

# The Great Moon Hoax



## The Great Moon Hoax



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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.*



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## Why a Hoax?

Kennedy made a promise...

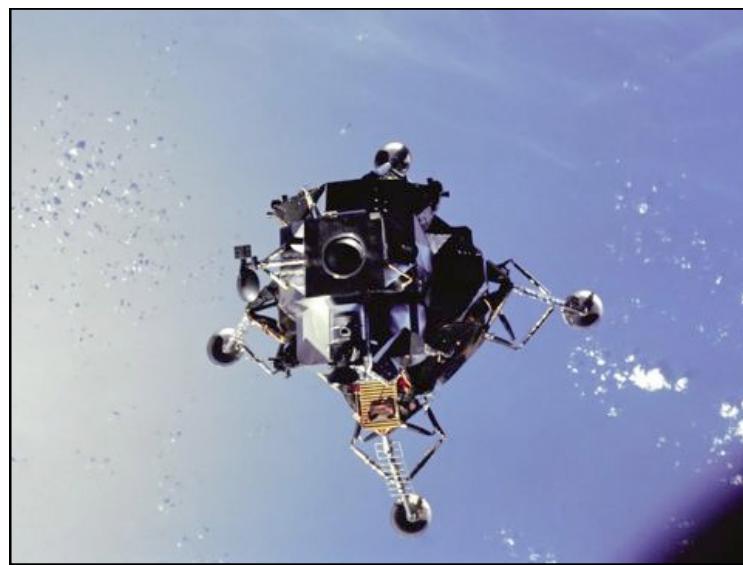


Impressive... Important... Difficult... Expensive...

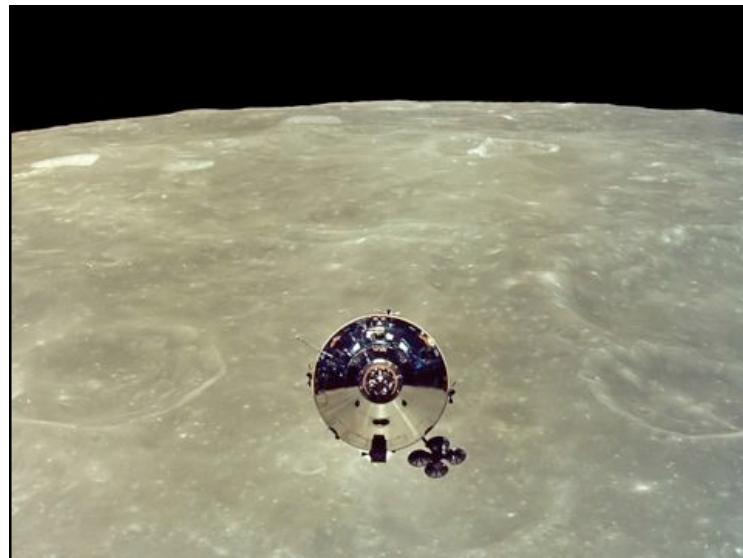


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# The Great Moon Hoax



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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...*



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## 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*



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## 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**



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## Look at the Evidence

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

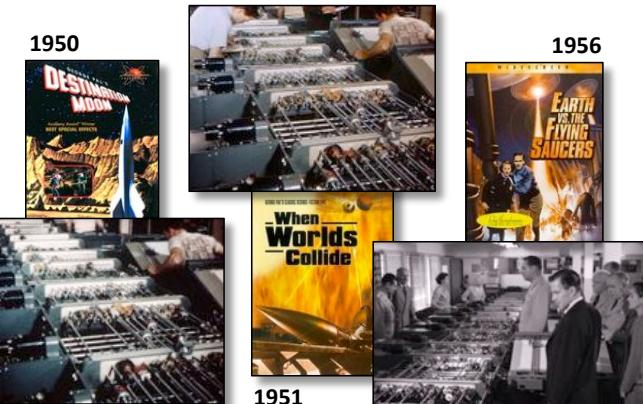
- Computers
- Radiation
- Video clips
- Still images



