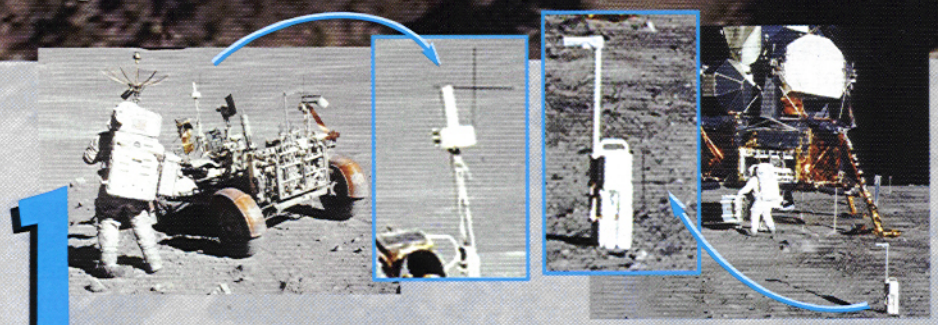
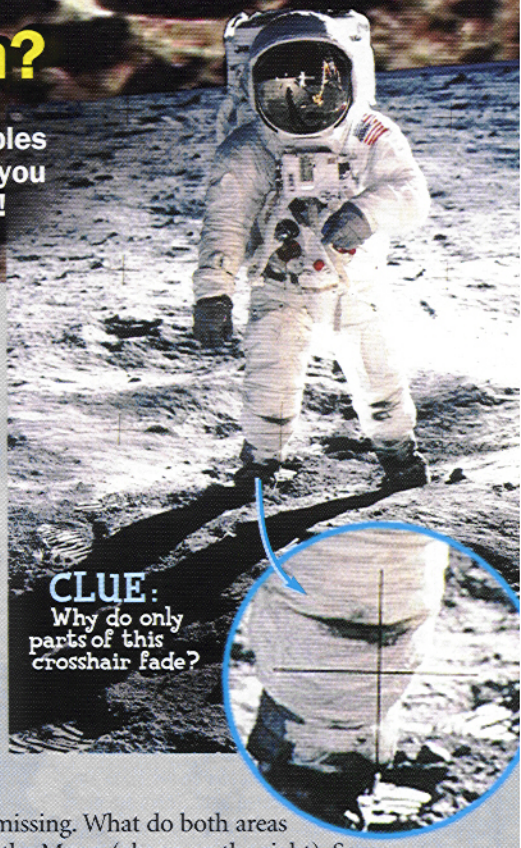
JR. SKEPTIC

No. 11

Did we really land on the Moon?

A TV show on the Fox network said we didn't. How good was their evidence that the moon landings were faked? Below are two examples of the arguments for a fake Moon landing from the TV show. See if you can guess the solutions to these mysteries from the clues provided!





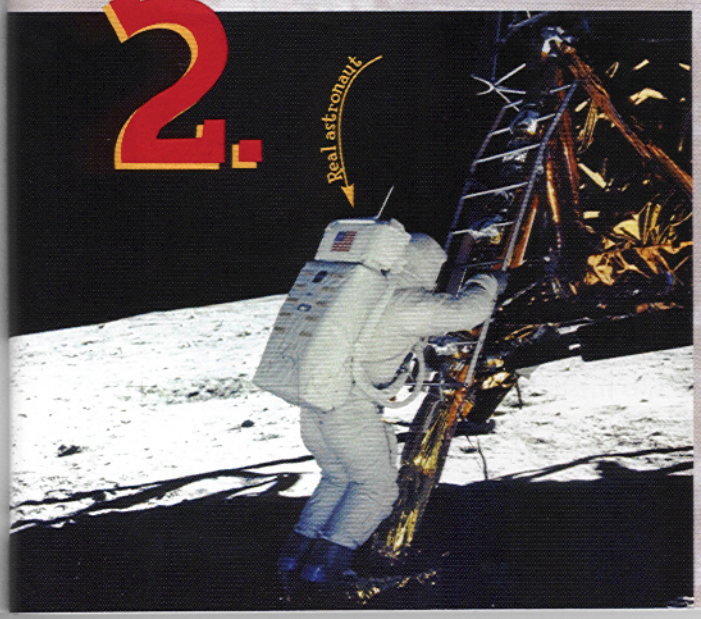
1. IS THIS PROOF THAT WE NEVER WENT TO THE MOON? PART OF THE CROSSHAIR IS MISSING ON THESE PHOTOS!!

