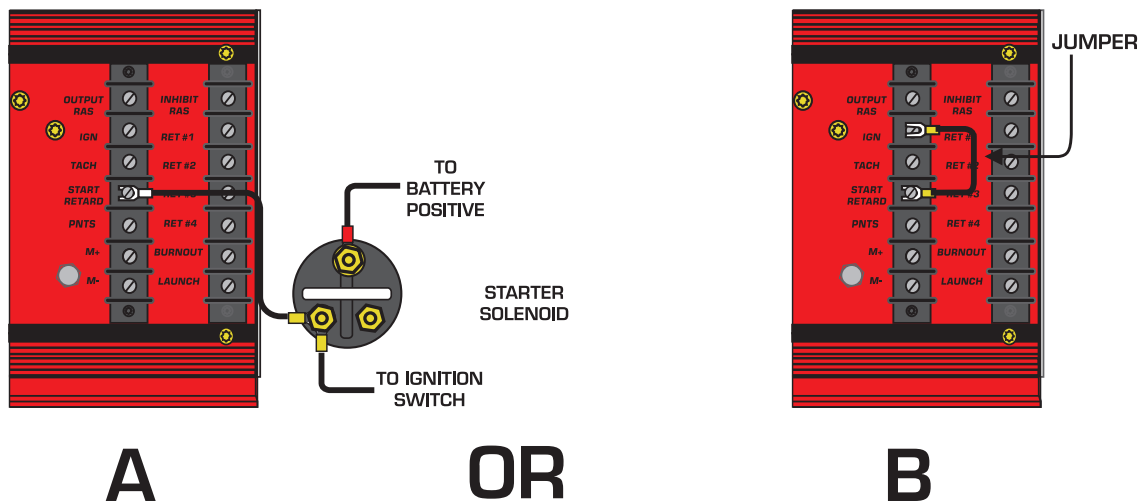
MSD 7AL-3 Using Retard Functions



NOTE: The retards will activate when removed from ground. The positive side of the solenoid will provide ground until activated.

NOTE: If a stage is not used, a ZERO Degree module must be installed or the terminal must be grounded.

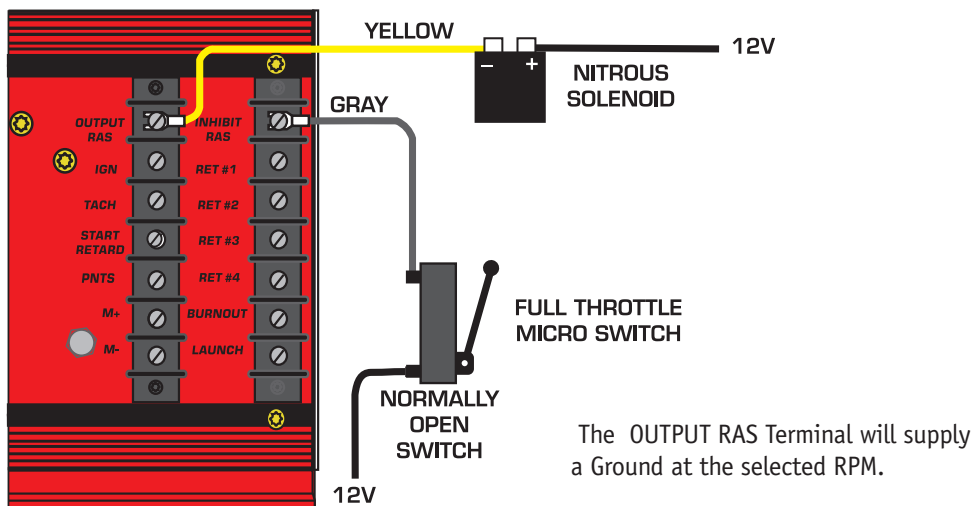
MSD 7AL-3 Using Start Retard Function



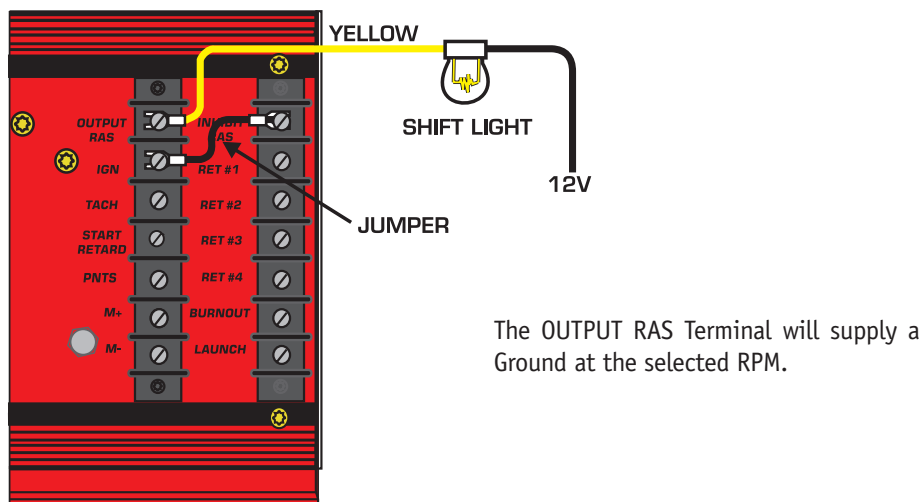
NOTE: The 25° start retard activates when supplied with 12 Volts.

NOTE: Once the engine revs past 1,300 rpm the 25° start retard will not activate again until the ignition is shut off.

MSD 7AL-3 Using RPM Activated Switch to Activate Nitrous



MSD 7AL-3 Using RPM Activated Switch for Shift Light



NOTE: A short jumper is supplied that can be used to provide a switched 12 Volts from the "IGN" terminal to the "RAS ON/OFF" terminal.

MSD Power Grid System Controller PN 7730

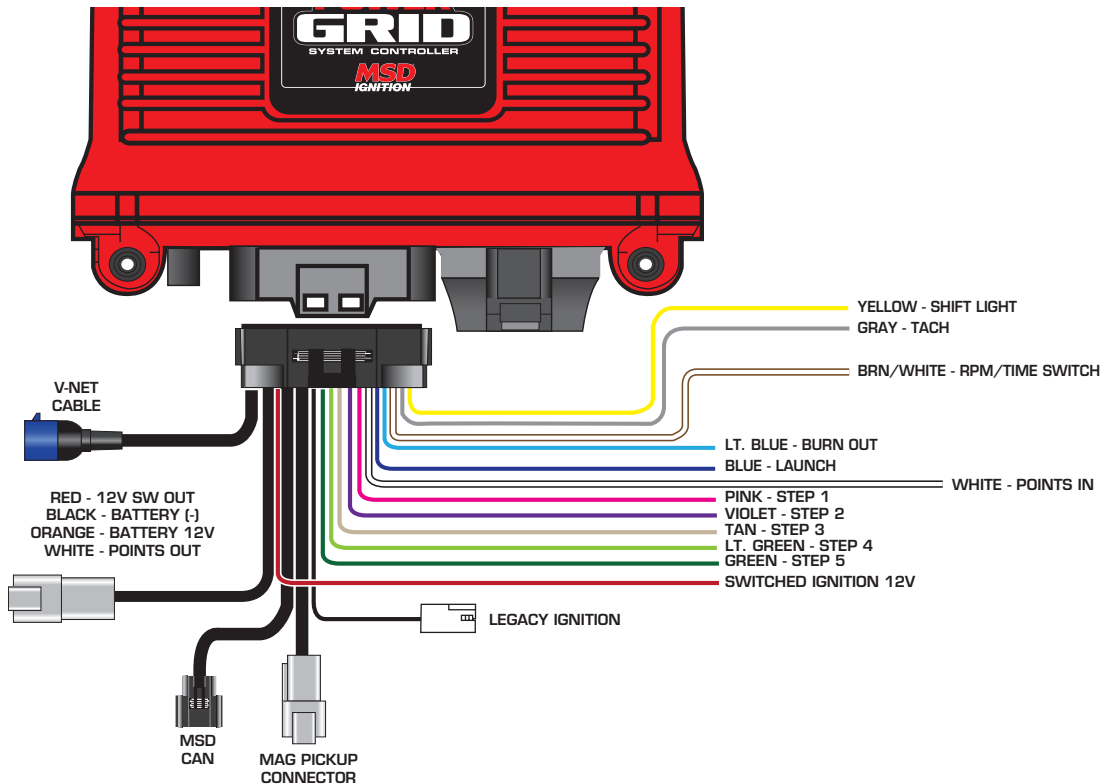
NOTE: Solid core spark plug wires cannot be used with an MSD Ignition Control.

NOTE: A crank trigger is recommended to supply the input signal to the Power Grid Ignition System to ensure the most precise timing and rpm control.

Operating Specifications

Operating Voltage: 12-18 Volts, Negative Ground
RPM Range: 15,000 RPM with 14.4 Volts
Spark Series Duration: 20° Crankshaft Rotation
Primary Voltage: 545-570 Volts
Spark Energy: 200-220 Millijoules/Spark
Weight and Size: 2.9 lbs., 7.5"L x 5"W x 2.25"H

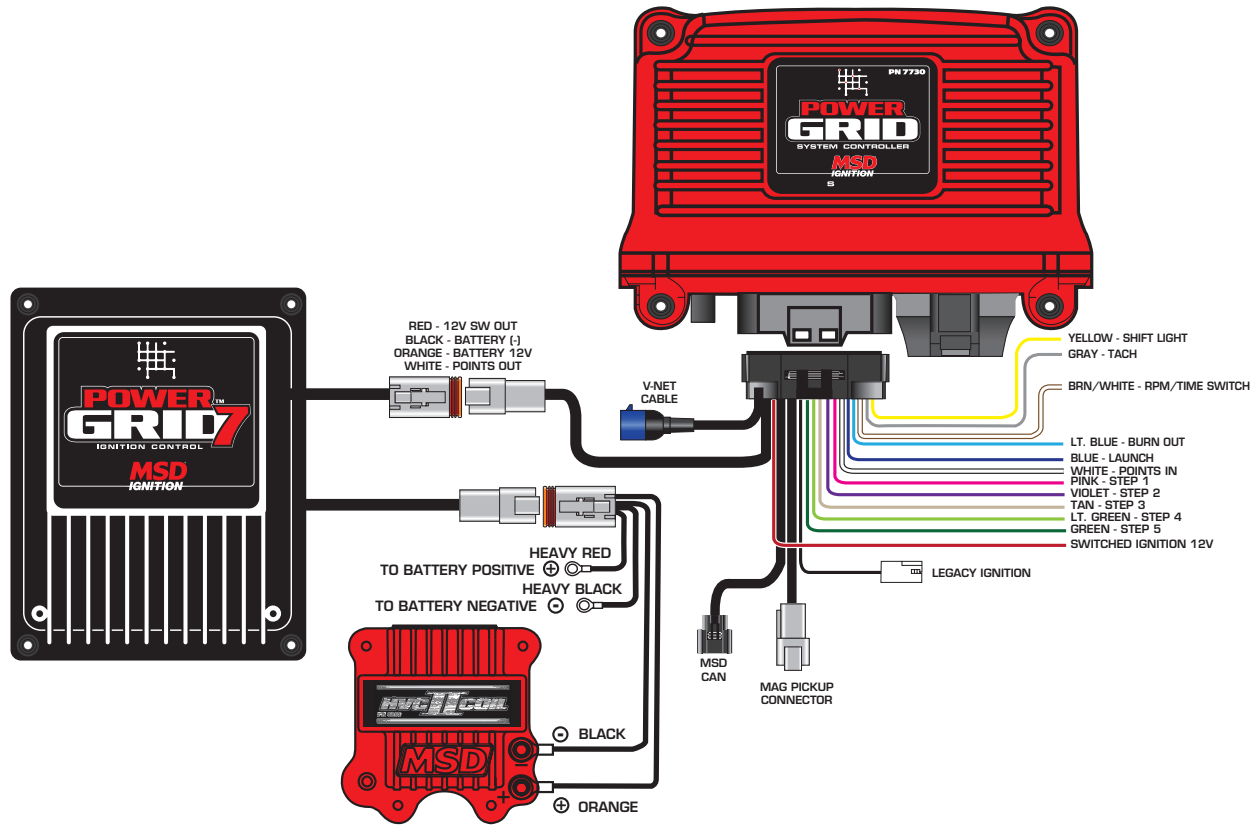
Power Grid System Controller Wiring



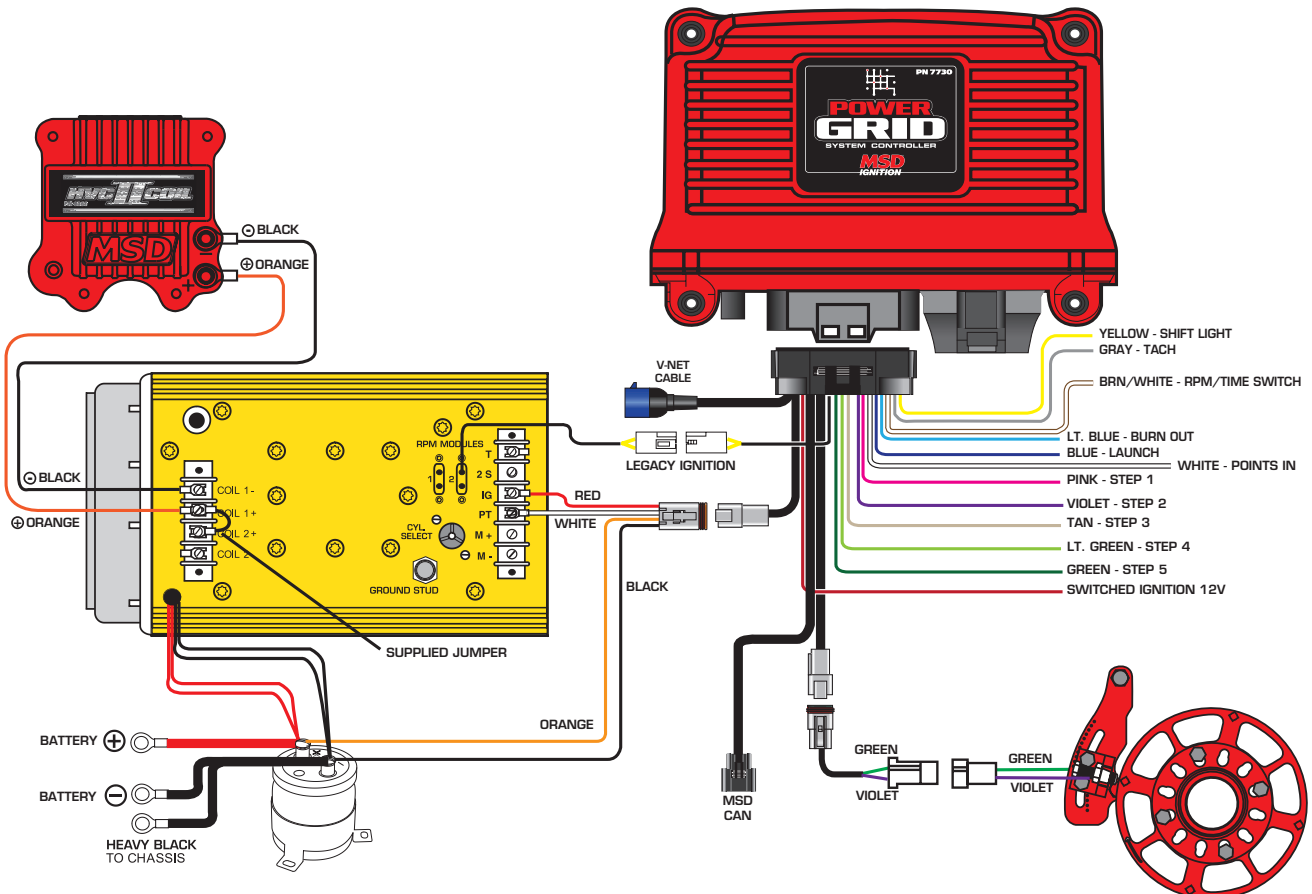
Wiring Features

Leading Group	Color	PIN	Function	Description
4-Pin Connector (to PN 7720 or Power Cable if not used with PN 7720)	BLACK	16	GROUND	Ignition supply Ground wire. Connect to battery negative (-) terminal or engine block.
	ORANGE	17	BATT POWER	Battery supply wire. Connects to battery positive (+) terminal or battery junction. NOTE: Do not connect to the alternator.
	YEL/WHT	33	TRIGGER OUT	Trigger output for electronic ignition amplifiers.
	RED	34	POWER OUT	On/Off switch wiring. This wire supplies switched 12V power to the 7720. (Not used when connecting to other MSD Ignitions)
LOOSE WIRES	RED	15	IGN	12V switched (Ignition)
	GRAY	18	TACH	Tach output. This wire will provide a 12 volt square wave tach signal.
	WHITE	32	POINTS IN	Trigger input from electronic ignition amplifiers, an ECU's trigger or points.
	YELLOW	1	SHIFT LIGHT	Shift Light output wire. It can handle up to 3 amps continuous to ground when enabled.
	LT BLUE	4	BURN OUT	Burnout Rev Limit. When 12 volts are applied the Burnout Rev Limit is active. This disables the Slew Rate rev limits and overrides other rev limits. It is recommended to have this wire switched from an outside source, such as the crew chief before the burnout and while staging the car.
	DK BLUE	21	LAUNCH	This wire activates the Launch Rev Limit and is the main reset wire for several features of the Ignition. When 12 volts are applied to this wire it will activate the Launch Rev Limit. It also resets the shift light, the gear indicator to first gear, the Launch Retard curve and select Gear 1 curve. When 12 volts is removed, the Launch Time begins as does the Gear 1 curve. When 12 volts are applied the Slew Rate Rev limit will be disabled as well as the Time-Based Rev Limit curve.
	PINK	22	STEP 1	Step 1 retard enabled with +12 volt input AND above Step 1 Rpm value OR Gear 2 Select.
	VIOLET	5	STEP 2	Step 2 retard enabled with +12 volt input AND above Step 2 Rpm value OR Gear 3 Select.
	TAN	23	STEP3	Step 3 retard enabled with +12 volt input AND above Step 3 Rpm value OR Gear 4 Select.
	LT GREEN	6	STEP4	Step 4 retard enabled with +12 volt input AND above Step 4 Rpm value OR Gear 5 Select.
	GREEN	10	STEP5	Step 5 retard enabled with +12 volt input AND above Step 5 Rpm value OR spool rev limiter.
BRN/WHT	19	RPM SW	RPM/Time switch output wire. It can switch up to 3 amps continuous to ground when enabled.	
2-Pin Connector (Legacy)	YELLOW	7	RELAY LO	Network Ignition Mode: Cam sync output to Racepak systems for individual cylinder timing.
	YELLOW	24	RELAY HI	Legacy Ignition Mode: Rev limiter output to legacy ignition..
3-Pin Connector	GREEN	8	MAG-	This is a magnetic pickup, 2-pin connector. Plugs into an MSD Distributor or Crank Trigger pickup. Violet is positive, Green is negative. NOTE: When this connector is used, the white POINTS IN wire is not connected. Brown connects to ground.
	VIOLET	9	MAG+	
	BROWN	25	SHIELD	
Racepak Assembly	WHITE BLACK	11	VNET HI VNET LO	Communicates data acquisition information with RacePak system. Only used to plug into VNet.
6-Pin Connector (to Hub/Modules)	RED BROWN RED BLACK BLACK	13 27 27 30 31	MSD CAN HI SHIELD POWER OUT MSD CAN LO MSD CAN GND	Supplies 12V switched power to add on module units. Also communicates between modules and Power Grid System Controller. This connector is only used with modules added onto the system. This is for the MSD CAN-Bus accessories. It is only used when adding Power Grid Modules to the system. The Hub Connector, PN 7769, is required.

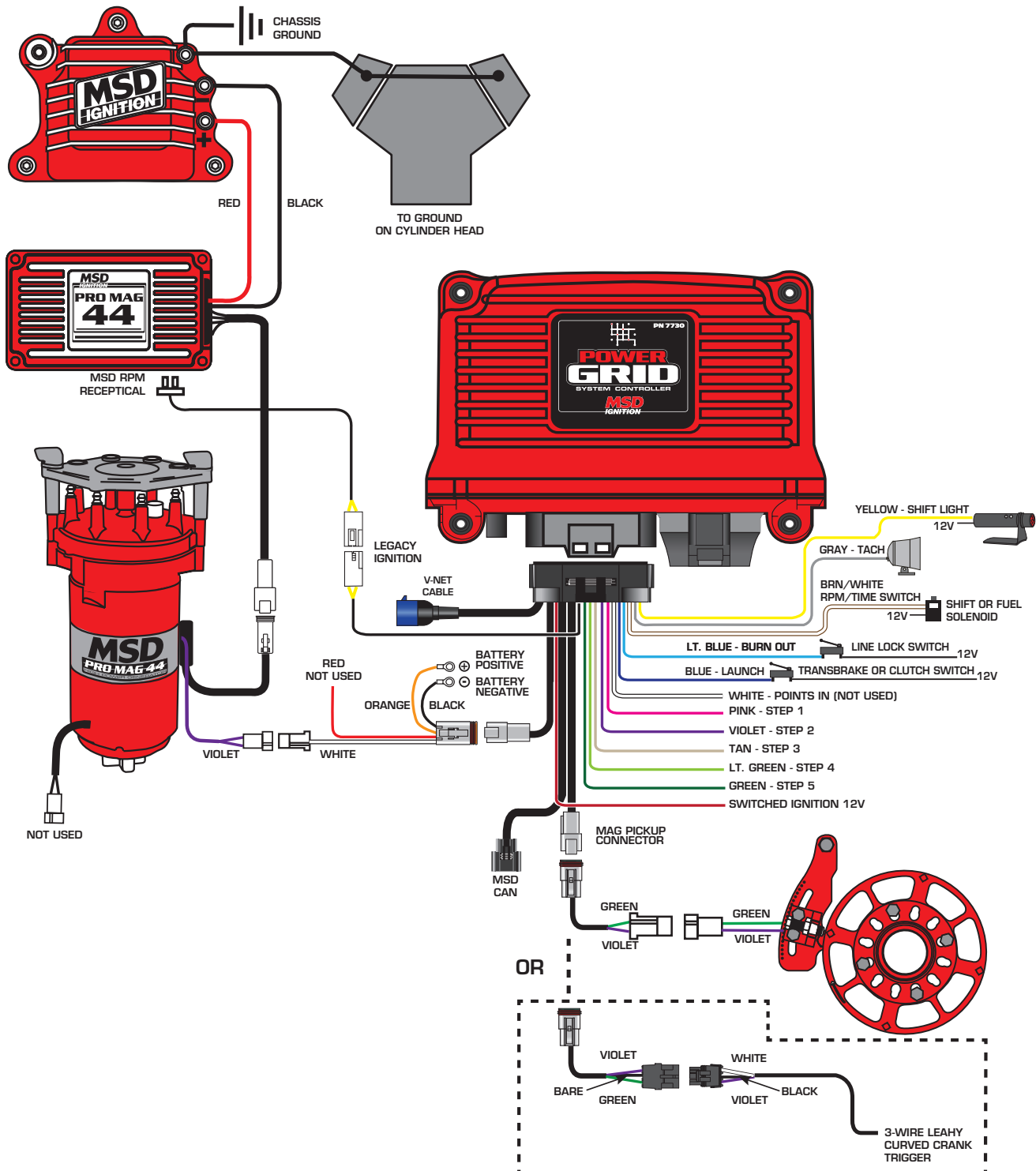
Power Grid System Wiring



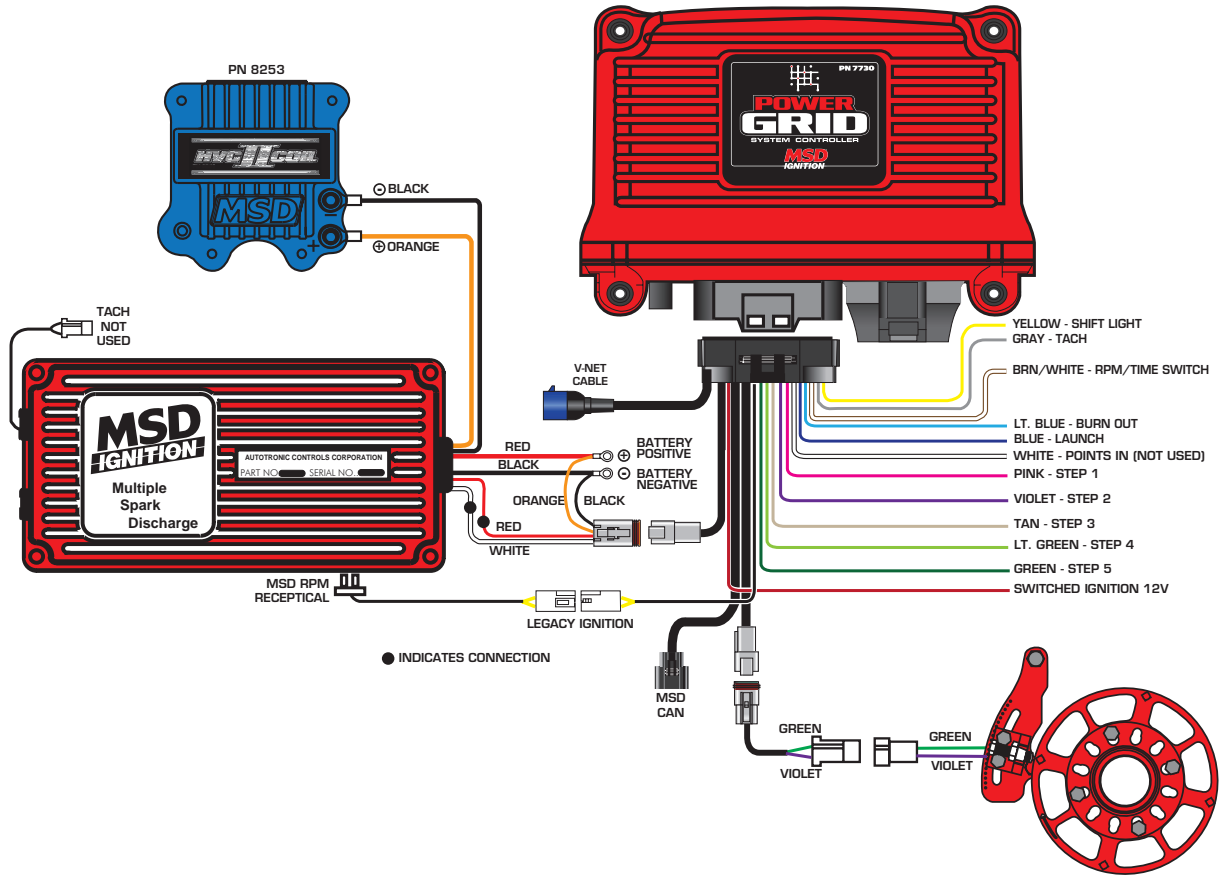
Power Grid System Controller to MSD 8-Plus



Power Grid System Controller to Pro-Mag



Power Grid System Controller to MSD 6AL



MSD Power Grid 7 Ignition Control PN 7720

NOTE: Solid core spark plug wires cannot be used with an MSD Ignition Control.

The Power Grid 7 Ignition Control was specifically designed to pair with the Power Grid System Controller, PN 7730. This Ignition system is designed for racing applications; it is not for sale for legal use on highways.

Operating Specifications

Operating Voltage:	12-18 Volts, Negative Ground
RPM Range:	15,000 RPM with 14.4 Volts
Spark Series Duration:	20° Crankshaft Rotation
Primary Voltage:	545-570 Volts
Spark Energy:	200-220 Millijoules/Spark
Weight and Size:	2.9 lbs., 7.5"L x 5"W x 2.25"H

Wiring

General Wiring Information

Wire Length: All of the wires of the MSD 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 soldered and 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.

Noise Capacitor: MSD offers a Noise Capacitor or Filter to help eliminate EMI noise. This capacitor, PN 8830, will also protect the MSD and accessories from voltage and current spikes.

Routing Wires

The MSD 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 firewall which creates an electrical shield.

WARNING: The MSD Power Grid Ignition is a capacitive discharge ignition. High voltage is present at the coil primary terminals. Do not touch the coil or connect test equipment to the terminals.

Wiring

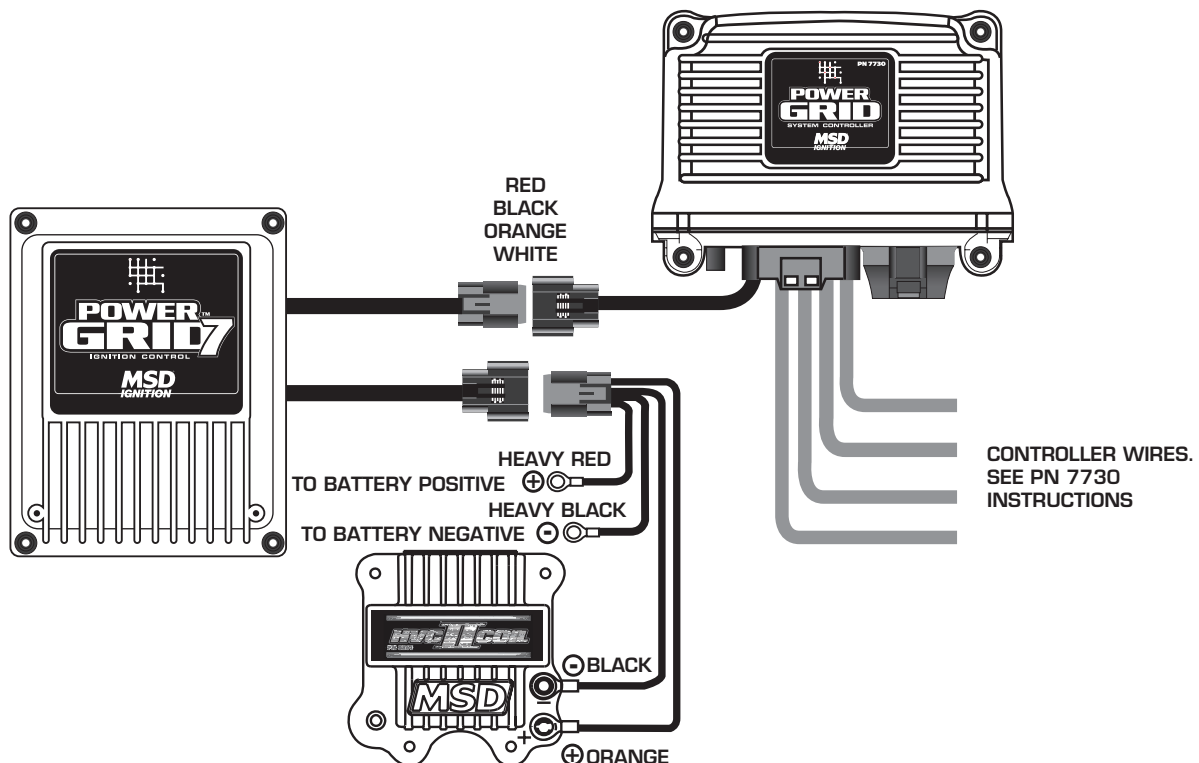
Deutsch Male 4-Pin Connector

12ga Red	Battery Positive – This wire connects directly to the battery positive (+) terminal or to a positive battery junction or the positive side of the starter solenoid.
12ga Black	Battery Negative – This wire connects to a good ground, either at the battery negative (-) terminal or to the engine.
16ga Orange	Coil Positive – This wire connects to the positive (+) terminal of the coil. This is the only wire that makes electrical contact with the coil positive terminal.
16ga Black	Coil Negative – This wire connects to the negative (-) terminal of the coil. This is the only wire that makes electrical contact with the coil negative terminal.

Deutsch Female 4-Pin Connector

18ga Red	Ignition – This wire is switched 12 volts to turn the ignition and modules on and off.
18ga White	Trigger Input – This wire is used to communicate the timing signal from the System Controller to the ignition.
18ga Black	Ground – This wire supplies the ground for the System Controller. This connects internally with the ground from the heavy Black wire in the first connector.
18ga Orange	Battery – This wire supplies power through the Power Grid Ignition to the System controller.

Power Grid 7 Ignition Control Wiring



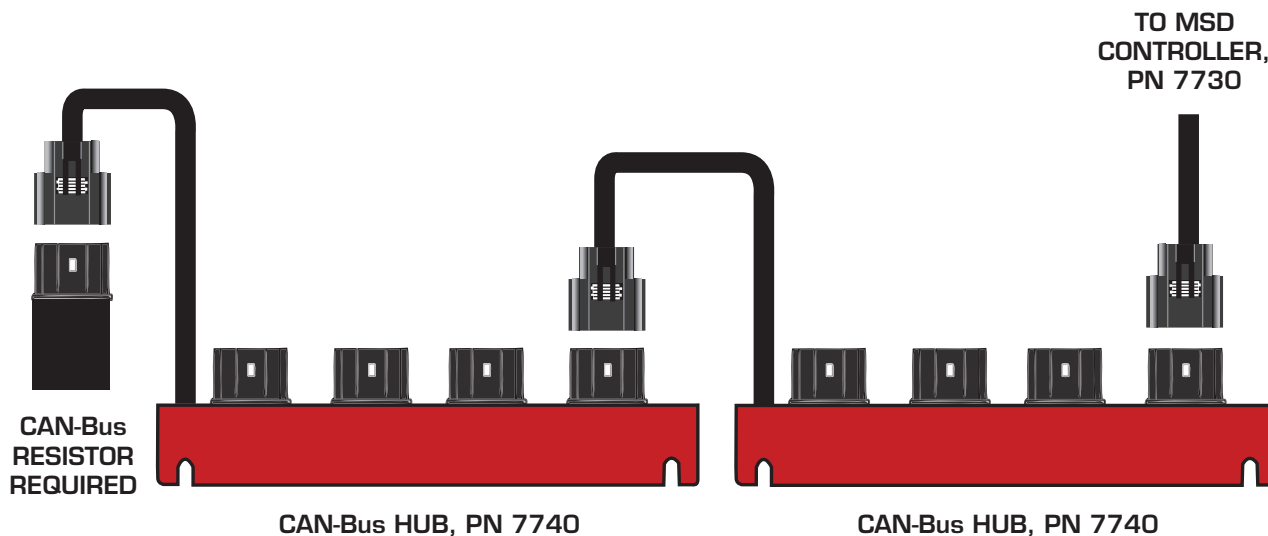
MSD 4-Connector CAN-Bus Hub PN 7740

The 4-Connector CAN-Bus Hub is intended for use with MSD Ignition CAN systems only. For a CAN system to work it must have definite ends. MSD Power Grid System Controller that will attach to the CAN system includes one end for the network incorporated internally. The controllers also come with a CAN-Bus Terminator, PN 7741, which will act as the second end to the system. Without the CAN-Bus Terminator in place at the end of the CAN-Bus system, signals could be distorted. These distorted signals could result in permanent or intermittent problems that include but are not limited to; improper timing, false signals, and repetitious signals. Always be sure to have the MSD Controller and the CAN-Bus Terminator at the ends of the MSD CAN-Bus.

When the System Controller is attached to the CAN Hub, it should be placed opposite of the pigtail. Modules will go in the following open connections. The CAN-Bus Terminator must be attached to the pig-tail end. If multiple CAN Hubs are needed, the prior hub(s) should be attached to the first connector of the subsequent hub. Doing so (as shown in Figure 1) will create a single channel for the CAN system with modules as branches.

Always be sure to supply a solid mount for the CAN Hub. The mounting system includes removable ends for the Hub that slide to allow the terminals to be turned in 90° increments. Never cut the CAN-Bus harness. If any of the CAN-Bus harnesses are not long enough for a desired mounting location MSD suggests the use of extensions (2', PN 7782; 4', PN 7784; 6', PN 7786).

MSD 4-Connector CAN-Bus Hub Wiring



MSD Manual Launch Control PN 7751

NOTE: The MSD CAN-Bus Hub, PN 7740, is required to connect the PN 7751.

NOTE: The CAN-Bus technology used in the Power Grid Ignition System requires a resistor at both ends in order to function properly. Do not throw away the Resistor cap, PN 7741, that comes attached to the Power Grid System Controller, PN 7730! It should be attached to the pig-tail of the CAN-Bus Hub, PN 7740, when the Hub is used to add modules.

The Manual Launch Control Module, PN 7751, is designed exclusively for use with the Power Grid System Controller, PN 7730. The Module provides racers an easy way to make adjustments to the launch rpm, and the the shift light intensity without connecting a PC. The Module also displays the engine timing.

Mount the Manual Launch Control Module in a position that allows for easy reach and adjustments. Also, make sure the harness of the module reaches the CAN-Bus Hub. Plug the connector from the Launch Module into an available CAN-Bus receptor on the Hub connector.

NOTE: Do not cut the wires to shorten the harness. If a longer harness is needed, MSD offers extension harnesses (2', PN 7782; 4', PN 7784; 6', PN 7786).

Operation

The Launch Module has five basic settings that can each be selected and adjusted using the module's joystick. Push the joystick in (as a button) to select a setting to be edited or to confirm changes after a setting is changed. To scroll through setting options the joystick should be pushed horizontally (left or right). To edit a selected setting, use vertical motions with the joystick. If a setting is selected to be changed and no action is taken in five seconds it will automatically deselect and revert to the setting that was initially programmed.

Multiple Manual Launch Control Modules can be plugged into the same system. If one is desired within reach of the driver and another is to be easily accessible to the crew, both will display real time changes.

Launch RPM: This selection controls the Launch Rev Limiter setting. Using the module the Launch Limiter can be changed in 50 rpm increments from 0-10,000 rpm.

Shift Light: This controls the shift light intensity. The setting is adjustable from 0-100% power 5% at a time.

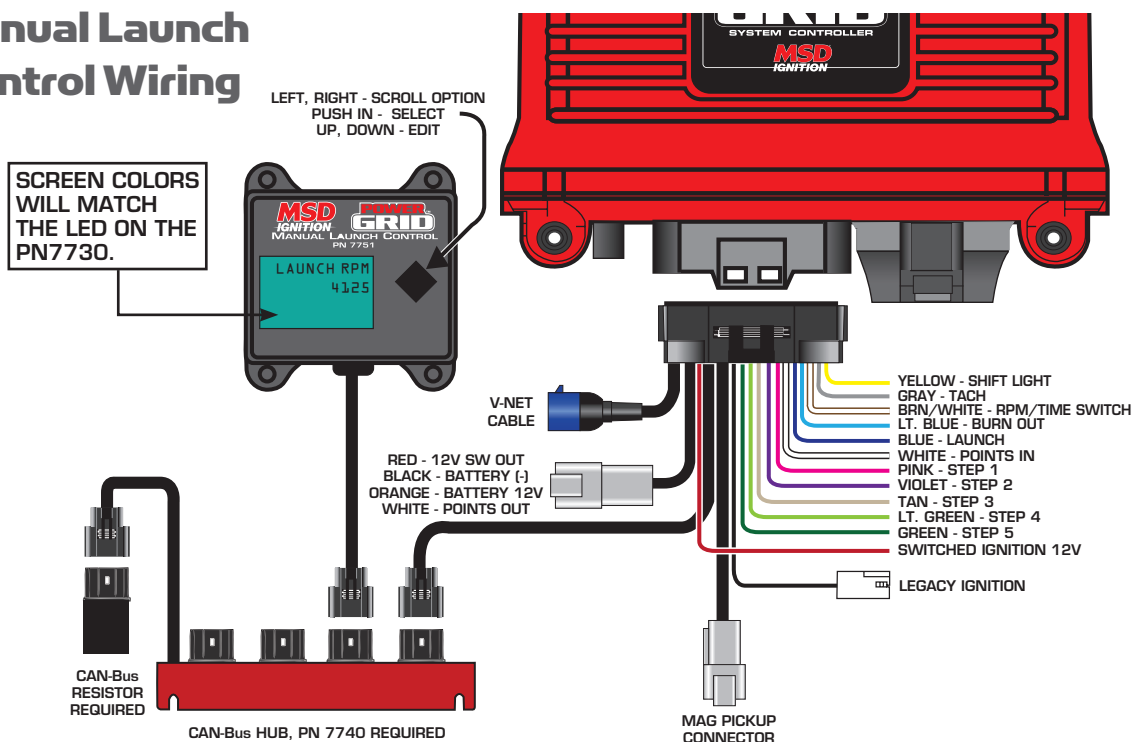
Timing: This displays the engine's timing as set by the 7730 in real time.* This is a Read Only feature.

Contrast: The screen on the Launch Module can be controlled for easier reading depending on lighting conditions.

Rotate: The screen on the Launch Module can be rotated 180° if needed depending on its mounting position.

***NOTE:** If the Maximum Timing Reference is not properly set within MSD View the 7730 may read and prescribe incorrect engine timing. Always ensure than the Max Timing Reference matches the timing where the crank trigger is set.

Manual Launch Control Wiring



MSD Advanced RPM Control Module PN 7761

The Advanced RPM Control Module (ARC), PN 7761, has been designed to help prevent excessive wheel speed. In the event that engine and / or driveshaft rpm increase(s) at an undesirable rate the module's software will retard timing and/or rev limiting in order to prevent excessive wheel speed.

Installation:

The ARC Module should be securely mounted near the MSD CAN-Hub. Plug the ARC CAN connector to an available port on the MSD CAN-Bus Hub, PN 7740. Do NOT cut the CAN-Bus connector wires.

The driveshaft sensor must plug directly to the 7761 module. MSD recommends using an 8-magnet driveshaft collar. Using less than an 8-magnet collar will result in less data for the processor to work with and slower, less reliable corrections.

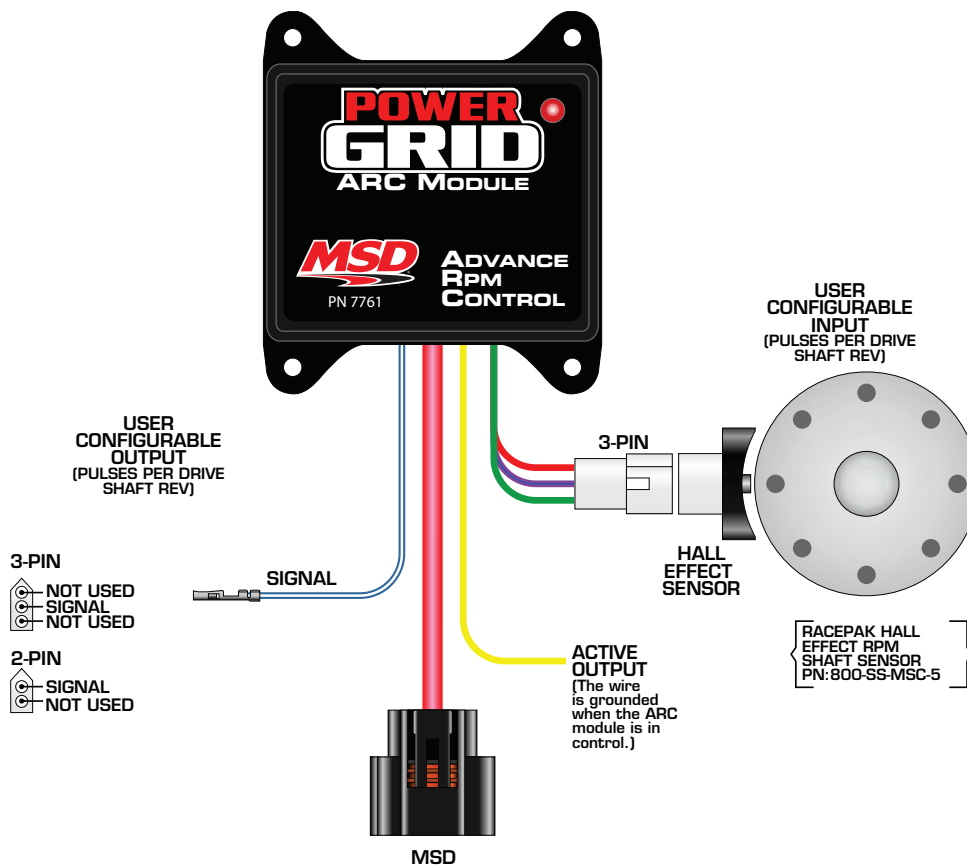
When connecting to a Racepak Data Recorder, the White/Blue and Brown wires will be connected to the driveshaft input on the Racepak. The wires (White/Blue and Brown) do not have a connector on them from the factory; two connectors are included in the parts bag of the module. Select and install either the 2-pin or 3-pin connector depending on which style is required by the data recorder being used. To install, push the pins (pre-installed on the wires) into the proper hole according to Figure 1 below. If these wires are not used, terminate the wires using heat shrink so that they cannot create a short.

The Yellow output wire is included in the same loom as the driveshaft output wires. The Yellow wire will switch to ground any time the ARC is controlling timing or rev limiting. The output circuit can support up to two amps continuous. This can be used to activate a light, solenoid, or boost controller.

MSD 7761 Wiring

Lead Grouping	Wire Color	Function	Description
6-PIN CONN (TO Hub / Modules)	RED	MSD CAN HI	Supplies 12V switched power to add on module units. Also communicates between modules and Power Grid System Controller. This connector is only used with modules added onto the system.
	BROWN	SHIELD	
	RED	POWER OUT	
	BLACK	MSD CAN LO	
	BLACK	MSD CAN GND	
3-PIN CONN (DS Out to Racepak)	Green	Ground	These wires send the drive shaft signal from the MSD unit to the Racepak data logger.
	Purple / Blue	Signal	
	Red	Power	
LOOSE WIRES	Brown	Ground	These two wires should be inserted into one of the connectors supplied in the parts bag as shown in Figure 1. These wires provide the driveshaft sensor output to the data recorder.
	White / Blue	Signal	
	Yellow	Active Indicator	Provides ground to a circuit any time the unit is active by retarding or rev limiting.

MSD 7761 Wiring



MSD Boost Retard Module for the Power Grid System PN 7762

The Boost Retard Module for the Power Grid System allows for engine timing changes based on pressure in the manifold. The Boost Retard Module also lets the user set several other functions including an Over-boost setting, a Boost Pressure Switch and Data Acquisition of the manifold pressure.

Over-Boost: Allows the user to set an over-boost limit that will disable the ignition if that limit is exceeded.

Boost Pressure Switch: There is an Orange output wire that switches to ground when the desired boost pressure is reached. The Orange wire can sync 2 amps of current (continuous) to ground. When higher current is required, use of a relay with the Orange wire is needed.

Data Acquisition: The Module provides data recording of the manifold pressure for boost or vacuum.

All Power Grid Modules work through MSD's CAN-Bus system. The Power Grid Modules are plug and play installations but may require extension harnesses for remote wiring. NOTE: Do NOT cut the wires to the CAN-Bus Harness. In the event an extension harness is needed to mount the unit in the desired location MSD offers the following extension harnesses-

- 2' CAN-Bus extension PN 7782
- 4' CAN-Bus extension PN 7784
- 6' CAN-Bus extension PN 7786

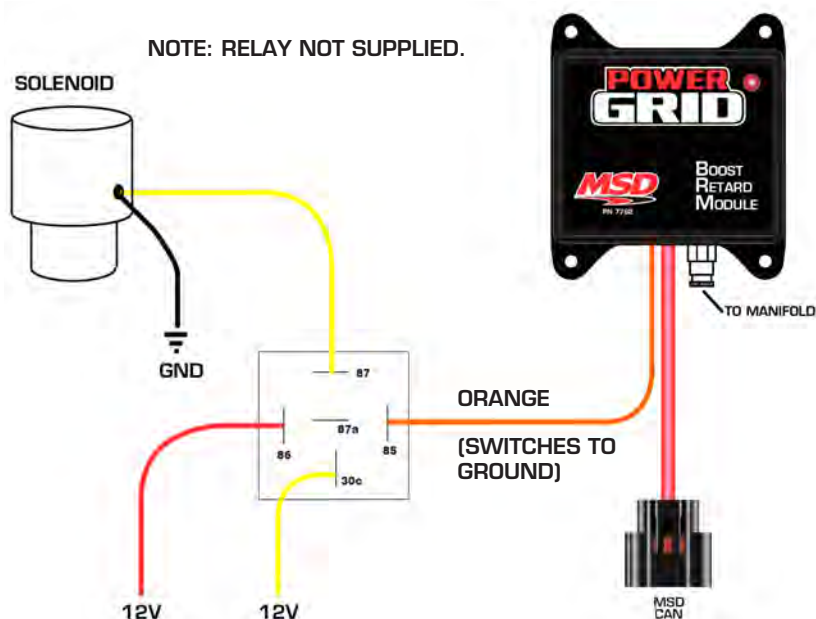
The Boost Retard Module utilizes a 1/4" Camozzi (push lock) pneumatic fitting. The fitting is not interchangeable. Attempting to change the fitting will damage the circuit board and is not recommended by MSD.

Wiring

Wire Grouping	Wire Color	Function	Description
6-PIN CONN (To Hub/Modules)	RED	MSD CAN HI	Supplies 12V switched power to add on module units. Also communicates between modules and Power Grid System Controller. This connector is used only with Modules added to the system.
	BROWN	SHIELD	
	RED	POWER OUT	
	BLACK	MSD CAN LO	
	Black	MSD CAN GND	
Loose Wire	Orange	SWITCHED GND	This wire is normally open to ground. Once activated, this wire will sync 2A of current to ground. Use of a relay is recommended with this wire (Figure 1).

Boost Activation Switch

The Orange wire can be used to activate a device based on boost pressure. If the device requires more than 2-amps, a relay is required. Figure 5 shows a typical example.



MSD Boost Control Module PN 7763

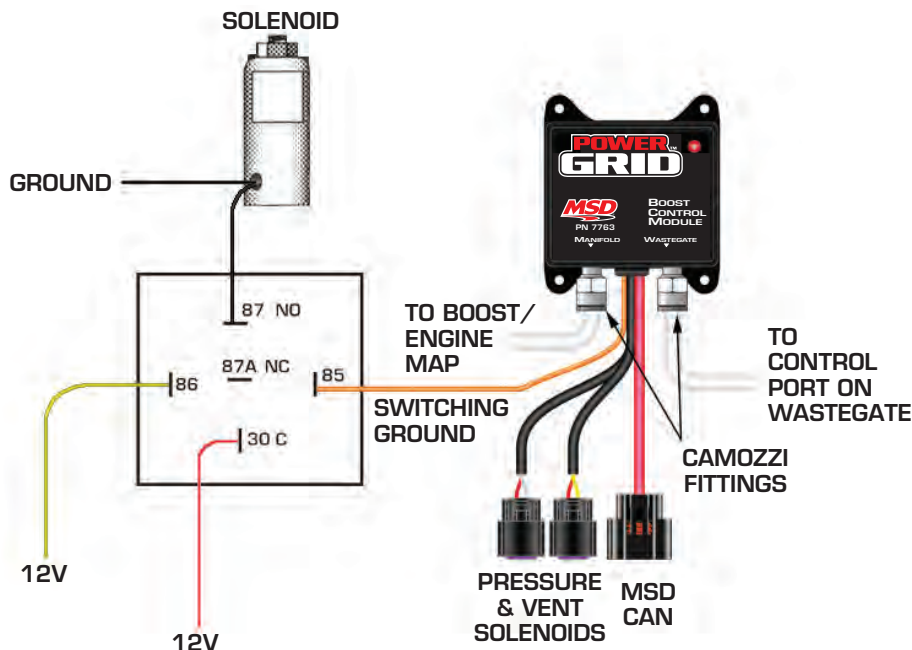
Installation

Note: Use of a pressure regulator is required. Adjust the CO2 bottle pressure to no more than 20psi above the maximum wastegate target pressure. MSD recommends Camozzi fittings throughout the air pressure system.

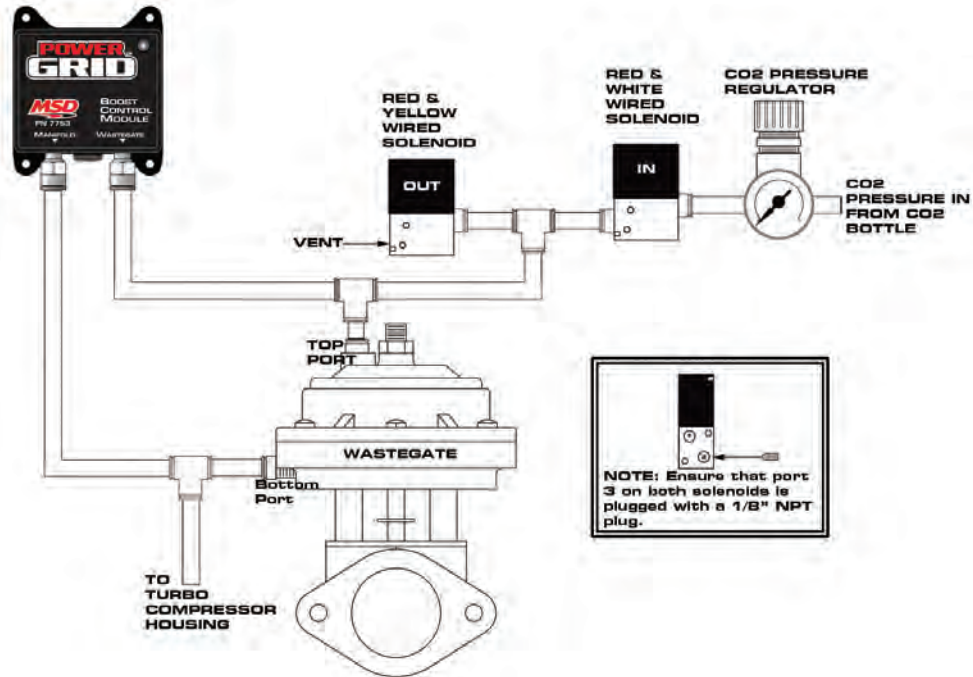
Wiring

1. Mount the Boost Control Module with the supplied hardware.
2. Plug the six pin MSD CAN connector from the Boost Control Module into a free port on the MSD CAN-Bus Hub PN 7740.
3. The orange wire switches to ground when active. Use a relay to activate devices that consume more than 2 amps.
4. Route all wires away from heat sources.
5. Assemble the connectors. NOTE: The solenoids are not polarity sensitive.
6. Connect the red and white wires to the Pressure IN solenoid.
7. Connect red and yellow wires to the Pressure OUT (VENT) solenoid.

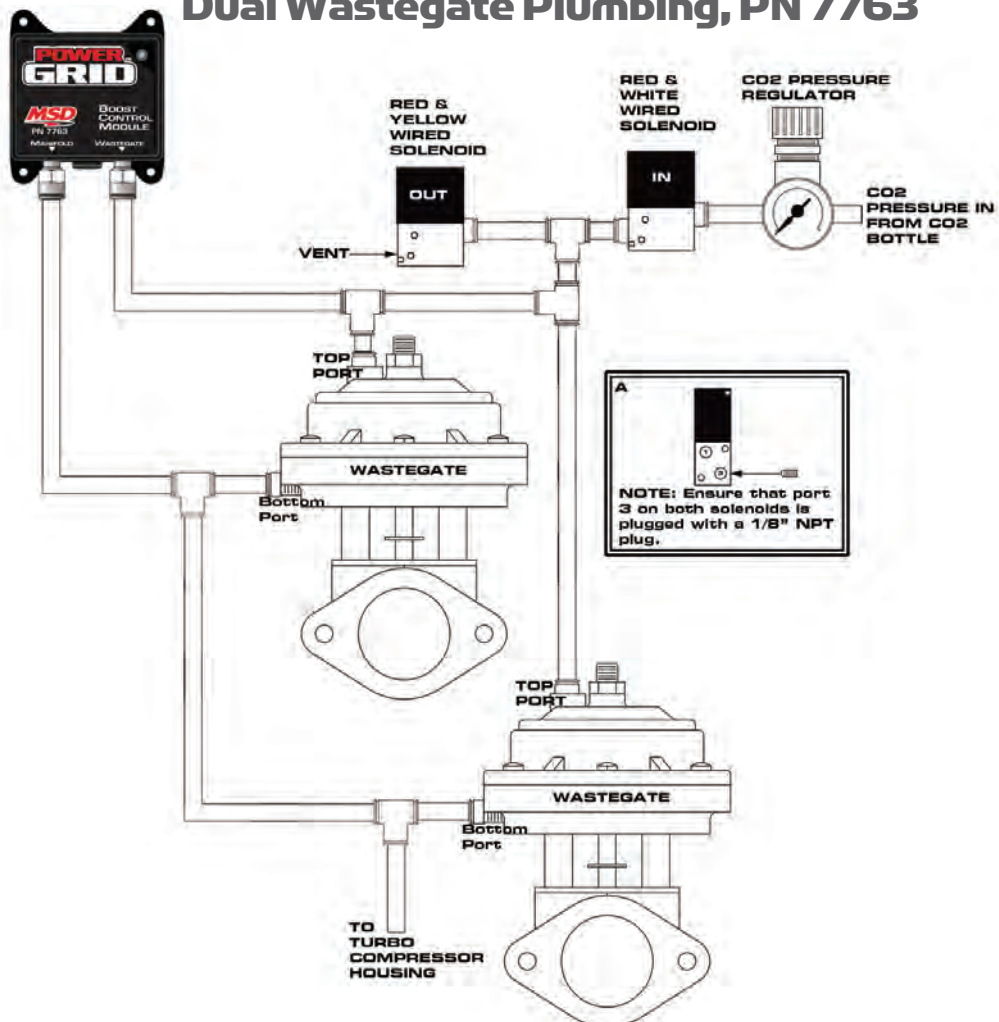
Wire Grouping	Wire Color	Function	Description
6 PIN CONN	RED	MSD CAN HI	Supplies 12v switched power to add on modules on CAN-Hub. Allows communication with the Power Grid System Control. This connector is used only with Modules added to the CAN-Hub System.
	BROWN	SHIELD	
	RED	POWER	
	BLACK	MSD CAN LO	
	BLACK	MSD CAN GND	
Single Wire	ORANGE	SWITCHED GND	Normally open and will switch to ground once activated (2A max). Use of a relay is required for higher current applications
Solenoid Connector	RED	12V	Control wires for the Pressure IN Solenoid.
	WHITE	SWITCHED GND	
Solenoid Connector	RED	12V	Control Wires for the Vent OUT Solenoid.
	YELLOW	SWITCHED GND	



Single Wastegate Plumbing, PN 7763



Dual Wastegate Plumbing, PN 7763



MSD Boost Control Module External Map PN 77631

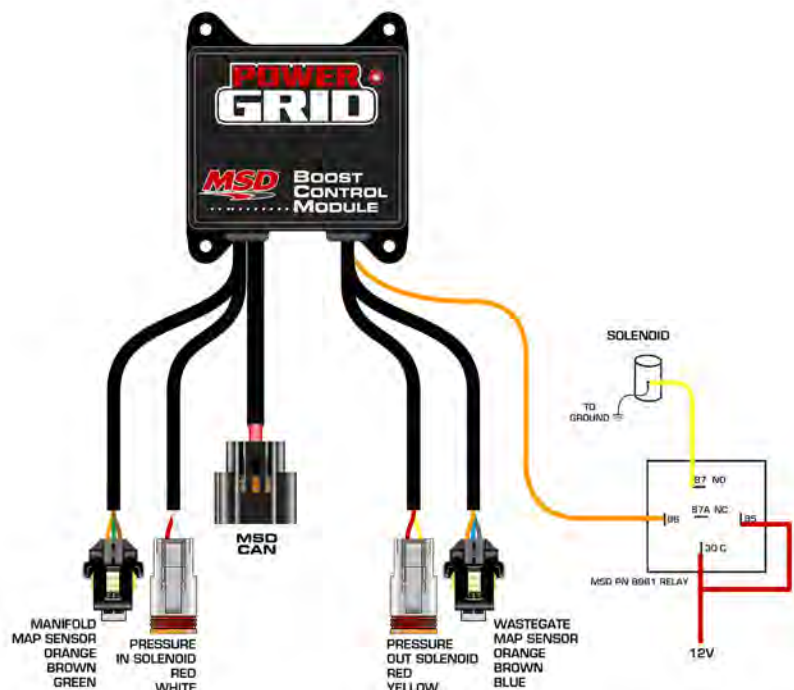
Installation

Note: Use of a pressure regulator is required. Adjust the CO2 bottle pressure to no more than 20psi above the maximum wastegate target pressure. MSD recommends Camozzi fittings throughout the air pressure system.

