

Building K2 — A Simple Star Tracker



K2

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Introduction

Designing K2	Basic Idea Design Criteria
Building K2	Components Construction
Aligning K2	Polaris Pegasus Arm
Testing K2	Periodic Error Drive Speed
Using K2	Results Overview

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Star Trails



Designing K2 | Building K2 | Aligning K2 | Testing K2 | Using K2

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Design Criteria

What criteria determine the design of a star tracker?

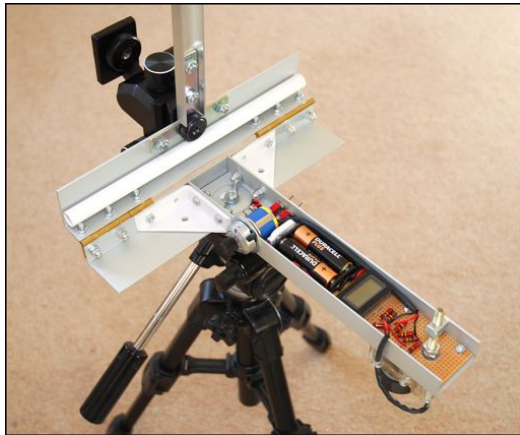
Ideally...	For K2 this means...
Compact	Footprint no larger than A4
Light	Less than 1 kg
Strong	Able to support a digital SLR
Accurate	Exposures of up to 15 minutes
Battery operated	AA batteries
Low power	Run for ~ 6 hours
Cheap	Cost < £50 for all components
Easy to construct	Manual tools (no workshop)

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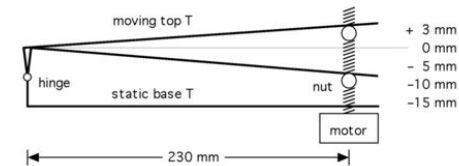
Construction



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Construction



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Aligning Using Polaris

A simple sighting tube would work for Polaris, but...

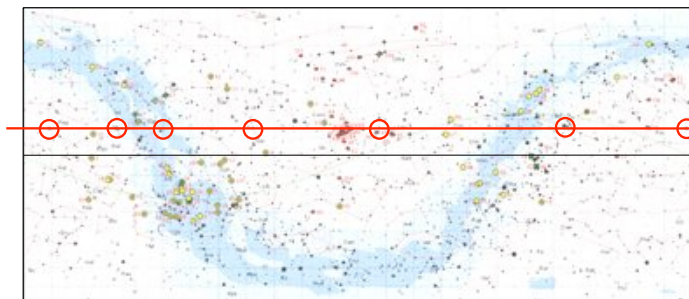


When in Kenya, on the equator,
an alternative alignment is required.

Designing K2 | Building K2 | Aligning K2 | Testing K2 | Using K2

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Aligning Using Pegasus Arm



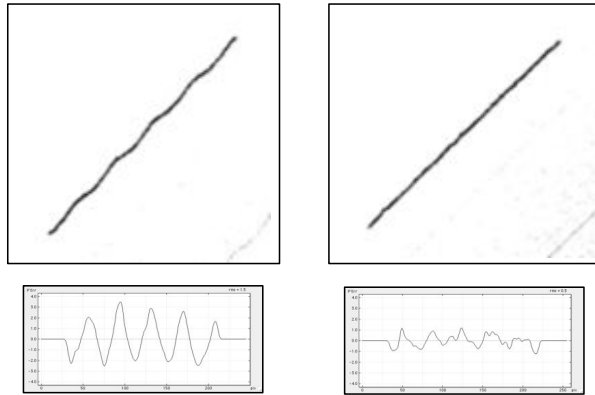
Declination = 15.2°

Designing K2 | Building K2 | Aligning K2 | Testing K2 | Using K2

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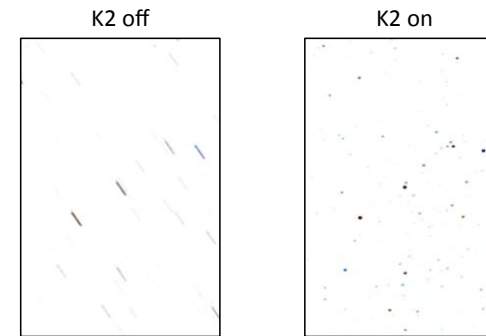
Periodic Error



Designing K2 | Building K2 | Aligning K2 | **Testing K2** | Using K2

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K2 Off/On

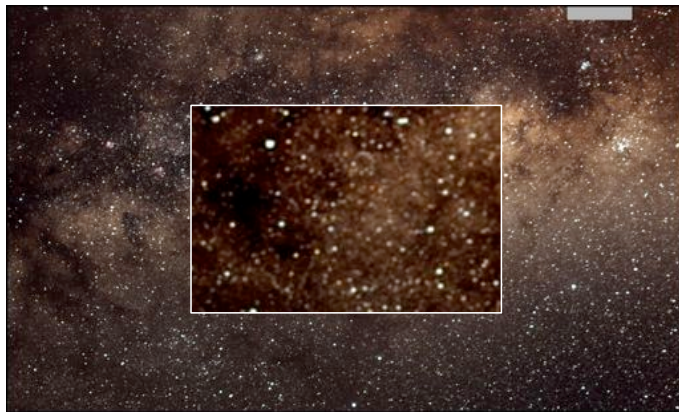


Focal length = 100 mm, Exposure = 30 sec

Designing K2 | Building K2 | Aligning K2 | **Testing K2** | Using K2

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Results



Designing K2 | Building K2 | Aligning K2 | Testing K2 | **Using K2**

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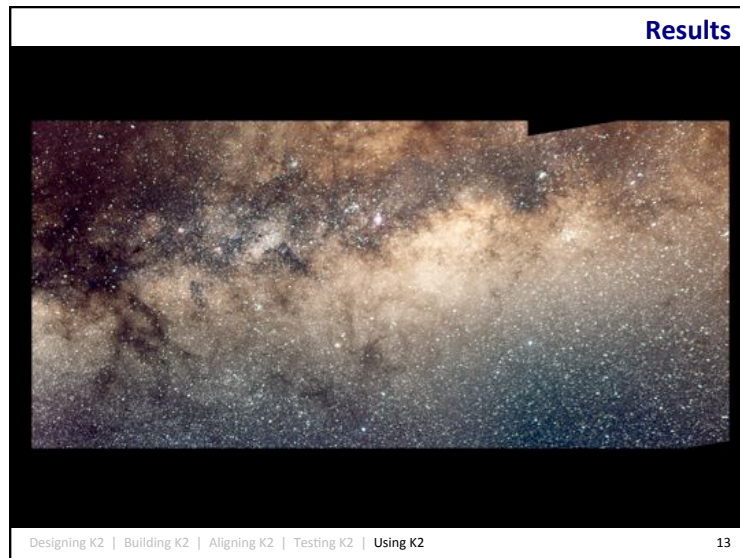
Results



Designing K2 | Building K2 | Aligning K2 | Testing K2 | **Using K2**

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Overview

So how well did K2 work?

Alignment using the Pegasus arm	✓
Tracking accuracy	✓
Size, weight, power	✓
Rigidity	✗

Designing K2 | Building K2 | Aligning K2 | Testing K2 | Using K2

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