

NOTES ON GMHEI COIL DRIVER

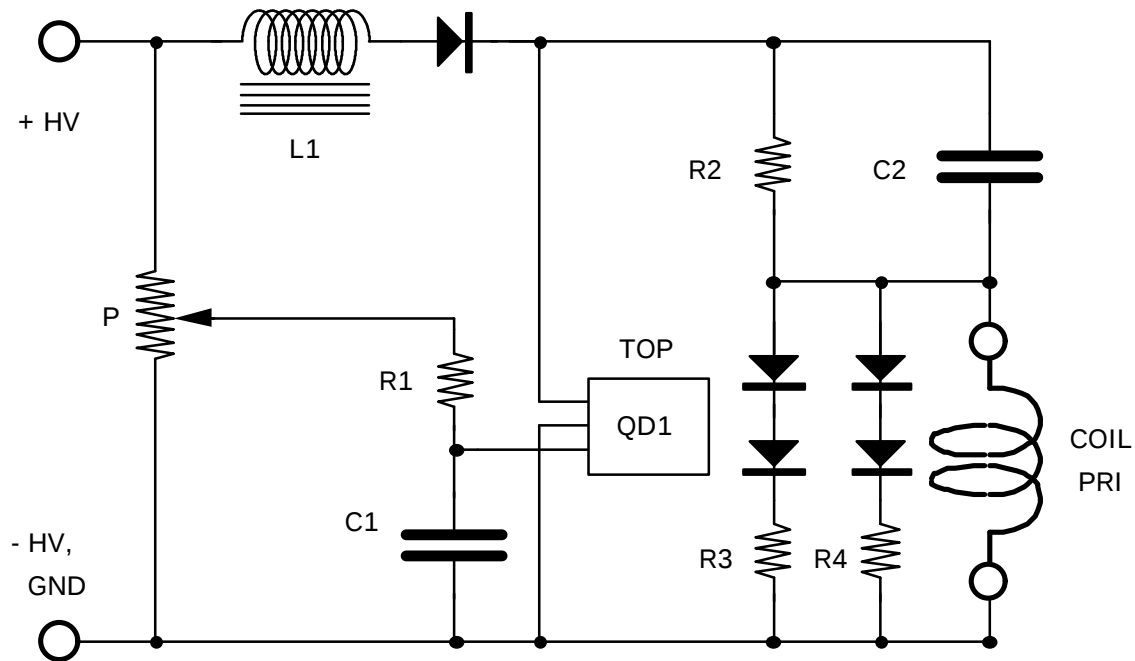
The schematics and note below give some details of a driver I made up here several years ago. It is asynchronous (free running) and uses resonant charging to effectively double the input high voltage. I have built up several of these and all seemed to work satisfactorily, but I consider the circuit experimental and would suggest that anyone copying the thing be prepared to set up his scope and experiment a bit. The component values shown have worked well for me.

The circuit operation is quite simple. The energy storage capacitor C2 is charged from the HV via inductor L1 and the series diode. The quadrac is connected as a relaxation oscillator, with the repetition rate determined by the setting of the control pot and the values of R1 and C1. With the pot at ground C1 can't charge and there is no pulsing. As the setting of P is moved toward + HV the oscillator will start to fire and C2 will be discharged through QD1 and the coil primary, creating a negative voltage pulse across it. C2 and the primary form a series resonant circuit, and the voltage at the top of the primary swings up toward a positive value which, in the absence of circuit loss, equal the initial negative peak. The diodes across the primary conduct as the voltage goes positive, and current continues to flow in the primary until all of the stored energy is dissipated. When C2 is fully discharged QD1 "opens up", and the current flowing in L1 charges C2 again in a sinusoidal fashion. At the peak of the charging cycle the voltage across C2 will approach twice the supply voltage. When the current in L1 falls to zero the series diode will quit conducting and the cycle will repeat.

The input current will be proportional to the repetition frequency and the size of C2. For a fixed value of C2 the current will increase linearly with the repetition frequency. I have run with C2 as large as 6 ufd, and an input current of 300 ma, but don't recommend it. A bit of experimenting is worth more than a lot of words.....