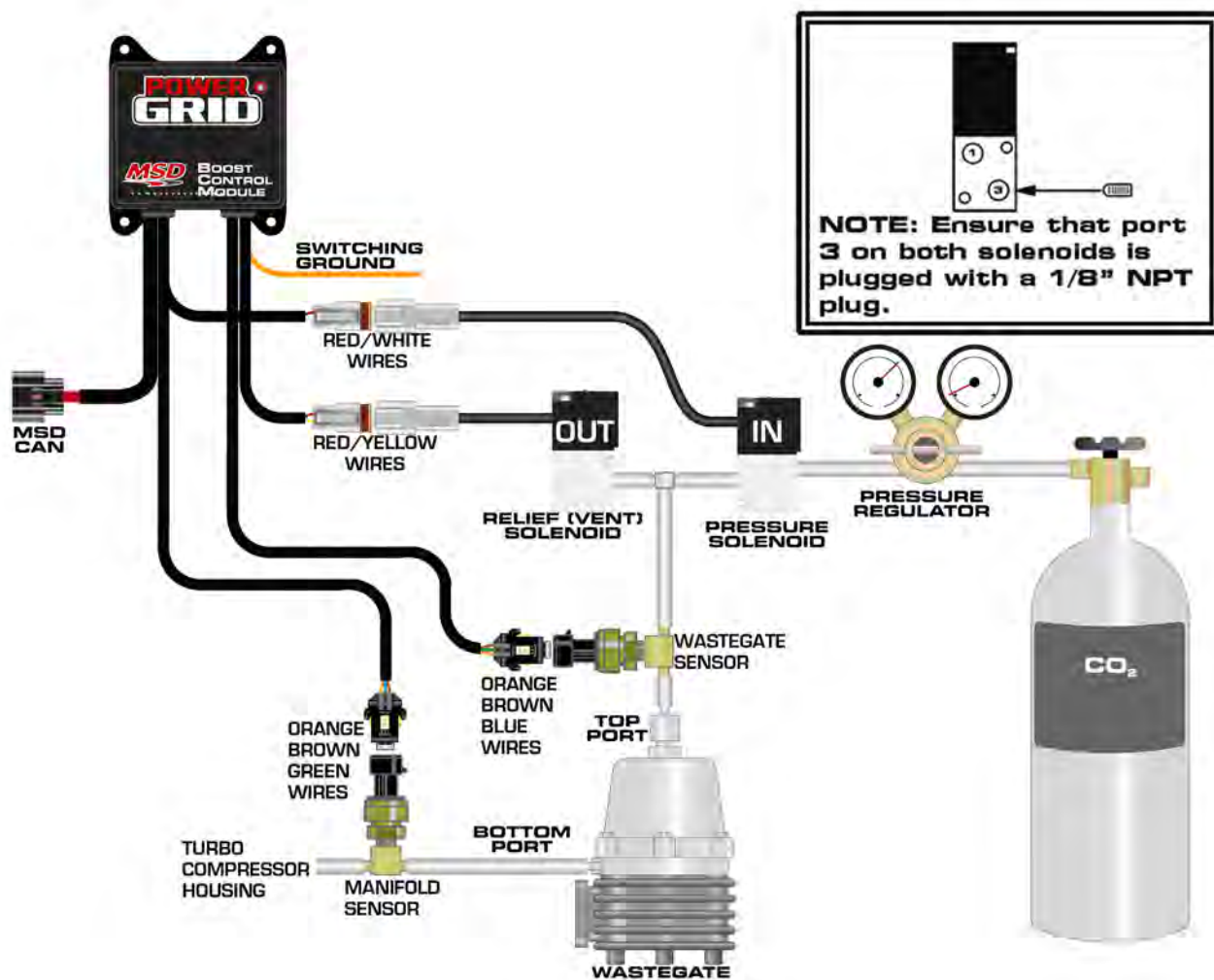
Wiring

1. Mount the Boost Control Module with the supplied hardware.
2. Plug the six pin MSD CAN connector from the Boost Control Module into a free port on the MSD CAN-Bus Hub PN 7740.
3. The orange wire switches to ground when active. Use a relay to activate devices that consume more than 2 amps.
4. Route all wires away from heat sources.
5. Assemble the connectors. NOTE: The solenoids are not polarity sensitive.
6. Connect the red and white wires to the Pressure IN solenoid.
7. Connect red and yellow wires to the Pressure OUT (VENT) solenoid.

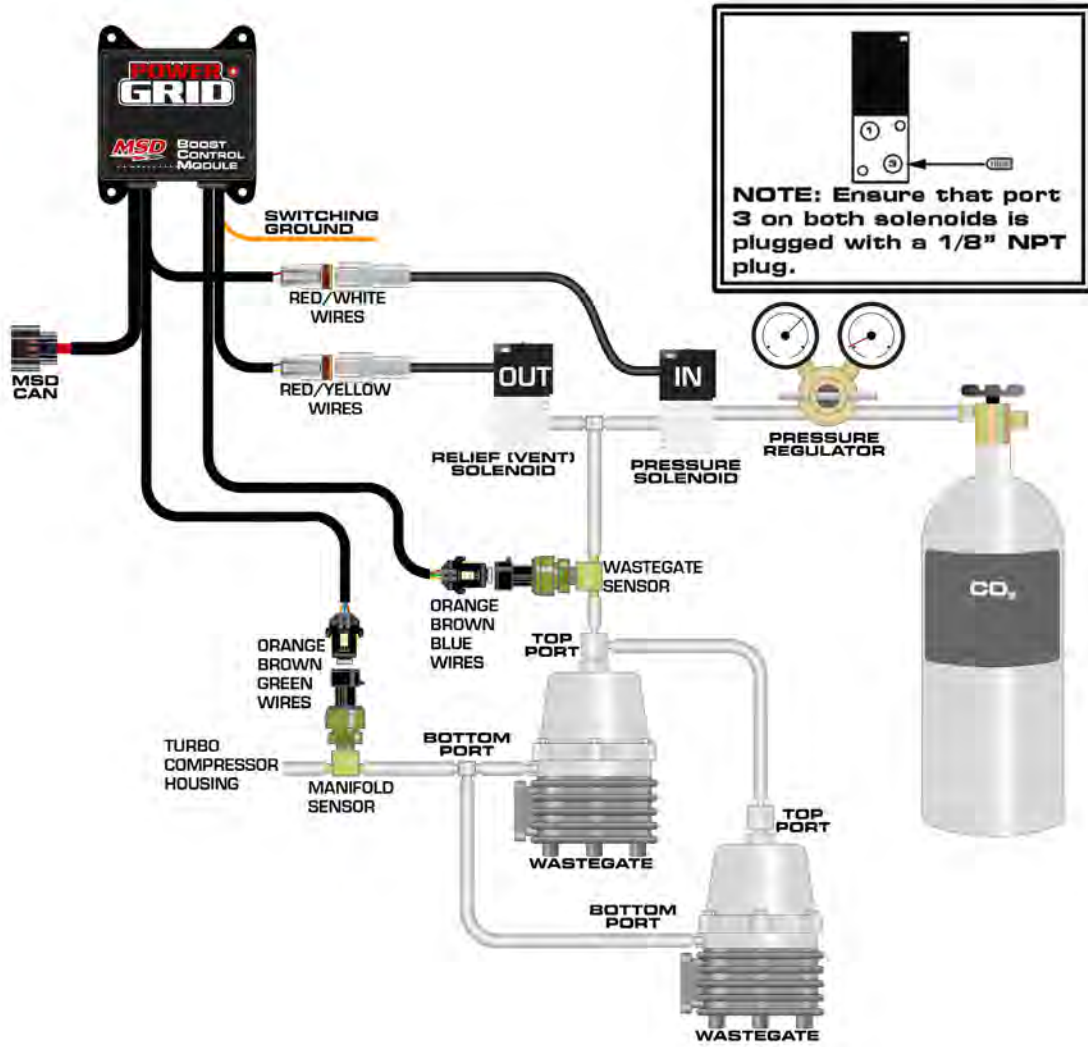
Wire Grouping	Wire Color	Function	Description
6 PIN CONN	RED	MSD CAN HI	Supplies 12v switched power to add on modules on CAN-Hub. Allows communication with the Power Grid System Control. This connector is used only with Modules added to the CAN-Hub System.(Figure 1)
	BROWN	SHIELD	
	RED	POWER	
	BLACK	MSD CAN LO	
	BLACK	MSD CAN GND	
Single Wire	ORANGE	SWITCHED GND	Normally open and will switch to ground once activated (2A max). Use of a relay is required for higher current applications (Figure 3)
Solenoid Connector	RED	12V	Control wires for the Pressure IN Solenoid.
	WHITE	SWITCHED GND	
Solenoid Connector	RED	12V	Control Wires for the Vent OUT Solenoid.
	YELLOW	SWITCHED GND	
MAP Sensor Connector	ORANGE	5V	Plug in for Wastegate MAP Sensor.
	BROWN	GROUND	
	BLUE	SIGNAL	
MAP Sensor Connector	ORANGE	5V	Plug in for Manifold MAP Sensor.
	BROWN	GROUND	
	GREEN	SIGNAL	



Single Wastegate Plumbing, PN 77631



Dual Wastegate Plumbing, PN 77631



Installing an MSD Programmable Digital-7 Ignition Control

This section covers the basic wiring and accessories of the MSD Programmable Digital-7 Series Ignition, PN 7530T, PN 75301, PN 7535, and PN 7531. These are powerful ignitions with a list of programmable timing and rpm features. The ignitions can be programmed with a PC or with MSD's hand held Programmer/Monitor. They can be triggered by points, amplifiers, magnetic pickups or the trigger output of an ECU for fuel injection systems.

Operating Specifications

Operating Voltage:	+12-18 volts
Current Requirements:	1.1 Amp per 1,000 RPM
RPM Range:	12,500 rpm with 14.4 volt supply
Spark Duration:	20° Crankshaft
Primary Voltage Output:	535 Volts
Spark Energy Output:	190 milliJoules Per Spark
Weight and Size:	4.7lbs., 9.5"L x 4.5"W x 2.2"H

NOTE: The Pro Power HVC Coil, PN 8251 or Pro Power HVC II, PN 8261, are recommended.

Programmable Digital-7 Ignition Options

Several versions of the Programmable 7-Series Ignitions have been offered. This chart shows what features are available in each model.

	PN 7535	PN 7530T	PN 75301	PN 7531
TRIGGER INPUTS				
Magnetic Pickup	X	X	X	X
Square Wave (Points, 12V Sq.)	X	X	X	X
REV LIMITERS				
Over-rev Limiter	X	X	X	X
Launch Limiter	X	X	X	X
Burn Out Limiter	X	X	X	X
Spool Limiter (Turbo)	X			X
Slew Rate Limiter (Per Gear)				X
Auto Learning Limiter	X	X	X	X
RPM/Time Based Limiter Map				X
<i>Time Rev Limiter (NHRA Req.)</i>		X	X	
<i>Traction Control Detection (NHRA Req.)</i>		X	X	
TIMING				
Individual Gear Timing Map	X	X	X	X
Boost Timing Map	X			X
Individual Cylinder Timing	X	X	X	X
DATA LOGGING				
Ignition Acquisition			X	X

	PN 7535	PN 7530T	PN 75301	PN 7531
RETARDS				
Start Retard	X	X	X	X
Launch Retard (based on time)	X	X	X	X
3-Step Retards (ramp on/off)	X	X	X	X
OUTPUTS				
Activation Switch				
by RPM	X	X	X	X
by Time	X	X	X	X
by PSI	X			X
Sequential Shift Light	X	X	X	X
Staging Light	X	X	X	X
Tach Output Configurable to Trigger/Timing	X	X	X	X
Configurable Cam Sync or Limiter output	X	X	X	X
SENSOR				
Configurable 1, 2 & 3-Bar	X			X
TUNING				
Real Time Graphical Display for Engine Monitor (with Laptop)	X	X	X	X

Programmable Wire Operation

Heavy Red	This wire connects directly to the battery positive (+) terminal or a positive battery junction such as the starter solenoid. 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.
Red	This wire is responsible for turning the MSD On and Off. Connects to a switched 12 volt source such as the ignition key or switch.
Orange	This wire connects to the coil positive (+) terminal. This is the ONLY wire that makes electrical contact with the positive coil terminal.
Black	This wire connects to the coil negative (-) terminal. This is the ONLY wire that makes electrical contact with the negative coil terminal.
Trigger Wires	There are two circuits that can be used to trigger the MSD Ignition; a Points circuit (the White wire) and a Magnetic Pickup circuit (the Green and Violet wires). The two circuits will never be used at the same time.
White	This wire is used to connect to breaker points, electronic ignition amplifier output or to the trigger output of the ECU. When this wire is used, the Magnetic Pickup connector is not used.
Violet and Green (Magnetic Pickup Connector)	These wires are routed together in one harness as the magnetic pickup connector. The connector plugs directly into an MSD distributor or crank trigger. It will also connect to aftermarket pickups. The Violet wire is positive (+) and the Green wire is negative (-). When these wires are used, the White wire is not.
Cam Sync Light Blue and Light Green	This 2-pin connector plugs into a Cam Sync Sensor to indicate when the number one cylinder is triggered. The wires are Light Blue and Light Green.
Fiber Optic Connection	This is where the fiber optic cable of the PN 7555 Inductive Sync Kit connects to take advantage of the Individual Cylinder Management feature. This must be covered when using the 2-pin cam sync input.
Accessories	
Dark Blue	Launch Limit. When 12 volts are applied, this wire activates several features including; Launch rev limit, Launch Retard value, Launch Timing Curve and will reset the Shift Light sequence to 1st gear.
Light Blue	Burnout Limit. This wire activates the Burnout rev limit when 12 volts are applied.
Spool-Up PN 7535 and PN 7531 Only	When the Dark Blue and Light Blue wires are applied to 12 volts at the same time, a fourth rev limit is activated. This limit is to spool up a turbo during the burnout. When both the Dark Blue and Light Blue RevLimit wires are at +12 volts then the Spool RevLimit is active.
Pink	Step 1 Retard. This wire activates the first retard stage when it is applied to 12 volts. When 12 volts is removed the retard is deactivated.
Violet	Step 2 Retard. This wire activates the second retard stage when it is applied to 12 volts. When 12 volts is removed the retard is deactivated.
Tan	Step 3 Retard. This wire activates the third retard stage when it is applied to 12 volts. When 12 volts is removed the retard is deactivated.
Yellow	Shift Light activation wire. Supplies ground to activate a light.
Brown/White	RPM Activation Switch. This wire will supply a ground to complete a circuit at a desired rpm. It will handle up to 3 amps continuous.
Yellow/Yellow	Output for data acquisition or fuel controls. Note, only two wires are used.
PN 7535 and PN 7531 Only 3-Pin Connector, MAP Sensor Connector Connects to an external MAP or gauge pressure sensor.	
Brown/Violet	+5 volt supply
Brown/Yellow	Ground
Dark Brown	Map Signal

Programmable Features

The following explains the programmable features of the PN 7535, PN 7530T, PN 75301 and PN 7531 Ignition. The features are listed in the same order that they show on the Data Editor list in the software. Note that all of the retard amounts are cumulative and the maximum amount of retard is 30°. As indicated, not all features are available in each model.

Rev Limits

Up to three different rev limits can be programmed in 100 rpm increments from 2,000 – 12,500.

RevBurn: Burnout Rev Limit. This limit is activated when 12 volts are applied to the Light Blue wire. It is adjustable from 2,000 to 12,500 rpm. Note that the Slew Rev Limiter is disabled by the Burnout Limit.

RevMax: Max Speed Rev Limit. This is the overrev limit and is active whenever the Launch and BurnOut limits are off.

PN 7531 only - OutCam: Select either a Cam Sync output or a Rev Limiting output that can be used with MSD components that use rpm modules for the rev limit, or data acquisition units.

RPM: Adjustable in 100 rpm increments from 2,000 – 12,500.

PN 7531 only - AdjOff: This program enables an automatic compensating rev limiter that will correct trigger input offsets and variables. It can be turned On or Off.

RevLaunch: Launch Rev Limit. This limit is activated when 12 volts are applied to the Dark Blue wire. It is adjustable from 2,000 to 12,500 rpm.

PN 7531 and PN 7535 only - Spool-Up: This program gives turbo cars a fourth rev limit to help the engine spool boost pressure prior to the burnout. It is active when both the Light and Dark Blue wires are applied to 12 volts at the same time. It is adjustable in 100 rpm increments from 2,000- 12,500. Default is 3,000 rpm.

Start Retard

Program an amount of retard that will occur while the engine is cranking. This helps reduce the load on the starter for easier cranking. It is adjustable from 0° - 25° in 1° increments. This is an automatic feature and will enable below 500 rpm and will deactivate when the engine reaches above 800 rpm. Default is 10°.

Launch Retard

This is the time based retard ramp. It can be programmed from 0°-15° in 0.1° increments and from 0-2.5 seconds. When the Dark Blue Launch/Reset wire is connected to 12 volts, this retard value is activated. When 12 volts are removed from the Dark Blue wire, the timer begins to ramp the retard value back to 0° over the programmed time. Once the time is over, the retard will not be activated again.

Step Retards

There are three step retards that are controlled through three corresponding activation wires or through rpm. They can also have an rpm point that the engine must reach before the retard becomes active. (A minimum rpm can also be programmed that must be reached before a step becomes active.) A time based ramp can be programmed to gradually bring the retard to its full on amount, or to ramp the retard amount out (back to no retard) from its setting.

Step 1 – Pink

Step 2 – Dark Brown

Step 3 – Tan

Activation through Wiring: Each step is activated when 12 volts are applied to its corresponding wire. When the steps are enabled at the same time the retard amounts are added together. The maximum retard allowed by the Ignition is a total of 30° (including other retard amounts from a launch, boost or gear retard).

Activation through RPM: Each step retard can also be activated through rpm. In order to achieve this, 12 volts must still be applied to the corresponding step retard, and an rpm value must be selected from the Step RPM menu. When 12 volts are applied, the retard will not activate until the rpm value is reached. Note that the retard will remain active above this rpm, even when other stages are activated. It will deactivate when the rpm drops below the set amount.

NOTE: If you prefer to activate the step retards through the activation wires and not rpm, then the rpm value in each of the desired step menus must be set to 800 rpm.

Step Retard Ramp: Each retard step can be ramped to and from its full retard amount over a time based program (Figure 3). It is adjustable from 0-2.5 seconds in 0.01 second increments. Default is 0°.

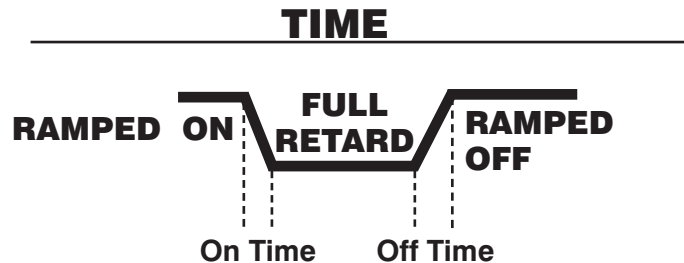
RPM: The minimum engine rpm that must be reached before a step retard is activated (default is 800 rpm).

On: The amount of time it takes for the step retard to reach its Retard Degree. Allows a gradual ramp On time to reach the Retard Degree. User adjustable from 0.00 to 2.50 sec. (0.01 sec increments).

Off: The amount of time it takes for the step to retard to reach 0° (no) retard. Allows a gradual ramp Off time to reach NO Retard. User adjustable from 0.00 to 2.50 sec. (0.01 sec increments).

Deg: The amount of retard.

Step Retard Off Delay: This feature will set a time based delay to deactivate the step retards. This is designed to keep the timing retarded to clear the engine of any nitrous oxide prior to deactivating the retard. The rate of ramp is adjustable from 0 – 2.5 seconds and the default is 0.5 second.



Ramping the Retard On and Off

Gear Select

The Three Step Retard wires, Pink (1), Violet (2) and Tan (3) can also be wired to indicate the first three gear changes to the ignition control. When selected from the Step Wire menu, the ignition will know that the car is in second gear when 12 volts are applied to the Pink wire, third for the Violet and fourth when the Tan wire is applied to 12 volts. By using this feature, if you lift off the throttle and get back on it, the ignition will not count it as a gear change.

NOTE: When selected, this feature overrides the RPM Drop Gear Select values.

This is a sequenced series meaning Tan (3) will not become active until it sees 12 volts on Pink (1), and Violet (2). This way, 12 volts do not need to be removed from each wire before the following gear is selected.

NOTE: Five and six speed transmissions will have to use the RPM Drop functions for gears 5 - 6.

Gear Retards

This program provides the ability to create a run curve for each gear. Up to six different curves can be programmed from 800 – 12,500 rpm in 0.1° increments for every 100 rpm. You can program up to 32 different points on each Gear Map. Also, all of these points are interpolated every millisecond to create a smooth (no steps) curve.

The number of gears is adjustable under the SHIFT menu, as well as the amount of rpm drop the ignition needs to see before knowing that a different gear has been selected. Up to six gears can be programmed. You can also use the Step Retard wires as Gear Select Indicators for the first four gears.

These retards are mapped out on the Gear Retard chart of the Graph View. In the chart, go to the View pull down menu and select Trace/AnalysisBox. That will give you a small window to show the different color gear traces so creating a different curve for each gear is easier.

If you want the same retard curve for all gears, compose the curve, select the Edit pull down menu and copy the curve, then select Paste All.

Cylinder Count

CylCnt: This is the number of cylinders of the engine. Programmable for 4, 6, 8 and Odd fire 6-cylinders (90°/150° only). Once a change has been made, turn the ignition Off and On to reset.

Tach Trigger: There are two choices for the output of the tach terminal on the end panel of the ignition or the Gray wire of the 12-pin connector. The tach output is a 30° duration 12 volt signal that is compatible with most tachs and data acquisition systems. The default is Trigger which provides the most accurate signal for rpm sensing components. The tach Timing program should only be used when spark timing data is required by an acquisition control or to fire another ignition.

Individual Cylinder Timing

Each cylinder can be retarded up to 10° in 0.1° increments. Adjustments are made through the CylDeg menu. Default for each cylinder is 0°. A Cam Sync signal for cylinder number one must be incorporated. The MSD Fiber Optic Pickup, PN 7555, is the easiest or a pickup kit could be fabricated on the cam gear (MSD Kit PN 2346).

The spark sequence, or firing order needs to be considered when selecting the ICT. You can go through the Cylinder Numbers and place them with the corresponding position, or go to the Sequence window and select from the pre-programmed firing orders. This will help by listing the cylinder number next to the sequence number.

Spark Sequence	Program the firing order of your engine, reference only.		
Degree	Program the amount of retard of each cylinder. These retard rates are added to any other retards that are active. Max retard is 30°.		
Sequence	Select a firing order reference:		
	Program	Order	Application
	1843	18436572	Most GM, Chrysler and AMC V8
	1542	15426378	Most Ford V8
	1372	13726548	Ford 351W/302 H.O.
	1425	142536	Ford V6
	1536	153624	Ford, Camaro, Chrysler, AMC V6
	1654	165432	Most GM V6
	1436	143625	Odd-fire 6-cylinder

RPM/Time/Pressure Activation Switch

This program lets you activate a circuit by supplying a ground path on the Brown/White wire (up to 3 Amps continuous). This can be activated in one of several ways: RPM, Time or Pressure.

RPM Window: Program an rpm value to activate and deactivate a circuit from 800 – 12,500 rpm in 100 rpm increments.

RPM On: Rpm that the circuit is activated

RPM Off: Rpm that the circuit is deactivated

RPM/Pressure Hysteresis - Only available on PN 7531 and PN 7535: Built in Hysteresis allows the deactivation point to be set lower than the activation value.

Time Based: Program an activation point in 0.1 second increments after the launch. Up to 25 seconds of total time.

OnDelay: The amount of time after launch (12 volts removed from the Dark Blue wire).

OffDelay: The amount of time that the switch stays activated. This can be programmed from 0-25 seconds. It will always deactivate after 25 seconds.

Pressure Activation - Only available on PN 7531 and PN 7535: Program a manifold pressure activation point from 2 – 45 psia in 0.25 psi increments. This also can be programmed where the deactivation point is less than the activation point.

PSI Switch On: The pressure at which a circuit can be activated through the Brown/White wire. Adjustable from 0-45psi.

PSI Switch Off: The pressure at which the circuit is deactivated. Adjustable from 0-45psi. This can be set lower than the activation pressure.

PSI Delay: Delay the activation or deactivation of the pressure switch.

OffDly: The amount of time that the switch delays turning off after the given pressure is reached. Adjusted from 0-25 seconds.

OnDly: The amount of time that the switch delays turning on after the given pressure is reached. Adjusted from 0-25 seconds.

Shift Light

This program lets you select the number of gears (Last Gear), program the shift light to come on when the Launch Light rpm is reached, set an rpm point for each gear and the rpm drop for the ignition to recognize as a gear shift between each gear. When the correct rpm is reached the Yellow wire is switched to ground to activate the shift light or solenoid relay.

Launch Light: This programs an rpm window that will illuminate the shift light when the correct rpm is reached for the holeshot. When the rpm is in this window the light will be on solid. If the rpm goes high, the light will flash. If the rpm goes low, the light turns off.

RpmHi: The high rpm for the launch light program.

RpmLo: The low rpm for the launch light program.

ShiftLight: Program the rpm point for each gear change.

(1)Rpm First gear rpm point to shift.

(2)Rpm Second gear rpm point to shift.

(3-5 gears)

ShiftGear: Program the rpm drop between each gear that the ignition must see to recognize a shift. Programmable from 200-1500 rpm.

(1)DropRpm Rpm drop between first and second.

(2)DropRpm Rpm drop between second and third.

(3-5 gears)

LastGear: The program lets you select the number of gears to use with the shift light from 2-6 gears. Default is five gears.

SetGear: This allows you to use the step retard wires as shift indicator wires. This is useful on engines that don't show enough rpm drop between gears to register a shift.

PN 7531 Only

RevLimit Curve

This program allows you to map an rpm limiting curve based on time. It is programmed in graph view on the Rev Limit chart and is adjustable in 100 rpm increments down to 0.01 seconds for up to 12.5 seconds.

Pt 1: Adjust from the Rev Limit chart of graph view (up to 32 points).

Time .00: Adjust from the Rev Limit chart of graph view.

RPM: Adjust from the Rev Limit chart of graph view.

RPM Slew

This program allows you to control the rate of engine acceleration in each gear. This is an rpm limiting function based on a ratio between engine rpm and time. You can program the rate at which the engine accelerates by selecting an rpm per second. If 3,000 rpm is selected, that means the engine will be limited to 3,000 rpm per second. This is adjustable for each gear.

Gear 1: The RPM Slew rate for each gear. Adjustable from 1-6 gears.

RPMSlew: The rpm amount per second, adjustable from 100 – 9,900 rpm per second in 100 rpm increments. Note that this Slew rate is disabled when the Launch or Burnout rev limits are active.

NOTE: The Slew Rev Limiter is not recommended with distributor triggers. A crank trigger should be used.

Margin

The Slew Margin is a program to ensure very accurate rev limiting action especially when an engine accelerates quickly. There is a High and Low Margin value that ranges from 100-990 rpm. The Margins should be programmed close to the Slew depending on the engine's acceleration capabilities. At lower rpm, there are less revolutions per second so the Margin should be set lower. At high rpm there are more combustion events taking place as well as more mechanical variables (such as crank flex) so the high Margin should be set higher.

Low: Default is 200 rpm.

High: Default is 400 rpm.

Launch Slew

This controls the status of the Slew Rev Limiting feature.

SlewOff: Activates the Slew Rev Limiting feature. Default is Off.

Inhibit: This feature allows you to inhibit the activation of the Slew for an adjustable length of time after the launch. It is adjustable from .02 - 5 seconds in 20ms increments.

Target

HoldCnt: The number of cylinder counts that occur after a Slew rev limit is active before the Slew Target rpm is repositioned. The default is 10 which is typical for an engine in the 7000-8000 rpm range.

Higher revving engines should use a higher Hold Count. A pro stock engine typically will be set around 11 or higher. The count is adjustable from 1-99 and is most effective in the 5-20 range.

Limit CNT

The Limit Count will set a maximum number of Rev Limits by the Slew Rate Rev Limiter. Adjustable from 0-500 maximum, in increments of 2.

NOTE: Reviewing the Launch History will help set the Target and Margin settings.

PN 7531 and PN 7535 only

Boost Retard Curve

This timing curve can be programmed in relation to boost/vacuum pressure within the intake manifold. The curve can be programmed from 2psia - 45psia in 0.25psia from 0°- 25° in 0.1° increments. Up to 32 different points can be input on the Boost Chart. Also, all of these points are interpolated every millisecond to create a smooth (no steps) curve. This curve can easily be edited using the Boost Curve chart in the Pro-Data+ software. An MSD MAP sensor is required to use this feature and three are offered:

1-Bar, for n/a engines, PN 23111 or GM 1-Bar Map Sensor (PN 16254719)

2-Bar, for 2-30psia, PN 23121

3-Bar, for 2-45psia, PN 23131

NOTE: The Boost Retard Curve default is 0° retard.

Rev Average: This allows you to program the number of engine revolutions that occur to produce an average boost value. It is adjustable in 2, 4, 6 or 8 crankshaft revolutions. This function is designed to help average the boost pressure to provide an accurate reading. The default is 2 revolutions which should be ideal for the majority of applications.

PSI Sensor: This allows you to input the specification of the MAP sensor. Select a 15psia (1-Bar), 30psia (2-Bar), or 45psia (3-Bar) sensor. Default is 15psia.

PN 7531 and PN 75301 only

Acquire

Arm LaunRevLim: This is where you program how to activate the Launch History recording to begin. Choose between Off, Launch Rev Limit or Launch. Default is the Launch Rev Limit.

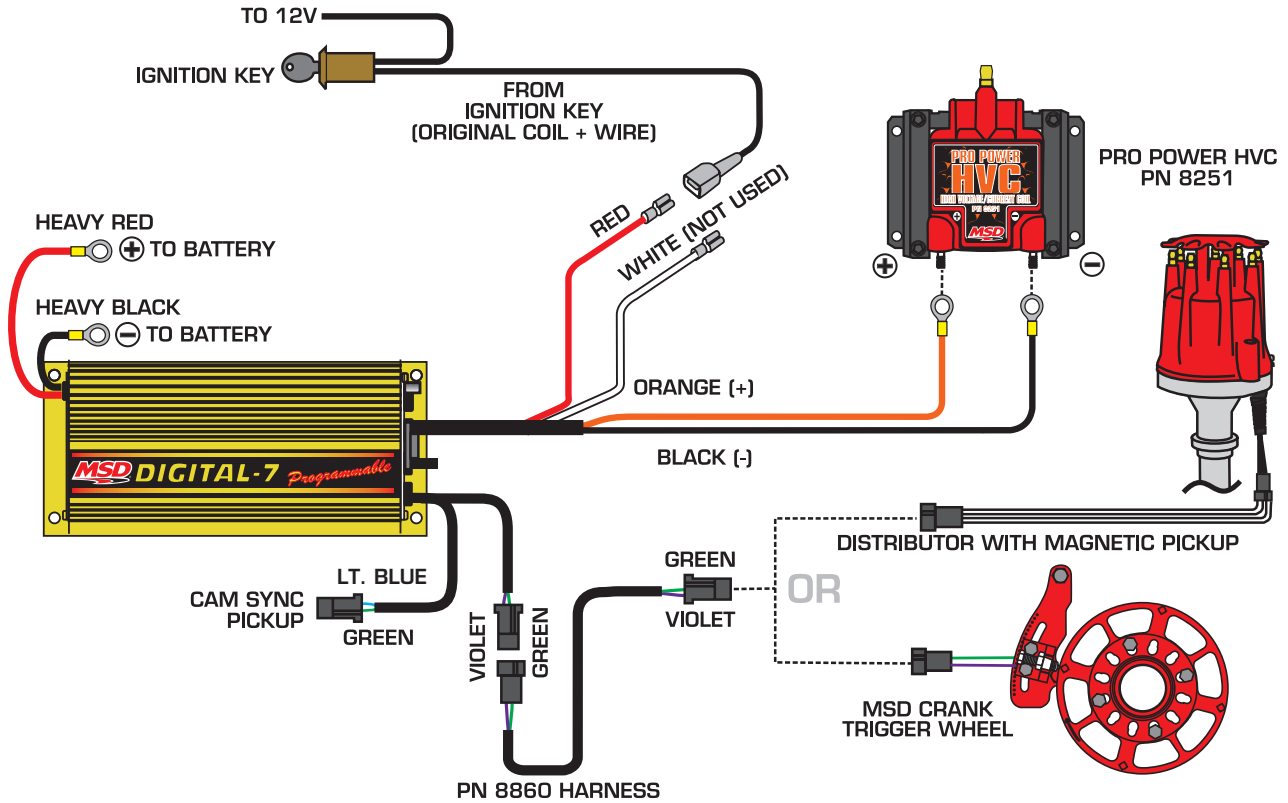
Off: Deactivates the Run History.

Launch: The Run History acquisition begins recording when the car launches (Dark Blue wire is removed from 12 volts).

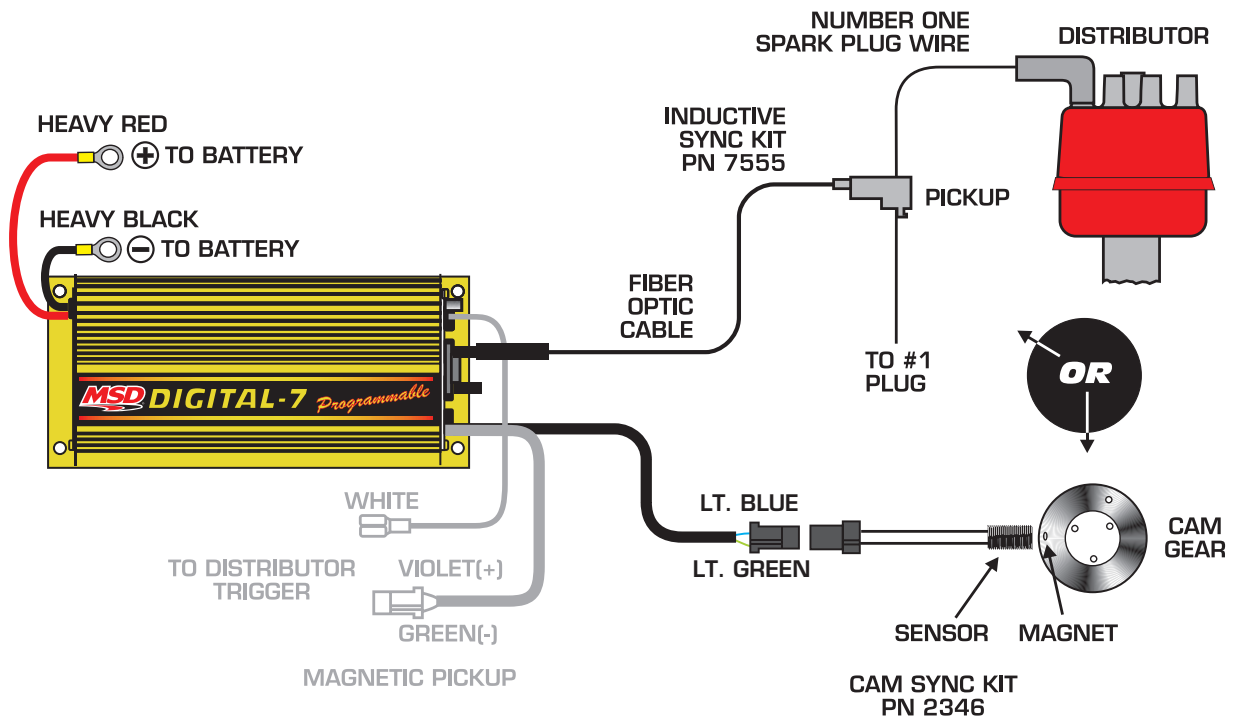
LaunRevLimit: The Run History acquisition begins when the launch rev limit is activated (Dark Blue wire is activated).

NOTE: The Light Blue burnout wire, when at 12 volts, will reset the History Record.

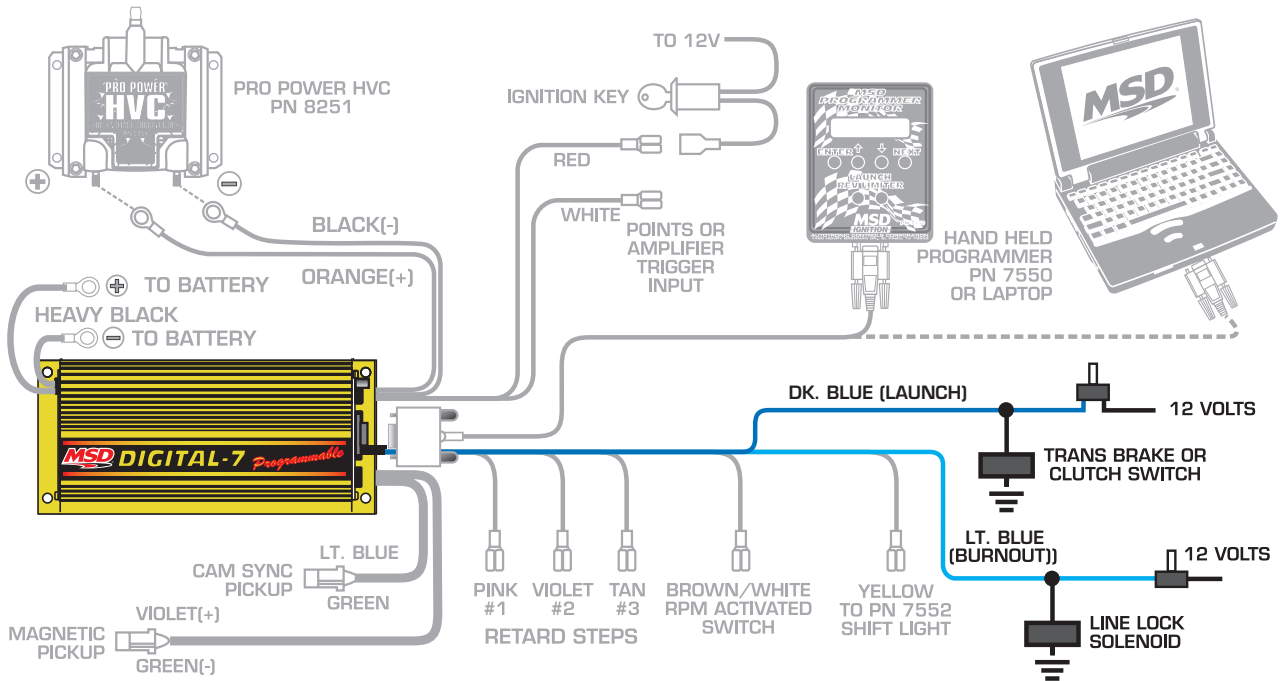
Programmable Digital-7 to MSD Distributor or Crank Trigger



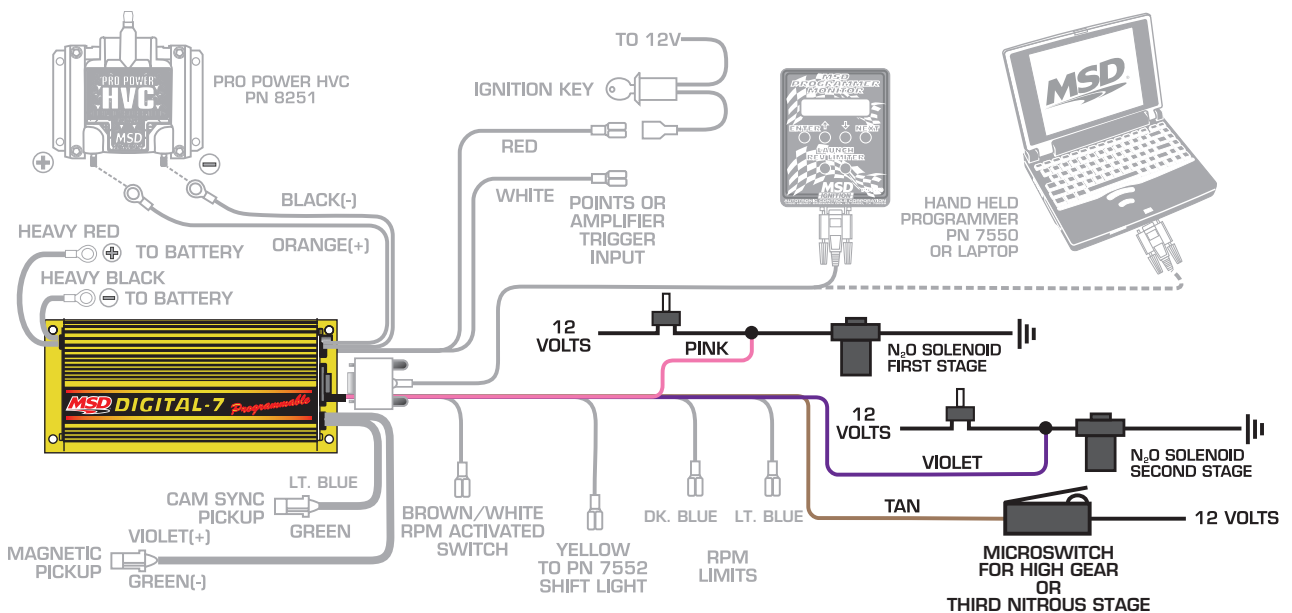
Connecting the Cam Sync to the Programmabl Digital-7



Wiring the Rev Limits to the Programmable Digital-7

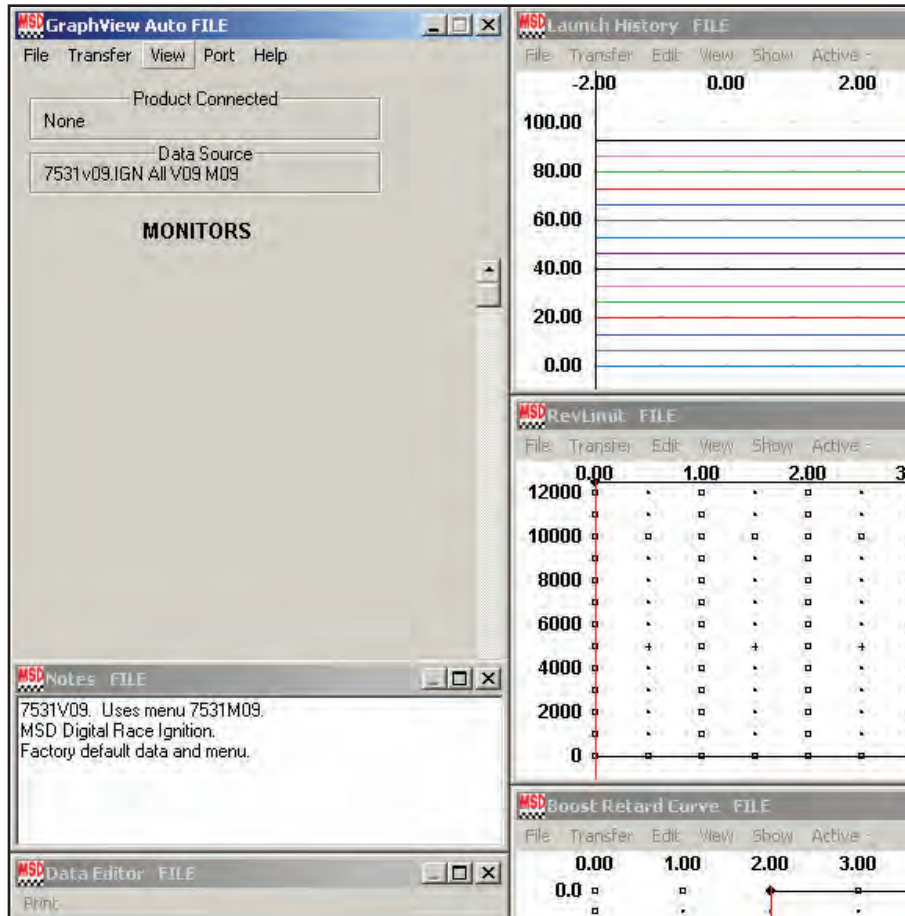


Wiring the Stage Retard to the Programmable Digital-7



Connecting the Programmable Digital-7 to Pro Mag

As the wiring diagram shows the “Gray” wire connecting to the “Violet” wire on the two pin connector. Earlier version units that don’t have a “Gray” wire on the 12-pin connector can connect to the “Tach” output connector.



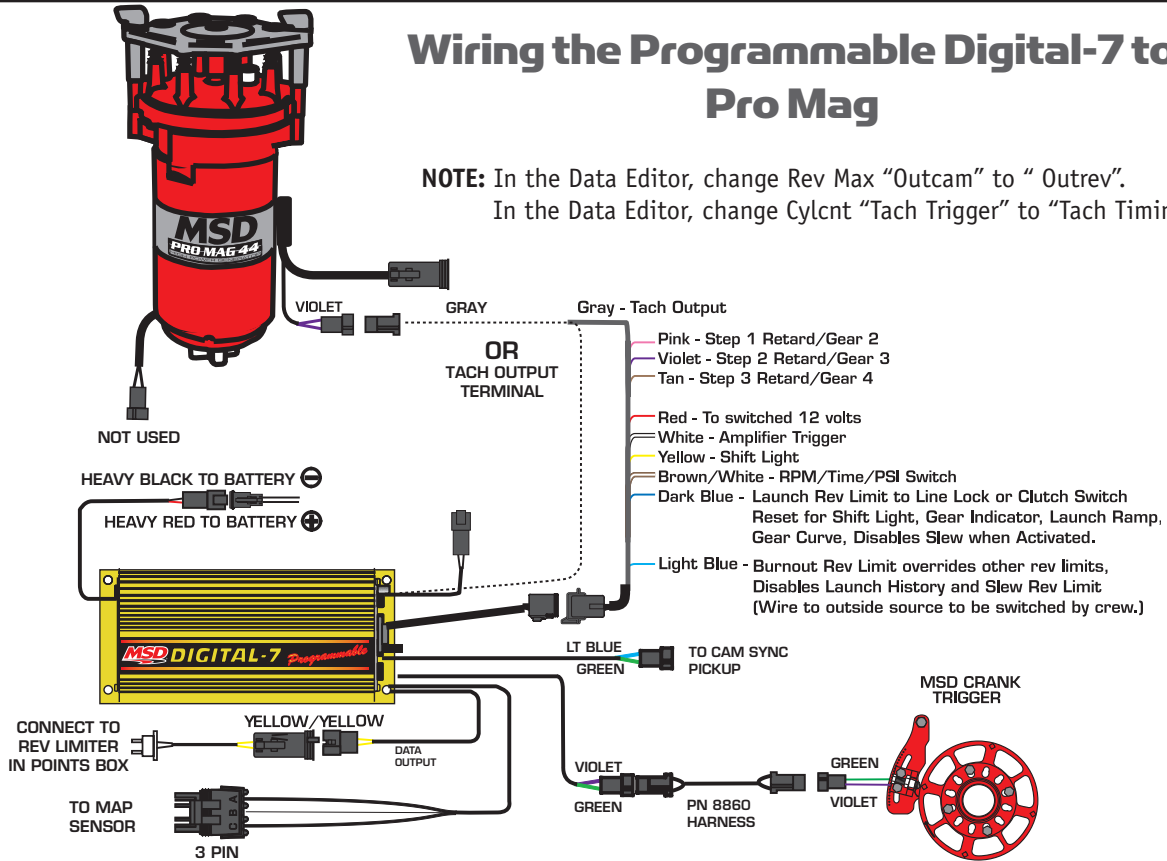
Due to different version of PN 7531, units starting with version 7531v09.IGN will require the use of a Heavy Red Power wire to be connected to Battery +12 volts. And a menu item at the bottom of the Data Editor listed “Text” will need to be switched to the “Spark Off” position.

The “Test” section in the Data Editor is only available in version 09 and later units. Your version can be identified in the Data Source location.



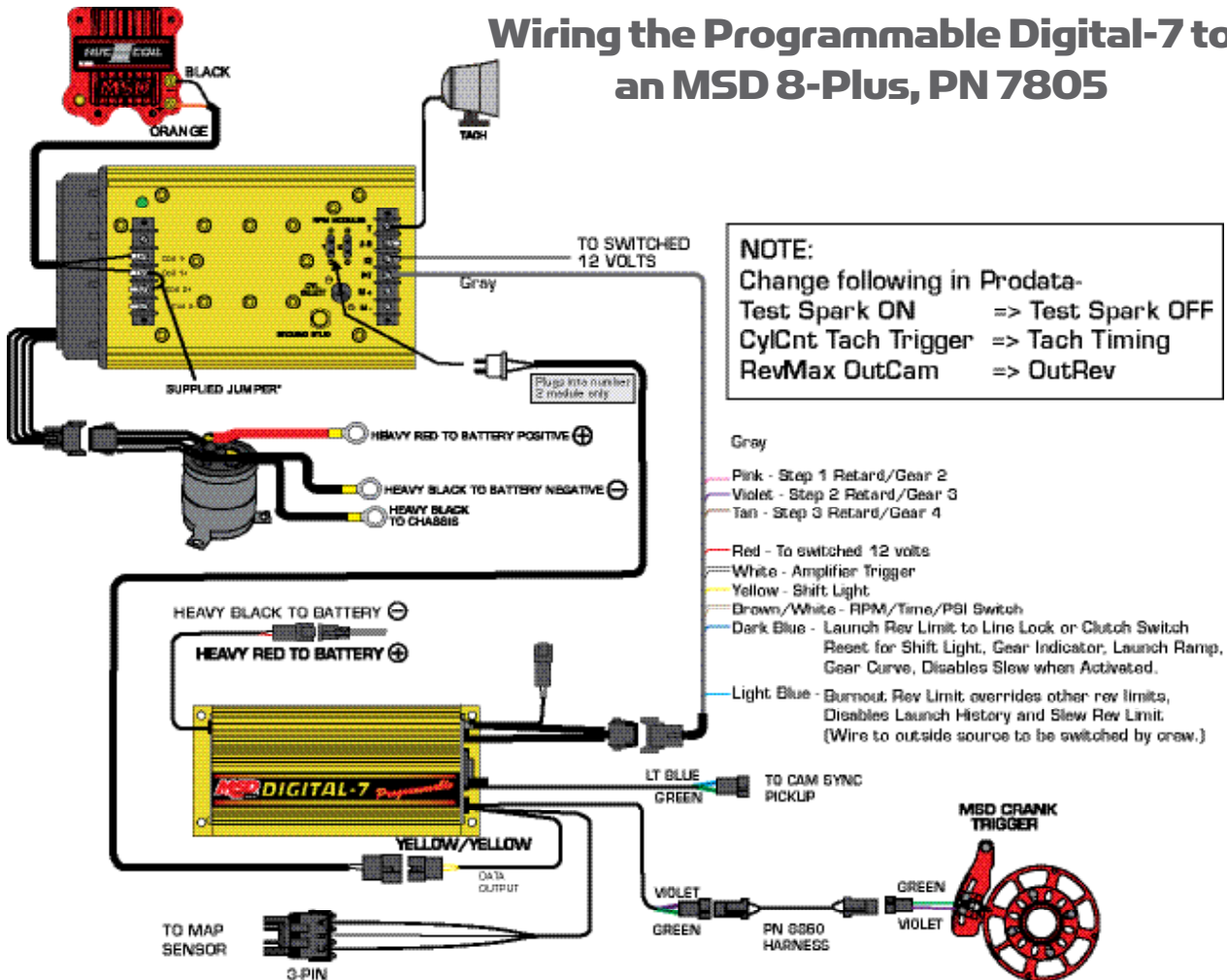
Wiring the Programmable Digital-7 to Pro Mag

NOTE: In the Data Editor, change Rev Max "Outcam" to "Outrev".
In the Data Editor, change Cylcnt "Tach Trigger" to "Tach Timing".



Wiring the Programmable Digital-7 to an MSD 8-Plus, PN 7805

NOTE:
Change following in Prodata-
Test Spark ON => Test Spark OFF
CylCnt Tach Trigger => Tach Timing
RevMax OutCam => OutRev



Hand Held Programmer/Monitors for MSD Programmable Ignition

For racers that do not use a PC to program their Programmable Digital Ignition Components, MSD offers a Hand Held Programmer/Monitor. This provides total programming control and features an LCD monitor screen with push buttons for editing the programs.

The Monitor connects to the MSDs through a 9-pin computer type harness. It can be left connected or removed when the engine is running. There are four buttons across the top of the Monitor:

- ENTER** – This is used to open the selected field for further programming or to load a new program.
- NEXT** – Pressing this button moves the cursor to the next field. After making adjustments to a program, pressing NEXT will take you to the SAVE menu.
- UP (↑) and DOWN (↓) ARROWS** – These are used to change the settings of programs such as rpm or timing. Pressing the Up button increases the value while the down arrow lowers it.

