

Digital **HP**

The logo features the word "Digital" in a red, italicized sans-serif font. To its right, the letters "HP" are rendered in a large, bold, white sans-serif font with a red outline. Below the "Digital" text and the left side of the "HP" are four horizontal red lines of varying lengths, creating a sense of motion or speed.

BY **PERTRONIX**

PERTRONIX DIGITAL HP INSTALLATION INSTRUCTIONS

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SPECIFICATIONS

Operating Voltage:	9-22 Volts
Cranking Voltage:	8-22 Volts
Current Draw:	1.2A per 1000 RPM
Input Triggers:	Points, Electronic Ignition, or Mag Pickup
Output Voltage:	530 Volts
Output Energy:	Up to 187+mJ primary spark
Tach Output Signal:	12 Volt square wave, 50% duty cycle
Multi-Spark Window:	Up to 20 crank degrees
Start Retard:	Adjustable 0-18 degrees / 500-1400 RPM
Weight:	0.7 lb
Length	4.18 Inches (5.15" with connector)
Width	3.75 Inches
Height	1.65 Inches
Mounting Bolt Pattern	3.5" X 3.25"

PARTS INCLUDED

- 1 - Digital HP Ignition
- 1 - Main Harness

- 1 - Mag Trigger Harness
- 1 - Hardware Pack

TOOLS NEEDED FOR INSTALLATION

- Phillips Screw Driver
- Wrenches and Sockets
- Wire Cutters / Strippers
- Power Drill & #20 Drill Bit
- Crimper
(PerTronix T3001 Recommended)

GENERAL INFORMATION

- It is important to read the entire installation manual before starting your installation. Doing so will insure proper setup and trouble free operation.
- Only connect the Digital HP main battery power leads to the battery. If installing on a vehicle with a trunk mounted battery, extend the Digital HP battery leads with 10 - 8 AWG wire.
- Completely disconnect and remove the Digital HP before performing any welding on the vehicle.
- Optional: Programming can be done on the bench top if desired. See page 11 for details
- If using the gray wire to trigger a fuel injection system, make sure to disable the rev limiter verification setting found on page 15.
- Remember to disconnect the battery negative cable before installation.
- The Digital HP should only be used in conjunction with a low resistance coil. We recommend the Flame-Thrower III canister coil or Flame-Thrower HP E-core coil for optimal performance.
- Never use solid core spark plug wires with this Ignition system.
- We recommend the factory spark plug heat range be used. The spark plug gap can be incrementally increased by 0.005" while testing after changes for best performance. Note extending the plug gap can shorten the spark plug life and increase service intervals of the cap and rotor.
- Resistor style rotors are not recommended.
- Not for use on 6 Volt or Positive Ground applications.
- This system is Legal only for Closed Course Competition Vehicles

UNDERSTANDING CAPACITIVE DISCHARGE

Inductive systems require a longer time, or dwell period, for the coil to charge fully. The Digital HP CD ignition steps up the primary voltage to 530+ volts and stores this in a capacitor, which when triggered, quickly dumps the high voltage into the coil. The coil then reaches maximum charge much quicker.

Most CD boxes stop multisparking around 3000 RPM. This is due to the rate at which other CD ignitions can multispark, about 1 time per millisecond. At 3000 RPM, their second spark occurs about 20 crank degrees later. The Digital HP sparks 50% faster. This means that you have 2-3 times as many sparks at 3000 rpm and multiple sparks to 7000 + RPM. More importantly, the following sparks are closer to the desired ignition timing for better combustion

COIL COMPATIBILITY

The Digital HP is a high power CD ignition system and needs a coil that is capable of handling the increased power without overheating. For normal street driving, the Digital HP will work with most coils that have a primary resistance of 3 ohms or less. A low resistance coil such as the Flame-Thrower III canister coil, or Flame-Thrower HC or HP are highly recommended. For extended high RPM use, such as circle track or road racing, only use the Flame-Thrower HP coil (PN 60100) or equivalent. The Flame-Thrower HP coil is an ultra low resistance coil designed specifically for CD ignitions.

Application	Canister Coils	E-Core Style Coils
Street Driving or Drag Strip	Flame-Thrower III PN 44001, 44011	Flame-Thrower HC/HP PN 60103, 60100
Road Racing/Circle Track	NOT RECOMMENDED	Flame-Thrower HP PN 60100

MOUNTING THE DIGITAL HP



Disconnect the battery negative cable before starting work on the vehicle. Select a mounting location for the Digital HP. Place the box where there is visibility of the LEDs, adequate access to the switch interface and room for the wire harness attachment. Keep it away from direct exhaust heat and areas that are exposed to wet conditions. Make sure the mounting location allows the harness wires to reach the battery and other connection points. Typical installation locations include the firewall and inner fenderwell. Due to the Digital HP's size, it can be mounted in locations that other larger ignition systems can't.

Hold the box in the desired location and mark the mounting hole positions. The mounting hole pattern measures 3.5" long and 3.25" wide. Drill four pilot holes with a # 20 or smaller drill bit. Use the provided #8 sheet metal screws to fasten the box in place. Optionally, the unit can be mounted with the provided 8-32 machine screws and locking nuts.



