

RHINO8 EL Sequencer

Hello all you EL wire fans!

Last year I used FETs to switch the 12V inverter inputs to create those snazzy light creatures at Burning Man '98. This year we'll be upgrading to a smaller circuit that uses triacs to switch the high voltage output of the inverter. This file includes schematic, PCB layout, and a picture of a 5 circuit sequencer for EL wire. It's a simple circuit except for a few gotchas.

Parts list:

U1	8 pin Microchip PIC microprocessor. PIC12508, PIC12C509, PIC12C672, etc. will work. The cheapest is the PIC12C508. I use Digikey part PIC12C509-04/P-ND.
U2	5V regulator in a TO-92 package. I use Digikey part ZSR500C-ND
R1	100K Ohm
R2	10K Ohm
R3,R4,R5,R6,R7	1K Ohm
D1	Some Radio Shack Diode I had lying around.
C1	35V 10uF electrolytic capacitor. This is overkill – just use anything with at least 20V rating. This cap goes across the 12V input to the voltage regulator.
C2	.1uF ceramic or other cheap cap. This cap goes across the 5V output of the voltage regulator.
Q1,Q2,Q3,Q4,Q5	600V logic level triac in a TO-92 package. Tecor part L601E3 or equivalent. I use Mouser part number 511-Z0103MA
Connectors	I used a 2mm micro connector like the ones that plug into your nicad battery in your cordless phone hand set. Marlin P. Jones has a special on these babies – part number 7315-PL
J1	This part is a 0 Ohm resistor, otherwise known as a wire, used if your inverter has isolated output and not used if your inverter has non-isolated outputs. More on this later.

Connectors:

SW1 – SW5	5 switched outputs that get hooked up to the EL wire. The EL wire has no polarity.
HV01 – HV03	Convenience high voltage outputs for running non-switched EL wires
HVIN	High voltage input from the inverter.
12VIN	12V input from your battery.
12VOUT	Convenience connector for 12V output to your inverter.

The PIC is a self-contained microcontroller with oscillator, EEPROM, and RAM all built in. Most any microcontroller will do, whatever you feel comfortable programming. I use MPLAB development software and a PICSTART PLUS programmer both from Microchip.

Gotchas:

The diode is only required for the polarity impaired like myself who may accidentally hook up the battery backwards. You can short this connection out if you don't feel like using a diode.

The trick to getting the triacs to work is to make sure you've got the ground hooked up correctly. If your inverter has a common ground for the input and output, then you may leave J1 disconnected and the PIC will get its ground from the high voltage side. Make sure you wire the 12V ground and high voltage ground from the inverter on pin 1 of the 12VIN and HVIN connectors. If you install J1 and use an inverter with a common ground you may notice reduced output from the inverter and your EL wire will not be as bright. I think this happens because a ground loop is set up that interferes with the oscillator in the inverter, but I really don't know why it doesn't work. I'd be very interested to hear anyone else's opinion on what's going on here.

If your inverter has an isolated output, then you must install J1 so the PIC has a ground reference to the 12V battery. In this case there is no polarity on the high voltage input to the circuit and you can hook it up either way to HVIN.

You can test if your inverter has a common ground while it is running by holding on to the 12V battery negative terminal and touching your tongue to each of the high voltage outputs ☺ A less interesting but perhaps safer way to do it is just to use an ohm meter to check for continuity between the negative input and high voltage outputs.

WARNING: As you know, the inverter puts out up to 400V of ac voltage. Besides being kind of uncomfortable if you encounter this voltage, I can guarantee that the PIC will not survive at all if it is subjected to this kind of voltage.