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## Computing Technology



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## Advancing Technology

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



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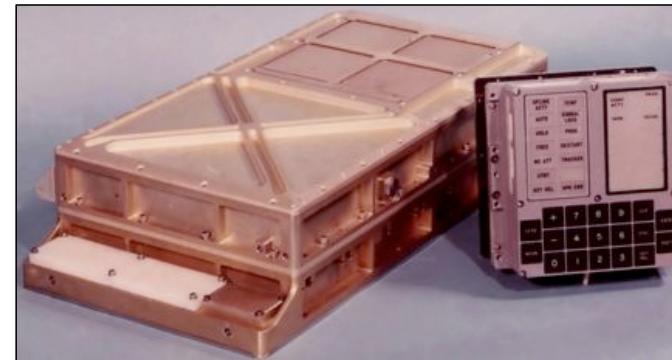
## Computers Too Big



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## Apollo Guidance Computer



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



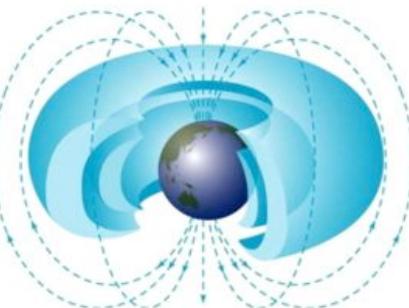
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## Radiation

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.



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## Blowin' in the Wind



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## Apollo 11 Flag



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## Rocket Engines on the Moon

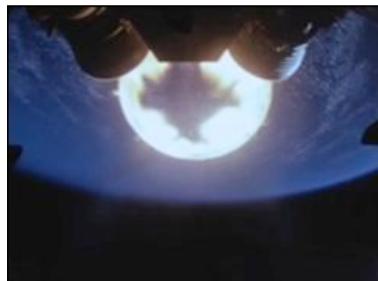
Why is there no rocket engine exhaust plume?



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## Rocket Engines in Earth Orbit



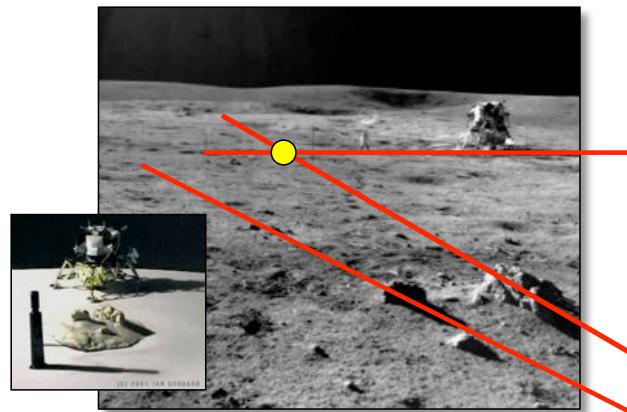
Engine exhaust plumes are not visible in a vacuum



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## Impossible Shadows



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## 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!



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## Why Footprints?

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



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## Sinking in the Soil

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

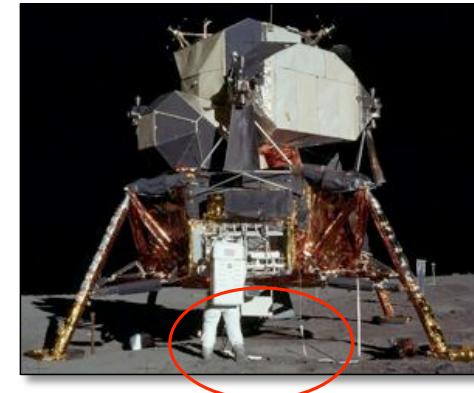
Sometimes they *did*.



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## 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.



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## Studio Set

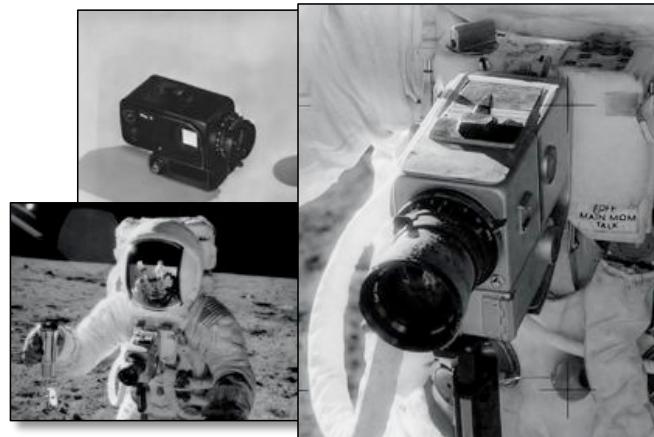
Two views taken from different locations have "identical" backgrounds.

