MMIRS Electronics

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MMIRS Requirements

- Instrument must be transportable
- Simple installation
- Servicing Instrument must be done by observatory staff

Meeting the requirements

- Embedded electronics
- Minimize field connections
  - Ethernet
  - Power
  - Fiber
- Remote maintenance
  - Report “Instrument health” parameters via Internet

Meeting the requirements

- Component replacement must be easy.
  - Connectors for all wired components
  - Monitoring of parameters
  - Use of components common to all sections
- Extensive use of monitoring
  - Power
  - Temperature
  - Vacuum

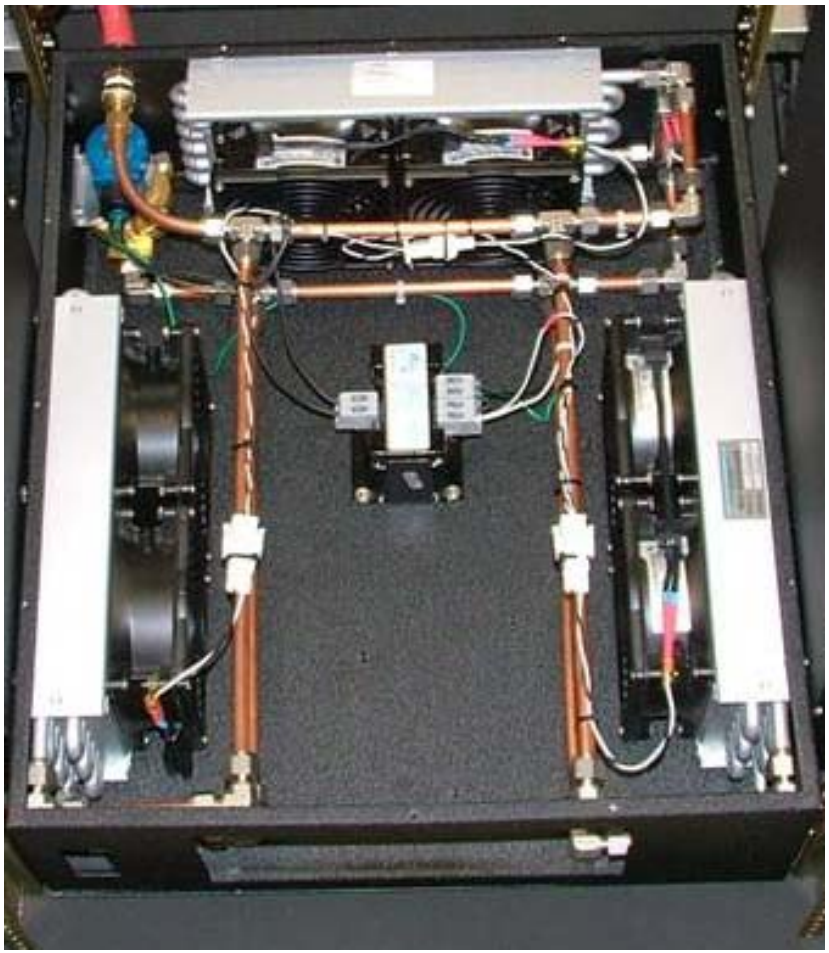
System overview

- Electronics mounts in two racks
- One rack for motion, temperature and vacuum control
- One rack for detector readout control
- Central controller with ethernet connection
- Use Flamingos thermal controlled rack design

System components

- Delta Tau UMAC motion controller with 10/100
- Cryocon Temperature Controller
- Pfeiffer and Varian vacuum equipment
- System controlled by off telescope mounted Linux rack computer
- Guider and detector cameras connect via fiber to rack computer

