

# Critical Analysis Review NMSGC Student Launch Program

University/Institution

Team Members

Date

Due November 1st

# Mission Overview

- What is your objective?
- What do you expect to prove, discover, or learn from your experiment?
- Brief overview of underlying science/theory
- What other related research/experimentation has been done in the past?
  - Results?
- Mission Requirements

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# Mission Overview

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**\*\*NOTE:** This can be a more refined rendition of the corresponding PAR slides. Don't plan on spending lots of time during the review here unless your mission has changed significantly

# User notes

- This template shall be followed as closely as possible.
- Deviations from this template will make it hard to assess your flight readiness. Without an understanding of your level of flight readiness, your chances of being awarded a primary position will be decreased.

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# Mission Overview

- What is your objective?
- What do you expect to prove, discover, or learn from your experiment?
- Brief overview of underlying science/theory
- What other related research/experimentation has been done in the past? (VERY IMPORTANT)
  - Results?
  - How is this flight different from those flight and how may your results vary based on this? (VERY IMPORTANT)

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# Mission Requirements

- What functional requirements must your payload conform to?
  - Scientific requirements
  - Mass, Volume, CG, No-Volt, etc.
- Usually presented in matrix form.
  - Matrix can use a color to indicate current compliance with the requirement.
    - Green: Compliant, Yellow: Partially Compliant, Red: Not Compliant
- SEE EXAMPLE ON NEXT SLIDE
- Your specific requirements will vary, but they should include the requirements in the UP Aerospace user's guide

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# Example Mission Requirements Matrix

Requirement	Method	Status
The spacecraft must not exceed a weight of 30 kg.	Design, Test	
The spacecraft must operate on 30W or less.	Design, Test	
The spacecraft's center of gravity (CG) shall be within 0.25" of the geometric central axis of the ICU.	Design, Analysis	
The allowable static envelope of the spacecraft is a cylindrical right prism with a diameter of 18.7" (47.5 cm) and a height of 18.7" (47.5 cm).	Design	
The spacecraft's CG shall not lie more than 12" above the satellite interface plane (SIP) .	Design, Analysis	
The spacecraft shall have a fundamental frequency above 100 Hz given a fixed-base condition at the SIP.	Design, Analysis	
The spacecraft must be capable of meeting all mission objectives.	Design, Test	

