SPACE PHYSICS RESEARCH LABORATORY

TIDI

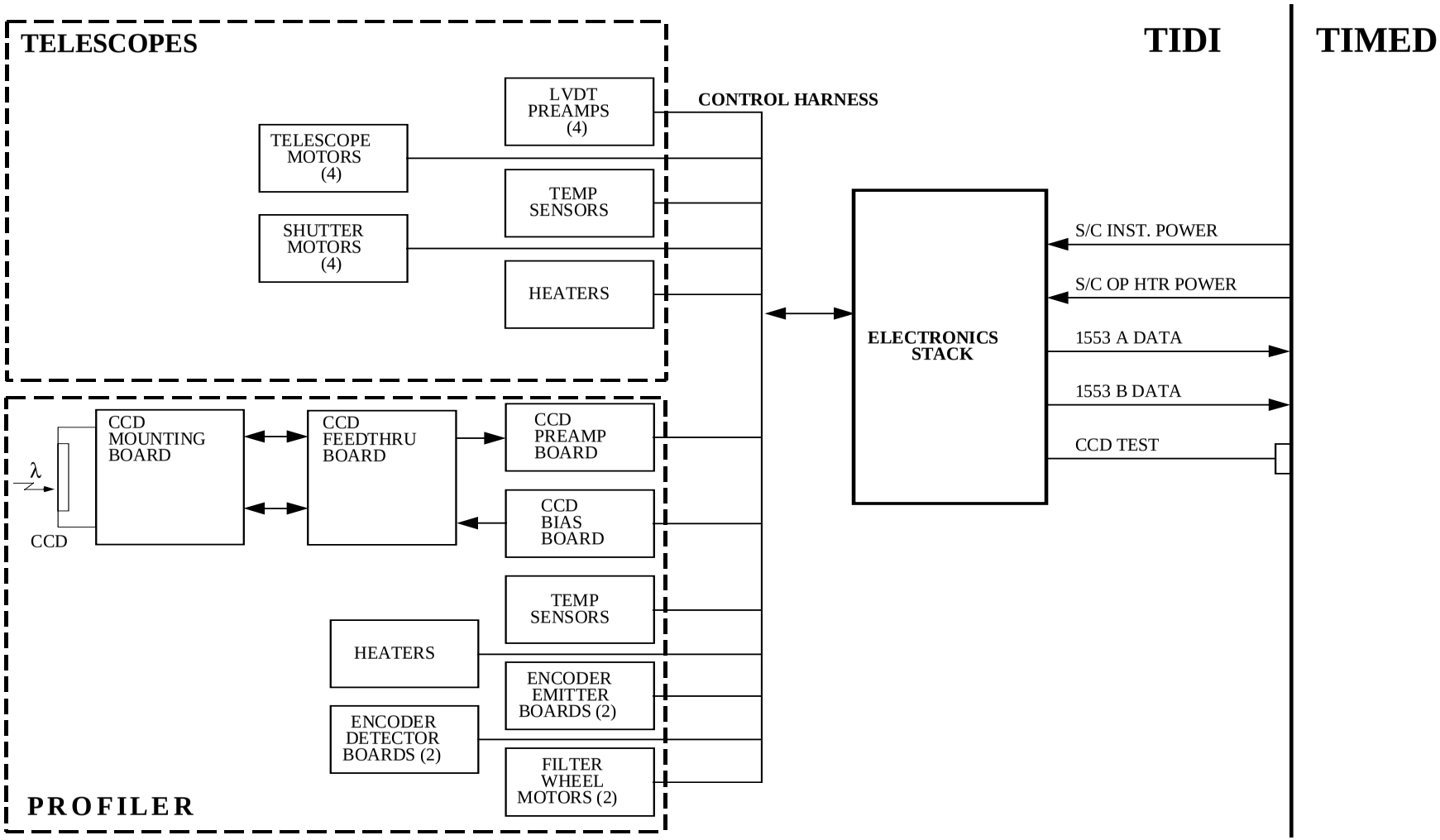
Electronics Overview

Peter Hansen

734-763-6241

pehansen@umich.edu

Electronics Block Diagram



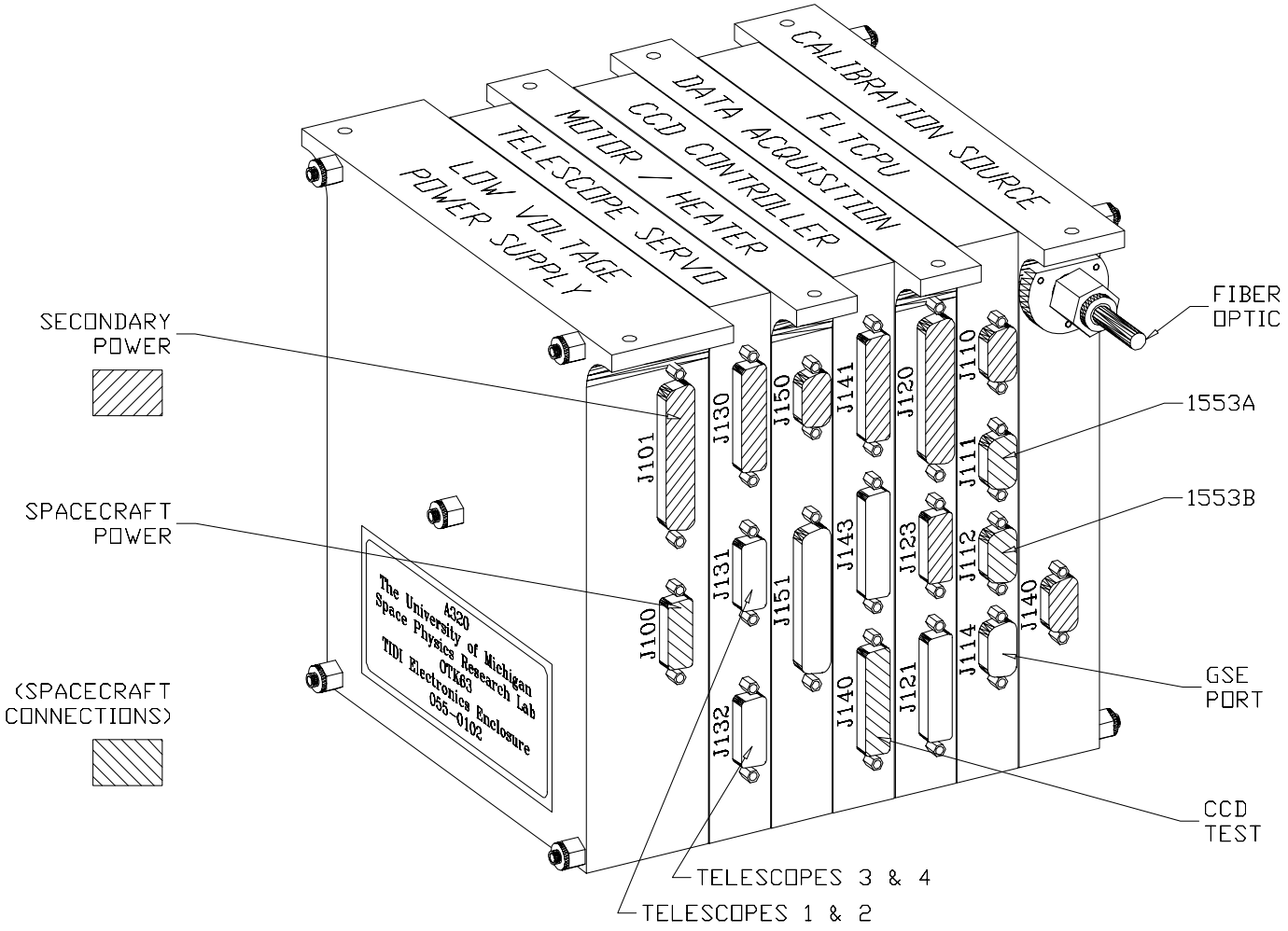
TIMED Electrical Interfaces

- **Power**
  - Separate Instrument and Operational Heater 28 VDC Power
  - Three way power isolation
    - Primary to chassis
    - Primary to secondary
    - Secondary to chassis
  - Inrush current limited
- **Communications**
  - Dual reduandant MIL-STD-1553B per 3.0 of the GIIS
    - Remote Terminal configuration - address 10

