

MSD INSTALLATION INSTRUCTIONS

MSD Ultra 7AL Racing Ignition PN 7227

ONLINE PRODUCT REGISTRATION: Register your MSD product online. Registering your product will help if there is ever a warranty issue with your product and helps the MSD R&D team create new products that you ask for! Go to www.msperformance.com registration.

Parts Included:

1 - MSD Ultra 7AL	1 - Parts Bags
1 - Main Harness	1 - RPM Pills bag 3K, 4K, 7K, 8K, and 9K
1 - Mag Pick-up Harness, PN 8860	1 - Degree Pills bag: 0°, 2°, 3°, 4°, 5°, 10°, 15°, & 20°

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

Note: The Ultra 7AL has not been CARB certified, therefore it is not legal for California use.

Important: When installing a Ultra Series Ignition, timing will be affected, reset to your

COIL RECOMMENDATIONS

The MSD Ultra 7AL can be used with a variety of coils, but to receive the best performance, it is recommended to use a MSD Coil. Using the MSD HVC III ignition coil, PN 82612 (Red), or PN 826123 (Black), will ensure maximum spark energy output and take advantage of the secondary current data logging capability. These coils have a current sense terminal that must be connected to the Black wire of the ignition for the current sense diagnostic.

COIL (+): Connect Orange wire to Coil (+) terminal

COIL (-): Connect Black wire to Coil (-) terminal

COIL (CS): Connect Black 18-Gauge wire to Coil (CS) terminal

Using the Current-Sense adds the 'Low Secondary Current' LED diagnostic for easier troubleshooting. See 'Alert LED' chart.

NOTE: In order to prevent arcing when the Current Sense feature (CS terminal) is not used, connect a jumper wire from the CS terminal to the coil Minus (-) terminal. (Figure 2)

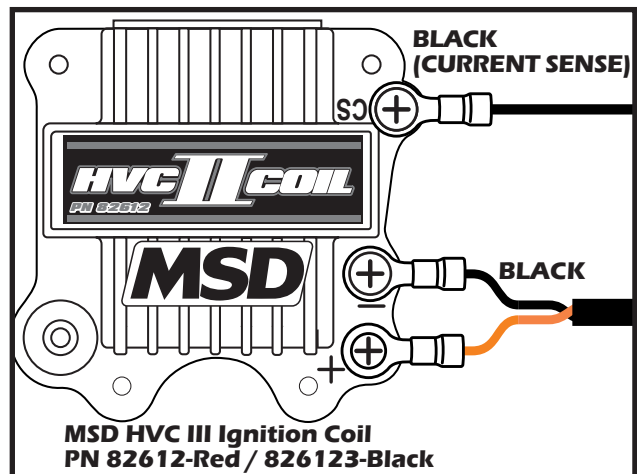


Figure 1 82612/826123 Wiring

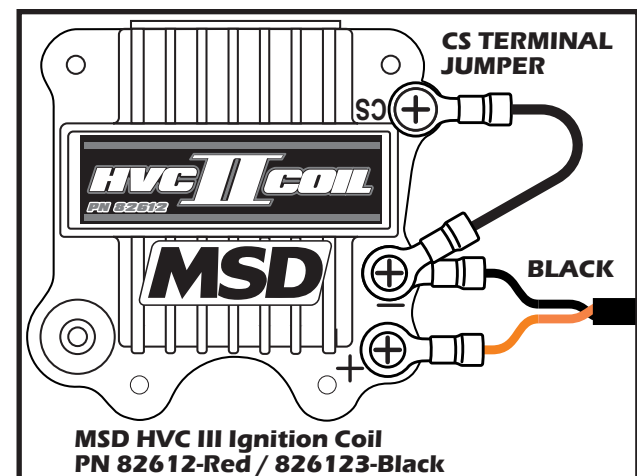


Figure 2 82612/826123 Wiring-CS Terminal Jumper

For drag racing and "short duration" applications, the Pro Power Coil, PN 8201, can be used. For street applications or long duration racing events, the HVC Pro Power Coil, PN 8251 are recommended.

The Ultra 7AL may be used with a GM HEI Distributor with an internal coil, however the Rotor Bushing must be replaced with the MSD Low Resistance Bushing, PN 8412.

SPARK PLUGS AND WIRES

The use of high-quality spark plug wires, and proper routing, are essential to ensuring proper operation and maximizing the output of your ignition system. MSD's helically wound 8.5mm Super Conductor spark plug wires are recommended.