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# Concept of Operations

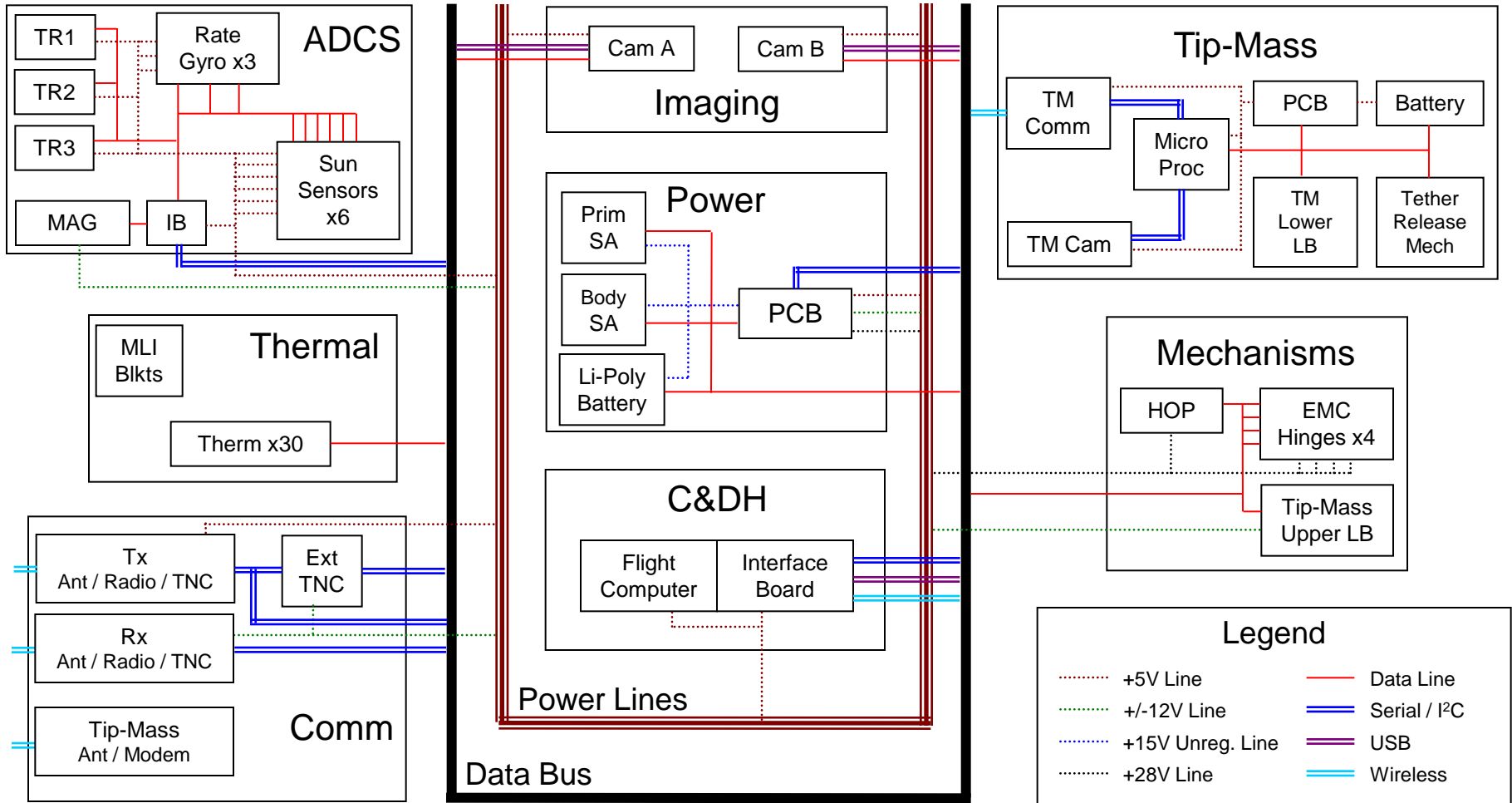
- Provide a high level overview of how your payload operates.
  - Diagrams are an excellent way to convey the mechanics without cluttering a slide with lots of words.
    - Show events such as: launch, G-switch activation, first accelerometer activated, at apogee first accelerometer deactivated and secondary becomes active, etc, etc, etc.
  - Although diagrams are nice, they are not required. A paragraph on operation would also be acceptable.

# Functional Block Diagrams

- A Functional block diagram of the entire system should be presented here.
  - It is helpful to box individual subsystems to give reviewers a reference for future presented analysis.
- **SEE EXAMPLES ON NEXT FEW SLIDES**
- **!! Schematics/Drawings/Analysis and Block diagrams are the driving elements of a CAR. Prove to the reviewers that your design is established enough that you can start bench testing and ordering test/development hardware !!**