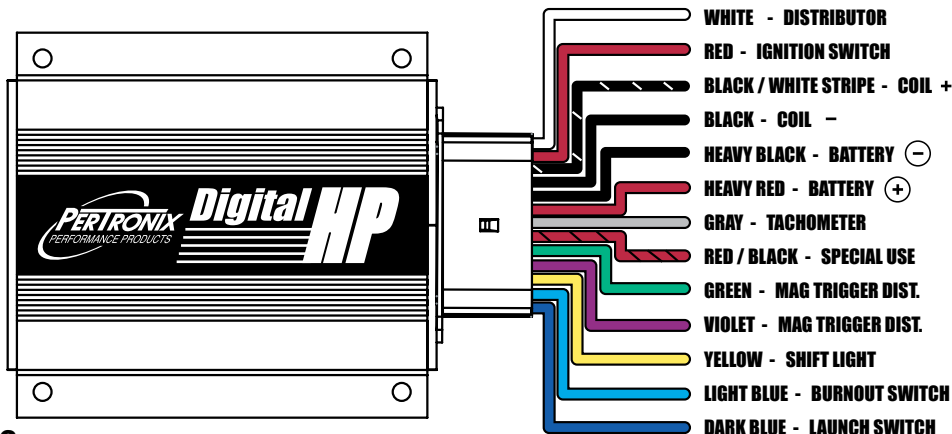
WIRING

The Digital HP uses a locking automotive connector. Push the wiring harness connector onto the box until it clicks. Push in the red lock to insure the connector is secure. To remove the connector, pull the red lock out, and press down on black latch while pulling on the connector.

Route the wires towards their ultimate connection points. Make sure to keep the wires away from sharp edges, moving objects, and heat sources.

Determine the appropriate length for each wire then cut the wire to length. Any unused wires should be coiled and taped out of the way. The most common terminals are provided to complete each connection. Use a proper crimp tool to attach the terminals to the wires. The PerTronix T3001 quick change crimp tool provides excellent crimp connections. It is best to keep the coil wires (Black & Black/White) separated from the trigger wires (White & Violet, Green) to prevent EMI. Only connect the Digital HP main battery power leads directly to the battery. If necessary, the wires can be extended with 10 - 8 AWG wire.

Application specific wiring diagrams can be found on pages 21-25 of this manual.



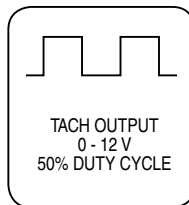
WIRING

Main Power Leads	The large red and black wires provide power directly from the battery. They are labeled "BATTERY" at the connector.
Heavy Red	This wire is labeled "B+". It connects directly to the battery (+) terminal. It must NOT be connected to the alternator. Do not reverse the polarity.
Heavy Black	This wire is labeled "B-". It connects directly to the battery (-) terminal. It must NOT be connected to an engine or chassis ground point.
Coil Wires	The two wires attached to the coil can create EMI (electromagnetic interference) Keep these wires isolated from the trigger wires.
Small Black	This wire connects to the coil (-) terminal. It will be the only wire connected to this terminal.
Black / White Stripe	This wire connects to the coil (+) terminal. It will be the only wire connected to this terminal.
Small Red	This wire is connected to the ignition switch wire or 12 Volt run switch.
White	This wire is used with breaker point and electronic ignition triggers. Do not use this wire if the Violet & Green wires are connected.
Violet & Green	These wires are used with magnetic trigger distributors. Duraspark, TFI and HEI distributors use these wires. Do not use these wires if the White wire is connected. Extension harness included.
Gray	This wire is connected to the trigger wire of most tachometers. It can also trigger rpm registered devices and batch fuel injection systems.
Dark Blue	This wire is used with the Launch Rev Limiter feature. Ground wire to activate Launch Limiter.
Light Blue	This wire is used with the Burnout Rev Limiter feature. Apply 12V to this wire to activate Burnout Limiter.
Yellow	This wire connects to a shift light or RPM switched device. It is grounded when activated.
Red / Black Stripe	This wire is used for internal tach adapter. See notes on use.

TACH OUTPUT (GRAY WIRE)

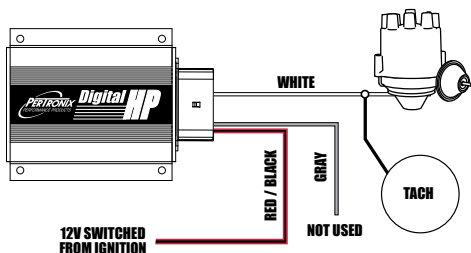
For most applications, the tach should be connected to the gray wire output from the Digital HP. This output is a 12V square wave signal for smooth tach operation, even at the rev limits. Using the gray wire also allows for other functions like rev limit verifications on startup.

Some OEM tachs will not function properly when connected to the gray wire. Determine the type of tachometer you have and follow the instructions below. Tach wires should never be connected directly to the coil.



