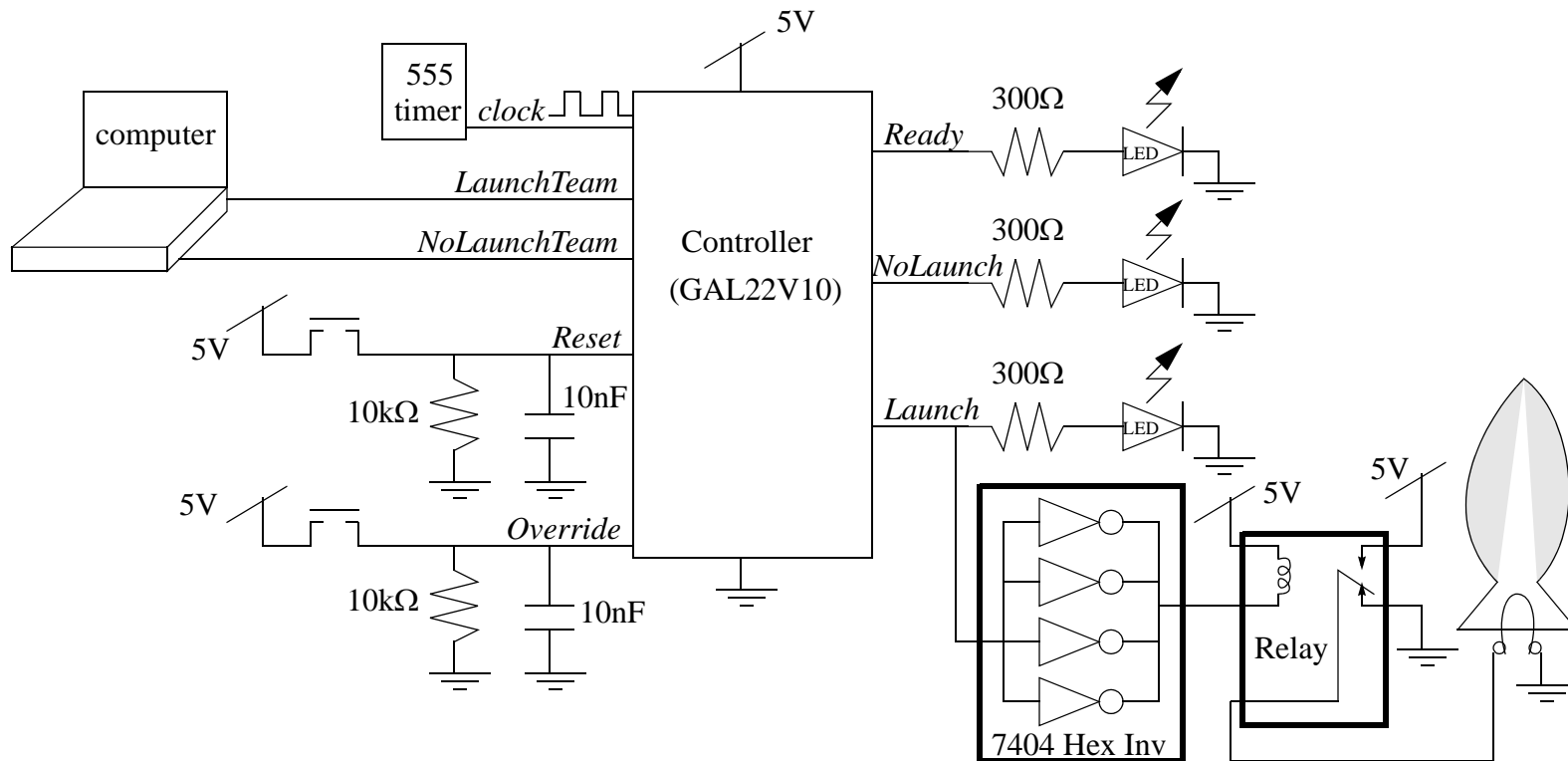


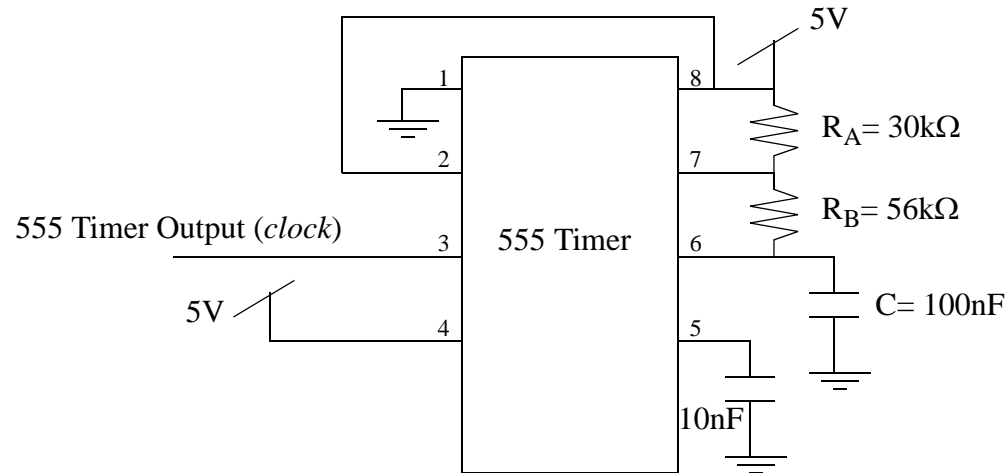
Detailed Schematic



- All 5V signals are connected to the positive terminal of the external battery. All ground signals are connected to the negative terminal of the external battery.
- A 555 timer generates the 100Hz clock needed by the GAL controller. See the accompanying 555 timer schematic for details.
- The 2 push button inputs (Reset and Override) are held low through the 10kΩ resistors until the push button is pressed. Pressing the push button generates a high signal. The controller is sensitive to a rising edge. The 10nF capacitor eliminates noise causing false signals.
- The current through the 3 LEDs is limited by the 300Ω resistors. The LED signals generated by the controller (Ready, NoLaunch, and Launch) are active high signals. A “1” will cause the LED to light.

- The inverting buffer is comprised of 4 inverters on a 7404 Hex Inverter chip connected in parallel. This buffer is necessary because the GAL is unable to produce enough current to drive the relay switch.
- The relay switch (part number OUAZ-SS-105D) is necessary to generate enough current to burn the squib in the rocket. When the Launch signal is low, the output of the hex inverter is high and the relay is held in the default position. This connects both ends of the rocket squib to ground, which will keep the squib from lighting the rocket. When the Launch signal goes high, the output of the inverter is low causing current to flow through the solenoid. This causes the relay switch to change positions, connecting the squib to the positive and negative terminals of the battery. As current flows through the squib, heat is generated which lights the rocket powder causing the rocket to fire.

555 Timer Schematic



- 555 timer is configured for astable operation (see 555 timer specification sheet).
- The values of R_A , R_B , and C were chosen to generate a 100Hz signal. The following equations may be used to modify the resistor and capacitor values for a different clock frequency (from National Semiconductor 555 Timer data sheet). More information may be obtained from the 555 Timer data sheet.

$$\text{frequency: } f = \frac{1}{T} = \frac{1.44}{(R_A + 2R_B)C}$$

$$\text{duty cycle: } D = \frac{R_B}{R_A + 2R_B}$$