Thermal

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Program Requirements

- Component Temperature Requirements
  - Electronics/Ordnance:
    - 0C to +40C (Op.) –20C to +60C (Non-Op.)
  - Thruster Valves, Propellant Tank and Lines:
    - +5C to +40C (Op.) +5C to +55C (Non-Op.)
  - AKM:
    - 370C Max. (Op.) 0 to 43C Max. (Non-Op.)
  - Battery: -5C to +20C
  - Instrument Mount I/Fs: +18C to +22C, TBD Radiation Environment Requirement
  - Solar Arrays: 100C Max
- Jitter Requirements
  - May Preclude Use of Mechanical Thermostats/Relays

Subsystem Requirements (1 of 2)

- Electronics and Battery Mounted on Bottom Panel
- Material Grounding for ESD Including MLI and Tapes
- Heater Power Requirement:

Launch	Stowed S/A	Nominal Op.	Safe/Hold
0W	57.5W	23.5W	90.5W

- MLI Blankets
  - Shear Panel Exterior Surfaces
  - S/A Back Sides
  - Propellant Tank, Lines, and Thruster Valves
  - Payload Interface

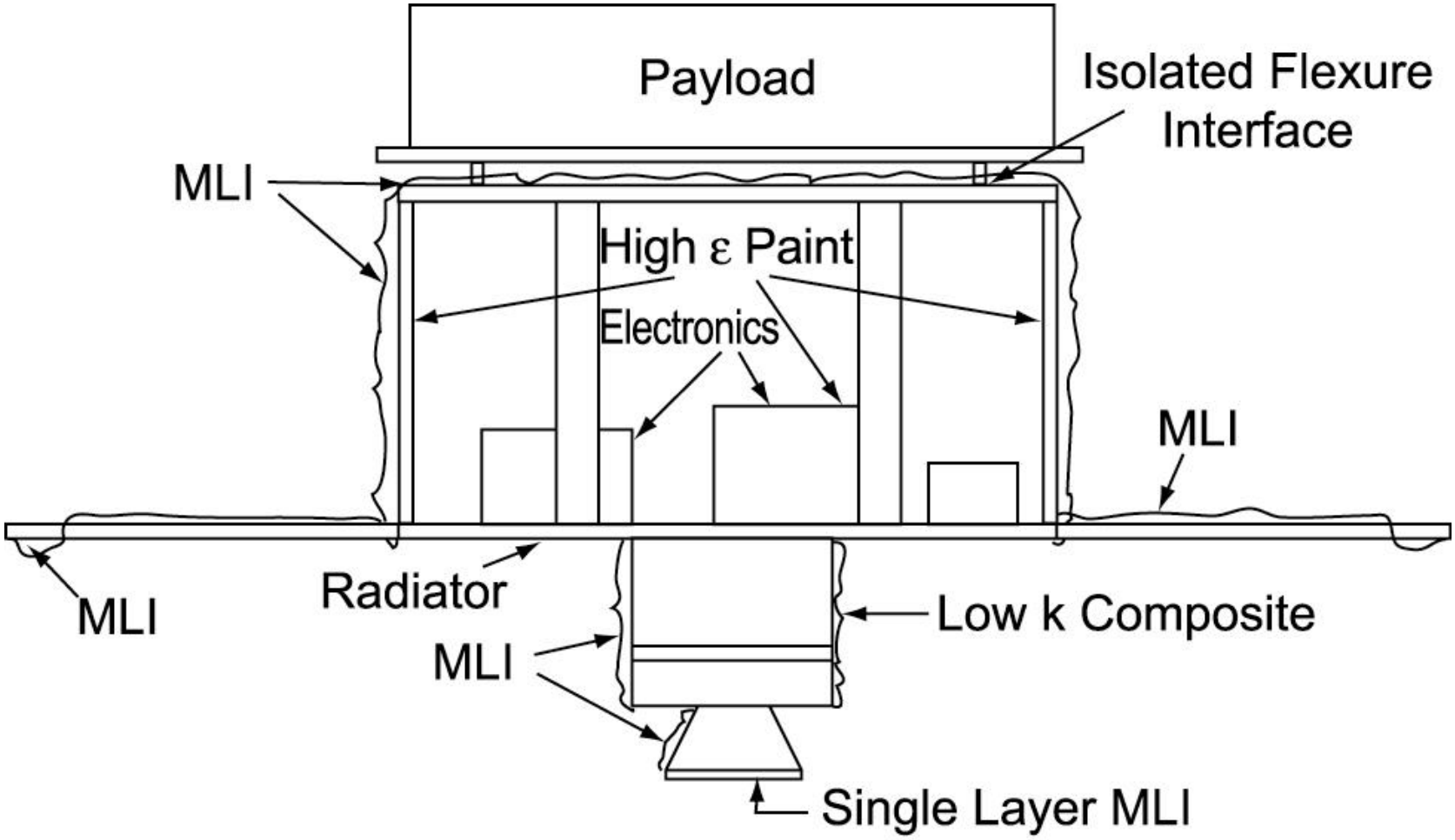
Subsystem Requirements (2 of 2)

- S/C Internal Surfaces/Boxes Provided With "High e" Finish
- External Optical Property Requirements . . . . . TBD
  - Degradation Will Be Key Component of Material Selection
  - Diffuse Rather Than Specular Properties Are Preferred
  - Use of Well Known, Characterized Materials Is the Goal

