2021 WSGC

WISCONSIN COLLEGIATE ROCKET DESIGN COMPETITION

DESIGN UPDATE MEETING I

14-JAN-2021

Welcome WSGC 2021 CRL

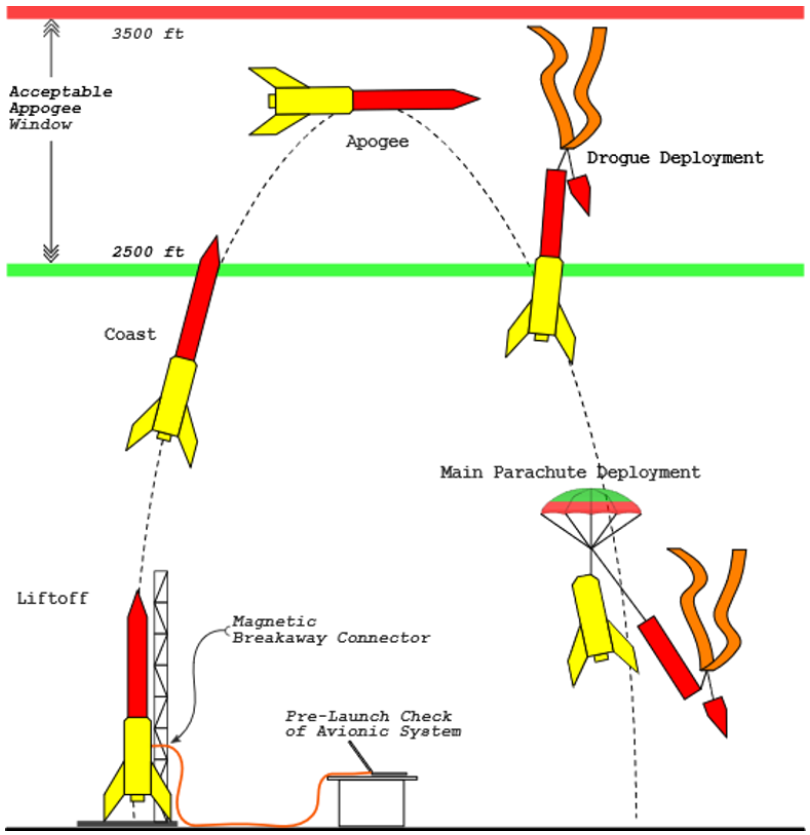
- Agenda
  - Who is competing?
  - What is the challenge?
  - When and where will events be taking place?
  - When are the important deadlines?
  - What support can teams expect from the WSGC?
  - What are the required deliverables?
  - Questions and Answers?

This Years Teams

- Teams competing in 2021
  - **8 Teams**
- WSGC Affiliate Schools entered in competition:

  Carthage College
  Marquette University
  Milwaukee School of Engineering
  UW Green Bay
  UW Milwaukee
  UW Platteville
  UW River Falls
  UW Sheboygan

2021 Competition



Umbilical Data Challenge

Flight Mission	
Avionics with Umbilical Data	Avionic system for capturing system performance data with umbilical to: - Confirm avionics systems ready, "stand-by" - Command avionic system to "ready to fly" - Activate visual indication of avionic system status on rocket
Apogee Ceiling	Apogee at least 2500ft and no greater than 3500ft
Flight Accuracy	- Predict flight of Rocket - Closest to predicted alt

Approved Motor List	
Aerotech Consumer Aerospace	**38 mm:** I435T, I366R, I284W, J350W, J400G, I600R