Note: Do not use Solid-Core spark plug wires with an MSD Ignition.

A helically, or spiral wound wire must be used. This style wire provides a low resistance path for the spark to follow while keeping electromagnetic interference (EMI) to a minimum. Excessive EMI, such as the amount that solid-core wires produce, interferes with the operation of the MSD and other electronics in your car.

Spark Plug Wire Routing: Correct routing of the plug wires is also essential to performance. Route wires away from sharp edges and engine heat sources. If two wires are next to each other in the engine's firing order, route the wires away from each other to avoid inducing a spark into the other wire. For example, in a Chevy V8, the firing order is 1-8-4-3-6-5-7-2. The #5 and #7 cylinders are next to each other in the engine and in the firing order. If the voltage from the #5 wire is induced into #7, detonation could occur and cause engine damage. To add more heat protection to your plug wires, MSD offers Pro-Heat Guard, PN 3411. This is a glass woven and silicone coated protective sleeve that you slide over your plug wires.

Spark Plugs: Selecting the right spark plug design and heat range is essential for getting the optimum performance. Since there are countless engine combinations and manufacturers, MSD does not recommend the plug or the gap for each application.

Spark Plug Boot: Due to the extremely high secondary voltage this system can produce, spark plug boot condition and proper sealing on the spark plug porcelain is critical. Boots should be inspected regularly for tears, pinholes and other damage. A high-quality dielectric grease (such as MSD Spark Guard, PN 8804) should be applied when the boots are installed or the wires are serviced.

MOUNTING

The Ultra 7AL, if placed in the engine compartment, should be away from direct exhaust or engine heat sources. While finding a proper location to mount the units, ensure that the wires can reach their intended connections and install the vibration mounts then mount the ignition using the supplied lock washers and nuts.

Before mounting the ignition, verify:

1. The HVC III ignition coil is mounted.
2. The wires can reach their destination.
3. The location is away from direct exhaust or engine heat sources.

WIRING

POWER LEADS The two larger gauge wires are for direct battery voltage to the ignition. The ignition is load protected from reverse battery connections.				
Heavy Red	16GA	6, 22, & 23	Battery Power	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	16GA	11, 28 & 29	Battery Ground	Connects to a good ground, either at the battery (-) negative terminal or to the engine.
Red	18GA	24	Ignition	Switched 12V (Ignition)
Black	18GA	1	Coil (-)	This terminal is the ONLY wire that makes electrical contact with the Coil (-) terminal. (Not Ground)
Orange	18GA	20	Coil (+)	This Terminal is the ONLY wire that makes electrical contact with the Coil (+) terminal.
TRIGGER - The Points circuit (White) and Magnetic Pickup circuit (Green/Violet) are used to trigger the MSD Ignition. ONLY ONE should be used at a time.				
White	18GA	16	Points	Connect to breaker points, electronic ignition amplifier output or to the Yellow wire of an MSD Timing Accessory. The Magnetic Pickup connector (Violet/Green) are not used.
Violet Green	18GA	30 13	Magnetic Pickup	Magnetic Pickup. 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 (-). The White wire is not used. (See Table 1. for wire colors)
ACCESSORIES				
Gray	18GA	9	Tach	Output tach wire which connects to the tachometer trigger wire or other RPM activated device.
Pink	20GA	15	Step 1 Retard	When 12 volts are supplied, the Step 1 Retard is activated.
Purple	20GA	12	Step 2 Retard	When 12 volts are supplied, the Step 2 Retard is activated.
Tan	20GA	8	Step 3 Retard	When 12 volts are supplied, the Step 3 Retard is activated.
Lt Green	20GA	7	Step 4 Retard	When 12 volts are supplied, the Step 4 Retard is activated.
Lt Blue	20GA	5	Burnout Rev Limit	When 12 volts are applied the Burnout Rev Limit is active. This overrides other rev limits. It is recommended to have this wire switched from an outside source.
Dk Blue	20GA	4	Two Step	When 12 volts are supplied, the Launch Rev Limiter RPM value is active. (Clutch/ Trans Brake)
Black	18GA	32	CS (Current Sense)	Used for Current Sense diagnostic on select coils with the CS terminal.
Pink/Black	18GA	34	Lo Side SW1	RAS 1 - Activated Ground at the RPM of pill used. It can turn on components such as a shift light or nitrous solenoid.
D Blue/ White	18GA	17	Lo Side SW 2	RAS 2 - Activated Ground RPM of pill used. It can turn on components such as a shift light or nitrous solenoid.
Gray/Green	20GA	31	Energy Level	Energy can be switched on the fly between lower energy of 165mJ to maximum energy output of 330mJ.

