

Flight Testing Outline & Objectives

E-flite Apprentice Flight Test:

Flight Test Team goals

For the flight test team, the E-flite apprentice offers a stable and predictable, yet maneuverable platform to carry out initial or advanced electronics systems tests. The flight handling characteristics of the Apprentice, along with its durability and repairability will also be advantageous for training new pilots.

First flight test items: (Mostly verifying control setups, as well as flight and ground handling)

- Standard pre-flight controls and power check
- Perform a taxi test to assess controllability on the ground
- Inflight control checks at altitude -- adjust controller trims as necessary
- Perform slow(low power)-flight and at least one stall to assess approach and landing flight characteristics
- Land aircraft and adjust clevis connections as needed to correct for trim errors (repeat until aircraft consistently flies straight at cruise power)

Later flight test items: (if the Team deems them necessary)

- Set up and test flaperons
- Set up and test control Mixing

Software/Electronics Team goals

The E-flite apprentice offers a platform that allows the electronics team to test electronics systems prior to integration into a UAS prototype. Having a platform with consistent and reliable flight dynamics will allow the electronics team to test hardware and software settings without having to worry about poor flight performance. This way, the team can determine using autonomous flight will be viable within the next available prototype and have working electronics for a prototype flight test.

Things to test: (Mostly a verification that the pixhawk will do what the documentation says it does)

- Autonomous flight; does the flight controller use the correct control surfaces
 - We'll be able to verify correct control surface usage during position flight mode test
- Test out airframe mix file
- Test switching between flight modes with a controller
- What flight modes work, what flight modes need to be programmed or tuned, or need more hardware (Lidar with auto-land)
 - Flight modes to test: (Before we do any autonomous testing, we will run a manual flight test to make sure everything is working properly)
 - Stabilized
 - Details in Initial Autonomous Stabilized Test Document
 - Hold
 - Details in Initial Autonomous Hold Test Document
 - Return
 - Details in Initial Autonomous Return Test Document
 - Altitude (requires lidar, might or might not have right away)
 - Details in Initial Autonomous Altitude Test Document
 - Position
 - Details in Initial Autonomous Position Test Document
 - Mission
 - Initial waypoint navigation test
 - Advanced waypoint navigation test

Documentation on flight modes is [here](#).

- See what the flight time is, find battery usage

UAS Prototype Flight Test:

Flight Test Team goals

The Spring 2020 UAS is the second iteration of our initial, Fall 2019 UAS design. Several modifications and improvements have been made to this iteration to decrease weight, and increase lift and stability in the effort to make this design capable of flight.

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- Perform slow(low power)-flight and at least one stall to assess approach and landing flight characteristics
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Software/Electronics Team goals