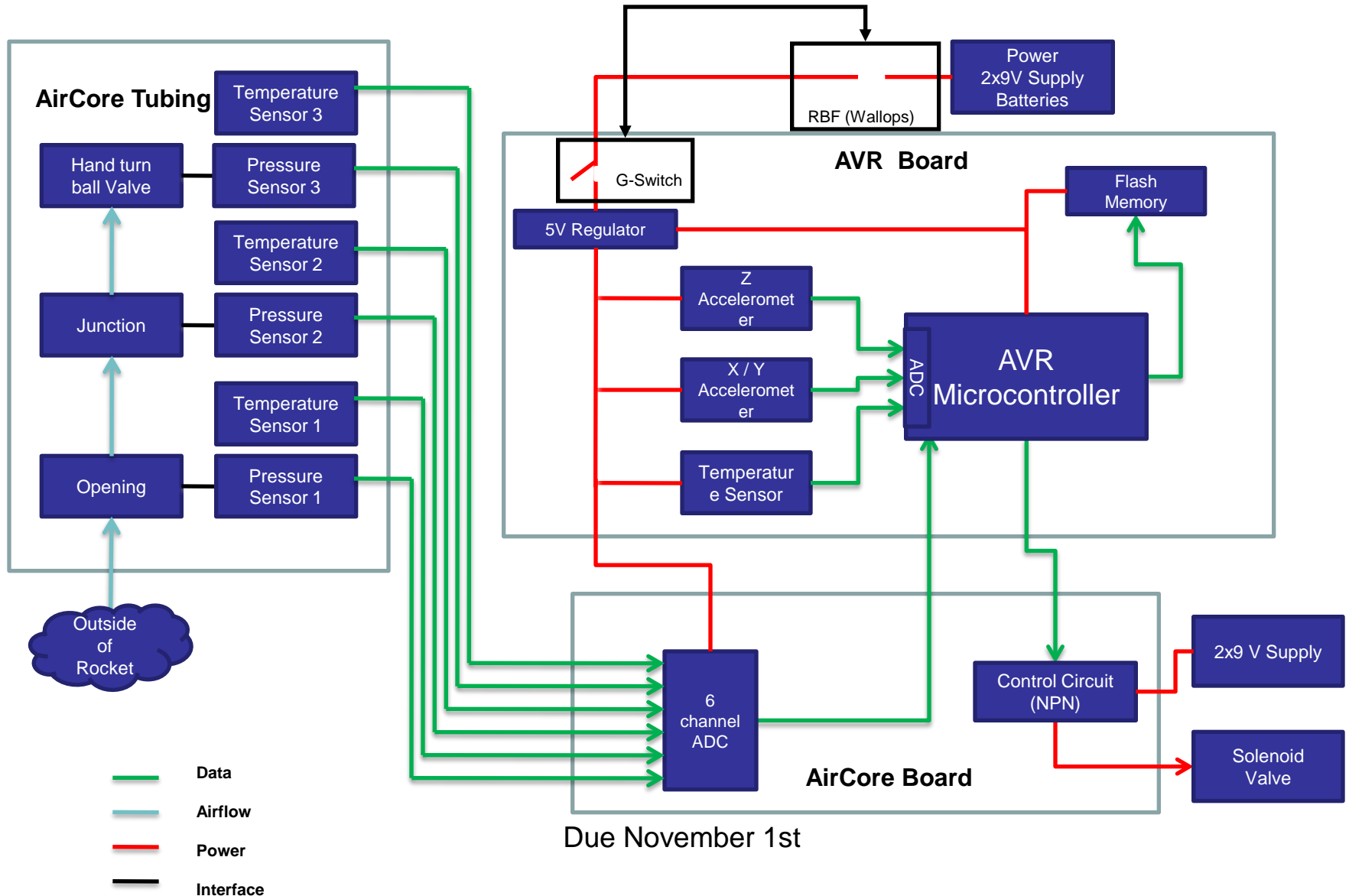
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# Example of Good Functional Block Diagram



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# Example Of Excellent Functional Block Diagram

