

MPR Internal Igniter Coil Driver



Hardware Rev 2

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Overview and Operation

Overview

The coil driver is able to drive up to 6 internal igniter coils from the three coil inputs. A number of combinations can be used, this allows for compatibility with factory ignition system employing a single coil, two dual post coils or three dual post coils.

Features..

- 6 logic level ignition outputs
- 3 Coil inputs
- Microprocessor controlled pseudo random re-limit
- User adjustable upper and lower (2-step) rev-limits

Operation

The coil driver module converts the signal that usually drives an inductive coil in to a logic level signal suitable for coils with built in ignitors. Inductive ignition coils are driven by grounding the negative (-) pin on the coil to begin dwell, and then releasing to fire the spark plug. Most coils with built in ignitors (such as LS1/LS2) require a signal that goes high to 5V to begin dwell and 0V to fire the spark plug.

A microcontroller monitors engine RPM, if the RPM exceeds the user set point a pseudo random progressive cyl cut is used to prevent spark plug fouling and give a smooth cut. The 2-step rev limit allows for a second RPM limit when the 2-step wire is grounded.

Installation and Wiring

Installation

The module must be installed in a position away from engine bay heat and any water. Ideally it would be mounted near the ECU in the vehicle cabin.

Wiring



Power

12V – This needs to be a switched ignition voltage. This is not used to power any coils and only needs to supply less than 100mA. A good source of power is the ECU ignition voltage [Pin A6 on an '808 VN ECU]

Colour: Loom 2 Red

GND – Should be located at the same point as the ECU. [Pin A12 or D10 on an '808 VN ECU]

Colour: Loom 2 Black

Signal GND – Provides the signal ground for the coils.

Colour: Loom 1 Black

Outputs

Coil 1-6 – 0-5V Logic level coil outputs. Max current source is 20mA per output.

Coil 1 Colour: Loom 1 Yellow

Coil 2 Colour: Loom 1 Red

Coil 3 Colour: Loom 1 Blue
Coil 4 Colour: Loom 1 Green
Coil 5 Colour: Loom 1 Brown
Coil 6 Colour: Loom 1 White

Inputs

Ign 1-3 – These connect to the original coil negative (-) wiring.

Ign 1 Colour: Loom 2 Blue

Ign 2 Colour: Loom 2 Yellow

Ign 3 Colour: Loom 2 Brown

RPM – This can be any source that provides a square wave signal of the engine RPM. On an EFI vehicle the reference signal the ECU uses to determine RPM should be used [Pin B5 on an '808 VN ECU]

Colour: Loom 2 Green

2-Step – Ground to enable the 2-step RPM limit

Colour: Loom 2 White

Coil Wiring

An ignition coil will consume large currents while charging during dwell, the coil power wire should be sufficient to handle the current. A single LS1 coil is around 4 amps peak and an LS2 around 8 amps peak. The wiring must be capable of handling the current with minimum voltage drop. The ground connection must also be capable of handling the same current. By far the biggest cause of ignition problems is from bad grounding. If the coil has a PCM ground wire (or signal ground wire) it should be grounded using the black wire in loom 1. The coil trigger is from one of the 6 module coil outputs.

The coil driver module uses 1 input to drive 2 logic level outputs as follows...

- Input 1 simultaneously drives output 1 and 2
- Input 2 simultaneously drives output 3 and 4
- Input 3 simultaneously drives output 5 and 6

Single-Coil

For single coil operation any of the three inputs can be used, the most common setup would be using input 1 and output 1.

Multi-Coil Pairing

When replacing dual-post wasted spark coils with multiple single coils it is extremely important to ensure the wiring maintains the correct cyl pairing and firing order.

Commodore 3.8 V6 – On each coil it is marked with the cyl pair, when wiring in the driver and new coils this pairing must be maintained. Remove the original coils and

there will be 6 spade terminals. The circled terminals in the picture below will be wired to the Ign inputs of the coil driver module.



