

# The Great Moon Hoax



### The Great Moon Hoax

Why a hoax?

*President Kennedy couldn't deliver on the promise*

How many believe it?

*10% of all Americans have doubts*


At what stage in the Apollo programme did it start?

*Man in Earth orbit — yes. Man on the Moon — no.*

What is the "evidence"?

*Scientific scrutiny makes a good science lesson*


*...and hopefully an interesting talk.*




3

### Why a Hoax?

Kennedy made a promise...

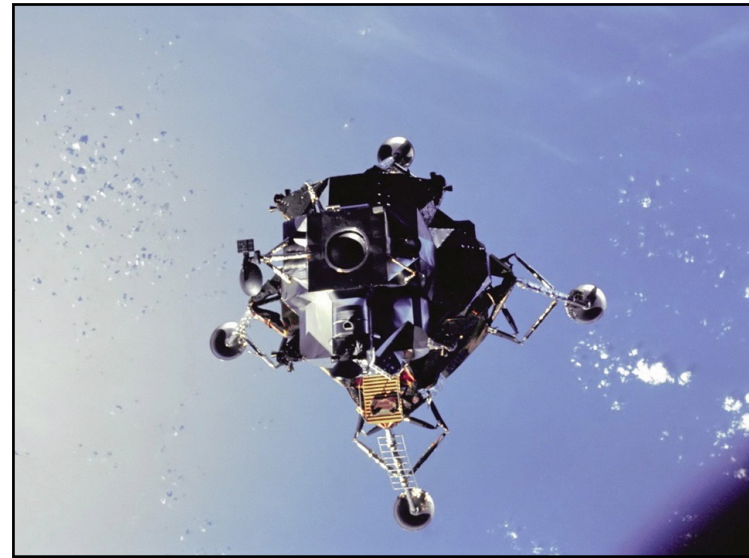


Impressive... Important... Difficult... Expensive...

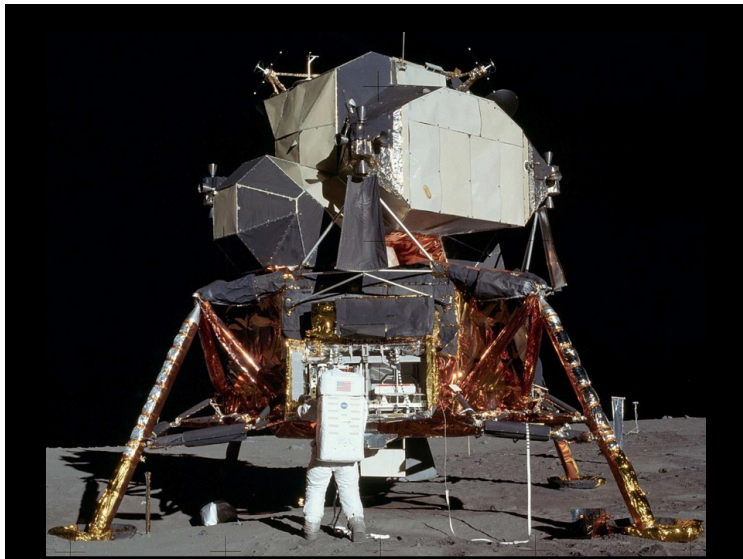
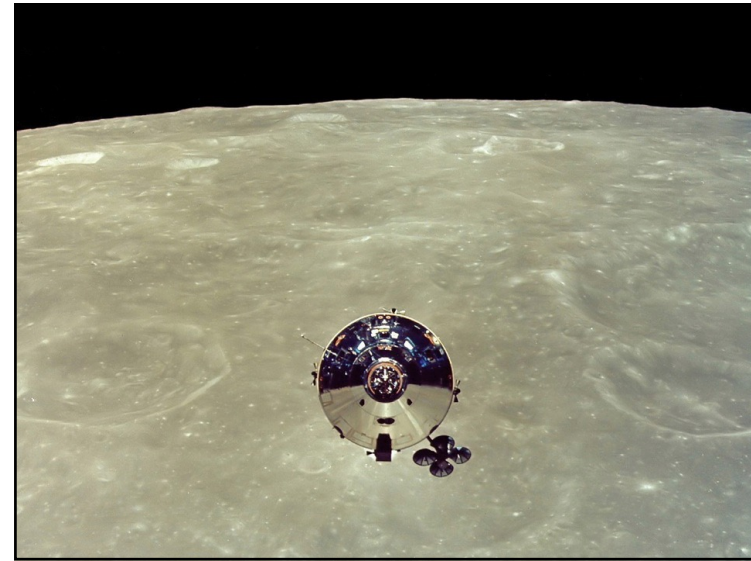