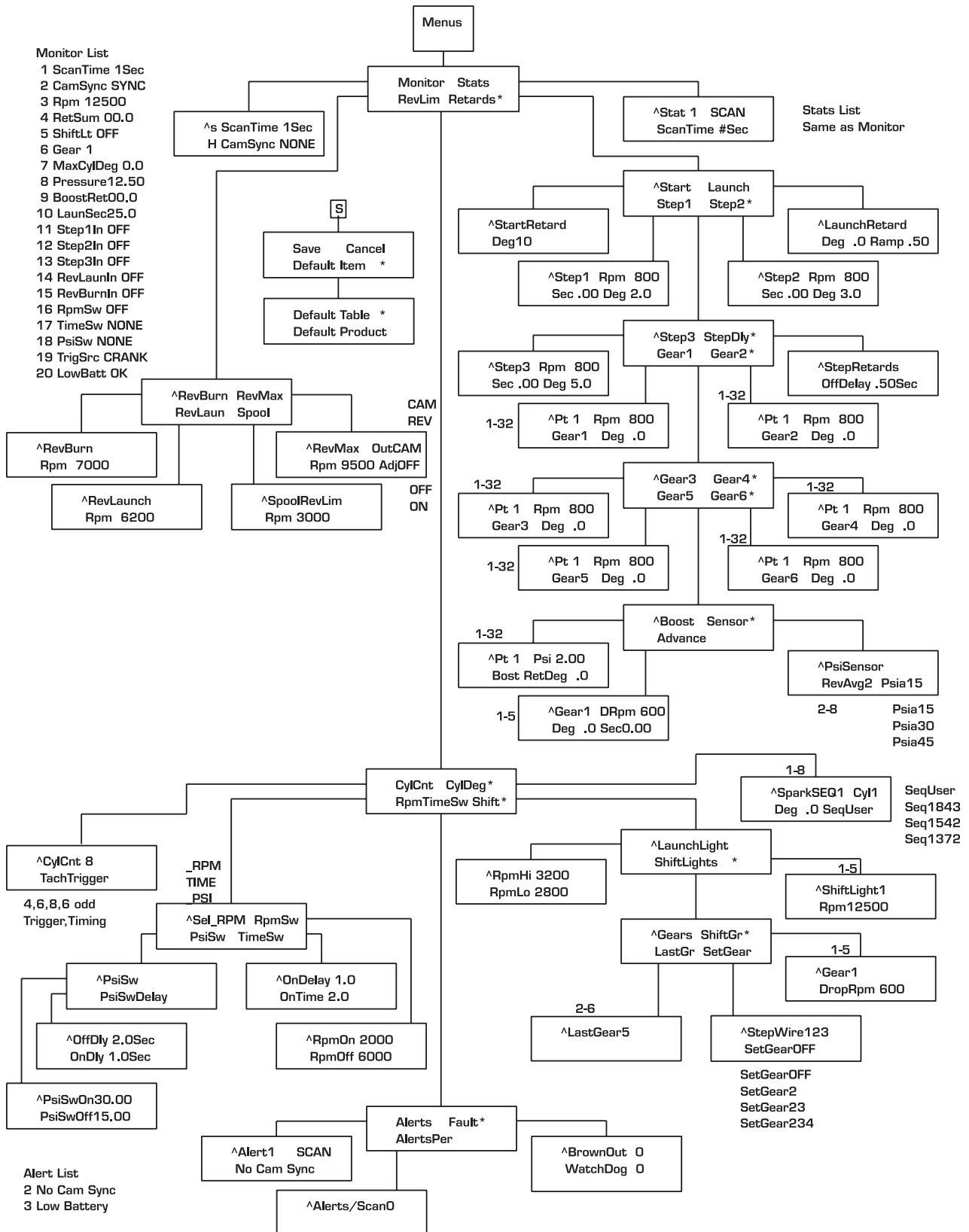


PN 7550

PN 7550 – Launch Rev Limiter – These buttons take you directly to the RPM Launch setting for quick starting line changes. From this screen, the rpm value automatically is saved without having to go to the Save menu.

PN 7535 Flow Chart with Hand Held Monitor, PN 7555

- Monitor List
- 1 ScanTime 1Sec
 - 2 CamSync SYNC
 - 3 Rpm 12500
 - 4 RetSum 00.0
 - 5 ShiftLt OFF
 - 6 Gear 1
 - 7 MaxCylDeg 0.0
 - 8 Pressure12.50
 - 9 BoostRet00.0
 - 10 LaunSec25.0
 - 11 Step1In OFF
 - 12 Step2In OFF
 - 13 Step3In OFF
 - 14 RevLaunIn OFF
 - 15 RevBurnIn OFF
 - 16 RpmSw OFF
 - 17 TimeSw NONE
 - 18 PsiSw NONE
 - 19 TrigSrc CRANK
 - 20 LowBatt OK



PN 7530T Flow Chart with Hand Held Monitor, PN 7555

Menu Tree

The following menu tree shows the different screens and programs of the PN 7530T and Monitor.

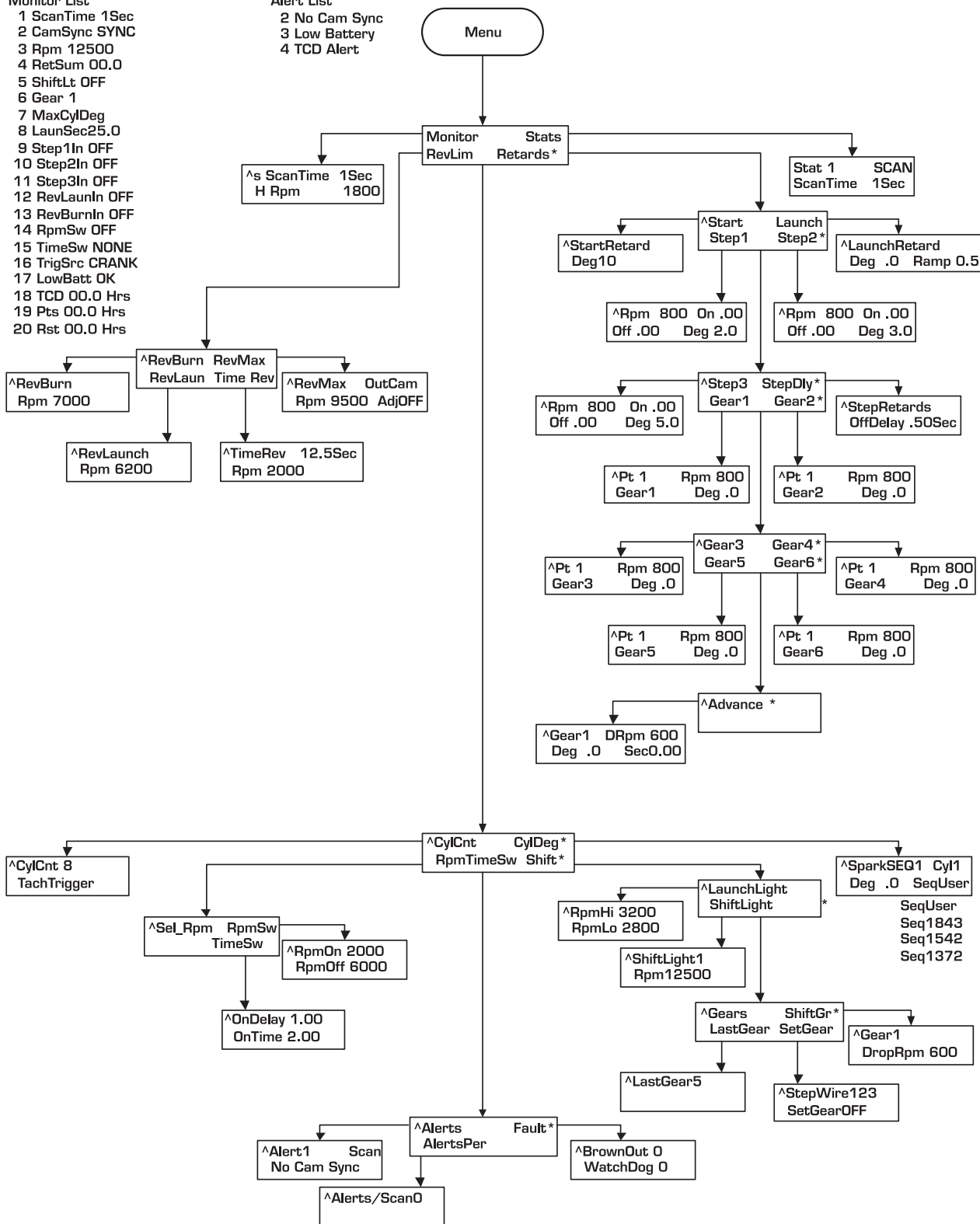
7530T M1 Digital Race Ignition

Monitor List

- 1 ScanTime 1Sec
- 2 CamSync SYNC
- 3 Rpm 12500
- 4 RetSum 00.0
- 5 ShiftLt OFF
- 6 Gear 1
- 7 MaxCylDeg
- 8 LaunSec25.0
- 9 Step1In OFF
- 10 Step2In OFF
- 11 Step3In OFF
- 12 RevLaunIn OFF
- 13 RevBurnIn OFF
- 14 RpmSw OFF
- 15 TimeSw NONE
- 16 TrigSrc CRANK
- 17 LowBatt OK
- 18 TCD 00.0 Hrs
- 19 Pts 00.0 Hrs
- 20 Rst 00.0 Hrs

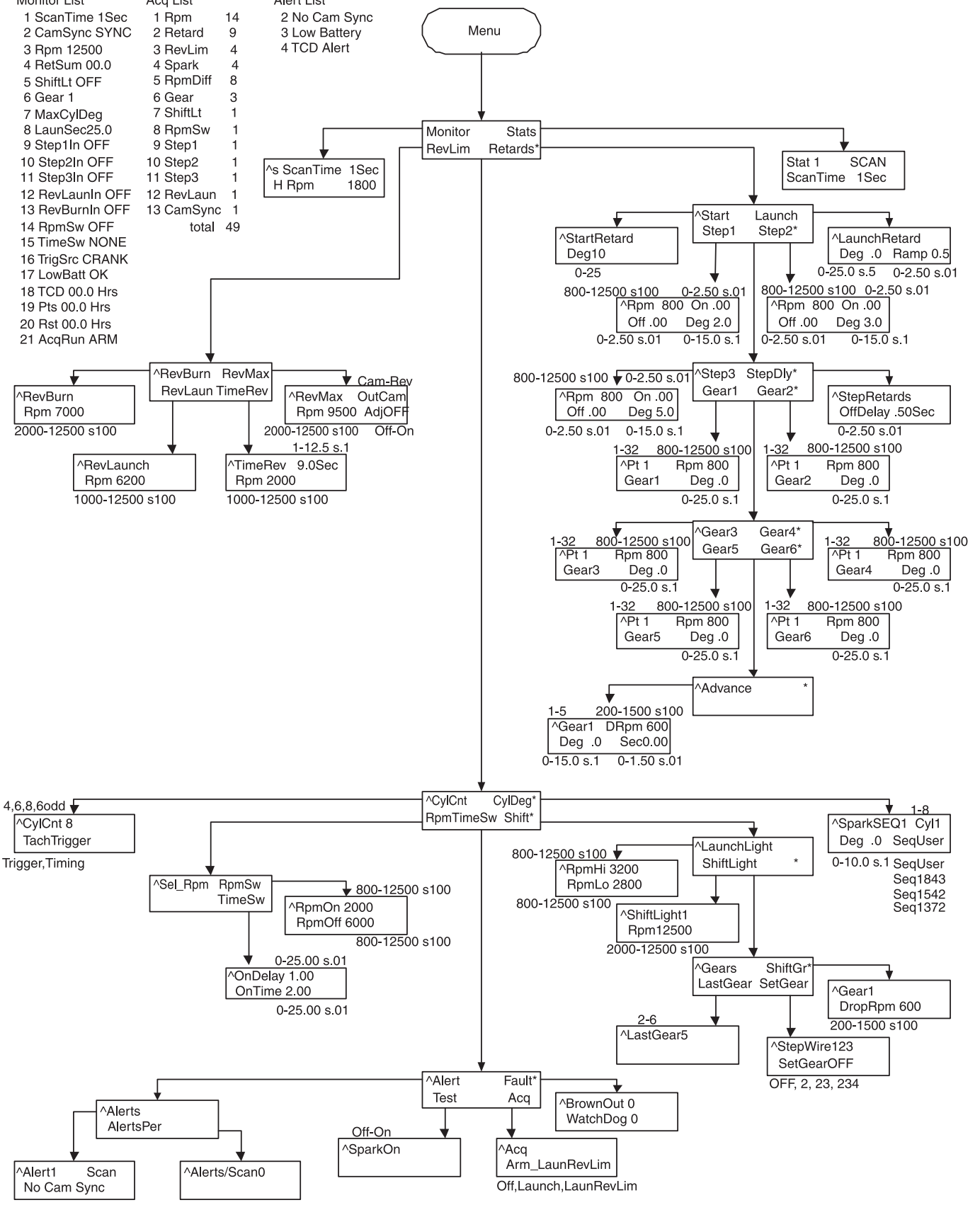
Alert List

- 2 No Cam Sync
- 3 Low Battery
- 4 TCD Alert



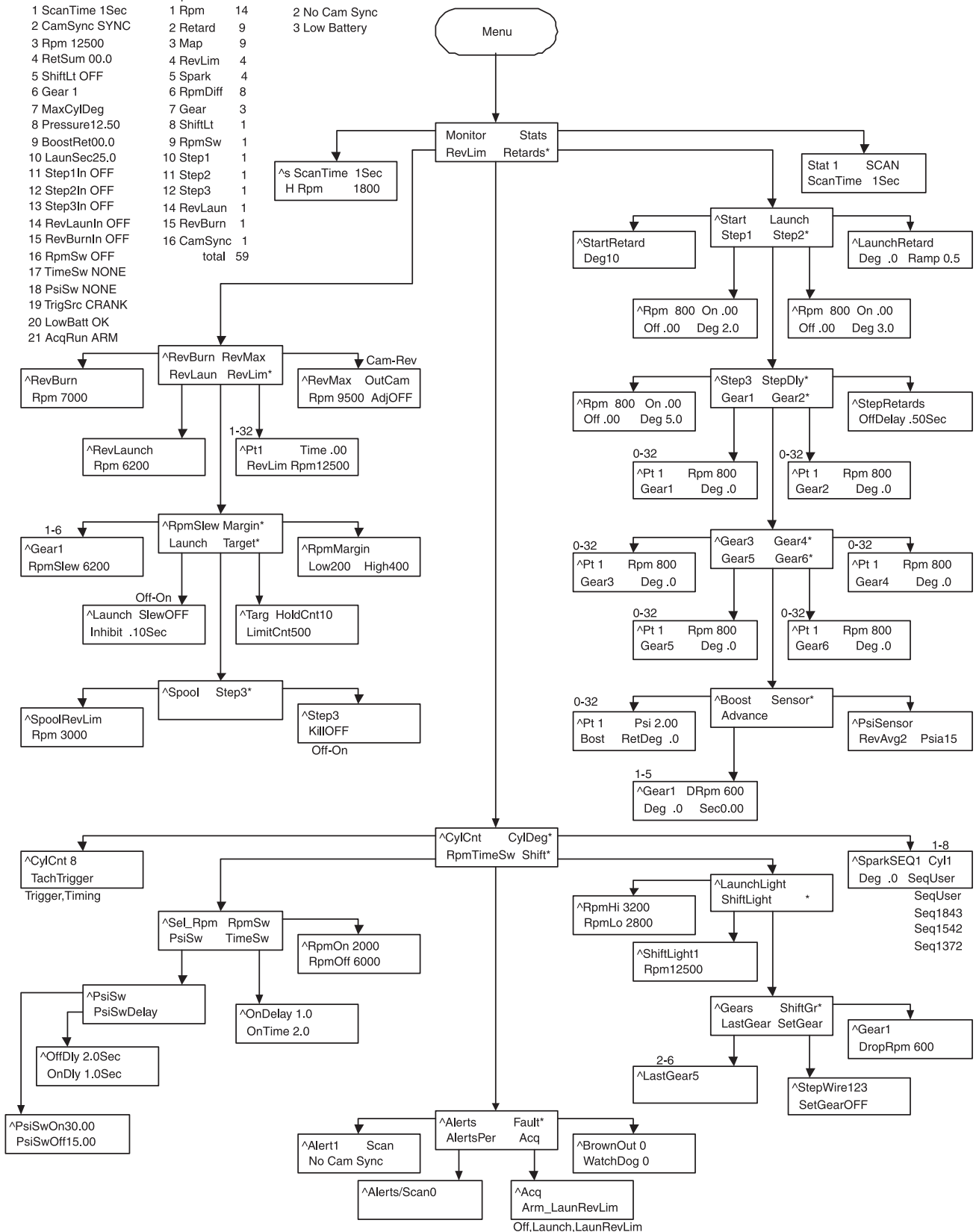
PN 75301 Flow Chart with Hand Held Monitor, PN 7555

- | Monitor List | Acq List | Alert List |
|------------------|--------------|---------------|
| 1 ScanTime 1Sec | 1 Rpm 14 | 2 No Cam Sync |
| 2 CamSync SYNC | 2 Retard 9 | 3 Low Battery |
| 3 Rpm 12500 | 3 RevLim 4 | 4 TCD Alert |
| 4 RetSum 00.0 | 4 Spark 4 | |
| 5 ShiftLt OFF | 5 RpmDiff 8 | |
| 6 Gear 1 | 6 Gear 3 | |
| 7 MaxCylDeg | 7 ShiftLt 1 | |
| 8 LaunSec25.0 | 8 RpmSw 1 | |
| 9 Step1In OFF | 9 Step1 1 | |
| 10 Step2In OFF | 10 Step2 1 | |
| 11 Step3In OFF | 11 Step3 1 | |
| 12 RevLaunIn OFF | 12 RevLaun 1 | |
| 13 RevBurnIn OFF | 13 CamSync 1 | |
| 14 RpmSw OFF | total 49 | |
| 15 TimeSw NONE | | |
| 16 TrigSrc CRANK | | |
| 17 LowBatt OK | | |
| 18 TCD 00.0 Hrs | | |
| 19 Pts 00.0 Hrs | | |
| 20 Rst 00.0 Hrs | | |
| 21 AcqRun ARM | | |



PN 7531 Flow Chart with Hand Held Monitor, PN 7555

- | | | |
|---------------------|-----------------|-------------------|
| Monitor List | Acq List | Alert List |
| 1 ScanTime 1Sec | 1 Rpm 14 | 2 No Cam Sync |
| 2 CamSync SYNC | 2 Retard 9 | 3 Low Battery |
| 3 Rpm 12500 | 3 Map 9 | |
| 4 RetSum 00.0 | 4 RevLim 4 | |
| 5 ShiftLt OFF | 5 Spark 4 | |
| 6 Gear 1 | 6 RpmDiff 8 | |
| 7 MaxCylDeg | 7 Gear 3 | |
| 8 Pressure12.50 | 8 ShiftLt 1 | |
| 9 BoostRet00.0 | 9 RpmSw 1 | |
| 10 LaunSec25.0 | 10 Step1 1 | |
| 11 Step1In OFF | 11 Step2 1 | |
| 12 Step2In OFF | 12 Step3 1 | |
| 13 Step3In OFF | 14 RevLaun 1 | |
| 14 RevLaunIn OFF | 15 RevBurn 1 | |
| 15 RevBurnIn OFF | 16 CamSync 1 | |
| 16 RpmSw OFF | total 59 | |
| 17 TimeSw NONE | | |
| 18 PsiSw NONE | | |
| 19 TrigSrc CRANK | | |
| 20 LowBatt OK | | |
| 21 AcqRun ARM | | |



MSD 8-Series Ignition Controls

This section covers the race-only MSD 8 Ignition Controls. The MSD 8-Plus Ignition, PN 7805, supercedes the original MSD 8, PN 7800, and the Dual Coil MSD 8, PN 7802.

The MSD 8-Plus Ignition can be used on single or dual coil ignition systems. It is also compatible with 4, 6 or 8-cylinder engines. There is also a built-in 2-Step rev control to provide an overrev and launch rpm limit.

Operating Specifications

Operating Voltage:	+12-18 volts
Current Requirements:	36 Amps @ 12,000 rpm
RPM Range:	15,000 rpm with 14.4 volt supply
Spark Duration:	20° Crankshaft
Primary Voltage Output:	480 Volts
Spark Energy:	315-345 milliJoules per spark
Weight and Size:	4.85lbs., 8.25"L x 3.75"W x 5.75"H

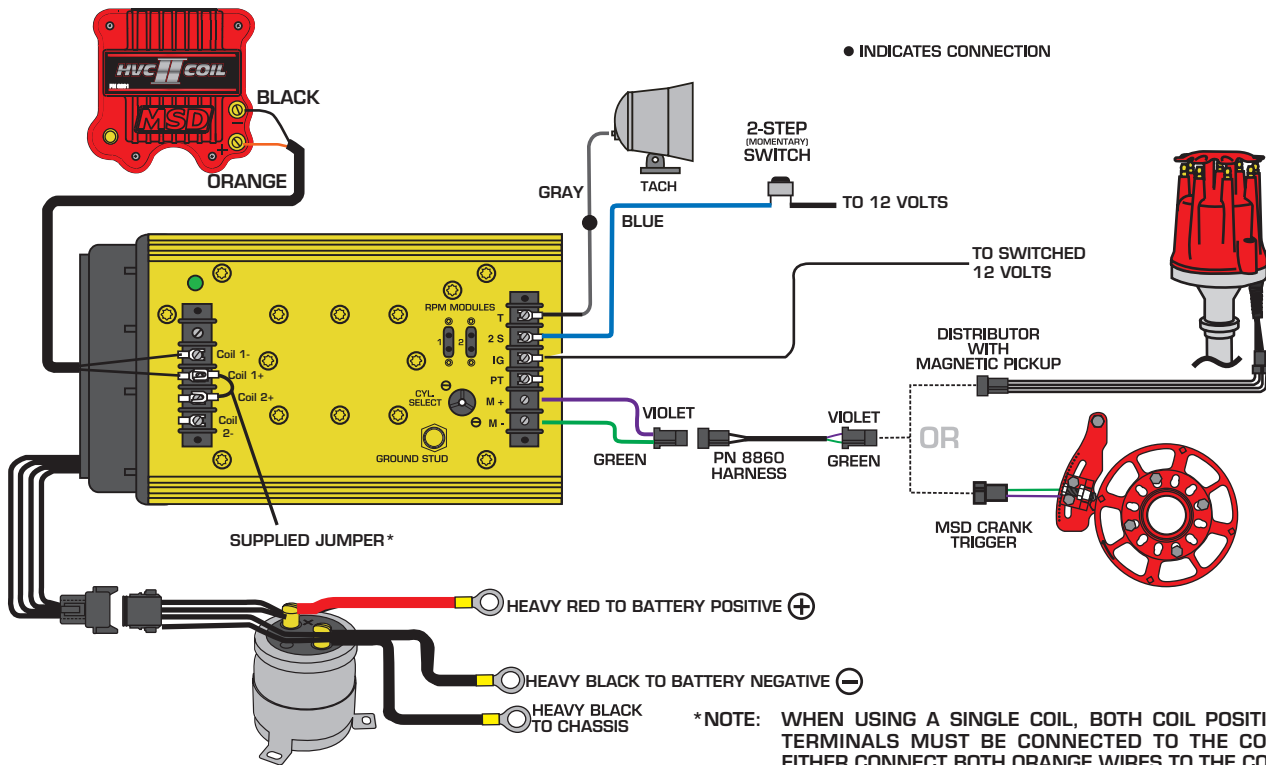
Wire Functions

Terminal	Wire	Function
COIL 1 +	ORANGE	Connects to the positive (+) terminal of the coil. This is the only wire that makes electrical contact with the coil positive terminal.
COIL 1-	BLACK	Connects to the negative (-) terminal of the coil. This is the only wire that makes electrical contact with the coil negative terminal.
COIL 2 +	ORANGE	Connects to the positive (+) terminal of the second coil. This is the only wire that makes electrical contact with the coil positive terminal.
COIL 2-	BLACK	Connects to the negative (-) terminal of the second coil. This is the only wire that makes electrical contact with the coil negative terminal.
BAT -	HEAVY BLACK	This wire connects to a good ground, either at the battery negative (-) terminal or to the engine.
BAT +	HEAVY RED	This wire connects directly to the battery positive (+) terminal or to a positive battery junction or the positive side of the starter solenoid. Note: Never connect to the alternator.
TACH	GRAY	This terminal delivers a 12 volt square wave signal as an output for a tachometer or devices that require an rpm signal.
2-STEP	DARK BLUE	When this terminal is connected to 12 volts, RPM module 1 is active. When there is no 12 volts, RPM module 2 is active.
IGNITION	RED	Connects to a switched 12 volt source. Such as the ignition key or switch.
POINTS	WHITE	This wire is used to connect to the points, electronic ignition amplifier output or to the Yellow wire of an MSD Timing Accessory. When this wire is used, the Magnetic Pickup connector is not used.
MAG + MAG -	VIOLET GREEN	These wires are routed together in one harness from the Magnetic Pickup connector. The connector plugs directly into an MSD Distributor or Crank Trigger. It will also connect to factory magnetic pickups or other aftermarket pickups (Figure 4). The Violet wire is pos. (+) and the Green is neg. (-). When these wires are used, the Points Terminal is not.

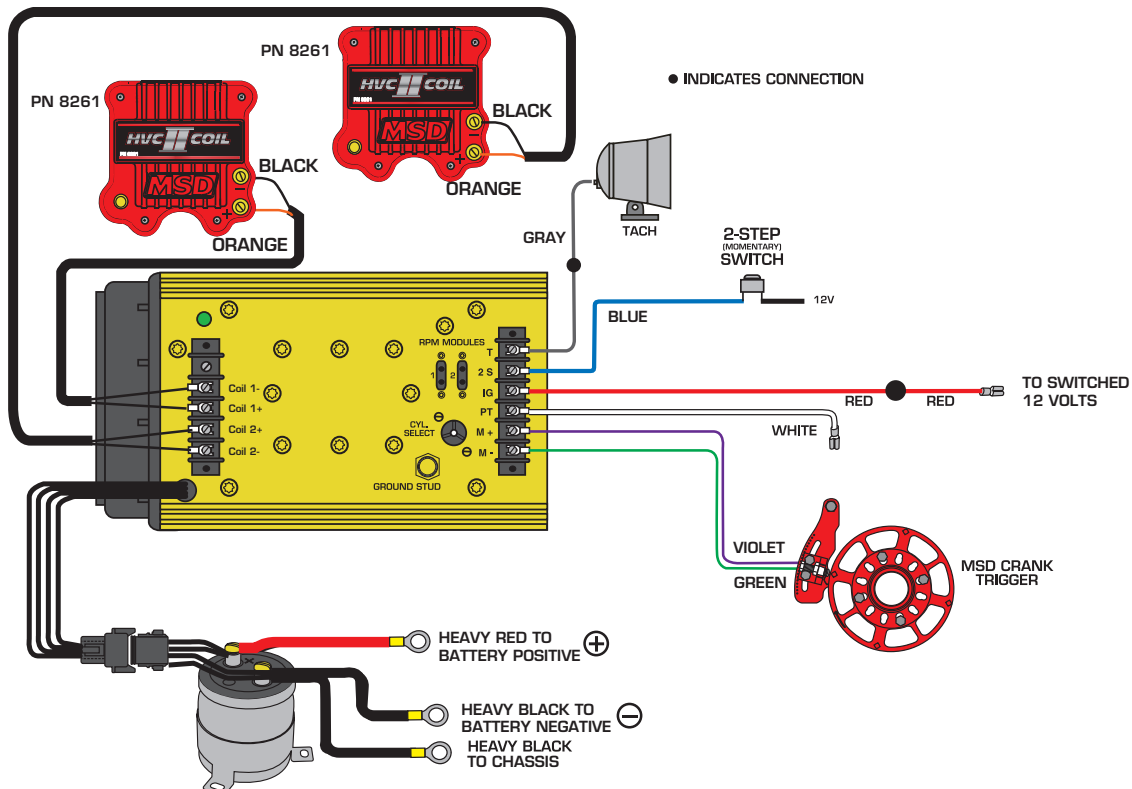
WARNING: When using a capacitive discharge ignition control, there is high voltage present at the coil primary terminals. Never touch the coil or connect test equipment to these terminals.

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

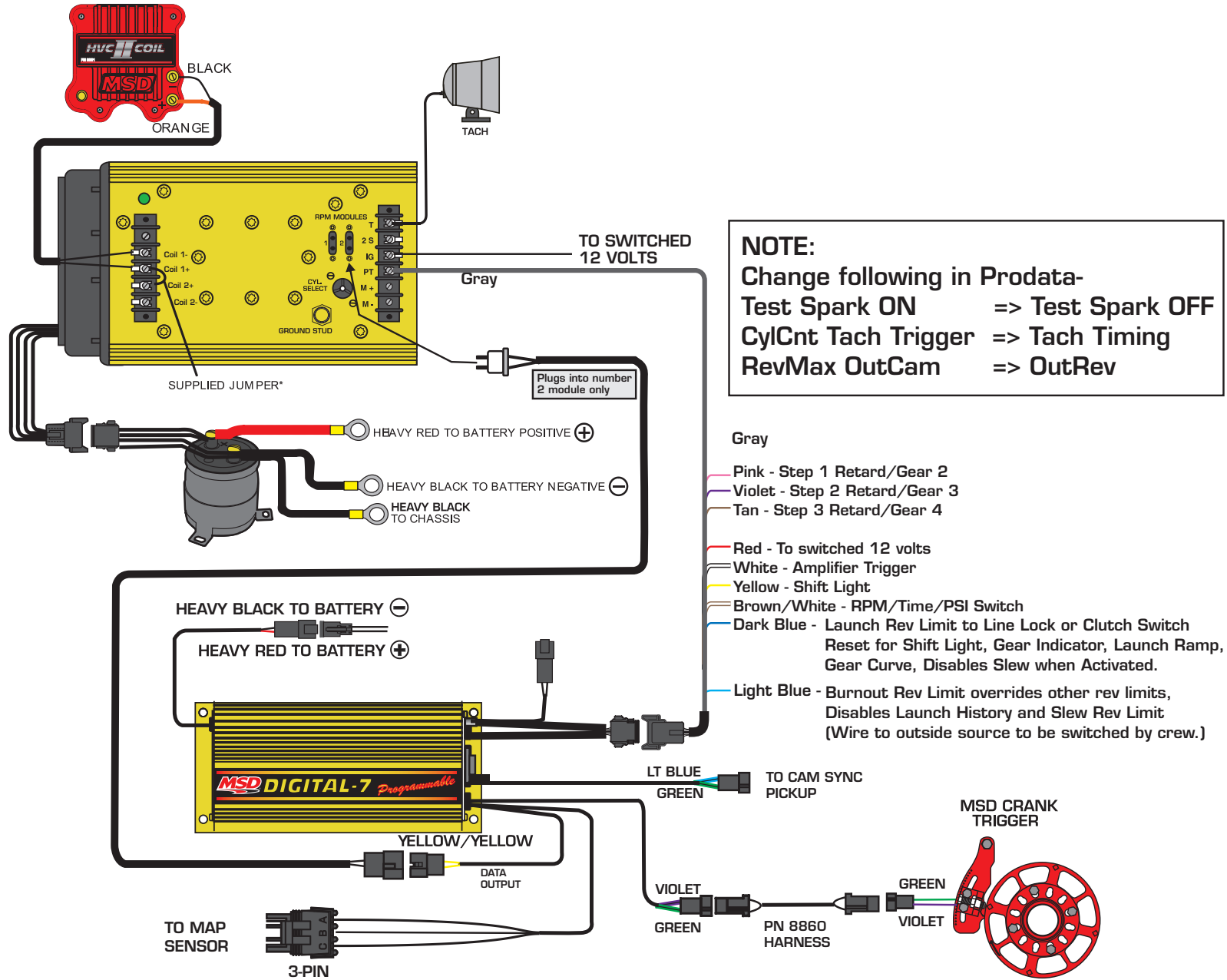
MSD 8-Plus Ignition to MSD Distributor/Crank Trigger



MSD 8-Plus Ignition to Dual Coil System

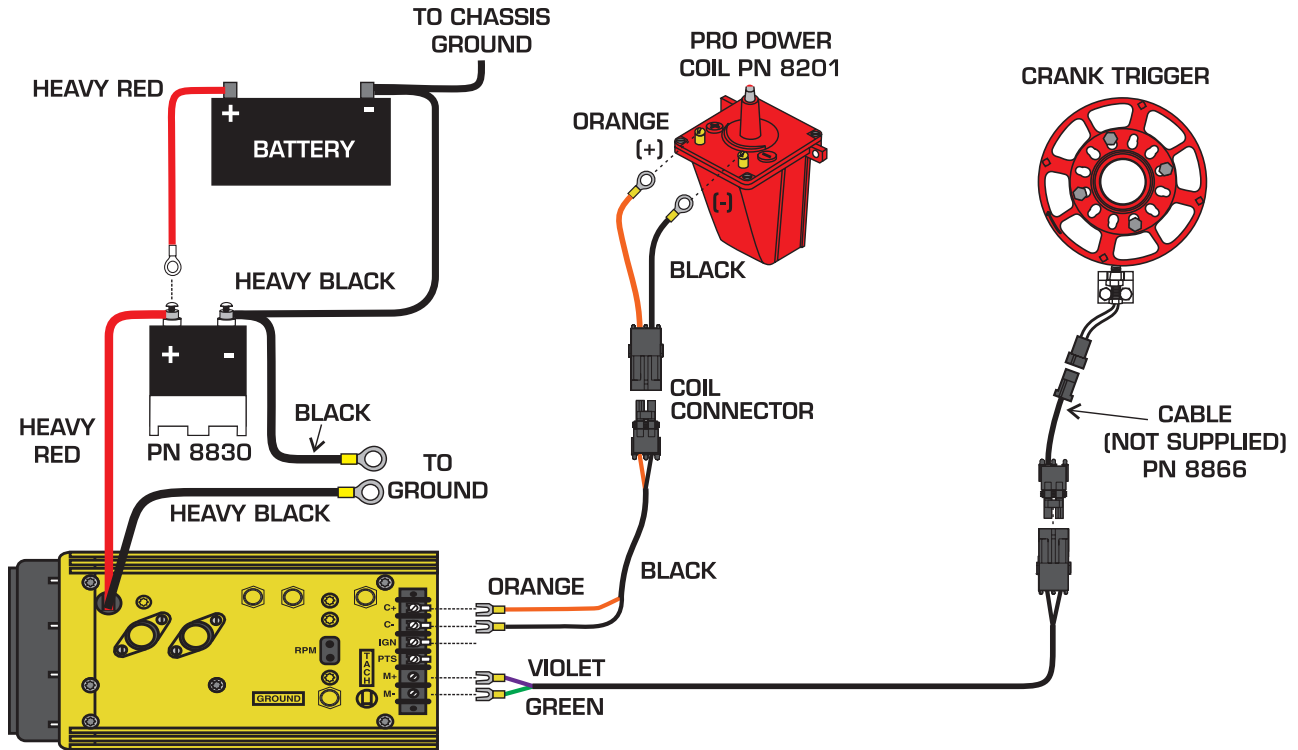


MSD 8-Plus Ignition to MSD Programmable Digital-7



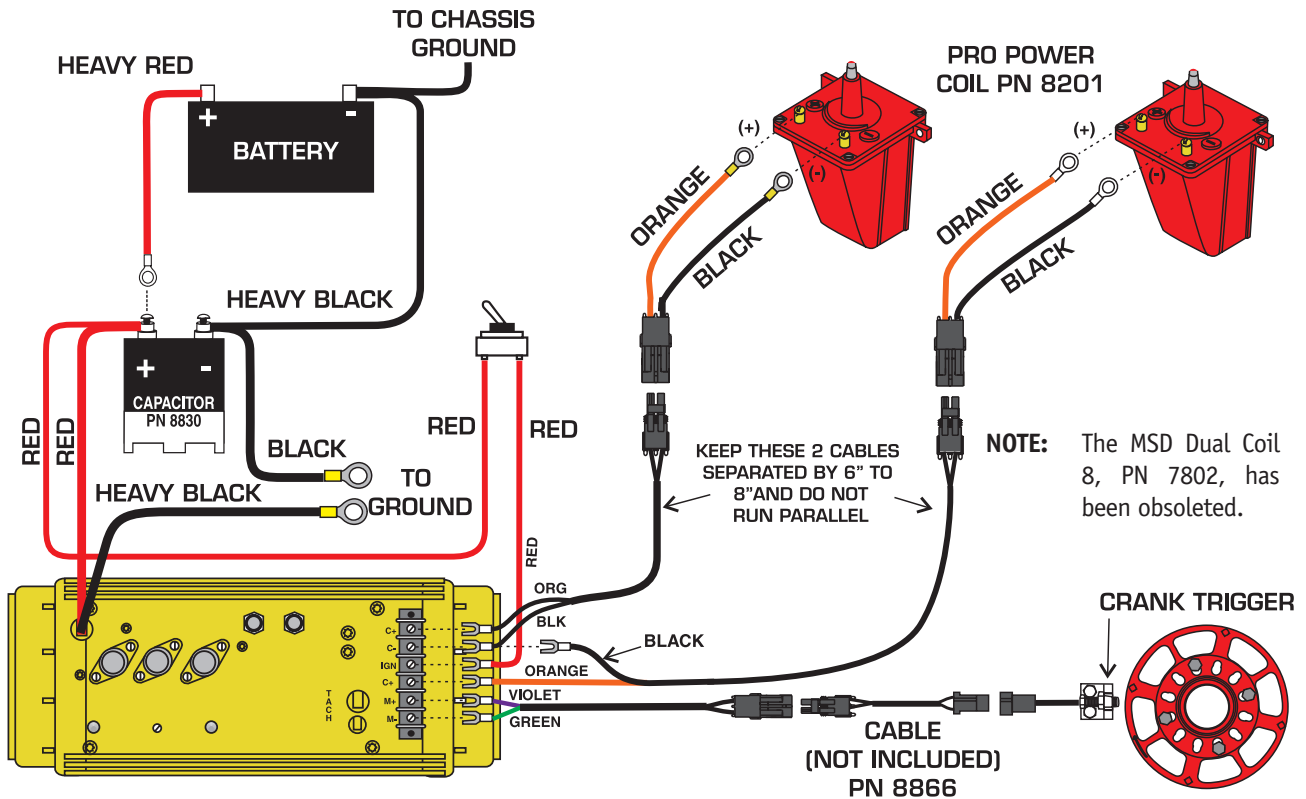
Achieve the output power of the MSD 8-Plus with the advanced tuning of the Programmable Digital 7-Plus, PN 7531.

MSD 8 Ignition, PN 7800, to Magnetic Pickup



NOTE: Both of these ignitions have been superseded by the MSD 8 Plus, PN 7805.

MSD Dual Coil 8 Ignition, PN 7802, to Magnetic Pickup



Installing MSD 10 Series Ignition Controls

This section covers the wiring of the MSD 10 Ignition Series which have been obsoleted. It is recommended to use the MSD 8-Plus, PN 7805, Ignition Control in place.

There were two MSD 10 Ignitions; the original design with two coils, PN 7501, required a Pro Power CD Coil, PN 8201, and a Coupler Coil, PN 8209R. The revised model, PN 7502, required a special single coil, PN 8208

Operating Specifications

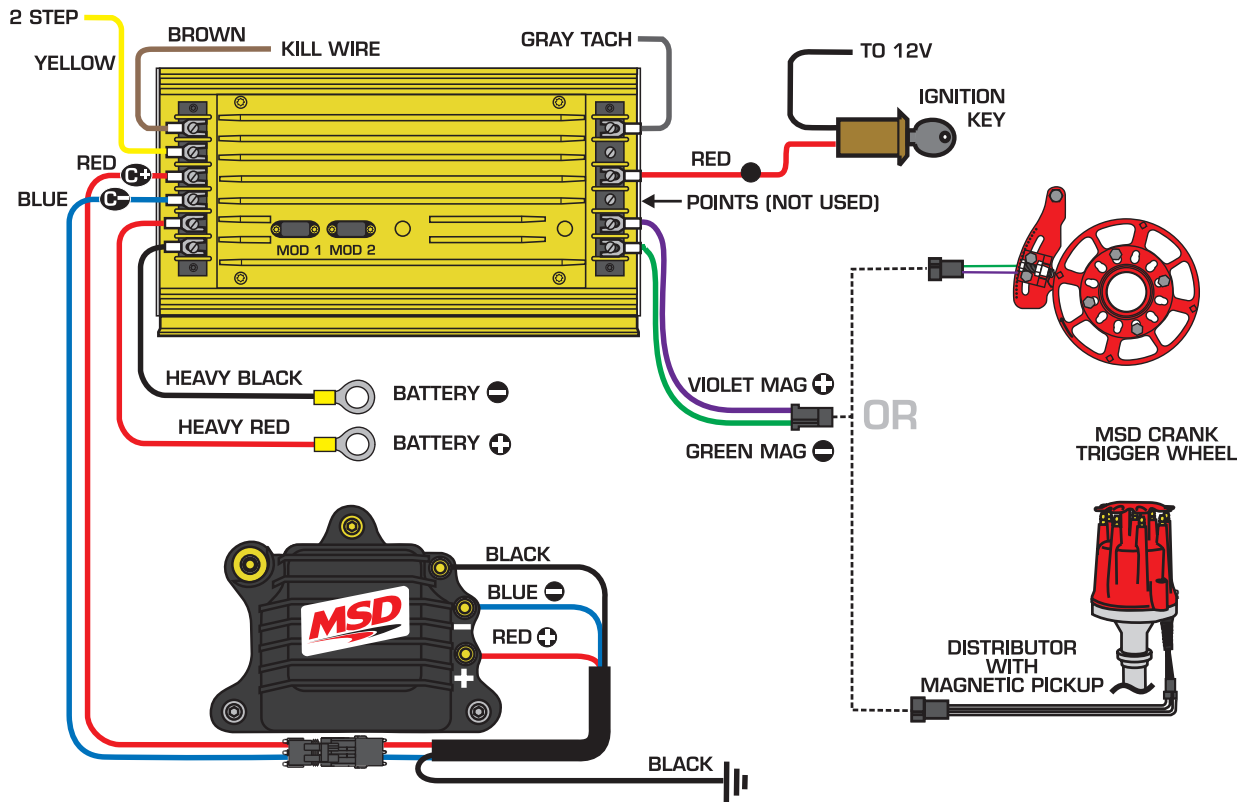
	PN 7501 (Dual Coil)	PN 7502 (Single Coil)
Operating Voltage:	12-18 volts	12-18 volts
Current Requirements:	17 Amps @ 8,000 rpm	17 Amps @ 8,000 rpm
RPM Range:	13,000 rpm with 14.4 volt supply	13,000 rpm with 14.4 volt supply
Spark Duration:	CD Coil; 20° Crankshaft Inductive Coil; 20°-30° Crankshaft	CD Coil; 20° Crankshaft 20°-30° Crankshaft
Primary Voltage Output:	520 Volts	630 Volts
Spark Energy:	CD Coil; 130 milliJoules per spark Inductive Coil; 500 milliJoules stored	CD Coil; 700 milliJoules per spark
Weight and Size:	4.8lbs., 9"L x 4"W x 5.75"H	4.75 lbs., 8"L x 3.75"W x 5.75"H

Wire Functions

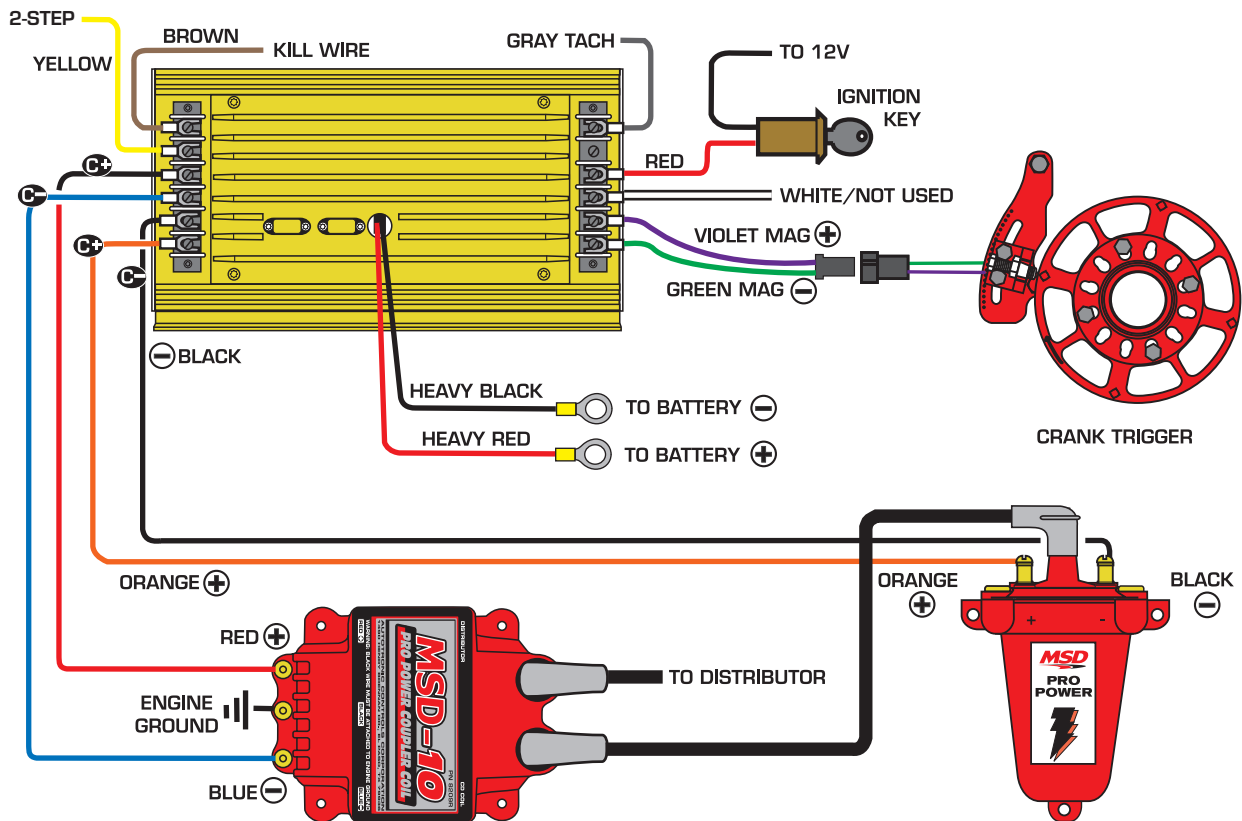
The MSD 10 features two terminal strips.

Power Cables:	The heavy Red connects to the battery positive (+) terminal. The heavy Black connects the battery negative (-) terminal or other good engine ground.
Ignition (Red):	Connects to a switched 12 volts source.
Power Coil + (Red):	Connects to the positive side of the Pro Power Coupler Coil (PN 7501 only).
Power Coil - (Blue):	Connects to the negative side of the Pro Power Coupler Coil (PN 7501 only).
CD Coil - (Black):	Connects to the negative (-) coil terminal. This is the only wire that makes electrical contact with the coil negative terminal.
CD Coil + (Orange):	Connects to the positive (+) coil terminal. This is the only wire that makes electrical contact with the coil positive terminal.
Points (White):	This is the trigger input terminal for points, amplifiers, a timing control or from an ECU. If this is connected, the magnetic pickup terminals will not be used.
Mag + (Violet):	These are the magnetic pickup terminals that connect to an MSD Distributor or Crank Trigger. If these terminals are connected, the Points terminal will not be used.
Mag - (Green)	
Tach (Gray):	This is the tach output terminal. It provides a 12 volt square wave signal that most tachometers will accept.
2-Step (Yellow):	This is the 2-Step activation terminal. When this wire is grounded, Module 2 is activated. When not grounded, Module 1 is active.
Kill (Brown):	This can be used as an emergency kill switch. When grounded, the ignition system is turned Off.

MSD 10 Plus, PN 7502, to a Magnetic Pickup



MSD 10 Ignition, PN 7501, to a Magnetic Pickup



Installing the MSD 6LS Controllers, PN 6010, LS1/LS6 or PN 6012, LS2/LS7

The MSD 6LS Ignition Controllers are designed specifically for the GM LS-Series Engines. The 6LS, PN 6010, is designed for use on LS1/LS6 based engines with a 24-tooth crank wheel. The 6LS-2, PN 6012, is for use on LS2/LS7 based engines with a 58-tooth crank wheel. The Controllers are designed to control the ignition system on engines that have been retro-fit with a carburetor. They can also be used on factory EFI systems with the proper accessory harness.

EFI

The Controller can also be used in stock, EFI applications, by using accessory Harness PN 8886 for the PN 6010, and Harness PN 88862 for the PN 6012. This Harness allows the 6LS Controllers to tap into the sensor signals without interrupting the OEM ECU. The ECU and coils operate as normal while the 6LS controls the timing and rpm.

Operation

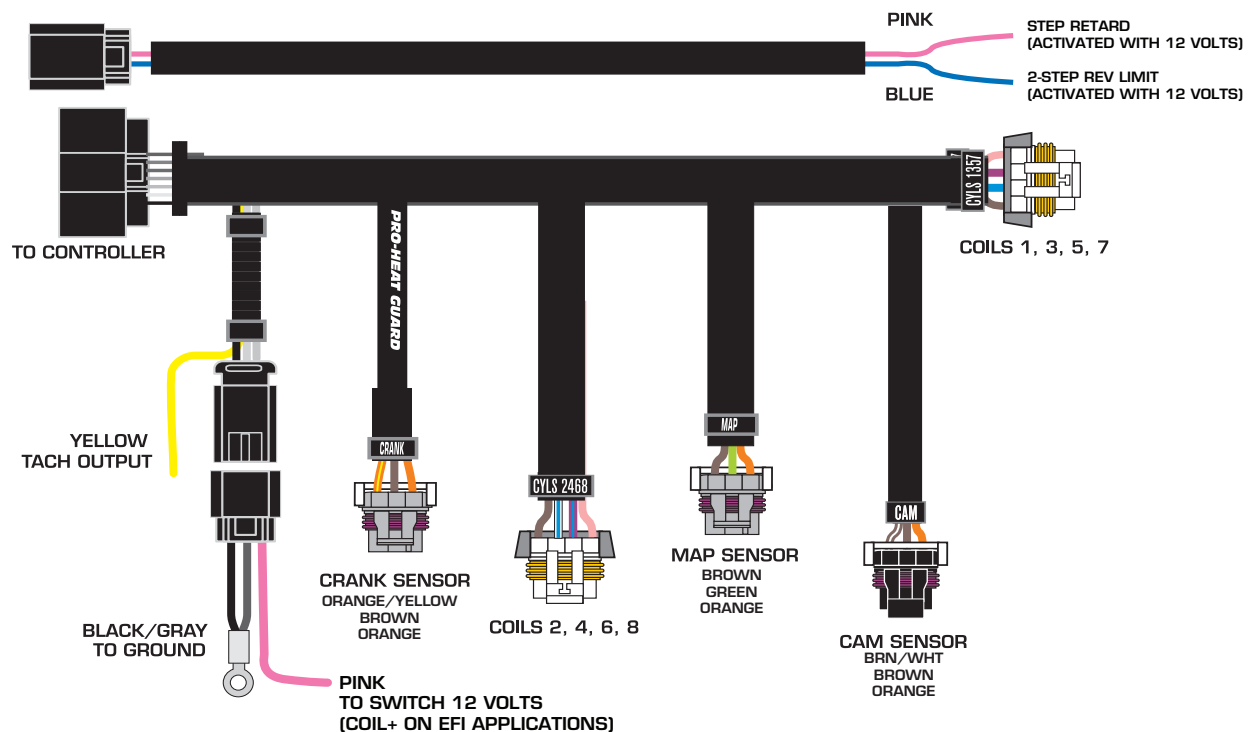
The MSD Controller offers several programmable features that allow rpm and timing adjustments. This can be achieved through the supplied Pro-Data+ software via a PC. Timing adjustments and selections can also be made with plug-in modules. Software installation, operation and the programmable features of the Controller are explained in detail in this document. More information can be found in the Pro-Data+ Software Help menu.

Mounting

The Controller is designed to be mounted under the hood or on the firewall. Do not mount the unit near exhaust, upside down or seal the base as that leaves no way for any moisture to escape the unit. Four vibration mounts are supplied to mount the unit. Find a suitable location, confirm that all of the wires reach their connections. Mark the mounting hole locations using the unit. Drill the holes with a 3/16" bit.

Wiring PN 6010 and PN 6012

All of the wiring, with the exception of four wires, are routed into factory style connectors to ensure an easy installation. The wire descriptions are listed in the corresponding charts on the following pages.



Wire Functions, 6LS Controllers, PN 6010

LOOSE WIRES		
BLACK/GRAY	Pin-A/B	Ground. Connect to a ground source, such as the engine or battery negative.
PINK	Pin-C	On/Off wire. Connect to a switched 12 volt source. Coil and wire on EFI applications.
YELLOW		Tach Signal. Provides a 12 volt square wave signal.
CRANKSHAFT SENSOR, 3-PIN		
ORANGE/YELLOW	Pin-A	Crank Sensor Signal
BROWN	Pin-B	Sensor Ground
PINK	Pin-C	12 Volt Supply
CAMSHAFT SENSOR, 3-PIN		
BROWN/WHITE	Pin-A	Cam Sensor Signal
BROWN	Pin-B	Sensor Ground
PINK	Pin-C	12 Volt Supply
MAP CONNECTOR, 3-PIN (OPTIONAL)		
BROWN	Pin-A	Sensor Ground
LT. GREEN	Pin-B	MAP Sensor Signal
ORANGE	Pin-C	5 Volt Supply
COIL CONNECTOR, CYLINDERS 2, 4, 6, 8		
BLACK	Pin-A	Ground
RED/GREEN	Pin-B	Coil-2
BROWN/GREEN	Pin-C	Coil-4
BROWN	Pin-E	Sensor Ground
WHITE/BLUE	Pin-F	Coil-6
VIOLET/BLUE	Pin-G	Coil-8
PINK	Pin-H	12 Volt Supply
Note: Pin-D is not used		
COIL CONNECTOR, CYLINDERS 1, 3, 5, 7		
BLACK	Pin-A	Ground
RED	Pin-B	Coil-7
GREEN	Pin-C	Coil-5
BROWN	Pin-E	Sensor Ground
LT. BLUE	Pin-F	Coil-3
VIOLET	Pin-G	Coil-1
PINK	Pin-H	12 Volt Supply
Note: Pin-D is not used		

Wiring Functions, 6LS Controllers, PN 6010, continued

2-PIN CONNECTOR, ACCESSORIES		
PINK	Pin-A	Step Retard. When 12 volts are supplied, the Sw Retard is activated.
BLUE	Pin-B	2-Step. When 12 volts are supplied, the RevLO (Launch) rpm value is active.
16-PIN CONNECTOR WIRE LOCATION		
GRAY	Pin-A	Ground
PINK	Pin-B	12 Volt Supply
BROWN/WHITE	Pin-C	Cam Sensor Signal
RED/GREEN	Pin-D	Coil-2
BROWN/GREEN	Pin-E	Coil-4
WHITE/BLUE	Pin-F	Coil-6
VIOLET/BLUE	Pin-G	Coil-8
YELLOW	Pin-H	Tach
BROWN	Pin-J	Sensor Ground
LT. GREEN	Pin-K	MAP Sensor Signal
RED	Pin-L	Coil-7
GREEN	Pin-M	Coil-5
LT. BLUE	Pin-N	Coil-3
VIOLET	Pin-P	Coil-1
ORANGE/YELLOW	Pin-R	Crank Sensor Signal
ORANGE	Pin-S	5 Volt Supply

Wire Functions 6LS-2, PN 6012

LOOSE WIRES		
BLACK/GRAY	Pin-A/B	Ground. Connect to a ground source, such as the engine or battery negative.
PINK	Pin-C	On/Off wire. Connect to a switched 12 volt source. Coil and wire on EFI applications.
YELLOW		Tach Signal. Provides a 12 volt square wave signal.
CRANKSHAFT SENSOR, 3-PIN		
ORANGE/YELLOW	Pin-A	Crank Sensor Signal
BROWN	Pin-B	Sensor Ground
ORANGE	Pin-C	5 Volt Supply
CAMSHAFT SENSOR, 3-PIN		
BROWN/WHITE	Pin-C	Cam Sensor Signal
BROWN	Pin-B	Sensor Ground
ORANGE	Pin-A	5 Volt Supply
MAP CONNECTOR, 3-PIN (OPTIONAL)		
BROWN	Pin-A	Sensor Ground
LT. GREEN	Pin-B	MAP Sensor Signal
ORANGE	Pin-C	5 Volt Supply
COIL CONNECTOR, CYLINDERS 2, 4, 6, 8		
BLACK	Pin-A	Ground
RED/GREEN	Pin-B	Coil-2
BROWN/GREEN	Pin-C	Coil-4
BROWN	Pin-E	Sensor Ground
WHITE/BLUE	Pin-F	Coil-6
VIOLET/BLUE	Pin-G	Coil-8
PINK	Pin-H	12 Volt Supply
Note: Pin-D is not used.		
COIL CONNECTOR, CYLINDERS 1, 3, 5, 7		
BLACK	Pin-A	Ground
RED	Pin-B	Coil-7
GREEN	Pin-C	Coil-5
BROWN	Pin-E	Sensor Ground
LT. BLUE	Pin-F	Coil-3
VIOLET	Pin-G	Coil-1
PINK	Pin-H	12 Volt Supply
Note: Pin-D is not used.		

Wiring Functions 6LS-2, PN 6012, continued

2-PIN CONNECTOR, ACCESSORIES		
PINK	Pin-B	Step Retard. When 12 volts are supplied, the Step Retard is activated.
BLUE	Pin-A	2-Step. When 12 volts are supplied, the RevLaunch rpm value is active.
16-PIN CONNECTOR WIRE LOCATION		
GRAY	Pin-A	Ground
PINK	Pin-B	12 Volt Supply
BROWN/WHITE	Pin-C	Cam Sensor Signal
RED/GREEN	Pin-D	Coil-2
BROWN/GREEN	Pin-E	Coil-4
WHITE/BLUE	Pin-F	Coil-6
VIOLET/BLUE	Pin-G	Coil-8
YELLOW	Pin-H	Tach
BROWN	Pin-J	Sensor Ground
LT. GREEN	Pin-K	MAP Sensor Signal
RED	Pin-L	Coil-7
GREEN	Pin-M	Coil-5
LT. BLUE	Pin-N	Coil-3
VIOLET	Pin-P	Coil-1
ORANGE/YELLOW	Pin-R	Crank Sensor Signal
ORANGE	Pin-S	5 Volt Supply

Programmable Features

The following explains the programmable features of the PN 6010 Controller. The features are listed in the same order shown on the Data Editor list in the software. Note that the Help pull down menu of the software offers explanations of all the features.

