

# Abstract:

## Wireless Rocket Launch Control System

### Overview of Hobby Rocketry and Launch Systems

Hobby rocketry has grown over the past few decades to include some very large and powerful rockets that weigh over 100 pounds and are over 12 feet long. These larger rockets require 1000 feet or more of distance between the launch pad and people, cars and buildings for proper safety. This requires some form of launch system capable of working over this distance. Most launch control systems use some combination of batteries, wires, switches, and relays.

Many hobby rocket club launch systems include a launch console with a bank of switches to allow the Launch Control Officer (LCO) to select which rocket(s) are to be launched, a master safety key switch, and a “big red button” to launch the rocket. At the launch pads, there are batteries and relays. The coils of the relays are driven through wires that are connected to the launch console. The relays connect to the rocket motor igniter through a pair of wires and alligator clips.

These wires are problematic for a number of reasons but there are two primary ones. First, people often trip over them and knock over some part of the launch system, sometimes damaging it. Obviously, people can fall and get hurt too. Second, even when treated with respect and care, the wires fatigue and break resulting in a frustrating day at the launch field debugging a broken launch system.

### My solution

I have developed a launch control system that is safe, effective and robust that solves all of the problems with typical launch control systems available today. There are two types of components in my system: the launch console where the system is operated from, and the pad unit which goes at the launch pads and supports 4 launch pads per pad unit. It primarily uses a wireless network but supports wired connections to save money in specific instances where the wires are not a problem.

For example, the wireless network can be used from the launch console to the first pad unit to support the first 4 pads. But then, if there are 4 more pads very close to the first 4, then a second wired pad unit could be connected to the first pad unit with a short wire. This saves the cost of the radio transceiver in the second pad unit.

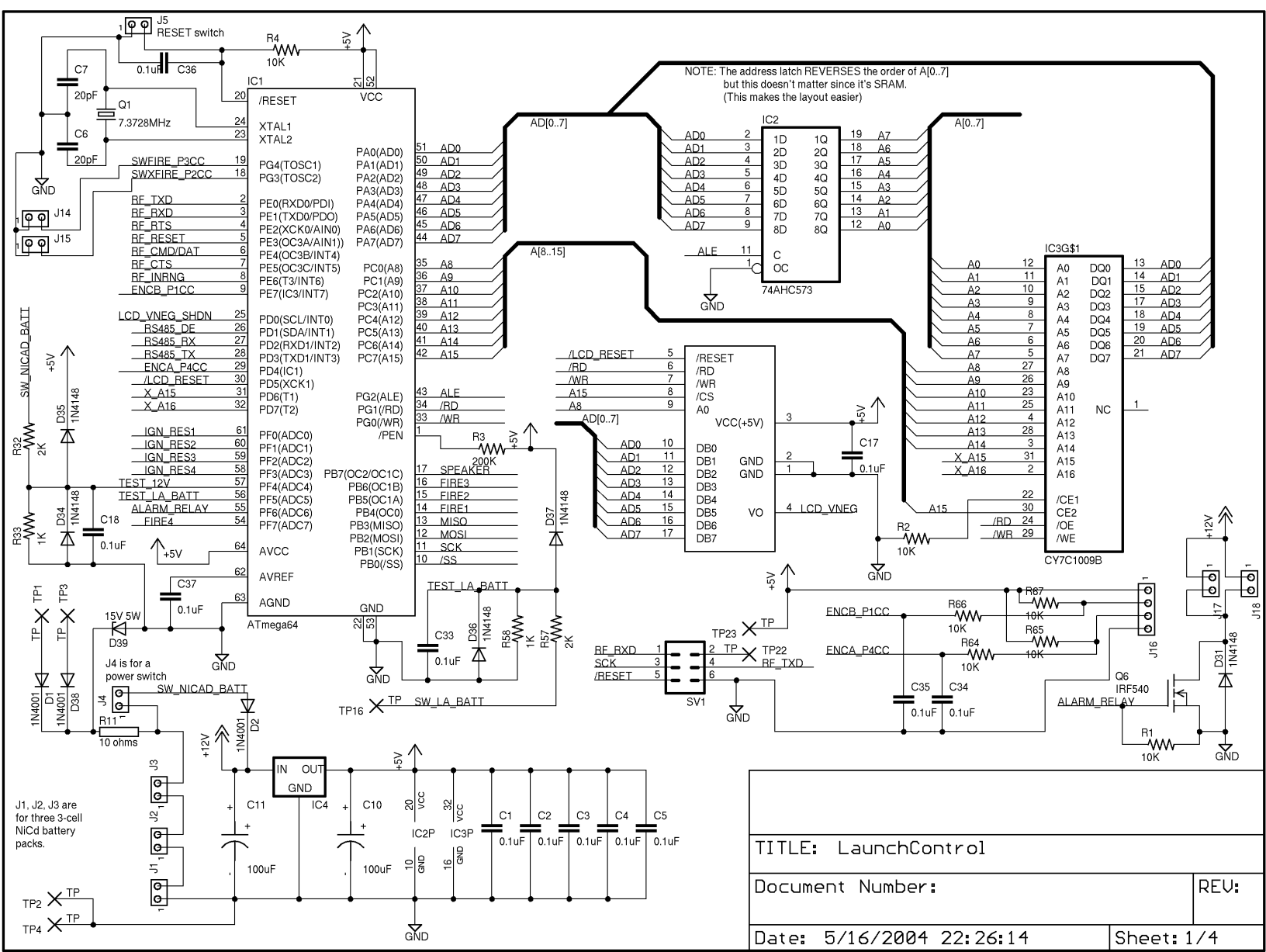
Due to the possibility of injury and property damage with these larger rockets, safety is the most important design criteria in this system. A number of safety features have been incorporated into this design and they work well.