University Of Florida Thermal rack



Power Interface

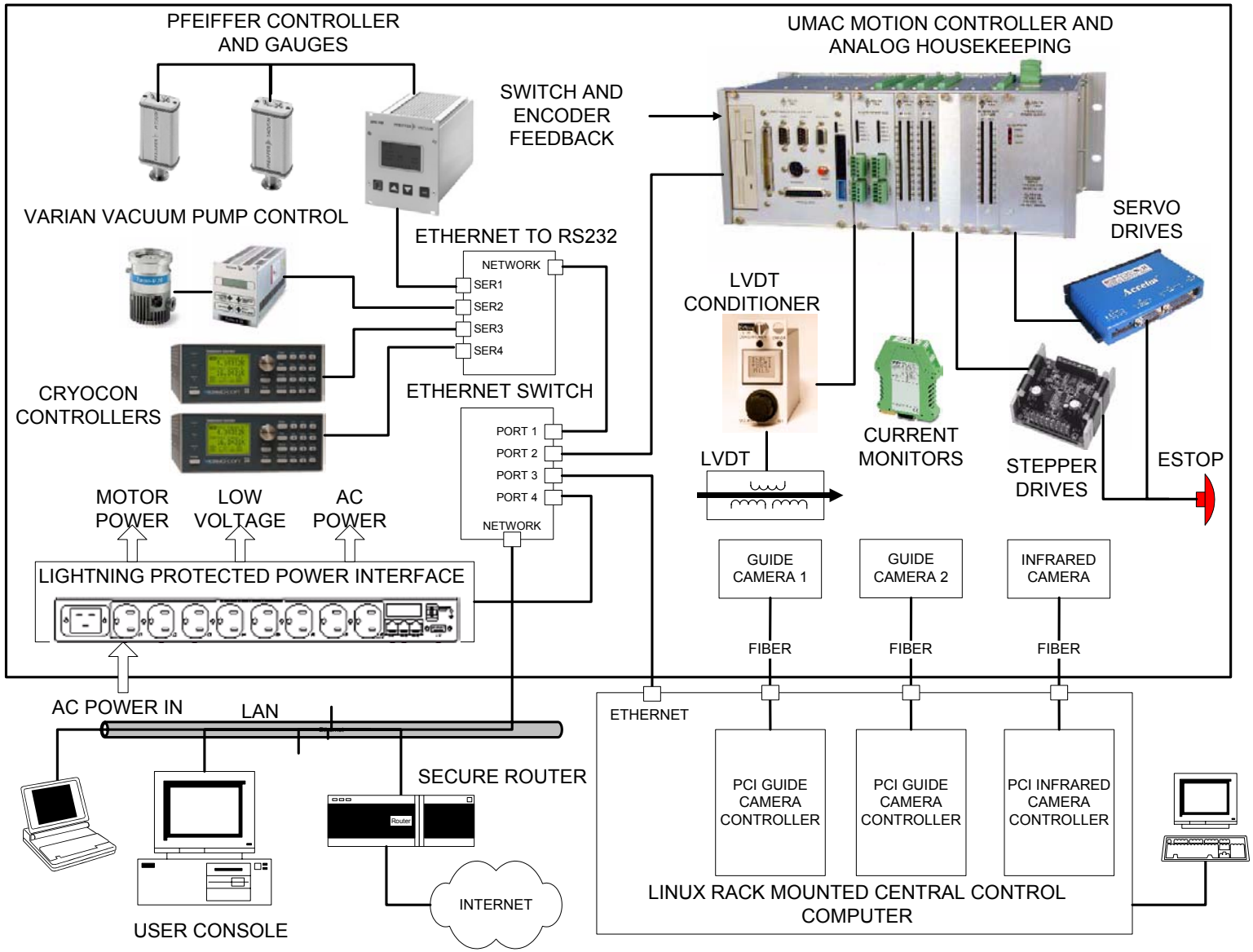
- Provides lightning and surge protected power to system
- Motor power
- Low voltage supplies
- Switched AC with ethernet
- UPS

Network Interface

- 10/100 Base T
- Provides for both WAN and LAN access
- 3 Fiber interfaces for cameras