A few notes on the components. The Quadrac shown is one I already had in stock, and any 15 amp 600 volt + unit should work equally well; if another package type is used make sure the connections are correct. L1 is non critical, and other inductance values will work OK; what is important is that the inductor not saturate at the maximum voltage swing. The inductor I have used is one "off my shelf". The lower the resistance of L1 the lower the charging losses are. It is possible to replace the inductor with a high-power resistor of say 1000 ohms but then C2 can only charge to the supply voltage, and much power will be lost in the resistor. The damper diodes across the coil primary are not essential, but I have found they improve the circuit efficiency.

QUADRAC IGNITION COIL DRIVER



P - 1 meg

R1 - 2.2 meg, 0.5 watt

R2 - 1 meg, 1 watt

R3,R4 - 1 ohm, 10 watt

C1 - 0.015 ufd, 200 volt

C2 - 1 to 4 ufd, 600 volt (See note)

L1 - 6 henry, 100 ma

QD1 - Tecor 6015LT QUADRAC (DIGIKEY CAT # Q6015LT-ND)

All diodes - 1N4007

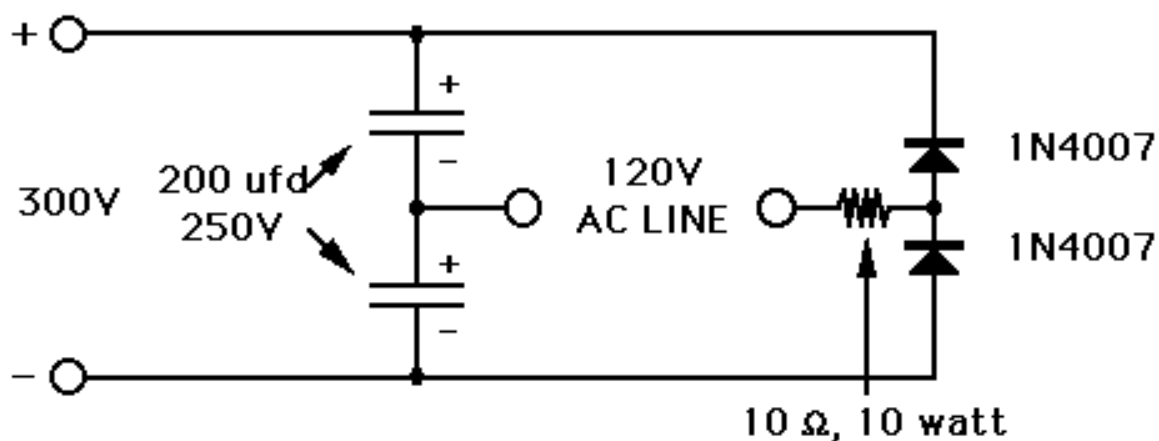
Note: Capacitors must be capable of handling AC currents. Paper or plastic probably OK. To run put milliammeter in +300 volt line, star with pot at ground and rotate until sparks start. Increasing pot setting will increase spark frequency. Don't exceed 100 to 120 ma current.

HIGHLY RECOMMEND PUTTING 1 AMP FUSE IN SERIES WITH HIGH VOLTAGE!!!!!!!!!!

NOTE RE GM "HIGH-ENERGY" IGNITION COILS:

Found in distributor caps of 1990 era Buick, Olds, Cadillac V-8's. \$5.00 each in LA-area junk yards. Red and yellow lead are primary, black is inside of secondary. Side metal plate is outside (HV) end of secondary, black is ground side; can be connected to ground, but shouldn't be than 1000 volts different from primary or short may result. Polarity of output spike depends on primary connections to driver. Have used two coils in series (yellow on one primary to red on other and vice versa) with black leads hooked together and to ground. Output gives 5 inch sparks with coils mounted in oil and 3 ufd capacitor.

LINE-CONNECTED VOLTAGE DOUBLER



NOTES:

1. BOTH SIDES OF THIS CIRCUIT ARE "HOT", HANDLE WITH CARE.
2. CAPACITORS CAN BE LARGER OR SMALLER, ANYTHING OVER 50 ufd WILL BE OK.
I USED ALL ELECTRONICS* # EC-2225, \$1.00 EACH.
3. HIGHLY RECOMMENT PUTTING 1 OR 2 AMP FUSE IN SERIES WITH AC LINE!

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