Spacecraft Simulator

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SPACE PHYSICS RESEARCH LABORATORY

TIDI

S/C Simulator Requirements Summary

- **Provide a ground-based testing platform**
  - **Variable DC power source, with GPIB interface to simulate S/C and supply instrument power**
  - **Controlled on/off interface to survival heaters**
  - **Interface to RTD temperature sensors**
  - **Serial interface to flight computer**
  - **Differential CCD test interface**
  - **Emergency stop switches (3) to interrupt TIDI power**
  - **Interface box to be located next to TIDI instrument**

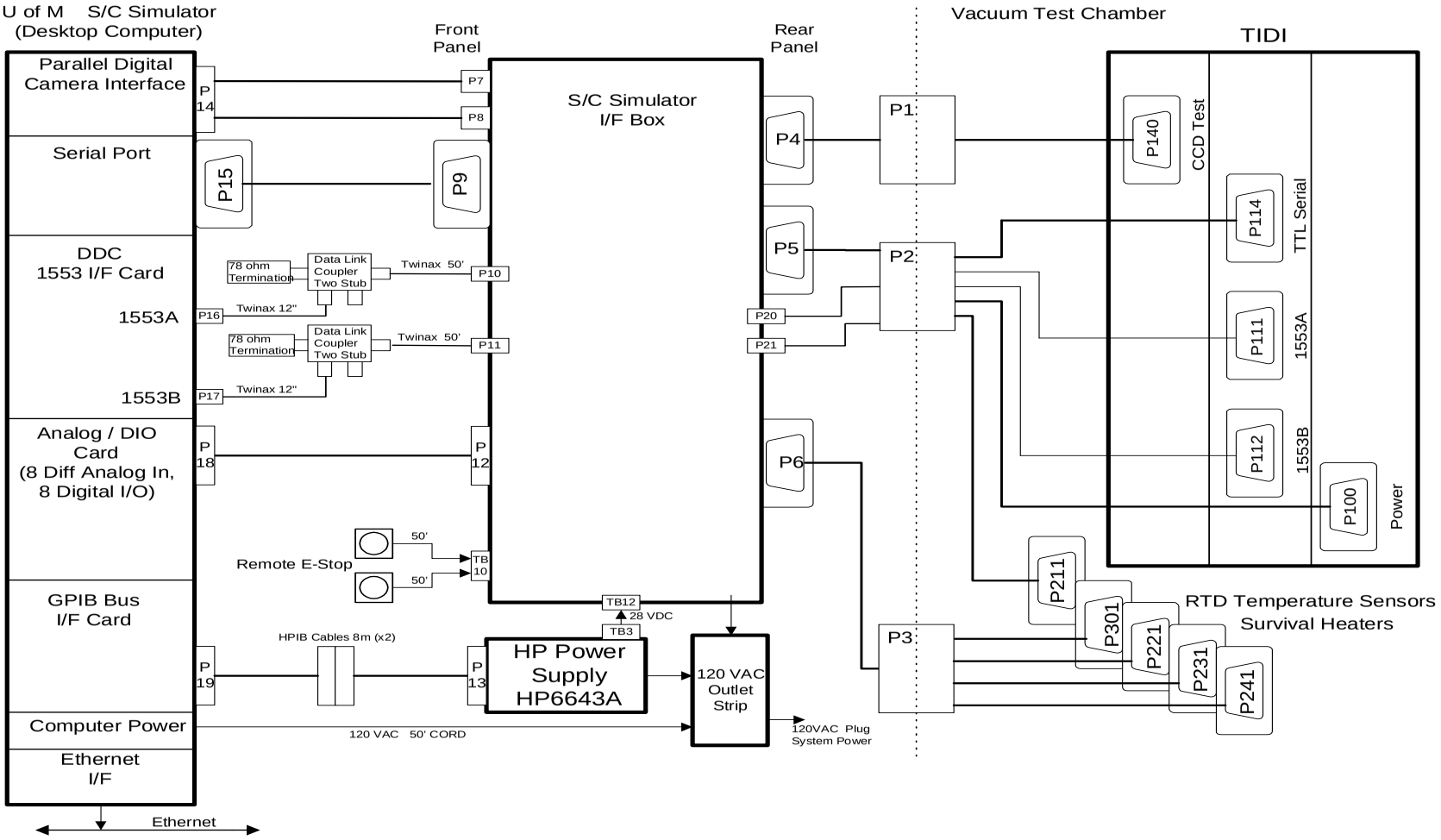
S/C Simulator Requirements Summary - cont

- **S/C simulator computer to be located up to 35 feet away**
  - **Transmit commands, receive TM via 1553 bus**
  - **Display real-time science TM, Histograms, CCD Images, numerical values, etc.**
  - **Display real-time engineering TM**

    Strip charts of analog values

    Command confirmations, error reports, memory dumps
  - **Provide GUI for easy single command control**
  - **Transmit all TM to the GSE Workstation**