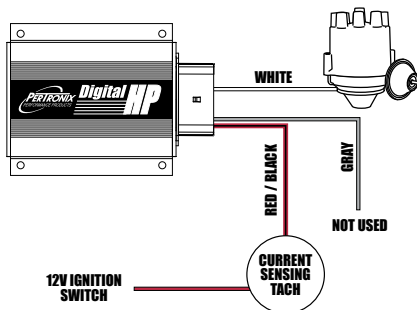
VOLTAGE SPIKE TACH

Some older tachometers that previously attached to the coil negative terminal, can have problems functioning with a modern tach signal. To adapt the tach signal for these tachs, attach the red/black wire to switched 12V power source. Attach the original tachometer wire to the white wire in the Digital HP harness.



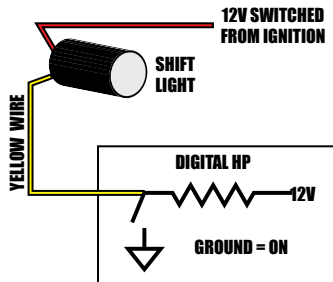
CURRENT SENSING TACH

Current sensing tachs typically connect inline with the coil and ignition switch. For these tachs, connect tach wire that previously attached to the coil directly to the red wire with the black stripe.



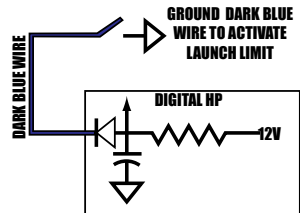
SHIFT LIGHT OUTPUT (YELLOW WIRE)

This output can be used to trigger a shift light, or as an RPM activated switch. This output grounds when active. To wire for a shift light, connect one side of the light to 12V, the other side of the light to the yellow wire. It is not recommended to exceed 200mA. This would be equal to a 2W bulb. If more current is needed, the yellow wire can be used to trigger a relay.



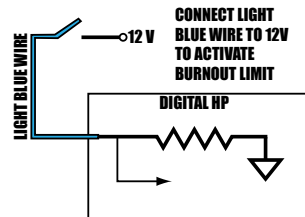
LAUNCH LIMIT INPUT (DARK BLUE WIRE)

This input is used to activate the Launch RPM Limit (2nd RPM Limit). It is activated when the input wire is grounded. To deactivate it, pull the input wire up to 12V, or disconnect it. This function can be tested by turning the ignition switch on, but engine not running, and activate the launch switch. The RUN LED will turn on indicating proper function.

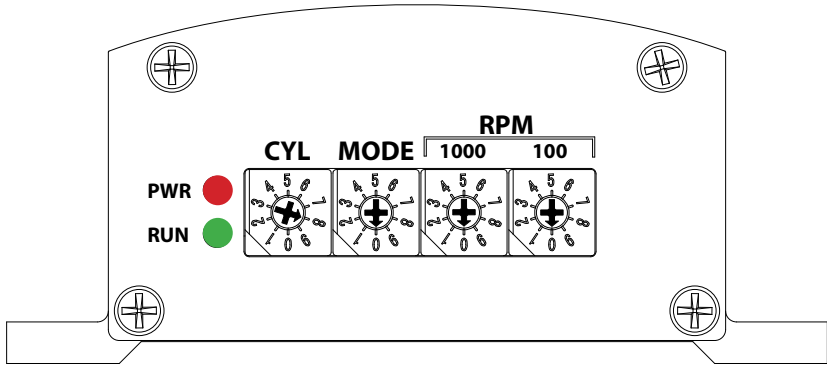


BURNOUT LIMIT INPUT (LIGHT BLUE WIRE):

This input is used to activate the Burnout RPM Limit (3rd RPM Limit). It is active when the input wire is pulled to 12V. To deactivate it, ground the wire, or just disconnect it. This function can be tested by turning the ignition switch on, but engine not running, and activate the burnout switch. The RUN LED will turn on indicating proper function.



USER INTERFACE



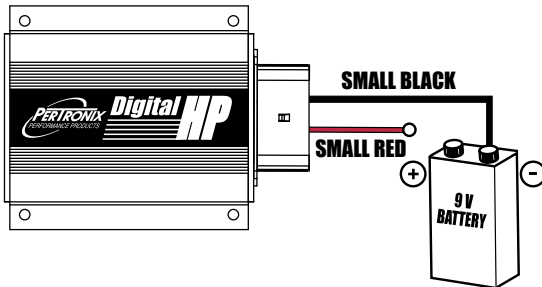
PWR LED	Red LED comes on with the key, and is used to indicate diagnostic codes.
RUN LED	Green LED blinks with each trigger & is solid while running. Blinks to indicate program activity and diagnostic codes.
CYL Switch	Used to select the number of cylinders.
MODE Switch	Used to activate various programming features.
1000 Switch	Used to set 1000 RPM increments for rev limiters and to select options while in some program modes.
100 Switch	Used to set 100 RPM increments for rev limiters and to select options while in some program modes.

PROGRAMMING

The following settings are loaded into the Digital HP from the factory. Once the settings are changed by the user, the new settings overwrite the default values, and are stored into memory.