Collegiate Rocket Launch Calendar 2021

26-OCT-2020	**Notice of Intent to Compete Deadline**
~~05-Nov-2020~~	~~Kick-Off Meeting @ 6:00 pm~~
~~13-Nov-2020~~	~~Award Acceptance Material Due~~
~~08-Dec-2020~~	~~PDR Report*, Preliminary Budget*, and Demo Flight* Deadline~~ ~~Upload RockSim Model file~~ ~~Upload rocket demo flight video on Facebook and/or Twitter and demo flight link to team lead grant management page.~~
14-Jan-2021	Design Update Virtual Meeting I
11-Feb-2021	Design Update Virtual Meeting II
18-Feb-2021	CDR Report* Deadline
18-Feb-2021	Final Team Roster* Deadline
05-Mar-2021	First Payout Deadline
	Please complete the Travel Expense Form and/or the Project Expense Form (found in Tools and Tips) according to the instructions. Email the form(s) and digital receipts to Connie Engberg, cengberg@carthage.edu. Allow 60 days for payment.
27-Mar-2021	Design and Safety Review Meeting ~~at EAA Museum~~ *EAA has cancelled spring events*
	Mandatory meeting with 90% ready-to-fly rocket
05-Apr-2021	FRR Report* Deadline
05-Apr-2021	Education Outreach* Deadline
	Team will share information pertinent to aerospace with a group or audience.
19-Apr-2021	FRR Oral Presentation PowerPoint* Deadline
23-Apr-2021	FRR Oral Presentation at Carthage College
	Present a 6-8 minute PowerPoint presentation discussing team's rocket
24-Apr-2021	Launch Competition
	Attend the High-Powered Rocket Launch at Richard Bong Recreational Area in Kansasville, WI.
10-May-2021	Post-Flight Performance Review* Report
10-May-2021	Final Payout Deadline
	Please complete the Travel Expense Form and/or the Project Expense Form (found in Tools and Tips) according to the instructions. Email the form(s) and digital receipts to Connie Engberg, cengberg@carthage.edu. Allow 60 days for payment.
Aug-2021	Annual Conference
	If your team places 1st-3rd in the competition, present the results of your studies associated with this program at the 31st Annual Wisconsin Space Conference at Milwaukee School of Engineering, Milwaukee.

2021 Competition Parameters

- Demonstrate the ability to control the rocket's onboard data avionics (separate from recovery altimeter).
- Must complete a "safe and successful flight".
- Rocket must employ dual-deploy recovery system with motor backup deployment.
- Downed rocket location aid must be included in the dart design.
- Max apogee and closest to team's predicted altitude.

2021 Competition Parameters

- Demonstrate the ability to control the rocket's onboard data avionics (independent from recovery altimeter) while on the launch pad.
  - Avionics to monitor and record vs. time:
    - Motor casing temperature
    - Internal pressure of Recovery Deployment Compartment
    - At least one other internal system of the team's choice
  - Using an "umbilical" USB cable with a magnetic coupling
  - Umbilical will passively separate from rocket at launch

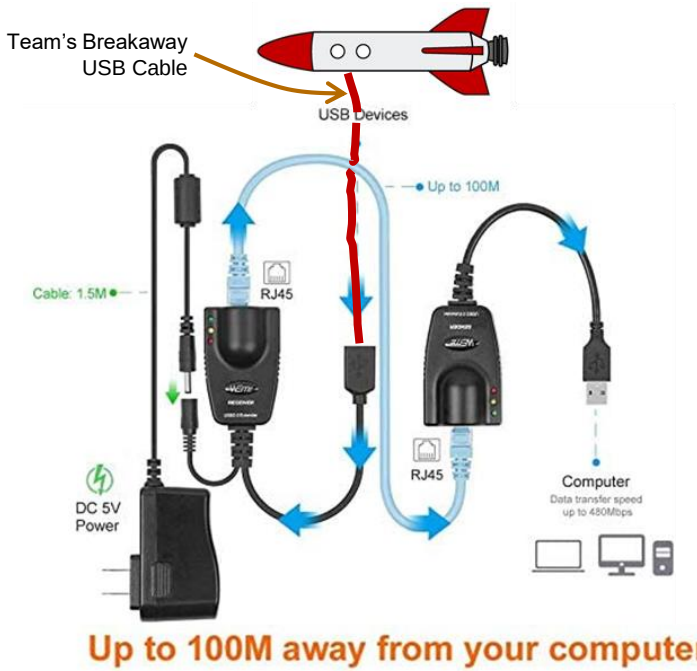
2021 Competition Parameters

- Example of Magnetic USB Data Cable for passive "breakaway"
  - **Team's equipment**
    - Team purchases cable
  - Look for Data & Charging
  - Standard USB 2.0
  - Choose end that fits
  - Q's? Contact Dr. Farrow

Magnetic Micro USB Cable
With charging and Data-Sync

2021 Competition Parameters

- USB Extender (WSGC Equipment)
  - Allows a > 200 ft separation between USB cable at rocket and the table for teams control computer.



