

John Murrell

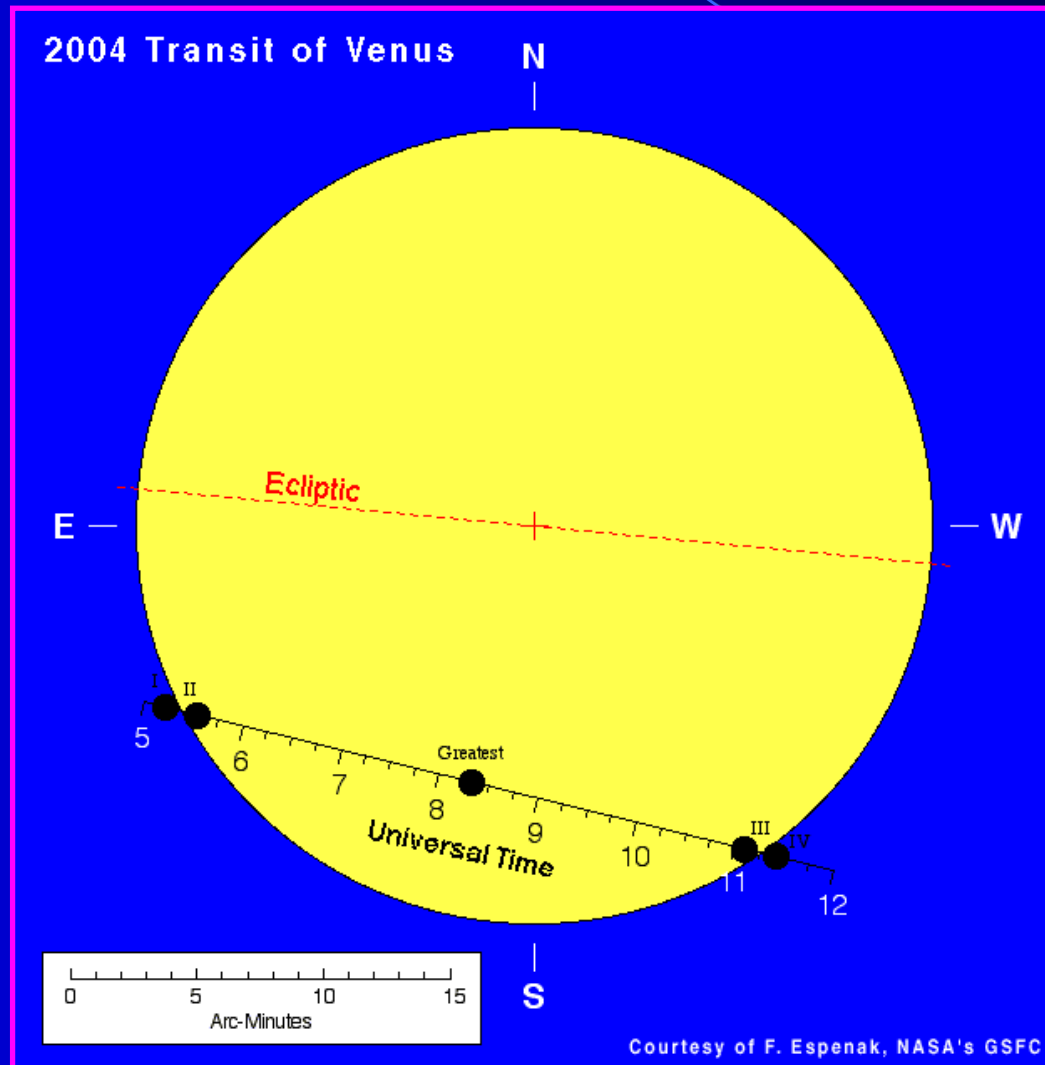
**Transit of Venus
8th June 2004**

**Obtaining accurate timing
and recording the 'Black
Drop' effect**

Introduction

- Timing the Transit
- Observing & recording the 'Black Drop effect

Scale diagram of Transit (topocentric view)



Location - Location - Location

- It is obvious that you have to be able to see both the start & end of the transit from your location
- To obtain good images you need to get away from hot surfaces that will cause turbulence - the Solar heating of the ground will be very strong
- Best over water or a forest
- Grass is a poor 2nd best
- Avoid bare soil, rock, tarmac, concrete buildings & cars

The ideal location



Possibly the best location ? (at least on Earth !)