Setting	Default Value
Cylinders	No default value. Must be set by user.
Trigger Type	Breaker points or Electronic Ignition (Rising Edge)
Fatal Rev Limit	5500 RPM
Launch Rev Limit	4000 RPM
Burnout Rev Limit	3000 RPM
Shift Light On	5000 RPM
Shift Light Off	8500 RPM
Multi-Spark	On
Power Level	145mJ
Start Retard Degrees	10 Crank Degrees
Start Retard RPM	800 RPM

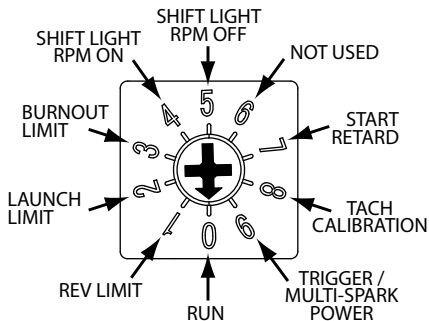
BENCH TOP PROGRAMMING



Optional: Programming of the Digital HP can be done before installing. This requires a 9V battery. Attach the small black wire to the battery negative terminal. Program your settings. When finished hold the small red wire on the battery positive terminal. The LEDs will blink indicating the setting is saved.

PROGRAMMING (CONTINUED)

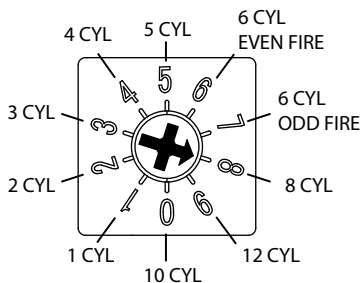
Each programmable feature is covered in its own section, complete with charts showing the available options. All settings should be changed with the ignition switch off. After each **MODE** selection, the ignition switch must be turned on so that the settings can be saved into memory. The PWR and RUN LEDs will blink simultaneously 3 times indicating successful programming. If the value that you are trying to program matches what is already saved into memory, the LEDs will blink alternating 3 times. After the programming is completed, turn the ignition switch off and return the **MODE** switch to the 0 position.



MODE Switch Position	Program Mode
1	Fatal Rev Limiter
2	Launch Rev Limiter
3	Burnout Rev Limiter
4	Shift Light On RPM
5	Shift Light Off RPM
6	Not Used
7	Start Retard
8	Tachometer Calibration
9	Trigger / Multi-Spark / Power Select
0	Run

CYLINDER SELECTION

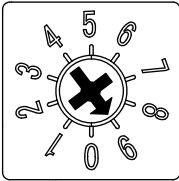
The **CYL** switch is for selecting the number of cylinders. The Digital HP will work on applications ranging from a single cylinder to 12 cylinder engine. Reference the chart and diagram below to determine the appropriate switch position for your application. Turn the dial so that the arrow points to your selection. This selection must remain fixed in this position for proper operation and RPM calculations. The cylinder selection switch is only read when the ignition switch is turned on and does not get stored into memory.



CYL Switch Position	Cylinders
1	Single cylinder engine
2	Two cylinder odd or even fire engines
3	Three cylinder engines
4	Four cylinder engines
5	Five cylinder engines
6	Six cylinder even fire engines
7	Six cylinder odd fire engines
8	8 cylinder engines
9	12 cylinder engines
0	10 cylinder engines

TRIGGER / MULTI-SPARK / POWER SELECTION

MODE 9



The trigger type, multiple spark and power settings are all set at the same time. Within this program mode, the Rev Limit Verification setting is also established (pg 15).

The trigger type can be configured for traditional breaker point triggers, electronic ignition triggers (rising edge) or magnetic triggers (falling edge). The multiple spark function can be turned on or off and the power level adjusted between 145mJ and 187mJ.

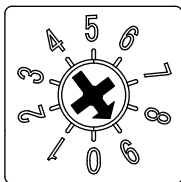
Select your trigger type in the chart below. Next choose your desired settings for the multiple spark and power level functions. The **1000** switch position is indicated in the column to the right. Write this position down and proceed to the Rev Limit Verification section on the next page.

Trigger Type	Multi-Spark	Power Level	1000 Switch Position
Points / Electronic Ignition (Rising Edge)	ON	187mJ	0
Points / Electronic Ignition (Rising Edge)	ON	145mJ	1
Points / Electronic Ignition (Rising Edge)	OFF	187mJ	2
Points / Electronic Ignition (Rising Edge)	OFF	145mJ	3
Magnetic Trigger (Falling Edge)	ON	187mJ	4
Magnetic Trigger (Falling Edge)	ON	145mJ	5
Magnetic Trigger (Falling Edge)	OFF	187mJ	6
Magnetic Trigger (Falling Edge)	OFF	145mJ	7
Not Used	Not Used	Not Used	8
Not Used	Not Used	Not Used	9

Note: All PerTronix Ignitor triggers should be set to Electronic Ignition (Rising Edge)

REV LIMIT VERIFICATION

MODE 9



This feature sends a signal to the tachometer on start up indicating the Rev Limit and Launch Limit setting currently stored in memory. This is only functional if the gray wire is used to trigger the tachometer. If a fuel injection system is using the gray wire for reference, disabled this to prevent triggering the injectors.

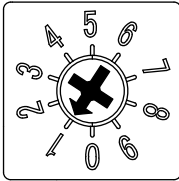
Select your desired display limit and duration in the chart

below. To program your settings turn the **MODE** switch to position “9”. Adjust the **1000** switch to indicate the setting you have selected from the previous “Trigger, Multispark, Power” section. Use the **100** switch to indicate the Rev Limit Verification setting you have selected. Now turn the ignition switch to the on position and watch the LED lights on the front of the unit to confirm the setting was stored. Turn the ignition switch off and return the **MODE** switch to the “0” position.