RPM Table (RPMtbl)

NOTE: When plotting a timing curve by using the RPM Table or MAP Table through your PC, there must NOT be a Timing Module installed. Power-up with a module installed will override the saved timing plot.

This setting can only be modified from the RPM Timing Curve edit graph on the lower right of the screen. It can also be set with the Hand Held Monitor. The chart allows you to map out an entire timing curve, much like the centrifugal advance of a mechanical distributor.

To create a map, simply position the mouse at a point on the chart and right click to add a dot. By moving the mouse over this point and a left click, the dot changes to red (active) and you can move it around the map.

NOTE: The timing has minimum and maximum limits that are set in the Data Editor Menu. These settings include the cumulative value of any vacuum advance or retard as well as the Switch Retard if used.

MAP Table (MAPtbl)

NOTE: In order to take advantage of a vacuum advance or retard, a MAP sensor is required.

NOTE: When plotting a timing curve by using the RPM Table or MAP Table through your PC, there must NOT be a Timing Module installed. Power-up with a module installed will override the saved timing plot.

This is a Manifold Absolute Pressure (MAP) chart. It gives you the capability of modifying the timing curve based on manifold pressure (vacuum or boost). A curve can be created from the MAP Advance Curve graph on the upper right of the screen. It can also be set with the Hand Held Monitor. The chart allows you to map out an advance curve based on manifold vacuum (much like the vacuum advance on a mechanical distributor).

To create a map, simply position the mouse at a point on the chart and right click to add a dot. By moving the mouse over this point and a left click, the dot changes to red (active) and you can move it around the map.

NOTE: The timing has minimum and maximum limits that are set in the Data Editor Menu. These settings include the cumulative value of any vacuum advance or retard as well as the Switch Retard if activated.

MAP Sensor Select

Allows the selection of a 1, 2 or 3-bar MAP sensor. This setting should be set to match the MAP Sensor in use: 1-bar (0-15 psia), 2-bar (0-30 psia), 3-bar (0-45 psia).

Timing Limit

There are two adjustments that set the limits of ignition timing. These settings are meant as safety targets to keep the timing in check. Both the Minimum and Max values include any timing retards or advancements.

Min Timing: This is minimum amount of timing advance. It is adjustable from 0°-20° BTDC with a default of 5°.

Max Timing: This is the maximum amount of timing advance. It is adjustable from 25°-65° BTDC with a default of 45°.

Pro-Data+

Installation of the Pro-Data+ Software

1. Insert the installation CD into your PC.
2. In Windows, click on Start then select Run.
3. In the box type, "D: Setup" and press Enter (or corresponding drive).
4. The screen will walk you through several steps.
5. Once loaded, your monitor will have an MSD Graph View logo. Click on it to open the software.
6. A program will open. Go to the upper left corner of the screen and click on File, then Open.
7. This will open a menu of part numbers. Select "6010" or "6012".
8. This will open another menu of versions. Highlight and open the "6010vxx.IGN" or "6012vxx.IGN" (xx determines the versions, such as 02). This will open the Pro-Data+ Software for the Ignition Controller.

Saves and Transfers

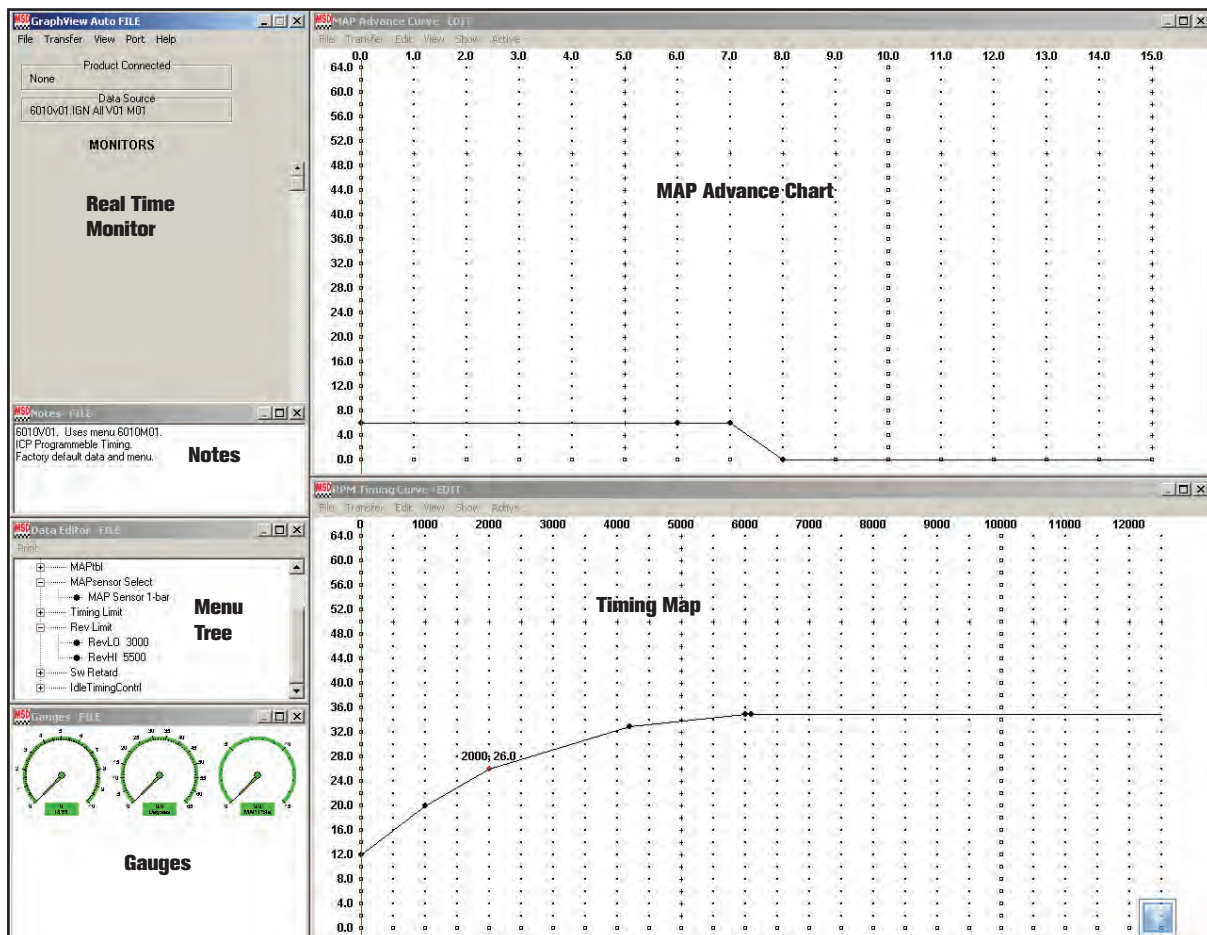
Whenever a change is made to a program, it either must be saved to a file in your PC or it needs to be transferred to the Controller. You will notice that whenever you make a change to a program, the bullet next to the modified value will turn red. It will remain red until you save it to a file or to the MSD. There are two ways to save your files.

Save to MSD: This step will save any changes directly into the Controller. If you are only making one or just a couple modifications this works well.

Save to PC: This will save your changes to only show on the PC screen (indicated by a red bullet point next to any altered values). These modifications will not be active or saved until you save the file or transfer the information to the MSD.

You can create numerous files on your PC and download them for testing purposes or save programs you used at different races or events.

Pro-Data+ Screen and Programming Windows



Installing the 6-MOD Controller, PN 6011

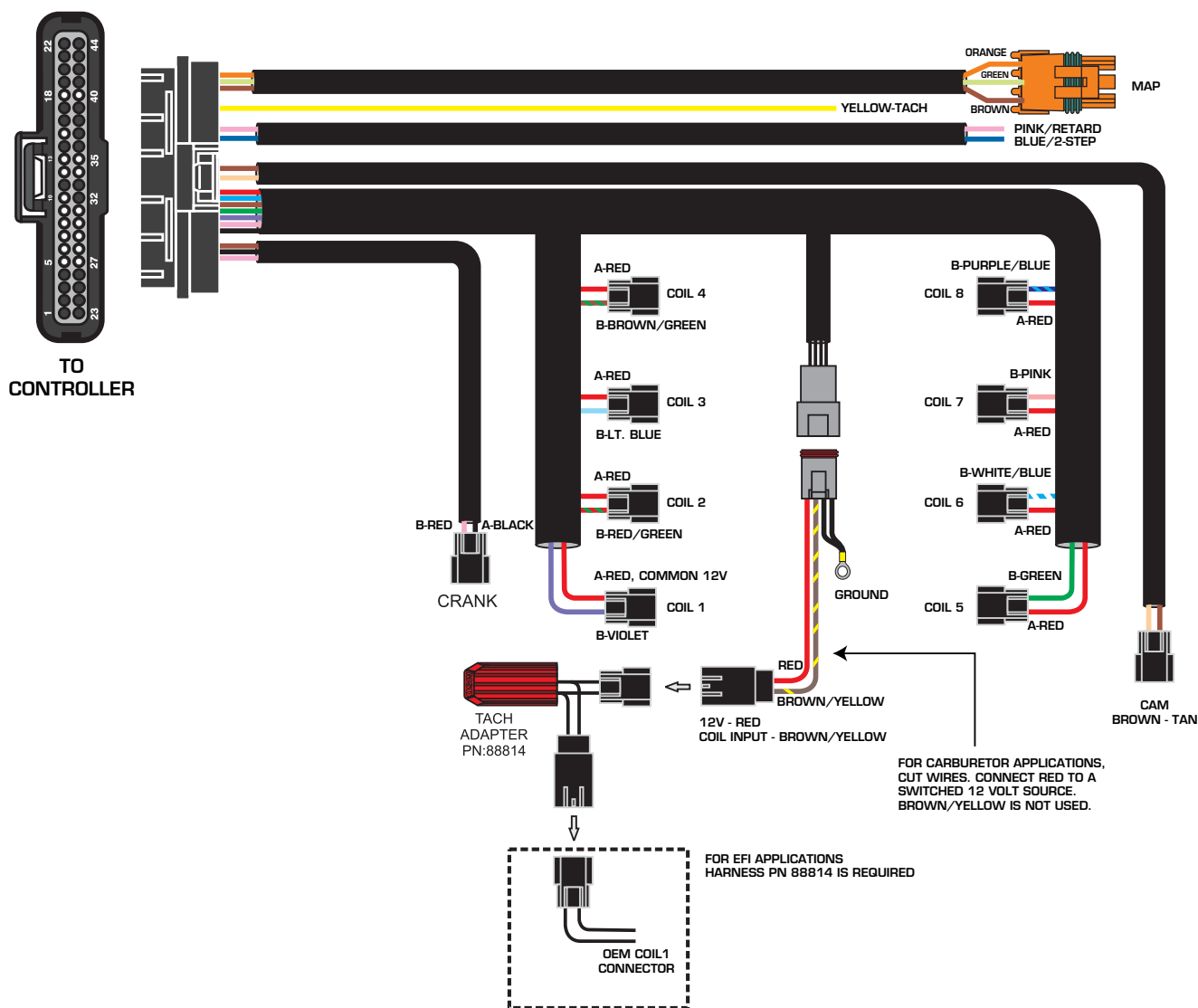
The MSD 6-MOD Controller is designed specifically for the Ford Modular Engine series equipped with coil-on-plug ignition systems. The 6-MOD is designed to drive the factory coils and control the ignition system on engines that have been retro-fitted with a carburetor. They can also be used on factory EFI systems with the proper accessory harness.

EFI

The 6-MOD can be used in stock, EFI applications by using accessory Harness, PN 88814. This harness provides a splice-free installation of the Controller to factory equipped EFI vehicles making installation easy. This allows the user to advance or retard the factory's timing curve, program their own, set a step retard, boost retard, step rev limits and more.

Operation

The 6-MOD Controller offers several programmable feature that allow rpm and timing adjustments. These can be achieved through MSD's Pro-Data+ Software via a PC. Loading the software is explained in this section and there is a useful Help menu found in the software for more details.



NOTE: The harness is set up for use on a SOHC engine. DOHC engines use coils with reversed polarity. In these applications, the location of two coil wires needs to be swapped in each connector.

Wire Functions, 6-MOD Controller, PN 6011

POWER WIRES		
Note: For carburetor applications only this connector is cut off and the Brown/Yellow is not used. For EFI applications, this connects to the number one coil connector using harness, PN 88814.		
RED		12 volt input. Connect to switched 12 volts.
BROWN/YELLOW		Use only with EFI. Coil input wire.
BLACK		Ground. Connect eyelet to ground.
LOOSE WIRES		
YELLOW		Tach Signal. Provides a 12 volt square wave source.
PINK		Step Retard. When 12 volts are applied, the step retard is activated.
BLUE		2-Step. When 12 volts are applied, the RevLaunch rpm value is active.
MAP SENSOR		
BROWN	Pin-A	Ground
GREEN	Pin-B	Map Signal
ORANGE	Pin-C	5 volt supply
CRANKSHAFT SENSOR		
BLACK	Pin-A	Signal Negative (-)
RED	Pin-B	Signal Positive (+)
CAMSHAFT SENSOR		
BROWN	Pin-A	Ground
TAN	Pin-B	Signal Wire
COIL CONNECTORS		
*Note: The harness is set up for use on a SOHC engine. DOHC engines use coils with reversed polarity. In these applications, the location of two coil wires needs to be swapped in each connector.		
RED	Pin-A*	12 volt supply
VIOLET	Pin-B*	Coil-1 Trigger
RED/GREEN	Pin-B*	Coil-2 Trigger
LT. BLUE	Pin-B*	Coil-3 Trigger
BROWN/GREEN	Pin-B*	Coil-4 Trigger
GREEN	Pin-B*	Coil-5 Trigger
WHITE/BLUE	Pin-B*	Coil-6 Trigger
PINK	Pin-B*	Coil-7 Trigger
VIOLET/BLUE	Pin-B*	Coil-8 Trigger

Programmable Features

The following explains the programmable features of the PN 6011 Controller. The features are listed in the same order shown on the Data Editor list in the software. Note that the Help pull down menu of the software offers explanations of all the features.

RPM Table (RPMtbl)

This setting can only be modified from the RPM Timing Curve edit graph on the lower right of the screen (It can also be set with the Hand Held Monitor). The chart allows you to map out an entire timing curve, much like the centrifugal advance of a mechanical distributor.

To create a map, simply position the mouse at a point on the chart and right click to add a dot. Up to 10 points can be added. By moving the mouse over this point and a left click, the dot changes to red (active) and you can move it around the map by clicking and dragging.

NOTE: The timing has minimum and maximum limits that are set in the Data Editor Menu. These settings include the cumulative value of any vacuum advance or retard as well as the Switch Retard if used.

MAP Table (MAPtbl)

NOTE: In order to take advantage of a vacuum advance, a MAP sensor is required.

This is a Manifold Absolute Pressure (MAP) chart. It gives you the capability of modifying the timing curve based on manifold pressure (vacuum or boost). A curve can be created from the MAP Advance Curve graph on the upper right of the screen (It can also be set with the Hand Held Monitor). The chart allows you to map out an advance curve based on manifold vacuum (much like the vacuum advance on a mechanical distributor).

To create a map, simply position the mouse at a point on the chart and right click to add a dot. Up to 10 points can be added. By moving the mouse over this point and a left click, the dot changes to red (active) and you can move it around the map by clicking and dragging.

NOTE: The timing has minimum and maximum limits that are set in the Data Editor Menu. These settings include the cumulative value of any vacuum advance or retard as well as the Step Retard if activated.

MAP Sensor Select

Allows the selection of a 1, 2 or 3-bar MAP sensor. This setting should be set to match the MAP Sensor in use: 1-bar (0-15 psia), 2-bar (0-30 psia), 3-bar (0-45 psia). A 2-bar Sensor is supplied.

Timing Limit

There are two adjustments that set the limits of ignition timing. These settings are meant as safety targets to keep the timing in check. Both the Minimum and Max values include any timing retards or advancements.

Min Timing: This is the minimum amount of timing advance. It is adjustable from 0°-20° BTDC with a default of 5°.

Max Timing: This is the maximum amount of timing advance. It is adjustable from 25°-65° BTDC with a default of 45°.

Rev Limits

The Controller allows you to program two rev limits; one for an over-rev safety and another that provides a low limit for use as a launch, or 2-Step limit.

- RevLaunch** This is the low rpm limit that is designed to be used while staged at the starting line. It is activated when the Blue wire is connected to 12 volts. When there is no 12 volts on this wire, the High Rev Limit is active. It is adjustable in 100 rpm increments from 2,000-12,500 rpm.
- RevMax** This is the high, or over-rev rpm limit. It is active whenever the Blue wire (RevL0) is not connected to 12 volts. It is adjustable in 100 rpm increments from 2,000-12,500 rpm.

Step Retard

A step retard will provide an adjustable amount of retard at a specific moment. This is ideal when using nitrous oxide. The amount of retard is adjustable from 0°-15° in 1° increments. The retard is activated when the Pink wire is switched to 12 volts. Default is 10°.

Timing Source

This adjustment allows you to select a timing curve. The 6-Mod lets you run a Built-In default curve that can easily be modified by using the RPM Table chart. On engines using the factory EFI you can select OEM Advance or OEM Retard to use the factory ECU's timing map.

- Built-In:** This is a general timing curve that is designed to work well with most stock type engines. This chart is shown in the RPM Table and MAP Table charts. These can easily be modified by clicking and dragging on the dots, or by adding a dot (right click) and saving to the ignition.
- OEM Advance:** This selection is used with a factory EFI equipped engine. The 6-Mod will use the factory ECU's timing curve. By using the OEM Timing Mod option below, the entire timing curve will be advanced the amount you set.
- OEM Retard:** This selection is used with a factory EFI equipped engine. The 6-Mod will use the factory ECU's timing curve. By using the OEM Timing Mod option below, the entire timing curve will be retarded the amount you set.

OEM Timing Mod

This option is available only when running the factory ECU's timing curve on EFI equipped engines (Selected as OEM Advance or Retard). Here you set the total amount of advance or retard for the factory timing curve. The default is 0°.

- OEMtimingmod:** Adjustable from 0° - 10°.
-

Pro-Data+

Installation of the Pro-Data+ Software

1. Insert the installation CD into your PC.
2. In Windows, click on Start then select Run.
3. In the box type, "D: Setup" and press Enter (or corresponding drive).
4. The screen will walk you through several steps.
5. Once loaded, your monitor will have an MSD Graph View logo. Click on it to open the software.
6. A program will open. Go to the upper left corner of the screen and click on File, then Open.
7. This will open a menu of part numbers. Select "6011".
8. This will open another menu of versions. Highlight and open the "6011vxx.IGN" (xx determines the versions, such as 02). This will open the Pro-Data+ software for the Ignition Controller.

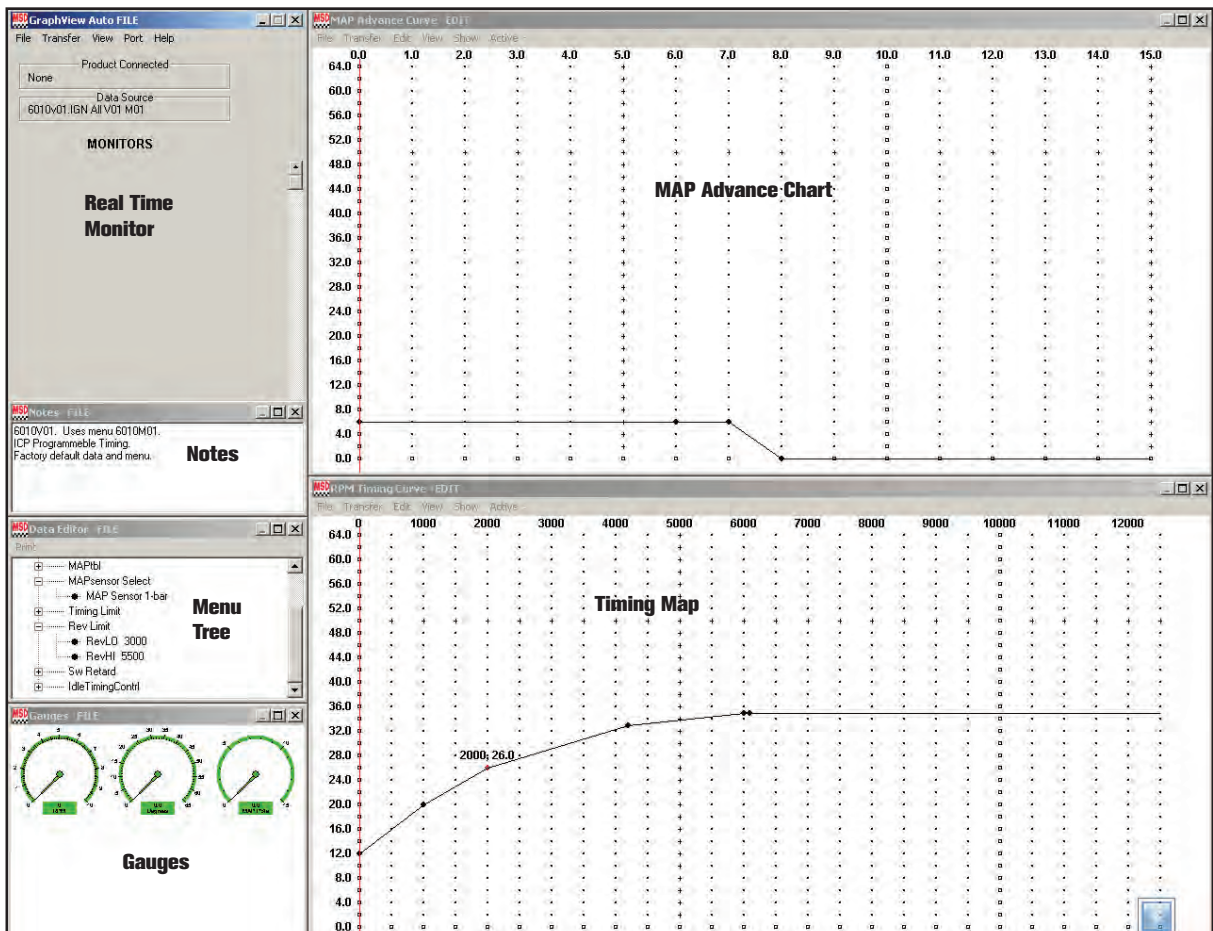
Saves and Transfers

Whenever a change is made to a program, it either must be saved to a file in your PC or it needs to be transferred to the Controller. You will notice that whenever you make a change to a program, the bullet next to the modified value will turn red. It will remain red until you save it to a file or to the MSD. There are two ways to save your files.

- Save to MSD:** This step will save any changes directly into the Controller. If you are only making one or just a couple modifications this works well.
- Save to PC:** This will save your changes to only show on the PC screen (indicated by a red bullet point next to any altered values). These modifications will not be active or saved until you save the file or transfer the information to the MSD.

You can create numerous files on your PC and download them for testing purposes or save programs you used at different races or events.

Pro-Data+ Screen and Programming Windows



Installing the 6-Hemi® Controller, PN 6013

The MSD 6-HEMI Controller is designed specifically for the Chrysler HEMI Engine series equipped with coil-on-plug ignition systems. The 6-HEMI is designed to drive the factory coils and control the ignition system on engines that have been retro-fit with a carburetor. Due to the two different coil offerings, a coil harness must be purchased separately. PN 88863 is designed for the '03-'05 coil design (which use spark plug wires) and the PN 88864 for '06-'08 model coils.

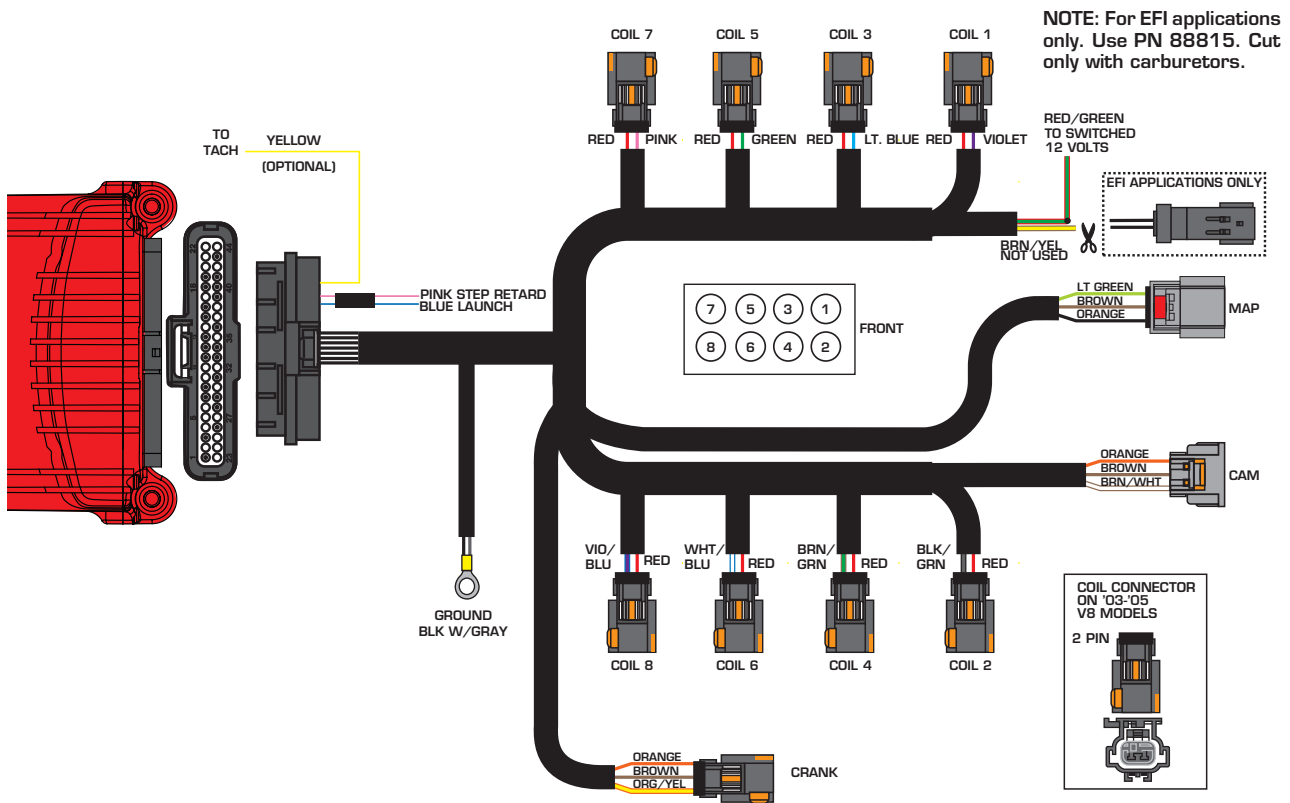
EFI

The 6-HEMI can be used in stock, EFI applications by using the corresponding accessory harness. Two Adapter Harnesses are available; PN 88815 for '03-'05 coils and the PN 88816 for the '06-'08 coil models. These harnesses provides a splice-free installation of the Controller to factory equipped EFI vehicles making installation easy. This allows the user to advance or retard the factory's timing curve, program their own, set a step retard, boost retard, step rev limits and more.

Operation

The 6-HEMI Controller offers several programmable feature that allow rpm and timing adjustments. These can be achieved through MSD's Pro-Data+ Software via a PC. Loading the software is explained in this section and there is a useful Help menu found in the software for more details.

Wiring with the '03-'05 PN 88863 Harness for Carburetors



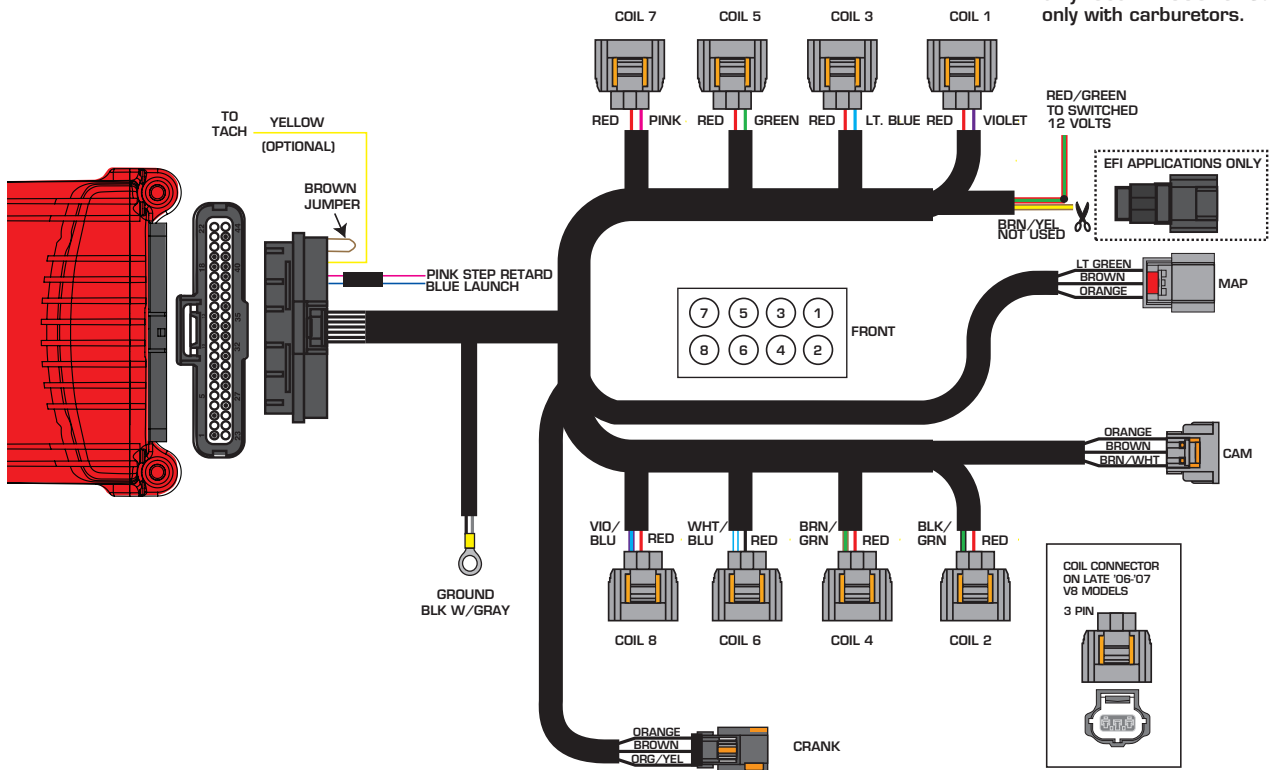
Installing an MSD 6-Hemi® Controller, PN 6013

Wire Functions

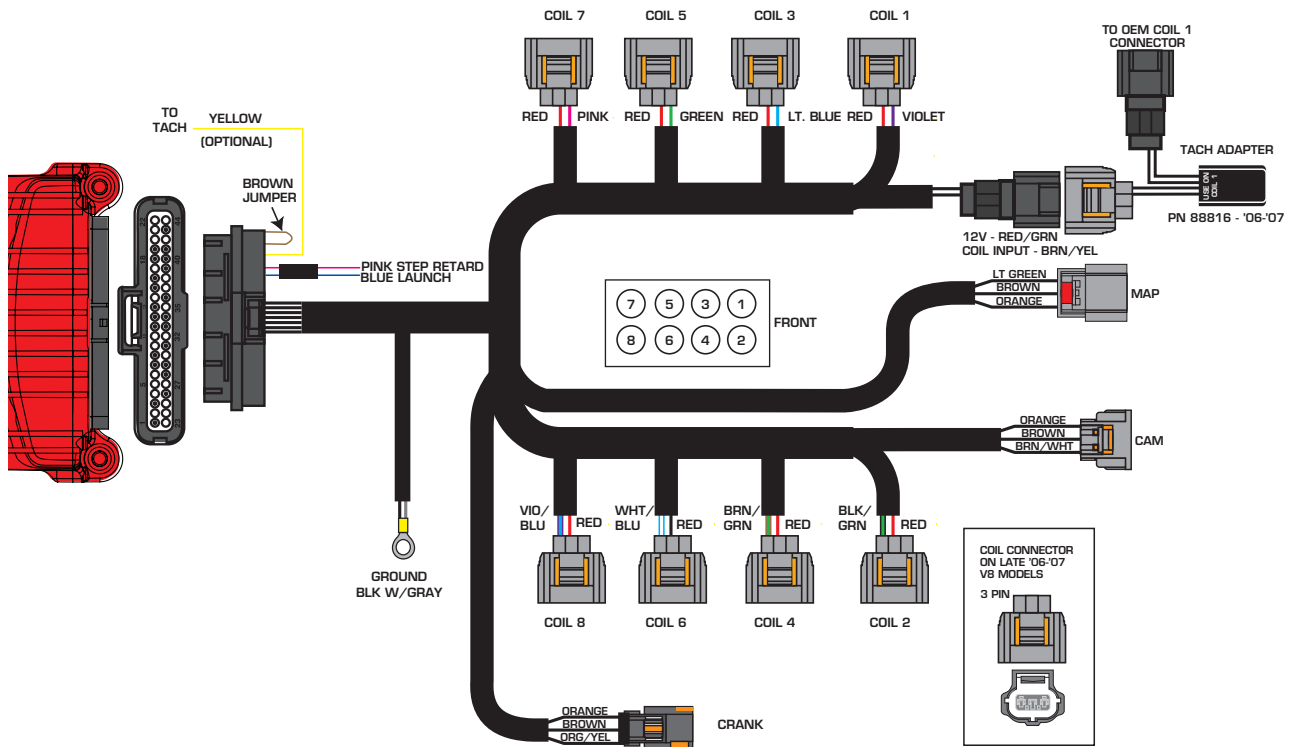
POWER WIRES		
Note: For carburetor applications this connector is cut off and the Brown/Yellow is not used. For EFI applications, this connector connects to the Coil-1 connector (See note on diagrams on following pages).		
RED/GREEN		12 volt input. Connect to switched 12 volts.
BROWN/YELLOW		Use only with EFI. Coil-1 input wire (See note on EFI diagram).
BLACK/GRAY		Ground. Connect eyelet to ground.
LOOSE WIRES		
YELLOW		Tach Signal. Provides a 12 volt square wave source.
PINK		Step Retard. When 12 volts are applied, the step retard is activated.
BLUE		2-Step. When 12 volts are applied, the RevLaunch rpm value is active.
BROWN		'06-'07 Harness, PN 88864 only: Waste Spark Control. To disable waste spark, cut the wire loop.
MAP SENSOR		
LIGHT GREEN	Pin-1	Map Signal
BROWN	Pin-2	Ground
ORANGE	Pin-3	5 volt supply
CRANKSHAFT SENSOR		
ORANGE	Pin-1	5 volt supply
BROWN	Pin-2	Ground
ORANGE/YELLOW	Pin-3	Crank Signal
CAMSHAFT SENSOR		
BROWN/WHITE	Pin-1	Cam Signal
BROWN	Pin-2	Ground
ORANGE	Pin-3	5 volt supply
COIL CONNECTORS		
Note: PN 88864, '06-'07 applications with 3-pin coil connector. Pin-1 is signal and Pin-2 is 12 volt supply.		
RED	Pin-1	12 volt supply (for all cylinders)
VIOLET	Pin-2	Coil-1 Trigger
BLACK/GREEN	Pin-2	Coil-2 Trigger
LIGHT BLUE	Pin-2	Coil-3 Trigger
BROWN/GREEN	Pin-2	Coil-4 Trigger
GREEN	Pin-2	Coil-5 Trigger
WHITE/BLUE	Pin-2	Coil-6 Trigger
PINK	Pin-2	Coil-7 Trigger
VIOLET/BLUE	Pin-2	Coil-8 Trigger

Wiring with the '06-'07, PN 88864 Harness for Carburetors

NOTE: For EFI applications only. Use PN 88816. Cut only with carburetors.



Wiring to Factory EFI on a '06-'08 with Harnesses PN 88864 and PN 88816



Programmable Features

The following explains the programmable features of the PN 6013 Controller. The features are listed in the same order shown on the Data Editor list in the software. Note that the Help pull down menu of the software offers explanations of all the features.

NOTE: STATS, Stat 1 or SCAN are display features only used with the Hand Held Monitors, PN 7550 or PN 7553.

RPM Table (RPMtbl)

This setting can only be modified from the RPM Timing Curve edit graph on the lower right of the screen (It can also be set with the Hand Held Monitor). The chart allows you to map out an entire timing curve, much like the centrifugal advance of a mechanical distributor.

To create a map, simply position the mouse at a point on the chart and right click to add a dot. Up to 10 points can be programmed. By moving the mouse over this point and a left click, the dot changes to red (active) and you can move it around the map by clicking and dragging.

NOTE: The timing has minimum and maximum limits that are set in the Data Editor Menu. These settings include the cumulative value of any vacuum advance or retard as well as the Step Retard if activated.

MAP Table (MAPtbl)

NOTE: In order to take advantage of a vacuum advance, a MAP sensor is required.

This is a Manifold Absolute Pressure (MAP) chart. It gives you the capability of modifying the timing curve based on manifold pressure (vacuum or boost). A curve can be created from the MAP Advance Curve graph on the upper right of the screen (It can also be set with the Hand Held Monitor). The chart allows you to map out an advance curve based on manifold vacuum (much like the vacuum advance on a mechanical distributor).

To create a map, simply position the mouse at a point on the chart and right click to add a dot. Up to 10 points can be programmed. By moving the mouse over this point and a left click, the dot changes to red (active) and you can move it around the map by clicking and dragging.

NOTE: The timing has minimum and maximum limits that are set in the Data Editor Menu. These settings include the cumulative value of any vacuum advance or retard as well as the Step Retard if activated.

MAP Sensor Select

Allows the selection of a 1, 2 or 3-bar MAP sensor. This setting should be set to match the MAP Sensor in use: 1-bar (15 psia), 2-bar (30 psia), 3-bar (45 psia). (Uses a Factory Mopar map sensor.)

Timing Limit

There are two adjustments that set the limits of ignition timing. These settings are meant as safety targets to keep the timing in check. Both the Minimum and Max values include any timing retards or advancements.

Min Timing: The minimum timing setting. It is adjustable from -5°-20° BTDC with a default of 5°.

Max Timing: The maximum timing setting. It is adjustable from 25°-65° BTDC with a default of 45°.

NOTE: These features are active when operating in OEM Advance or Built-In timing mode.

Rev Limits

The Controller allows you to program two rev limits; RevMax for an over-rev safety and RevLaunch that provides a low limit for use as a launch, or 2-Step limit.

RevLaunch: This is the low rpm limit that is designed to be used while staged at the starting line. It is activated when the Blue wire is connected to 12 volts. When there is no 12 volts on this wire, the RevMax Limit is active. It is adjustable in 100 rpm increments from 2,000-12,500 rpm.

RevMax: This is the over-rev rpm limit. It is active when the Blue wire (RevLaunch) is not connected to 12 volts. It is adjustable in 100 rpm increments from 2,000-12,500 rpm.

Step Retard

A step retard will provide an adjustable amount of retard at a specific moment. This is ideal when using nitrous oxide. The amount of retard is adjustable from 0°-15° in 1° increments. The retard is activated when the Pink wire is switched to 12 volts. Default is 10°.

Timing Source

This adjustment allows you to select a timing curve. The 6-Hemi lets you run a Built-In default curve that can easily be modified by using the RPM Table chart. On engines using the factory EFI, you can select OEM Advance to use the factory ECU's timing map.

- Built-In:** This is a general timing curve that is designed to work well with most stock type engines. This chart is shown in the RPM Table and MAP Table charts. These can easily be modified by clicking and dragging on the dots, or by adding a dot (right click) and saving to the ignition (The built in timing curve is designed for 91+ octane fuel).
- OEM Advance:** This selection is used with a factory EFI equipped engine. The 6-Hemi will use the factory ECU's timing curve. By using the OEM Timing Mode option below, the entire timing curve will be advanced the amount you set. A negative value retards the timing.

OEM Timing Mode

This option is available only when running the factory ECU's timing curve on EFI equipped engines (Selected as OEM Advance or Retard). Here you set the total amount of advance or retard for the factory timing curve (Negative value will retard the timing). The default is 0°.

OEMtimingMod: Adjustable from retard 10° to advance 10°.

Caution: Too much advance can cause damage to engine!

Idle Timing Control

When this feature is On, the timing will fluctuate during idle to improve the idle quality. This is only used during the "Built-In" timing mode.

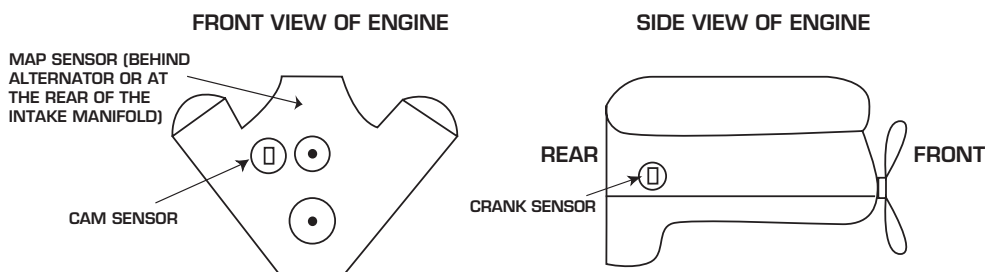
- On:** Idle timing will vary to produce a more stable idle RPM.
- Off:** Timing will be fixed, based on the timing tables.

Waste Spark Option

When this feature is On, each coil will fire every 360°. When turned Off, each coil will fire every 720° of crankshaft rotation.

- Harness:** When harness PN 88864 is used, waste spark is Off.
When harness PN 88863 is used, waste spark is On.
- On:** Coil firing order = 1 and 6, 8 and 5, 4 and 7, 3 and 2.
- Off:** Coil firing order = 1, 8, 4, 3, 6, 5, 7, 2.

Cam, Crank and Map Sensor locations



Pro-Data+

Installation of the Pro-Data+ Software

1. Insert the installation CD into your PC
2. In Windows, click on Start then select Run.
3. In the box type, "D: Setup" and press Enter (or corresponding drive).
4. The screen will walk you through several steps.
5. Once loaded, your monitor will have an MSD Graph View logo. Click on it to open the software.
6. A program will open. Go to the upper left corner of the screen and click on File, then Open.
7. This will open a menu of part numbers. Select "6013".
8. This will open another menu of versions. Highlight and open the "6013vxx.IGN" (xx determines the versions, such as 02). This will open the Pro-Data+ software for the Ignition Controller.

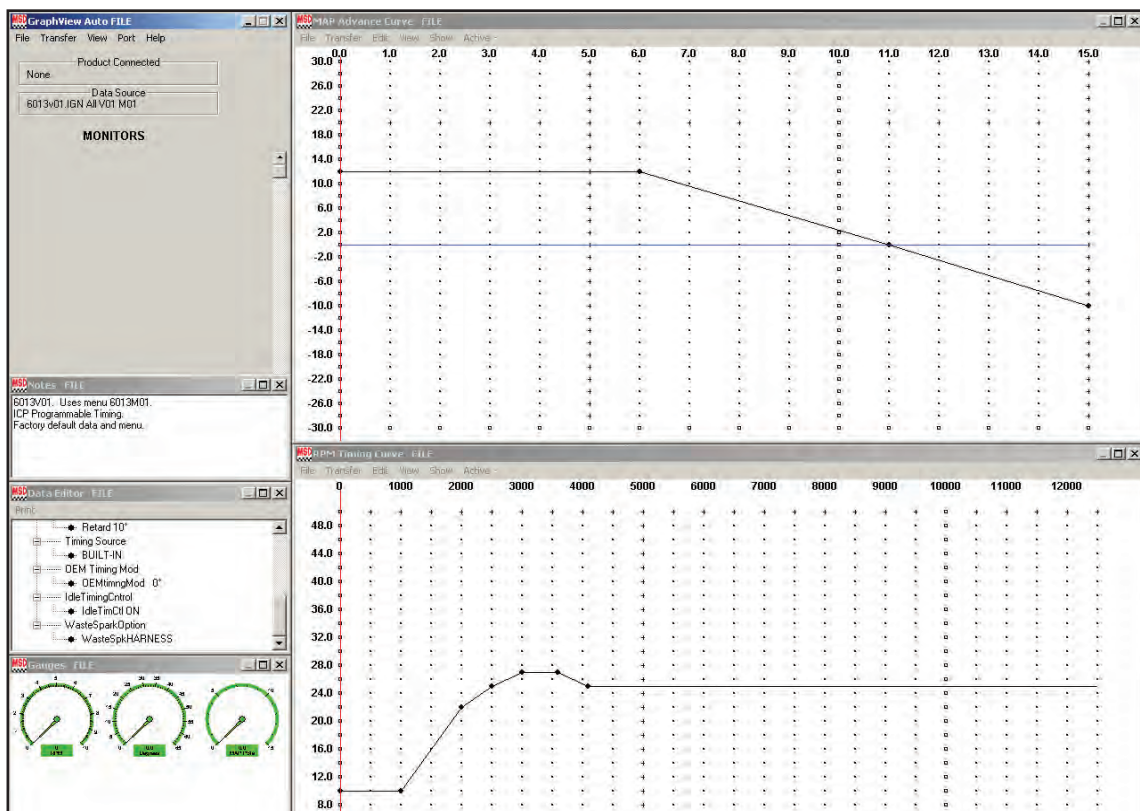
Saves and Transfers

Whenever a change is made to a program, it either must be saved to a file in your PC or it needs to be transferred to the Controller. You will notice that whenever you make a change to a program, the bullet next to the modified value will turn red. It will remain red until you save it to a file or to the MSD. There are two ways to save your files.

- Save to MSD:** This step will save any changes directly into the Controller. If you are only making one or just a couple modifications this works well.
- Save to PC:** This will save your changes to only show on the PC screen (indicated by a red bullet point next to any altered values). These modifications will not be active or saved until you save the file or transfer the information to the MSD.

You can create numerous files on your PC and download them for testing purposes or save programs you used at different races or events.

Pro-Data+ Screen and Programming Windows



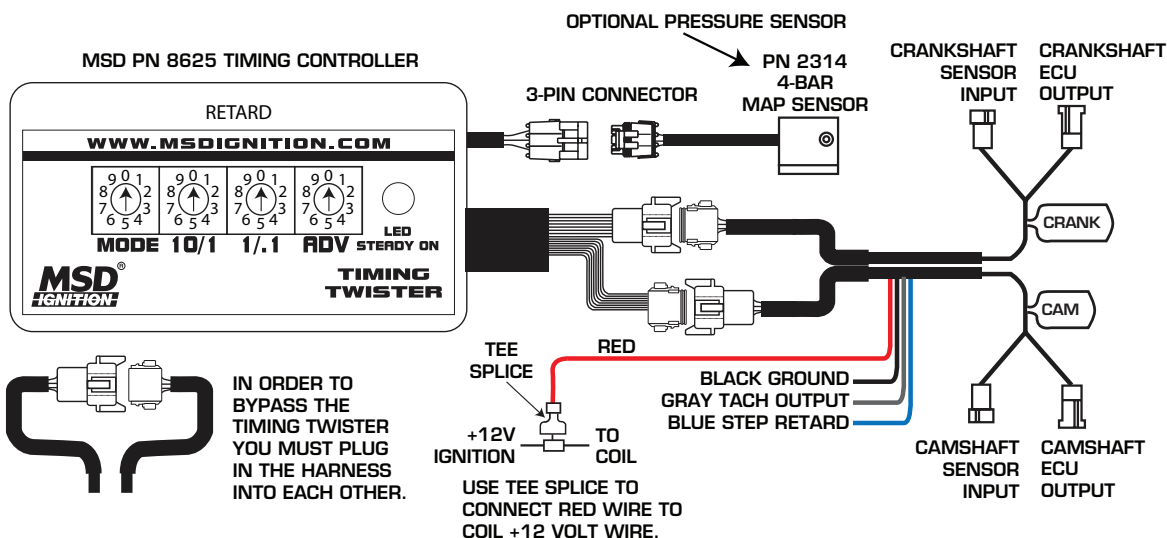
MSD Timing Twister, GM LS1/LS6, PN 8625, GM LS2/LS7, PN 86251, Ford Modular, '96-'04, PN 86252

The MSD Timing Twisters provide a simple way to manipulate the timing of late model GM or Ford engines. The units feature direct plug-in installation and provide a step retard, boost retard and even allow for the timing to be advanced.

It is important to note that the timing will not be changed at idle rpm. Once the engine reaches 1,800 rpm, the timing will change to your settings. The boost timing allows you to retard the timing from 0.1° - 1.9° per pound of boost up to 30°. Note that a MAP Sensor is required.

Wire Functions

- Red:** On/Off wire. Connects to switched 12 volts (Powered while cranking and when key is On).
- Black:** Connects to Ground.
- Blue:** Step retard (Active when 12 volts is applied).
- Gray:** Tach output. 12 volt square wave, 30% duty. V8 only.

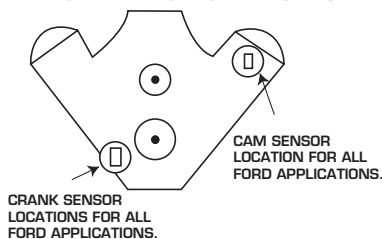


LED

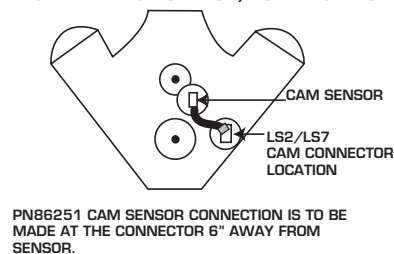
A flashing LED on the controller indicates that the controller has not acquired the cam and crank tooth patterns. It will use pass-through timing from the sensors below 1800 rpm or above 1800 rpm anytime the LED is flashing. Once the Timing Twister has learned the tooth patterns the LED will remain illuminated with no flashing when the engine rpm is above 1800 rpm, indicating the timing is being controlled, not passed through.

Cam and Crank Sensor Locations

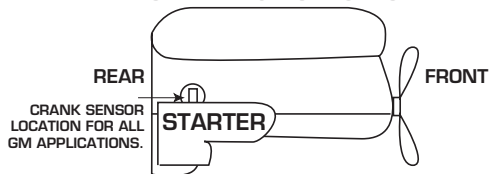
FRONT VIEW OF FORD ENGINES



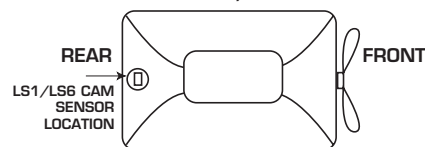
FRONT VIEW OF GM LS2/LS7 ENGINES



SIDE VIEW OF LS ENGINES



TOP VIEW OF LS1/LS6 ENGINES



See Switch Position Chart in two pages.

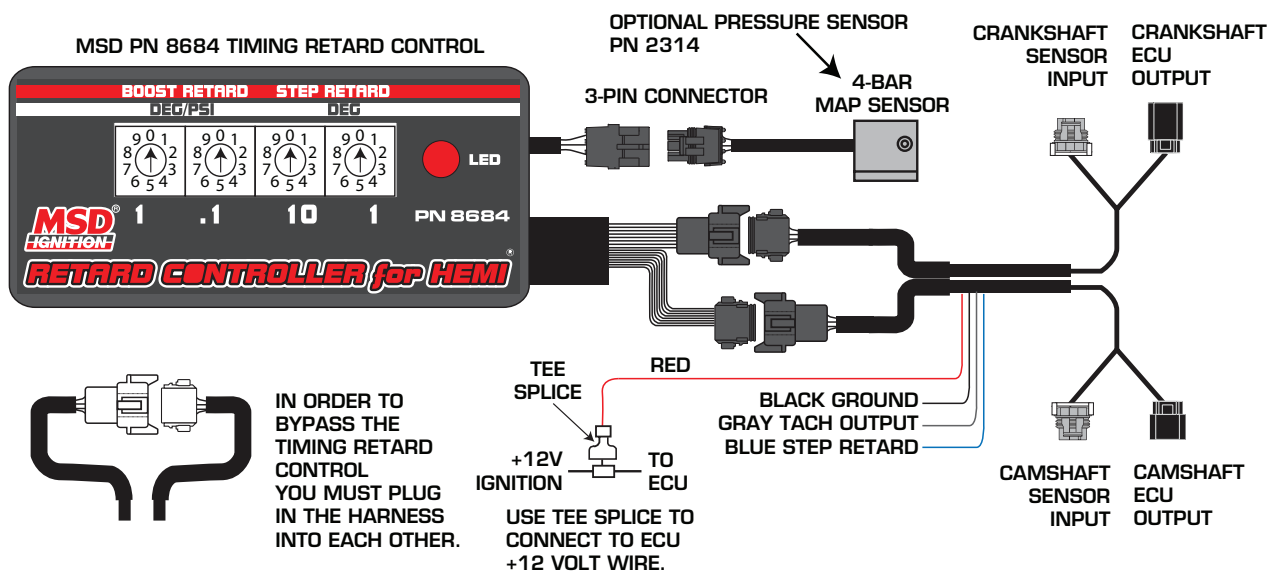
MSD Timing Retard for Late Model HEMI[®], PN 8684

This Timing Retard is designed specifically for the '03 and On Chrysler HEMI. It provides a simple way to retard the timing. The units feature direct plug-in installation and provide a step retard and boost retard (MAP Sensor required).

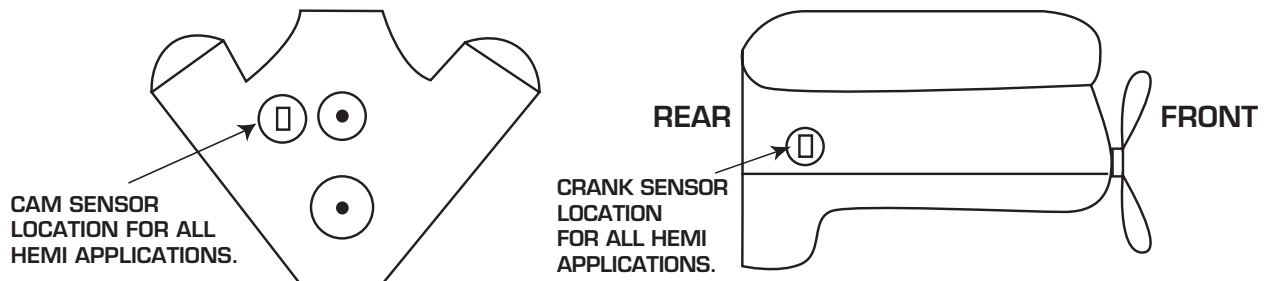
It is important to note that the timing will not be changed at idle rpm. Once the engine reaches 1,800 rpm, the timing will change to your settings. The boost timing allows you to retard the timing from 0.1° - 1.9° per pound of boost up to 30°.

Wire Functions

- Red:** On/Off wire. Connects to switched 12 volts (Powered while cranking and when key is On). **NOTE:** Do not connect Red wire to coil positive.
- Black:** Connects to Ground.
- Blue:** Step retard (Active when 12 volts is applied).
- Gray:** Tach output. 12 volt square wave, 30% duty. V8 only (4 pulses per rev).



Timing Retard Control Cam and Crank Sensor Locations



LED

A flashing LED on the controller indicates that the controller has not acquired the cam and crank tooth patterns. It will use pass-through timing from the sensors below 1800 rpm or above 1800 rpm anytime the LED is flashing. Once the Timing Twister has learned the tooth patterns the LED will remain illuminated with no flashing when the engine rpm is above 1800 rpm, indicating the timing is being controlled, not passed through.

Operation and Programming

The Timing Retard Control has four 10-position rotary switches that allow the user to select ignition timing values for each of the following:

Step Retard, Blue wire activated	0° to 30°
Boost Retard, requires MAP Sensor	0° to 2.9° per pound of boost with a max Retard of 20° in .1° increments.
Step and Boost Retard	Up to 30° Step Retard plus max Boost Retard ranges of 20° for a max Retard of 50°.

