

Secondary Fuel Injector Driver

by

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A SENIOR THESIS PROPOSAL

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The accompanying Senior Thesis Proposal, "Secondary Fuel Injector Driver," is submitted in accordance with the requirements of CEEN 4980, Senior Thesis Proposal. As stated in the proposal, the project will be done for and funded by myself.

Respectfully yours,

Scott Craig

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I. BACKGROUND

The installation of a turbo charger on a fuel injected motorcycle causes a large increase in fuel pressure. Because of the increased amount of air being administered to the intake, there must also be an increase in the amount of fuel being injected. In order to inject more fuel in the same amount of time, the pressure in the fuel line must be increase forcing the fuel through the injector at a faster rate. This increased pressure in the fuel line causes the injectors to be overly pressurized, which is a large strain on the injectors. This excess strain could and does cause injector failure. The remedy to this over pressurizing of the injectors is to install a set of secondary injectors that will administer the extra fuel needed to compensate for the additional air forced into the manifold. With the use of the secondary fuel injectors the fuel pressure in the fuel line can be decreased to a safer level of operation because the primary injector no longer needs to inject a large amount of fuel in a short amount of time.

II. THESIS OVERVIEW

The “Secondary Fuel Injector Driver” circuitry will control the operation of the secondary fuel injector drivers discussed in the previous section of this proposal. The circuitry will fire the secondary fuel injectors for the appropriate amount of time in order to inject the correct amount of extra fuel into the intake manifold.

III. GENERAL DESCRIPTION

The “Secondary Fuel Injector Driver” circuitry requires two input signals. The reference point for the first input signal is between the main computer of the motorcycle and the number one primary fuel injector. The signal obtained from this point is very noisy. Therefore, it is passed through a small circuit that cleans it up to form distinct rising and falling edges. The microcontroller then measures the pulse width of this signal and stores the result to be used in later calculations. The second input is obtained from the turbo charger via a pressure sensor with an electrical output. The pressure sensor monitors the pressure in the crossover tube and outputs a voltage corresponding to the amount of pressure measured. The voltage output of the pressure sensor is converted to a digital voltage level through the use of an A/D converter. The microcontroller divides the pulse generated by the first input based on the digital conversion of the voltage output from the pressure sensor. The new pulse will be output to a second set of injectors that will supply the correct amount of fuel to correspond to the amount of air being forced in the manifold. Figure 1.1, below, is a block diagram of the “Secondary Fuel Injector Driver” circuit.

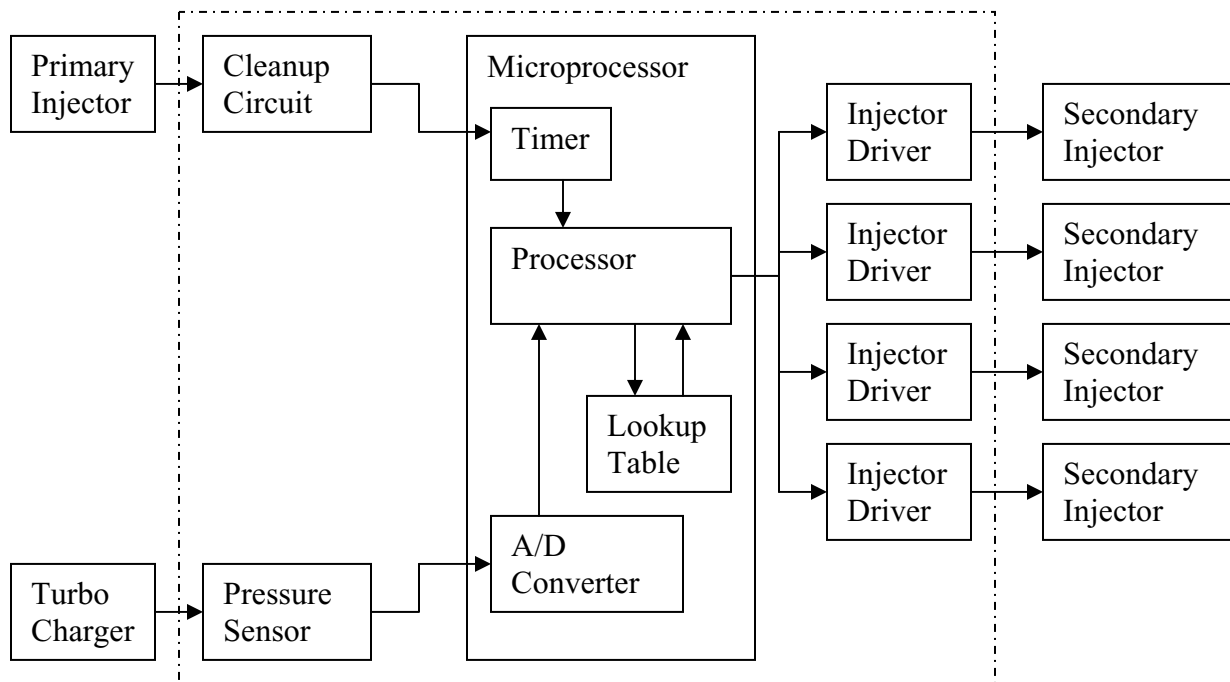


Figure 1.1

IV. COMPONENTS LIST

The following table shows a projected list of parts and their prices. This list may vary as the project progresses because of unseen needs of additional components.

Components List	
Part/Sub-circuit	Price
Microcontroller and Supporting Circuitry	\$85.00
Injectors	\$100.00
Injector Driver ICs	\$5.00
Clean up Circuit	\$5.00
Pressure Sensor	\$25.00
Misc. Ics	\$25.00
Sockets	\$10.00
Circuit Board	\$10.00
Misc. Parts (resistors, caps, wire, connectors)	\$25.00
Total	\$290.00

V. TIME SCHEDULE

The following table shows an estimated schedule of events. If this schedule is met or exceeded, the project will be completed in time to meet the deadline.

Task	Schedule (Month [Week])																	
	January				February				March				April				May	
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
Research																		
Parts Ordering																		
Hardware Design																		
Software Design																		
Implementation																		
Testing																		
Final Testing																		
Documentation																		

VI. ACCEPTANCE TESTING

The items on the following checklist will be demonstrated in order to verify the operation of the “Secondary Fuel Injector Driver” circuitry.

1. Produce a clean input signal from the primary injector that can be referenced.
2. Obtain a digital representation of the turbo pressure to be used in calculations.
3. Output a signal proportional to the injector signal based on the turbo pressure.

VII. SUMMARY

The “Secondary Fuel Injector Driver” circuitry requires two input signals. One is obtained from the input signal to the primary fuel injector and needs to be debounced before it can be used. The other input is obtained from by measuring the pressure in the turbo charger. The microcontroller will output a signal proportional to the input signal obtained from the injector based on the pressure measured from the turbo charger. This signal is intended to operate the secondary fuel injectors.