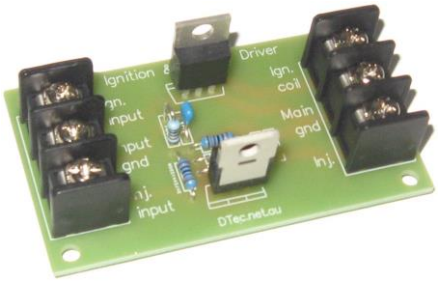
Driver Board- Ignition/Injector Driver

Operating Instructions



What is Driver Board?

'Driver Board' allows the convenient switching of fuel injectors and ignition coils from a low power input signal.

It can easily form part of testing equipment for such tasks as injector (high impedance) flow testing, measuring 'dead time' (voltage dependent delays) or ignition coil testing and dwell time mapping (voltage, time, coil current).

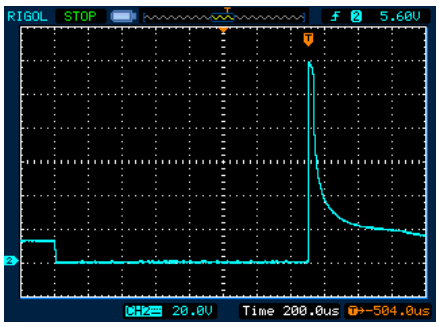
- For fuel injector testing/parameterising it takes care of voltage protection and controls the magnetic field collapse in a way that mimics aftermarket and vehicle manufacturers ECU's, this is the only way to get valid test data.
- For ignition coil testing/parameterising it allows switching of very high currents and avoids too low a primary voltage cut-off that limits secondary output voltage.

Signal generators such as DTec's 'Pulser' are ideal for running the driver board; this allows detailed parameterising of coils and injectors. The injectors/coils can be run from an independent power supply so their voltage can be varied.

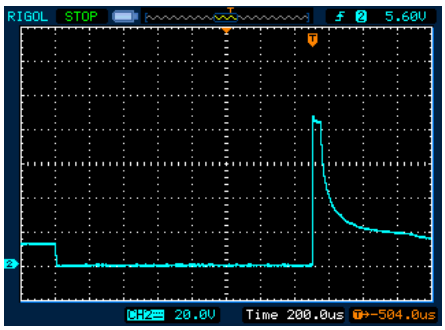
Why use for injector testing?

Many public forums show testers consisting of the test injector driven by a transistor/MOSFET and a simple diode placed across the injector to prevent voltage spikes (induced voltage) and protect the transistor. This is wrong and shows ignorance, this form of protection alters the injection quantity i.e. it greatly slows down injector operation (this change in injector response is even audible!).

'Driver Board' mimics a typical vehicle ECU injector circuit and controls the induced injector voltage by active clamping; this gives comparable operating characteristics to those found in the vehicle.



The problem- unprotected injector shows a 120V spike that can damage circuitry. If we completely eliminate the spike the injector is slow to turn off as the current circulates through the protection diode.



The solution- active clamping of the injector voltage spike protects the circuitry and closely mimics an ECU's behavior. This means that the injector response times match the vehicles when dynamic flow testing.

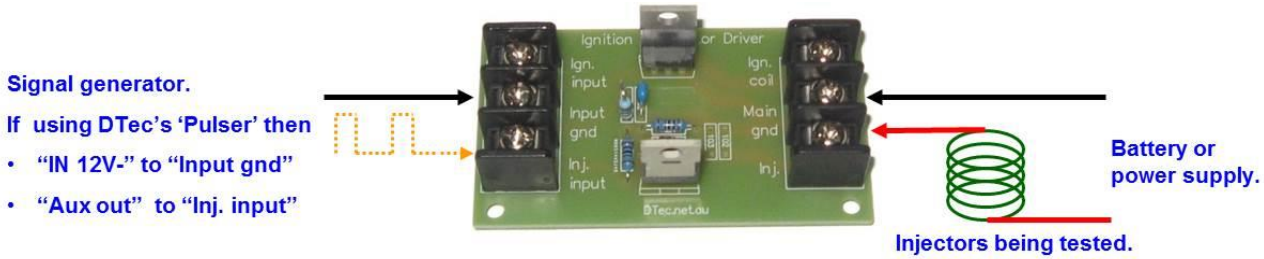
Why use for ignition coil testing?

'Driver Board' has a high ignition current capability (up to 46 Amps) and allows a primary voltage to reach approximately 360 Volts. It uses a specially designed ignition driver transistor (IGBT) to achieve this and can even have a heatsink easily attached if required.

Having high current capability means it's possible to freely explore the effects of dwell time on coil current levels with less chance of driver damage.

Setting up for injector testing-

Connecting a signal generator such as DTec's 'Pulser' allows the injection time to be freely altered and also the number of pulses to be controlled. Typically a set number of pulses are used to get a good average of results e.g. 1000 pulses.



NOTE: More than one injector can be wired in parallel (up to 17 Amps). If the MOSFET becomes too hot to touch then fit a heatsink or reduce injectors.

To explore supply voltage relationship to injector flow ('dead time' effect) use a variable power supply for the injectors.

Tip: Leave a substantial break (Lo pulse time) between pulses e.g. 2000µs (2ms) so as injector as fully closed before opening again.