Switch Position Table PN 8684

Boost Retard	
1°/PSI Retard Switch Position	.1°/PSI Retard Switch Position
0=0°	0=.0° 3=.3° 6=.6° 9=.9°
1=1°	1=.1° 4=.4° 7=.7°
2 thru 9=2°	2=.2° 5=.5° 8=.8°

Step Retard	
10° Retard Switch Position	1° Retard Switch Position
0=0° 3 thru 9=30°	0=0° 3=3° 6=6° 9=9°
1=10°	1=1° 4=4° 7=7°
2=20°	2=2° 5=5° 8=8°

Switch Position Table

MODE Switch Position	10° Retard Switch Position	1° Retard Switch Position	ADV* Switch Position
0=Step Retard in 1° steps, 30° Max	0=0° 3 thru 9=30° 1=10° 2=20°	0=0° 3=3° 6=6° 9=9° 1=1° 4=4° 7=7° 2=2° 5=5° 8=8°	0=0° 3=3° 6=6° 9=9° 1=1° 4=4° 7=7° 2=2° 5=5° 8=8°
1=Boost Retard 15° Max in Deg./PSI	0=0° 1 thru 9=1°	0=.0° 3=.3° 6=.6° 9=.9° 1=.1° 4=.4° 7=.7° 2=.2° 5=.5° 8=.8°	0=0° 3=3° 6=6° 9=9° 1=1° 4=4° 7=7° 2=2° 5=5° 8=8°
2=Boost Retard 20° Max in Deg./PSI	0=0° 1 thru 9=1°	0=.0° 3=.3° 6=.6° 9=.9° 1=.1° 4=.4° 7=.7° 2=.2° 5=.5° 8=.8°	0=0° 3=3° 6=6° 9=9° 1=1° 4=4° 7=7° 2=2° 5=5° 8=8°
3=Boost Retard 30° Max in Deg./PSI	0=0° 1 thru 9=1°	0=.0° 3=.3° 6=.6° 9=.9° 1=.1° 4=.4° 7=.7° 2=.2° 5=.5° 8=.8°	0=0° 3=3° 6=6° 9=9° 1=1° 4=4° 7=7° 2=2° 5=5° 8=8°
4=Step and Boost Retard 15° Max Boost Retard and Step Retard in 2° steps 2-18° range	Step Retard 0=0° 5=10° 1=2° 6=12° 2=4° 7=14° 3=6° 8=16° 4=8° 9=18°	Boost Retard °/PSI 0=.2° 3=.6° 6=1.2° 9=1.8° 1=.3° 4=.8° 7=1.4° 2=.4° 5=1° 8=1.6°	0=0° 3=3° 6=6° 9=9° 1=1° 4=4° 7=7° 2=2° 5=5° 8=8°
5=Step and Boost Retard 20° Max Boost Retard and Step Retard in 2° steps 2-18° range	Step Retard 0=0° 5=10° 1=2° 6=12° 2=4° 7=14° 3=6° 8=16° 4=8° 9=18°	Boost Retard °/PSI 0=.2° 3=.6° 6=1.2° 9=1.8° 1=.3° 4=.8° 7=1.4° 2=.4° 5=1° 8=1.6°	0=0° 3=3° 6=6° 9=9° 1=1° 4=4° 7=7° 2=2° 5=5° 8=8°
6=Step and Boost Retard 30° Max Boost Retard and Step Retard in 2° steps 2-18° range	Step Retard 0=0° 5=10° 1=2° 6=12° 2=4° 7=14° 3=6° 8=16° 4=8° 9=18°	Boost Retard °/PSI 0=.2° 3=.6° 6=1.2° 9=1.8° 1=.3° 4=.8° 7=1.4° 2=.4° 5=1° 8=1.6°	0=0° 3=3° 6=6° 9=9° 1=1° 4=4° 7=7° 2=2° 5=5° 8=8°
7=Disable Step and Boost Retards	No Retard	No Retard	0=0° 3=3° 6=6° 9=9° 1=1° 4=4° 7=7° 2=2° 5=5° 8=8°
8 and 9=Stock Timing Only	No Retard	No Retard	No Retard or Advance

*Not Available on PN 8684

Installing an MSD Digital DIS-2/DIS-4 Plus Ignition Control

This section covers the MSD DIS-2 and DIS-4 line of Ignition Controls. The DIS-2 Ignitions can be used on 4-cylinder engines equipped with two dual output coils. The DIS-4 Ignitions can be used on 4, 6 or 8-cylinder engines equipped with up to four dual output coils. They will accept trigger inputs from electronic DIS type ignition systems.

The DIS-H0 Ignitions are designed for race only applications.

Operating Specifications

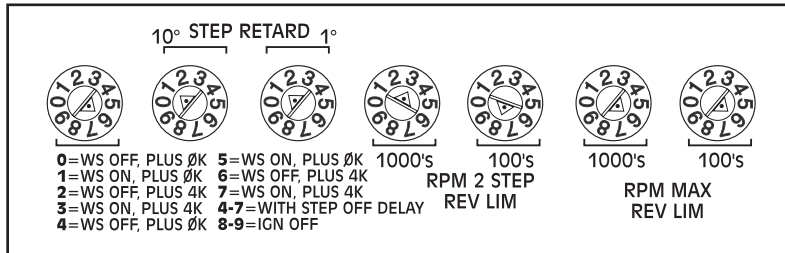
	Digital DIS-2 Plus	Digital DIS-4 Plus
Operating Voltage:	12-18 volts (neg. ground)	12-18 volts (neg. ground)
Operating Current:	3.5A @ 10,000 RPM	6.6A @ 10,000 RPM
RPM Capability:	14,000 RPM - 4-cyl. @ 14 volts	14,000 RPM - 4, 6, 8-cyl. @ 14 volts
Ignition Inputs:	2 - DIS Type	2, 3, 4 - DIS Type
Ignition Outputs:	2 - DIS Type	2, 3, 4 - DIS Type
Tach Output:	(+) 12 volt square wave, 40° Duration	(+) 12 volt square wave, 40° Duration
Spark Duration:	20°- 4-cyl. Max Sparks - 12	20°- 4, 6, 8-cyl. Max Sparks - 12
Energy Output Max:	105-115 milliJoules per spark	105-115 milliJoules per spark
Output Voltage:	Primary (into coil): 460-480 volts Secondary: (w/stock coil) 40,000 V	Primary (into coil): 460-480 volts Secondary: (w/stock coil) 40,000V
Weight & Size:	3 lbs., 9.5"L x 4.5"W x 2.2"H	3 lbs., 9.5"L x 4.5"W x 2.2"H

Warning: High Voltage is present on the coil terminals. Do not touch the coil terminals or wiring when the engine is cranking or running.

Power Leads	
These are the two heavy gauge wires (14 gauge) and are responsible for getting direct battery voltage to the ignition.	
Heavy Red	This wire connects directly to the battery positive (+) terminal, a positive battery junction or the positive side of the starter solenoid. NOTE: Do not connect to alternator.
Heavy Black	This wire connects to a good ground, either at the battery negative (-) terminal (recommended) or to the engine.
Red	Connects to a switched 12 volt source, such as the ignition key or switch (factory coil positive (+) wire).
Coil Wires	
Brown/Orange	There are two Brown/Orange wires. Connects to the positive (+) terminal/wire of the coil. NOTE: This is the only wire that makes electrical contact with coil positive (+).
Brown/White	Connects to the negative (-) terminal/wire of the coil (Channel 1). NOTE: This is the only wire that makes electrical contact with channel 1 coil negative (-).
Brown/Green	Connects to the negative (-) terminal/wire of the coil (Channel 2). NOTE: This is the only wire that makes electrical contact with channel 2 coil negative (-).
Brown/Yellow	Connects to the negative (-) terminal/wire of the coil, (Channel 3 available on DIS-4 only). NOTE: This is the only wire that makes electrical contact with channel 3 coil negative (-).
Brown/Violet	Connects to the negative (-) terminal/wire of the coil, (Channel 4 available on DIS-4 only). NOTE: This is the only wire that makes electrical contact with channel 4 coil negative (-).
Trigger Wires	
There are two or more circuits that can be used to trigger the MSD Ignition; from the electronic amplifier.	
White	This wire is used to connect to the factory coil negative (-) trigger of channel 1.
Green	This wire is used to connect to the factory coil negative (-) trigger of channel 2.
Yellow	This wire is used to connect to the factory coil negative (-) trigger of channel 3 (DIS-4 only).
Violet	This wire is used to connect to the factory coil negative (-) trigger of channel 4 (DIS-4 only).
Accessory Wires	
Brown	Ignition interrupt/theft deterrent. To activate, connect this wire to ground through a switch.
Blue	2-Step feature. To activate low rpm limit, connect this wire to 12 volts.
Pink	Step Retard. To activate the step retard connect this wire to 12 volts.

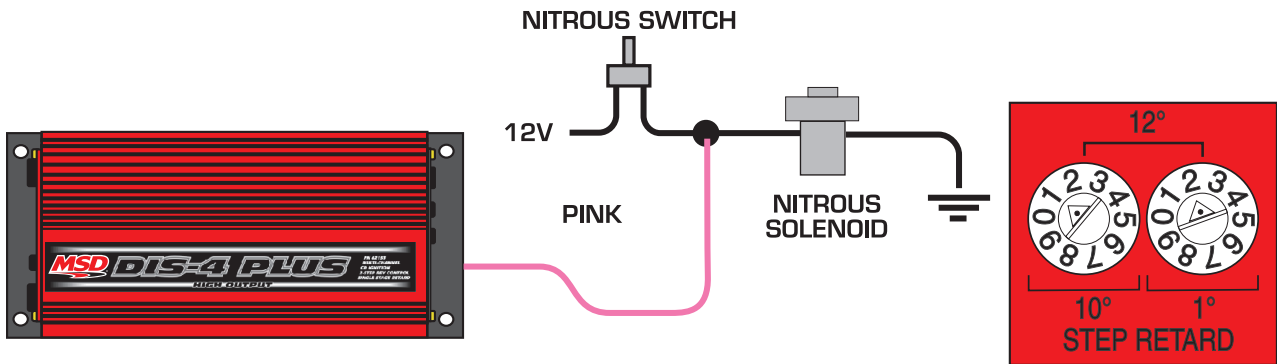
Programming Rotary Switches

The DIS Ignitions provide several programmable features that are set using the seven rotary dials on their end panel. The DIS Ignitions are programmed at the factory for operation on most 4, 6 or 8-cylinder engines with distributorless ignitions. Early models feature dip switches.



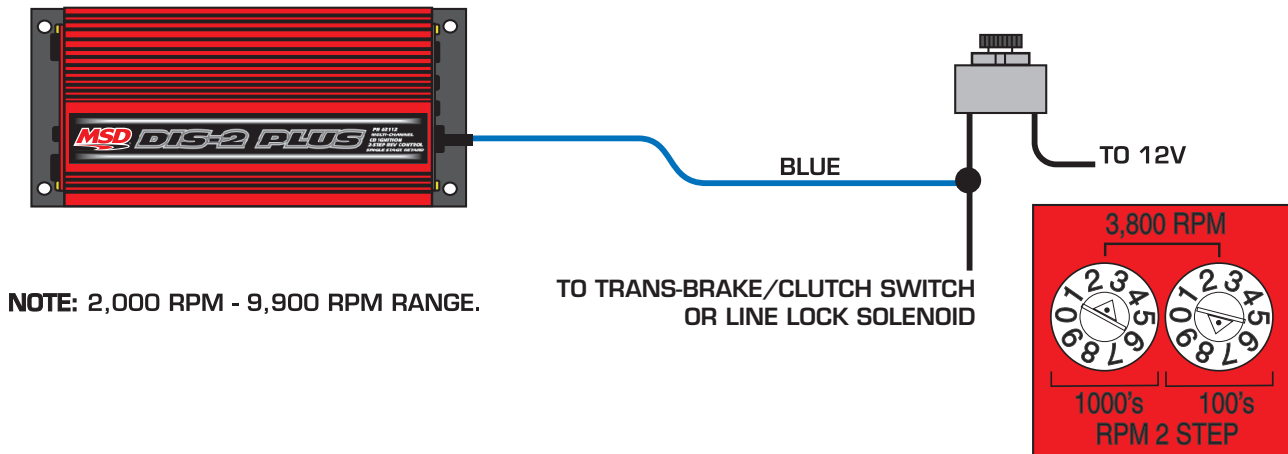
Wiring the Step Retard

Retard is activated when connected to 12 volts.



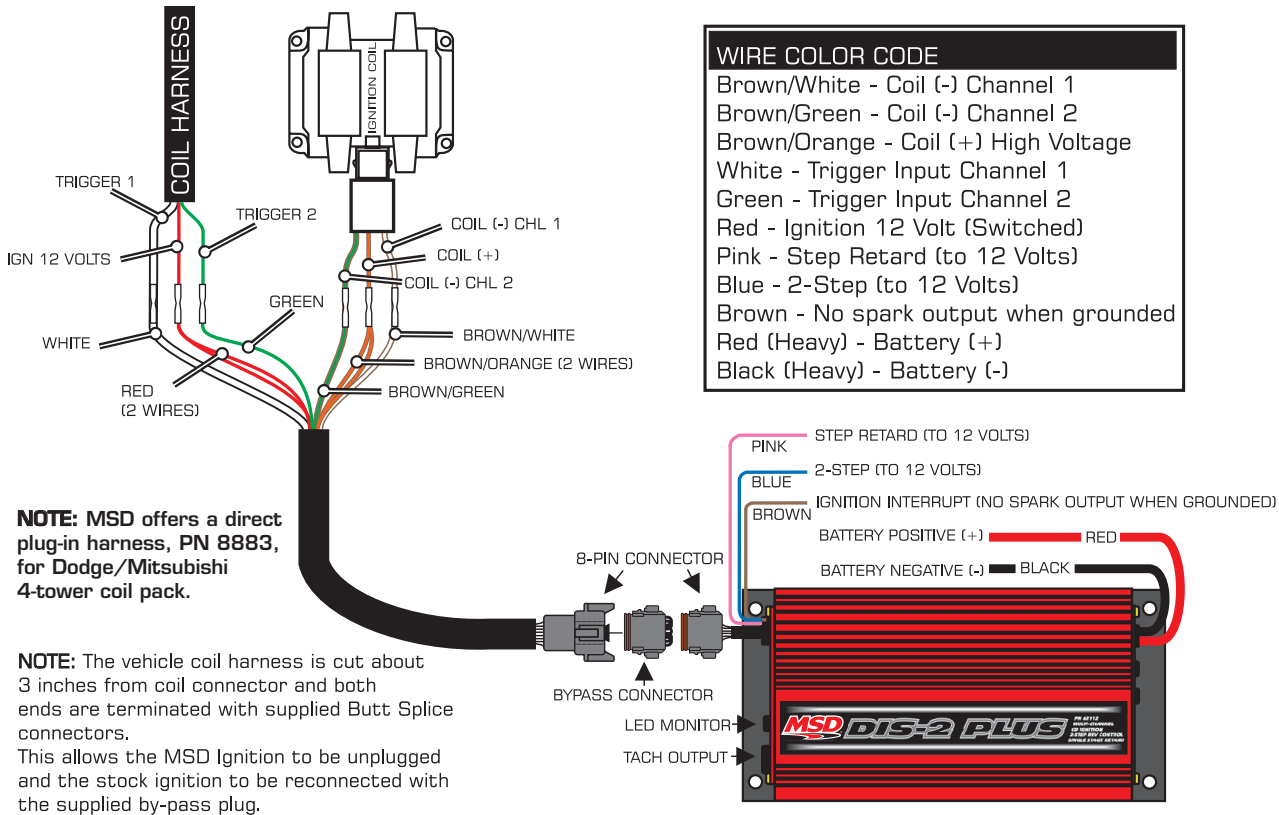
Wiring the 2-Step

2-Step rev limit is activated when connected to 12 volts.

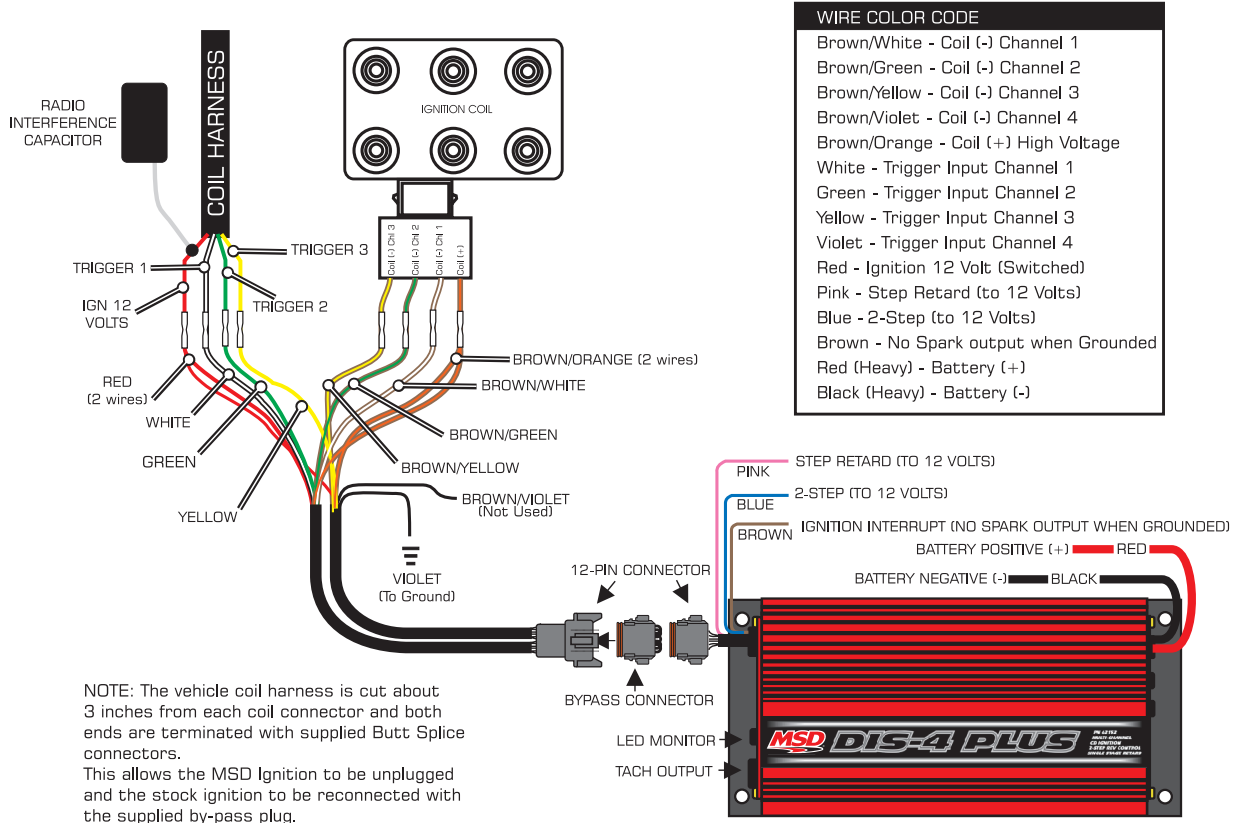


NOTE: 2,000 RPM - 9,900 RPM RANGE.

MSD DIS-2 to Typical 4-cylinder Ignition

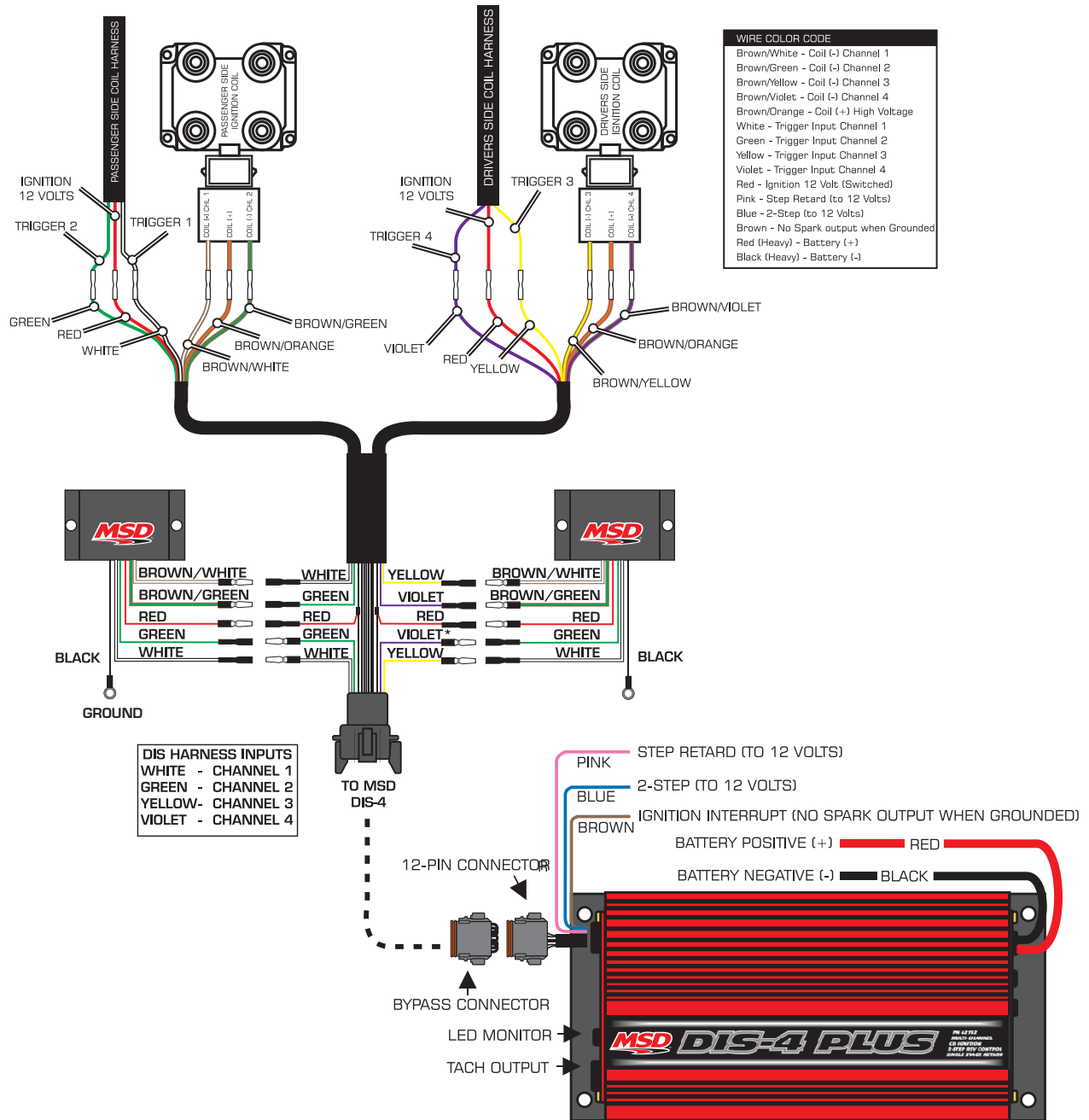


MSD DIS-4 to Typical 6-cylinder Ignition



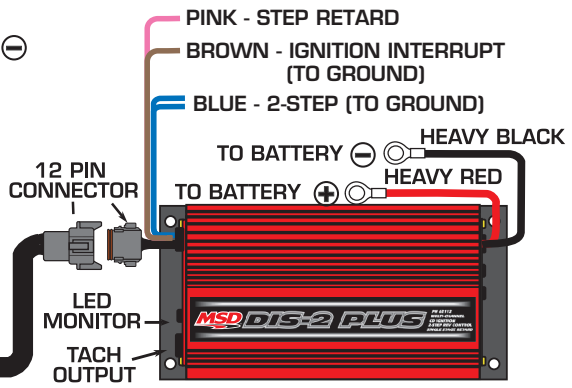
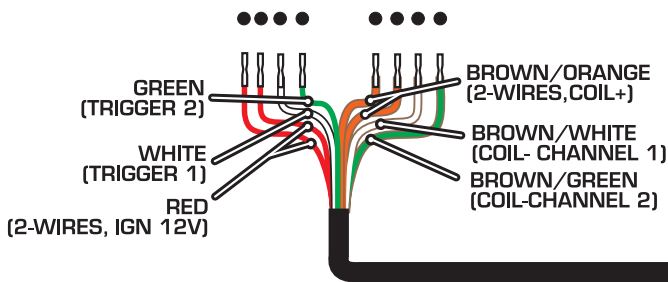
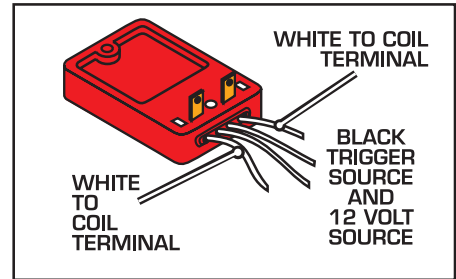
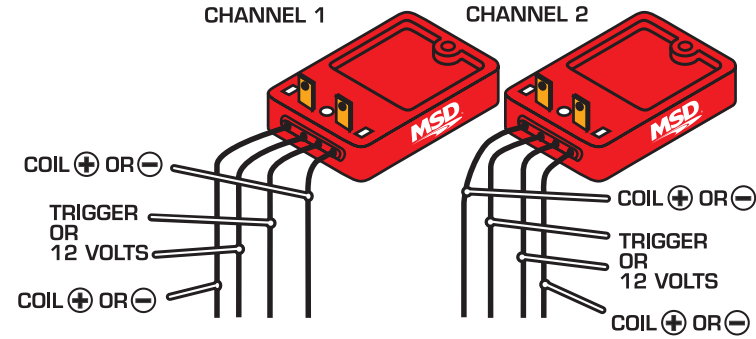
MSD DIS-4 with a Typical Distributorless V8 Ignition

NOTE: MSD offers a direct plug-in Harness for Ford dual coil systems, PN 88812.



MSD DIS-2 with PN 8870, Coil Spacers for GM applications

NOTE: OEM wiring is inconsistent. Start by determining which factory terminal is the 12-volt source. The MSD wiring is dependent on the 12-volt source.



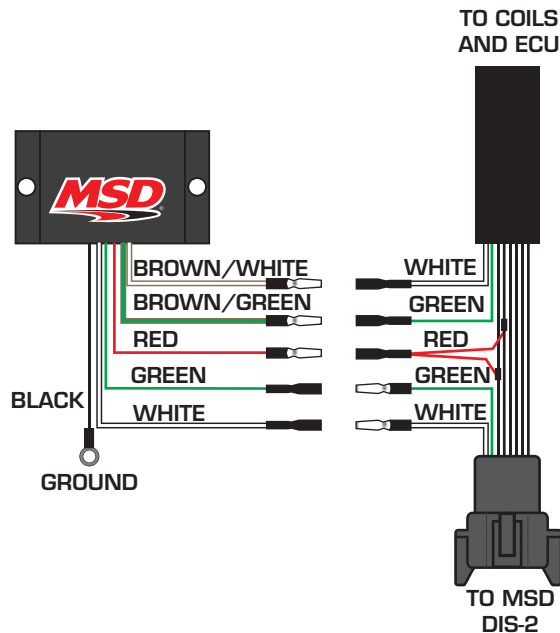
Wiring an MSD Tach Adapter, PN 8912 and PN 89121

The PN 8912 is a dual channel adapter that will only be used with MSD line of DIS-2 or DIS-4 Ignition (the DIS-4 requires two). The Adapter has six wires that need to be connected and the DIS Ignition already has the matching connectors.

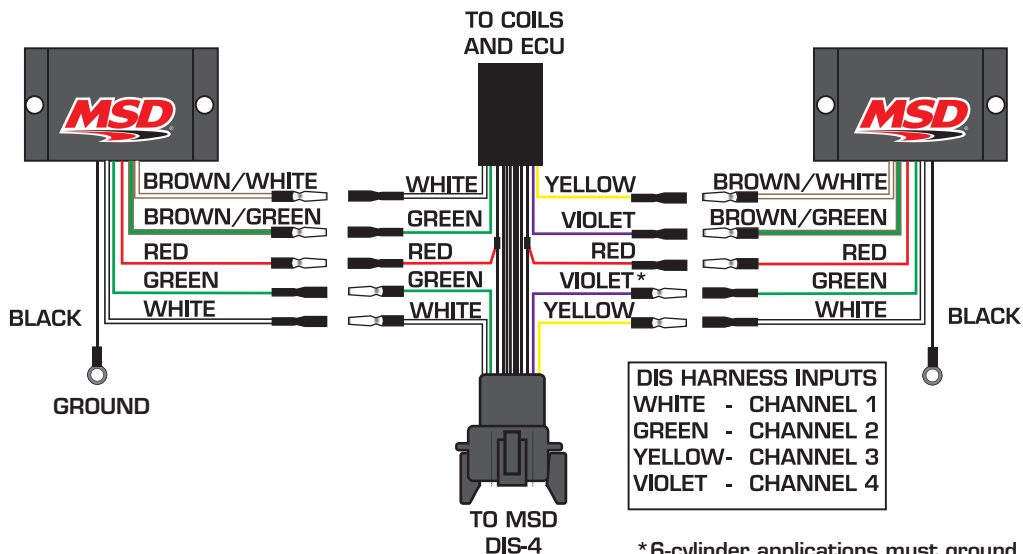
General Wiring

- Black:** Connects to Ground.
- Red:** Connects to 12 volts (ignition).
- Brown/White:** Connects to the White wire going to the Coils and ECU.
- Brown/Green:** Connects to the Green wire going to the Coils and ECU.
- White:** Connects to the White wire going to the MSD DIS Ignition.
- Green:** Connects to the Green wire going to the MSD DIS Ignition.

MSD Tach Adapter, PN 8912, to DIS-2



MSD Tach Adapter, PN 8912, to DIS-4



*6-cylinder applications must ground the violet wire.

Boost Timing Master, PN 5462

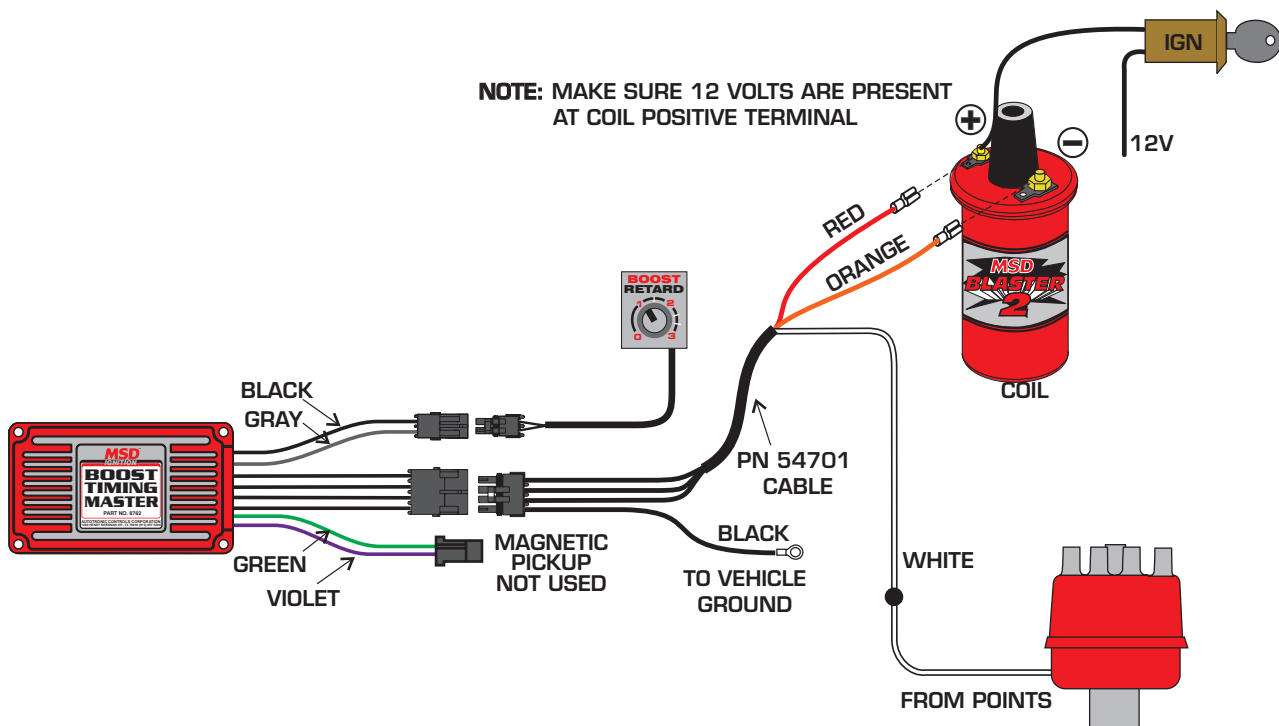
The Universal Boost Timing Master, PN 5462, is a Timing Control and ignition enhancer in-one. It allows you to adjust the timing up to 15° as the boost pressure of the turbo or supercharger increases. It also increases the stock inductive ignition spark energy and voltage creating a powerful spark to completely ignite the fuel mixture. The Universal BTM connects to most single coil factory and aftermarket ignition amplifiers and points style distributors. It can also be used as a stand alone ignition with an MSD Distributor.

NOTE: If you are already using an MSD 6, 7, 8, or 10 Ignition Control, use BTM, PN 8762.

Wire Functions

- Black and Gray:** These wires are routed together into a Weathertight Connector to hook to the Adjustable Timing Control Knob.
- Orange:** Connects to the coil negative (-) terminal.
- Red:** Connects to the original switched 12 volt wire that used to connect to the coil positive (+) terminal. With the BTM, the wires hook together, but not on the coil terminal.
- Black:** Connects to engine or chassis ground.
- Violet:** The supplied violet jumper connects from the battery positive (+) terminal to the coil (+) terminal.
- White:** This is the trigger signal wire and connects to the points or electronic ignition trigger wire.
- Magnetic Connector:** This connector is used when triggering the ignition from a magnetic pickup.
 - Violet:** Magnetic pickup positive (+).
 - Green:** Magnetic pickup negative (-).

Universal Boost Timing Master Using Points



Boost Timing Master for MSD Ignitions, PN 8762, with Vacuum Advance, PN 8962

The Boost Timing Masters are designed to be used with an MSD Ignition Control. They allow you to retard the timing in relation to boost pressure created by a turbo or supercharger. Timing adjustments can be made by the driver with a dash mounted control knob. The timing can be retarded up to a maximum of 20°.

Part Number 8962 is a BTM with an additional vacuum advance feature. When vacuum is present, you can adjust up to 20° of timing advance. This adjustment is made with a locking potentiometer on the side of the unit.

Both BTM's must be used with an MSD Ignition Control and can be used on 4, 6 or 8-cylinder engines.

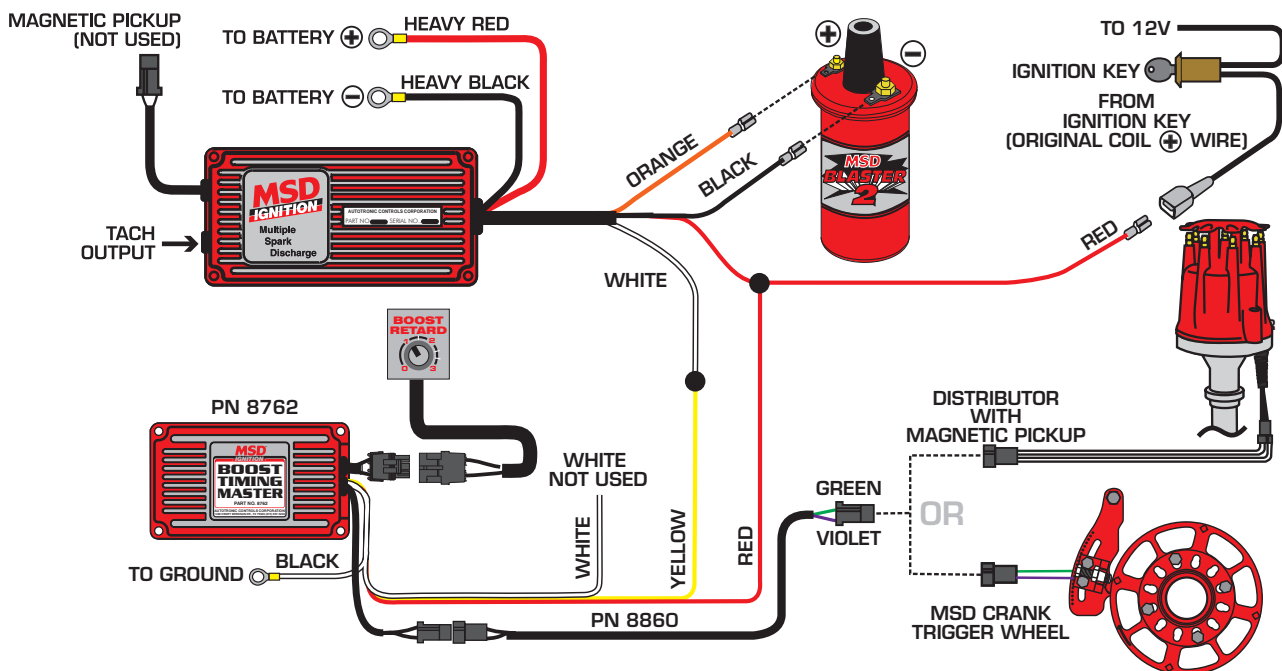
General Wiring

- Red:** Connects to switched 12 volt source.
- Black:** Connects to ground.
- Yellow:** This is the trigger output to the Ignition. It will connect to the MSD's White wire or Points terminal.

Trigger Wires

- White:** Connects to points or an ignition amplifier output. When this wire is used the Magnetic Pickup is not (Violet and Green).
- Violet and Green:** These wires are routed together in one harness and form the magnetic pickup connector. This connector plugs directly into an MSD Distributor or Crank Trigger. The Violet wire is positive (+) and the Green wire is negative (-). When this connector is used, the White wire is not and should be sealed.

Control Knob: The control knob wiring is routed through a 2-Pin Weathertight Connector. It does not matter which color wire is connected to which. The control knob shows 1°, 2° and 3° increments. The ignition timing will be retarded 1°, 2° or 3° per pound of boost with a maximum of 15°. (With the knob set at 2°, at 6-Lbs. of boost there will be 12° of retard.) When the control knob is at full counterclockwise position, there will be no retard.



Adjustable Timing Control, PN 8680

The PN 8680 Timing Control easily connects to an MSD Ignition. Timing adjustments can be made by the driver with a dash mounted control knob. The timing can be retarded up to 15°. When the control knob is at full clockwise position, the timing will be at the factory setting.

General Wiring

- Red:** Connects to switched 12 volt source.
- Black:** Connects to ground.
- Yellow:** This is the trigger output to the Ignition. It will connect to the MSD's White wire or Points terminal.

Trigger Wires

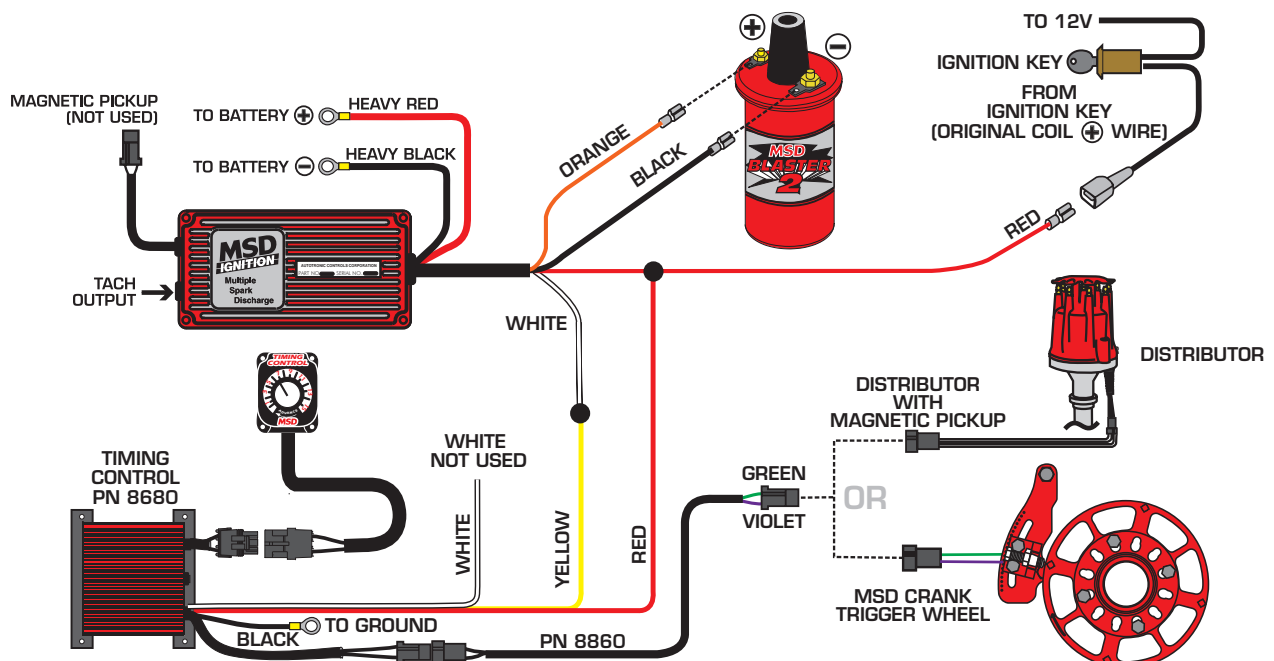
- White:** Connects to points or an ignition amplifier output. When this wire is used the Magnetic Pickup is not (Violet and Green).
- Violet and Green:** These wires are routed together in one harness and form the magnetic pickup connector. This connector plugs directly into an MSD Distributor or Crank Trigger. The Violet wire is positive (+) and the Green wire is negative (-). When this connector is used, the White wire is not and should be sealed.

Magnetic Pickup Loop: When used with a magnetic pickup, a white wire loop must be cut. The loop is with the cylinder select loops.

Control Knob: The control knob wiring is routed through a 2-Pin Weathertight Connector. It does not matter which color wire is connected to which.

Cylinder Select: There are two wire loops under the small cover on the side of the control. For 6-cylinder operation, cut the Red loop, for 4-cylinder engines, cut both the Red and Blue loop.

PN 8680 to Magnetic Pickup



3-Stage Retard, PN 8970, and Multi-Step Retard, PN 8972

The 3-Stage Retard, PN 8970, supercedes the Multi-Step Retard, PN 8972. They both are designed to provide up to three different retard rates that can be activated at different times. The three stages are cumulative up to 20° (6° on first stage, 4° second, 2° third means 12° total).

There are three retard module sockets on the side of the unit, each with their own activation wire. Each stage is activated when the corresponding wire is removed from ground. If a stage is not going to be used, its activation wire **MUST** be connected to ground, or a Zero degree rpm module **MUST** be installed.

General Wiring

- Red:** Connects to switched 12 volt source.
- Black:** Connects to ground.
- Yellow:** This is the trigger output to the Ignition. It will connect to the MSD's White wire or Points terminal.

Trigger Wires

- White:** Connects to points or an ignition amplifier output. When this wire is used the Magnetic Pickup is not (Violet and Green).
- Violet and Green:** These wires are routed together in one harness and form the magnetic pickup connector. This connector plugs directly into an MSD Distributor or Crank Trigger. The Violet wire is positive (+) and the Green wire is negative (-). When this connector is used, the White wire is not and should be sealed.

Activation Wires

- Brown:** When removed from ground, the **FIRST** stage is activated.
- Orange:** When removed from ground, the **SECOND** stage is activated.
- Gray:** When removed from ground, the **THIRD** stage is activated.

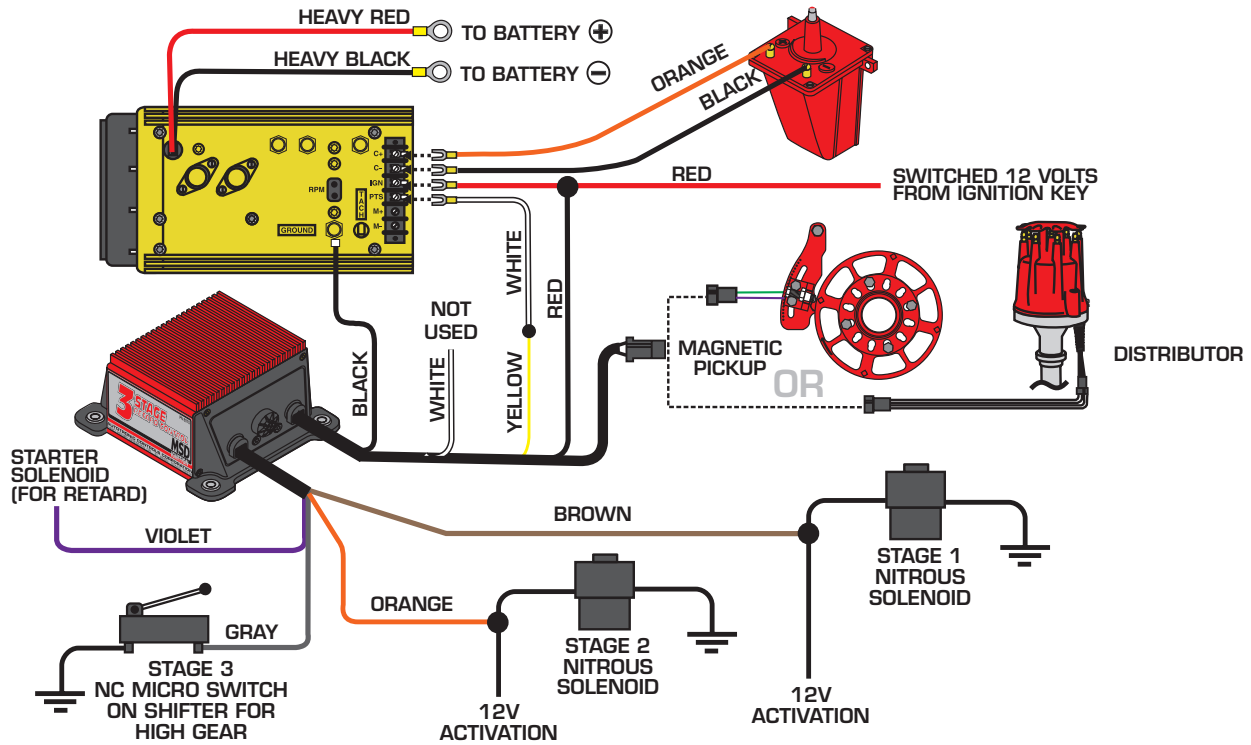
NOTE: If a stage is not going to be used, the wire must be grounded or a Zero degree module must be installed.

Start Retard

- Violet:** Activates the start retard when supplied with 12 volts. The PN 8970 will automatically deactivate the retard once the engine reaches over 1300 rpm and will not return again until the ignition is turned Off or engine rpm drops below 400 rpm. The PN 8972 requires momentary 12 volts to activate and will deactivate when 12 Volts are removed.
- Violet Loop:** Under the cover next to the Blue and Red cylinder loops is a Violet loop. This adjusts the start retard of the PN 8970 only. When it is not cut, the retard is 10°, cutting it will retard it 25°.

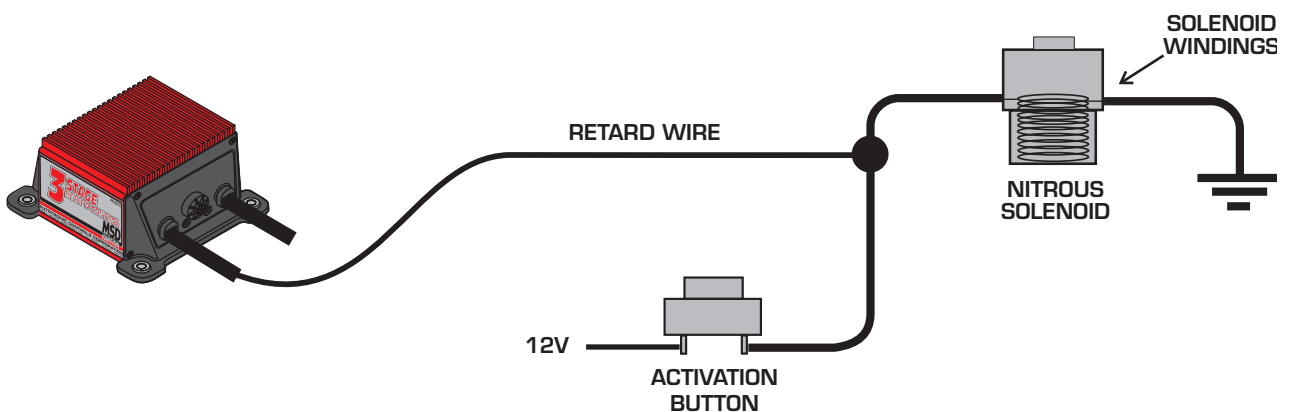
Cylinder Select: There are two wire loops under the small cover on the side of the control. For 6-cylinder operation, cut the Red loop, for 4-cylinder engines, cut both the Red and Blue loop.

Timing Control, PN 8970, PN 8972



NOTE: ANY RETARD WIRE THAT IS NOT USED MUST BE GROUND.

Connecting a Retard Stage Through a Nitrous Solenoid



By connecting the retard wire to the 12 volt activation wire of the nitrous solenoid, the wire receives a ground path through the windings of the solenoid. When the activation button is pressed, 12 volts is applied to the wire, thus removing the ground path and activating the retard stage.

Installing a Digital Retard Control, PN 8975

The Digital Retard Control, PN 8975, provides up to four different retard rates that can be activated at different times. The four stages are cumulative up to 20° (6° on first stage, 4° second, 3° third, 2° fourth produces 15° total). Instead of using rpm modules, this unit has four rotary dials that range from 0°-9° in one degree increments.

Each stage is activated when the corresponding wire is removed from ground. If a stage is not going to be used, its activation wire **MUST** be connected to ground, or positioned at zero on its dial.

Any time a setting is changed with a rotary dial, the ignition must be turned Off/On to reset.

General Wiring

- Red:** Connects to switched 12 volt source.
- Black:** Connects to ground.
- Yellow:** This is the trigger output to the Ignition. It will connect to the MSD's White wire or Points terminal.

Trigger Wires

- White:** Connects to points or an ignition amplifier output. When this wire is used the Magnetic Pickup is not (Violet and Green).
- Violet and Green:** These wires are routed together in one harness and form the magnetic pickup connector. This connector plugs directly into an MSD Distributor or Crank Trigger. The Violet wire is positive (+) and the Green wire is negative (-). When this connector is used, the White wire is not and should be sealed.

Activation Wires

- Brown:** When removed from ground, the **FIRST** stage is activated.
- Orange:** When removed from ground, the **SECOND** stage is activated.
- Gray:** When removed from ground, the **THIRD** stage is activated.
- Dark Blue:** When removed from ground, the **FOURTH** stage is activated.

NOTE: If a stage is not going to be used, the wire should be grounded or the rotary switch must be turned to Zero.

Start Retard

Activates the start retard when supplied to 12 volts. Once the engine reaches over 800 rpm, the retard will be deactivated and will not return again until the ignition is turned Off or engine rpm drops below 500 rpm. There is a rotary dial that controls the amount of retard in 5° increments with a max of 20°.

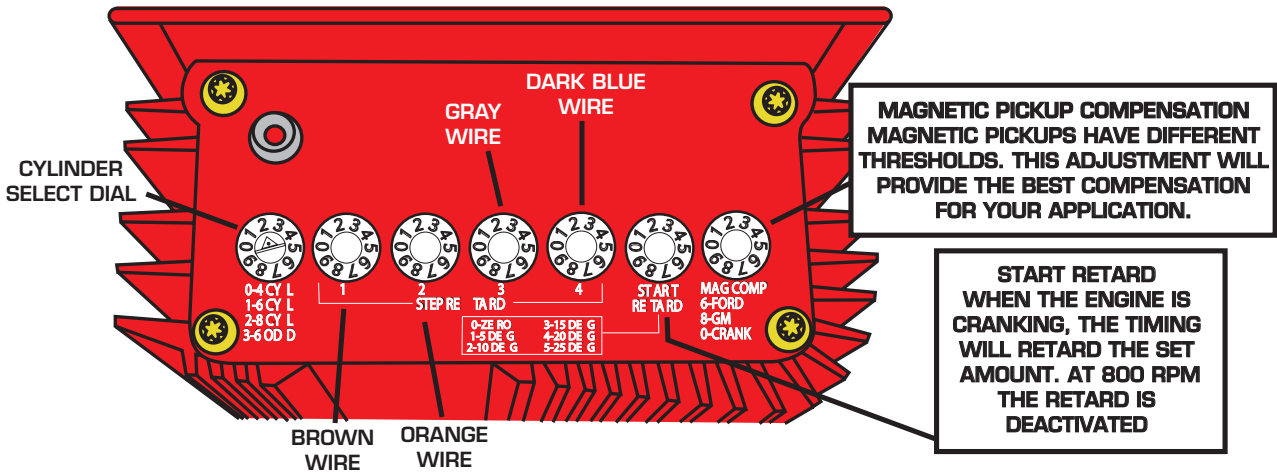
Cylinder Select

A rotary dial is used to select the number of cylinders.

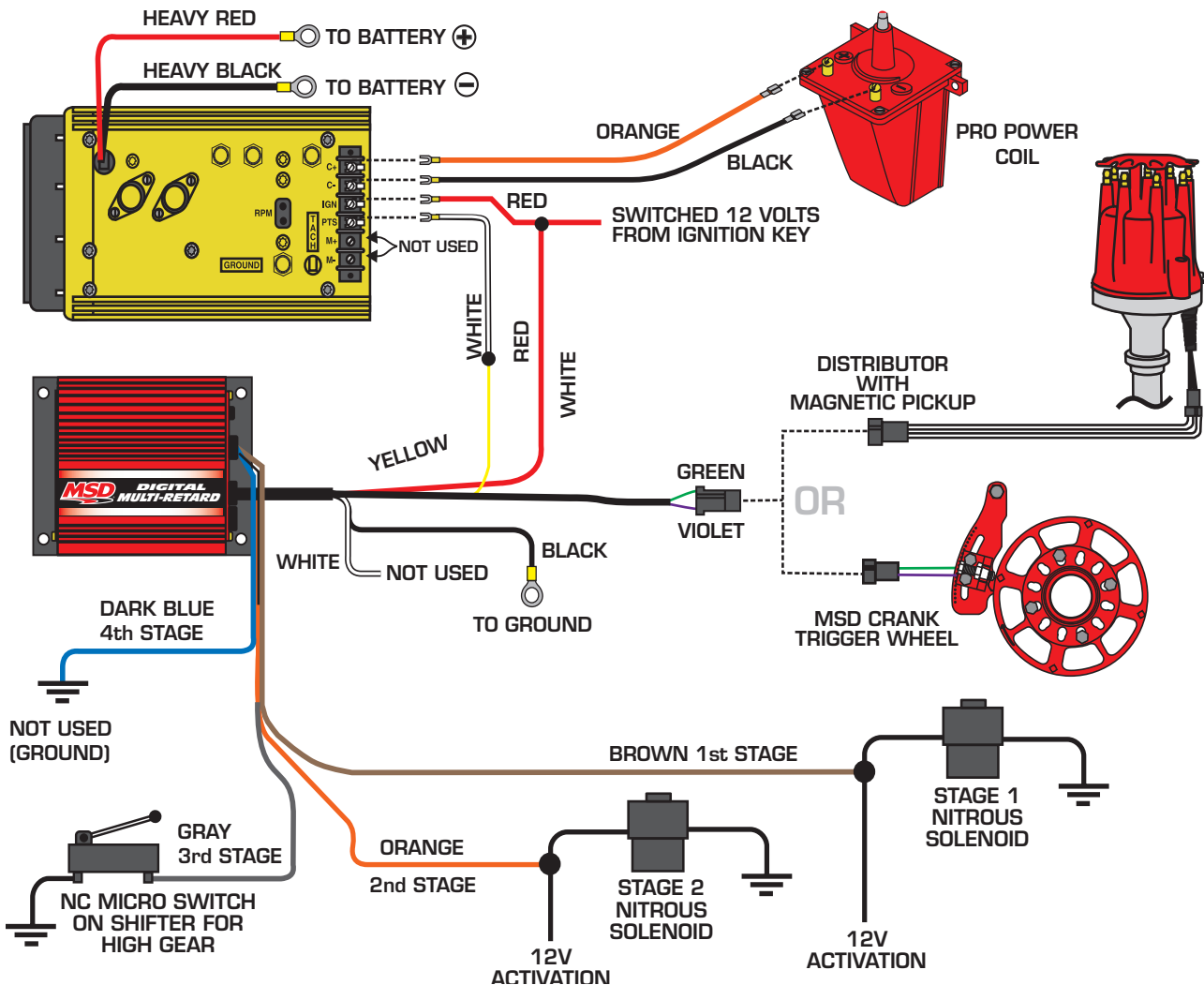
Magnetic Pickup Compensation

This circuit provides a timing compensation circuit for different style pickups. This adjustment is more important for crank triggers and locked-out timing systems. If you are using the White wire for a trigger input, no adjustment is necessary.

Digital Multi-Retard, PN 8975

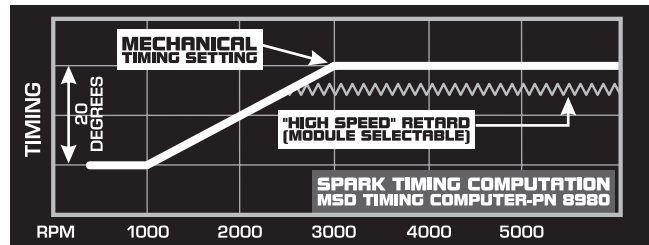


Digital Multi-Retard to Magnetic Pickup



Installing a Timing Computer, PN 8980

The MSD Timing Computer has a built-in timing curve designed for engines with locked-out timing. It is an electronic version of a centrifugal advance. When the engine is cranking the timing retards 20° from the mechanical locked out timing and remains there until 1,000 rpm. At this point, the timing begins to ramp back up and reaches your mechanical setting by 3,000 rpm. This curve is not adjustable. This Control also has a single stage of retard that is adjustable with plug-in modules.



General Wiring

- Red:** Connects to switched 12 volt source.
- Black:** Connects to ground.
- Yellow:** This is the trigger output to the Ignition. It will connect to the MSD's White wire or Points terminal.

