

Satellite Tracking Using a Mobile 8" Aperture Telescope

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TREX  **ENTERPRISES**
HAWAIIAN OPERATIONS

Why Mobile Satellite Tracking?

Information Gathering

- Precision tracking means imaging capability
- We would like to know...
 - What is the satellite looking at?
 - What isn't it looking at?
- Provides operational information to the war fighter

Asset Protection

- Dispersible Targets
- Deployable
- Effective



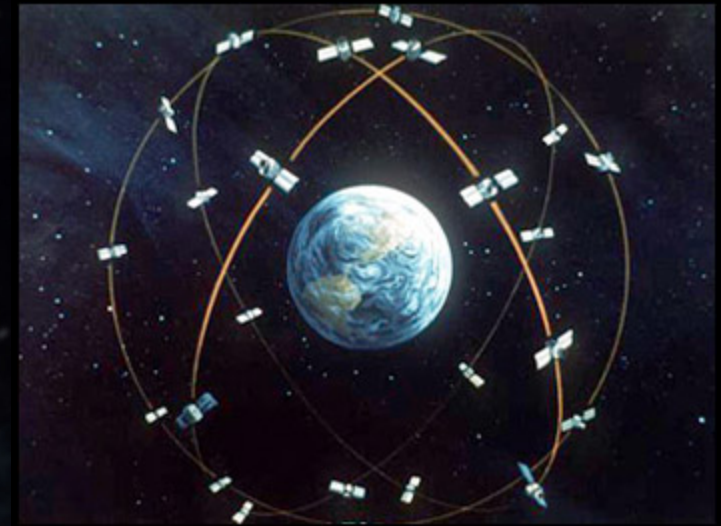
Mobile Tracking Dependencies

18:50:11 HST

USNO Master Clock Time



NORAD Two-Line Element Sets



Global Positioning System

Lucky Imaging







Finding the IFOV and FOV

Instantaneous Field of View (IFOV) – The number of arcseconds per pixel

Field of View (FOV) – The visible angular area (arcseconds squared)

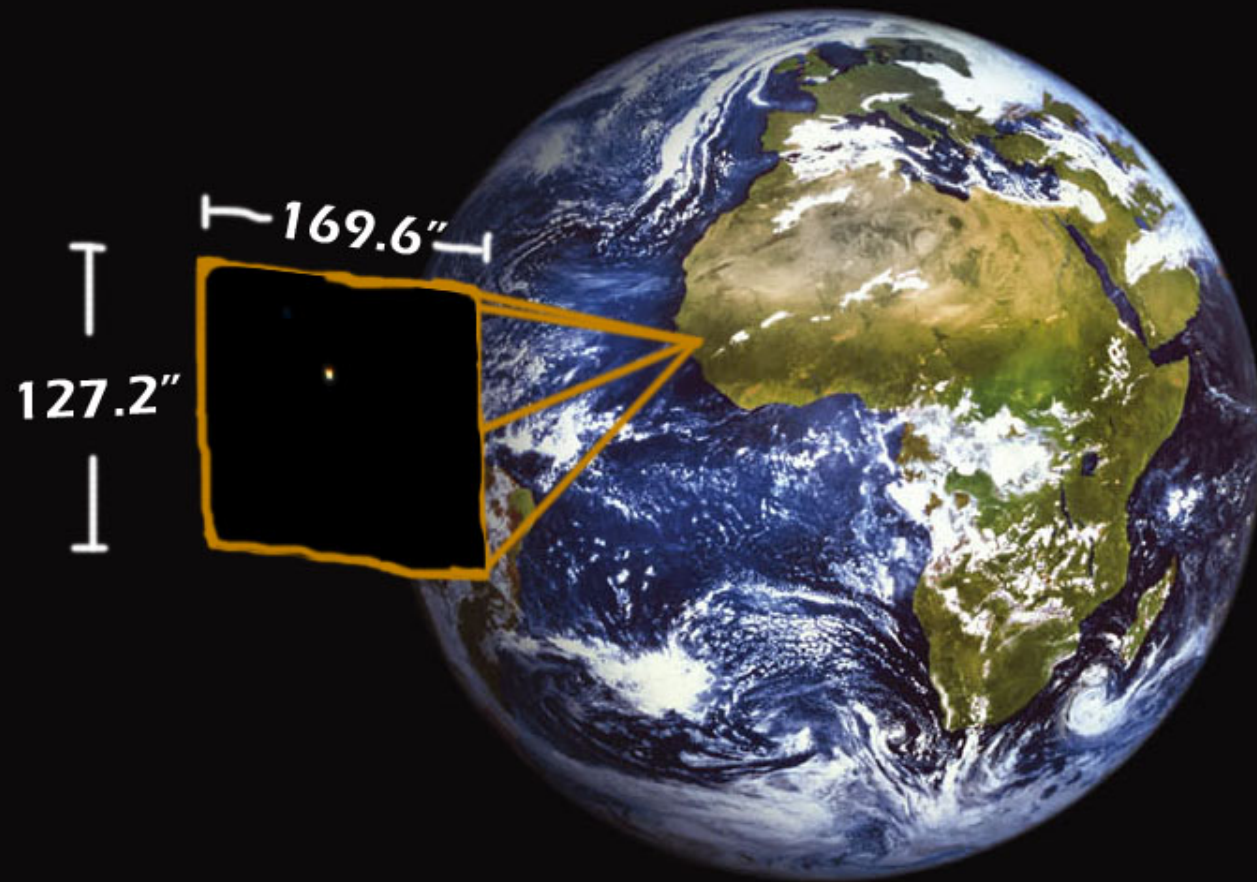
Steps:

1. Find Known Angular Separation of a Double Star
2. Image the Double Star
3. Calculate IFOV and FOV

129.5 pixels = 34.3 arcseconds

IFOV = 0.265 arcseconds

FOV = 169.6 arcseconds x 127.2 arcseconds



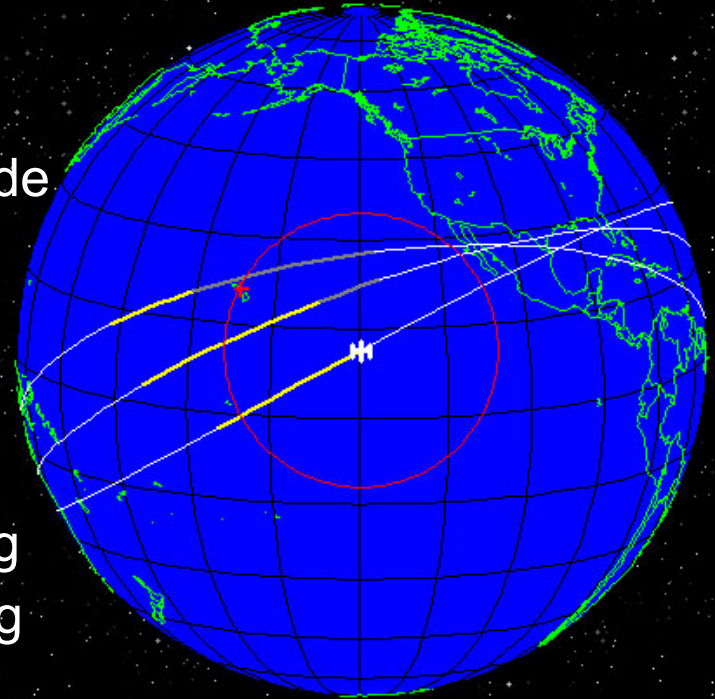
Satellite Tracker

What It Needs:

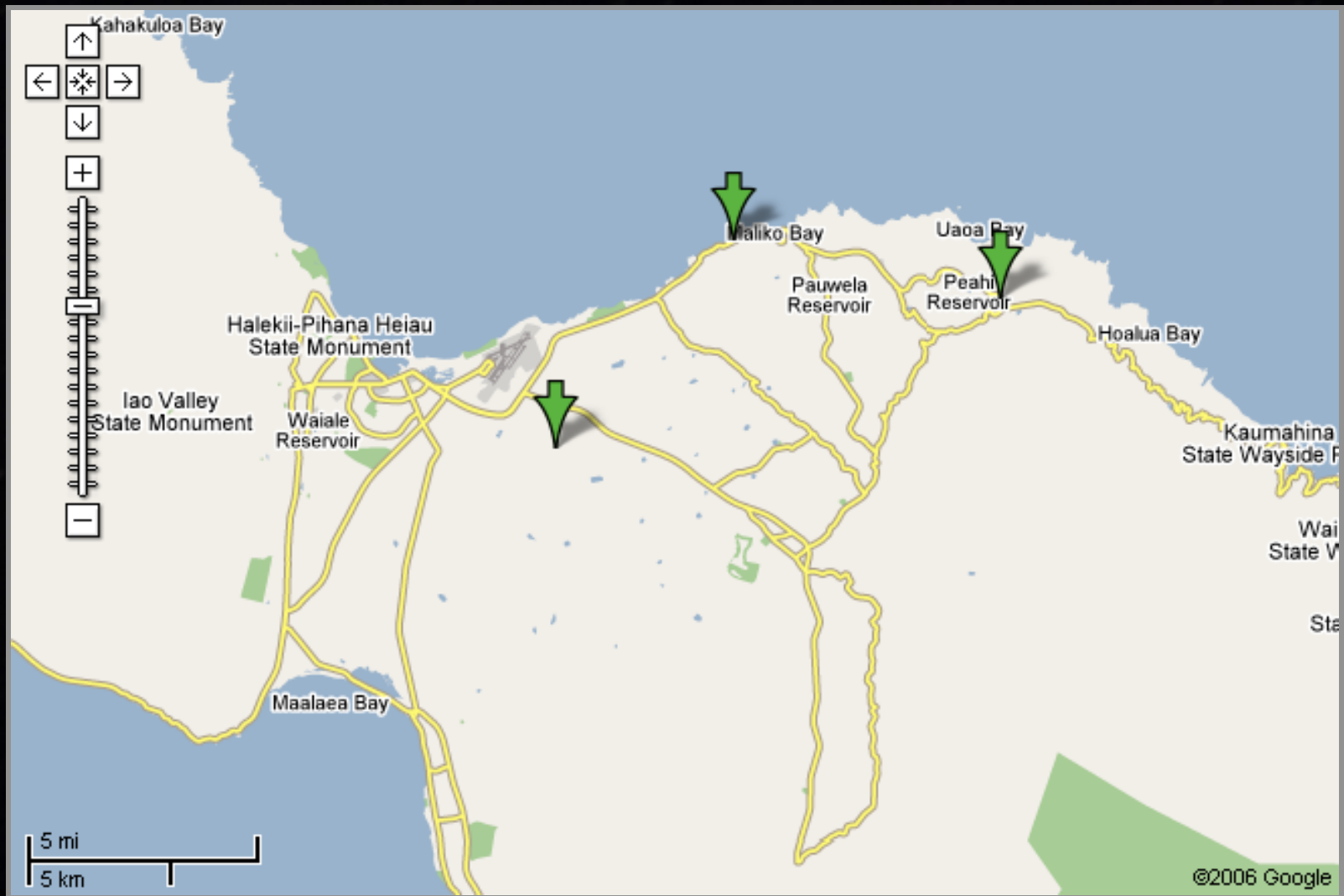
- USNO Master Clock Time
- Exact Location Coordinates and Altitude
- Current Two Line Element Sets
- Aligned Telescope