Example Extender: WEme USB 2.0 Extender to RJ45 Over Cat5

Tripoli Certification Level 1 & 2

- All faculty and student participants eligible
- Purchase a rocket (see Frank or Bob for guidance)
- Build rocket individually, not a team effort
- Bring a 90% Ready-to-Fly Rocket to the competition
- Launch certification rocket competition weekend (Sunday)
- Level 2 Certification Tests available upon request
- Level 2 Certification Test must be passed in order to fly certification rocket
- Cost = $10 Launch Fee (Cash Only) and Motor Purchase
- Last day to register for certification: March 1, 2021
- Link for additional information: http://www.tripoli.org/Level1

WSGC Reimbursement - NEW

- Two Options:
- *The CRL team will submit reimbursement requests to WSGC through the University/College.*
  - *Quarterly Invoice by institution*

OR

- *Individuals will submit reimbursement requests to WSGC for supply and travel expenses.*
  - March 5, 2021 and May 10, 2021 deadlines
  - Submit digital receipts and reimbursement forms per the reimbursement instructions.

Competition Logistics

- ~~Team Award Acceptance Material due 20-Nov-2021~~
  - ~~Filed online by Advisor/Team Lead on Grant Management Page~~
- Members must be individually registered with WSGC to be reimbursed
- Final team rosters 18-Feb-2021

Contact Connie Engberg regarding reimbursement requests and online submissions questions.
cengberg@carthage.edu

Tools and Tips

- Links to forms and additional information:
  - https://spacegrant.carthage.edu/students/tools-and-tips/
    - Under heading **Forms/Templates**
      - W9 Tax Form
      - Media Release Form (Adults or Minors) for items to be posted on WSGC Website
    - Under heading **Reimbursement Request Forms**
      - Project Expense Form Instructions
      - Travel Expense Form Instructions
    - Under heading **Collegiate Rocket Launch**
      - Competition Handbook 2021
      - Calendar of Events 2021
      - Education Outreach Form

Components of the Competition

Critical Design Review (CDR) Report

- 18-Feb-2021
- Purpose: to communicate the engineering and design decisions involved in system development
- Design features of "Payload"
  - Brief description of possible methods identified
  - Comparison of methods and decision process for evaluation and selection
  - Include the design of method to capture video monitor systems and remote control via USB cable
  - Image of the Rocket and its subsystems
  - Mechanical and electrical diagrams of the design
  - Downed rocket location aid

Components of the Competition

CDR Report cont.

- Additional Design Features of Rocket
  - Compensations made to accommodate the magnetic breakaway USB
  - Downed rocket location aid
- Design Features of Recovery System
  - Electronic, dual-deployment system
  - Design to allow motor deployment backup
  - Recovery systems selected
  - Shock-cord and mounting design
- Analysis of Anticipated Performance
- Construction Photos
- Budget

27-Mar-2021 Design Safety Review

Purpose: Assess rocket construction flight worthiness

- Teams attendance **REQUIRED**
- Location planned for EAA AirVenture Museum, Oshkosh, WI
- Rocket in 90% assembled condition
  - Rocket and payload systems
  - Airframe complete
    - Body tube, fins, motor mount, nose cone, payload sections, etc. should all be assembled
    - Shockcord should be installed, attached to motor mount
  - Parachute does not need to be installed
  - Does not have to be painted
  - **Photo documentation of assembly process**

Components of the Competition

Flight Readiness Review (FRR) Report

- Purpose: to communicate final design and improvements
- Results of System Performance Verifications
  - Avionic systems tests?
  - Magnetic breakaway tests?
  - Video system tests?
  - Flight test?
- Adjustment to design of payload
- Adjustment to design of rocket
- Accurate diagram of rocket system
- Adjustment to anticipated performance
- Photographs of completed rocket system