Electronics Environment

- **Temperature (Operational) per 2.3.1 of the CES**
  - **Telescopes -20 to +50 C**
  - **Electronics Stack -20 to +45 C**
  - **Profiler +15 to +25 C (CCD Preamp -40 to +25 C)**
- **EMI/EMC**
  - **Selected paragraphs of MIL-STD-461B per 2.6 of the CES**
- **Pressure per 2.3.1 of CES - less than 10e-5 torr**
- **Vibration per 2.4.2.2 of CES**
  - **Sine 8.5g Thrust, 8.5g Lateral**
  - **Random 0.10g^2/Hz, 100-600 Hz**
- **Radiation**
  - **10 krads (si) Total Dose per 2.7.1 of the CES**

Stack Pictorial



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Deck Status Summary

Deck Assembly	SW I/F Spec	Schematic Capture	Parts List	PCB Layout	FPGA Design	Parts on Order	Flight Frame Design	EM PCB Dwg Pkg	EM Fab	EM Test
Power Supply	N/A	90%	75%	25%	N/A	50%	50%	N/A	100%	30%
Flight Computer	100%	100%	100%	100%	100%	100%	95%	80%	100%	50%
Data Acquisition	50%	95%	95%	80%	50%	90%	95%	50%	0%	0%
Telescope Servo	90%	95%	95%	95%	100%	95%	95%	80%	25%	0%
CCD Controller	100%	100%	100%	100%	100%	100%	95%	80%	100%	75%
Motor Heater	80%	20%	30%	25%	10%	30%	50%	0%	0%	0%
Calibration	N/A	95%	50%	50%	N/A	50%	90%	40%	0%	0%

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Remote Electronics

- **Telescope Electronics**
  - LVDT Preamplifier (4)
- **Profiler Electronics**
  - CCD Mounting Board
  - CCD Feedthru Board
  - CCD Bias Board
  - CCD Preamp Board
  - Encoder Emitter Board (2)
  - Encoder Detector Board (2)

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Remote Electronics Status

Electronic Assembly	Schematic Capture	Parts List	PCB Layout	Parts on Order	Flight Mech Design	EM PCB Dwg Pkg	EM Fab	EM Test
CCD Mounting Board	80%	80%	50%	100%	80%	90%	75%	0%
CCD Bias Board	80%	80%	50%	90%	80%	90%	75%	0%
CCD Preamp	80%	80%	50%	100%	100%	90%	75%	0%
CCD Feed Thru Board	100%	N/A	100%	N/A	100%	90%	75%	0%
Encoder Preamp Board	95%	100%	0%	80%	0%	0%	0%	0%
Encoder Emitter Board	95%	100%	0%	80%	0%	0%	0%	0%
Encoder Dectector Board	95%	100%	0%	80%	0%	0%	0%	0%
LVDT Preamp	100%	100%	100%	100%	100%	90%	50%	0%

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Power Summary

- Extensive study and estimates made for Appendix E of the TIDI SIIS - November 97
- Update for this CDR reveals very small changes to the estimates previously submitted
- Estimates generated from detailed average and peak power calculations of the current electrical designs at the component level
- Operational heater loads are factored into calculations
- Increase in operational heater power of about 25% since Nov 97
- Conservative estimate of power supply efficiency was applied to determine primary load

Power Summary (contd.)

- **Definition of Modes:**
  - **Standby = Cal and servo supplies commanded "off"**
  - **Direct Control = Cal and servo supplies on, telescopes holding**
  - **Data Collection = Cal and servo supplies on, telescopes scanning**

	HOT CASE	COLD CASE
TIDI Electronics Power (Watts)		
Standby	6.6	6.6
Data Collection	9.5	9.5
Direct Control	6.6	6.6
TIDI Operational Heater Power (Watts)		
Standby	8.1	12.9
Data Collection	7.7	12.5
Direct Control	8.1	12.9
Total TIDI Power (Watts) = System + Opr Htr		
Standby	14.7	19.5
Data Collection	**17.2**	**22.0**
Direct Control	14.7	19.5