4

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## The Evidence

- Computing power just wasn't up to the task
- Radiation in space would kill the astronauts
- Video anomalies :
  - filmed on Earth, just slowed down
  - flags wave in the breeze
  - dust doesn't fall at the right rate
  - hammer and feather experiment
  - rocket exhaust not visible from LM
- Image anomalies : *many anomalies are quoted...*

## So Many Image Anomalies ...

- Shadow angles are **inconsistent** with illumination by Sun
- Shadow lengths are **inconsistent** with illumination by Sun
- Shadows are filled in by **another** light source
- **No** stars appear in the sky
- **No** blast crater underneath the Lunar Module engine
- **Same** background appears in images of **different** regions

*... and dozens more*

## So Many Image Anomalies ...

Concerning the Hasselblad cameras used...

- Astronauts couldn't operate the cameras with gloves
- Fiducial cross marks appear **behind** objects
- Images are **perfectly** framed even though **no viewfinder**

## Look at the Evidence

Let's look at the evidence, piece by piece, and see how much of it stands up to scientific scrutiny.

Computers

Radiation

Video clips

Still images

# The Great Moon Hoax

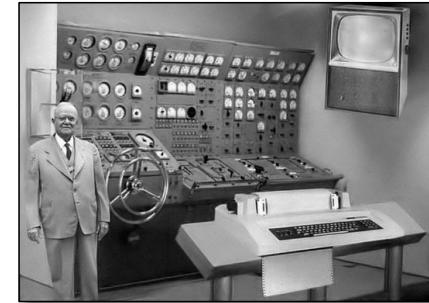
## Computing Technology



## Advancing Technology

1954: Scientists from the RAND Corporation illustrate how a "personal computer" might look in the year 2004...

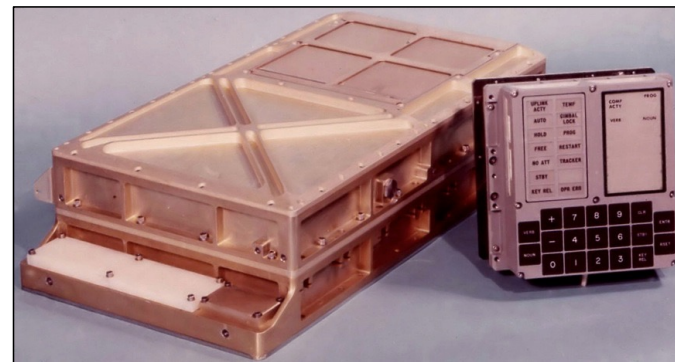
"With teletype interface and Fortran language, the computer will be easy to use."



## Computers Too Big



## Apollo Guidance Computer



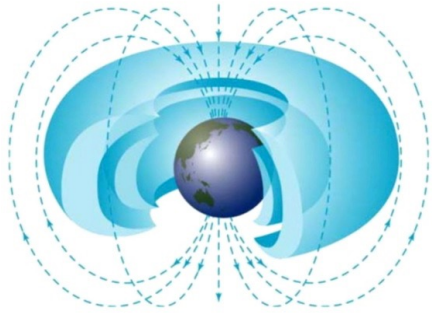
Was this sufficient computing power to put a man on the Moon?

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## Radiation

Energetic protons and electrons from the Sun get trapped in the Van Allen belts encircling the Earth.

Astronauts travelling to the Moon would receive a "lethal" dose of radiation.



## Blowin' in the Wind



## Apollo 11 Flag



## Rocket Engines on the Moon

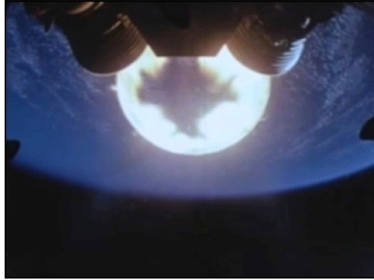
Why is there no rocket engine exhaust plume?



