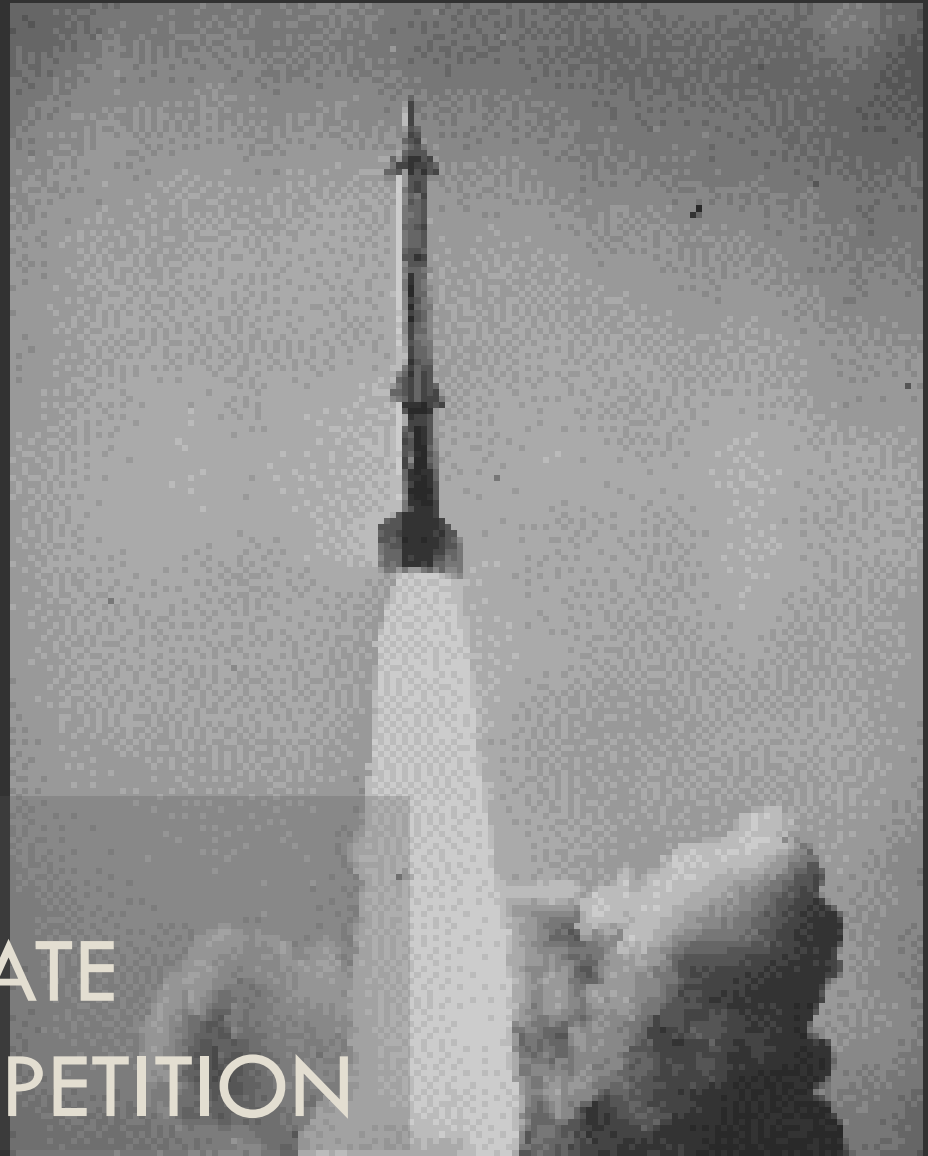


WSGC

2016

WISCONSIN COLLEGIATE  
ROCKET DESIGN COMPETITION



25-FEB-2016 – Q & A Mtg

# Welcome WSGC 2016 CRL

2

- Agenda
  - ▣ Welcome
  - ▣ Competition Logistics
  - ▣ Competition Dates
  - ▣ Questions and Answers

# This Years Teams

3

- Teams competing in 2016

- **11 Teams**

- WSGC Affiliate Schools with entries include:

Carthage College

Marquette Univ.

