

Time in the 10,000 Year Clock

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Goal:

A clock that keeps time for
the next 10,000 years.

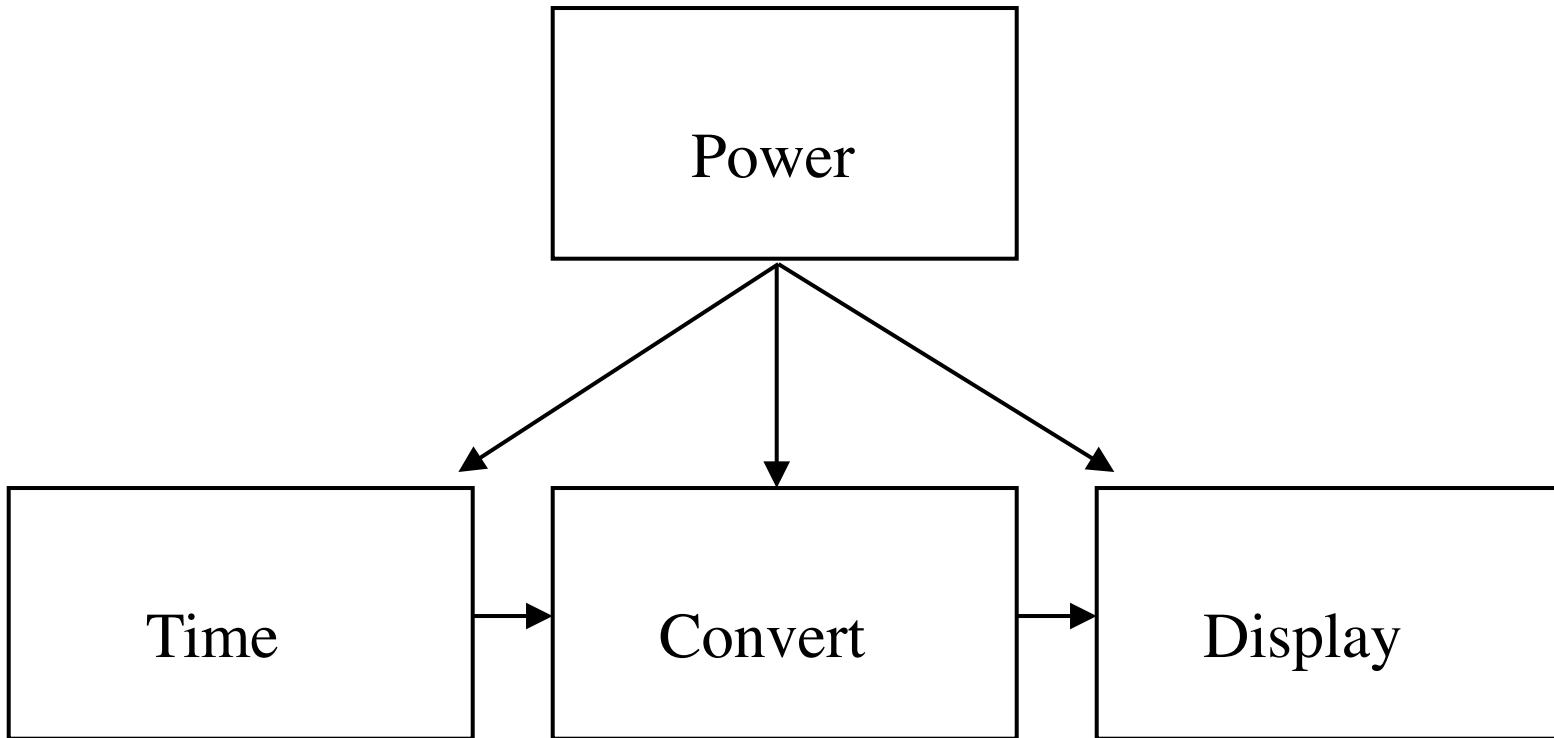
5 kinds of time in the Clock

- Pendulum time
- Uncorrected solar time
- Corrected solar time
- Displayed solar time (apparent)
- Orrery time (ephemeris)

Design Principles for the Clock :