It must be a studio model on wires.

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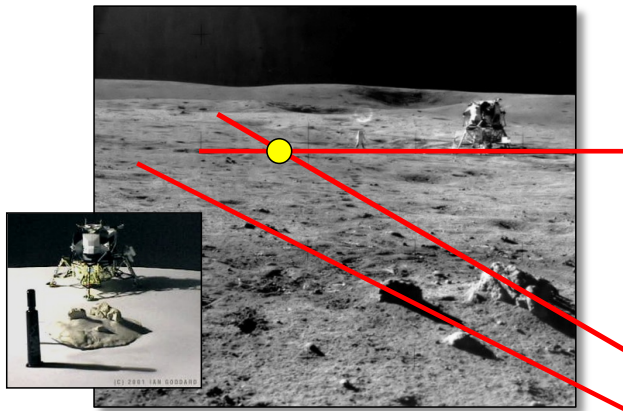
## Rocket Engines in Earth Orbit



Engine exhaust plumes are not visible in a vacuum

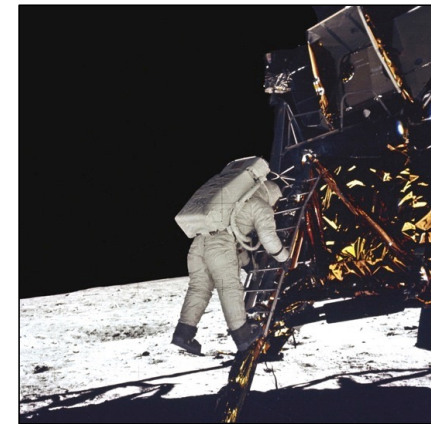


## Impossible Shadows



## Where's the Light Source?

If the Sun is the only light source, why is Aldrin visible when in shadow?

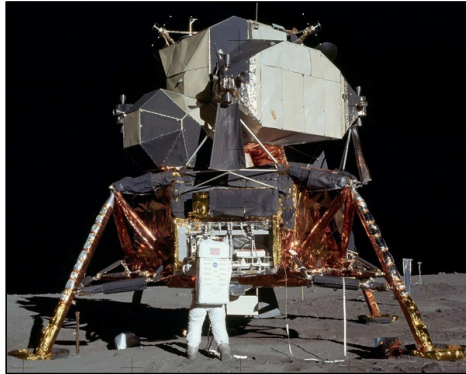


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## Where Are the Stars?

Why are there no stars in the sky?

NASA didn't want to get it wrong!



## Why Footprints?

Why did the astronauts leave footprints, but the footpads on the Lunar Module did not sink into the soil?



## Sinking in the Soil

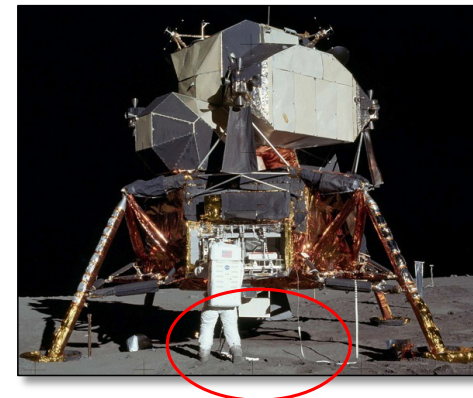
Why did the footpads on the Lunar Module not sink into the soil?

Sometimes they *did*.



## Sinking in the Soil

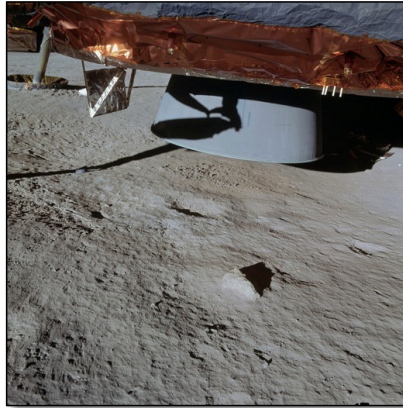
Why is there no 'blast' crater visible below the descent engine?