Marathon County/UW-Sheboygan

Milwaukee School of Engineering

Ripon College

UW Madison

UW Milwaukee

UW Oshkosh

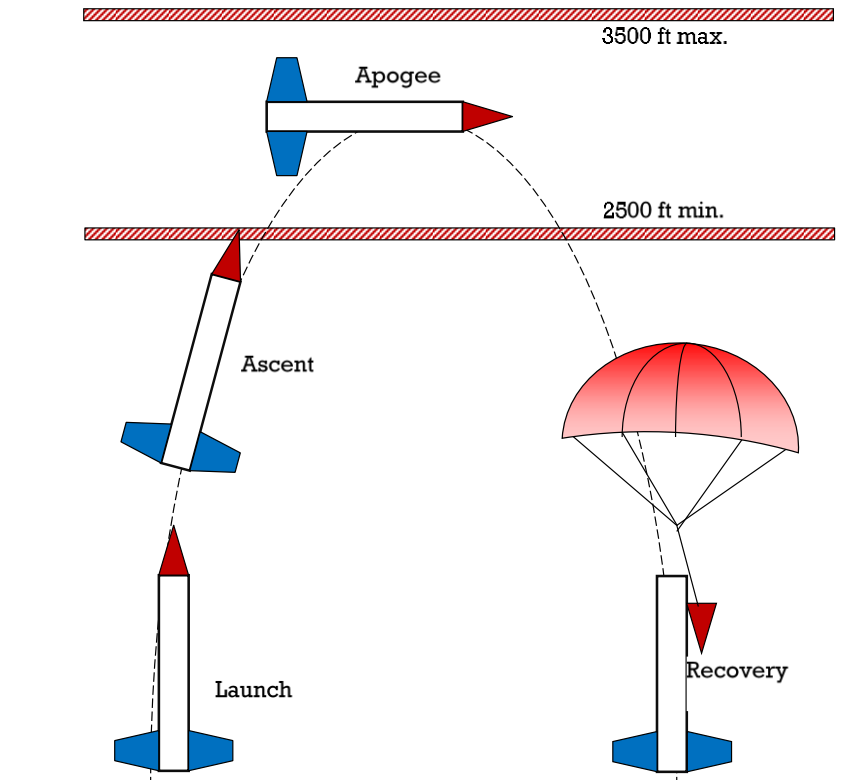
UW Platteville

UW River Falls

UW Whitewater

# 2016 Competition

4



## True-Scale Model

### Flight Mission

True-Scale Model	Accuracy of Model
Apogee Window	2500 – 3500 ft
Flight Accuracy	<ul style="list-style-type: none"><li>- Predict flight of Rocket</li><li>- Compare to actual apogee</li></ul>

### Constraints

Rocket Motors to select from:	Ceseroni (38 mm)
	567I125-10A
	601I350-16A
	634I540-16A
	648J285-15A
	684J290-15A
	649J335-15A
	658J357-17A

# 2016 Competition Parameters

5

- ❑ “True Scale Model” of an actual, rocket or.
- ❑ “Successful flight”
- ❑ Apogee between 2500 and 3500 ft
- ❑ Elec. deployment with motor deploy backup. **REQ'D**
- ❑ Downed rocket location aid.
- ❑ Accuracy of apogee from simulation vs. actual flight will determine flight winner.

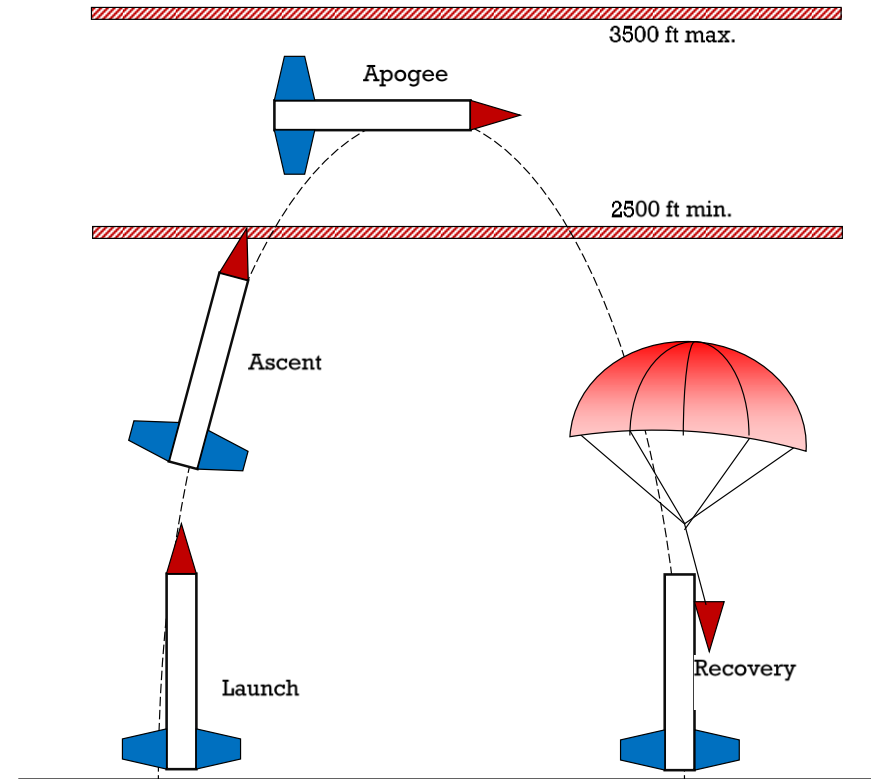
# Competition Flight

6

## Flight

### ■ Successful flight requires:

- Launch
- Stable, vertical ascent
- Apogee between 2500 ft and 3500 ft
- Electronically deployed recovery system must successfully deploy
- Rocket must be recovered in flyable as-is condition