Moon photos all contain crosshairs from lines that were etched on glass inside the cameras, for the purpose of helping measure the Moon's surface. Yet there are crosshairs that actually go *behind* objects in these two pictures! Obviously this is impossible, so the photos were faked. Crosshairs must have been drawn on the photos by artists, who occasionally forgot to finish one. Or maybe the artists were leaving clues that the Moon landings were a hoax for people smart enough to spot them.

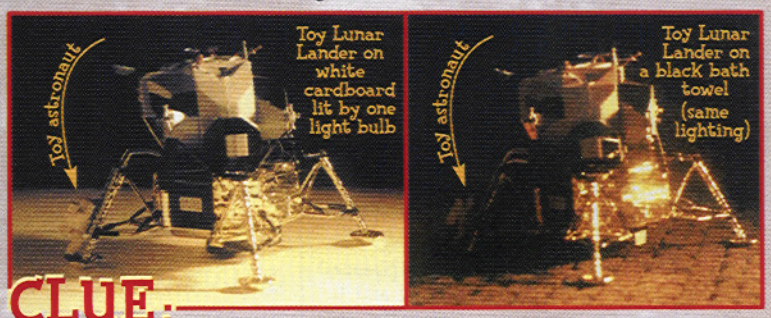
CLUE: First study the area in each of the two photos above where part of a crosshair is missing. What do both areas have in common? Then check out all the crosshairs in this famous photo of Buzz Aldirn on the Moon (above on the right). Some crosshairs are black, some are dark gray, some are light grey. In a few places, parts of a crosshair disappear, and then reappear again (see the crosshair in the circle). Can you think of a simple straightforward reason why? (Answer on inside cover.)

IS THIS ASTRONAUT IN A SHADOW PROOF THAT WE NEVER WENT TO THE MOON? SHADOWS SHOULD BE COMPLETELY BLACK ON THE MOON, BUT WE CAN CLEARLY SEE OBJECTS IN SHADOW AREAS.

2.



The Sun is the only source of light on the moon so shadows should be completely black. Yet you clearly see astronauts and other objects in dark shadow areas. This is evidence that this is a fake photo made with several sources of artificial light in a studio or on a movie set.



CLUE:

The Sun is the only source of *direct* light on the moon. Could there also be sources of *reflected* light on the Moon? Photographers like to use reflected light to illuminate objects in shadows. They use objects such as white sheets of cardboard and white or silvered umbrellas to bounce light into shadow areas. (Answer on inside cover.)

JR. SKEPTIC

PUBLISHER AND EDITOR IN CHIEF
Pat Linse

CO-PUBLISHER
Michael Shermer

JR. SKEPTIC ADVISORS
Shoshana Cohen
Tyson Gilmore
Emily Rosa
Devin Ziel

STAFF
Yolanda Anderson
Jaime Botero
Tim Callahan
Michael Gilmore
Andrew Harter
Dr. Tom McDonough

ANSWERS TO COVER QUIZ

Some people promoting the idea that the Moon landings were faked claim to be "photographic experts," yet they seem never to have heard of these well-known photographic effects!