The flexibility and rich peripheral set of the Atmel ATmega processors allowed me to achieve all of the design goals of the project. In addition, I was able to combine two designs onto one board to save design effort and inventory costs.

## **Summary**

This launch control system met all of the design goals and has been a useful addition to the launch equipment of our rocket club. To date, the system has a perfect safety record and there has not been a rocket launched that was unintended. The system has been robust and reliable. Given the flexibility of a wireless system that can be expanded at will and inexpensively augmented with some wired connections, the system will meet all future needs of the club's launch control system.





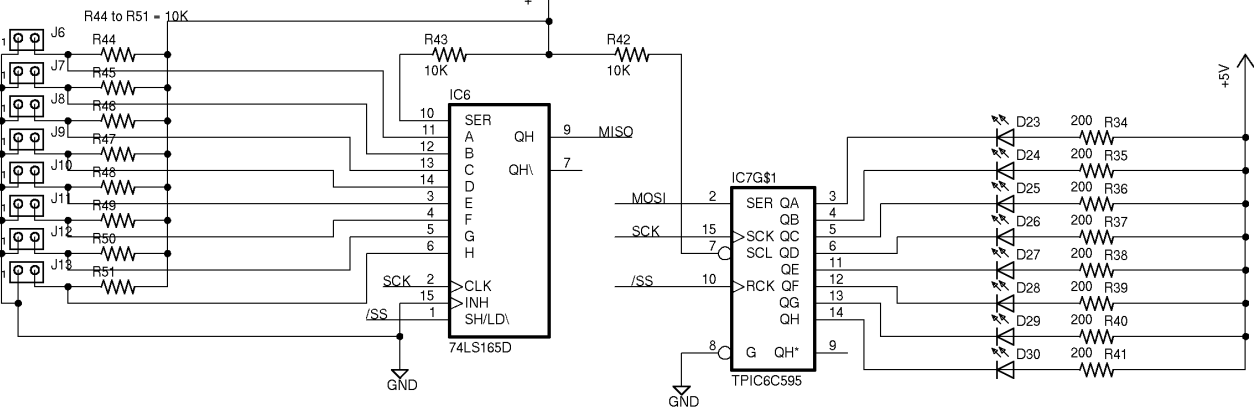
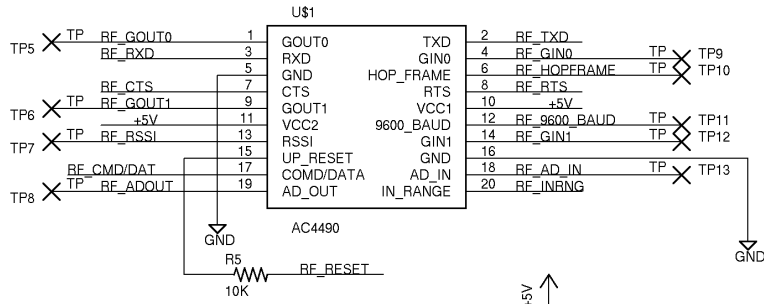
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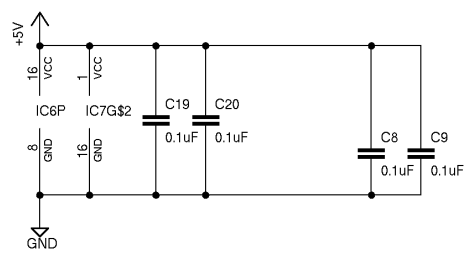
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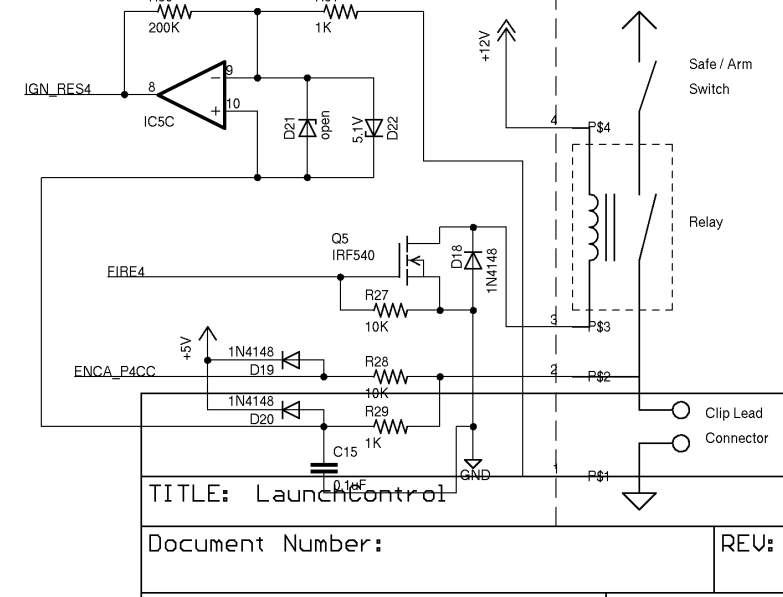
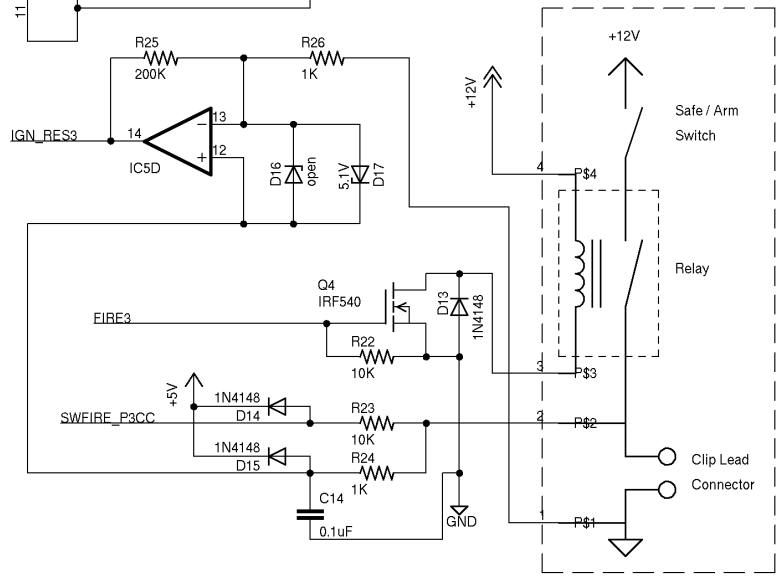
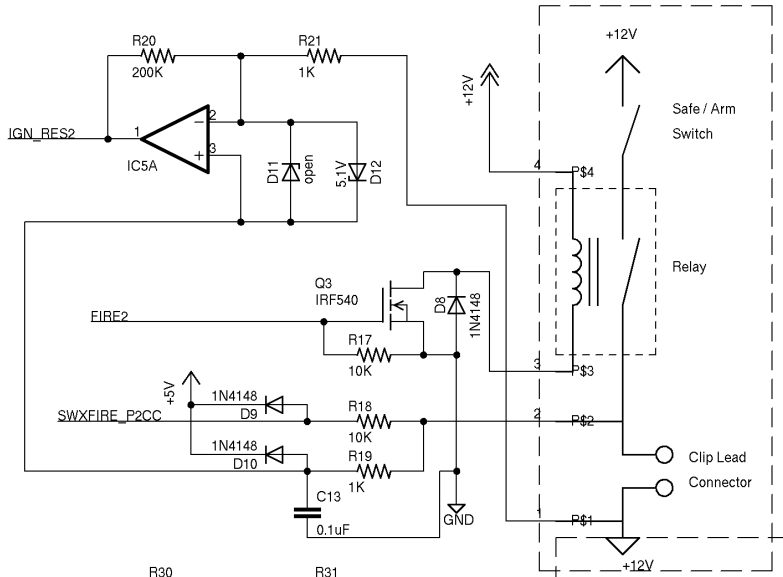
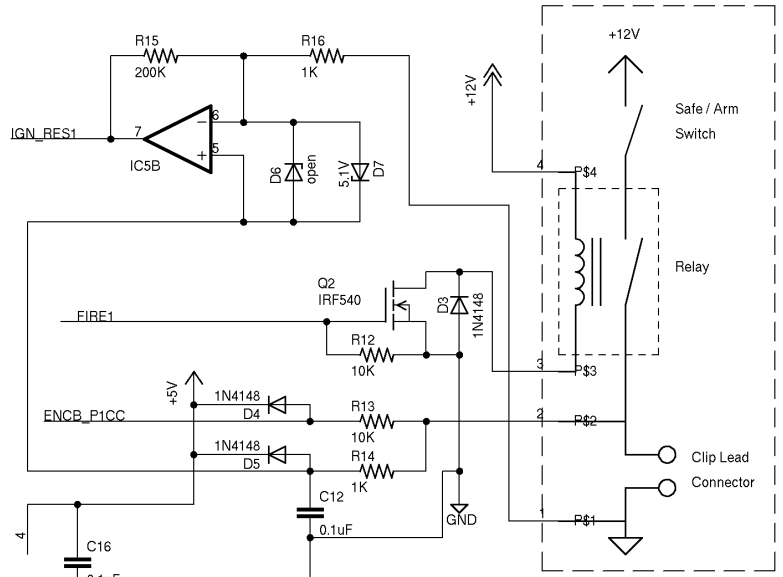
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NOTE: Plan WAS to add +3.3V regulator and jumper so the RF module can select +5V or +3.3V



