ANTENNA SERVO AND SUBREFLECTOR CONTROLLER
Existing Hardware

- **Antenna Control Unit (ACU)**
  - 58 digital I/O lines: interlocks, enables, etc.
  - 11 analog inputs: currents, temperatures, etc.
  - 8 analog outputs: current command, etc.
  - Analog PI loop

- **Focus/Rotation Controller (F/R)**
  - 22 digital I/O: steppers, brakes, etc.
  - 12 analog inputs: temperatures, etc.
New Hardware

• Integrate Encoder Buffer, ACU, and F/R into one unit
  • Saves cabling, power, complexity
  • Improves reliability, cost, serviceability

• Digital positioning loop
  • Better servo response
  • Software tuning, no drift
  • Upgradeable
Science Requirements

• Super-sidereal tracking
  • 2" rss @ 1 deg/min ⇒ 30Hz update
  • 4" rss @ 2.5 deg/min ⇒ 40Hz update
  • Worst case @ EL=70º, AZ=7.3º/min (max 40º/min)
• Target settle time <3sec for 30' step
Position Loop

• Convert PI to PID to improve settle time
• Since loop is software, can tune PID or upgrade to state space, $H_\infty$, etc. in future
Other Issues

- RFI
- Power
- Cooling
- Enclosure
- User Interface
Solutions

• Custom with small microcontroller
  • Minimize cost, RFI, maximize reliability
  • Most design time (but mostly software anyway)

• SBC with ext I/O and motion controller
  • Quicker and almost as cheap
  • Lots of I/O
  • Limited choices of interface to motion controller
More solutions

- PC with I/O
  - RFI harder to control
  - Easy to program/interface
- MIB with support circuitry
  - Requires extensive support circuits
Interface

• Primary interface will be new M&C
  • Use one MIB interface, or MIB itself
• Able to use old M&C
• Same plugs/cables as existing system – "drop in" replacement
Procurement

- No special hardware required
- All parts must be readily available for long-term serviceability