

EFIE bypass and shut off circuits

(Always be sure to check the drawing version dates, to be sure you have the latest information)

Around year 2000 some modern computers started 'looking' for a periodic cycle of the oxygen sensor signal to see that the oxygen sensor was operating correctly. If an EFIE is installed, and the voltage offset is turned up high enough to get a decent gain in mileage, this 'self-check' finds out that the voltage is not going 'low' enough often enough and causes a trouble code for 'low cycle frequency' or some similar wording, depending on the vehicle.

I personally think this programming was deliberately implemented (by the vehicle manufacturers) to prevent devices like the EFIE from working. I also know I have a big ego to think I caused it ☺

On the other hand, we have been getting a lot of people ask us how to properly shut off the EFIE, so the EFIE is not operating when their fuel saving technology is shut off. If you just shut off the power to the EFIE, it actually causes a voltage drop of the Oxygen sensor signal to the CPU and you'll use MORE GAS.

To shut off the ER EFIE (even while power is applied to the red wire), you can to short out the green and white wires (to each other). This can be done with a relay. This causes the signal from the oxygen sensor to bypass the EFIE and the CPU gets the full normal O2 sensor voltage signal.

The Eagle-Research EFIE is designed to be shorted like this without damage, do not try this with EFIEs designed by other companies without checking with them for approval or you may damage them.

Another way to shut off the EFIE (should work with all designs of EFIEs) is to disconnect the white wire from the EFIE and connect it to the green wire. This sends the O2 sensor signal directly to the computer WITHOUT putting a load on the EFIE; which can also be shut off at this time.

We've developed electric and electronic circuits to address the issues above.

These are the circuits to use with oxygen (O2) sensors when:

1. You are already using an EFIE that doesn't have the bypass or shutoff 'built in'.
2. You have a computer that 'checks' the voltage of the oxygen sensor, expecting to see the voltage swing between a 'low' and a 'high' at least once every three seconds.
3. You want to maximize fuel savings by having the greatest possible EFIE voltage offset the vehicle's computer will allow.
4. You want to shut off the EFIE voltage offset for any reason, like when your fuel saver is shut off or you want to see if the EFIE is really working.

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Combustion Enhancement Interface Technology (C.E.I.T.):

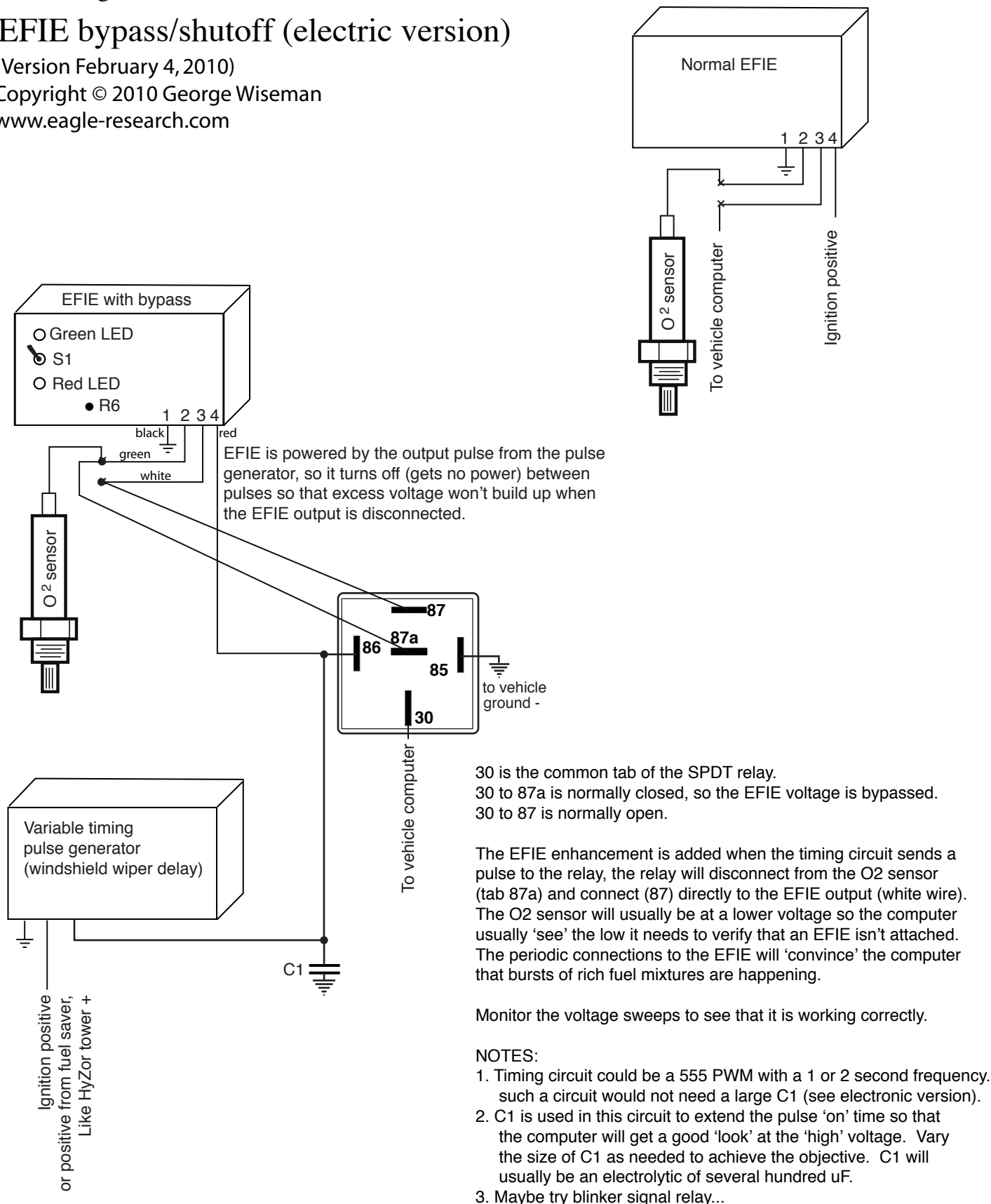
Sensor Signal Modification Series:

EFIE bypass/shutoff (electric version)

(Version February 4, 2010)

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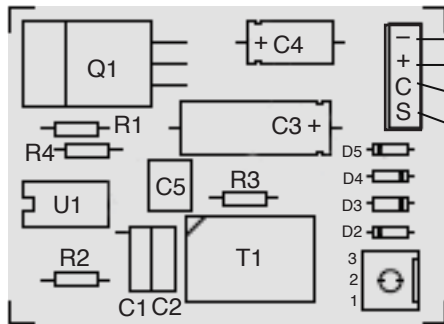
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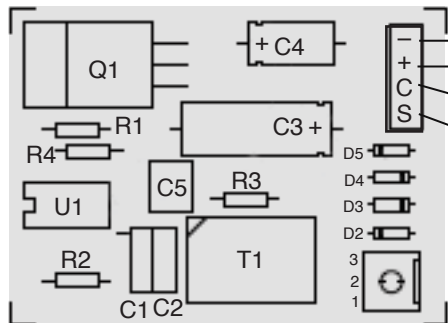


NOTES:

1. Monitor the voltage sweeps (from vehicle ground to tab 30 of relay), for each EFIE, to check that the circuit(s) are working correctly. Timing circuit should have a 1 to 2 second frequency. Vary the pulse width (with R1) to optimize EFIE gains; i.e. keep signal voltage high as long as possible, going to 'low' voltage only long enough to satisfy the computer.

2. If there is no power to the pulse circuit, the O2 sensor signal will bypass the EFIE, going directly to the computer. So we recommend powering the pulse circuit, and thus the EFIE, with the voltage that flows to your HyZor. Then the EFIE will only be ON when the HyZor is ON.

3. One timing (pulse) circuit can power up to 4 relays. You need one relay per EFIE and one EFIE per O2 sensor.



555 is a standard timing IC, frequency varied by R1 and C1
P1, is a board mounted p-channel mosfet, IRFD9014

(turns on power to relay(s) when all P1 gate inputs are low voltage)

D1 and D2 are 1 amp, 1000 volt diode IN4007

(directs current to/from 555 through variable resistance R1 to allow PWM)

D3 is a 1 amp, 1000 volt diode IN4007

(wheeling diode to prevent voltage spikes generated by solenoid coils from damaging P1)

D4, D5 and D6 are 1 amp, 1000 volt diodes IN4007

(prevent feedback from each shutoff signal to other signal voltage inputs)

R1 is a 50K multi turn pot, mounted flat, in the style of the EFIE.
DigiKey #490-2870-ND, Murata #PV36P503C01B00
(allows PWM of circuit)

R2 and R3 are 1K

(voltage pullup resistors)

R4 is 1 meg ohm.

(brings P1 gate negative to turn P1 on)

C1 is electrolytic ??uF

(controls the PWM frequency. Larger = lower Hz)

black
red
white
green

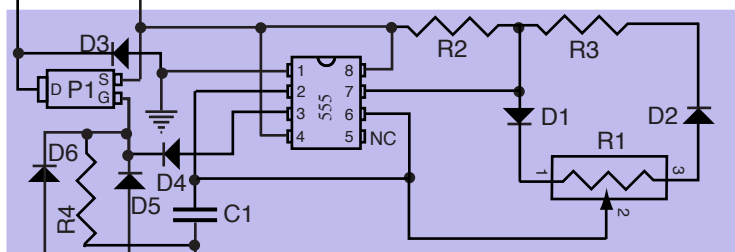
to vehicle ground -

30 is the common tab of the SPDT 'headlight' relay, and sends the O2 signal to the computer. 30 to 87a is normally closed, no voltage enhancement. 30 to 87 is normally open, the EFIE voltage enhancement is added when it closes.

When the timing circuit sends a pulse to the relay, the relay will disconnect the O2 sensor from tab 87a and send the signal through the EFIE to tab 87. The computer will regularly 'see' a lower voltage (raw O2 sensor signal), so it shouldn't have any further issues with the oxygen sensor not cycling between high and low often enough.

To vehicle computer

HyZor positive + From HyZor relay tab 87



Electronic Timing (Pulse) Circuit

Idle shutoff (optional) > 3 VDC turns off EFIE

Cold shutoff (optional) > 3 VDC turns off EFIE

Addition of D4, D5, D6 and R4 allows the option of bypassing the EFIE voltage offset during

1. engine startup,
2. engine idle,
3. times when maximum power is required
4. anytime you don't want it on...

Just apply a voltage to the gate of P1 through a diode.

P1 could be replaced with a TO-220 sized mosfet to compensate for extra power needed for EFIEs. EFIEs are powered by the pulse circuit to prevent voltage from building up when EFIEs are disconnected from the circuit.

To vehicle computer