Motion Controller

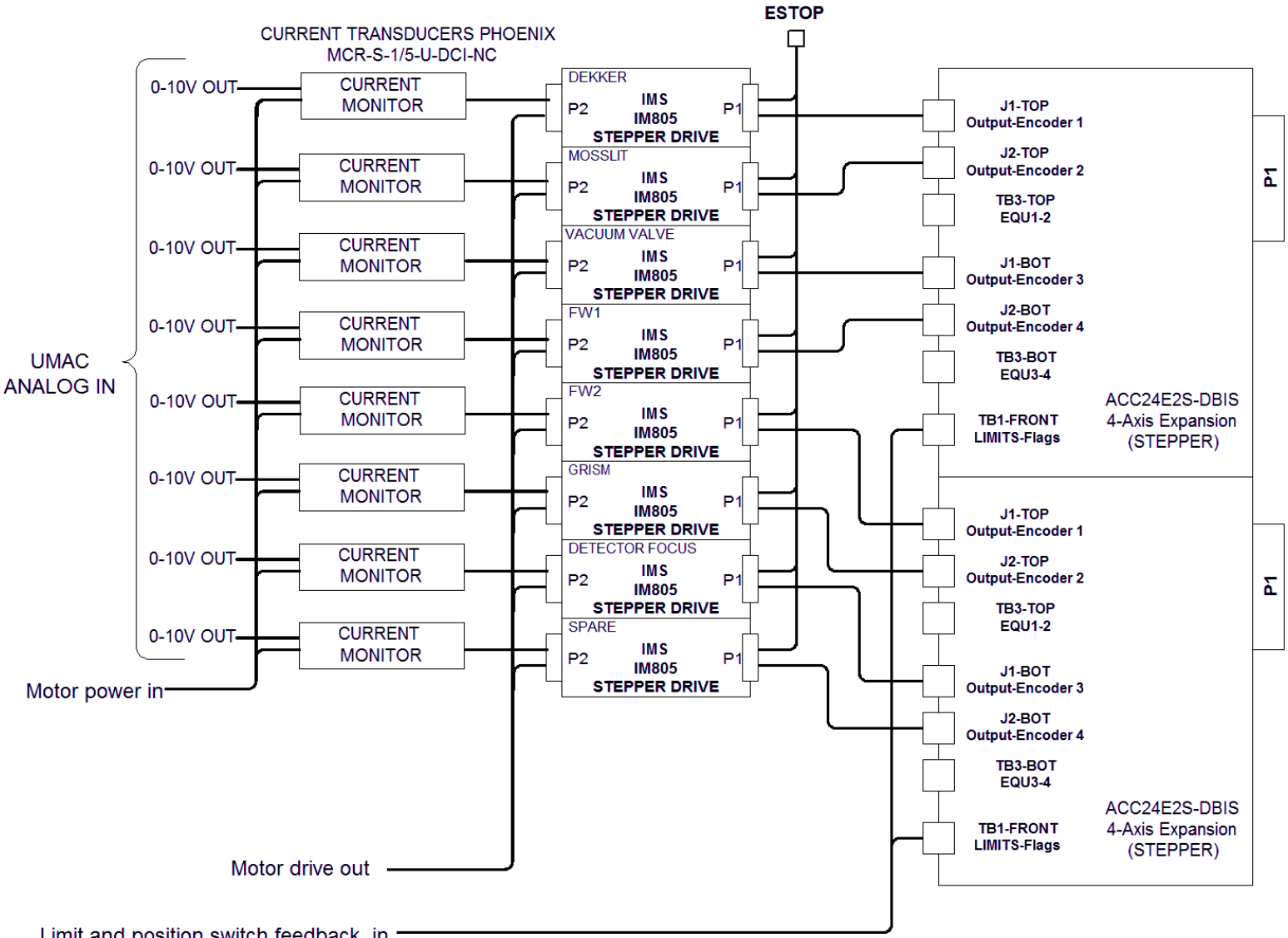
- Delta-Tau UMAC system with Ethernet Interface
  - DSP based motion control
  - Expandable stepper and servo motor control
  - Analog and parallel and serial digital I/O



Electronics and Control Overview

Motion Control

- UMAC provides closed loop control
  - 4 axis stepper controller modules
  - 4 axis servo controller modules
- IMS IM805 motor drives
- Copley servo drives if needed
- Position feedback from switches
- Encoder feedback if servos are used
- Phytron cryogenic motors
- SA0/UF Heritage



Stepper Motor Drive Interface

LVDT For Focus Stage

- Schaevitz 100 XS–ZTR cryogenic qualified LVDT
- Ectron Model 451 LVDT signal conditioner
  - Includes excitation
  - Voltage out to UMAC
  - Front panel setup

Vacuum Monitoring

- Pfeiffer HPT100 and CPT100 vacuum transmitters.
- Pfeiffer DPG109 multi-channel controller
- Controlled via RS-232 to Ethernet converter.

Vacuum Pump Control

- Varian pump controller
- RS-232 port control
  - RS-232
- Front panel control

Temperature Control

- Two Cryocon Model 34 controllers
  - Single 50 watt control loop per controller
  - 4 inputs each
  - Drives Minco heater strips

Safety

- Emergency stop switch stops all axis by disabling motor drives
- Valve lockout

Housekeeping

- Temperatures from Cryocon controller
- Motor power
- Heater power
- Switch status
- Valve monitoring
- Vacuum
- Slit mask ID

Power Estimate

- Instrument < 700 WATTS
- Detector ≅ 170 WATTS

Planned Activities

- Tests of subsystems that carry risk
- Motor power requirements need to be finalized
- In the process of deciding if servo drives should be used in the Guider and Wavefront sensor sections

Conclusion

- Design utilizes off-the shelf components to minimize integration time
- Design reflects needs of both portability and remote installations
- Design carries few risks.