Trigger Wires

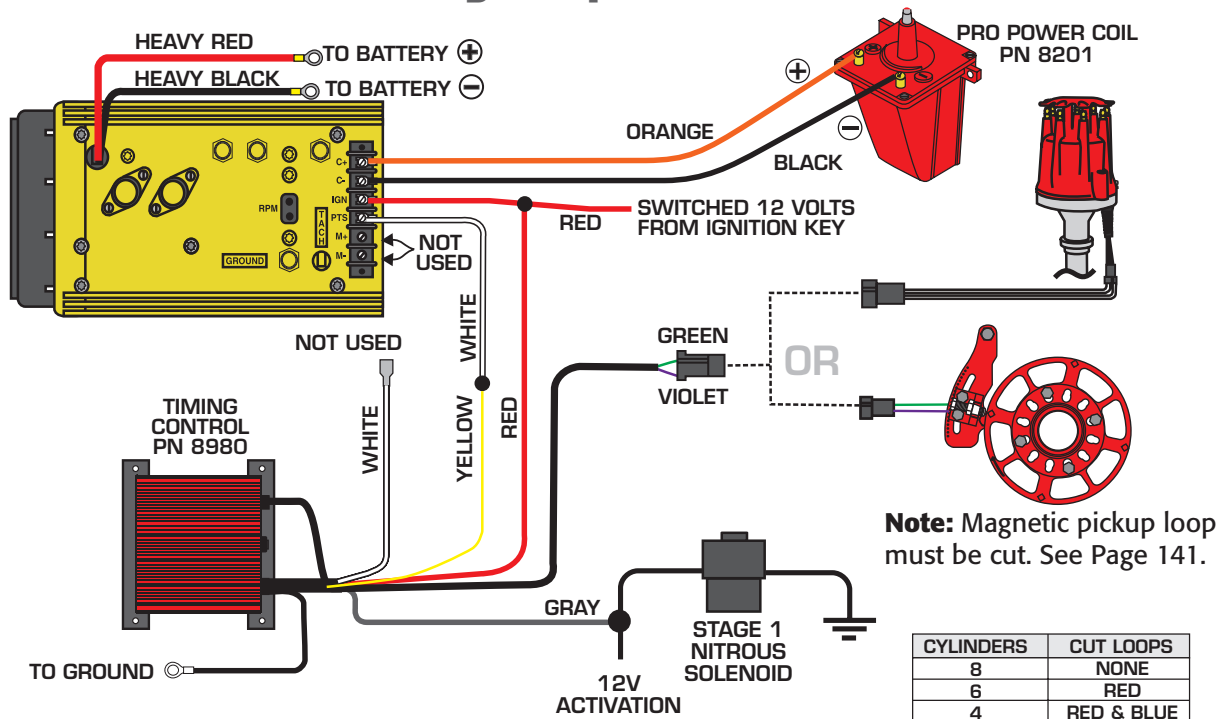
- White:** Connects to points or an ignition amplifier output. When this wire is used the Magnetic Pickup is not (Violet and Green).
- Violet and Green:** These wires are routed together in one harness and form the magnetic pickup connector. This connector plugs directly into an MSD Distributor or Crank Trigger. The Violet wire is positive (+) and the Green wire is negative (-). When this connector is used, the White wire is not and should be sealed.

Retard Stage

There is a Gray and Black wire routed together into a 2-pin connector. The Gray is the activation wire for the retard stage. The black is a ground wire.

- Gray:** When this wire is removed from ground, the retard stage is activated.
- Black:** This is a ground wire. By connecting this to the Gray wire, the retard will not activate. A mating connector is supplied to jump the two together

Timing Computer, PN 8980



Installing a Programmable Timing Control, PN 8981

The MSD Programmable Timing Control allows you to program an advance curve for engines with locked-out timing. It is a programmable electronic version of a centrifugal advance. There is also an optional single stage of retard and 20° start retard.

The timing curve is programmed with three locking potentiometers. When all of the pots are turned to full clockwise position, there is no timing curve. This is where you should begin all adjustments. The total timing must be set in the engine before beginning any adjustments.

General Wiring

- Red:** Connects to switched 12 volt source.
- Black:** Connects to ground.
- Yellow:** This is the trigger output to the Ignition. It will connect to the MSD's White wire or Points terminal.

Trigger Wires

- White:** Connects to points or an ignition amplifier output. When this wire is used the Magnetic Pickup is not (Violet and Green).
- Violet and Green:** These wires are routed together in one harness and form the magnetic pickup connector. This connector plugs directly into an MSD Distributor or Crank Trigger. The Violet wire is positive (+) and the Green wire is negative (-). When this connector is used, the White wire is not and should be sealed.

Retard Stage

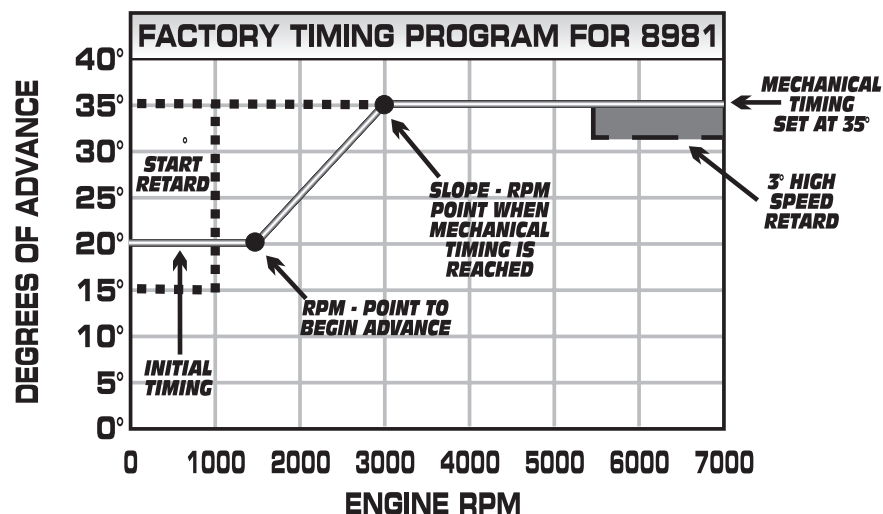
There is a single stage of retard that is activated when the Gray wire is removed from ground. The amount of retard is adjustable with plug-in modules. When the retard is not being used, the Gray wire **MUST** be grounded or a Zero degree module must be installed.

- Gray:** When this wire is removed from ground, the retard stage is activated.

Start Retard

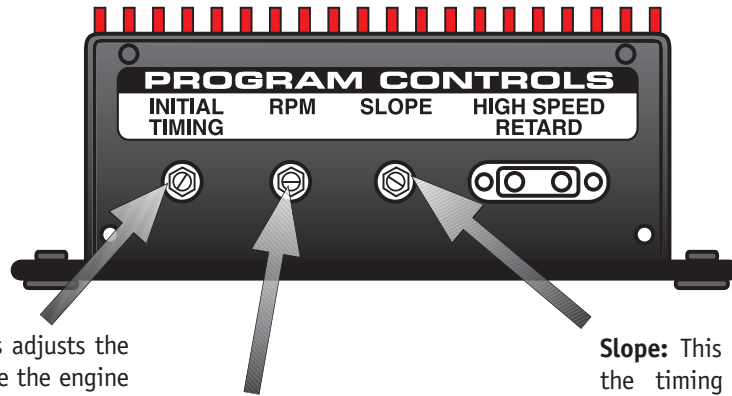
When 12 volts is present on the Violet wire, the timing will be retarded 20° during cranking.

- Violet:** Activates 20° of retard when connected to 12 volts. Connect to the starter side of the starter solenoid wiring.



Timing Computer, PN 8981

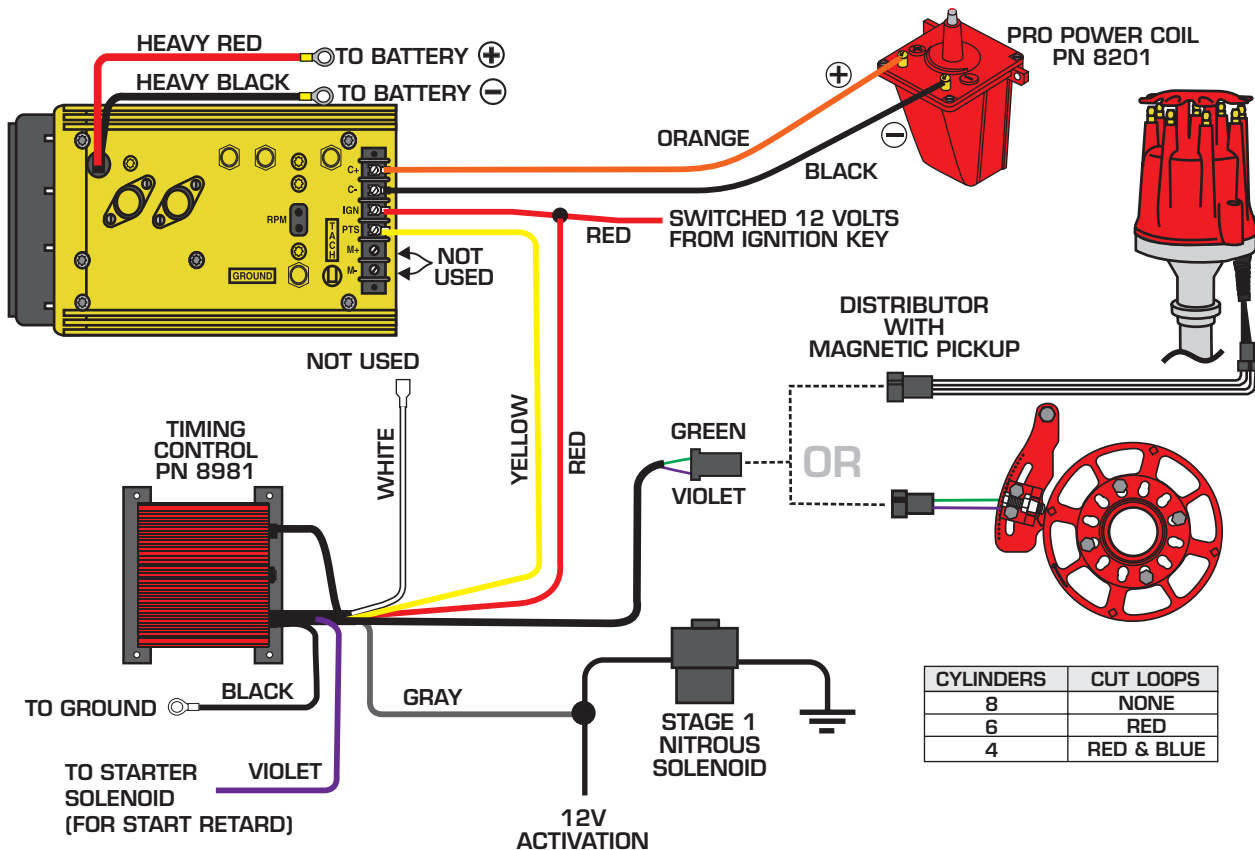
All adjustments of the Timing Computer are taken from your Mechanical, or total timing setting. The Mechanical timing is set by the position of the crank trigger or distributor. Before making any adjustments, be sure to have your mechanical timing set to your specifications.



Initial Timing: This adjusts the timing setting where the engine idles. This amount can be adjusted 20° from where the mechanical timing is set. To adjust the initial timing, turn the control pot counterclockwise. It will retard the timing up to 20° from the mechanical timing.

RPM: This is the rpm point in which the advance will begin. To set this, accelerate the engine to the rpm point that you want the advance to start. Turn the RPM control pot counterclockwise until the timing begins to change.

Slope: This is the point where the timing advances to the mechanical timing again. To set this, rev the engine up to the rpm point that the timing should be completely in at. Turn the Slope control pot counterclockwise until the timing begins to change.



Installing a Start/Retard Control, PN 8982

The MSD Start Retard Control provides a start retard and a single stage of retard. The start retard can be set for 10° or 25° during cranking. When the engine is cranked, the timing will retard until the engine reaches over 1,300 rpm. At this point it will return and stay at the set timing.

There is also a step retard that is adjustable with plug-in modules. This retard is controlled by the Gray wire. It will be activated when the Gray wire is removed from ground.

The PN 8982 must be used with an MSD Ignition Control and can be used on 4, 6 or 8-cylinder engines.

General Wiring

- Red:** Connects to switched 12 volt source.
- Black:** Connects to ground.
- Yellow:** This is the trigger output to the Ignition. It will connect to the MSD's White wire or Points terminal.

Trigger Wires

- White:** Connects to points or an ignition amplifier output. When this wire is used the Magnetic Pickup is not (Violet and Green).
- Violet and Green:** These wires are routed together in one harness and form the magnetic pickup connector. This connector plugs directly into an MSD Distributor or Crank Trigger. The Violet wire is positive (+) and the Green wire is negative (-). When this connector is used, the White wire is not and should be sealed.

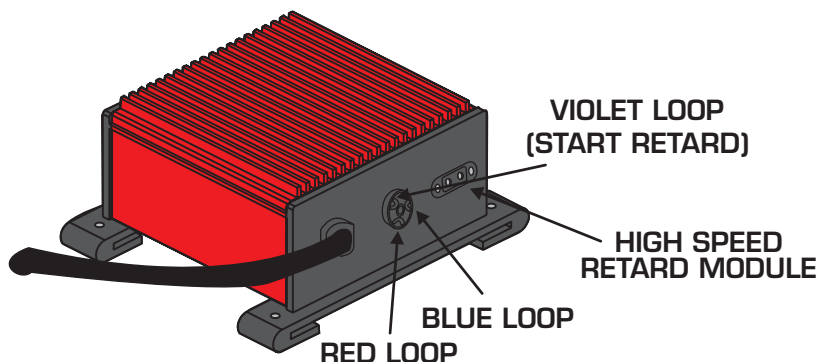
Start Retard

- Violet:** Activates the start retard when supplied to 12 volts. Once the engine reaches over 1,300 rpm, the retard will be deactivated and will not return again until the ignition is turned Off or engine rpm drops below 400 rpm.
- Violet Loop:** Under the cover next to the Blue and Red cylinder loops is a Violet loop. This adjusts the start retard. When it is not cut, the retard is 10°, cutting it will retard it 25°.

Retard Stage

There is a single stage of retard that is activated when the Gray wire is removed from ground. When the retard is not being used, the Gray wire MUST be grounded or a Zero degree module must be installed.

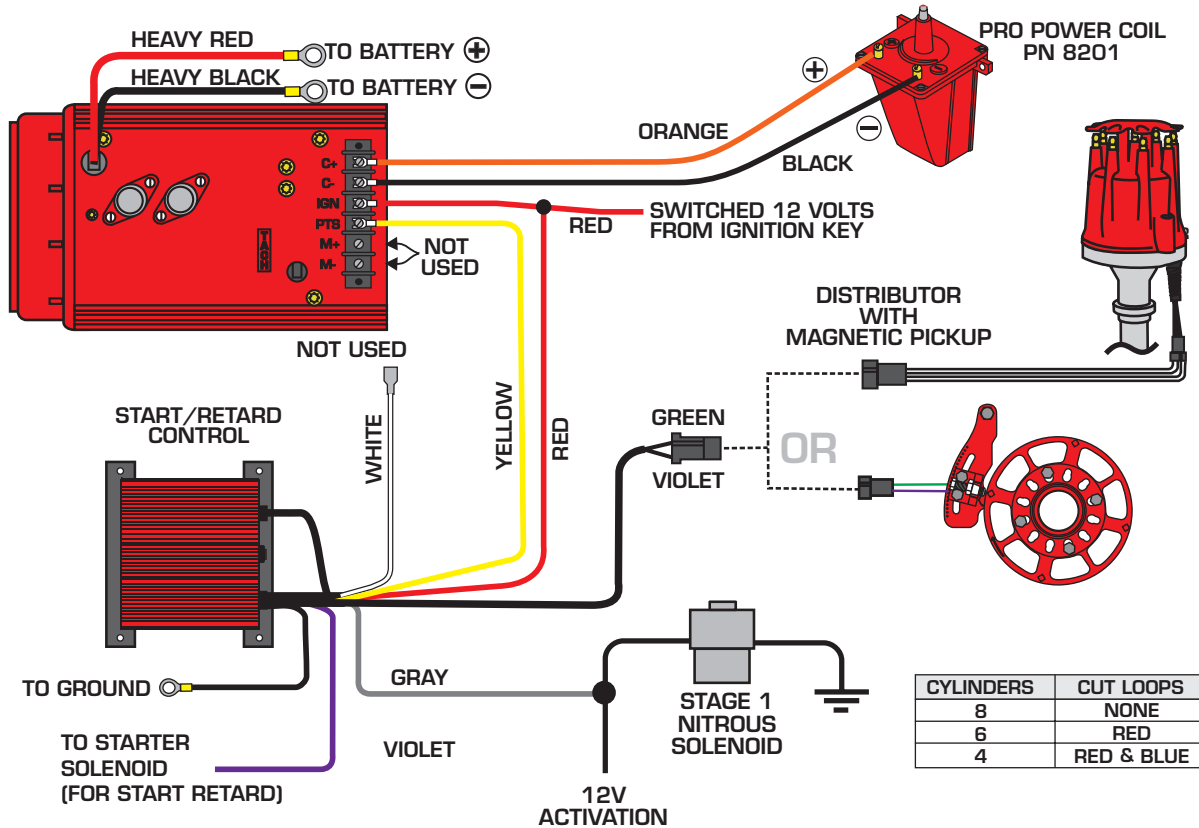
- Gray:** When this wire is removed from ground, the retard stage is activated.



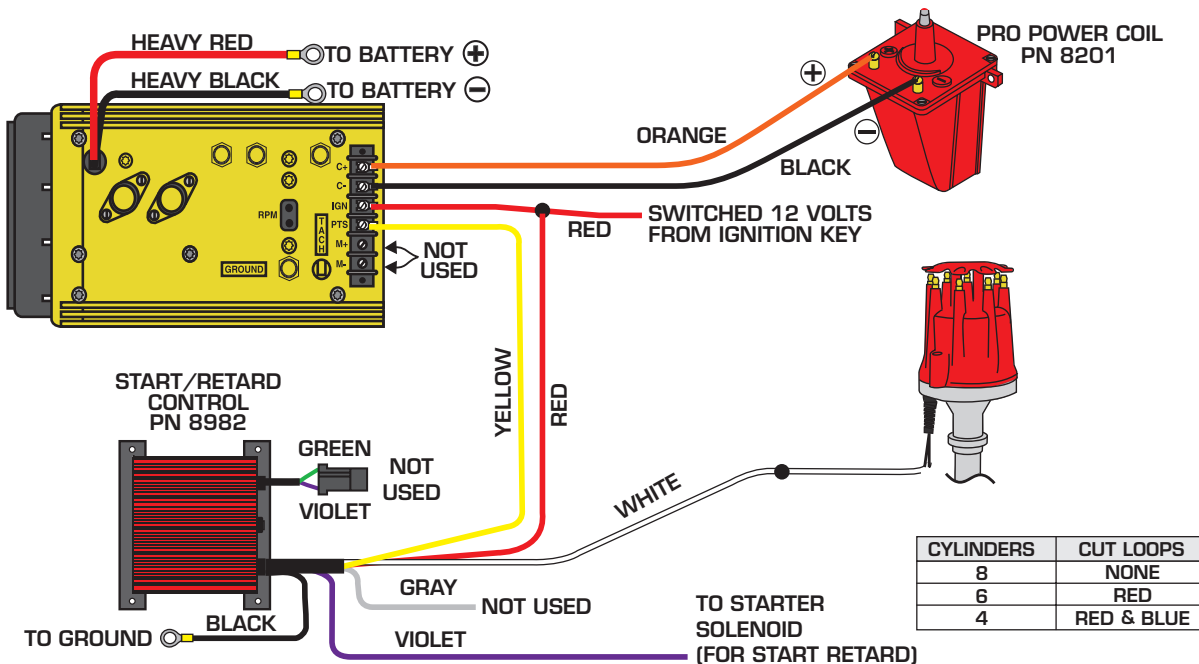
CYLINDERS	CUT LOOPS
8	NONE
6	RED
4	RED & BLUE

RETARD	CUT LOOP
10°	NONE
25°	VIOLET

Start/Retard Control, PN 8982, with Magnetic Pickup



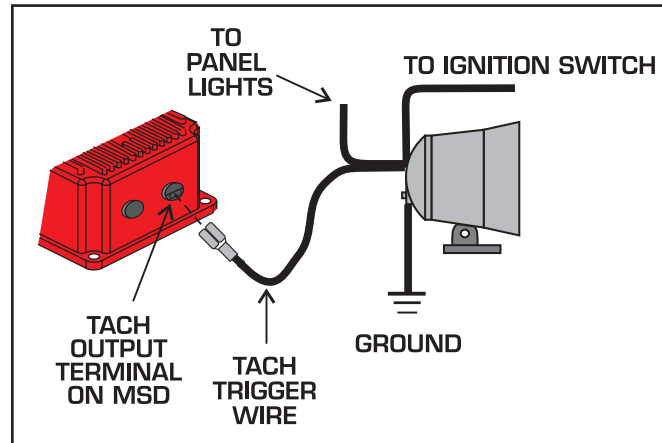
Start/Retard Control, PN 8982, with White Wire Trigger



Tachometer Information

Tachometer Trigger Wire

This diagram shows a typical wiring schematic for aftermarket tachometers. These tachometers will usually have three wires and sometimes a fourth for a panel light. The tach trigger wire is the wire that originally went from the Tachometer to the Negative side of the coil. With an MSD installed, remove the wire that is connected to the coil negative terminal and connect it to the MSD Tach Output Terminal as shown.

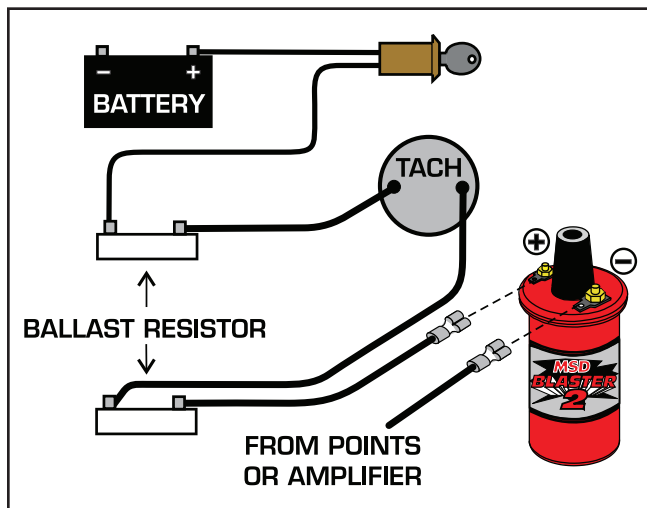


Notes

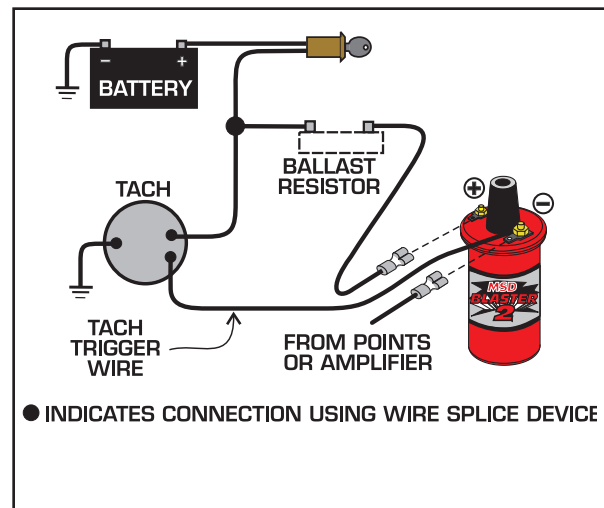
Note #1 Tachometer Types

There are basically two types of tachometers: Current Triggered Tachometers and Voltage Triggered Tachometers. The type of tachometer that is on the vehicle may be recognized by the way it is connected to the ignition coil. The drawings below show two wiring diagrams to help in determining which type of tachometer is on the vehicle.

Current Triggered Tach



Voltage Triggered Tach



Note #2 Tach Manufacturers

Auto manufacturers use tachometers made by different tachometer manufacturers. Some will work when connected to the MSD Ignition Unit Tach Output Terminal, others may require an MSD Tach Adapter. Connect the tachometer trigger wire to the Tach Output Terminal of the MSD to determine if the tachometer is operating correctly. If it does not operate correctly, go back to the chart to determine which MSD Tach Adapter should be used.

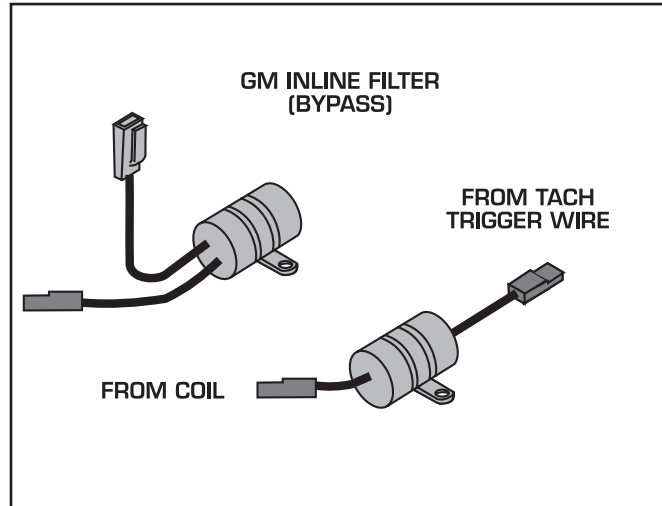
Tachometer Information

Note #3 GM Inline Filters

Many General Motors Corporation vehicles have an inline filter that should be bypassed when the factory tachometer drops back to zero as the engine RPM is increasing.

The drawings at the right show what the filter might look like. Locate the filter by tracing the wire from the TACH Terminal on vehicles equipped with an HEI Ignition System. On vehicles equipped without an HEI, trace the wire from the coil negative terminal until the filter is found.

Disconnect both wires from the filter and leave disconnected. Connect the wire going to the tachometer to the MSD Ignition Unit Tach Output Terminal as shown in this figure.

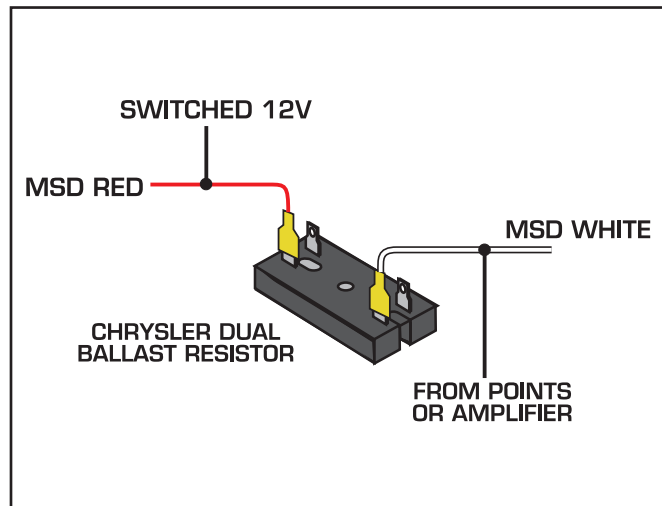


Note #4 Current Triggered

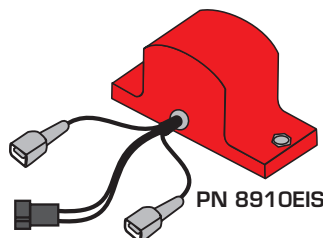
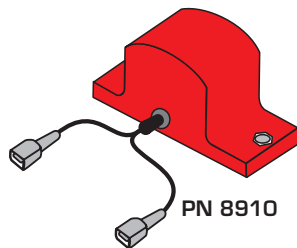
If the tachometer is connected to the positive side of the ignition coil, do not attempt to connect this tachometer to the tach output terminal on the MSD Unit.

See Note #1 for a diagram of an original current triggered tach. The tachometer is connected to the positive side of the ignition coil. The ballast resistor or resistance wire can be on either side of the coil.

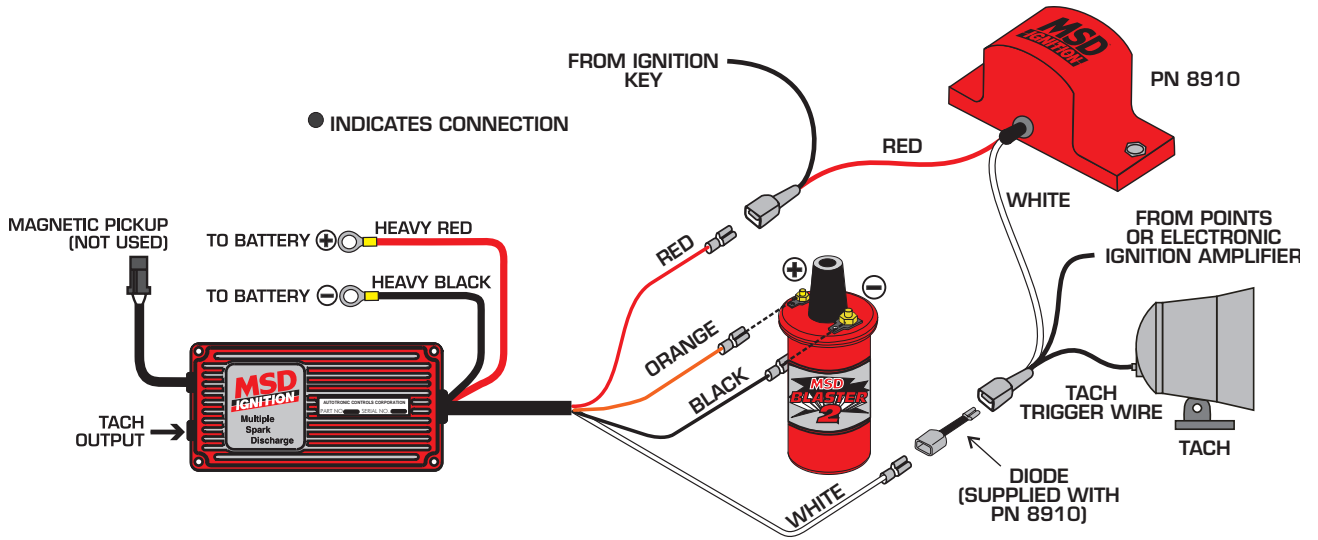
The diagram to the right shows a Chrysler Dual Ballast Resistor being used with a WHITE Wire Triggered installation. The Chrysler Dual Ballast Resistor is from a 1973 to 1976 Chrysler electronic ignition system and may be purchased from any auto parts store. The additional resistance may correct the tachometer function.



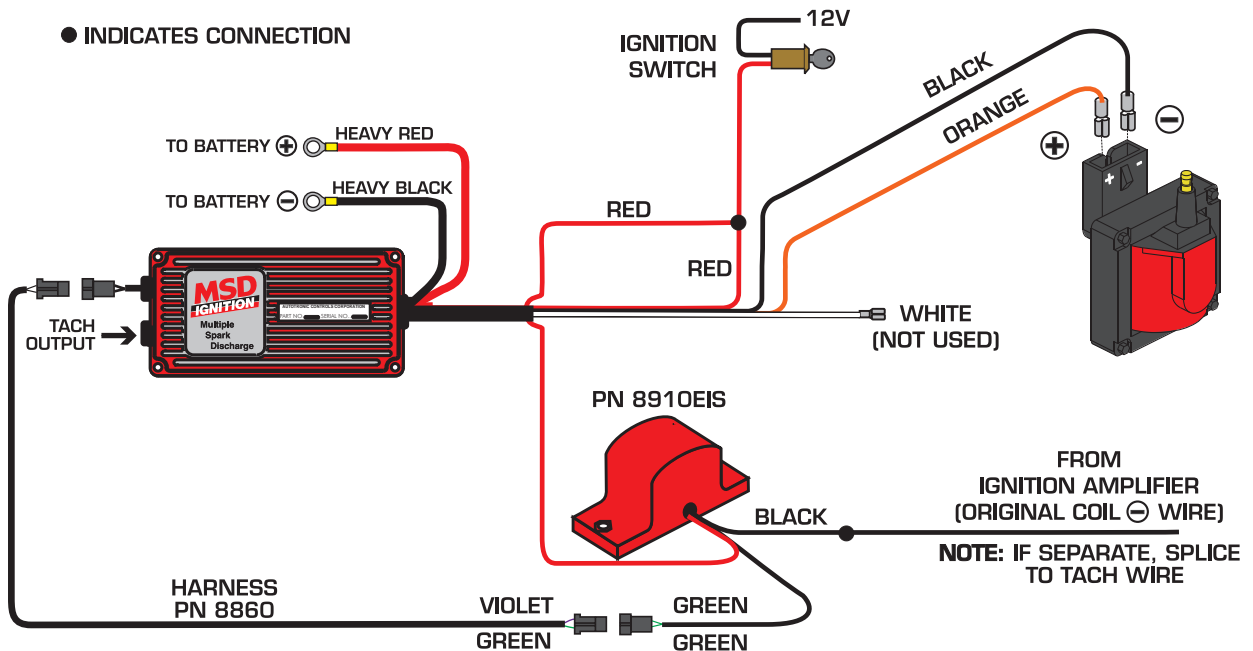
Tach Adapters



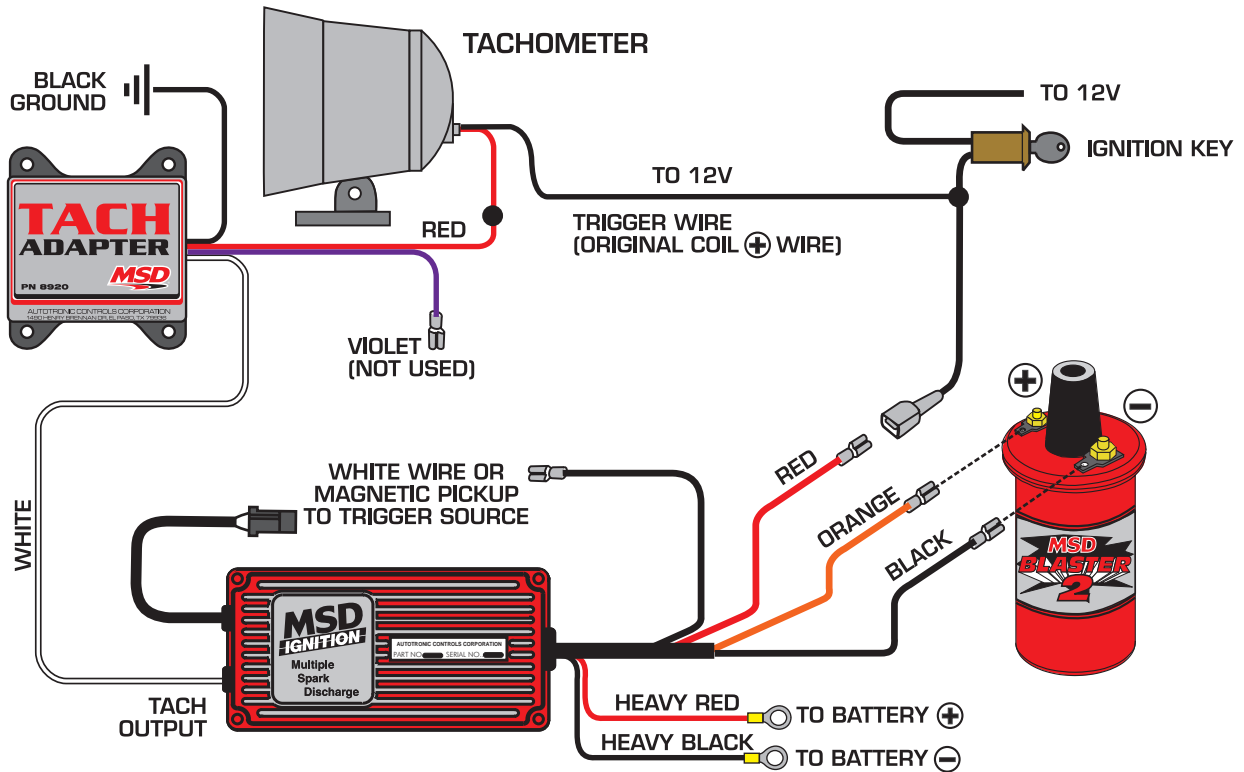
MSD Tach Adapter, PN 8910, to Voltage Triggered Tach



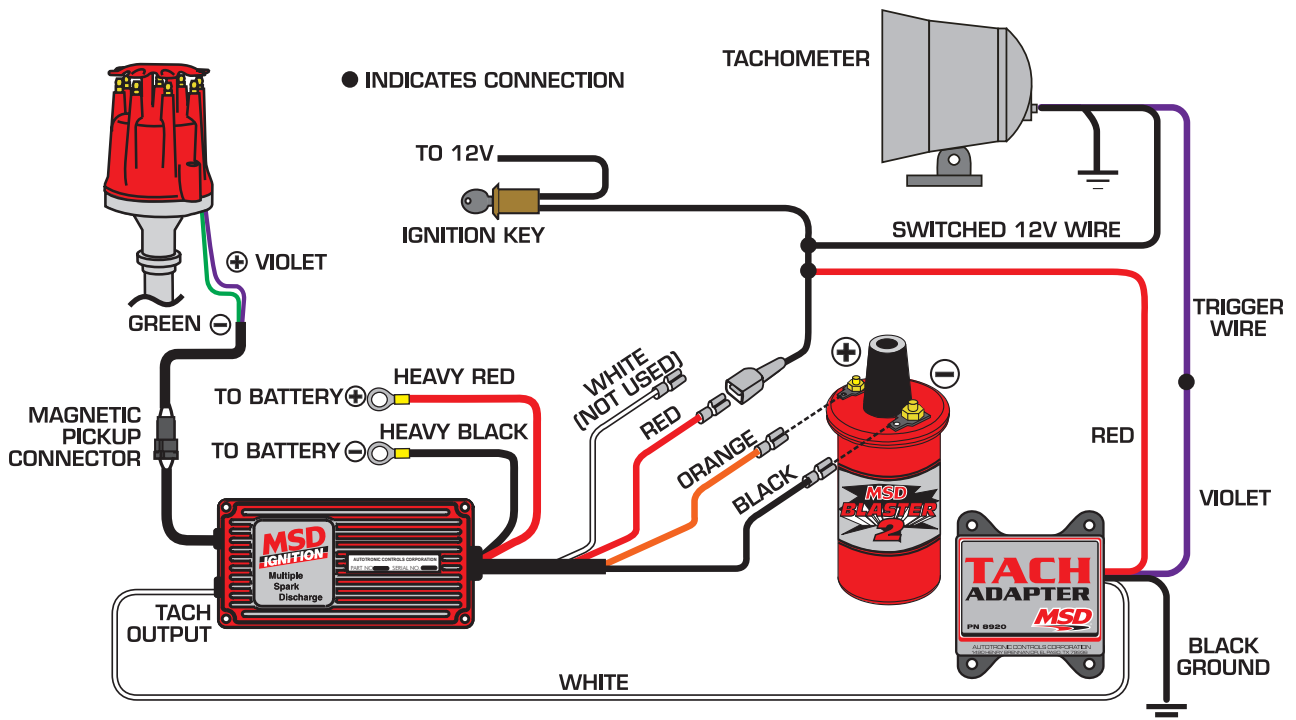
MSD Tach Adapter, PN 8910EIS



MSD Tach Adapter, PN 8920, to Current Triggered Tach



MSD Tach Adapter, PN 8920, to Voltage Triggered Tach



Soft Touch Rev Controls

The MSD Soft Touch Rev Control, PN 8728, is designed for inductive style ignition systems. It cannot be used with an MSD CD Ignition such as any 6 or 7-Series Ignition Control.

The Rev Limit is set with plug-in rpm modules. When the rpm reaches the specified limit, the Control will randomly drop the spark to the cylinders to keep the rpm at the limit. If no module is installed, there will be no rev limit.

Wire Functions

- Red:** Connects to a switched 12 volt source.
- Black:** Connects to ground.

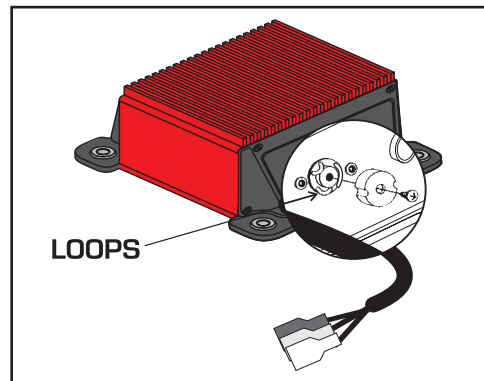
Trigger Pickup Wires:

- Green:** Connects to the coil negative (-) terminal.
- White:** Connects to Points or Amplifier trigger wire.
- Violet:** Connects to the magnetic pickup positive (+) wire.

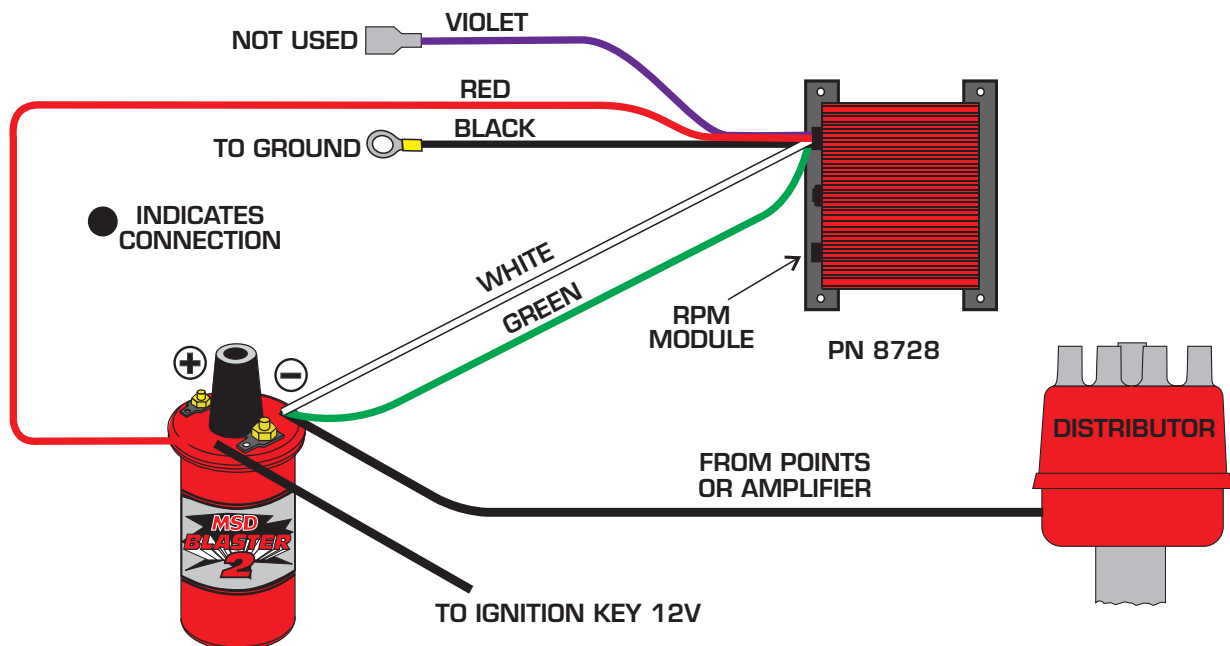
Cylinder Programming Loops: There are two wire loops, Red and Blue under a small cover on the side of the Control. For a 6-cylinder engine, cut the Red loop. For 4-cylinder applications, cut the Blue and Red loops.

NOTE: MSD also offers another Soft Touch Rev Control, PN 8738. This Control can only be used with an MSD 6T, 6TN and 6 HVC Ignition Control.

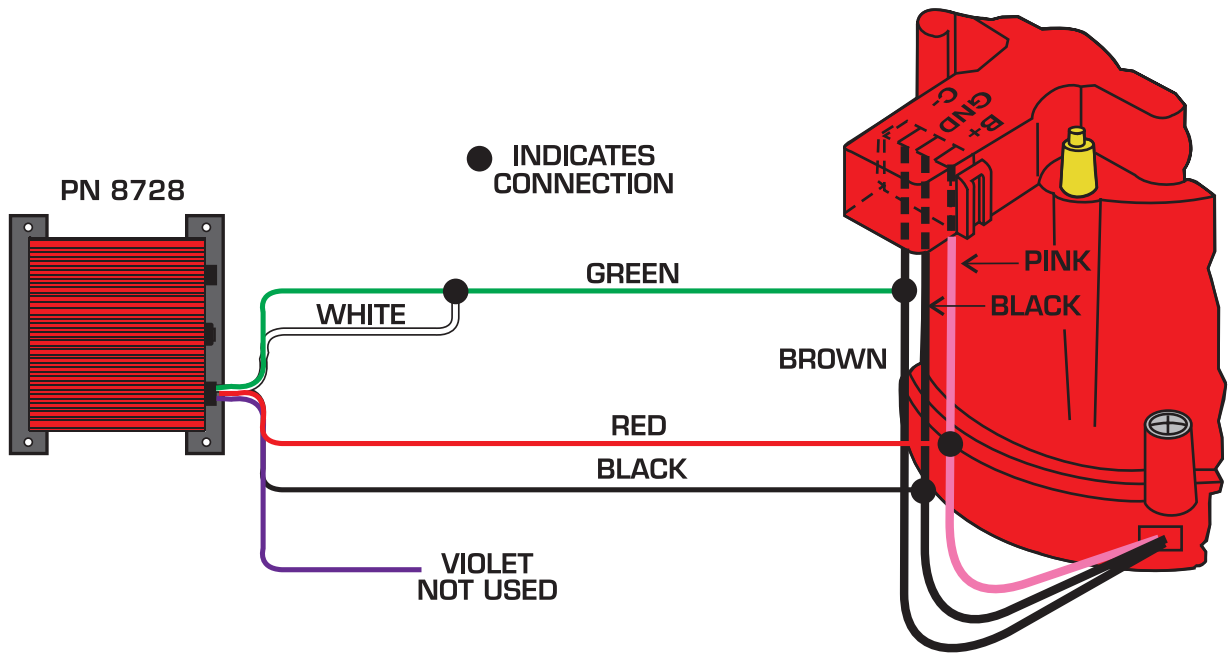
NOTE: This Rev Control is not recommended for Chrysler Gold and Chrome Ignition boxes.



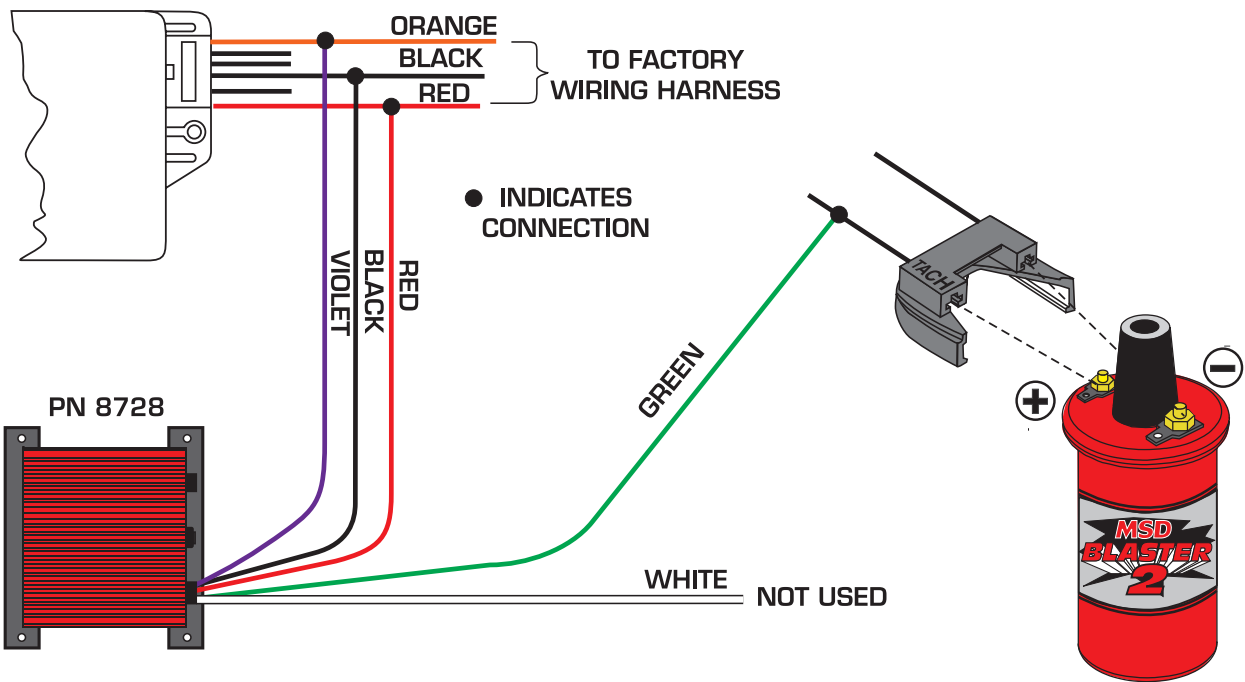
Soft Touch Rev Control, PN 8728, with Points/Amplifier Ignition



Soft Touch Rev Control, PN 8728, with GM HEI



Soft Touch Rev Control, PN 8728, with Ford Duraspark Ignition



2 and 3-Step Module Selectors

The MSD 2-Step, PN 8739, 3-Step, PN 8737, and Launch Control, PN 8735, Module Selectors allow you to switch between two or three different rpm or retard modules. The different modules are activated when 12 volts are applied to the corresponding wire. They must be used with an MSD component equipped with a rev control or timing control module.

Wire Functions

- Two Pin Connector:** Plugs into the module holder of the MSD component.
Black: Connects to engine ground.
Red: Activation wire, when 12 Volts are applied.
Blue: Activation wire (3-Step and Launch Control only), when 12 Volts are applied.

2-Step, PN 8739, Operation

When there is 12 volts applied to the Red wire, Module 1 is activated.
 When no voltage (grounded or open) is present on the Red wire, Module 2 is activated.

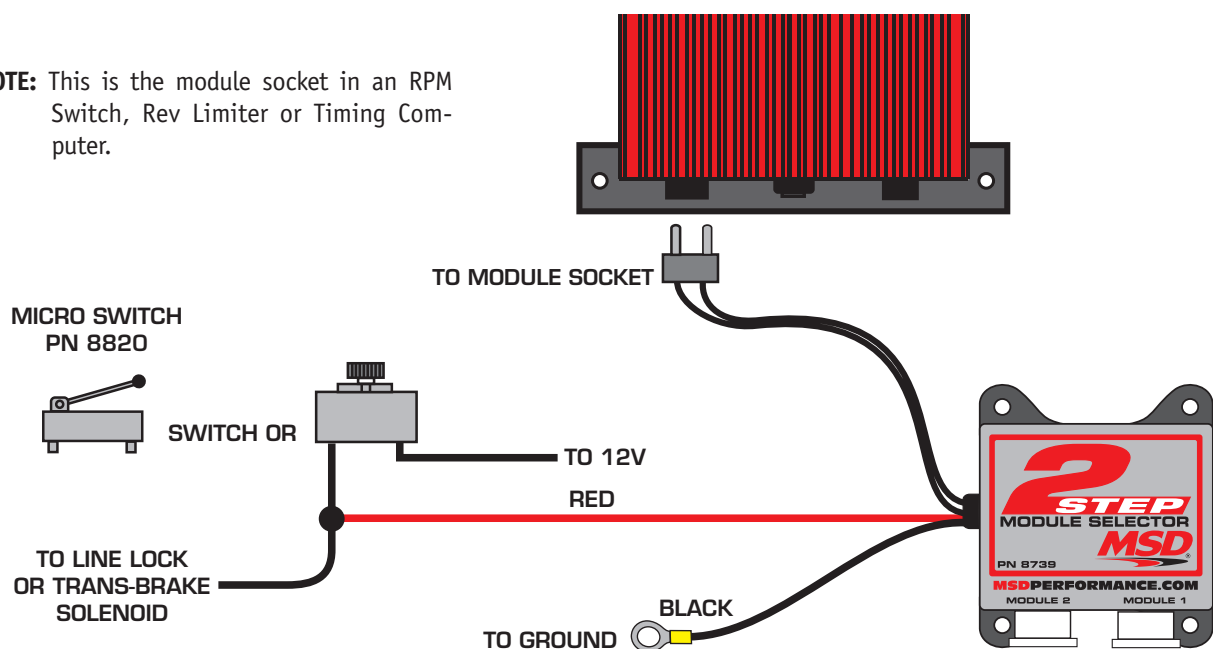
3-Step, PN 8737, Operation

When there is no voltage present on the Red or Blue wires, Module 2 is engaged.
 When there are 12 volts applied to the Red wire, Module 1 is activated.
 Where there are 12 volts applied to the Blue wire, Module 3 is activated.
 If the Red and Blue wires are activated at the same time, only Module 3 (Blue wire) will be activated. Module 3 overrides the other modules.

Basic 2-Step Module Selector Installation

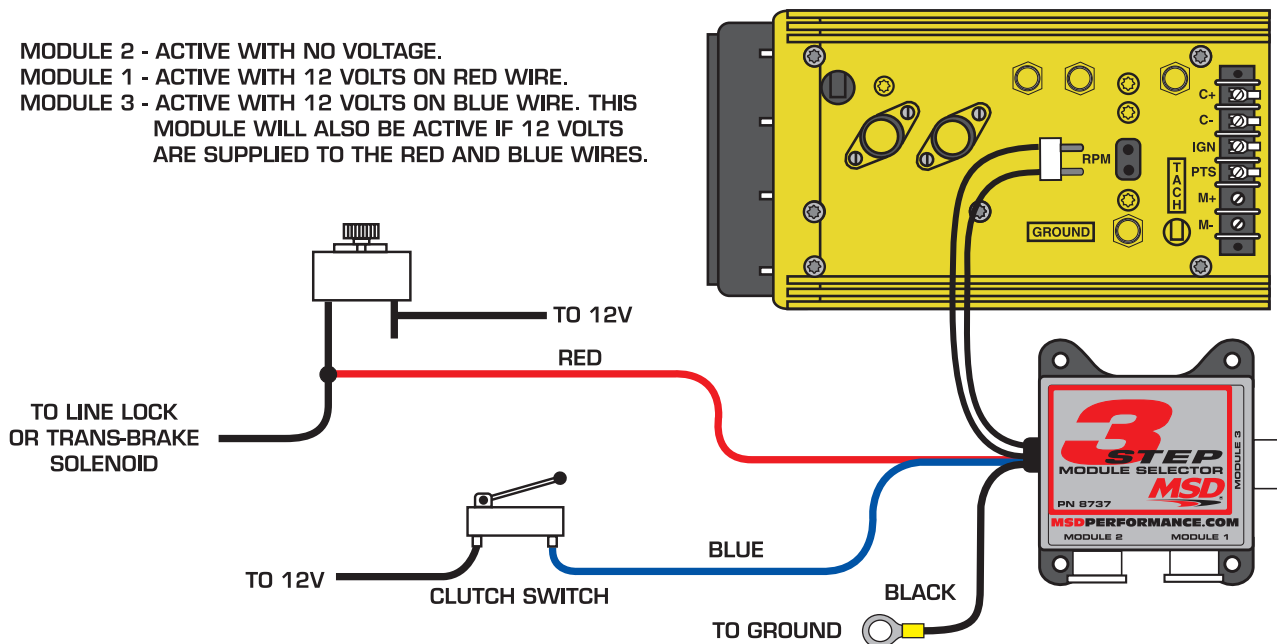
When 12 volts are applied to the Red wire of the 2-Step (button depressed), Module 1 will be engaged. When the button is released, Module 2 will automatically engage.

NOTE: This is the module socket in an RPM Switch, Rev Limiter or Timing Computer.