Display	Display Duration	100 Switch Position
DISPLAY OFF	0	0
REV LIMIT ONLY	1 Sec.	1
LAUNCH LIMIT	1 Sec.	2
REV & LAUNCH LIMIT	1 Sec.	3
DISPLAY OFF	0	4
REV LIMIT ONLY	3 Sec.	5
LAUNCH LIMIT	3 Sec.	6
REV & LAUNCH LIMIT	3 Sec.	7
Not Used	Not Used	8
Not Used	Not Used	9

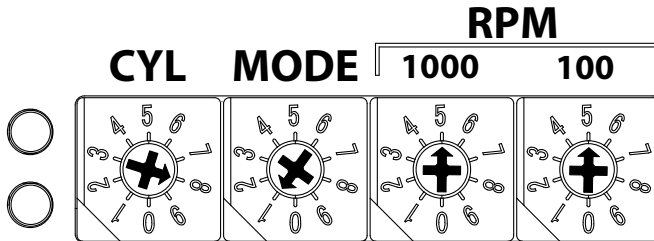
FATAL REV LIMITER

MODE 1



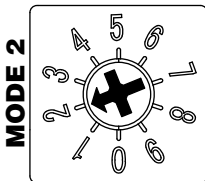
The Fatal Rev Limiter is to prevent catastrophic engine failure from missed shifts and broken drivetrain. This feature is adjustable from 400 RPM to 10,000 RPM. This rev limiter is always active, even when the 2 and 3 stage limiters are activated. When determining a value for the Fatal Rev Limit, consider the maximum RPM the engine can safely operate. The factory default setting for this feature is 5500 RPM.

Turn the **MODE** switch to position “1”. Adjust the **1000** switch to the desired 1000 RPM value and the **100** switch to the desired 100 RPM value. Now turn the ignition switch to the on position and watch the LED lights on the front of the unit to confirm the setting was saved. Turn the ignition switch off and return the **MODE** switch to the “0” position. The illustration below shows the switch positions for a typical 5500 rev limit.



Note: Setting a rev limit values less than 1000 RPM requires that the “1000” switch be placed in the 0 position. For a maximum rev limit of 10,000 RPM both “1000” and “100” switches would be in the 0 position.

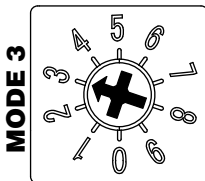
LAUNCH REV LIMITER



The Launch Rev Limiter feature is only functional when the dark blue wire is switched to ground. Typically this is done with a trans brake or clutch switch. The factory default setting for this feature is 4000 RPM.

Turn the **MODE** switch to position “2”. Adjust the **1000** switch to the desired 1000 RPM value and the **100** switch to the desired 100 RPM value. Now turn the ignition switch to the on position and watch the LED lights on the front of the unit to confirm the setting was saved. Turn the ignition switch off and return the **MODE** switch to the “0” position.

BURNOUT REV LIMITER

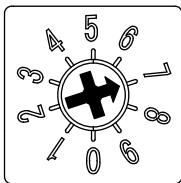


The Burnout Rev Limiter feature is only functional when the light blue wire is supplied 12V. Typically this is done with a momentary switch or toggle. The factory default setting for this feature is 3000 RPM.

Turn the **MODE** switch to position “3”. Adjust the **1000** switch to the desired 1000 RPM value and the **100** switch to the desired 100 RPM value. Now turn the ignition switch to the on position and watch the LED lights on the front of the unit to confirm the setting was saved. Turn the ignition switch off and return the **MODE** switch to the “0” position.

START RETARD SETTING

MODE 7



The Digital HP start retard feature controls the degrees of timing retard, and the RPM at which the timing retard feature shuts off. When this is enabled, the start up timing is retarded until the engine reaches the selected RPM. This helps high compression engines and applications with locked-out distributors start easier.

If you are using an Ignitor II or III trigger, or any other system that has a built in start retard, the Digital HP start retard feature should be turned off.

To adjust the start retard settings, turn the **MODE** switch to position “7”. Use the charts below to determine the degrees of retard and the start RPM that works best for your engine. The **1000** switch adjust the start RPM and the **100** switch adjust the degrees of retard. When finished turn the ignition switch to the on position and watch the LED lights on the front of the unit to confirm the setting was saved. Turn the ignition switch off and return the **MODE** switch to the “0” position.

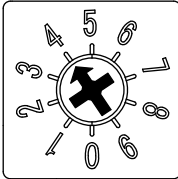
1000 Switch Position	Start RPM
0	500
1	600
2	700
3	800
4	900
5	1000
6	1100
7	1200
8	1300
9	1400

100 Switch Position	Start Degrees
0	OFF
1	2°
2	4°
3	6°
4	8°
5	10°
6	12°
7	14°
8	16°
9	18°

Note: Once the start RPM is reached, this feature shuts off and will not activate again unless the engine RPM drops to 1/2 of the established start RPM

SHIFT LIGHT / RPM SWITCH

MODE 4 & 5



The Digital HP shift light output can be used as a standard shift light, or as an RPM activated window switch. The difference in the two settings is that the shift light turns on above a certain RPM, and then shuts off when RPMs drop off again. A window switch turns on when the RPM is between the two RPM values, and shuts off when it is either above that range, or below it.