- Longevity
- Maintainability
- Transparency
- Evolvability
- Scalability

Elements of a Clock

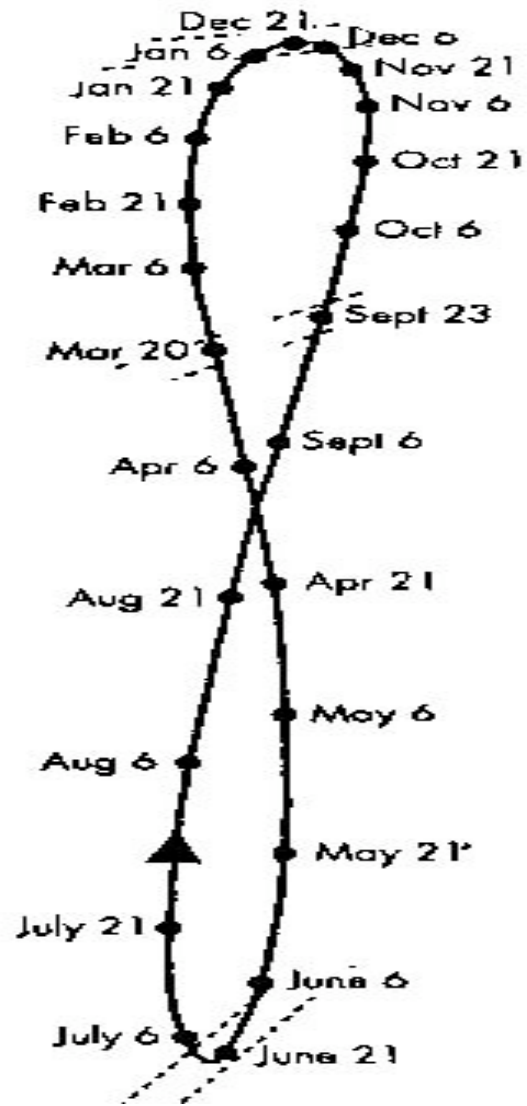






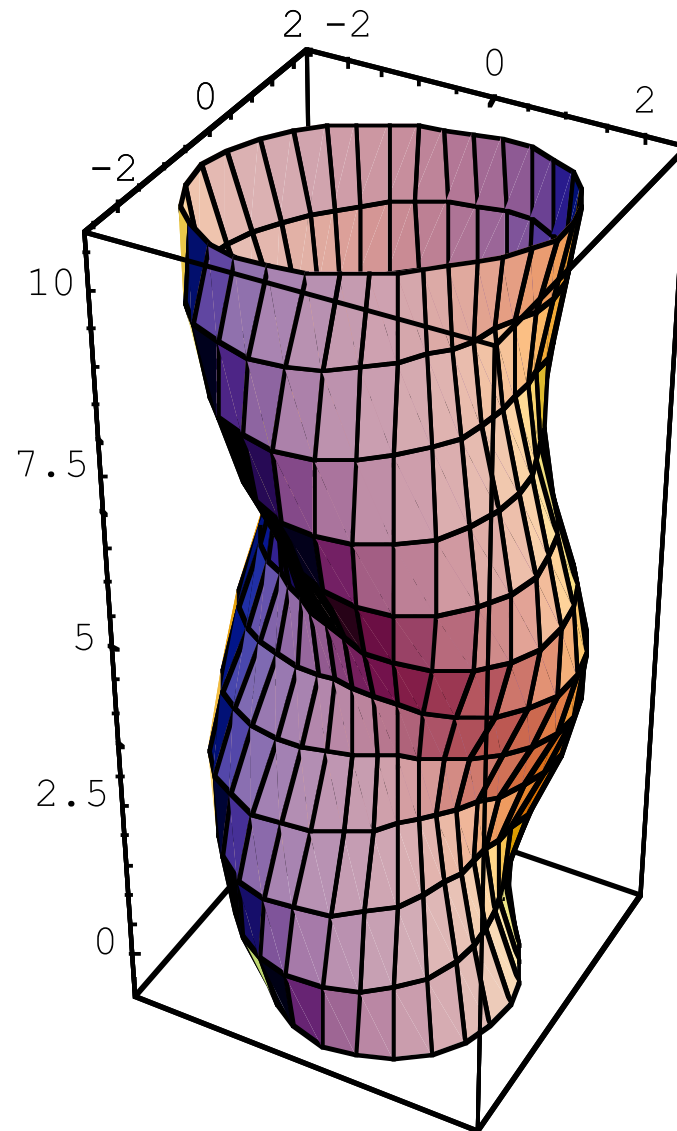


The Analemma





Equation of Time Cam



Options for Powering the Clock:

Atomic

Poor Transparency

Chemical

Poor Scalability

Solar Electric

Poor Maintainability

Prestored potential energy

Poor Scalability

Water flow

Exposure to water

Wind

Exposure to weather

Geothermal

Poor Scalability

Tidal gravitational changes

Poor Scalability

Temperature change

Pressure change

Need for bellows or seal

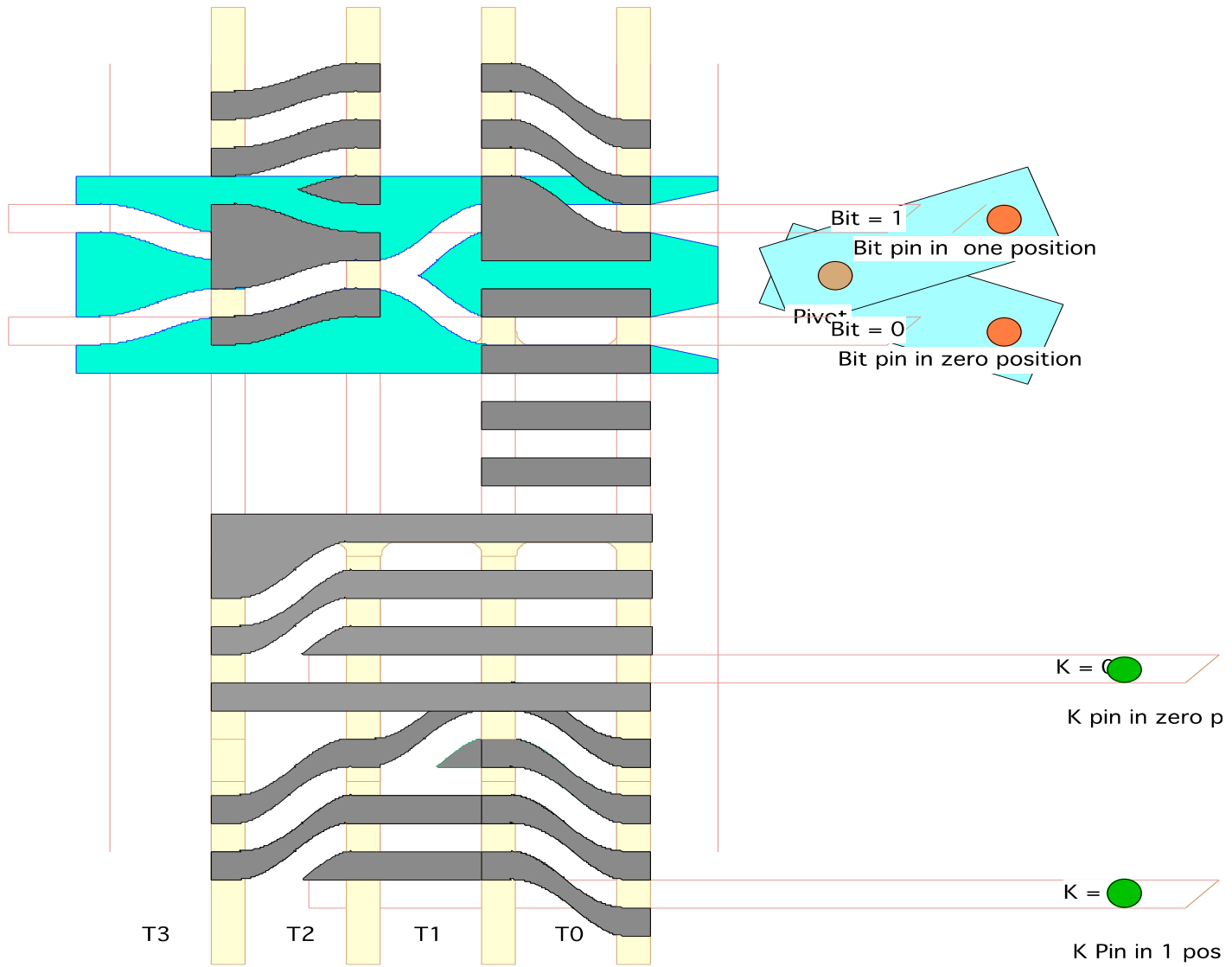
Seismic and plate tectonic

Poor Scalability

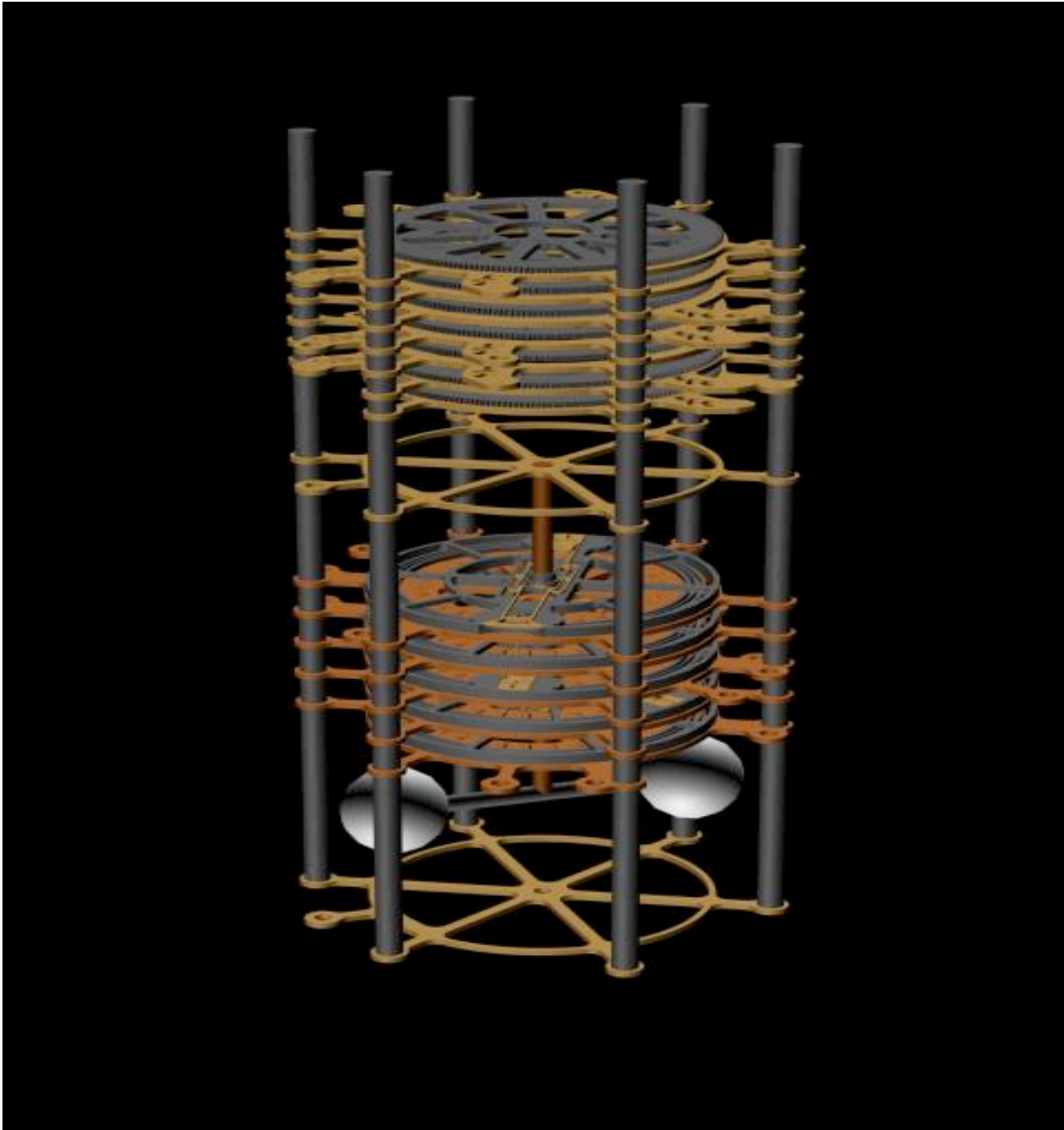
Human winding

Fosters responsibility

Bit Serial Adder







ADDER/PENDULUM PROTOTYPE ASSEMBLY