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



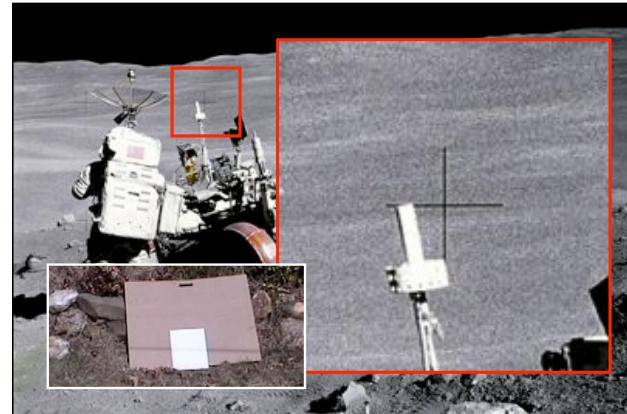
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## Hasselblad Cameras



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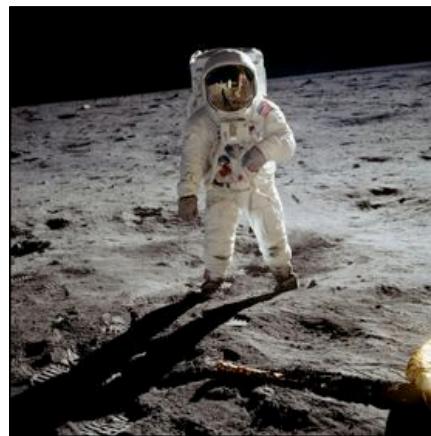
## Impossible Images



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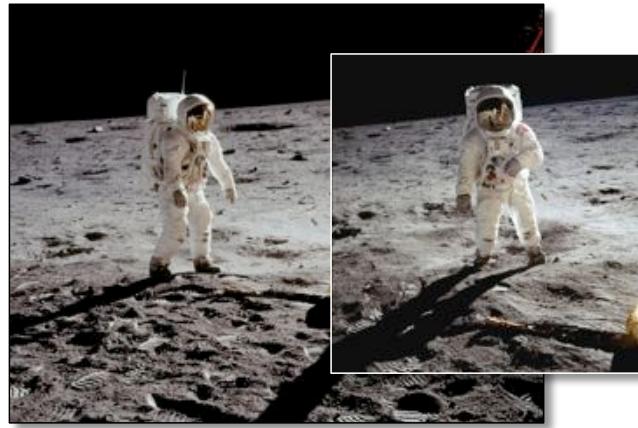
## How Did They Get Perfect Framing?



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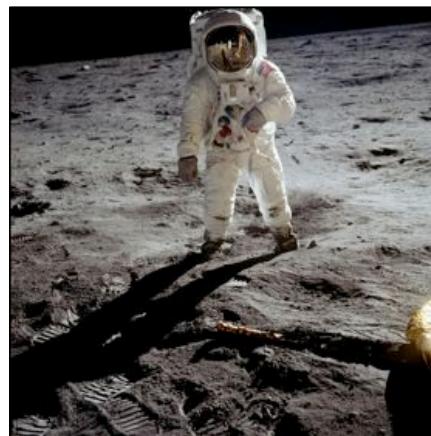
## Spot the Difference



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## How Did They Get Perfect Framing?



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## 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'.



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## Hammer and Feather



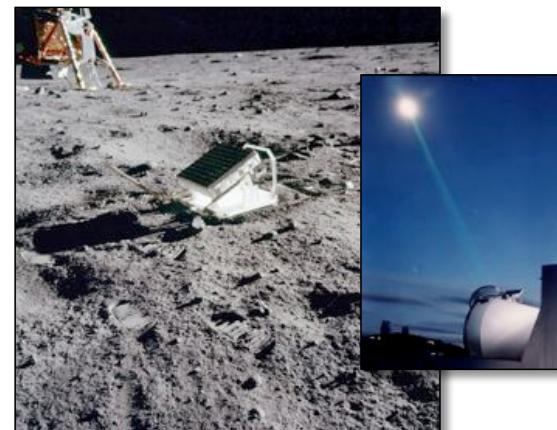
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## Kicking Up Some Dust