When set up as a shift light, error codes will be displayed on the

shift light.

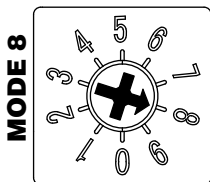
SHIFT LIGHT SETTING

The shift light and RPM switch will only function when the yellow wire is used. To set this output up for a shift light, move the **MODE** switch to position “4”. Now using the **1000** and **100** switches, select your desired shift light ON RPM. Turn the ignition switch on to save the setting, then turn the ignition switch back off. Move the **MODE** switch to position 5. Select a RPM equal to or just below your shift light ON setting. Turn the **1000** and **100** switch to program the shift light OFF RPM. Again turn the ignition switch on to save the setting and then turn the ignition switch back off. Remember to return the **MODE** switch to “0”.

RPM ACTIVATED SWITCH SETTING

To program this output as an RPM activated switch, turn the **MODE** switch to position “4”. Using the **1000** and **100** switches, set the lowest RPM in which the output will be activated. Turn the ignition switch on to save the setting, then turn the ignition switch back off. Move the **MODE** switch to position “5”. Now again using the **1000** and **100** switches, set the highest RPM in which the output will turn off. Turn the ignition switch on to save the setting and then turn the ignition switch back off. Remember to return the **MODE** switch to “0”.

TACHOMETER CALIBRATION

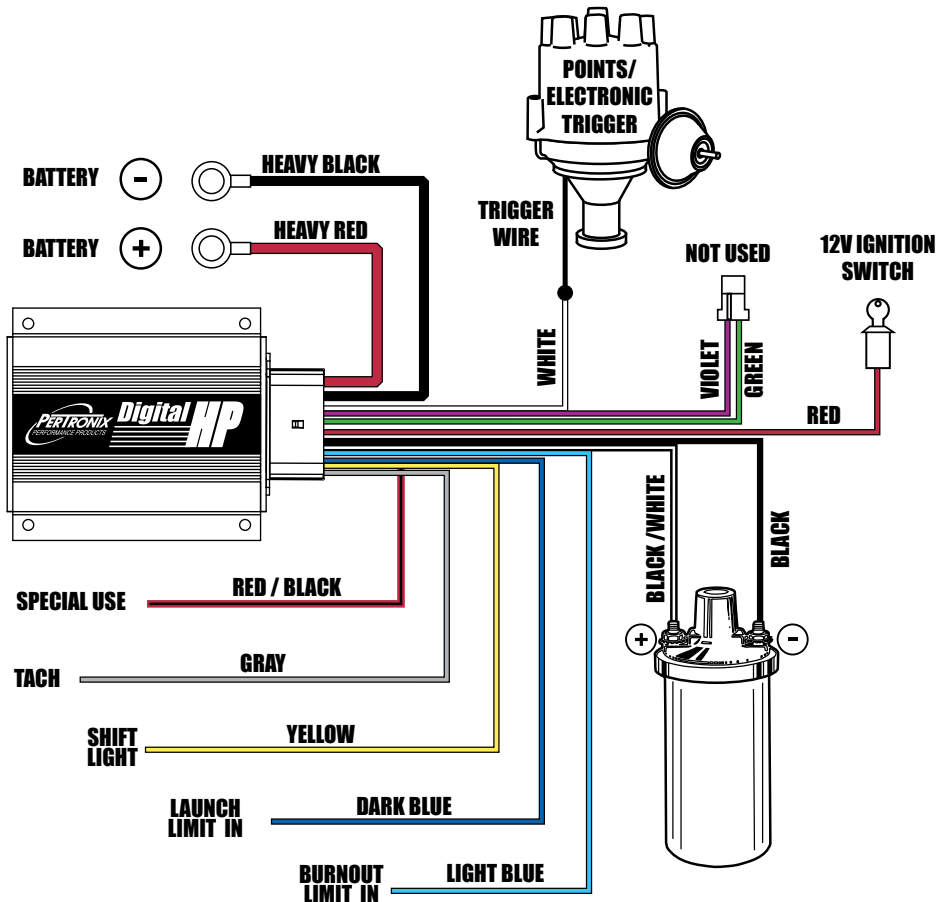


The Digital HP tachometer calibration feature generates a highly accurate signal to the tachometer when its attached to the gray wire. There is no spark created, while the tach is sent a simulated steady RPM. This gives the user visibility of their tachometer accuracy. If the tachometer has calibration adjustments, then the tach can be corrected. This feature should not be used if the gray wire triggers a fuel injection system.