# Competition Flight

7

## Flight cont.

- ▣ Flight Scoring:
  - Successful flight
  - Max. Altitude
  - Flight score:

$$\begin{aligned} \text{Flight Score} = & 20(\text{for successful flight}) \\ & + 80 \left( 1 - \frac{(\text{Actual Apogee} - \text{Predicted Apogee})}{\text{Predicted Apogee}} \right) \end{aligned}$$

# 5 Components of the Competition

8

- Design Report (written) (25%)
- Flight Readiness Presentation (oral) (15%)
- Flight (35%)
- Post Flight Performance Report (written) (15%)
- Education Outreach (Outreach Form) (10%)

**Total 100%**



# Tools and Tips

9

□ Links for forms and additional information at:

▣ <https://spacegrant.carthage.edu/students/tools-and-tips/>

- CRL Competition Calendar
- W9 Tax Form (for award winning teams)
- Media Release Form (Adults or Minors) for items to be posted on WSGC Website
- What you Need to Know
- Competition Handbook
- Education Outreach Form
- Expense Reimbursement Form

# Timetable

10

Activity	Date
Kickoff Meeting ( <del>In Person &amp; Online</del> )	<del>24-Oct-2015</del>
Budget and Demo Flight Deadline	<del>08-Jan-2016</del>
Design Update Meeting ( <del>Online</del> )	<del>14-Jan-2016</del>
Interim Progress Report	<del>18-Feb-2016</del>
Q&A Meeting (Online)	25-Feb-2016
Design and Safety Review Meeting (In Person, EAA, Oshkosh)	19-Mar-2016
Design Reports Due to WSGC	04-Apr-2016
Design Presentations (In Person)	22-Apr-2016
Launch (In Person)	23-Apr-2016
Post Flight Performance Report	09-May-2016
Final Reimbursement Request Deadline	09-May-2016

*Dates are subject to change or may be rescheduled due to weather or other factors.*

# Design Safety Review - 19-Mar-2016

11

- Teams attendance REQUIRED
- EAA AirVenture Museum, Oshkosh
- Rocket in 90% assembled condition
  - ▣ Documentation showing true-size and scaled dimensions
  - ▣ Ready to describe deviations from actual rocket/missile
  - ▣ Shockcord should be installed, anchored to motor mount
  - ▣ Parachute not installed
  - ▣ Does not have to be painted
  - ▣ Selected paint scheme duplicating a historic image of the rocket/missile

# Design Report — *Due 04-Apr-2016*

12

## Design Report

- ▣ Purpose: to communicate the engineering and design effort involved
- ▣ Research info about chosen rocket/missile
  - Purpose of the Rocket
  - Date of Use
  - Country of Origin
  - Actual size and weight
  - Any additional information specific to the Rocket
  - Image of the Rocket

# Design Report — *Due 04-Apr-2016*

13

## **Design Report cont.**

- ▣ Adjustments from scale to achieve safe, stable flight, removable components
- ▣ Analysis of predicted performance
- ▣ SHOW the design and construction
  - (pictures, diagrams, etc.)
- ▣ 25 page MAX.
- ▣ Due in advance of presentation

# Analysis of Predicted Performance

14

To account for not knowing the wind speed at launch when running simulations. Trying simulating for a “grid” of possibilities.

ALTITUDE VS. LAUNCH ANGLE & Wind Speed  
From VERT. TOWARDS WIND

LAUNCH ANGLE (deg) FROM VERT	WIND SPEED (mph)		
	0 mph	5 mph	10 mph
0°	?	?	?
5°	?	?	?
10°	?	?	?

# Presentation – 22-Apr-2016

15

## **Flight Readiness Presentation**

- ▣ Purpose: to communicate the design and engineering effort involved
- ▣ Organization and presentation important
- ▣ VISUAL AIDS
- ▣ Rocket Appearance
- ▣ 10 minutes (7 for presentation, 3 for Q&A)
- ▣ Friday evening before launch

# Post Flight Report – 09-May-2016

16

## **Post Flight Performance Report**

Material that must be included, at a minimum:

- Cover Page
- Flight Performance Comparison Sheet
  - Table of performance characteristics
  - Plot: “Acceleration Performance Comparison of Predicted and Actual”
- Discussion of Results
  - Compare predicted and actual apogees, describe and defend possible reasons for differences
  - Compare predicted and actual accelerations, describe and defend possible reasons for differences
  - Discussion of how flight could have been improved



# Outreach Form — 15-Apr-2016

17

## Education Outreach

### ▣ Purpose

- Spread the word and share the excitement

### ▣ Example Possibilities

- Meet with a K-12 class or student organization to explain how rockets work.
- Make a presentation in the community or to a group on campus to describe the rocket competition and your team's design.
- Make a presentation to a group on campus describing opportunities at NASA or through the WSGC that are available to students before they graduate.