Beating Turbulence

- Use fast exposures
- Record the Transit on video and then pick the best frames
- Use a web cam to record the transit to a computer & then pick out the good frames (6 Hours is a lot of Data !)

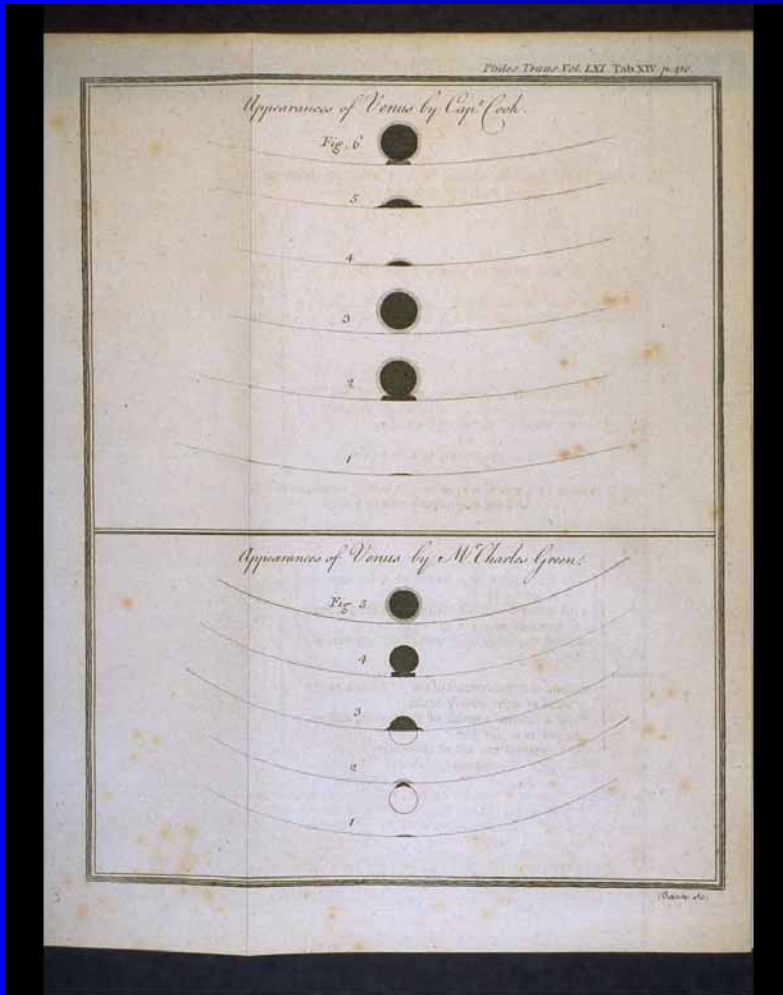
Speed of Transit

- Beware
- From First to Second Contact and from third to fourth contact takes around 18 minutes
- The whole transit takes around 6 Hours so remember the Sun will move by 90 degrees to the right and will rise from 12 deg to 61 degrees altitude
- Can you see this entire range from your chosen location ?
- Will your camera be clear of the mount ?