What It Does:

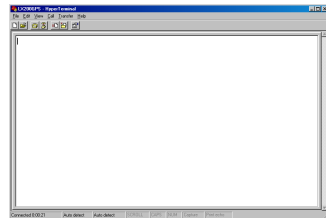
- Predicts Satellite Passes and Visibility
- Computer-Controlled Satellite Tracking
- Receives User Input to Adjust Tracking



Primary Tracking Locations



Communication



HyperTerminal

#:g+##

Turn on GPS Receiver

#:gT#

Take GPS Fix

#:gps#

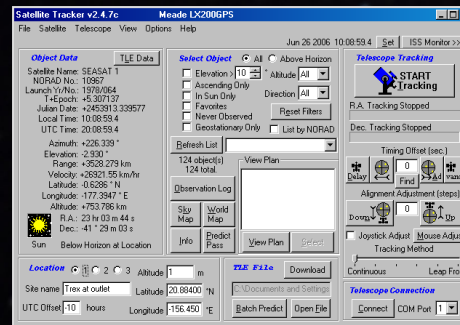
Request GPS Coordinates

GPRMC,010643,A,2053.0403,N,15627.0584,W,
000.0,265.3,230606,,A*40

20 deg 53.0403 min N
156 deg 27.0584 min W

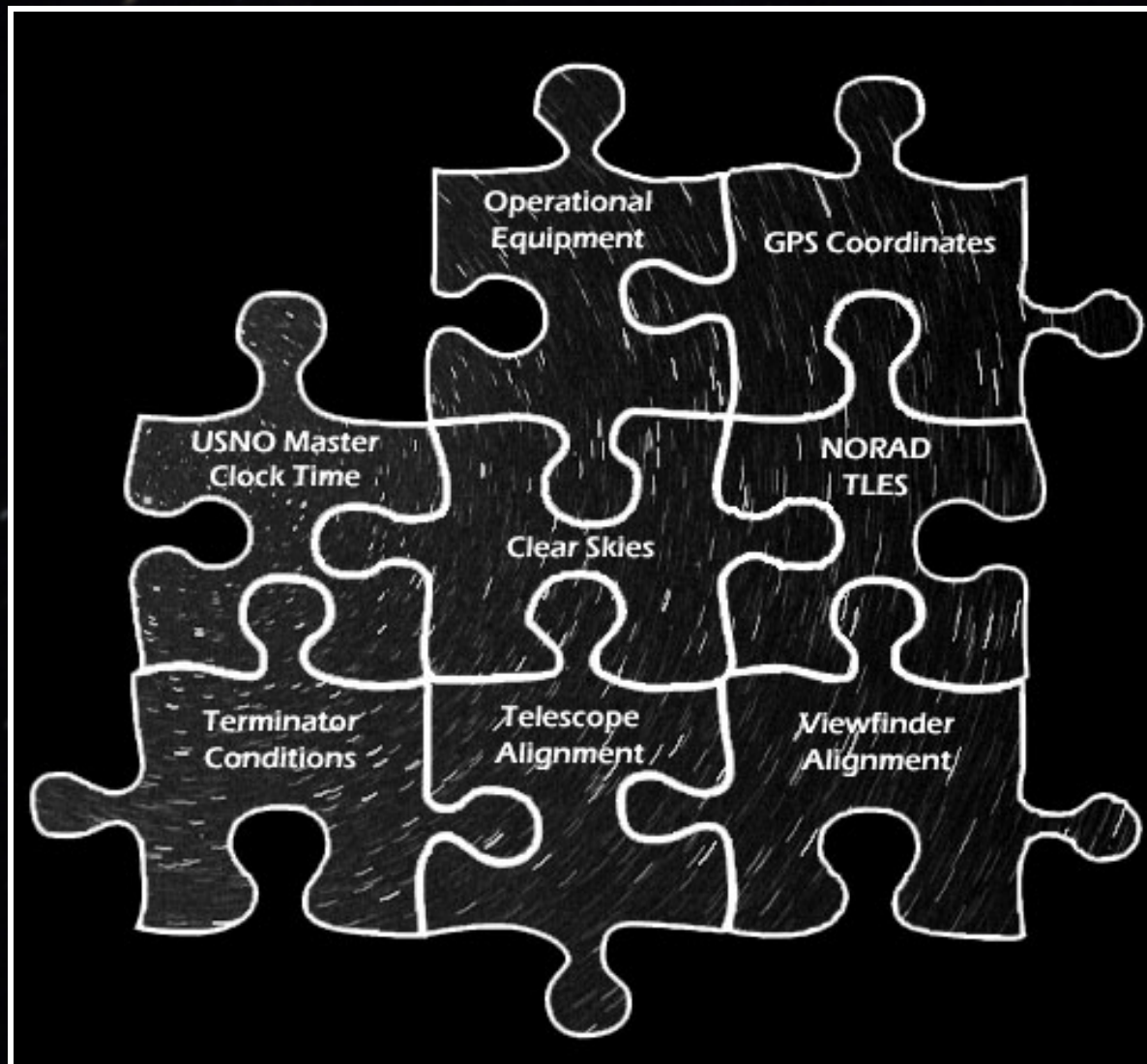


USNO Master Clock Time



Two Line Element Sets

All The Pieces Must Fit Together...



Is It Feasible?

Controllable Variables

Star Alignment (Pointing Accuracy)

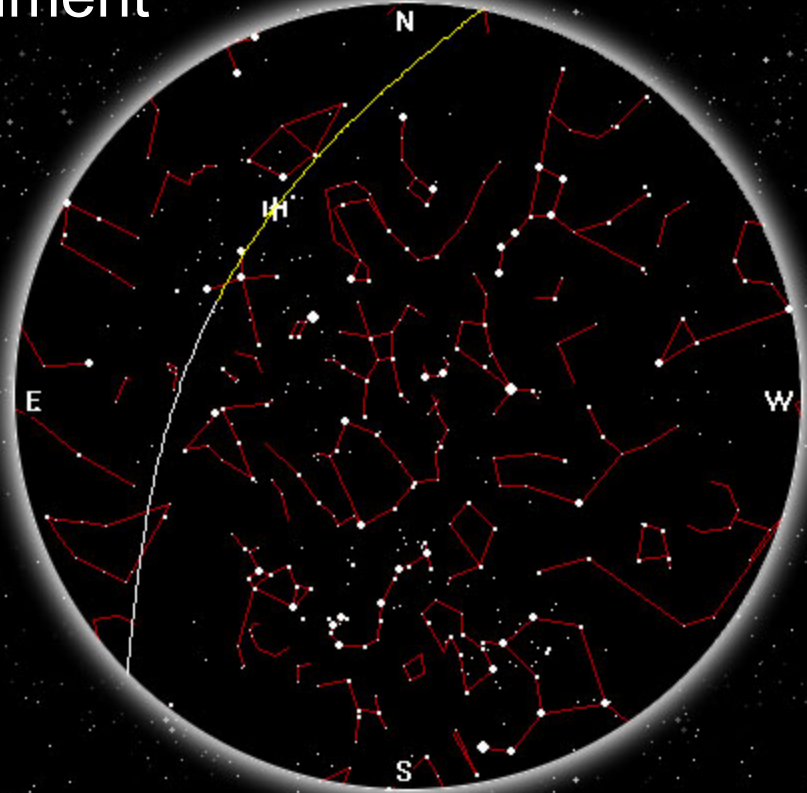
NORAD Two-Line Element Sets

Viewfinder + Telescope Alignment

Time + Location

Force Majeure

Weather



The Limiting Factor



What is Possible?

Range 1255 km Time 21:36:03 UTC



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