CELT Technical Note 4

Requirements for CELT Bearings, Drives, Encoders
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Definitions

Telescope is an altitude-azimuth system
The component that moves in altitude or elevation is called the "tube."
The component that moves in azimuth is called the "yoke."
Coordinates:
 Origin of coordinate system is at the intersection
   of the elevation, azimuth and optical axes

Tube:
   +z is along the optical axis, looking out to the stars,
   +x is along axis of rotation (elevation axis)
   +y is orthogonal, in a right handed coordinate system, and points downwards
      when the telescope is pointing towards the horizon
Yoke
   +z is vertical
   +x is same as for the tube
   +y is the orthogonal coordinate in a right handed system

All numbers are tentative

Mass and Moment of Inertia
Tube:
   $M = 4.17e5$ kg
   $Ix = 7.795e7$ kg-m^2
   $Iy = 7.803e7$ kg-m^2
   $Iz = 4.856e7$ kg-m^2

Yoke:
   $M = 4e5$ kg
   $Ix = 4e7$ kg-m^2
   $Iy = 9e7$ kg-m^2
   $Iz = 9e7$ kg-m^2

Motion Requirements

Pointing	within 1 arcsecond rms over all sky
Tracking (open loop)	0.02 arcsecond rms in 10 s
	0.1 arcsecond rms in 10 minutes
	0.5 arcsecond rms in 1 hr
Guiding (closed loop, AO off)	within 0.02 arcsecond rms over 10 min.
	Within 0.05 arcsecond rms over 1 hr
Focus	within 0.02 arcsecond (80%)
Slewing	360° azimuth, 65° elevation in 5 minutes

Slewing   360° azimuth, 65° elevation in 5 minutes

1 arcsecond on sky	1 s
10 arcsecond on sky	3 s
100 arcsecond on sky	10 s
1000 arcsecond on sky	30 s

slewing goals are 50% of above values

Sky coverage	Unvignetted above 25°
	<2° zenith blind spot diameter

Observing range

Azimuth	100.5° ±220.5°
Elevation	25°-89°