Components of the Competition

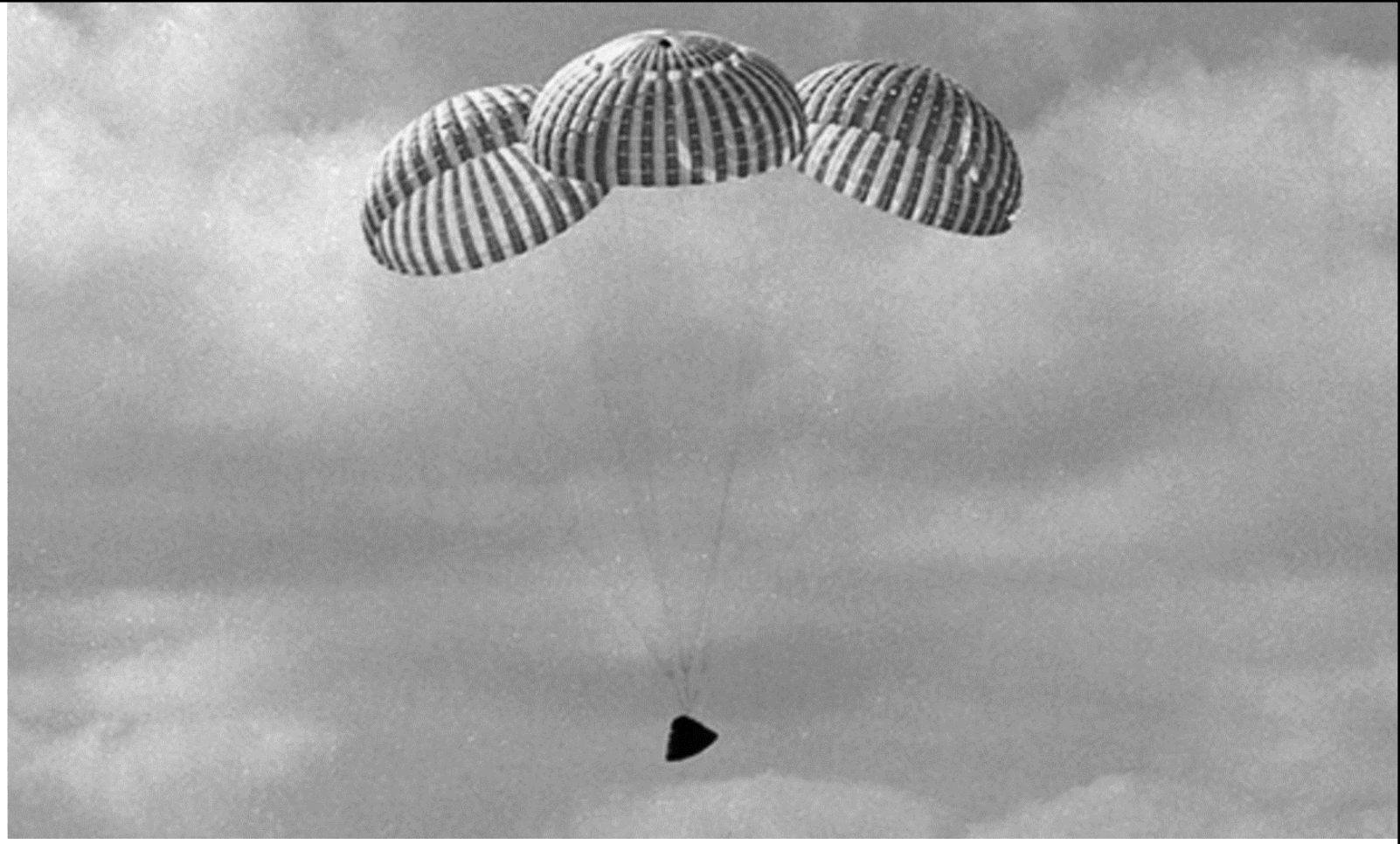
Flight Readiness Presentation

- Purpose: to communicate the design and engineering effort involved
  - Rocket and Payload system
  - Anticipated performance – Apogee
- Organization and delivery of presentation important
- VISUAL AIDS, Slides, Video
- Actual Rocket and Payload system in presentation
  - Describe its operation
- Rocket's "Fit and Finish" will be evaluated
- 10 minutes (7 for presentation, 3 for Q&A)
- Friday evening before launch

Components of the Competition

Competition Flight

- Safe & Successful flight requires:
  - Launch
  - Stable, vertical flight during ascent
  - Electronic dual-deployment recovery systems must successfully operate
  - Rocket must be recovered in flyable condition
  - Apogee within competition “window”



Questions? Comments?