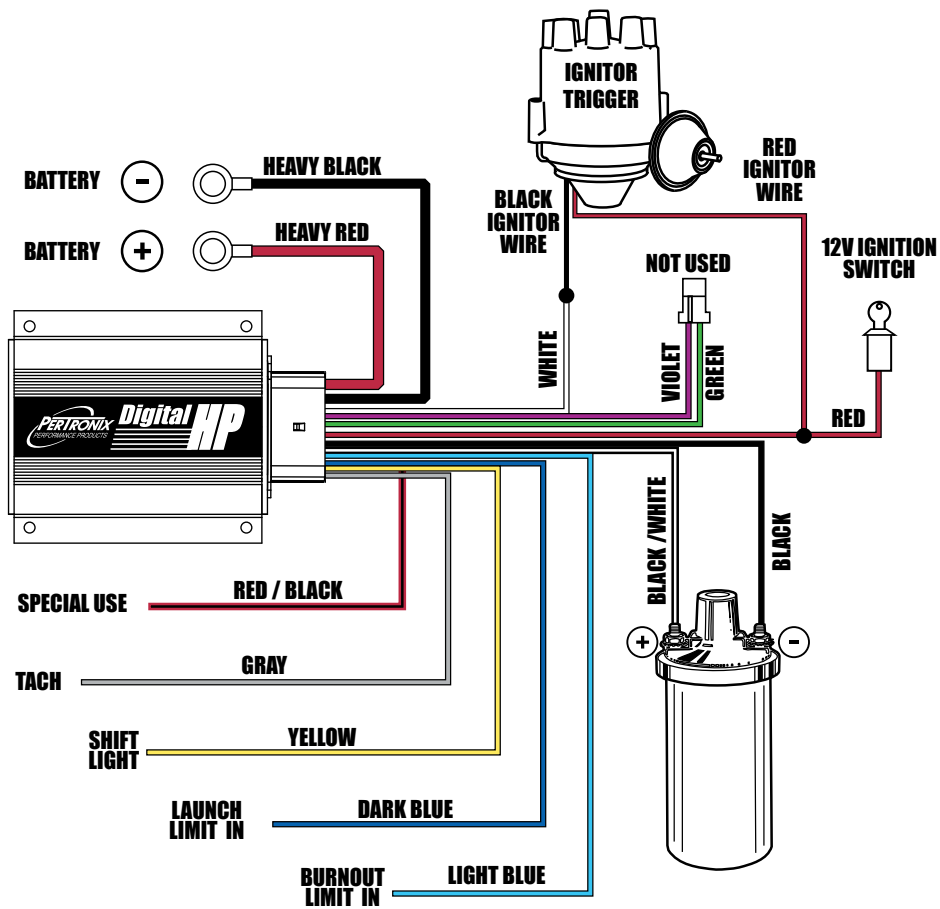
To use this feature, turn the **MODE** switch to position 8. Adjust the “**1000**” and “**100**” switches to set the desired RPM. Turn the ignition switch on and observe the tachometer.

More information on wiring and troubleshooting tachometers can be found on page 8

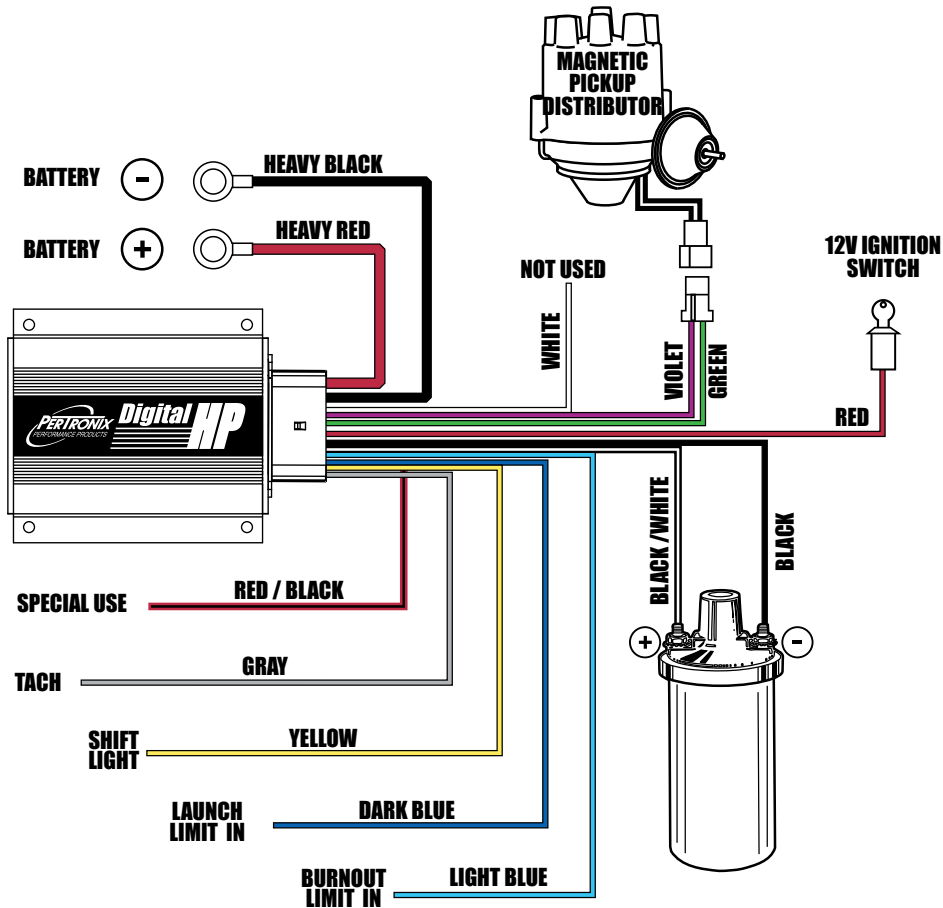
WIRING BREAKER POINT OR ELECTRONIC TRIGGER