INTERCALLATOR DIFFERENTIAL DETAIL



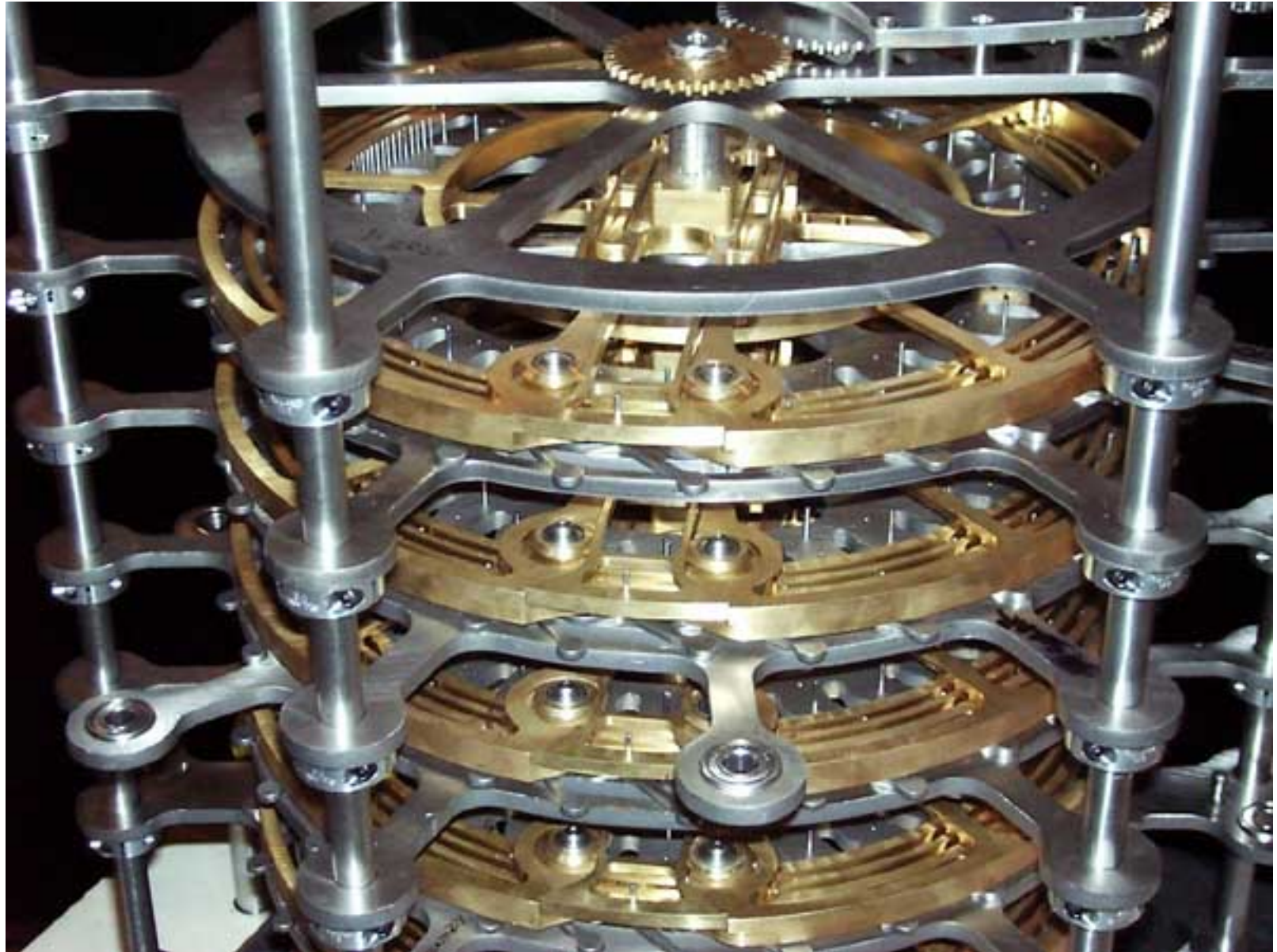
INTERCALLATOR CAM DETAIL



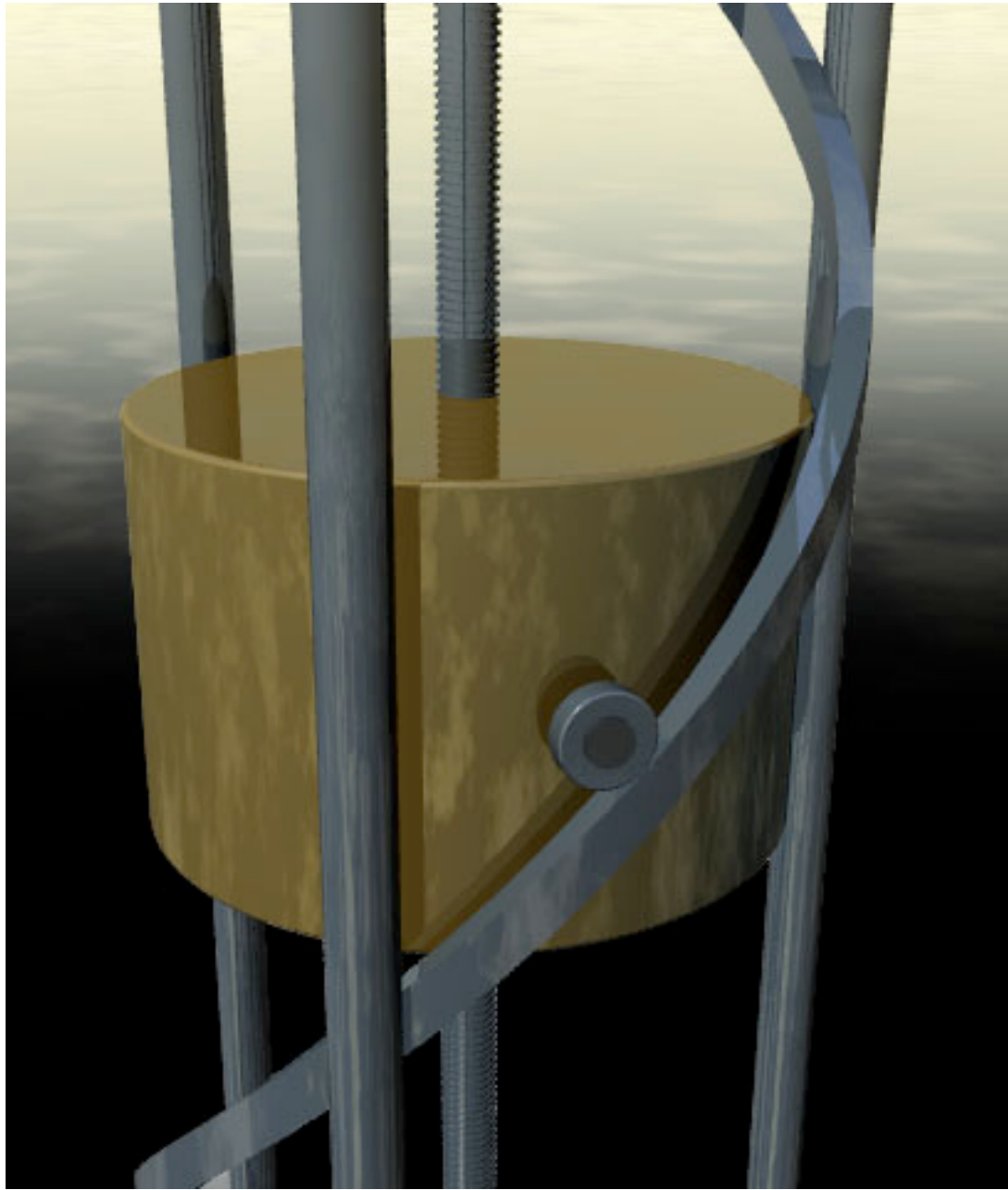
INTERCALLATOR INTERIOR

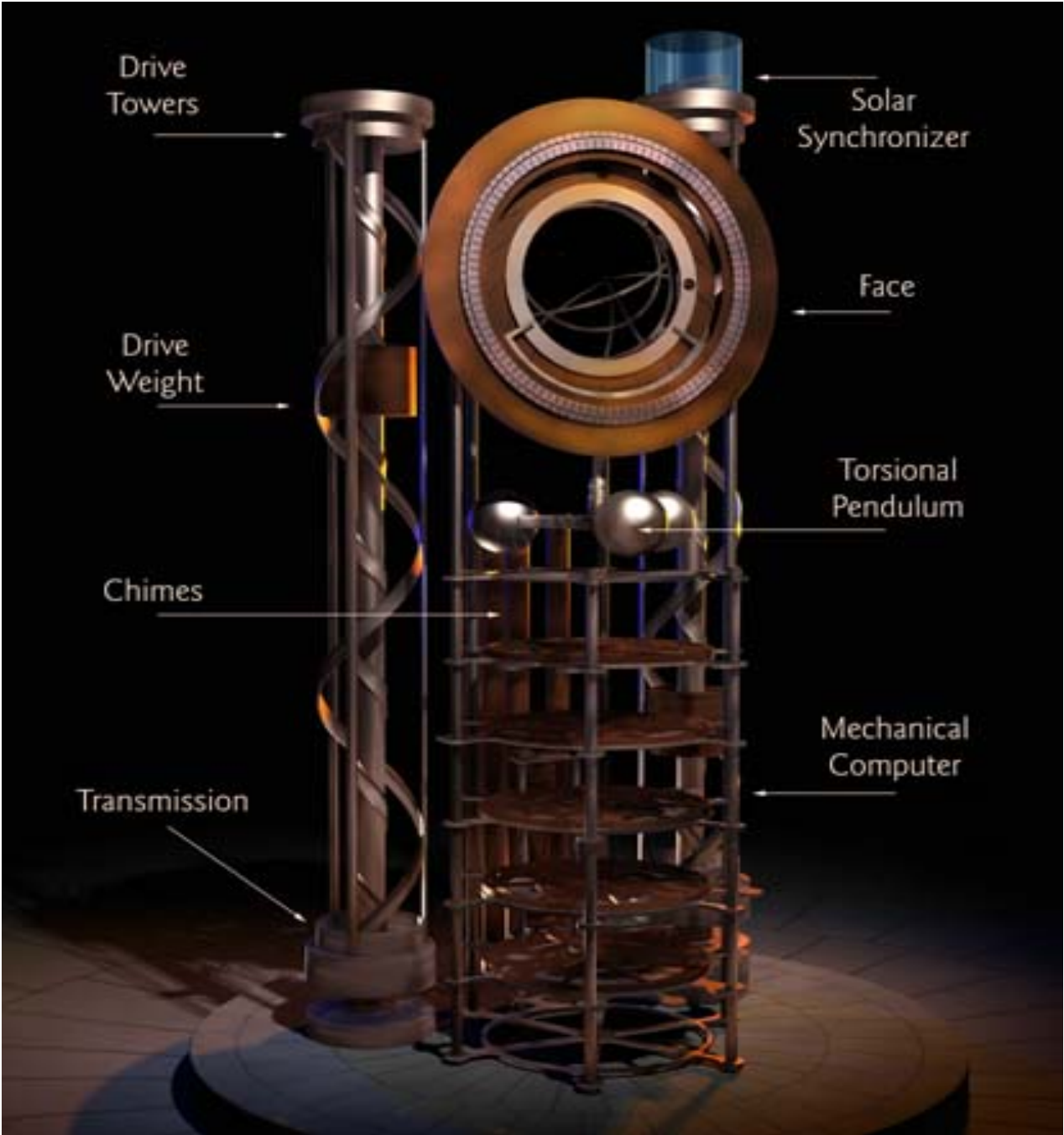


INTERCALLATOR AND TORSIONAL PENDULUM









First Working Prototype:

- Working by January 2000
- Small version (6 ft.)

Other Members of DesignTeam:

- Alexander Rose
- David Munro
- Chris Rand
- Liz Woods
- Kiersten Muenchinger
- Brian Eno

More Information:

www.longnow.org

The Clock of the Long Now
by Stewart Brand