1. ANSWER-WHY CROSSHAIRS DISAPPEAR: The crosshairs disappear over the bright white areas in the photos. The strong white light has simply "washed out" the thin black line so it doesn't show. Notice how crosshairs only fade to gray over areas that are not quite bright enough to completely wash them out. Also, if a crosshair starts over a dark area, then passes over a narrow brilliant white area and then goes over a dark area again, it disappears only over white. The Moon hoax people simply chose pictures where one part of the crosshair was over a bright white area. The washout effect is commonly created on purpose by photographers for dramatic effect. Flip through any picture magazine and look for pictures of bright spot lights behind solid objects. Notice how the brilliant spot light tends to flow over the edge of dark objects.

2. ANSWER-WHY YOU CAN SEE OBJECTS IN SHADOWS: The objects in the shadows on the Moon are illuminated by reflected light. There are many sources of reflected light on the Moon. The Earth shining in the Moon's sky and was nearly full during the first Moon landing. It is much bigger and brighter than the Moon is in our own sky. The surface of the moon itself reflects a great deal of light as you may know if you've ever read by the light of the full Moon. The bumpy surface of the Moon bounces light in all directions, particularly onto objects resting directly on it. Light is also reflected off the astronaut's white spacesuits. Much of the Lander's surface was either white or covered by reflective foil.

CONTRIBUTORS TO THIS ISSUE:

Bob Friedhoffer is a magician who uses magic tricks to teach the principles of science. He has written many books that show you how you can do science magic using everyday household items.

Michael R. Gilmore is a 20-year veteran of the space program and a Fellow of the British Interplanetary Society. Applying low-light-level television to astronomy he tracked Apollo and other spacecraft for NASA. At Rockwell Space Division and TRW Space and Technology Group he has studied the thermophysical and optical properties of materials in the space environment.

Pat Linse is one of the founders of the Skeptics Society and a creator of both SKEPTIC and JR. SKEPTIC magazine. She illustrates, writes for, and edits JR. SKEPTIC magazine.

Moon photos courtesy of **NASA.**

DID WE LAND ON THE MOON?

WERE THE MOON LANDINGS ACTUALLY A GIGANTIC HOAX?

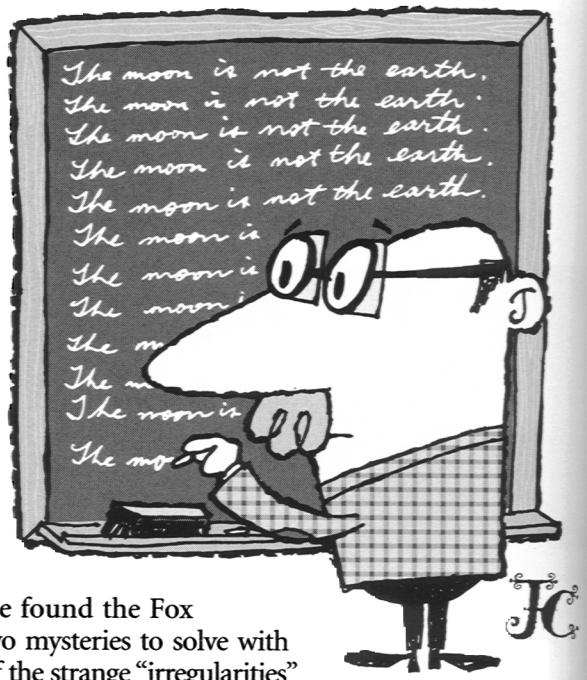
Was the film footage of the astronauts walking on the Moon simply one of the most expensive movies ever made? Fox TV's show "Conspiracy Theory" presented the claims of several authors who say they have discovered evidence that proves the moon landings were faked.

Most of the evidence consists of "irregularities"—things that appear in video or photos shot on the moon that the investigators feel should not be there. There are also technical objections—the idea that going to the Moon was just too dangerous and difficult for it to have actually happened.

How good is their evidence? Right up front we have to tell you that the evidence for a hoax is just plain terrible. Often the "irregularities" that the conspiracy authors spotted in photos are unexpected results of the airless vacuum or unfamiliar landscape of the Moon, so they are evidence that the pictures WERE shot on the Moon, not that they weren't!