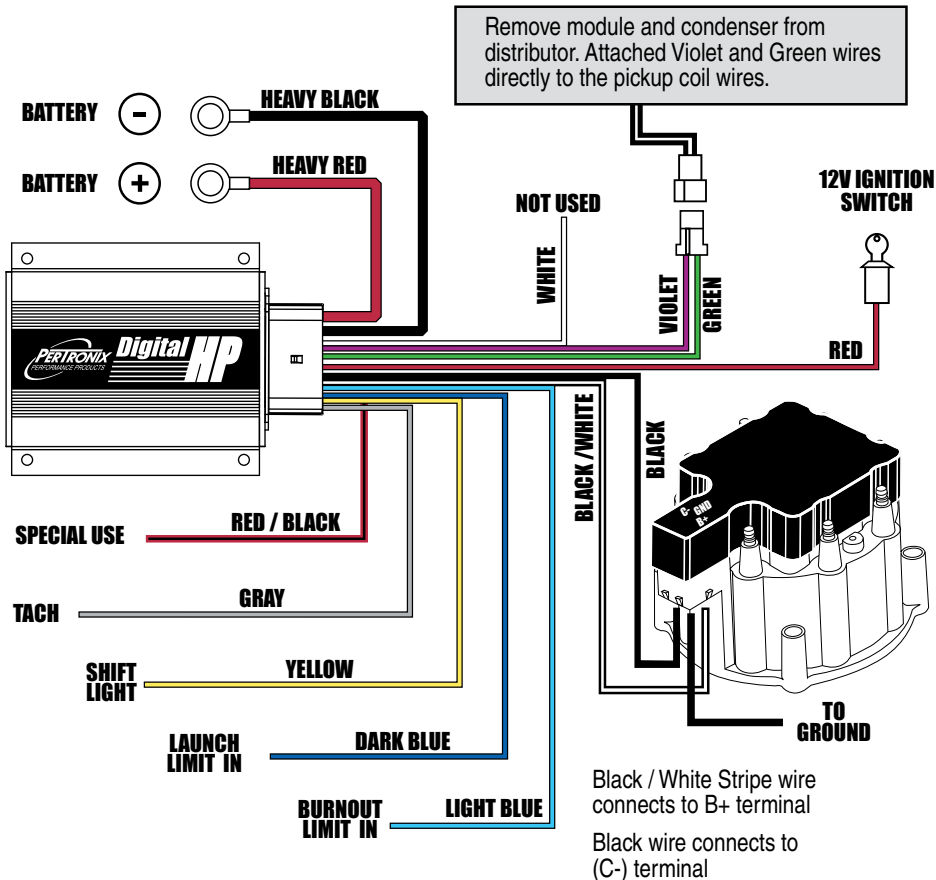
WIRING IGNITOR, II OR III TRIGGER



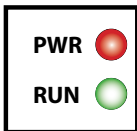
WIRING MAGNETIC PICKUP DISTRIBUTOR



WIRING GM HEI DISTRIBUTOR



DIAGNOSTICS



The Digital HP performs on board diagnostics and error checking before each start and while the system is running. If any of these checks fail, it will attempt to disable certain features, such as multiple sparks, in an attempt to continue running. If the error is major, it may shut down completely.

Should an error occur, the system status will be displayed through the Red and Green LEDs on the front of the unit. This code is not stored in memory and will only be visible while the ignition switch remains in the on position. Between each read out there will be a 2 second pause, then it will repeat until the ignition switch is turned off. The Red LED will flash a series of long blinks for the 10s digit, followed by short blinks for the 1's digit. If a major fault is detected both Red and Green LEDs will flash together. Momentary errors such as low start voltage will repeat 5 time and then disappear.

Error Code	Fault	Condition	Possible Cause
11	Batt. Voltage Low	< 8 V	Weak battery, charging system or inadequate power or ground wiring
12	Batt. Voltage High	> 25 V	Battery or alternator voltage too high
13	Batt. Voltage Drop	> 6.5V Drop	Main battery red wire not connected directly to battery, or weak battery
14	Batt. Voltage Low (Starting)	< 7 V	Weak battery, or inadequate power or ground wiring
16	DC Power Supply	< 5 V	Weak battery, or inadequate power or ground wiring
21	Coil Output Open		Coil output wire not connected to coil, bad coil
22	Coil Output Shorted		Output wire not tied to ground or damaged unit
31	Switched 12V Low	< 8.5 V	Weak battery, charging system or inadequate power or ground wiring
32	Switched 12V High	> 24.0 V	Battery or alternator voltage too high
33	Switched 12V Excessive Drop		Weak battery, or voltage to Small Red wire insufficient.
34	Switched 12V Low (Starting)	< 8.0 V	Weak battery, or Inadequate power, ground wiring
35	Switched 12V Low	<7.0 V	Weak battery, or Inadequate power, ground wiring