Heavy Red: Connect Red wire directly to the battery positive (+) terminal.

Heavy Black: Connect Black wire directly to the battery negative (-) terminal.

Orange: Connect the "Orange (Coil +)" wire to the positive terminal (+) of the coil.

Black: Connect the "Black (Coil -)" wire to the negative terminal (-) of the coil.

Note: The Points and Mag Pickup will never be connected at the same time.

Points: If you are using a Points style distributor or electronic amplifier, only "Points" will be used. Connect the supplied WHITE wire from the points output in the distributor to the White Points wire.

Magnetic Pickup: If you are using an MSD Distributor or Crank Trigger, only the Magnetic Pickup terminals will be used. Locate the supplied harness with a VIOLET and GREEN wire with a 2-pin connector on one end. Connect the VIOLET wire to the "Mag +" terminal and the GREEN wire to the "Mag -" terminal then connect the 2-pin connector to the Distributor.

Magnetic Pickup Polarity

The Ultra 7AL can be used with other magnetic pick-up distributors as long as the wires are connected correctly.

The table on the right shows the polarity of some common magnetic pickups

MAKE	POLARITY	
MSD DIST	BLACK/ORANGE	BLACK
CHRYSLER	WHITE/ORANGE	BLACK
FORD	BLACK/ORANGE	BLACK/PURPLE
GM	WHITE	GREEN

Table 1 Mag Colors

TACHOMETER

The Gray wire, TACH, provides a square wave 12 volt, 20% duty cycle signal for your tachometer. If your tachometer reads erratically or does not operate properly, a Tach Adaptor may be required. If you are using the white wire to trigger (points input) you will need Adapter PN 8910. If you are using the magnetic pickup, PN 8920 will be the right Adapter.

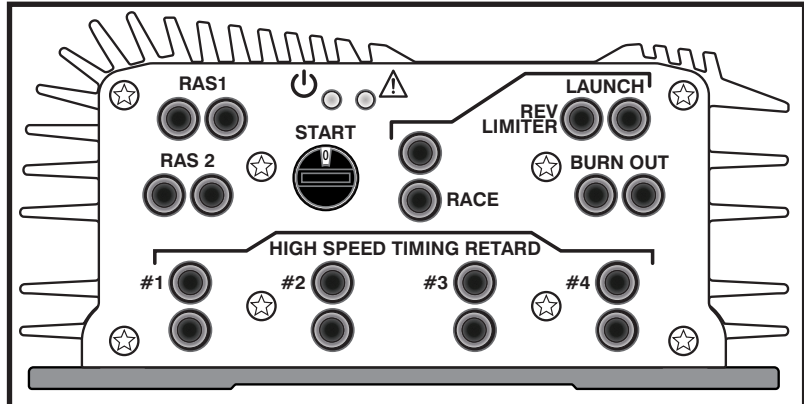


Figure 3 Switch and Module Panel

Burnout Rev Limit:

Connect the supplied Light Blue wire from the MSD to the 12 volt activation wire of the line lock solenoid. With this setup, when the line lock is activated, 12 volts will be supplied to the Burnout wire which limits the rpm to your specified burnout rpm module.

Launch Rev Limit (Two Step):

Connect the supplied D.Blue wire from the MSD then splice it into the clutch or trans brake 12 volt activation wire. This way, when the clutch pedal is depressed, 12 volts is applied to the Launch terminal which limits the rpm to your specified launch rpm module.

Note: The Launch rpm limit is designed to override the Burnout limit. This way, if you activate the line-lock on the starting line, when the Launch terminal is activated through the trans brake or clutch switch, the Launch rpm (not the Burnout limit) will be in effect.

Energy Level:

With the Gray/Green Power Boost wire, the ignition output can be changed on the fly between programmable lower energy (165 mJ by default) to higher programmable energy (330 mJ by default). The lower energy reduces the battery power requirements, lessening the stress on the ignition components. The ignition's use of Alternating Current (AC) energy transfer and an internal coil coupler, considerably improves the system's efficiency over Direct Current (DC) Ignitions. This increased efficiency translates to more energy at the spark gap combined with longer spark duration and cooler operating temperature of the ignition coils.