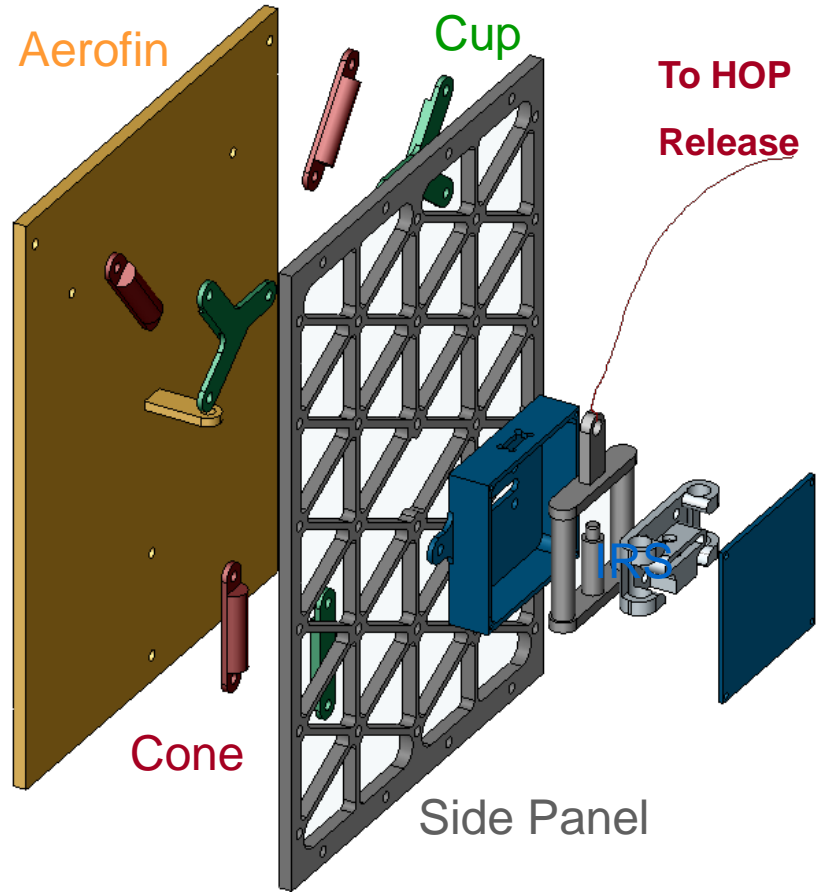
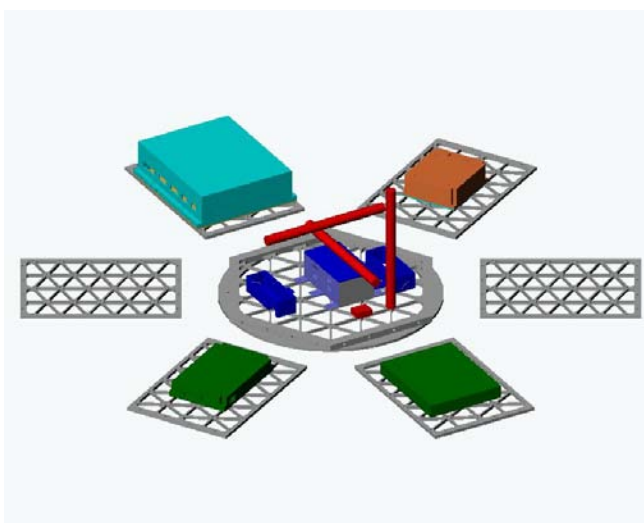
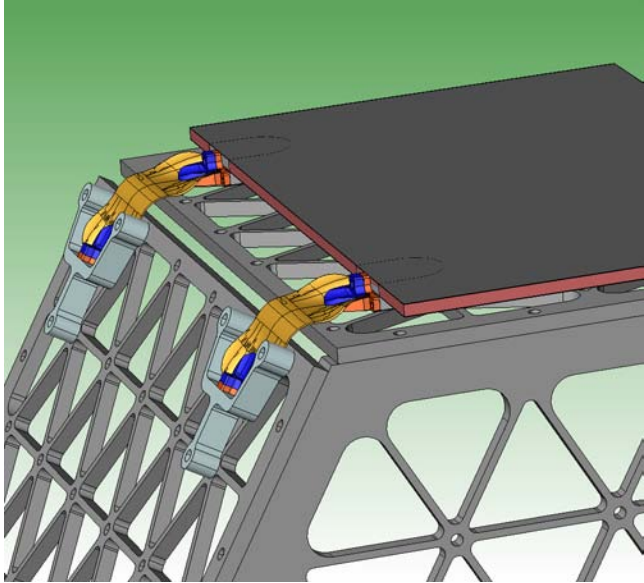


# • **Structural Drawings and Pictures**

- Solid models
- Integrated solid models
- Interfaces:
  - To the can per the user guide requirements
  - To your shared customer
- 2D drawings can be reserved for the appendix
- **SEE EXAMPLES ON NEXT FEW SLIDES**