Current Baseline/Approach

- **Passive Temperature Control**
  - **Body Mounted Radiator(s) With "Thermostatically" Controlled Heater Circuits**
  - **Heaters Sized for Worst Case Cold Conditions**
- **Payload Interface**
  - **Top Panel Interface to Instrument Maintained at 20C ±2**
  - **MLI Installed Between Bus and Instrument**
- **AKM Thermal Design**
  - **MLI Maintains Propellant Temperatures Before Firing and Protects S/C From High Temperatures During Firing**

Current Baseline/Approach



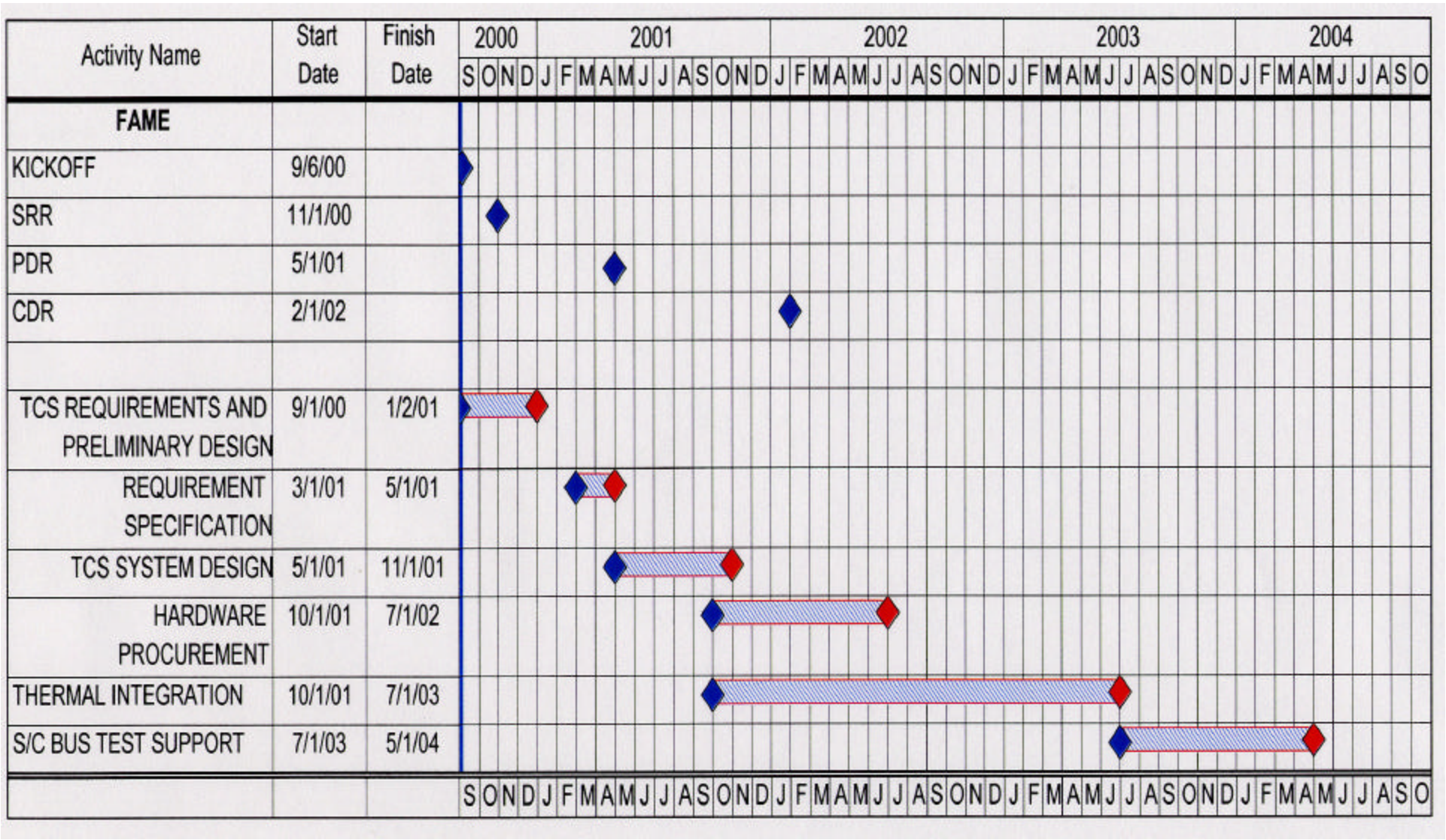
Trade Studies

- Optical Properties
  - Optical Property Degradation Over Time
  - Materials for Sun Shield, Radiator, Trim Tabs Are Focus of Trade
- Temperature Gradients
  - Heat Pipe (HP) vs. Non-HP Thermal Control System
  - Battery Location
- Heater Control
  - Solid State Relays vs. Solid State Thermostats
- Electronics Layout
- Trim Tab
  - Optical Properties, Heater Material Design

Issues/Concerns

- Optical Properties
  - Optical Property Degradation Over Time
- Solid State Heater Control
- Jitter Requirements
- Electro-Static Discharge

Top Level Schedule



Activity Name	Start Date	Finish Date
FAME		
KICKOFF	9/6/00	
SRR	11/1/00	
PDR	5/1/01	
CDR	2/1/02	
TCS REQUIREMENTS AND PRELIMINARY DESIGN	9/1/00	1/2/01
REQUIREMENT SPECIFICATION	3/1/01	5/1/01
TCS SYSTEM DESIGN	5/1/01	11/1/01
HARDWARE PROCUREMENT	10/1/01	7/1/02
THERMAL INTEGRATION	10/1/01	7/1/03
S/C BUS TEST SUPPORT	7/1/03	5/1/04