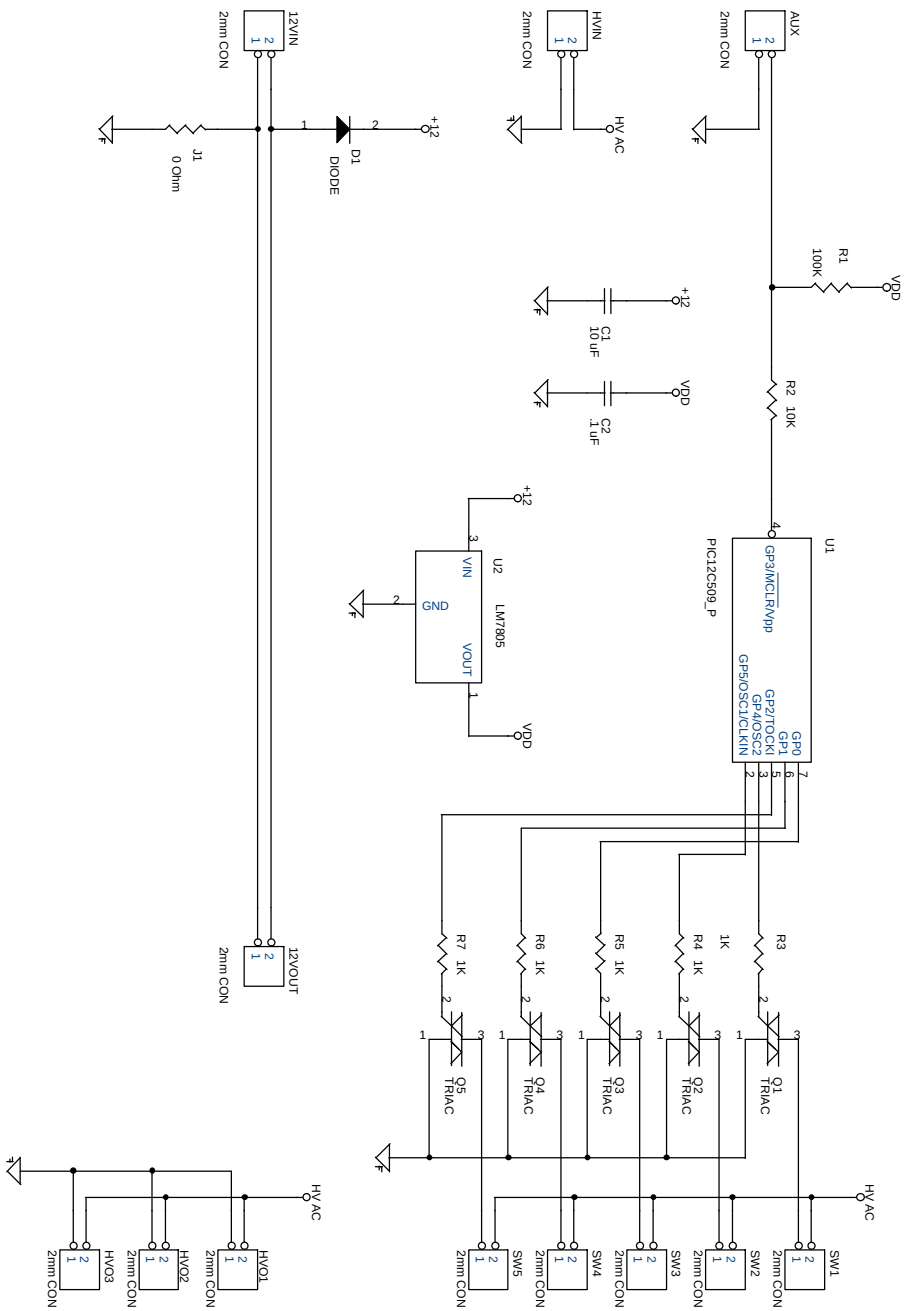
PC Boards

The board in the picture is the first prototype board. At low volumes I think I can get these boards made for about \$5 a piece if anyone is interested. Anyone interested in a board should email me at greg@acmeart.com.

The PCB layout shown here is actually a mirror image (viewed from the bottom) so that the text etched into the bottom of the circuit board is readable.

Good Luck, see ya all at BM '99!

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