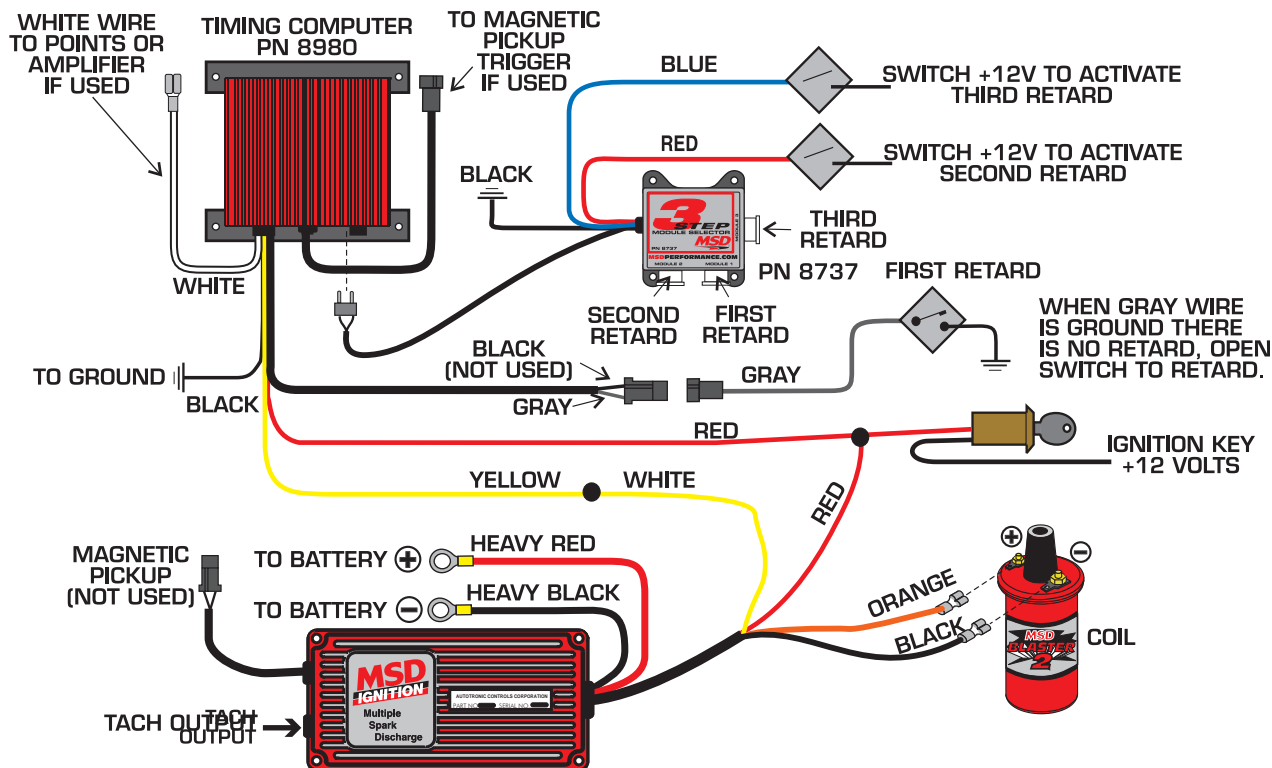


3-Step to MSD 7AL-2

MODULE 2 - ACTIVE WITH NO VOLTAGE.
 MODULE 1 - ACTIVE WITH 12 VOLTS ON RED WIRE.
 MODULE 3 - ACTIVE WITH 12 VOLTS ON BLUE WIRE. THIS MODULE WILL ALSO BE ACTIVE IF 12 VOLTS ARE SUPPLIED TO THE RED AND BLUE WIRES.



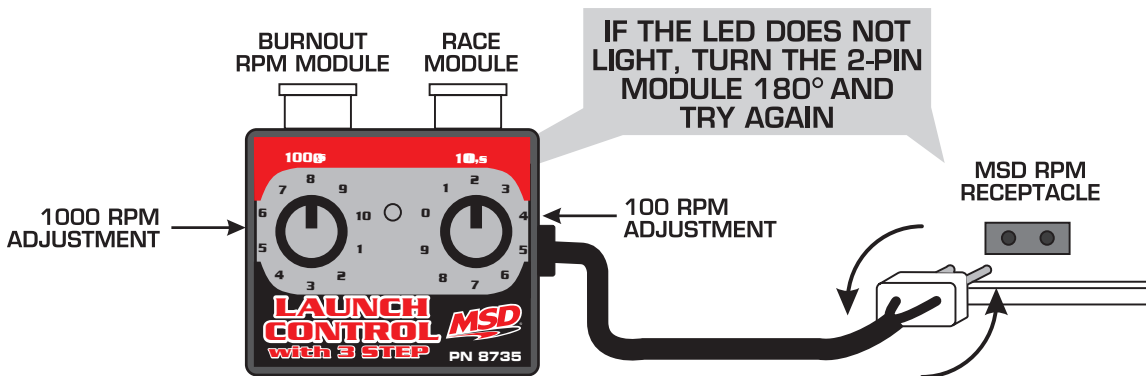
3-Step to Timing Control for Multiple Retards



MSD Launch Control, PN 8735

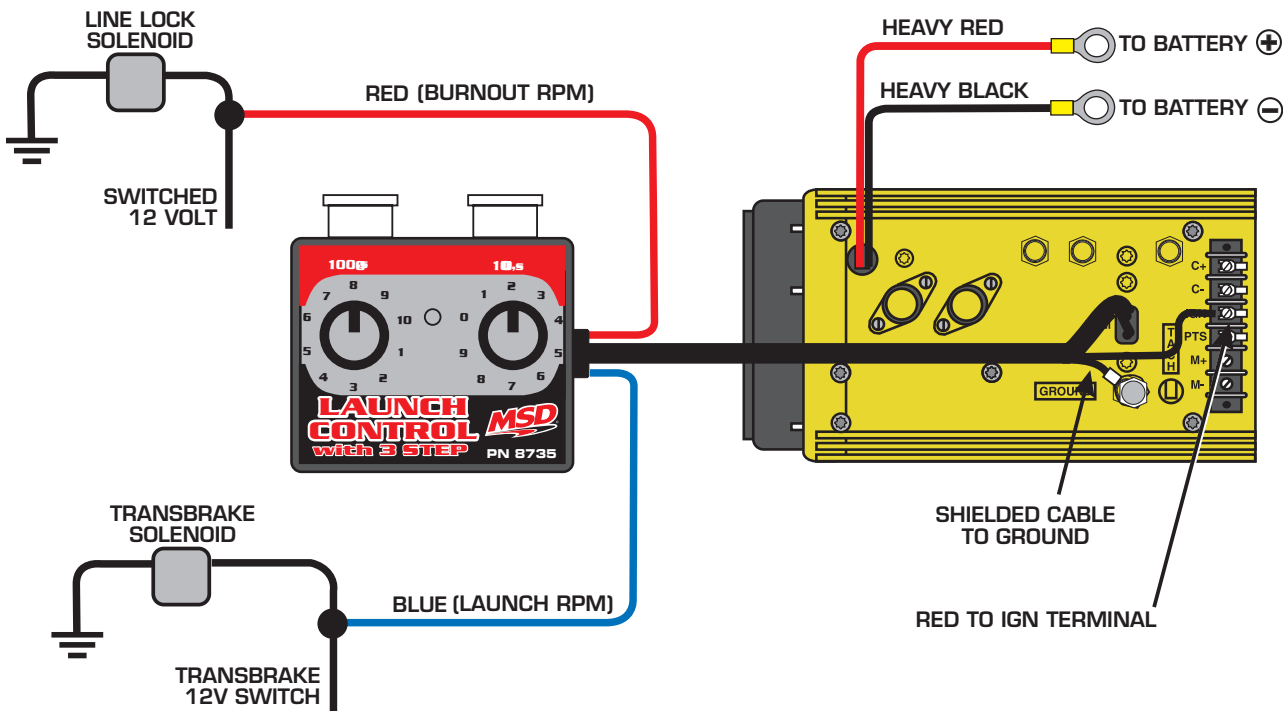
The 2-pin connector of the Launch Control can only be installed one way to operate correctly. There is an LED on the control that will light when the connector is in the correct position.

Bare Wire: Connects to ground. This ground acts as an EMI shield for the wiring of the control.



MSD Launch Control to MSD 7AL-2

- BURNOUT** - ACTIVE WITH 12 VOLTS ON RED WIRE.
- LAUNCH** - ACTIVE WITH 12 VOLTS ON BLUE WIRE. THIS LIMIT WILL BE ACTIVE IF 12 VOLTS ARE ON THE RED AND BLUE WIRES.
- RACE** - ACTIVE WITH NO VOLTAGE.



MSD 2-Step Launch Control for GM LS Series Engines, PN 8733

The MSD 2-Step Launch Control is designed for GM LS Series Engines with Coil-per-Cylinder ignitions. It can be used with 24x or 58x trigger wheels. The 2-Step Control will provide consistent launches and quick 60-foot times. RPM adjustments are made via two rotary switches located on the harness side of the unit. The adjustment range is from 1,000 - 10,900 rpm, in 100 and 1000 rpm increments. The LED will illuminate when the launch rev limit is active. Note that the 2-Step Launch Control is designed as a momentary low-rpm limiter. It will not provide, nor modify any over-rev protection.

NOTE: It is recommended to have the service manual for your vehicle.

The LS 2-Step has a built-in rpm drop circuit that prevents the low rpm limit from activating during gear shifts (when connected through the clutch switch). In order for the limit to activate, it must see an rpm drop of more than 1/3 the set amount. For example, if the limit is set at 3,000 rpm, the limiter will not activate unless it sees more than a 1,000 rpm drop.

Caution: Keeping the engine on a lower rpm limit may cause the Check Engine light to come on and could potentially damage the catalytic converter.

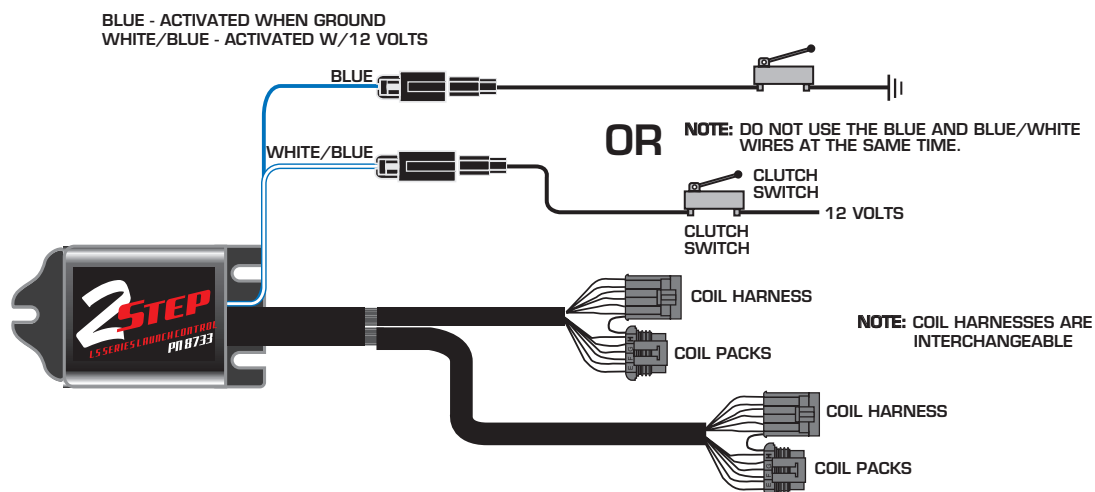
Activation Wire Functions

The launch rpm limit can be activated through a ground or a 12 volt source.

Blue: When grounded, the launch feature will be active.

White/Blue: When switched to 12 volts, the launch feature will be active.

Wiring the 2-Step Launch Control, PN 8733, Activation Wire



LED

The built-in LED will illuminate when the 2-Step Launch Control is activated.

Confirm Installation

With the power On, engine running, activate the clutch or On/Off switch. If connected correct, the LED will illuminate when the clutch is activated. To verify the rpm, set the limit at a lower rpm, such as 3,000, and test the system.

MSD 2-Step Launch Control for Ford Mod Motors '99-On, PN 8734

Note that the 2-Step Launch Control is a low-rpm limiter that will not provide, nor modify any overrev protection. The stock high rpm rev limiter will still be active.

The MSD 2-Step Launch Control is designed for Ford Modular Engines with Coil-on-Plug ignitions. The 2-Step Control will provide consistent launches and quick 60-foot times. RPM adjustments are made via two rotary switches located on the harness side of the unit. The adjustment range is from 1,000 - 10,900 rpm, in 100 and 1000 rpm increment, and LED will illuminate when the launch rev limit is active.

NOTE: It is recommended to have the service manual for your vehicle.

NOTE: The engine rpm must drop more than one third of the set launch limit in order to activate. For example, if the launch limit is set at 3,000 rpm, the engine speed must drop below 2,000 rpm in order for the launch limit to become active (one third of 3,000 rpm is a 1,000 rpm drop).

Caution: Keeping the engine on a lower rpm limit may cause the Check Engine light to come on and could potentially damage the catalytic converter.

Wire Functions

8-Wire Connector Tan:	Single Connections.
8-Wire Connector Red:	12-Volt Connection through this single Red wire.
3-Wire Connector	
Black:	Connects to a good engine ground or the negative battery terminal.
Blue:	Activation Wire. When grounded, the launch feature will be active.
White/Blue:	Activation Wire. When switched to 12 volts, the launch feature will be active.

LED

The built-in LED will illuminate when the 2-Step launch Control is activated. It will also, illuminate when there is no rpm signal.

1. Connect the 3-pin harness to the 2-Step and connect the Black wire to the good engine or chasis ground.
2. Disconnect the 2-pin connectors from each of the eight ignition coils.
3. Connect all eight of the 2-pin male connectors from the MSD harness into the factory coil connectors.
4. Plug the 8-pin connector with the single Red wire from the 2-Step to the connector with Black wires.
5. Turn the key to the On position - do NOT start the engine. Look at the LED on the 2-Step:
LED On - This confirms that the wiring is correct and you can move to step 6 (See Wiring the 2-Step Launch Control).
LED Off - The wiring is different for this application and needs to be changed. Turn the key Off, plug the 8-pin connector with the eight Gray wires into the connector with the single Red wire (See Alternate Wiring).
6. Connect the 8-pin harness with the tan wires to the remaining connector on the harness.
7. Connect all eight of the female 2-pin connectors from the MSD harness into the factory coils.

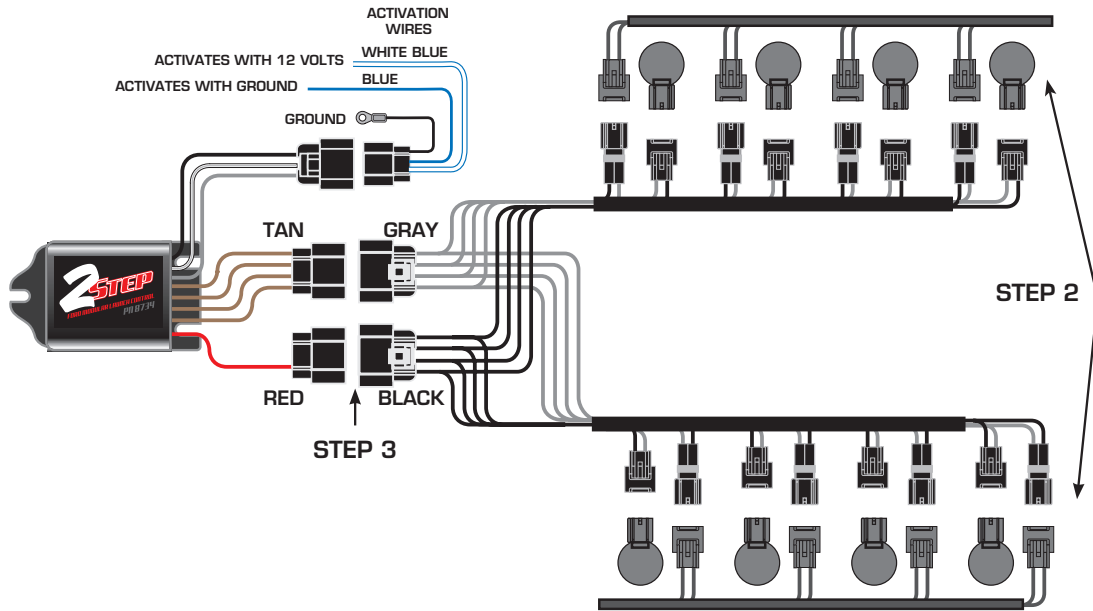
Confirm Installation

With the power On, engine running, activate the clutch or On/Off switch. If connected correct, the LED will illuminate when the clutch is activated. To verify the rpm, set the limit at a lower rpm, such as 3,000, and test the system.

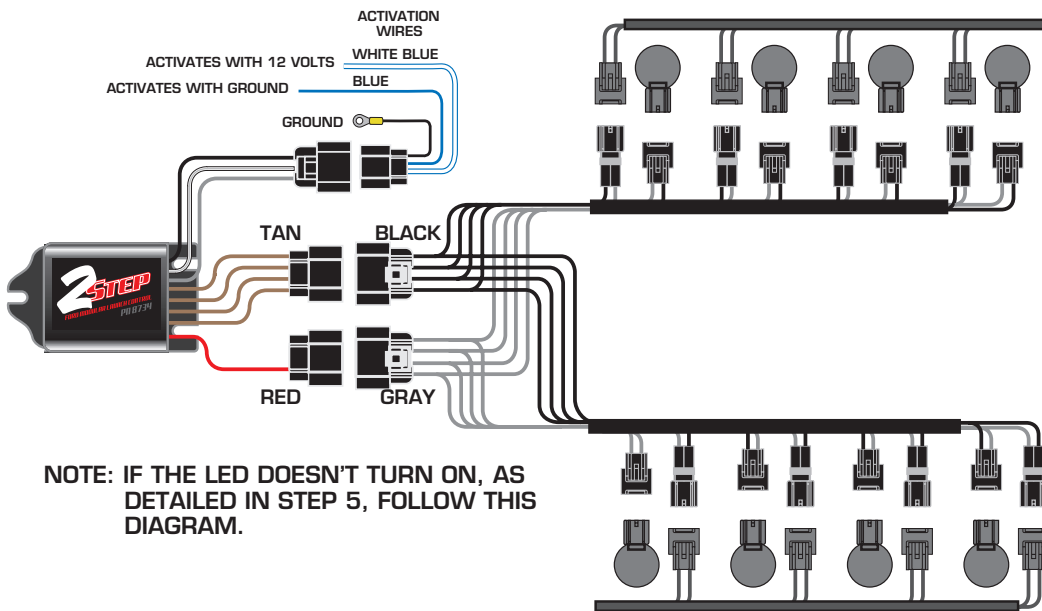
If the engine has trouble starting or running, check the following:

- Ground or switched 12 volts connection.
- Coil connections
- The two 8-pin connectors may be in the wrong position and should be swapped and tested again.

Wiring the 2-Step Launch Control, PN 8734

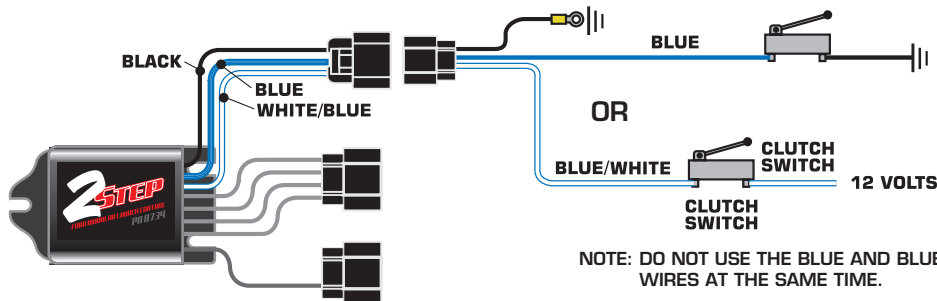


Alternate Wiring for 2-Step Launch Control, PN 8734,



NOTE: IF THE LED DOESN'T TURN ON, AS DETAILED IN STEP 5, FOLLOW THIS DIAGRAM.

Activation Wiring for 2-Step Launch Control, PN 8734



NOTE: DO NOT USE THE BLUE AND BLUE/WHITE WIRES AT THE SAME TIME.

BLUE - ACTIVATED WHEN GROUND
 WHITE/BLUE - ACTIVATED W/12 VOLTS

MSD RPM Activated Switches

This section covers the MSD RPM Activated Switch, PN 8950, and the Window Switch, PN 8956. The PN 8950 will activate a circuit at a desired rpm by supplying or removing ground. The PN 8956 Window Switch will activate a circuit by supplying ground, then will deactivate the same circuit at a different rpm.

The MSD Switches are capable of switching approximately 2 amps continuously. If too much current or the circuit heats up over time, the Switches will shut off to prevent damage. For circuits that require more current for an extended time, MSD recommends a Relay. Page 128 shows a relay wiring example.

If no module is installed, the switch will not activate.

An RPM Activated Switch for magnetos is also available as PN 8957. It shares the same wiring as the PN 8950.

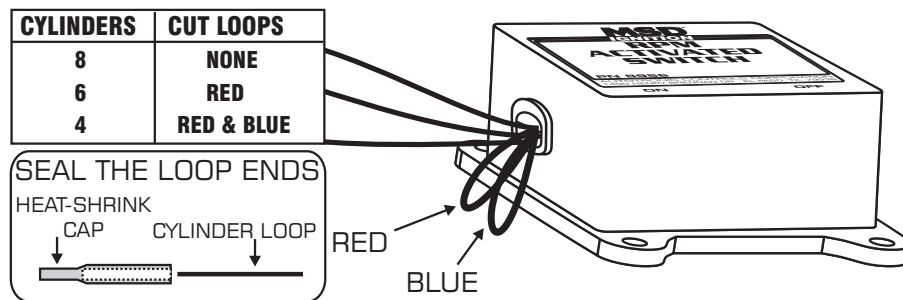
Wire Functions

- Red:** Connects to a switched 12 volt source.
- Black:** Connects to ground.
- White:** The rpm input wire that picks up engine rpm. It connects to the tach output terminal of an MSD Ignition. When used with inductive or factory ignitions it connects to the coil negative terminal.

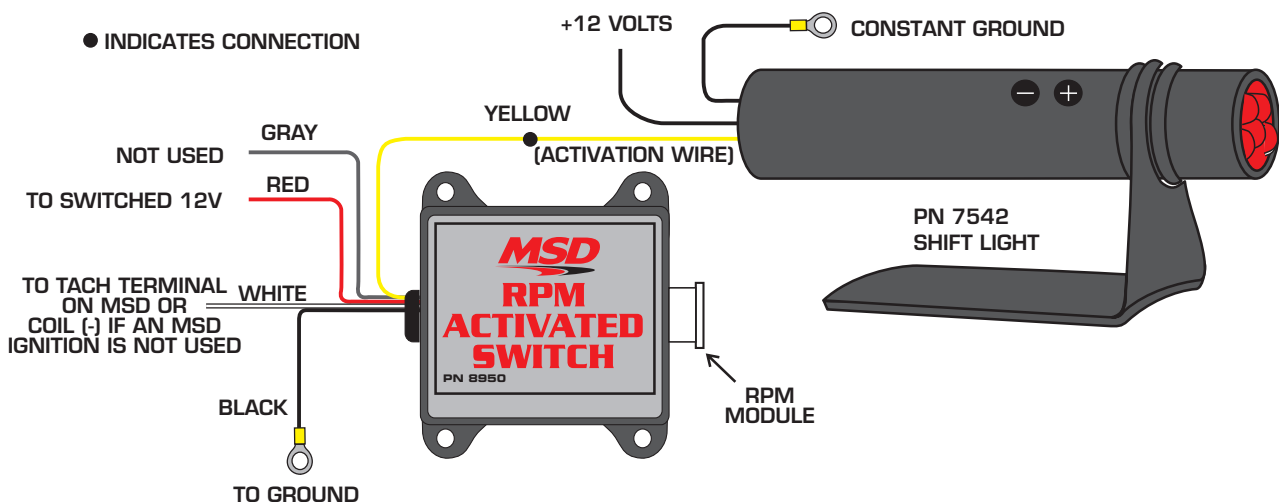
Activation Wires:

- Yellow:** This wire is normally open and will switch to ground at your desired rpm to complete a circuit.
- Gray:** This is on the PN 8950 only. This wire is normally closed to ground and will open a circuit at your desired rpm.

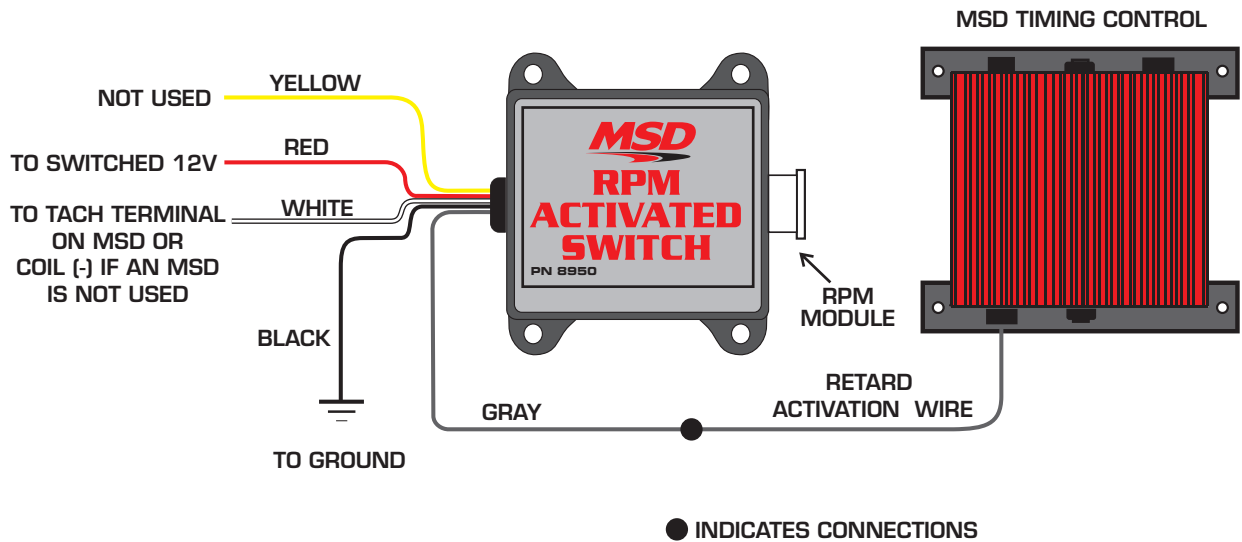
Cylinder Programming Loops: There are two wire loops, Red and Blue, on the side of the Control. For a 6-cylinder engine, cut the Red loop. For 4-cylinder applications, cut the Blue and Red loops.



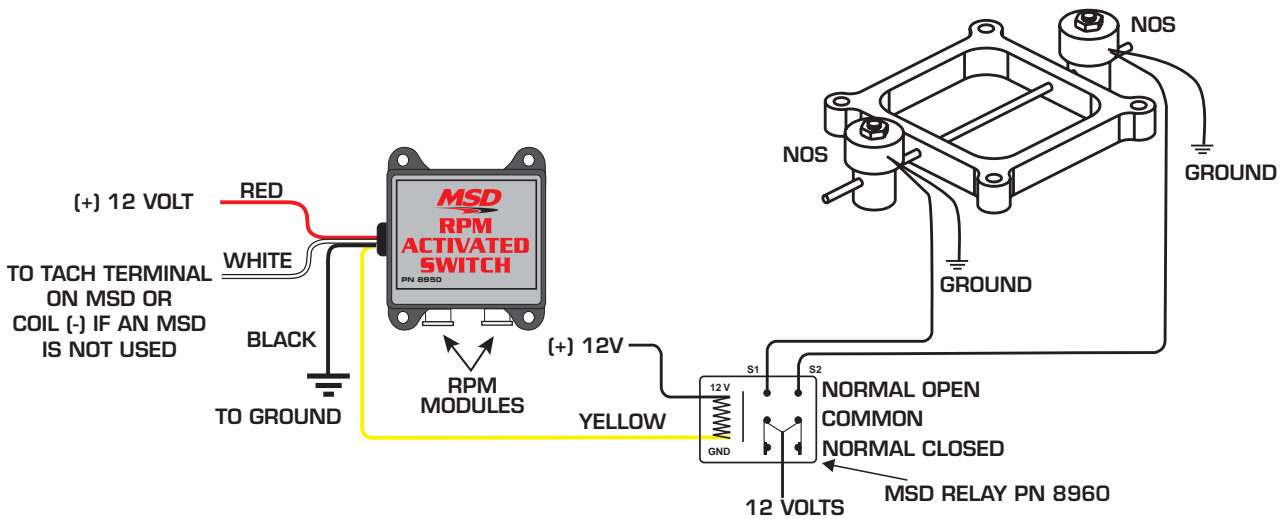
RPM Activated Switch, PN 8950, to a Shift Light



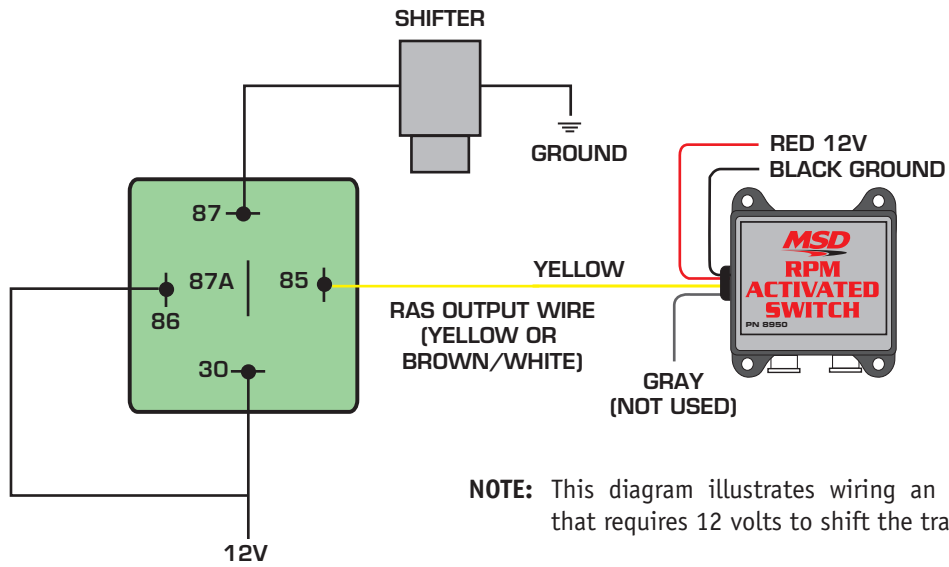
RPM Activated Switch, PN 8950 to Timing Control Retard



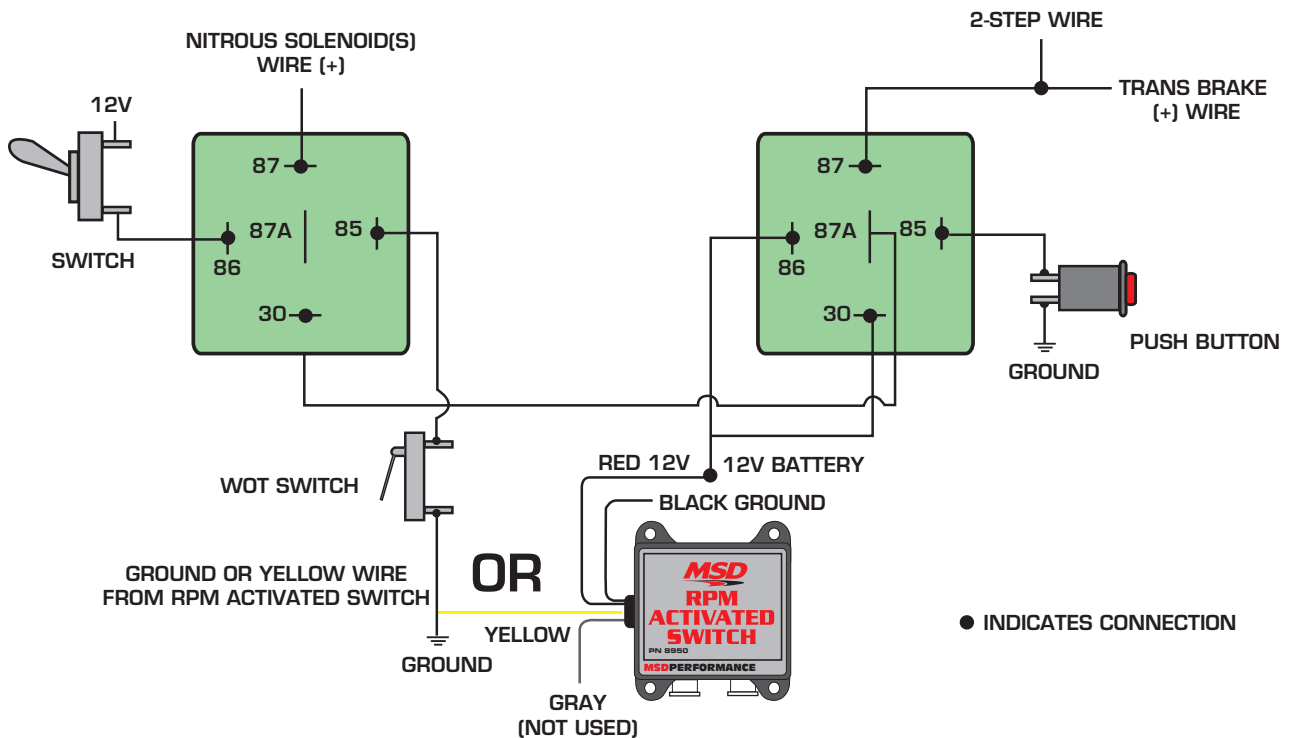
RPM Activated Window Switch, PN 8956 to Activate Nitrous



RPM Activated Window Switch, PN 8956



RPM Activated Window Switch, PN 8956, to Nitrous Relay with Trans Brake Interrupt



MSD Relays, Single Pole, PN 8961, Double Pole, PN 8960

MSD Relays will allow you to activate a variety of accessories that require high current. These are ideal to tie in with rpm activated switches such as nitrous or air shifter solenoids or even a horn or fuel pump.

The most common use of a relay is to switch the relay on (energize its coil) using a small amount of power (12V/1 amp) which then moves the relay's armature so it can transfer a large amount of power (12V/30 amp) to the device which you need to activate.

- The PN 8960 will handle a 30 amp load, on each side, with an input voltage of 12 volts.
- The PN 8961 Relay will handle a 30 amp load and is ideal for multiple accessories.

Relays have a variety of specifications to understand for your application. A few things to consider include:

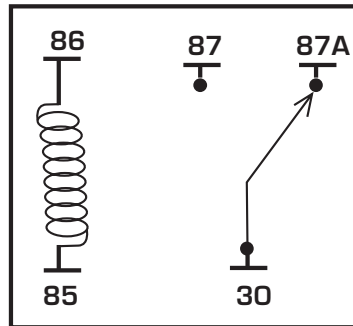
- Make sure the Relay can accept and handle the voltage and current required to activate the desired circuit.
- The number of bobbins to use with different circuits (generally 1-2).
- The number of electrical contacts for the armature (generally 1-2).
- If the Relay is Normally Open (NO) or Normally Closed (NC).

MSD Relays

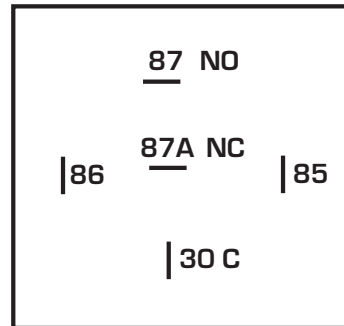
MSD PN 8961 RELAY

NO - NORMALLY OPEN
NC - NORMALLY CLOSED
C - COMMON

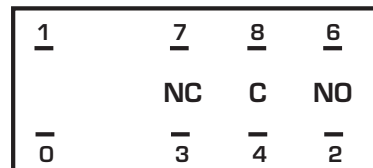
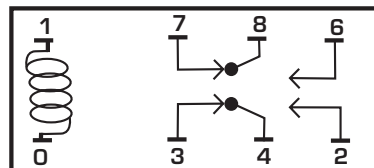
INSIDE



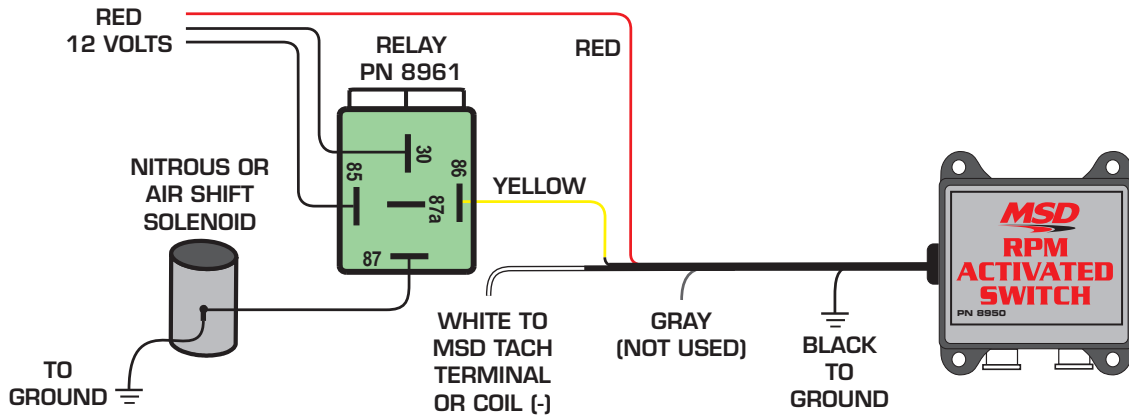
LOCATION OF PINS



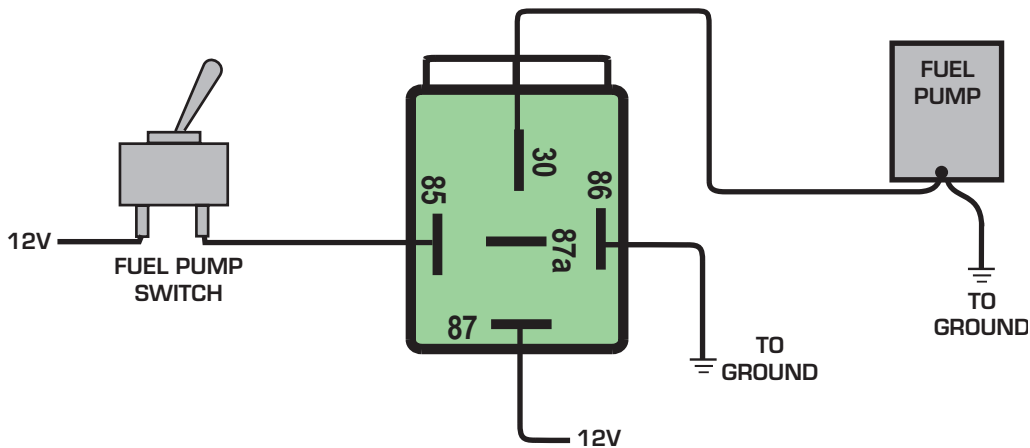
MSD PN 8960 RELAY



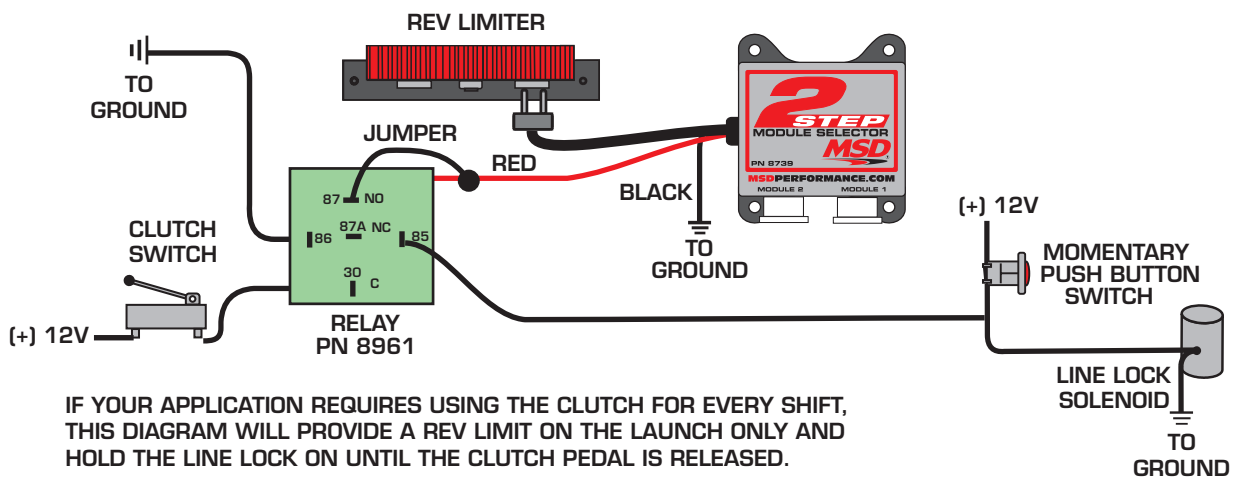
MSD RPM Activated Switch, Solenoid and Relay, PN 8961



MSD Relay, PN 8961, to an Electric Fuel Pump



MSD Relay, PN 8961, 2-Step and Clutch Switch



MSD Shift Light, PN 8952

This section covers the MSD Shift Light, PN 8952. The Light will activate at a desired rpm which is controlled by MSD's white RPM Modules. If no rpm module is installed in the Light, it will not turn on. The Light can be used with stock ignitions or with MSD Ignition Controls.

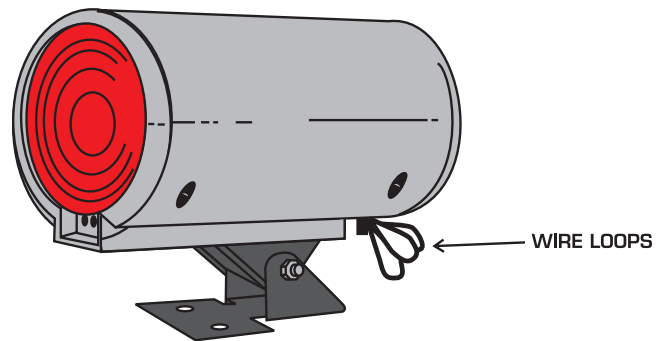
Wire Functions

- Red:** Connects to switched 12 volt source.
- Black:** Connects to ground.
- Green:** This is the rpm input wire that picks up engine rpm. It connects to the tach output terminal of an MSD Ignition. When used with inductive or factory ignitions it connects to the coil negative terminal.

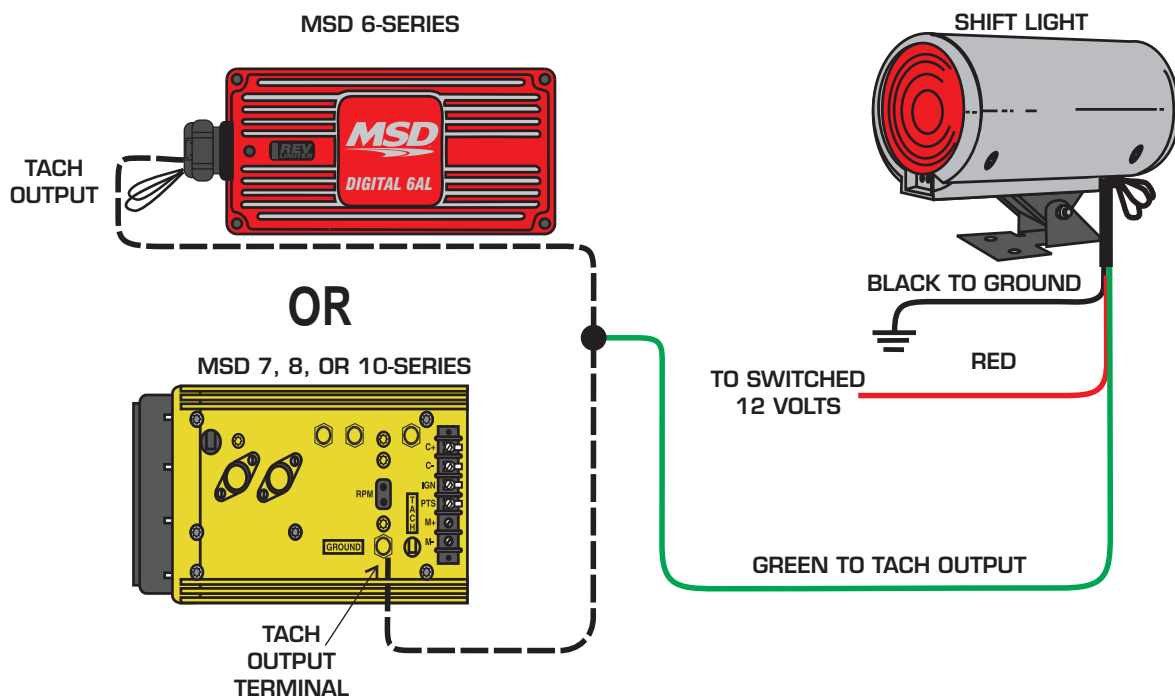
Cylinder Programming

The Shift Light is programmed for 8-cylinder operation. There are three wire loops, that need to be modified for use on other engine configuration. For a 6-cylinder engine, cut one loop. Cut two loops for 4-cylinder engines and three loops for 2-cylinder engines.

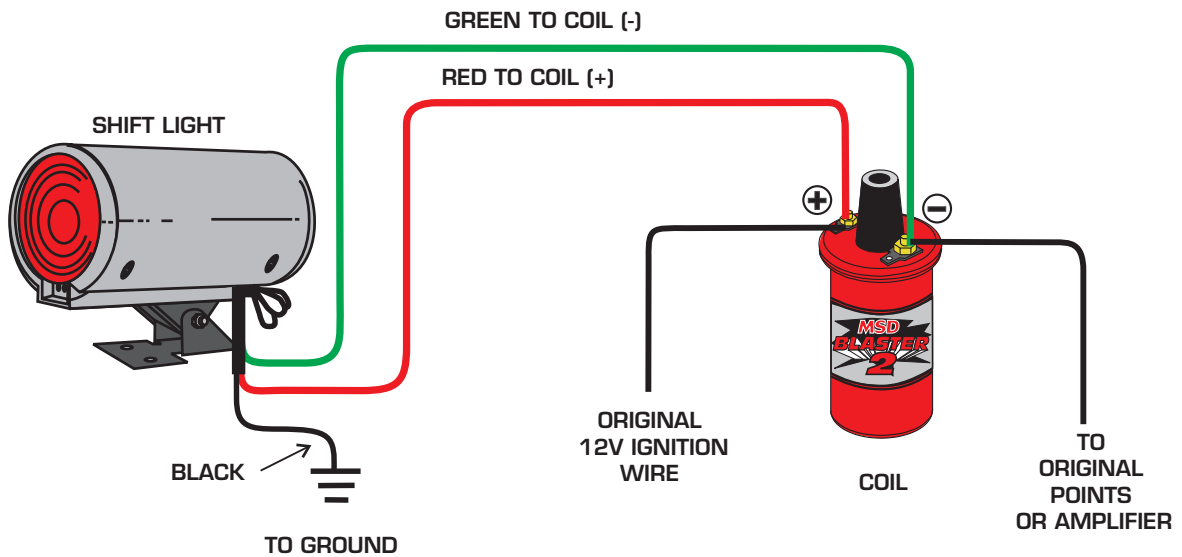
Note: Once installed, whenever the ignition is turned On, the Shift Light will flash to confirm operation.



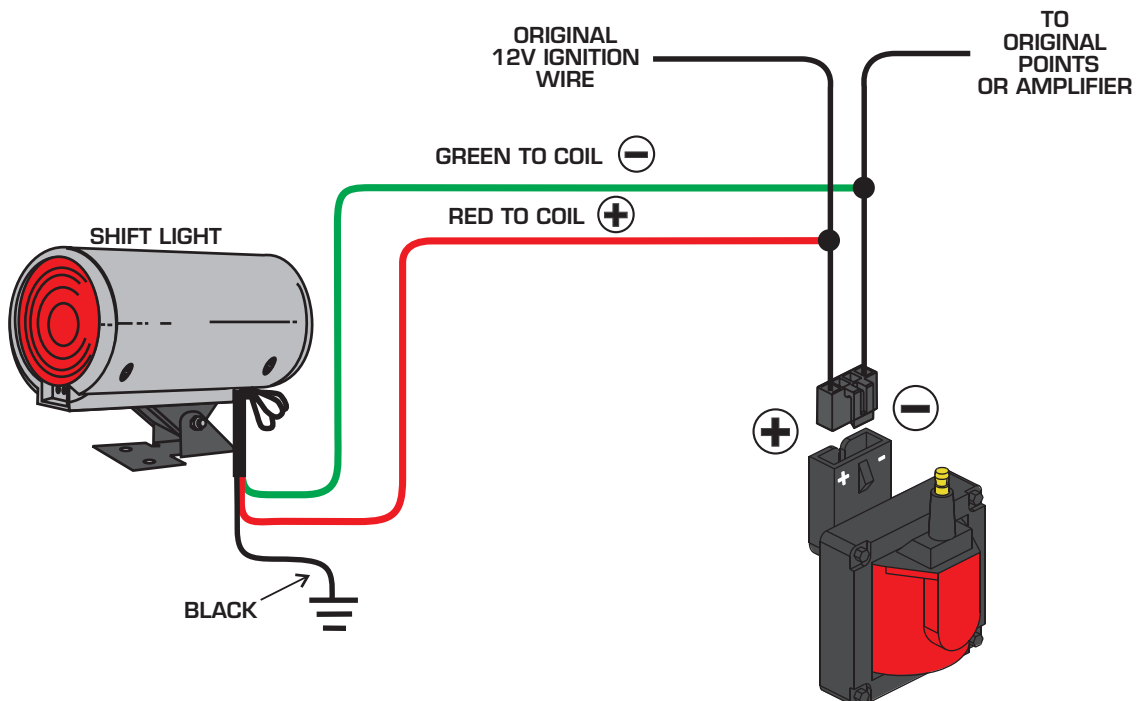
MSD Shift Light, PN 8952, to MSD Ignition



MSD Shift Light, PN 8952, to Points/Amplifier Ignition



MSD Shift Light, PN 8952, to Ford TFI Ignition



Digital Shift Light with Adjustable Intensity, PN 7542

This MSD Shift Light features two switches that allow the driver to control the LEDs' intensity. This unit is designed to be used with MSD's Programmable Series of Ignition Controls. It can also be used in conjunction with an RPM Activated Switch (such as MSD's PN 8950 or PN 8956).

Wire Functions

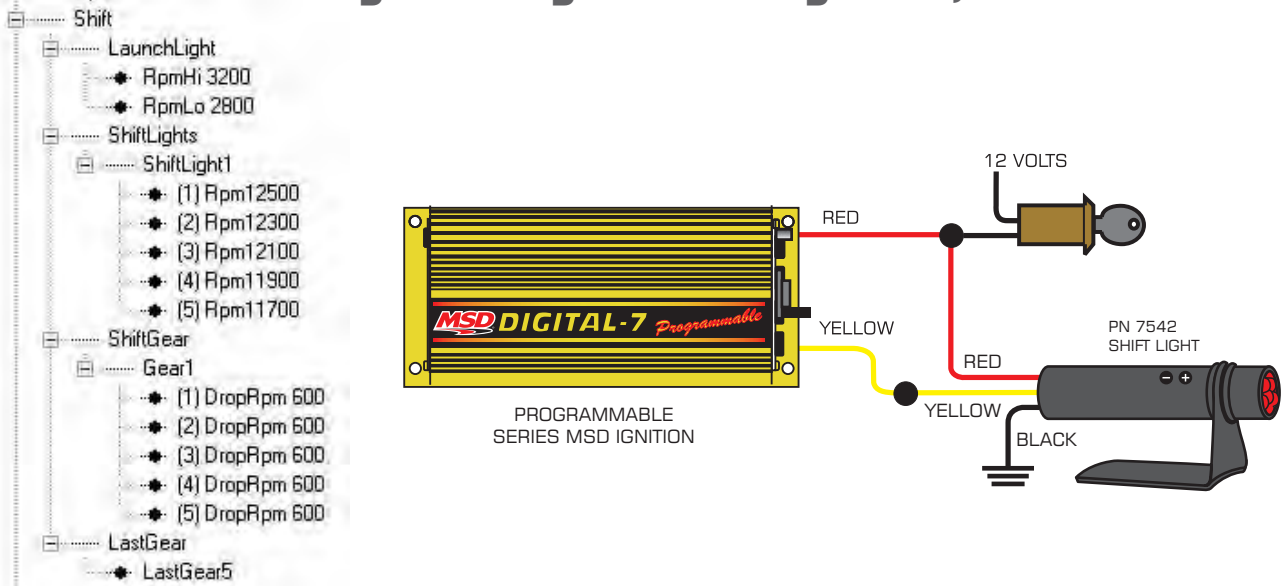
- Red:** Connects to a switched 12 volts.
- Yellow:** Activation wire. Connects to the Yellow wire of a Programmable Ignition or RPM Activated Switch.
- Black:** Connects to ground.

Programming

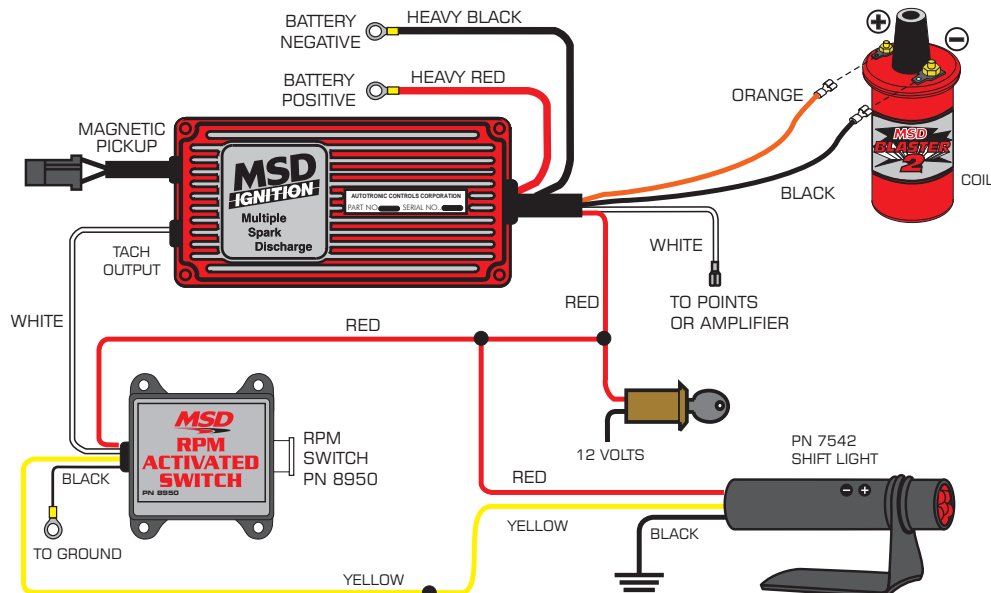
To change the intensity of the LEDs, turn the ignition On. Press either of the two buttons until the LEDs light on. Then, press or press and hold the + or - button to adjust the LEDs accordingly. When adjusted to your requirements, simply release the button and in two seconds the light will turn off and is programmed.

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

Connecting to a Programmable Ignition, PN 7542



Connecting with an RPM Activated Switch, PN 7542



MSD Digital Shift Light, PN 89631

IMPORTANT: Do NOT connect to the coil (-) terminal. The supplied GMR pickup must be used when installing the Digital Shift Light unless the rpm signal is coming from the tach output of an MSD Ignition or aftermarket ECU. Damage to the DSL will occur if connected to a high voltage trigger source.

PROGRAMMING

By pressing the two buttons simultaneously, you get the Shift Light into the different programming modes.

RPM: To adjust the rpm, press the two buttons until the rpm shows. Notice that all of the numbers flash. Adjust the rpm then push the two buttons again to move to the next mode. The rpm can be set up to 16,000 rpm. Once you go over 9,900 rpm, the display will show 1,000 indicating 10,000 rpm and higher.

Cylinder Count: The display will read CY and allow you to select between one to 12-cylinder engines using the Up/Down buttons. On single cylinder two stroke or four stroke applications that fire every revolution (waste spark systems) the shift light should be programmed for two cylinder operation for correct operation.

Intensity: Control the intensity of the LED and read out. Hold the buttons until LuL displays. Use the buttons to select from 9 (brightest) to 0 to turn off the shift light.

Self: Self mode will walk through all of the settings programmed into the light. It will first show the rpm shift value for the shift light, the cylinder count and light intensity. Start the test mode by pushing either button once Self is displayed. To reset the Self mode, push either button when SELF is displayed, or turn the power Off.

Each time the DSL is powered on, the LED will display the program values that are set.

PROGRAMMING

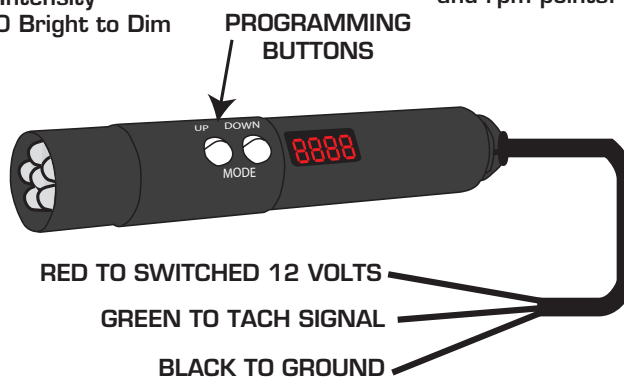
CY - Cylinder Count

12, 10, 8, 6, 6 odd, 4, 2, 2 odd, 1

LuL - Light Intensity

Scale of 9-0 Bright to Dim

Use Up/Down buttons to adjust cylinders, intensity and rpm points.