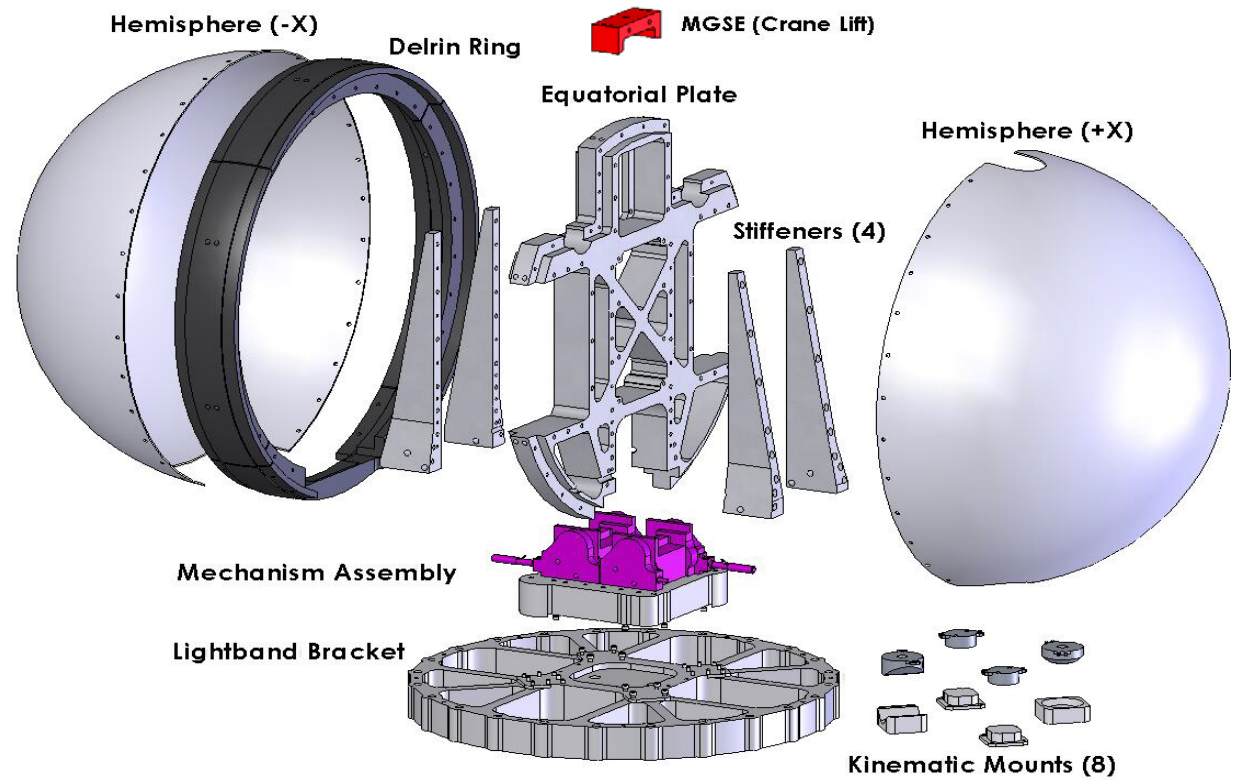
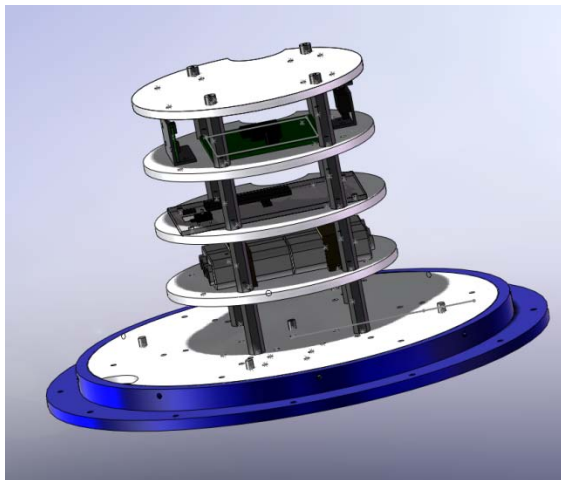
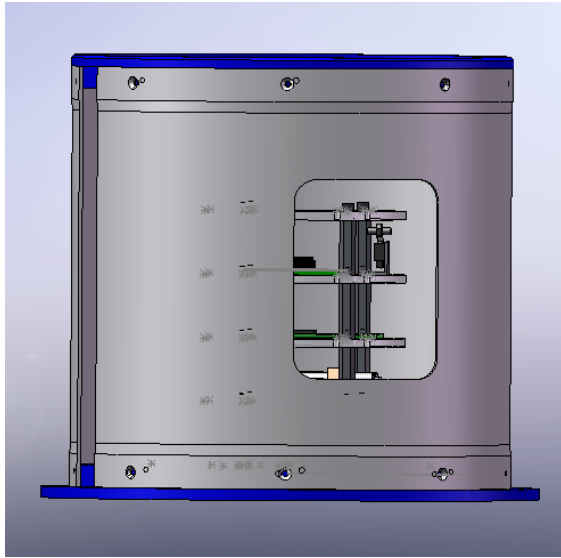
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# • Structural Drawing Examples



