

Date: 2/22/12  
Location: ACRC  
Aircraft: Thor  
Pilot: Arion Mangio  
Flights: 5 Thor

### **Weather**

Sunny, light westerly winds, temps around 30F.  
METAR KANE 221745Z 26006KT 10SM BKN250 M01/M06 A2945=

We took Thor to ACRC to gather system ID data.

The controller used for all flights was the student controller. The system ID sequence used varied by run number (flight\_data.run\_num); the original plan was as follows:

Runs 1-5: original chirps, tested previously on Loki  
Runs 6-10: Modified chirps, .4 to 7Hz, with pulse to help remain on trim  
Runs 11-15: Modified chirps, .1 to 5Hz, with pulse to help remain on trim  
Runs 16-18: doublets for model validation

We ran into issues with the batteries having lower capacity due to the cold temperatures. Thus, we shortened the test sequence to be four runs of each chirp and only 2 doublets, and moved the low frequency chirps to second in the sequence.

Runs 1-4: original chirps, tested previously on Loki  
Runs 5-8: Modified chirps, .1 to 5Hz, with pulse to help remain on trim  
Runs 9-12: Modified chirps, .4 to 7Hz, with pulse to help remain on trim  
Runs 13-14: doublets for model validation

Amplitudes:

Elevator: 4 deg for chirps, 3 deg for the doublet  
Aileron: 4 deg for original, high freq, doublet. 6 deg for low freq  
Rudder: 4 deg for chirps, 2 deg for doublet

Software used was [trunk/Software/FlightCode rev 777](#)

**Thor Flight 29:** Elevator system ID. Flight cut short by motor battery low voltage cutoff. Emergency landing in the field resulted in a broken propeller and snow on the pitot tube. This was blown out by mouth using the lines in the fuselage. Rx data: A013, L030, F000, H000

**Thor Flight 30:** Elevator system ID. Continued previous flight, with modified sequence to pick up where previous flight left off. Set repeats to 4 instead of 5, 2 doublets instead of 3. Noted spiraling behavior during closed loop control- not expected since the roll angle controller is still active during the elevator movements. Theorized the nav filter was giving a bogus roll angle. Terminated flight to examine data.

**Thor Flight 31:** Elevator system ID. Repeat of flight 30 to finish off elevator runs. Rx data: A000, L014, F000, H000

**Thor Flight 32:** Aileron system ID. Significant spiraling noted.

**Thor Flight 33:** Rudder system ID. Significant spiraling noted. Rx data: A005, L010, F000, H000

### **Issues**

1. Failsafe setting for the R/C system (transmitter off) did not transfer Rx Mux? control back to manual. This needs further investigation.
2. Flaps stay at manual setting when in auto mode.
3. Pitot tube was knocked off and plugged during one landing. Needs realignment and clearing out.
4. Batteries can't handle cold well. Keep them in the car to stay warm.
5. Need to bring the following: compressed air to blow out pitot lines, tape, charger, CA glue/accelerator.
6. NAV filter did not perform well. Noted significant bias corrections (sharp notches in data).

### **Flight Data Analysis**

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