

Building K2 — A Simple Star Tracker



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Introduction

Designing K2

Basic Idea
Design Criteria

Building K2

Components
Construction

Aligning K2

Polaris
Pegasus Arm

Testing K2

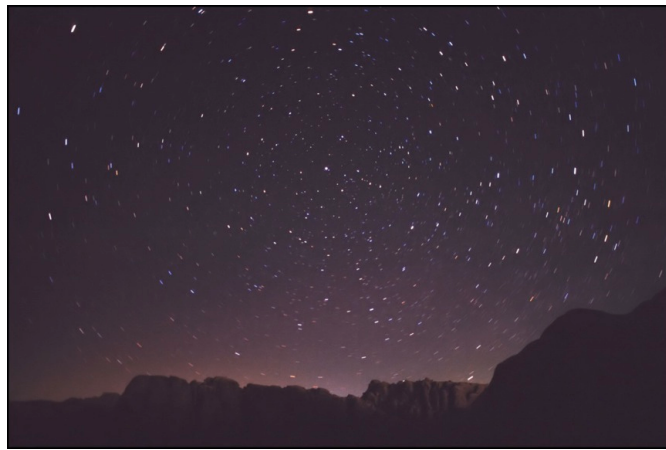
Periodic Error
Drive Speed

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...**

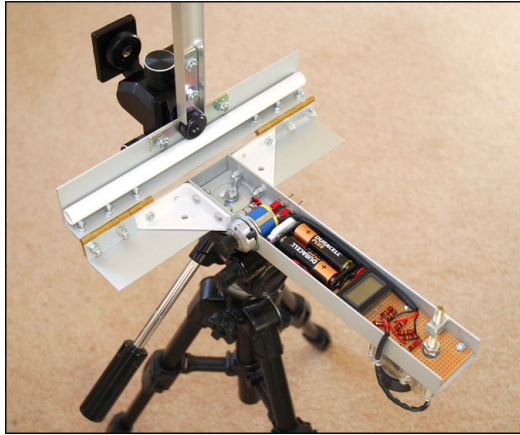
Compact	Footprint no larger than A4
Light	Less than 1 kg
Strong	Able to support a digital SLR
Accurate	Exposures of up to 15 minutes
Battery operated	AA batteries
Low power	Run for ~ 6 hours
Cheap	Cost < £50 for all components
Easy to construct	Manual tools (no workshop)

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

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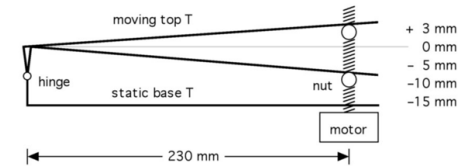
Construction



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

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Construction



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

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Aligning Using Polaris

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

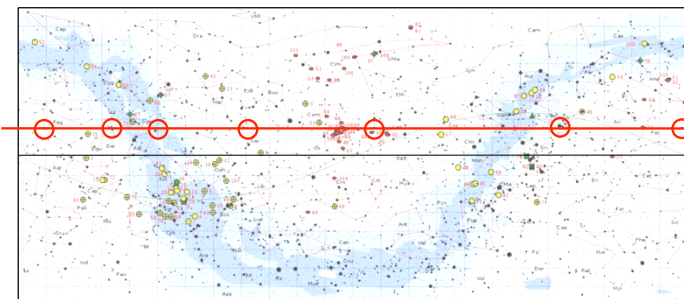


When in Kenya, on the equator,
an alternative alignment is required.

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

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Aligning Using Pegasus Arm



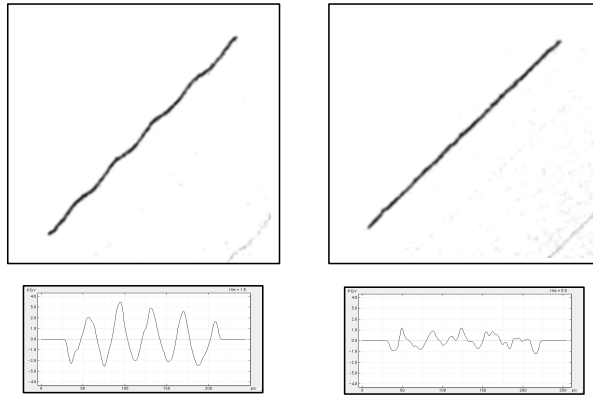
Declination = 15.2°

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

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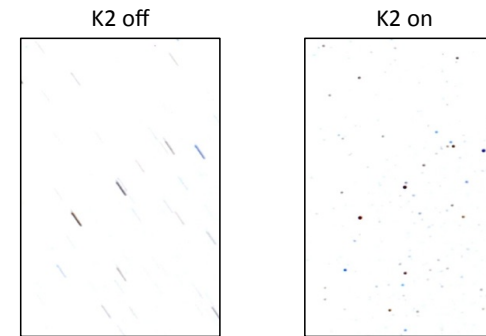
Periodic Error



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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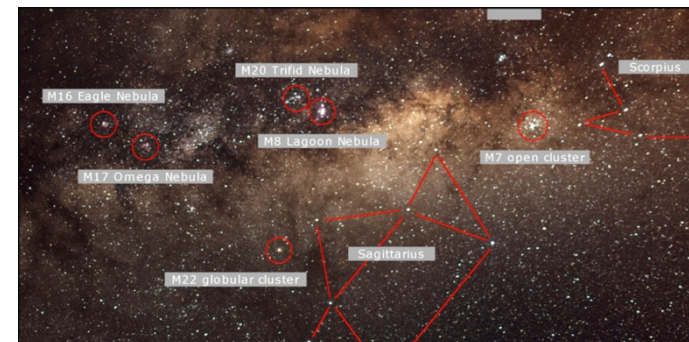
Results



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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Results



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Overview

So how well did K2 work?

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

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<http://www.liv.ac.uk/~sdb/Astro/K2>

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