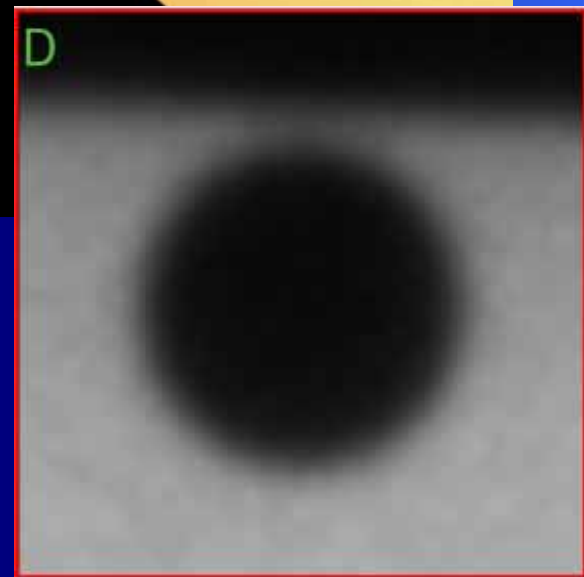
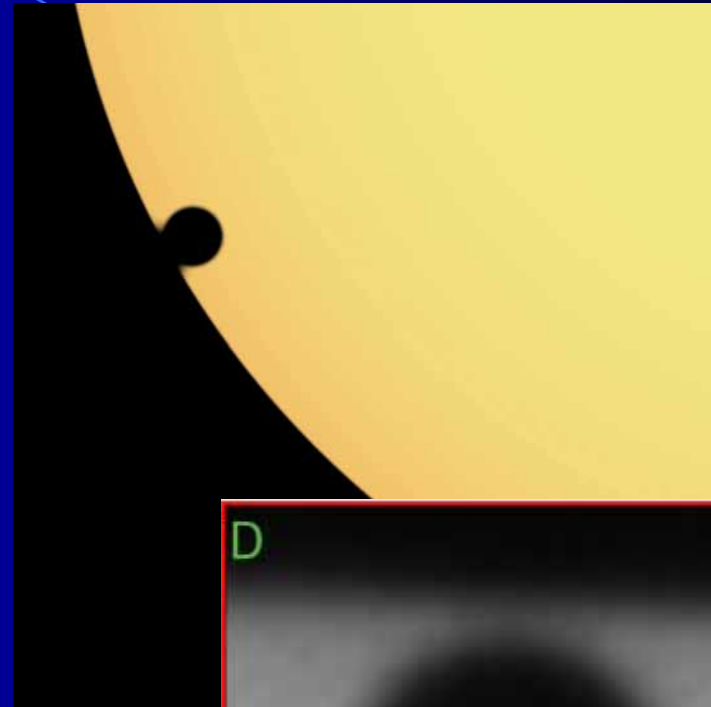
Timing the transit

- o Require accurate time either:
 - o A GPS receiver
 - o Time display on Teletext
 - o Speaking Clock
 - o Can be from a 'Radio Controlled clock but beware !
- o Use these to set an accurate watch or clock preferably with 'split' timing facilities else you will need an assistant to watch the clock & record the times
- o Set the clock / watch before the transit & then check how much it is out after - use a linear correction to your timing.

Black Drop Effect



Cook's and Green's illustrations of "black drop" effect 1769 Transit



1999 ToM from TRACE showing black drop effect

Recording details of the 'Black Drop' effect

- In addition to a notebook to record what you see use an audio recorder to keep a record of what you saw 'in real time' - you can always edit / transcribe it later.
- Recording a time signal on one channel would be useful