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# • Structural Drawing Examples



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- **Shared Can Logistics Plan**

Update Larry and I on RSPC sharing logistics since PDR

- Pertains to Institutions/Universities sharing a can
- Descriptions of interfacing to each other
- Descriptions of interfacing to the top and bottom bulkheads

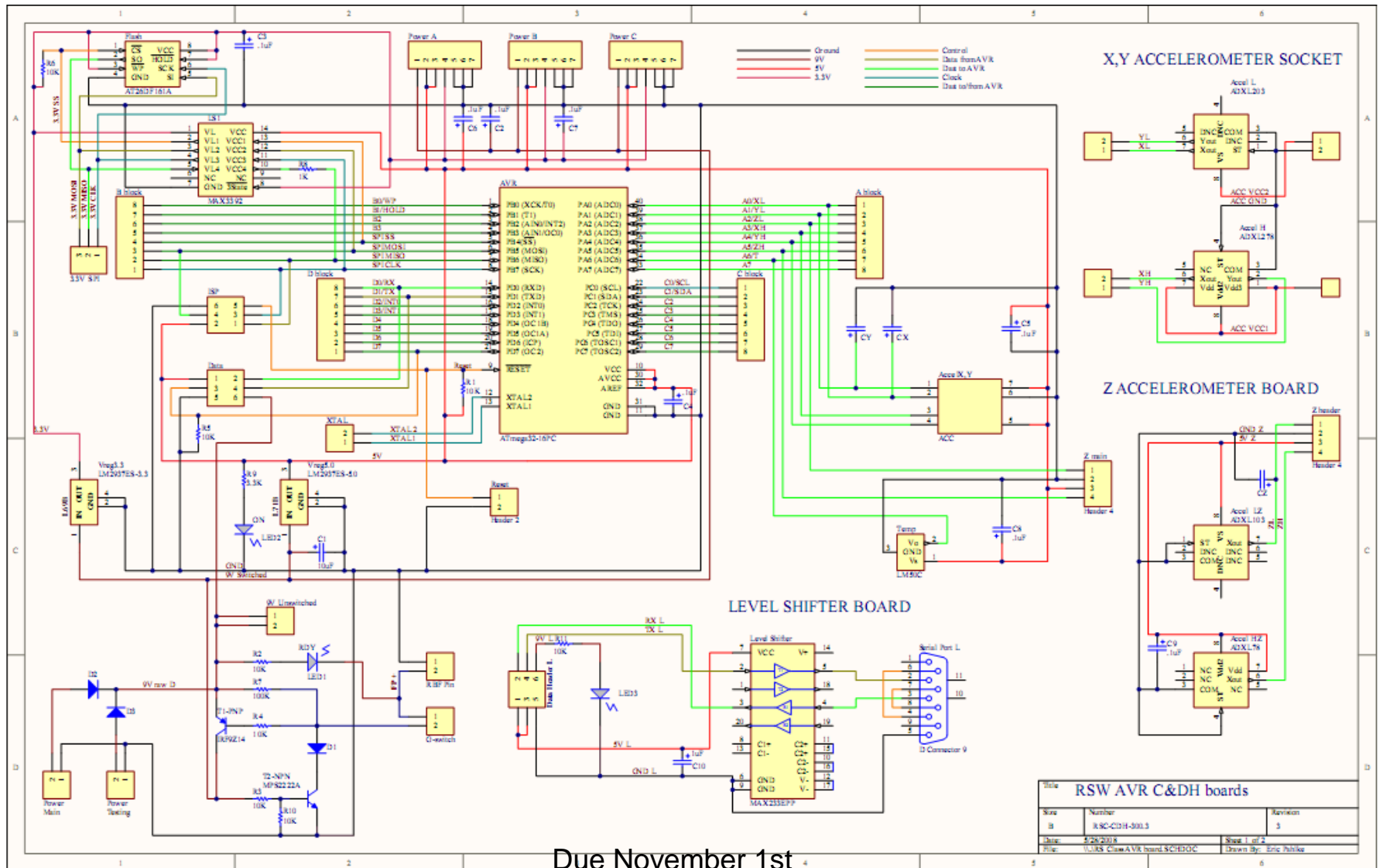
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# Schematics