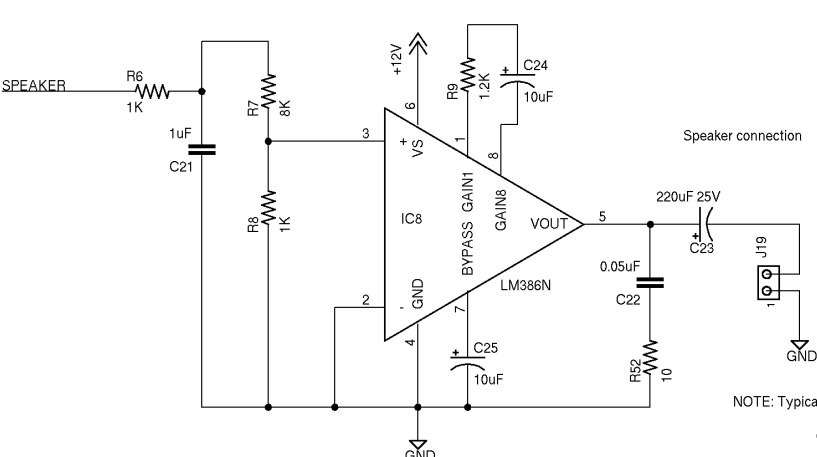
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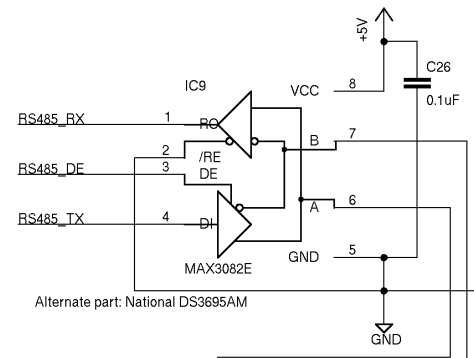
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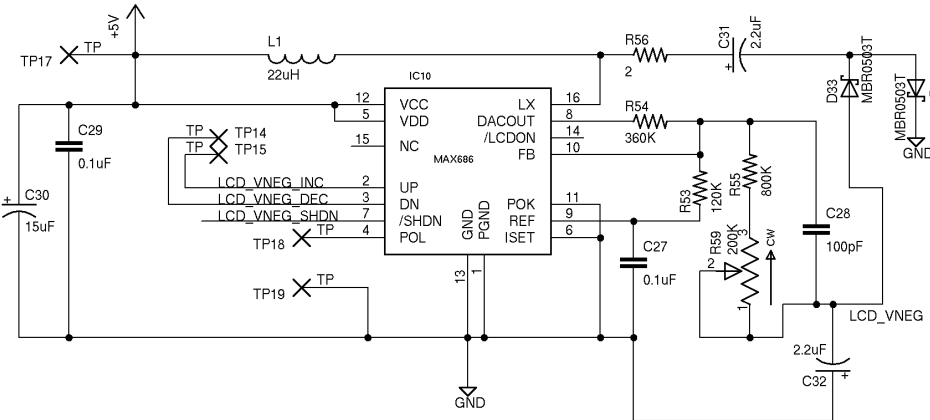
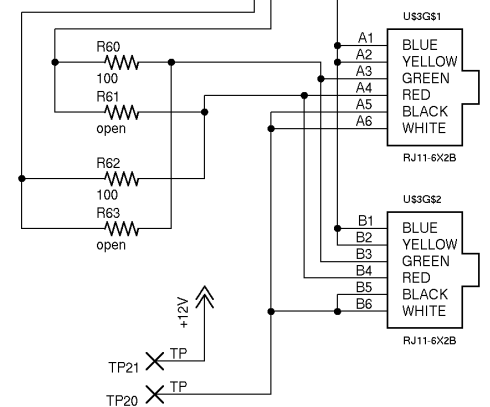
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NOTE: Typically install R60 & R62  
or install R61 & R63 to  
swap A & B signals  
Never install all 4.  
Only even or odd.



Alternate part: National DS3695AM



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