Why a civil engineering project to last 10,000 years is outside the scope today

Why it should be a clock is precisely an issue

Great works from the past often had a primary or second purpose of timekeeping & astronomy

Societies have always been organized around the Sun

Civilization required agriculture, and agriculture the sun

Human activities on, above, or beneath the surface of the Earth are organized with a diurnal cadence

(Even when duty cycles << day or >> day there is a diurnal signature from human maintenance or admin.)

The 10,000 year Clock is:

- Solar-powered
- Solar regulated
- human-mediated update of its displays
- strong diurnal peaks of activity

The Clock keeps:

- apparent solar time
- apparent positions of solar system objects
- mean solar time never explicitly realized

How is it pertinent to a colloquium about the relationship between UTC and TAI?

- The Clock is *not* a sundial
- An alternate idea could have been a colossal stone dial and gnomon

Complex mechanism

- digital computer
- space age materials & techniques

Benefits over a sundial

- other solar system cycles
- can be read even on a cloudy day

Solar time was an engineering choice, not a side effect of measuring the Sun's shadow

A simulation of the solar system

- 500 feet inside a mountain
- Dynamic conversation between
- Tuned physical oscillator
- Changing syncopations of the natural world

As the centuries pass, on sunny days:

- Occasional resynchronization
- residual drift of the pendulum
- quirky residuals in the Earth's rotation

Variations in the mean solar length-of-day

Ancient values for Length of Day (LOD)