S/C Simulator Block Diagram



S/C Simulator Operational Description

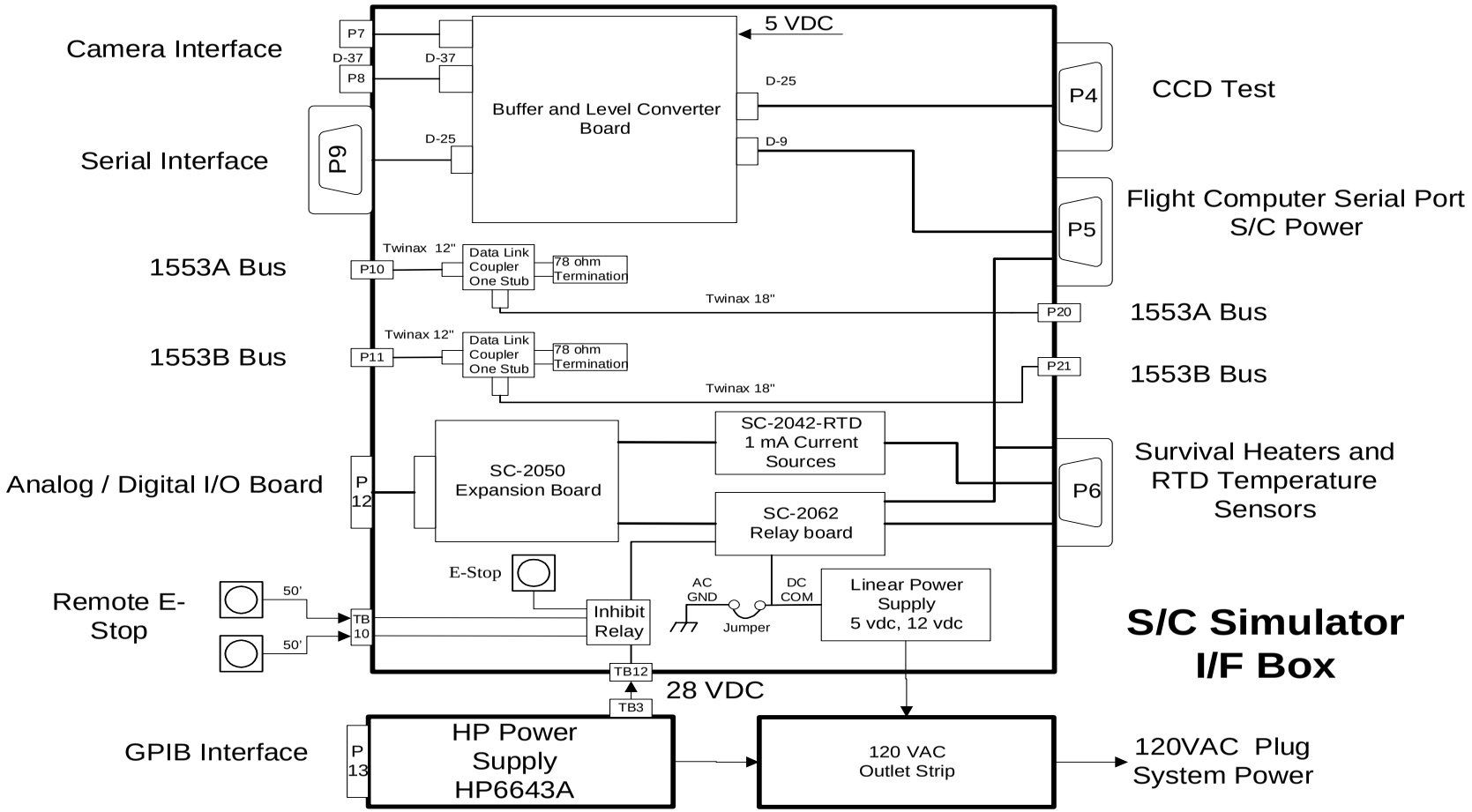
The S/C Simulator consists of four major components

- **S/C Simulator I/F Box in a transportable 19" rack**
  - GPIB 200 watt power supply, 0-35V, 0-6A with inhibit input
  - 19" chassis for power control, data acquisition, and interface circuitry
  - Power distribution outlet strip
- **S/C Simulator Computer**
  - Spectral Instruments PDCI (Parallel Digital Camera Interface) for PCI bus
  - Serial interface for communication with the Flight Computer processor
  - DDC 1553 interface board
  - National Instruments Analog/Digital IO board, 8 differential analog inputs, 8 digital I/O
  - GPIB interface board
  - Optional Ethernet board

S/C Simulator
Operational Description - cont

- **Cabling to connect Simulator I/F Box to S/C Computer**
  - **Allow 35 ft separation for computer to reside outside the clean room**
- **Cabling between TIDI and the Simulator I/F Box**
  - **TIDI will be located inside a vacuum chamber**
  - **Interface through 3 Varian connectors, 20 conductors each**

S/C Simulator Subsystem Diagram



S/C Simulator Subsystem Overview

S/C Simulator I/F Box

- **Buffer and level converter board**
  - converts single ended CCD signals to differential
  - provides RS232 level conversion
- **Data Link couplers for the 1553 Bus**
  - high impedance stubs connect to TIDI
  - low impedance busses connect to S/C Simulator computer
- **RTD interface, independent 1 mA current sources**
  - 4 telescope sensors
  - 2 profiler sensors
  - RTDs are 1000 ohm @ 0 deg C, +3.85 ohm/deg C
  - Analog input board with 12 bit A/D and 0-5V range gives 0.3 degree resolution

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S/C Simulator Subsystem Overview - cont

- **Relay board under S/C Simulator Computer control**
  - control main 28 V bus
  - control each of 5 survival heaters
- **Emergency Stop switches (3)**
  - one on front of 19” rack, 2 remote
  - immediate interruption of the 28 V power supply
  - indication through GPIB that E-stop has been pressed
  - opens a 12 v inhibit relay
- **Linear power supply, +5 V, + 12V**
- **Single point connection from DC common to chassis ground**

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S/C Simulator Status

- Design completed
- All parts on order
- CCD interface built and tested
- Remaining assembly to be completed by mid May