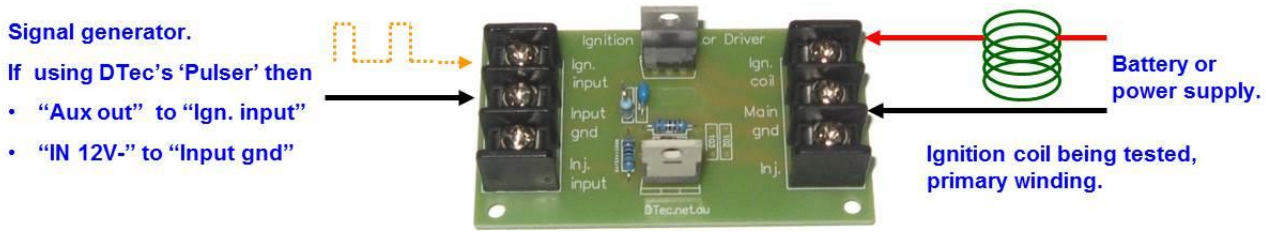
A dynamic flow test rig can be made to test:

- Flow pattern observations
- Flow rate with different pulse widths
- Minimum pulse time for operation
- Minimum pulse time for linear flow characteristics
- Effect of voltage variations on flow ('dead time' compensation)

Tip: Although you can use gradated measuring cylinders to get flow rate and observe spray patterns, most manufacturers use mass measurement for accuracy i.e. a precision scale under the capture container.

Setting up for ignition coil testing-

Connecting a signal generator such as DTec's 'Pulser' allows ignition dwell time to be accurately set so that coil current can be monitored to determine optimal dwell (voltage vs time). This allows setup of an aftermarket ECU for maximum performance and coil reliability.



To explore supply voltage relationship to coil current use a variable power supply for the coil.

Tip: There is an article called "Ignition Coil Dwell Calibration" on the DTec.net.au website ('Tech Articles' page) that is essential reading for those testing coils to map the dwell characteristics for their aftermarket ECU's.

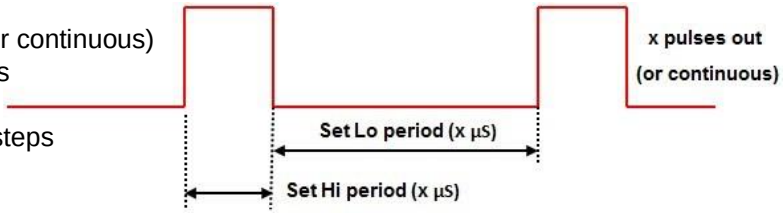
Start with a short pulse Hi period so as to not turn on the test coil for too long i.e. set a dwell period of about 1500µs (1.5ms). Leaving a long Lo period between pulses will allow the coil/driver to cool down.

NOTE: Monitor the IGBT temperature, if too hot to touch then fit a heatsink or reduce dwell time and/or spark frequency.

Additional advice if using the DTec 'Pulser' as the signal generator-

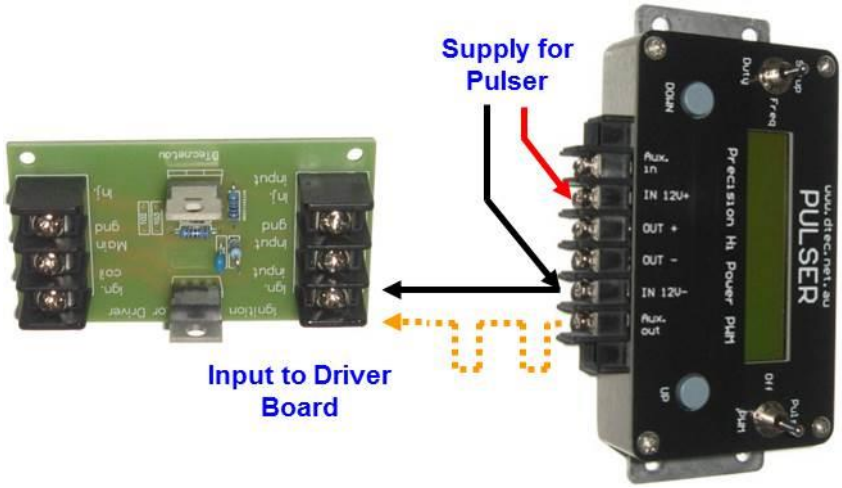
Generally the Pulser will be in 'Pulse' mode, this allows:

- Set number of pulses produced from 1 to 5000 (or continuous)
- Set Hi & Lo period from 15 - 65400µs in 1µs steps
  or
- Set Hi & Lo period from 150 - 654000µs in 10µs steps



Tip: 1000µs = 1ms = 0 .001second

Pulser has an auxiliary input (see Pulser manual) that can remotely start/reset the output pulse counter and this is ideal for designing an injector tester were a set number of pulses each test is the norm.



NOTE: Although the 'input ground' and 'main ground' are physical joined on the Driver Board circuit, the 'input ground' is not rated for high current. For best performance make sure the 'main ground' terminal is wired to the power supply source for the item under test.

Specifications-

Injector driver:

- Designed for standard high impedance (saturated) injectors e.g. 8-16 Ohm style.
- Drive via MOSFET rated at 100V & 17A.
- Can drive multiple injectors in parallel. An additional heatsink can be added if required (i.e. if the MOSFET is too hot to touch).
- Active voltage clamping circuit to protect the MOSFET and control magnetic field collapse.

Ignition driver:

- Drive via specialised IGBT rated at 360V & 46A (25degC).
- An additional heatsink can be added if required (i.e. if the IGBT is too hot to touch).

General:

- 2 independent circuits for injector and ignition coil testing.
- Input signals can be logic level (0-5V) or battery voltage.
- Inputs pulled low on driver board.
- Injectors and coil have ground (-) side switched as is conventional.
- Common connection between input and output (main & input grounds). 'Main ground' is high current path.

If you are unsure of its suitability for your application then please contact us.