My observing setup

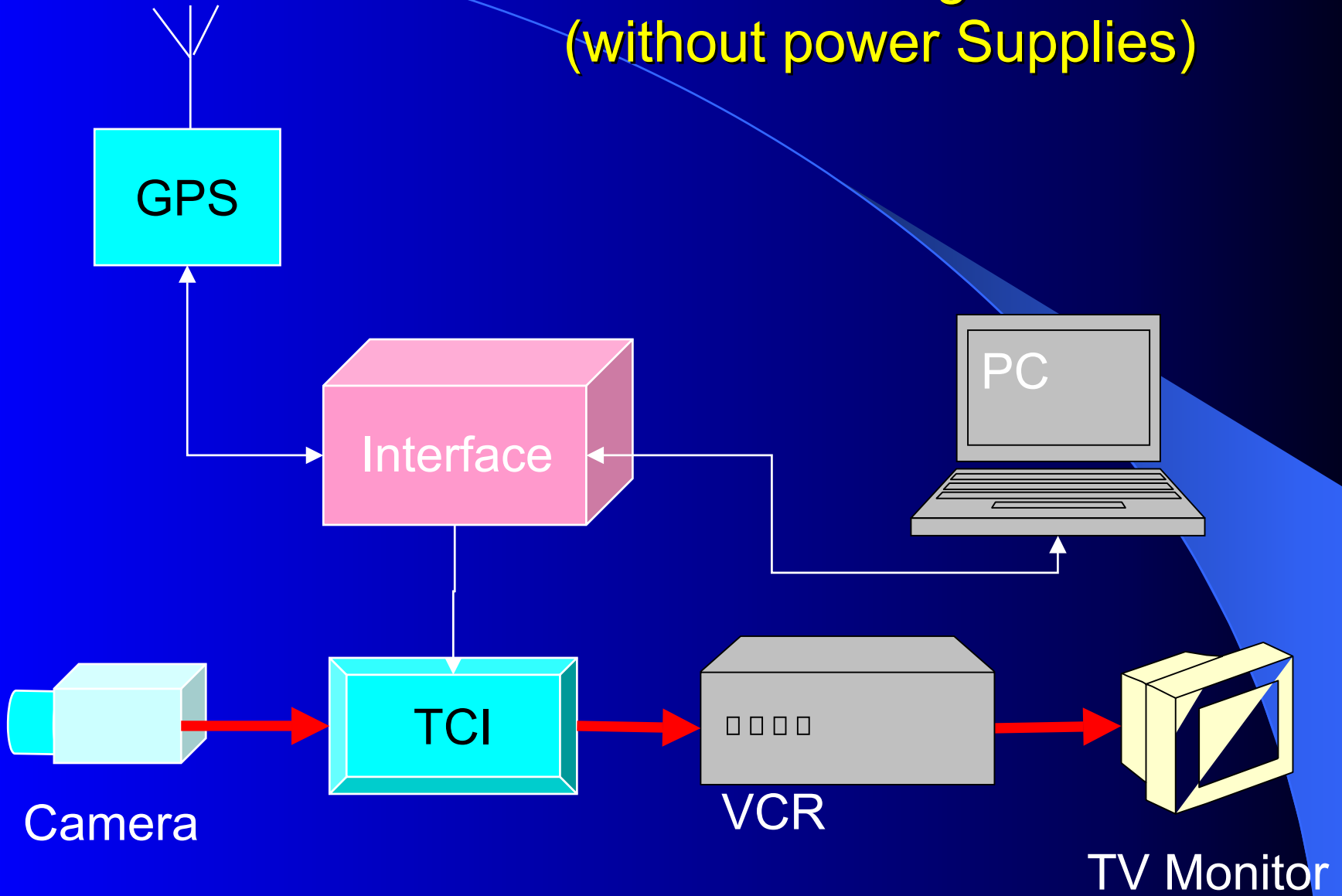
- I will be using a similar setup to the equipment I used for the transit of Mercury in May 2002.
- In addition to recording the video signal I am going to record audio tracks both from a personal boom microphone and a general area microphone.

Equipment – Telescope A Celestron 8 GPS

Used with a Celestron 8”
Solar Filter for the ToM



Block Diagram (without power Supplies)



Equipment – Video Camera

Astrovid StellaCam

This uses the same Sony ExaView chip as some of the Starlight Express Cameras. It produces a video output rather than single pictures but can integrate up to 128 frames. It is not cooled