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## Sinking in the Soil

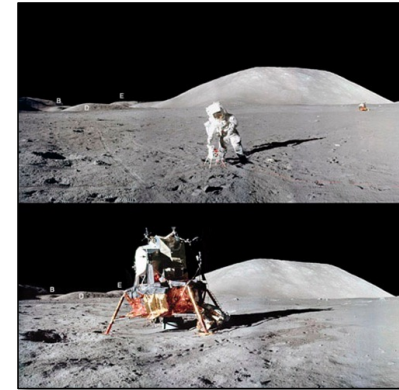
Sometimes there *is* a small blast crater — it is simply rather shallow.



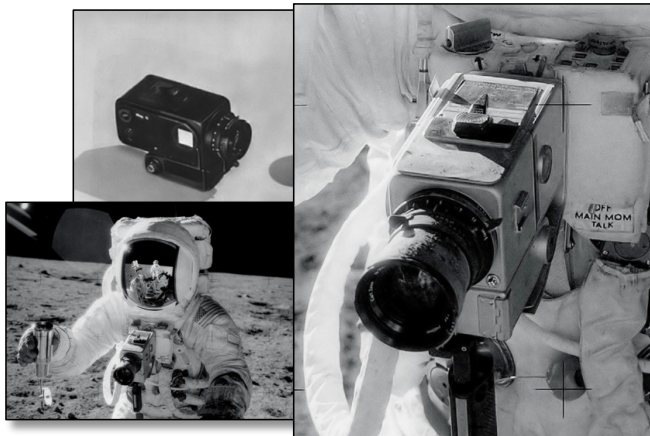
## Studio Set

Two views taken from different locations have "identical" backgrounds.

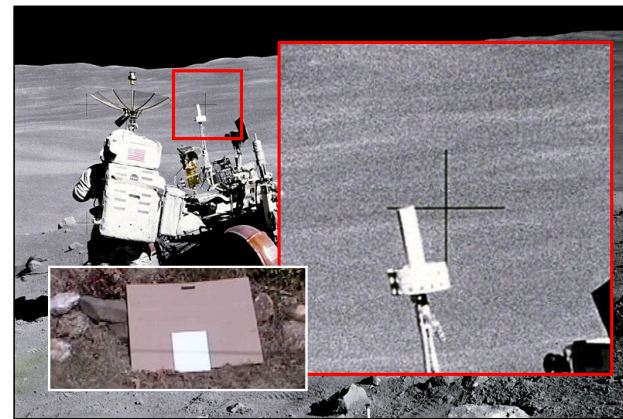
Is this proof that the same studio set "backdrop" was used twice?



## Hasselblad Cameras



## Impossible Images

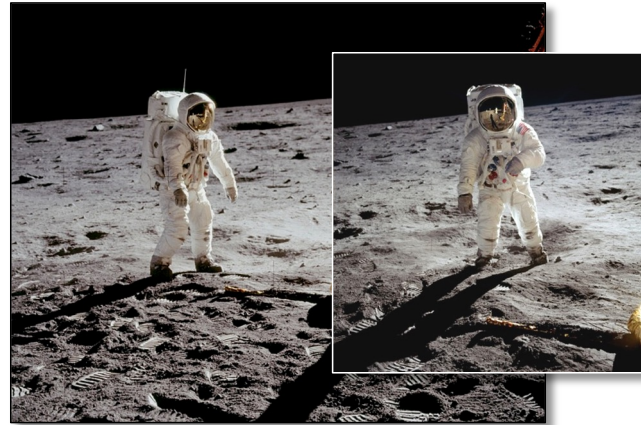


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How Did They Get Perfect Framing?



Spot the Difference



How Did They Get Perfect Framing?



Signs of Life



Take 1



Take 2

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## Proof

So the question remains...

Is there *any* evidence that can prove, beyond any reasonable doubt, that the moonlandings *did* take place?

That depends on your definition of 'reasonable'.

