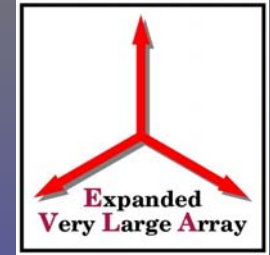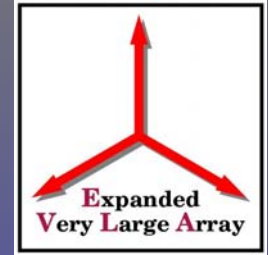# ANTENNA SERVO AND SUBREFLECTOR CONTROLLER

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.
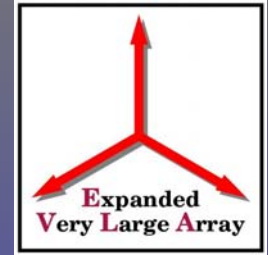 - 12 analog inputs: temperatures, etc.

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
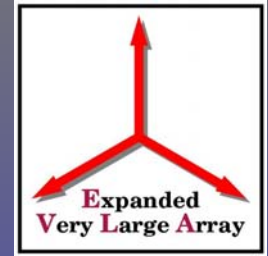 - Software tuning, no drift
  - Upgradeable

Science Requirements

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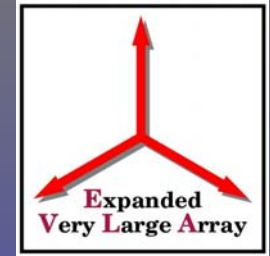- Target settle time <3sec for 30' step

Position Loop

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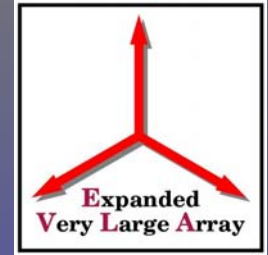
Other Issues

- RFI
- Power
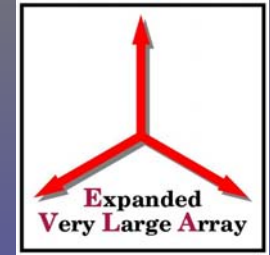- Cooling
- Enclosure
- User Interface

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
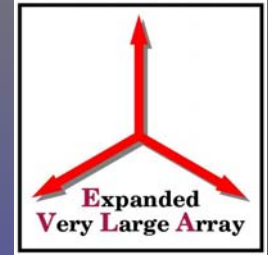 - Limited choices of interface to motion controller

More solutions

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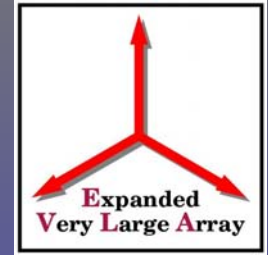 - ### Requires extensive support circuits

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