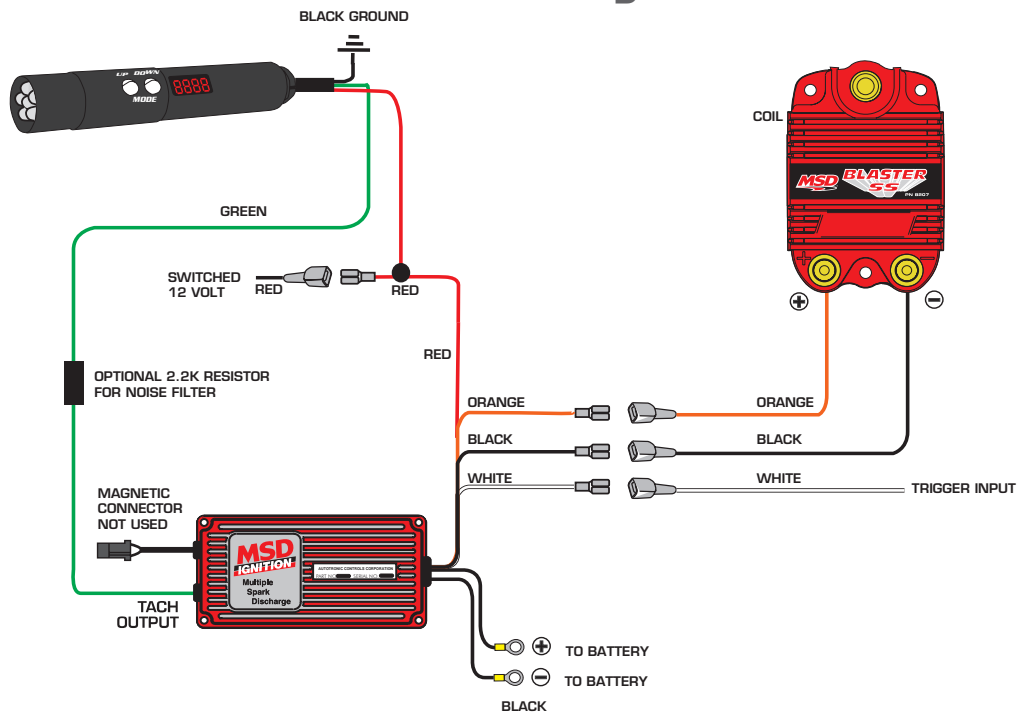


INSTALLATION

The Shift Light installs easily with the GMR Pickup or through the tach output terminal of an MSD Ignition Control or aftermarket ECU. It will accept a trigger signal rated from 0-24 volt amplitude. Never connect the Green Wire directly to the coil negative terminal.

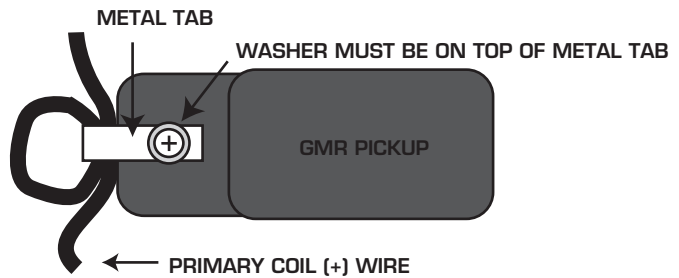
If an ignition control or aftermarket ECU are not being used, the GMR pickup must be connected.

Wiring the MSD Digital Shift Light, PN 89631, with an MSD Ignition

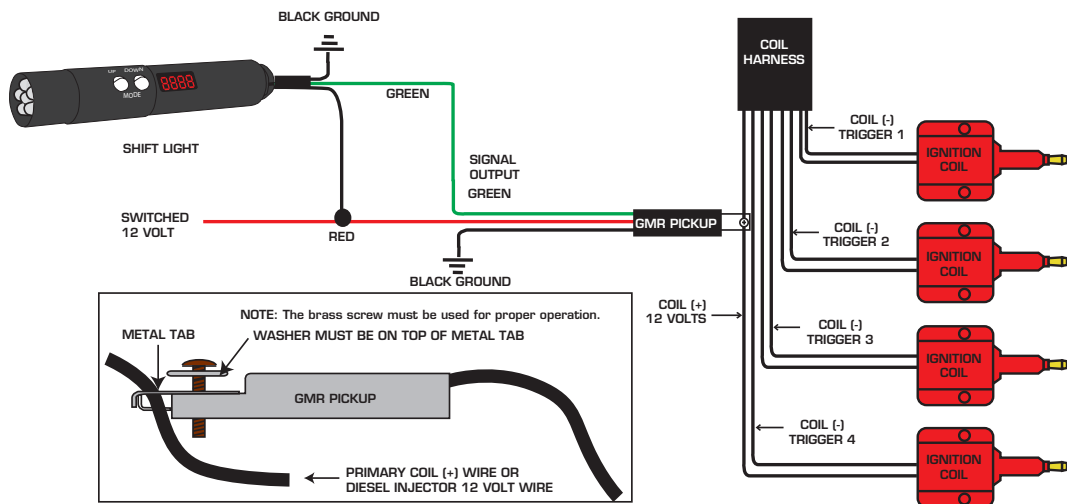


GMR PICKUP INSTALLATION

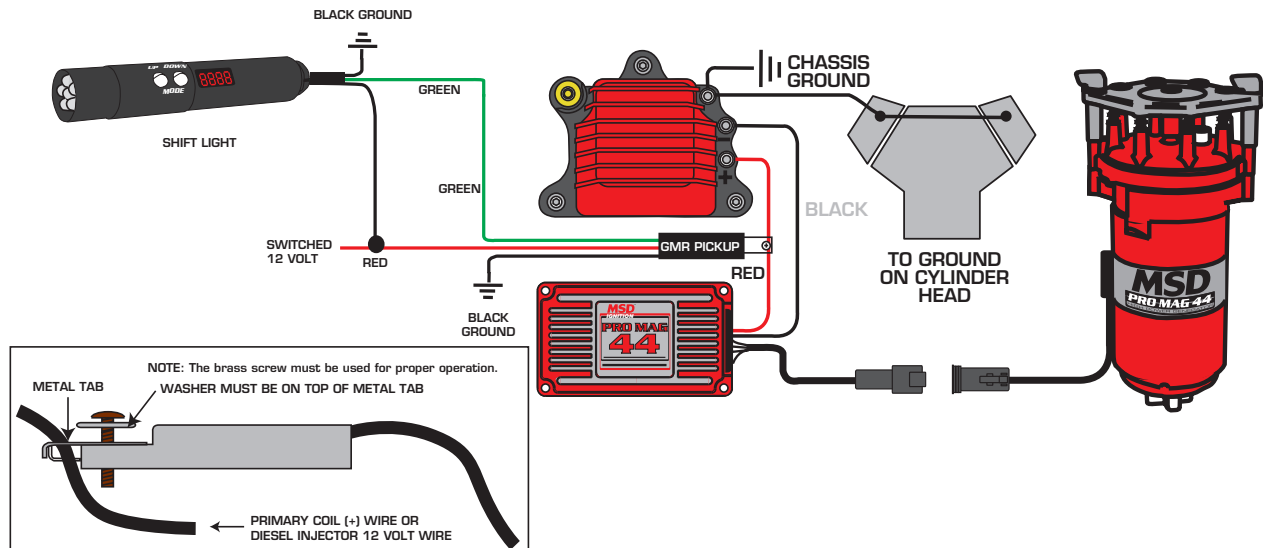
The MSD GMR pickup can be used with inductive or capacitive ignition types to provide an rpm signal of 30% duration when the ignition coil fires. Two washers are provided with the pickup and must be installed in one of two positions depending on the type of ignition driving the coil. For late model applications, it is recommended to have a wiring schematic of the vehicle's ignition system. On some motorcycle and ATV applications, the stock coils do not produce a long enough pulse. In these cases, loop the coil wire through the GMR pickup twice (See figure to the right).



Wiring the MSD Digital Shift Light, PN 89631, with an Inductive Coil-Per-Cylinder Ignition System.



Wiring the MSD Digital Shift Light, PN 89631, with Pro Mag 44 Electronic Points Box



MSD GMR Pickup, PN 8918/PN 89181

The MSD GMR pickup can be used with inductive or capacitive ignition types to provide an rpm signal of 30% duration when the ignition coil fires. Two washers are provided with the pickup and must be installed in one of two positions depending on the type of ignition driving the coil.

Note: For late model applications, it is recommended to have a wiring schematic of the vehicle's ignition system.

Capacitive Discharge Ignitions

For a CD Ignition such as an MSD, the two washers should be installed under the metal tab to provide a small air gap between the metal tab and the pickup sensor (Figure 1). Refer to note on Figure 2 for RPM Device programming.

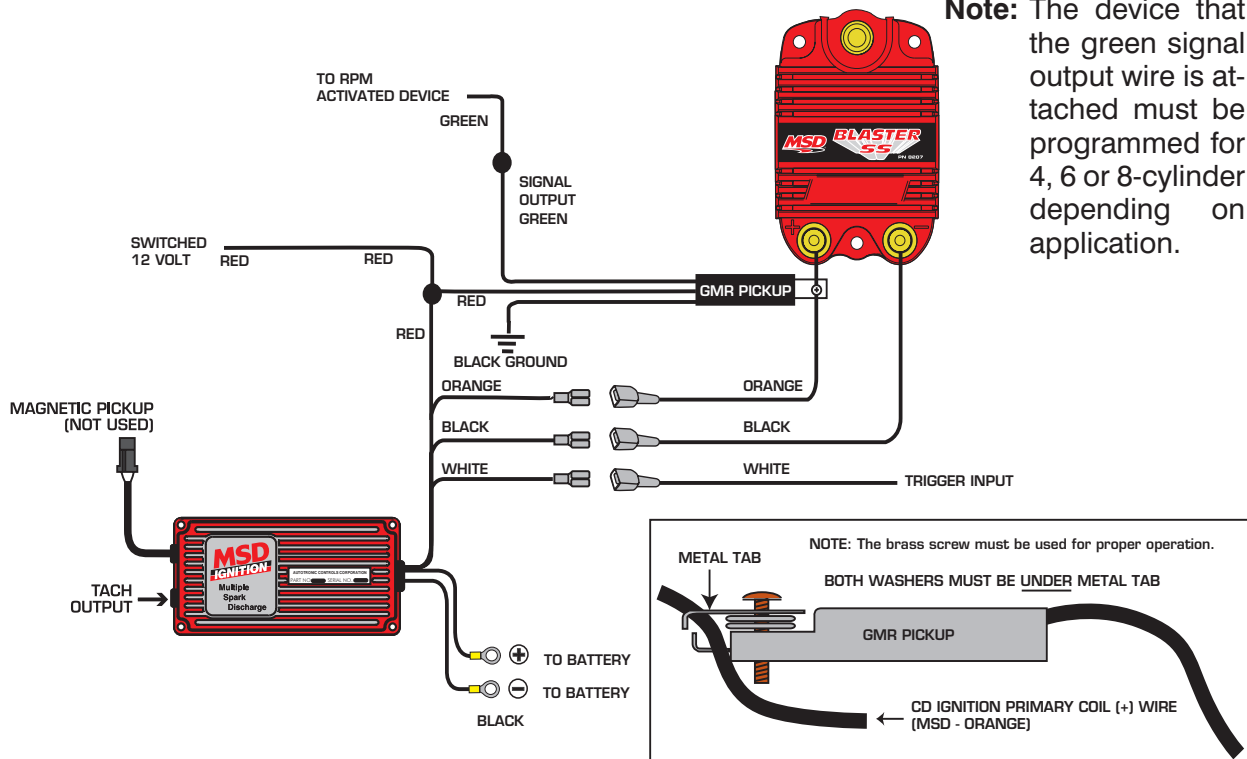
Inductive Coil per Cylinder Ignition

For an inductive ignition (mostly stock applications) the metal tabs must make contact, therefore no washer is required. There should be no air gap between the metal tab and the pickup sensor (Figure 2). Refer to note on Figure 3 for RPM Device programming.

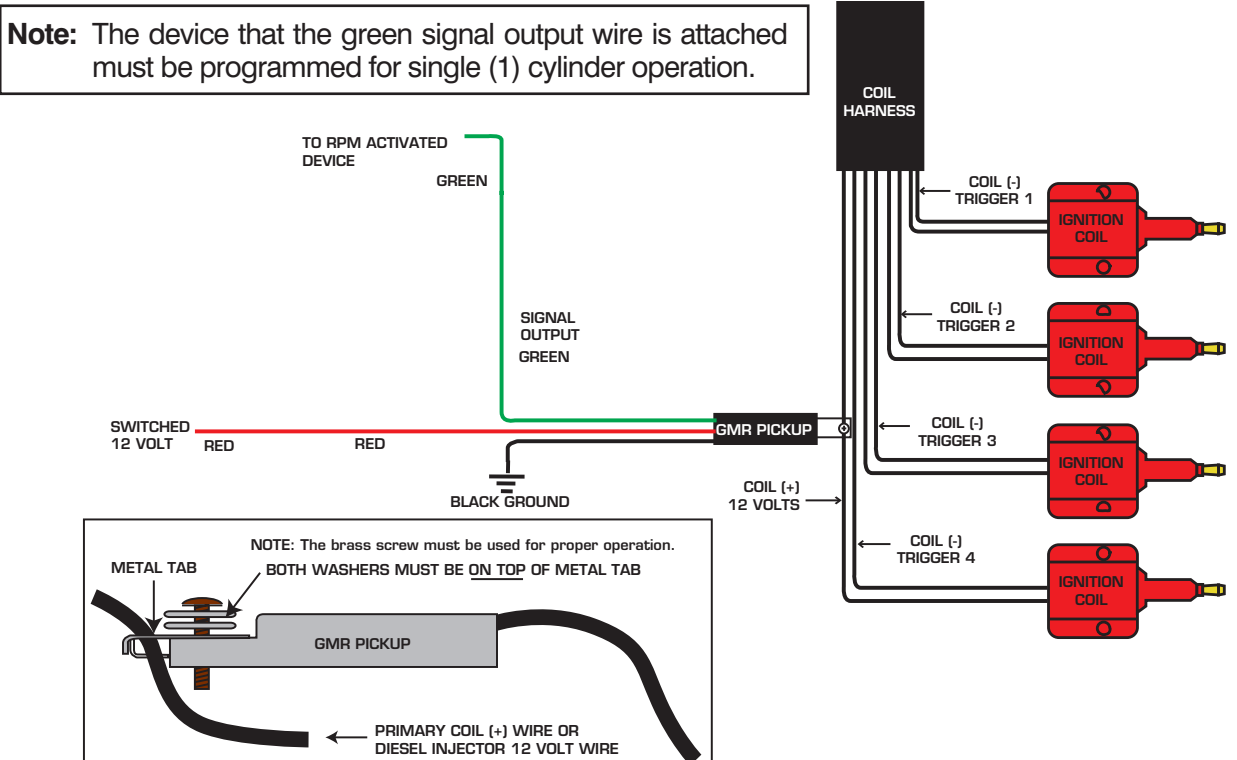
Distributorless Coil Packs

On distributorless applications, the GMR pickup must be installed on the primary lead going to one of the coils. If the pickup is installed on the main ignition +12v wire feeding more than one coil, the pickup may not operate correctly at high speeds because of overlapping coil dwell current failing to fall to zero current between coil operating cycles (Figure 3). Refer to note on Figure 3 for RPM Device programming.

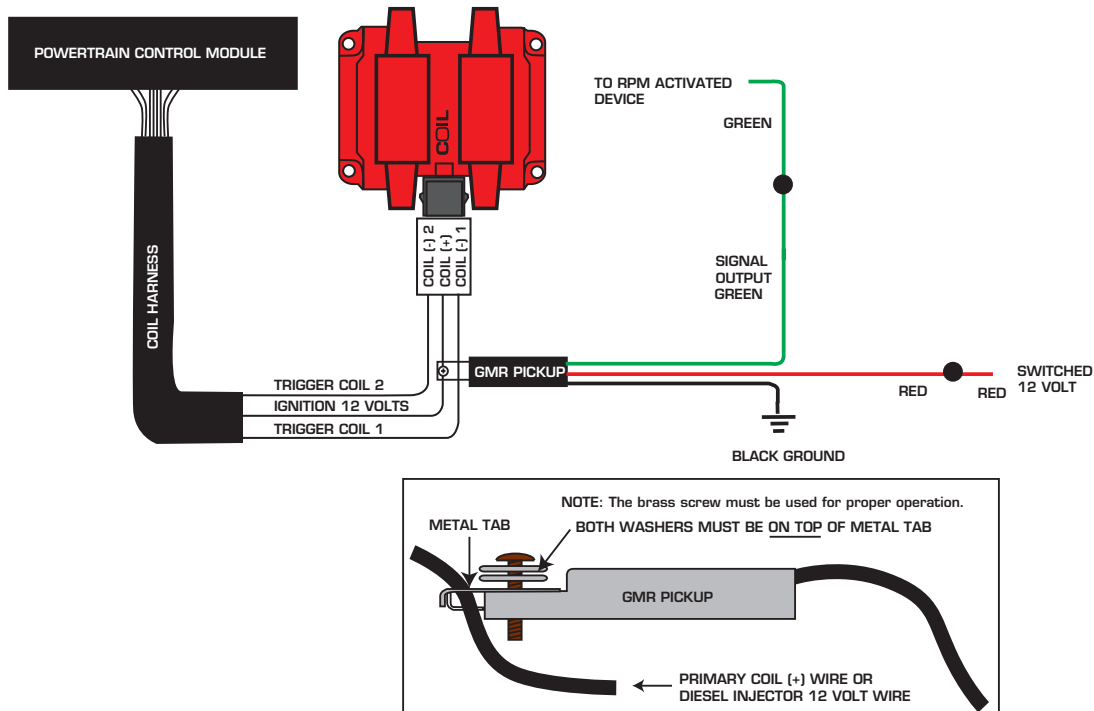
Installation of MSD GMR Pickup, PN 8918, with a Capacitive Discharge Ignition Control



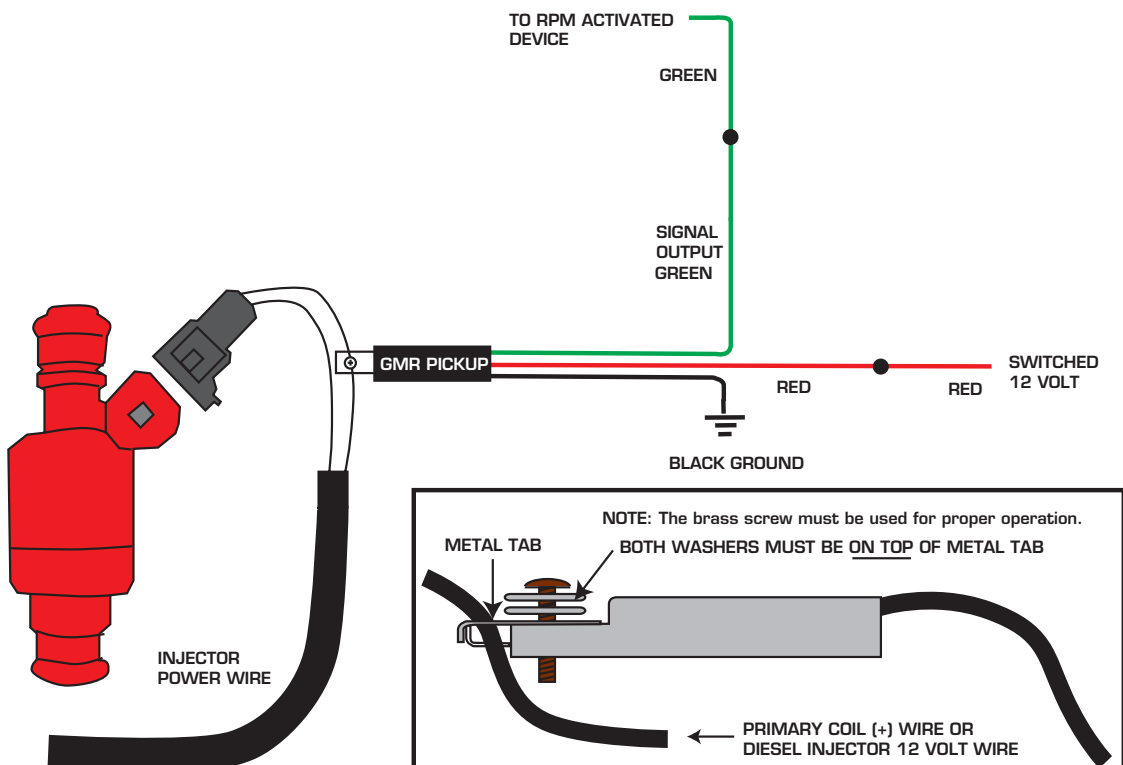
Installation of MSD GMR Pickup, PN 8918, with an Inductive Distributorless Ignition System



Installation of MSD GMR Pickup, PN 8918, with a Distributorless Ignition Control



Installation of MSD GMR Pickup, PN 8918, with an Injector System



MSD Programmable Controllers and Accessories

Dual Delay Timer, PN 7563

Wire Functions

- Red:** This is the On/Off wire. Connects to switched 12 volts.
- Black:** Connects to a good ground source.
- Light Blue:** Resets the timer to zero when switched to 12 volts.
- Dark Blue:** Starts the timer when removed from 12 volts.
- Yellow:** Channel 1 Output, switches ground, 2 amps max.
- Gray:** Channel 2 Output, switches ground, 2 amps max.

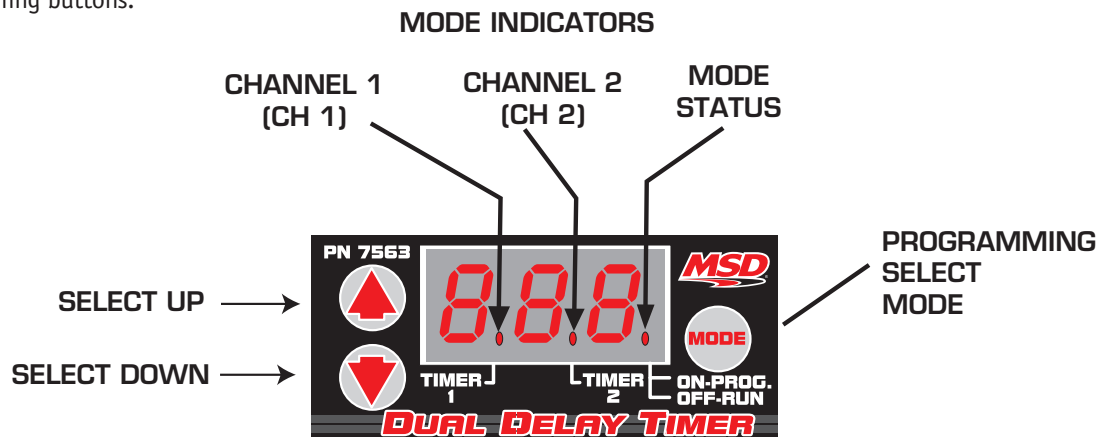
Programming

When the Timer is turned on, three dashes will appear across the monitor. The Mode button switches between the programming stages. First you select Channel 1 or Channel 2 by pressing Mode, followed by the up or down button.

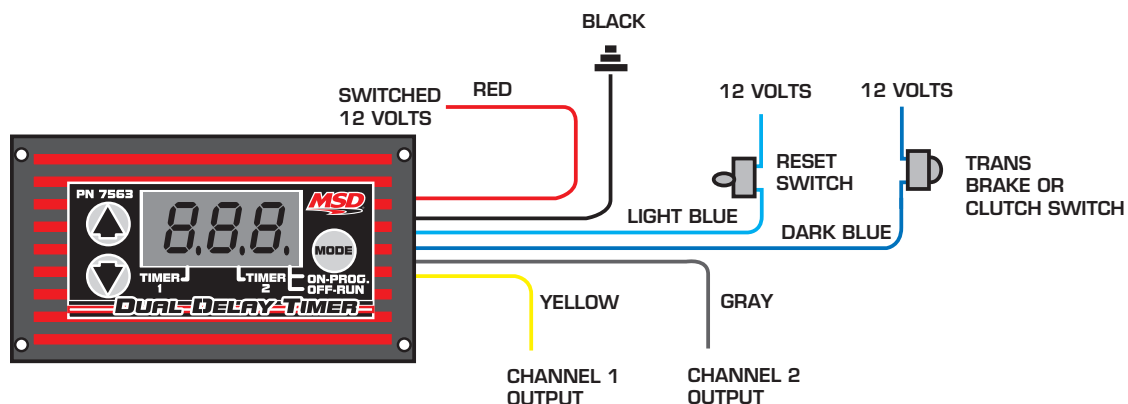
Once a Channel is chosen, press Mode again to select between On or Off. This determines if the ground is connected (On) or removed/open (Off). Pressing Mode again will take you to the time setting which can be set from 0.01-9.99 seconds.

Also notice the mode indicators on the monitor. Each of these LEDs will be illuminated while being programmed. Also, the LED will either be On when the Channel is activated or Off when the Channel is Off.

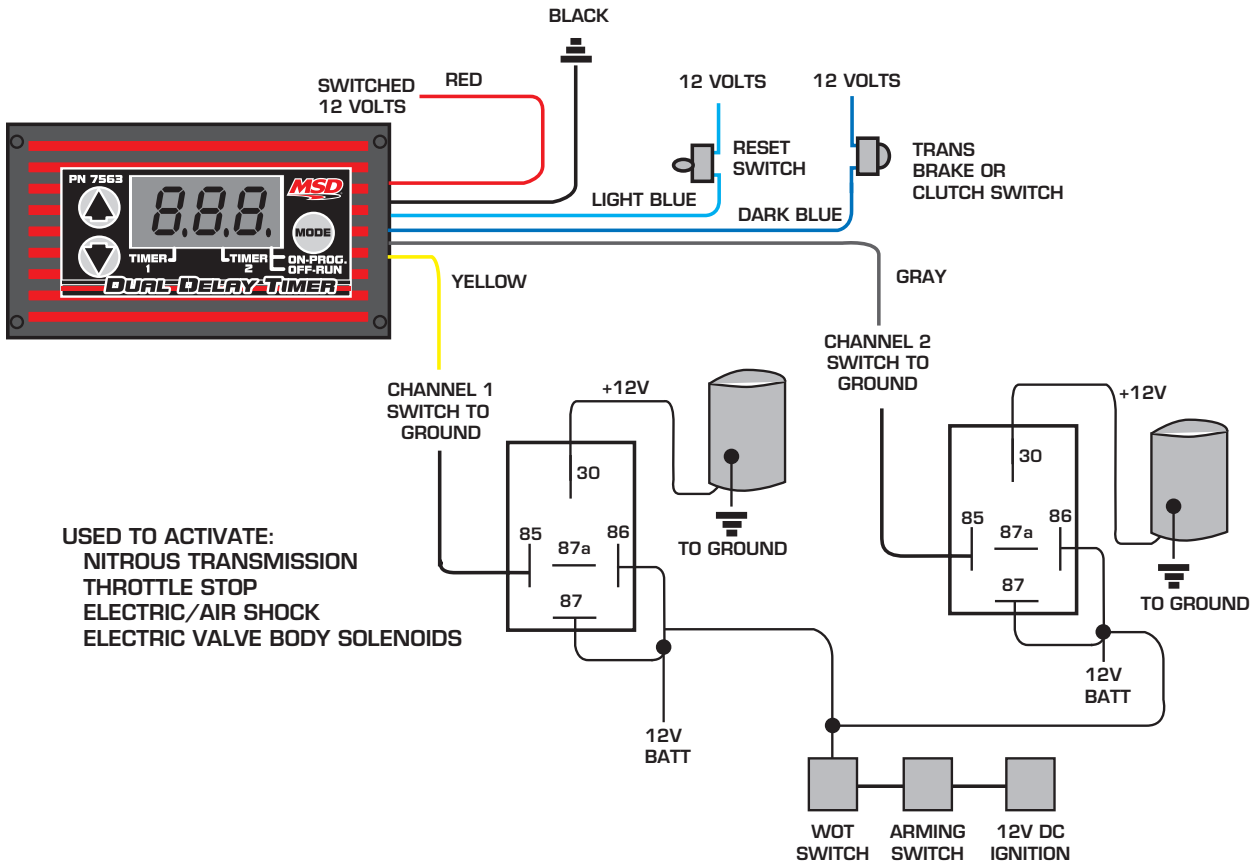
Once programmed, the Light Blue wire must be momentarily connected to 12 volts. This resets the Timer to zero. When 12 volts are removed from the Dark Blue wire, the timer begins. It will count to 9.99 seconds and stop. Note that the only way to stop the timer once it is going is to apply 12 volts to the Light Blue wire again (reset), or by touching any of the programming buttons.



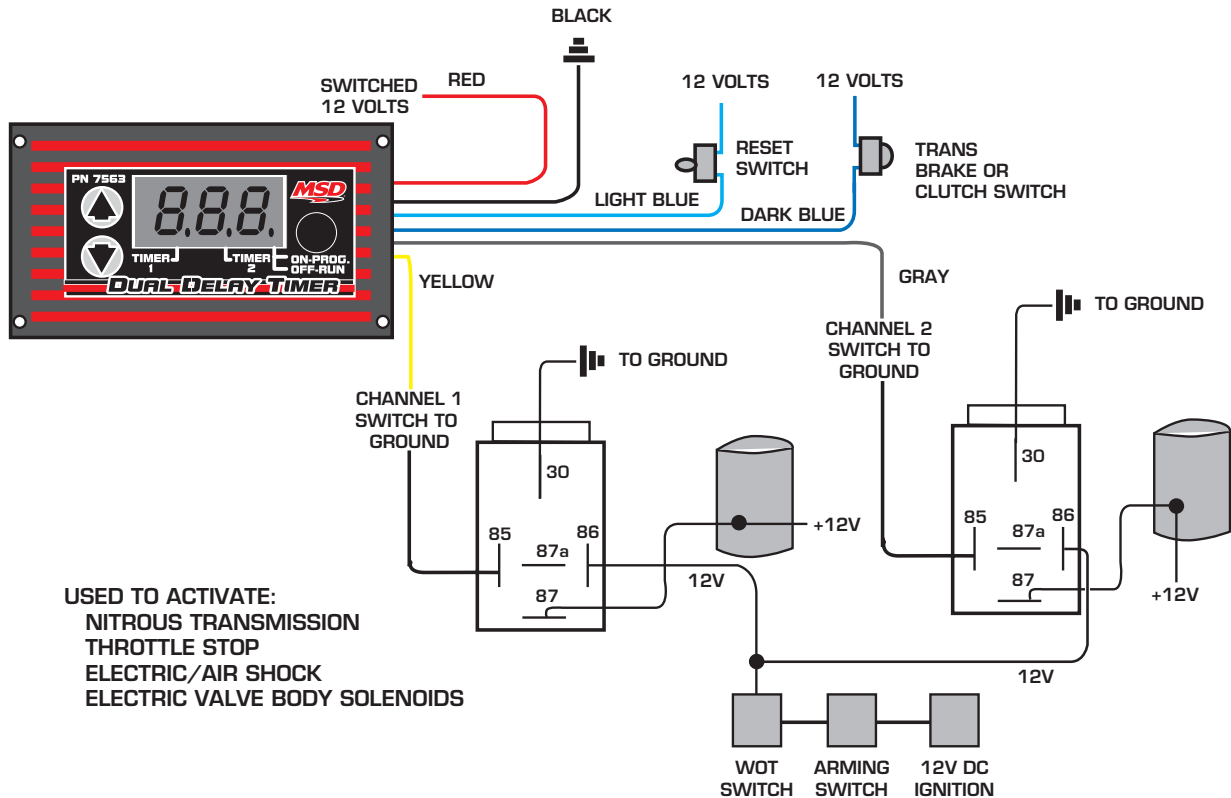
Basic Wiring of the Dual Delay Timer, PN 7563



Wiring High Current Applications Switching to +12V



Wiring High Current Applications Switching to Ground



MSD Programmable Fuel Booster, PN 2351

The Programmable Fuel Pump Booster will increase the voltage to the fuel pump in proportion to manifold boost pressure. The maximum voltage output is 22. The minimum output will be the battery voltage.

The MSD Fuel Pump Booster must be wired inline with the factory fuel pump relay. The factory has safety features built in, such as an inertia switch and high pressure shut-off which must be retained.

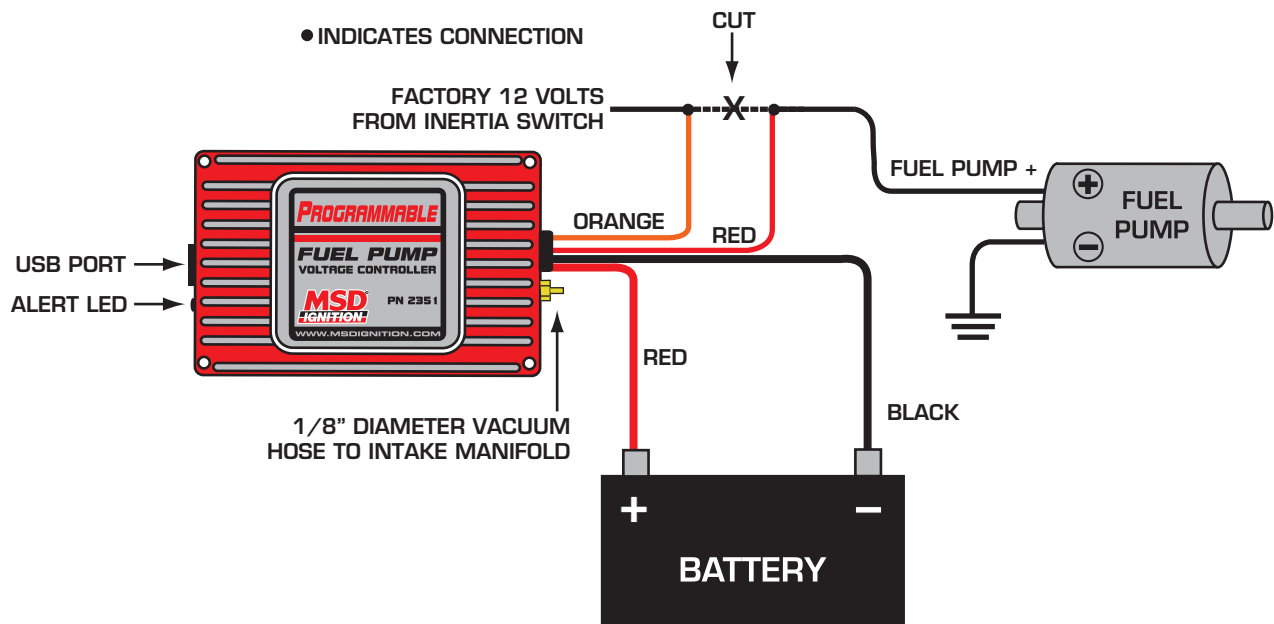
NOTE: It is recommended to have the Service Manual for your vehicle to identify the original wiring and fuel pump relay.

RATING: Continuous Power: 275 Watt, Peak Power: 375 Watt (one minute)

Wiring Function

Orange (18-Gauge, long):	OEM Fuel Pump Power (12V)
Red (12-Gauge, long):	Pump (+) Positive lead to Fuel Pump
Red (12-Gauge, short):	Battery (+) 12V
Black (12-Gauge, short):	Battery (-) Ground

Wiring the MSD Programmable Fuel Boost, PN 2351



LED

The LED will blink fault codes to alert the following conditions. See charts.

LED ALERTS	
ON	Normal Operation / No Fault
OFF	USB Power with No Fault

BLINKING TWO DIGIT FAULT CODES	
12	Over Current (25 A)
13	Open Load (.5 A)
14	Over Temperature (135° C)
21	Under Voltage (10V)
22	Over Voltage (17V)
23	Map Sensor Out of Range
24	Untested
31	Over Voltage - On output

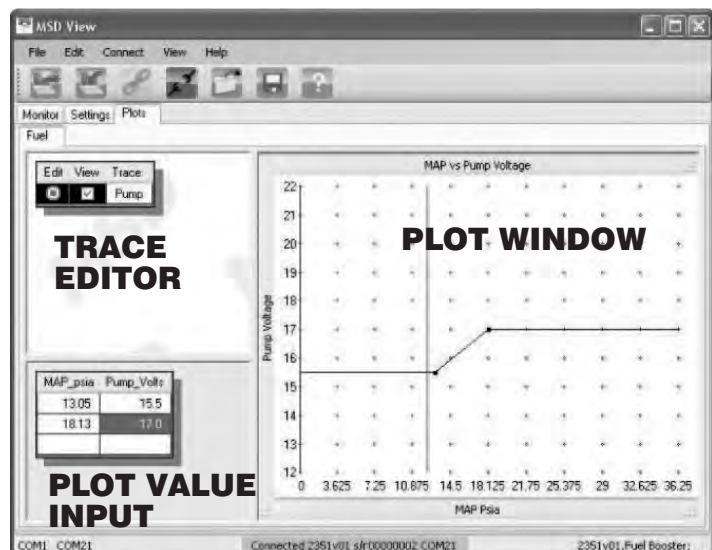
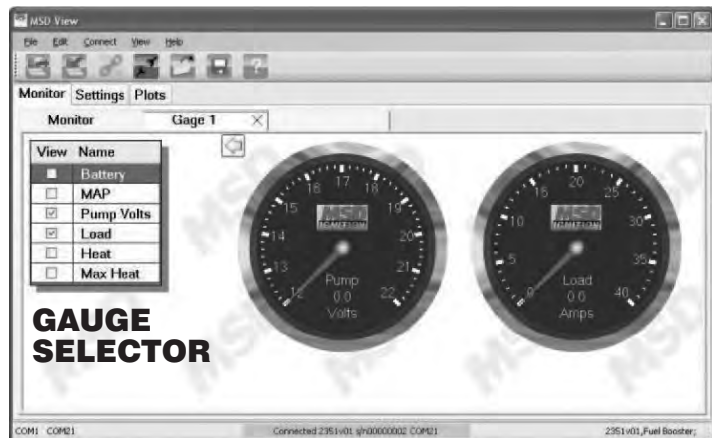
Using the MSDView Software

With the MSD connected, open the software by clicking the icon on your desktop. The screen will prompt for the MSD product part number (PN 2351) to be selected.

The MSD software is a Graphical User Interface (GUI) design that incorporates the familiar Windows style operating environment. There are three tabs that you can select; Monitor, Settings and Plots.

Monitor: The Monitor Tab allows you to view gauges for real time readings of the voltage and amps.

Plots: This tab will display the Trace editor, the Plot value input and widow.



Ignition Tester, PN 8998

MSD's Ignition Tester, PN 8998, will give you a quick way to confirm the operation of your MSD Ignition and Coil. It will also let you check rev limits, rpm switches and the camshaft sync signal of controls with Individual Cylinder Management circuits.

The Tester connects easily to a 12 volt source, ground and a trigger wire. The PN 8998 will simulate a trigger signal through either the points (White) wire or magnetic pickup connector of the ignition. A test plug is supplied that connects to the coil secondary wire leading to the distributor and ground. When the Tester is turned on, a spark will jump the gap of the test plug confirming operation of the Ignition and Coil.

The PN 8998 is designed for testing single channel MSD Ignitions such as the 6A, Digital-7 and even the MSD 8. It can also be used with MSD Timing Controls.

General Wiring

Red: Connects to switched 12 volt source.

Black: Connects to ground.

Trigger Wires

White: Connects to points or an ignition amplifier input. When this wire is used the Magnetic Pickup is not (Violet and Green).

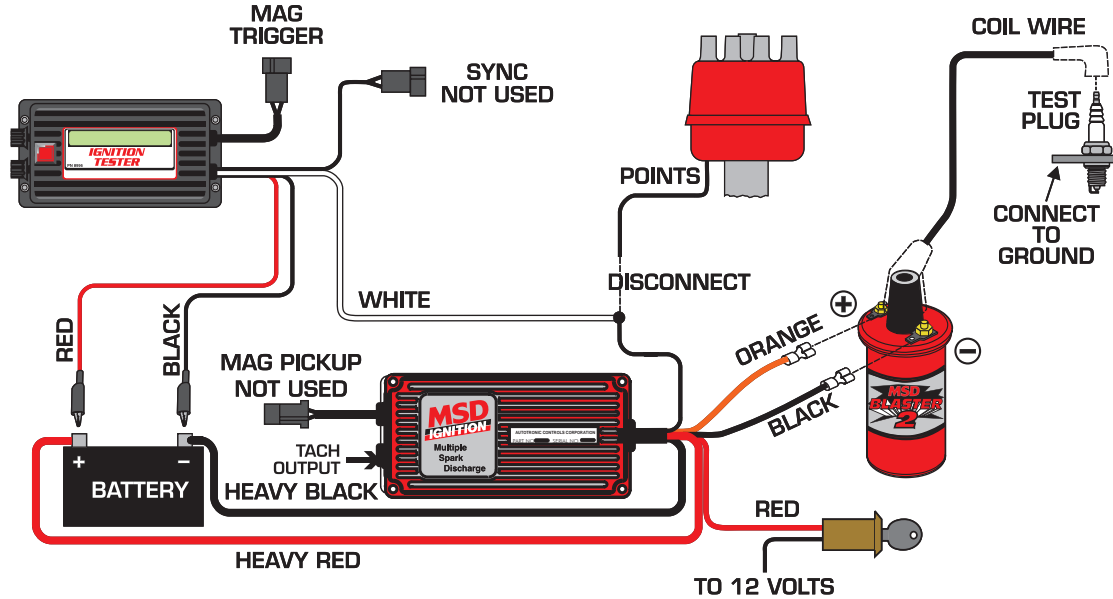
Violet and Green: These wires are routed together in one harness and form the magnetic pickup connector. This connector plugs directly into an MSD Magnetic Pickup Input. The Violet wire is positive (+) and the Green wire is negative (-). When this connector is used, the White wire is not.

Cam Sync

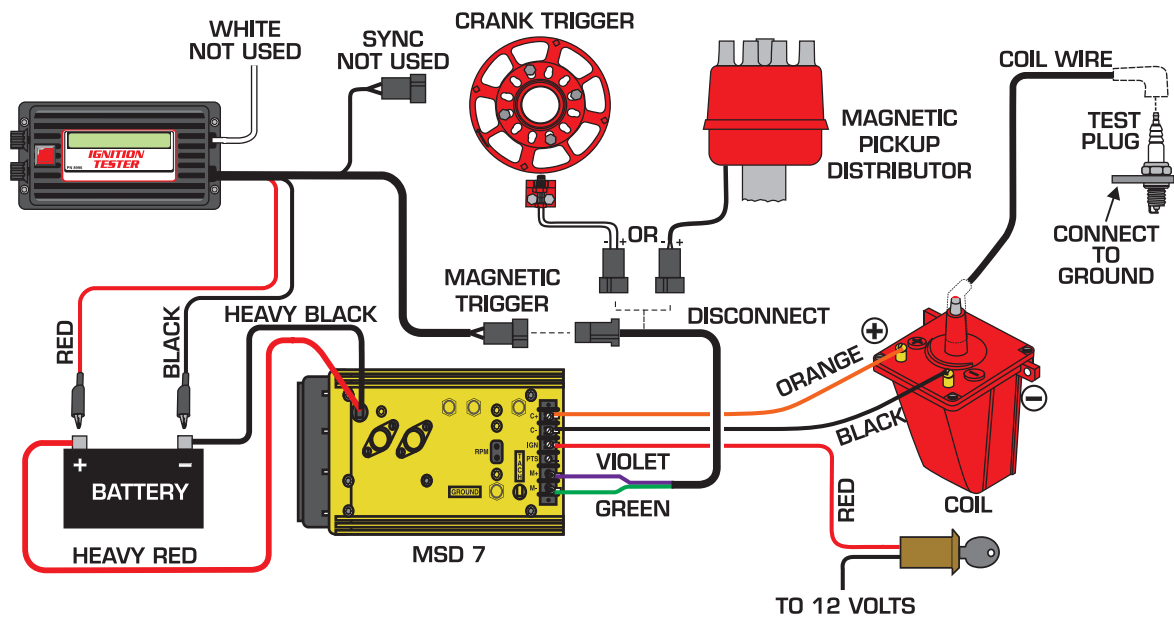
Light Blue and Green: This connector is used to confirm the cam sync signal for use with Individual Cylinder Management circuit. When the engine runs, it will show "Cam Sync - Sync" for a good signal "Cam Sync - None" if there is a problem.

Cylinder Select: Push the Program Selection button on top of the PN 8998 to select 4, 6 or 8-cylinder operation.

MSD Ignition Tester, PN 8998, to MSD 6-Series Ignition with Points

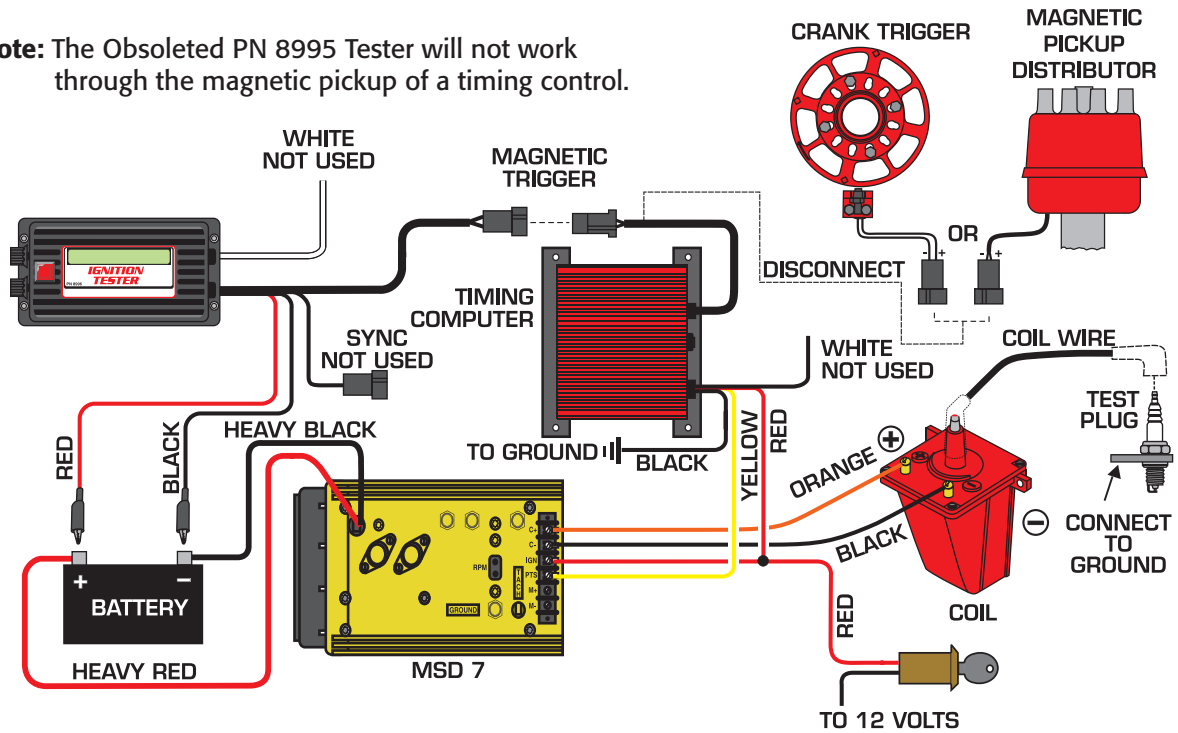


MSD Ignition Tester, PN 8998, to MSD 7-Series Ignition with Mag Pickup

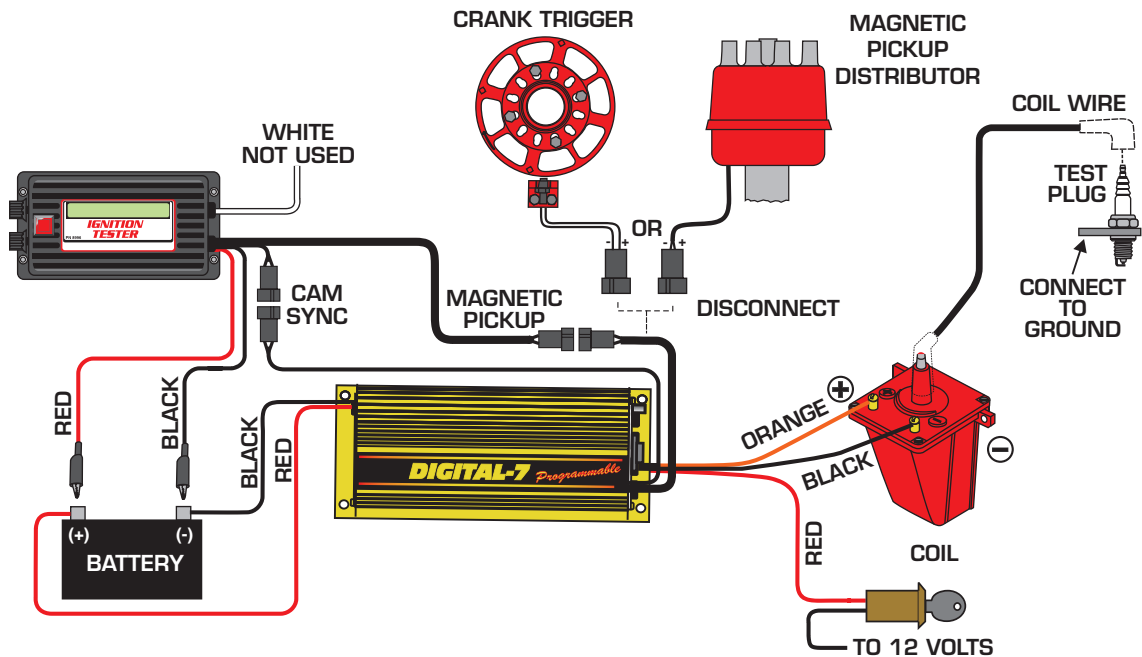


MSD Ignition Tester, PN 8998, to MSD 7-Series Ignition with Timing Control

Note: The Obsolete PN 8995 Tester will not work through the magnetic pickup of a timing control.



MSD Ignition Tester, PN 8998, to MSD Programmable Digital-7 Ignition



Troubleshooting

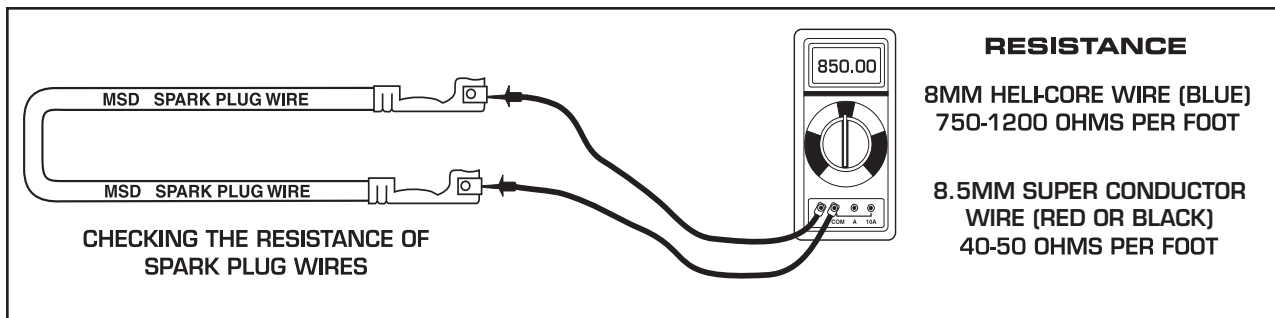
MSD Spark Plug Wires

If you suspect a spark plug wire to be open, or the cause for poor engine performance, the resistance of each wire can be checked. This will tell you two things:

1. That there is continuity (plug wire is not open).
2. That there is too much resistance in the wire.

Using an Ohm Meter, connect the terminals to the spark plug wire connectors. It is a good idea to try to push the boot up, to ensure that a good contact is being made. The resistance should be:

- A. Heli-Core Wire: 150-1,200 ohms per foot of wire
- B. 8.5mm Super Conductor: 40-50 ohms, per foot of wire

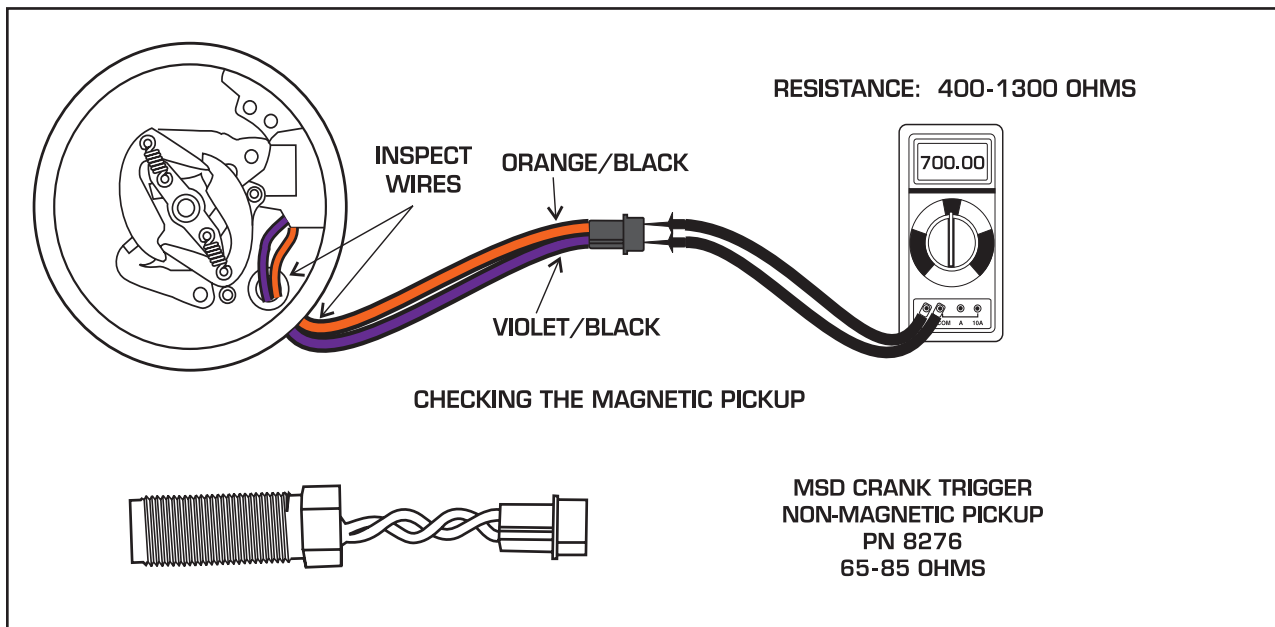


NOTE: For other brand wires check with the manufacturer for their specifications.

Checking Pickups

You can check the resistance of the magnetic pickup of an MSD Distributor. Using an Ohm Meter, connect the leads to the VIOLET and ORANGE wires at the two wire distributor connector.

- A. The resistance should be: 550 - 750 ohms.
- B. If the resistance is out of this specification, check all of the wiring connections. If the wires are okay, the magnetic pickup is at fault.

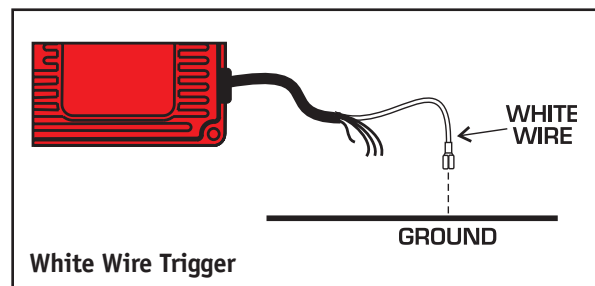
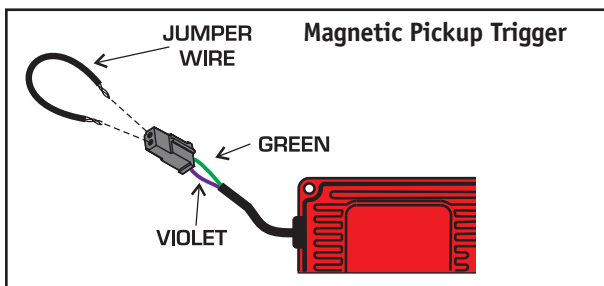


How to Test an MSD Series Ignition Control

If for some reason you feel that you have a non-functioning MSD Ignition Control, this simple test can be performed to determine if the MSD Ignition Control is functioning properly.

If triggering the MSD using the magnetic pickup connector (Violet and Green Wire) of the MSD:

- A. Make sure the ignition switch is in the "OFF" position.
- B. Remove the coil wire from the distributor cap and set the wire 1/2" from ground, such as the intake manifold or cylinder head. Do not crank or attempt to start the engine.
- C. Disconnect the magnetic pickup wires from the distributor or crank trigger pickup. Turn the ignition switch to the "ON" position. Do not attempt to crank the engine.
- D. With a small jumper wire, short the Green and Violet magnetic pickup wire going to the MSD together several times. Continue to step E below.



If triggering using the White wire of the MSD Series Ignition:

- A. Make sure the ignition switch is in the "OFF" position.
- B. Remove the coil wire from the distributor cap and set the wire 1/2" from ground, such as the intake manifold or cylinder head. (Do not crank or attempt to start the engine.)
- C. Disconnect the MSD White wire from the distributor's points or ignition amplifier. Turn the ignition switch to the "ON" position. Do not attempt to crank the engine.
- D. Tap the White wire to ground several times.
- E. When the magnetic pickup wires (Violet and Green) are shorted together repeatedly or the White wire is tapped to ground, a spark should jump from the coil wire to ground. If there is no spark substitute another coil and repeat the test. After repeating the test with another coil, if a spark still does not occur from the coil wire, remove the small "Red" wire from your MSD going to your ignition key "On/Off" source and attach it directly to the positive (+) terminal on your battery.

NOTE: Attaching the "Red" wire directly to the positive side of the battery will cause the engine not to shut off when the ignition key is turned off. If attaching the wire to the positive side of the battery cures the problem, then you must find a different "On/Off" 12 volt source for the small "Red" wire from the MSD. If after all of the above tests have been performed and no spark appears, then your box is in need of repair.

Service

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

All returns must have a Return Material Authorization (RMA) number issued to them before being returned.

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 using Ground shipping methods (ground shipping is covered by warranty).