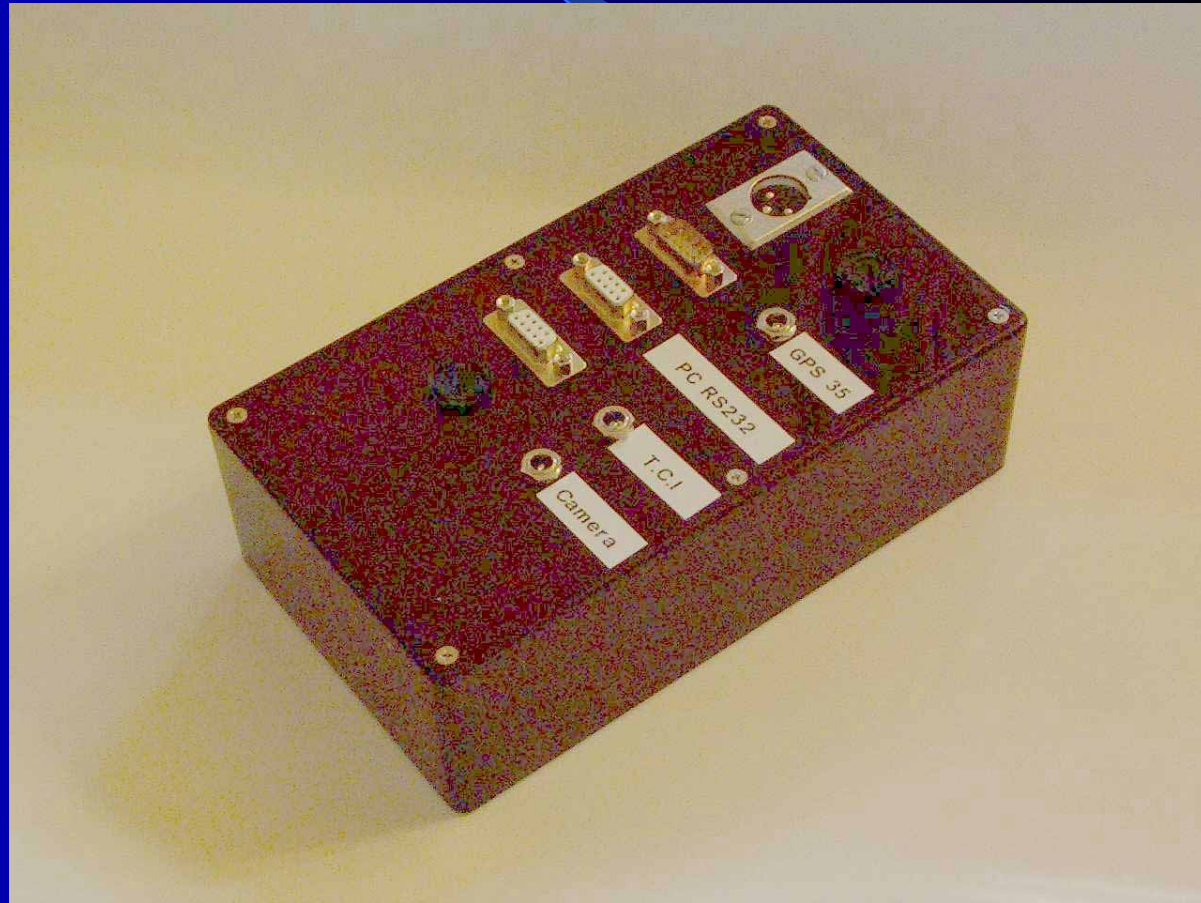
Equipment – GPS

This is not a standard Navigation GPS. It is unusual in that it gives a pulse out every second accurate to 1us. In addition to NEMA encoded date time & position.



Equipment – Interface

Home built – connects the units together and distributes the power (12V DC) to the Camera, GPS, Time Code Inserter and the RS232 interface inside the interface



Equipment – Power Supply

Provides 12V DC power from an 18Ah Battery. Powers the equipment mentioned before plus the Telescope & Dew Remover



Add

- A Video Recorder
- A Television for focus & framing
- A Large Black Plastic Sheet (To keep the rain off – used as a sunshield to allow me to see the television !
- Plus lots of wire !

The final result !



Helpful Advice - 1

- ✓ The FOV will be quite small if Venus is a decent size - with the reversals due to both the telescope & the diagonal it is difficult to work out which way the image is up & thus which quadrant of the Sun you are looking at - Venus will not be visible before it touches the edge of the Sun. One way of testing your setup is to try it on the moon beforehand. Record how you set up everything - photographs help !
- ✓ Take notes as you go - a 'dictaphone' will help
- ✓ It's very difficult to see a TV in Sunlight - work out how you are going to shelter from the light
- ✓ It will be quite hot & Sunny ! Don't forget the sun tan cream, sunglasses & a cold drink
- ✓ Can you realign your telescope in daylight if it gets knocked or the power supply fails ?

Helpful Advice - 2

- ✓ Have spares of everything - it's a once in a lifetime event !
- ✓ Practice on Sunspots - if you can film these you are likely to get good results for the ToV
- ✓ Practice - Practice - Practice
- ✓ Share your practice experience with others on Altair_B
- ✓ Pray for good weather !

Questions

- There will be a Q&A session on the transit of Venus after the AGM in 2 weeks time.