- Show/prove compliance with UP Aerospace requirements
- Schematics shall be mature and complete at this point
- **SEE EXAMPLES ON NEXT FEW SLIDES**

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# Schematic Example



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# Subsystems Overview

- What subsystems do you have: power, C&DH, thermal, etc.
- What top level requirements do you have for each subsystem.
  - Make requirements as quantifiable as possible.
    - Power subsystem shall supply 2W to...
    - Power subsystem shall remain at or above 72 F at all times during the flight.
- Which requirements are design drivers?
- Where is data stored?
- Be sure to include sensor specifications
- Any states that your payload may have:
  - Active, Active/Safe, Idle...

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# Parts List

- MAJOR Components lists
  - Not at the nut and bolt level... just major hardware that will be purchased or built in house
  - Lead times can be useful, but are not required (This can make or break a project)
  - Distributors
  - Manufacturers
- SEE EXAMPLE ON NEXT SLIDE

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# Example Parts List

<b>Parts</b>	<b>Company</b>	<b>Model</b>
Low range accelerometers		
x and y-axis	Analog Devices	ADXL 203
z-axis		ADXL 103
High range accelerometers		
x and y-axis	Analog Devices	ADXL 278
z-axis		ADXL 78
Microcontroller	Atmel	ATmega 32
ADC	Analog Devices	AD73360
Pressure Sensor	Omega	PX 209
Solenoid valve	Parker	099-0167-900
Temperature sensor	National Semiconductor	LM50CIM3
Power Regulator	Texas Instruments	M2937IMP
Flash memory	Atmel	AT26DF161A
Transistors		NMOS

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# Special Requirements

- Some customers have very special needs that shall be addressed in detail (THIS WILL NOT APPLY TO ALL CUSTOMERS)
  - Schematics (???)
  - Mechanical Drawings
  - Demonstrated Need
  - What can NM Space Grant Consortium do to help?
  - Tools/Special Equipment that you need from Wallops for integration
    - Torque wrench, argon gas, etc.

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# RockSat Payload Canister User Guide Compliance

Type of Restriction	Restriction	Status
Mass allotment:	$\leq$ <b>your allotment</b>	Green
Volume allotment:	$\leq$ <b>your allotment</b>	Green
The payload's center of gravity (CG):	In 1"X1"X1" envelope of centroid?	Yellow
Wallops No-Volt Requirement Compliance:	Yes?	Green
Structure mounts:	Top and bottom bulkheads. No mounts to sides of cans.	Yellow
Sharing:	Fully developed?	Yellow

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- **Management**

- Updated Organizational Chart
- Updated Schedule
- Updated mass/monetary budgets

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# Test Plans

- What type of testing can be performed on your payload pre-flight?
- What is required to complete testing?:
  - Support Hardware
    - Purchase/produce?
  - Software
    - Purchase/in-house?
- Potential points of failure
- Testing/Troubleshooting/Modifications/Re-Testing Schedule

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# Conclusions

- Issues and concerns
- Closing remarks

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# Appendix

- Information and drawings not essential to the presentation, but that could be useful for tough questions
  - Data sheets, 2D drawings, additional schematics/diagrams, any design analysis completed.