

# System Check Logs

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A journal of our attempts as a team to get the entire plane system up and running for a test flight.

## 10/5/2018: Pre-flight checklist test run 1

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We attempted to go through the entire pre-flight checklist as found on <rosflight.org>. Specific assignments were given out the previous day, and each individual was self-driven in getting ready for the check.

When it came time for the actual check, there were two main issues:

- We had trouble getting the ground station to launch. It might have been a problem specific to the specific machine being used (changes had been made to the repos on that computer), but that's something to look into
- **RC was giving us a lot of grief.** When we connected pure RC, the motors responded (when armed), but the servos never responded. When the autopilot was turned on, it claimed to have lost RC signal, and turned on the motors itself, even when it was "disarmed" from RC.
  - This was enlightening; in the future, we need to ensure that RC is working perfectly before proceeding with anything else.

## 10/11/2018: Pre-flight checklist test run 2

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Once again, we tried to go through the entire pre-flight checklist, this time provided by Brandon McBride with his work with Tray in the MAGICC Lab. Everyone seemed to remember their individual assignments, and got right to work when the time came.

- We ran tests with the props on, and we *burned out the left motor*.
- RC appears to be working great, but we didn't test it with ROSPlane also attached
- We need to replace the left motor, and set a limit on the throttle command. Kameron, Ryan, and Tyler are looking into that.
- We will try to do the full pre-flight check tomorrow. This will probably set back our test flight to Tuesday.

## 10/15/2018: Pre-flight checklist test run 3

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Steps followed:

1. Power on
2. Verify network connection
3. Check RC
4. Launch ROSPlane
5. Launch Interop Server
6. Launch Groundstation
7. Calibrate sensors, verify on groundstation

Issues encountered: - the groundstation kept running into the issue "waiting for send\_waypoints service to become available" - we were able to view the states on the old groundstation on Brandon's computer - it's apparent that *we are not sufficiently familiar with last year's path planning/ground station setup*

## 10/16/2018: FLIGHT TEST I

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## Issue

We were unable to connect to the plane via ssh; the bullet couldn't seem to get full bars, and we're not sure why. The computers were able to connect to the rocket.

## Debugging

- We repeatedly reset our systems, turning on things in a different order, etc.
- The computers were able to connect to the rocket, so that wasn't the issue.
- After the flight test, we connected everything to my car's power, so powering things through the car wasn't the issue.
- With the rocket connected to my car and the bullet connected to the Airplane's battery, a connection was easily established... maybe we just ran into some really bad luck.

## Issue

We launched the plane incorrectly, and damaged the airframe. We were not able to fly and had to go back to campus.

## Debugging

Kameron and Brandon believe that the following may have been the causes:

- the plane was launched at a slight angle, which diminished its lift capabilities from the beginning
- the elevator was not pinned sufficiently during launch
- not enough throttle was given at launch

The two of them will attempt to get some practice in a separate setting, and perhaps take on one more team member to be familiar with the launching process.

## 10/19/2018: VISION FLIGHT TEST

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## Issue

We weren't able to connect to the bullet again.

## Debugging

We moved down a block and the bullet connected just fine. It's weird the location would be the issue.

## Issue

We believe the plane's RC cut out and the autopilot (which was disarmed) took over and went full throttle and then elevated all the way causing the plane to go upside down. Then it pulled out of the loop and then rolled. The left side of the plane hit the ground and the wing disconnected.

## Debugging

After looking at the ROS bag, RC did indeed cutout. To prevent this in the future, we need to create a launch file that still launches ROSFlight, but has no autopilot.

## Successes

The bullet connected to the network. We launched the plane overhead and it worked smoothly.

## 1/18/19: SECOND SUCCESSFUL RC FLIGHT

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### Outcomes

- Verified that new GPS positioning in the nose is adequate for obtaining satellites
- Obvious that the orientation of the tail matters A LOT when it comes to how the plane wants to pitch
- Trims set for new tail configuration and “slow” flight
- Maybe try to fly somewhere else where the wind doesn’t bring us down so much?
- Never had RC/Network connectivity issues
- First time flying RC routing everything through the ROSFlight board

### Observations/Goals

#### Controls:

- We need to make sure that all of the RC parameter switches work to give and take control away from the autopilot. This will entail working with the plane on the table more, as well as possibly communicating with the MAGICC Lab.
- We need to make sure that we have a way to visualize the hardware on the groundstation quickly and easily. Is this done with `theseus groundstation.launch`? We need to look into this quickly.
- We need to get the airspeed sensor running to be able to deal with wind.

## 1/25/19: FOURTH SUCCESSFUL RC FLIGHT

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### Outcomes

- Kameron seems relatively comfortable in RC flight
- Barometer had one flight with weird height values, and one flight with good output values
- Airspeed sensor appears to rail at 3 knots, more or less, which is *way too low*
  - No especially noisy sensor output
- We successfully stored trim parameters on ROSFlight, and verified that it transfers the trim through flights

### Goals/Observations

- Investigate airspeed sensor and check values; we want to tune gains with working airspeed!
  - **ROSbag observations from the two flights:**
    - \* **Flight 1 was actually giving airspeed data that makes sense (corresponding to about 11 m/s airspeed), but the data is FLIPPED.** ROSPlane was outputting 0 for airspeed because it would not accept negative values. It looks like switching the tubes that one time actually wasn’t the right thing to do.
    - \* Flight 2 was not really railing the airspeed data; the sensor was spitting out a single value for differential pressure the entire time. I hope that this can be amended easily, or that flipping the tubes again does the trick.
  - Tomorrow we will take the ME truck out and run tests on the airspeed sensor.

## 1/29/19: AIRSPEED TESTS

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### Outcomes

- **The airspeed sensor works!** We validated the airspeed sensor outputs (coupled with ROSplane's estimator under `Official.launch`). There was not significant noise, as can be seen in the Google Drive video.
- We are ready for autopilot tuning.

## 1/30/19: AUTOPILOT TUNING 1

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