Colin Hale-Brown

Project Goals:

- Low cost
- Easy for users to operate
- Fit in rockets of all sizes
- Lower the barrier to entry for dual deploy rockets

Possible Features:

- Pyro charges (dual or quad)
- L2 or L3 GPS
- Radio
- Data storage
- Audio Cues
- Altimeter
- Gyroscope
- Accelerometer
- Magnetometer
- Voltage monitoring
- External pyro battery
- Battery charger
- STEMMA QT plug
- Ground station
- Verbal cues
- Ground testing
- 29mm rocket diameter

Most fliers want redundant controllers over a single quad charge controller with the thinking being that it is an additional failure mode however that implies that a controller fails to work entirely.

Discussing failure modes with users in the community I found that the backup controller is more there for peace of mind. The most common failures are controllers not powered on, low battery, or incorrectly configured. With the only non-user failures told to me being screws that come loose during flight in the AV bay and damage the exposed electronics or water damage due to high humidity or direct contact with water. While I feel that a single more advanced controller would be a better use of money, users are adamant that they would not fly a controller like that.

With these learnings in mind I wanted to make a simple controller that is capable yet cost effective and small enough to fit in a 29mm rocket. A dual pyro controller makes the most sense because users are going to use two of them anyways. They need to have recoverable data storage so using a microSD card would be ideal. When the device is in the rocket it would be great to know it is operational on the pad using a buzzer of some kind as an audio indicator. The device should have USB-C for charging the li-po powering it and for debugging the system if needed. Because of where we launch and the theme of naming flight computers after birds, I am going to call this controller the Meadowlark Mini.

Colin Hale-Brown

Meadowlark Mini Target Specs:

- Dual mosfet pyro controllers with screw terminals for attaching charges
- Interrupt switch for powering on the system, either JST or screw terminal
- RP2040 microcontroller
- Piezzo buzzer
- USB-C for Li-Po charging and serial communication
- Li-Po connector and power management
- Barometric pressure sensor
- Accelerometer and gyroscope (magnetometer would be cool but not required)
- LEDs for power and status indicators
- M3 mounting locations

I removed any power switches and buttons for the boot loader and board reset from the board to save weight, cost, and prevent failure due to g-forces during flight. Pads for Pogo pins can be found on the bottom of the board for programming and debugging. To prevent water related failures the board can be coated in a conformal coating. To prevent a failure due to loose debris in the AV bay I would like to design a sleek, lightweight case for the board to protect it in flight and when being handled. This also protects the conformal coating from chipping and damage which could lead to water related failures. I would like to get the BOM down below $20 for the flight computer so that a kit for $50 could include an interrupt switch and battery along with the flight computer itself.