

TIME SUMMARY  
PRIME DIRECTIVE → KEEP PACE WITH THE SUN

EARLY CLOCKS -

SUNDIALS, CANDLES, LAMPS, WATER CLOCKS

“TRUE” SOLAR TIME

PENDULUM CLOCKS (GALILEO, HUYGENS 1650 AD) -

PERIOD OF SWING  $\propto$  [LENGTH]<sup>1/2</sup> ; 10 SEC / DAY ERROR

NOT 24 HOURS FROM NOON TO NOON

EARTH’S ELLIPTICAL ORBIT & 23.5° TILT OF ECLIPTIC

“MEAN” SOLAR TIME

BALANCE WHEEL CLOCKS (HARRISON 1761)

0.2 SEC / DAY ERROR

QUARTZ CRYSTAL CLOCKS (1970s) – SINCLAIR BLACK WATCH

0.1 SEC / DAY ERROR

ATOMIC CLOCKS (RADIO 1960s, GPS 1990s) - NIST

VIBRATING COLUMN OF ATOMS OR IONS

10<sup>-9</sup> SEC / DAY ERROR

→ NON-UNIFORM ROTATION OF EARTH

→ LEAP SECONDS

TIME ZONES (1880s)

DAYLIGHT SAVING TIME – NO ASTRONOMICAL MEANING

INTERNATIONAL DATE LINE