Example Wiring:

Terminal Marked 'Cyl 1+4' - Wired to Ign 1 (Loom 2, Blue)

Terminal Marked 'Cyl 2+5' - Wired to Ign 3 (Loom 2, Brown)

Terminal Marked 'Cyl 6+3' - Wired to Ign 2 (Loom 2, Yellow)

Coil 1 (Loom 1, Yellow) – Wired to coil on Cyl 1

Coil 2 (Loom 1, Red) – Wired to coil on Cyl 4

Coil 3 (Loom 1, Blue) – Wired to coil on Cyl 6

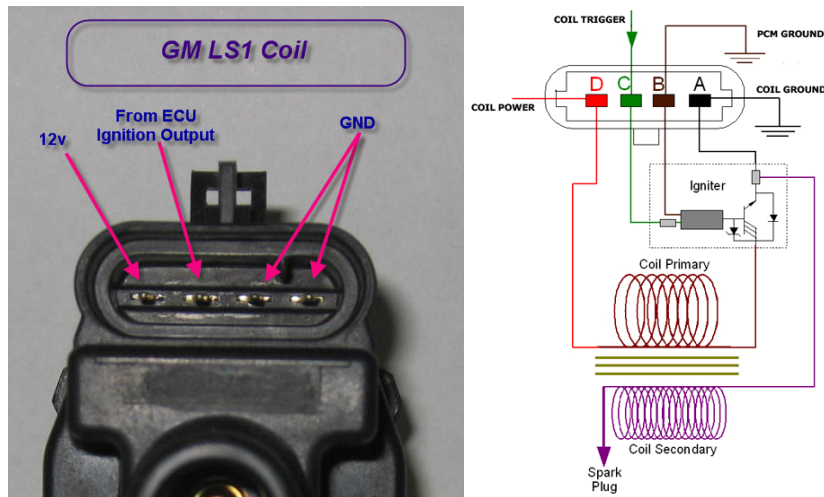
Coil 4 (Loom 1, Green) – Wired to coil on Cyl 3

Coil 5 (Loom 1, Brown) – Wired to coil on Cyl 5

Coil 6 (Loom 1, White) – Wired to coil on Cyl 2

LS1 Coils

LS1 coils use a built in logic level triggered ignitor requiring a rising edge to begin dwell and falling to fire the spark plug. This is compatible with the coil driver module.



LS2 Coils

Not all LS2 coils are compatible as they require a smart driver that handle dwell, this coil driver module simply uses the dwell that the ECU commands. The protection mechanism on some LS2 coils will fire the plug early if dwell times exceed around 5ms. Most early ignition systems and ECUs will command more than 5ms at low RPMs and while cranking. This causes erratic spark advance and potential engine damage.

Known to work LS2 coils are D513A and D514A.

Operation and Use

Switching between Normal and 2-Step

Switching between the normal and 2-step rev-limits is done by grounding the 2-step wire, releasing the wire from ground reverts back to the normal rev-limit.

RPM Limit Setting

The RPM limit is user configurable however the unit is pre-configured with 6000RPM for normal mode and 3000RPM for 2-step mode when used on an 8cyl engine.



Setting Normal RPM Limit

- Start the engine.
- Ensure the 2-step trigger is left open circuit and not grounded.
- Press and hold the RPM Set button.
- After approx 2 seconds the unit will enter RPM set mode.
- Bring the engine up to **half** the desired RPM limit.
- Release the RPM set button.

Setting 2-Step RPM Limit

- Start the engine
- Ensure the 2-step trigger is grounded.
- Press and hold the RPM Set button.
- After approx 2 seconds the unit will enter RPM set mode.
- Bring the engine up to **half** the desired RPM limit.
- Release the RPM set button.

Testing and Troubleshooting

Testing

To confirm the operation of the module it is recommended to test the 2-step briefly. Follow the procedure on setting the 2-step revlimit, setting it at a low RPM that can be tested easily. Activate the 2-step and confirm using a tachometer that the rev-limit begins to cut spark at the set point. While the 2-step is cutting spark release the 2-step enable wire, being quick to also release the throttle to prevent an over-rev.

This confirms the coil driver module is able to read the RPM signal and the 2-step enable wiring is correct.

Trouble Shooting