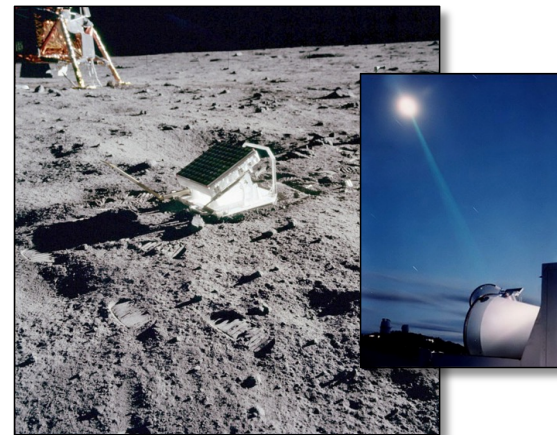
## Hammer and Feather



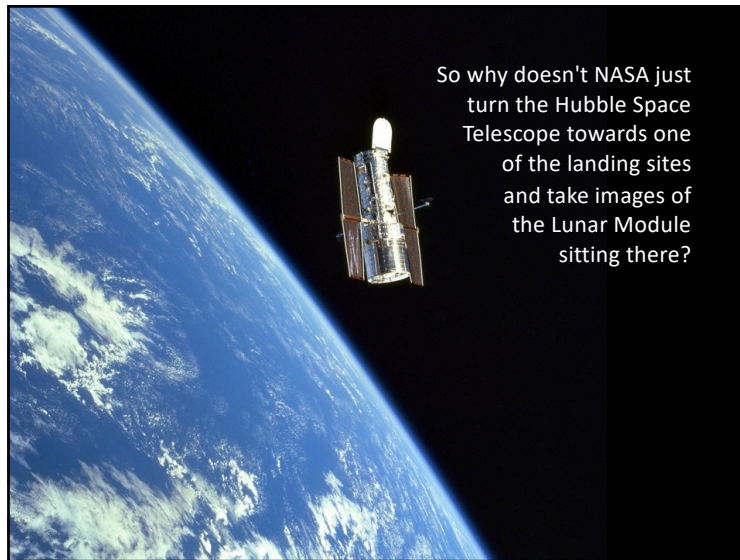
## Kicking Up Some Dust



## Reflectors



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## Can Hubble See Apollo?

Despite what some Moon Hoax advocates believe, we still have to obey the laws of physics.

Resolution of the HST  $\sim \lambda / D \sim 0.2 \mu\text{radians}$

$\sim 10$  millionths of a degree

$\sim 0.05$  arc seconds.

To see an object a few metres across at a distance of 400,000 km would need a resolution of

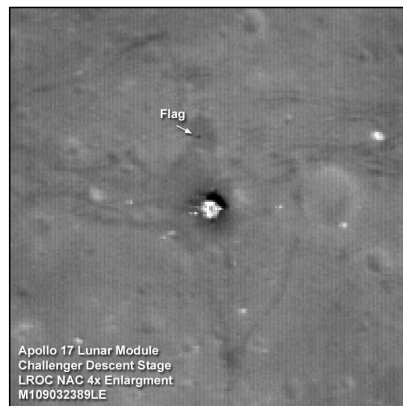
$\sim 0.01 \mu\text{radians}$

$\sim 0.002$  arc seconds.

The Lunar Module is **too small** by a factor of  $\sim 30$ .

## Can Anything See Apollo?

The mapping satellite Lunar Reconnaissance Orbiter Camera (LROC) has a Narrow Angle Camera (NAC) that can see the evidence.



## Be Sure of Your Facts

Professor Goddard does not know the relation between action and reaction and the need to have something better than a vacuum against which to react. He seems to lack the basic knowledge ladled out daily in high schools.

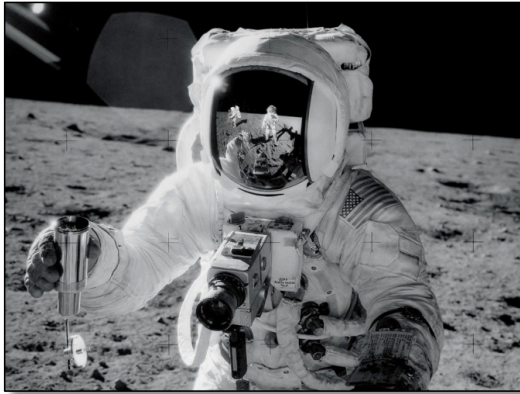
New York Times editorial 1921

Correction: It is now definitely established that a rocket can function in a vacuum. The Times regrets the error.

New York Times July 1969

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## What's Wrong With This Image?



## What's the Point?

Why are there **so many** Moon Hoaxers?

Do they **really** believe their "scientific evidence"?

Most arguments can be countered with some basic physics...  
...so analysis of the "evidence" makes a good science lesson.

Thinking about why things (might) behave differently on the Moon can help teach "Physics on Earth".