Note: For long duration operation, where maximum ignition energy is not required (such as a Drag & Drive event), it is advisable to select the low energy (165 mJ) setting to maximize and extend distributor rotor life.

LEDs

ON/OFF LED

The ON/OFF LED monitors Idle speed, Faults and will illuminate green above idle speeds. If there is a problem with the ignition system the Alert LED will illuminate.

COLOR	ACTIVE ALERTS
GREEN	SPARK
RED	FAULT (AND BLINKING LED)
YELLOW	KEY ON (IDLE)

Table 2 ON/OFF LED

ALERT LED

The Alert LED provides various color codes to help with troubleshooting if there is a problem with the ignition system. See Alert LED table for color and list faults.

COLOR	ACTIVE ALERTS
GREEN	SPARK
RED	CONVERTOR SHORTED
PINK	OPEN COIL
WHITE	OPEN LOAD (WORN OUT SPARK PLUGS)
PURPLE	COIL SHORTED
ORANGE	REGULAR FAULT
YELLOW	HIGH TEMPERATURE WARNING

Table 3 ALERT LED (RGB)

MODE SWITCH SELECTION CHART

(Cylinder Select & Start Retard)

The Mode switch sets the Cylinder, a start retard, and Rev Limit. The Start Retard eases cranking on engines with locked timing, high compression and a lot of advance

See 'MODE SWITCH SELECTION CHART'

(Table 4) for detailed settings. When the Mode switch is set to 0 or 9, the unit defaults to 8 cylinder, 00 start retard operation.

When the Mode switch is set to positions 1-8, the unit will be set to the corresponding setting in the Mode Switch Selection Chart.

RPM Activated Switch (RAS)

The RPM Activated Switch Outputs, RAS1 (Pink/Black wire) & RAS2 (D.Blue/White wire) will turn on a component such as a shift light or nitrous solenoid at an adjustable rpm point determined by the pill used and by supplying a ground path.

The RPM Switch is capable of handling a 10 amp load. If 12 volts is required to activate the component, use an MSD Relay, PN 8961.

RETARD WITH THE RPM ACTIVATED SWITCH

The Ultra 7AL has both an RPM Activated Switch (RAS) and a Multi-Step Retard. The stages of retard are activated when the corresponding activation wire is connected to 12 volts. The RAS can only activate a circuit by providing a ground path.

If you want to use the RAS to activate a retard stage of the Ultra 7AL, an external relay must be used. The MSD Relay, PN 8961, is supplied in the parts bag with the Ultra 7AL.

MULTI-STEP RETARD (High Speed Timing Retard)

There are four retard modules available with the Ultra 7AL. The controlling terminals are listed as #1 through #4 their corresponding wires are:

- Pink - Step 1 Retard
- Purple - Step 2 Retard
- Tan - Step 3 Retard
- Lt Green - Step 4 Retard

Each module is activated independently by supplying 12 volts . The modules can be activated in any order and are cumulative unless deactivated. The maximum amount of retard allowed is a total of 20° even if the modules add up to more than 20°.