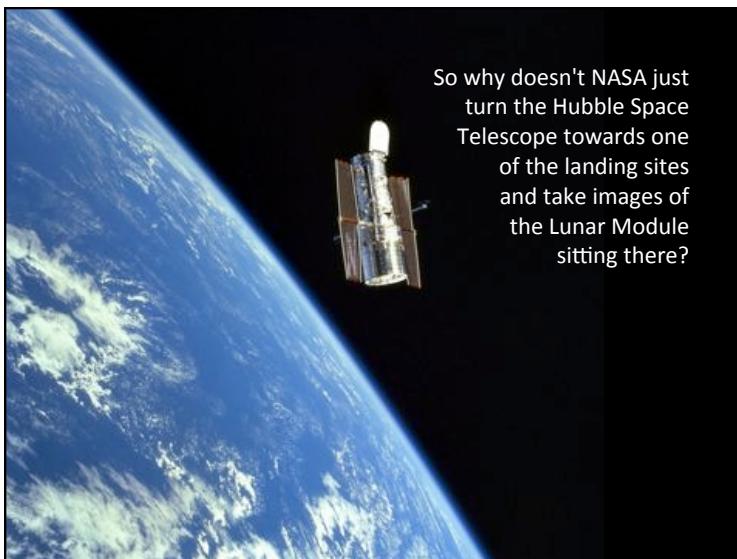
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## Reflectors



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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.

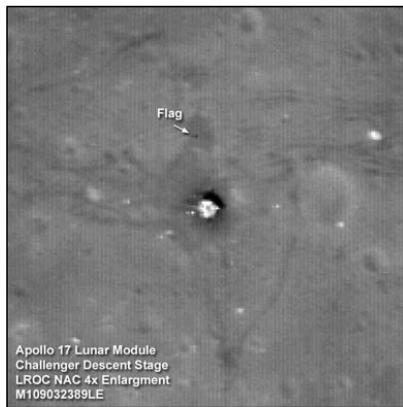
The Lunar Module is **too small** by a factor of  $\sim 30$ .



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## Can Anything See Apollo?

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



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## 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.

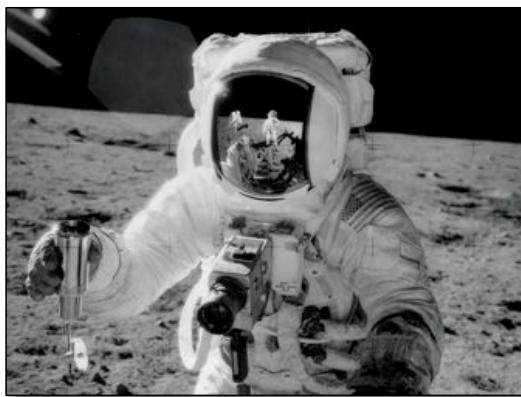
New York Times July 1969



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## What's Wrong With This Image?



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## What's the Point?

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

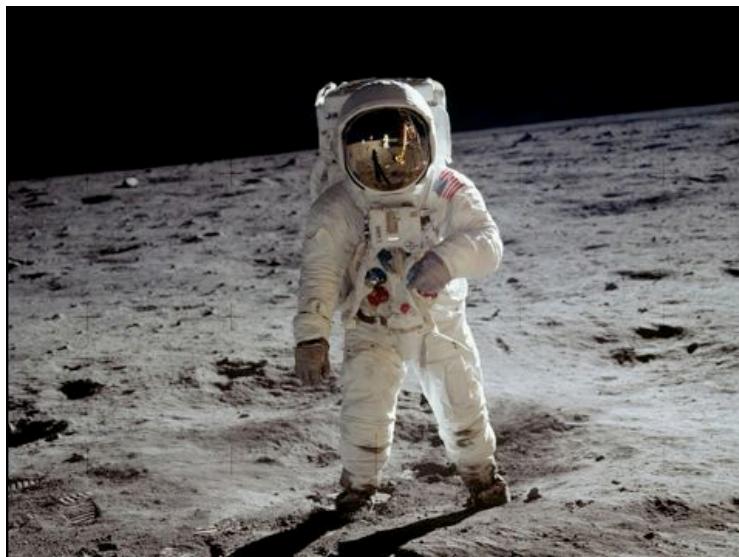
Do they **really** believe their "scientific evidence"?

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".



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[www.liverpool.ac.uk/~sdb/Talks](http://www.liverpool.ac.uk/~sdb/Talks)

Dr Steve Barrett      WDAS 9 Sep 2019