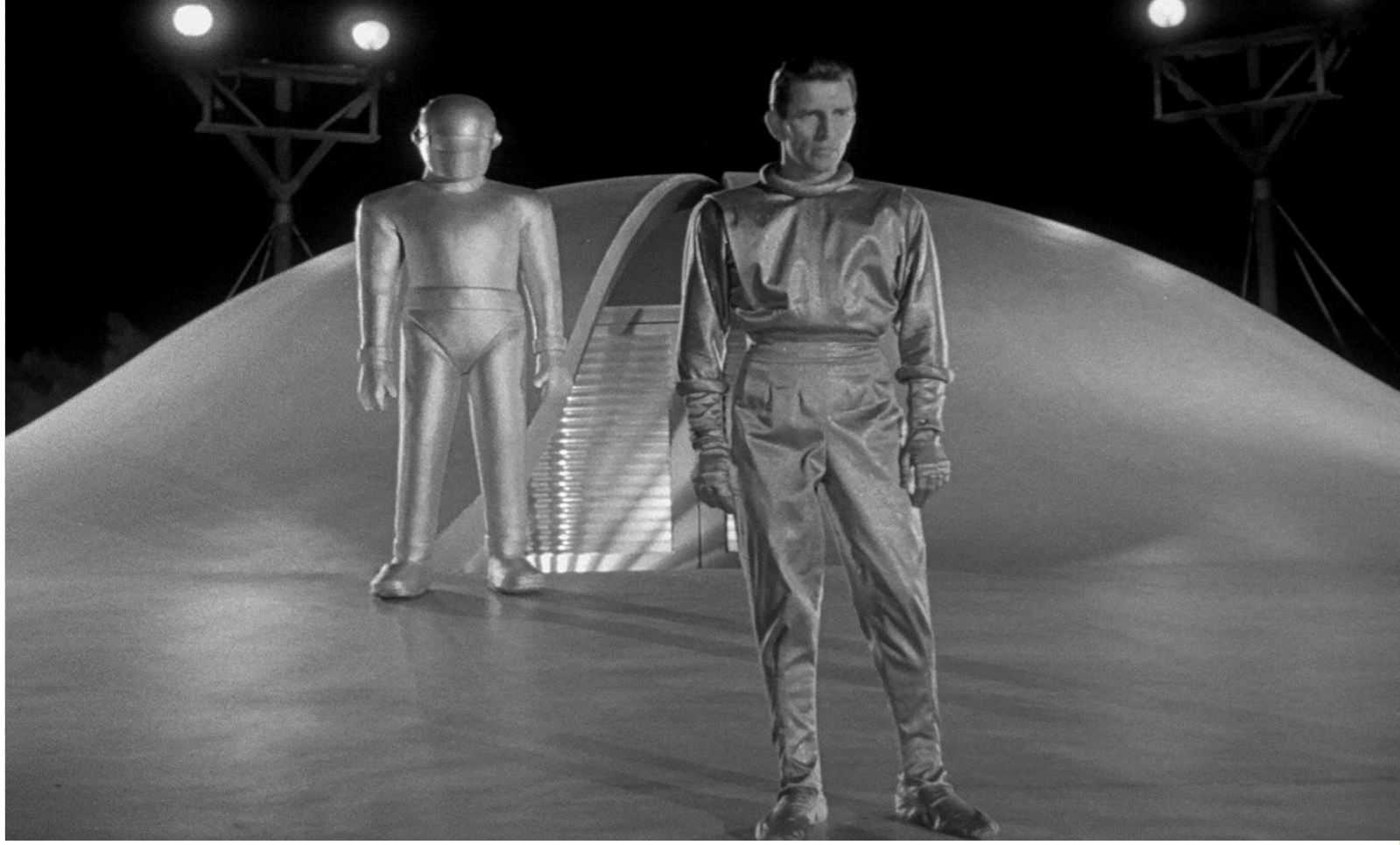
# Flight Data Recorder

## ❑ Featherweight Raven 3

- ❑ [http://www.featherweightaltimeters.com/The\\_Raven.php](http://www.featherweightaltimeters.com/The_Raven.php)
- ❑ WSGC Flight Data Recorder (FDR) will be used to gather flight data ONLY
- ❑ Teams must allow properly vented space for the FDR
- ❑ FDR's will be issued for use at the launch and retrieved from each team immediately following recovery



Image enlarged for clarity.  
Actual size only  
1.80" x 0.8" x 0.55."



19

Questions?   Comments?

End Transmission