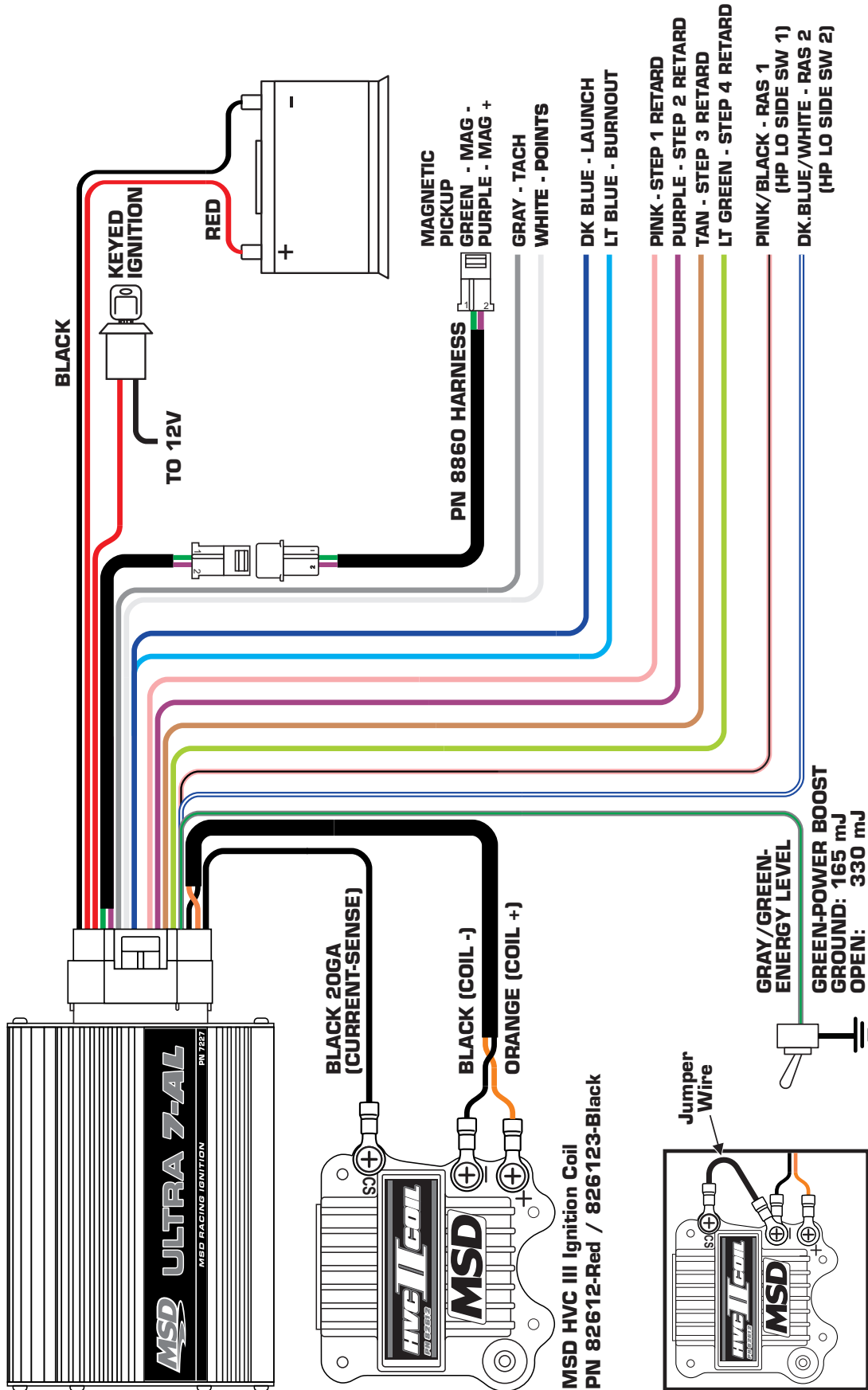
Note: If a Retard function is not going to be used it is recommended to install a "zero" degree module.

RACE Limit:

After the car launches the Race rpm limit is activated to the RPM limit used to protect the engine from over revving.

MODE SWITCH SELECTION CHART	
MODE Switch Position	Max Engine RPM/Number of Cylinders Selected/Start Retard Selected/Rev Limit
0	Max Engine RPM / 8 Cyl, 0°, Start Retard / Rev Limit Set
1	Max Engine RPM / 8 Cyl, 10°, Start Retard / Rev Limit Set
2	Max Engine RPM / 8 Cyl, 20°, Start Retard / Rev Limit Set
3	Max Engine RPM / 6 Cyl, 0°, Start Retard / Rev Limit Set
4	Max Engine RPM / 6 Cyl, 10°, Start Retard / Rev Limit Set
5	Max Engine RPM / 6 Cyl, 20°, Start Retard / Rev Limit Set
6	Max Engine RPM / 4 Cyl, 0°, Start Retard / Rev Limit Set
7	Max Engine RPM / 4 Cyl, 10°, Start Retard / Rev Limit Set
8	Max Engine RPM / 4 Cyl, 20°, Start Retard / Rev Limit Set
9	Max Engine RPM / 0 Cyl, 0°, Start Retard / Rev Limit Set

Table 4 Mode Switch Selection



Note: For long duration operation, where maximum ignition energy is not required (such as a Drag & Drive event), it is advisable to select the low energy (165 mJ) setting to maximize and extend distributor rotor life.

NOTE: In order to prevent arcing when the Current Sense feature (CS terminal) is not used, connect a jumper wire from the CS terminal to the coil Minus (-) terminal.