THE MOON IS NOT EARTH. THE MOON IS NOT EARTH.

We can't say it enough: the Moon is not Earth. Our expectations about sound do not apply on the airless Moon. Distance is difficult to judge because distant objects appear as sharp and clear as close ones. A giant rock in the distance looks about the same as a nearby medium sized stone. The Moon's closer horizon can be confusing. There is less gravity. Even dirt is different on the Moon. The dust from crater impacts hasn't been rounded by wind or water. It still has all its jagged edges, so it packs together differently. Fine particles of dust don't billow into clouds on the Moon—there is no air for them to float on. Dust kicked up by the wheels of the Lunar car spouts weirdly away in the airless environment, looking like an arch of water from a garden hose. These differences—the very things that would let you know you are indeed on the Moon—have been noticed by authors of conspiracy books who assume they are "mistakes" made by sloppy Moon hoaxers, or deliberate clues planted by unhappy employees who wanted to tip people off about the hoax.



But many thoughtful people found the Fox show convincing. So we have two mysteries to solve with this article. What are the causes of the strange "irregularities" that are supposed to be evidence the landings never happened. And if the solutions to these mysteries are so simple, why were so many people convinced that the landings were faked when they watched the show?

THE DISCLAIMER

You should always be suspicious of a TV show that claims to be an "investigation" presenting "evidence" when the producers feel they must run a disclaimer at the beginning of the show. The Fox TV network ran this warning before their hour long program titled "Conspiracy Theory: Did We Land on the Moon?"

Disclaimer:
The following program deals with a controversial subject. The theories expressed are not the only possible interpretation. Viewers are invited to make a judgement based on all available information.

The last sentence of the disclaimer is a little confusing, possibly on purpose. Does it mean you need to be sure to watch the *entire* show before making a judgement? Are they saying the show leaves out so much important information that you have to do your own research if you want to know the truth about the Moon landings? Are they trying to weasel out of taking responsibility for producing a one-sided show that was designed to mislead the viewer?

Did the Fox show really present both sides of the argument?

The arguments for a faked moon landing were so weak that the producers of "Conspiracy Theory" had to avoid presenting any real answers to the hoax claims, while at the same time they had to create the impression that both sides of the argument were being heard.

If you saw the Fox show, you could have come away with the impression that NASA representatives were offered a fair chance to challenge the "evidence" discovered by conspiracy authors. They spoke almost a dozen times. But if you watched the show a second time you'd realize they were only shown when they were making vague generalizations or dismissive comments about the silliness of the whole hoax idea. These comments were probably only the introductory statements to a discussion of some particular hoax claim. But taken out of context, without the explanation, the comments could seem evasive or deceptive. With only one exception, no qualified scientific expert or government official was allowed to directly answer a specific hoax claim.

The crew of a TV show often spends an hour or more interviewing a show participant, but only a few seconds of the interview may be aired. Almost any impression can be created, depending on which statements, or parts of statements are selected, and what kind of material is woven around them.

Moon hoax authors were allowed to present specific claims using colorful, vivid examples, accompanied by dramatic footage. The narration and historical footage was designed to completely support the idea of a hoax. One historian's comments were selectively edited into a conspiracy argument to make him appear to support it.

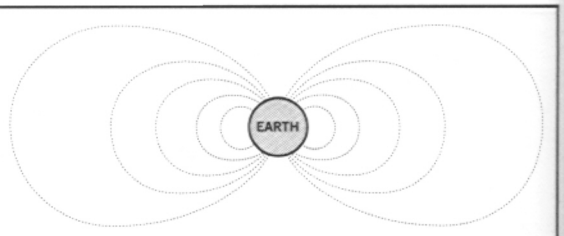
Oh yeah!? How do you explain THAT?

"Jumping to conclusions" is one of the major thinking blunders made by authors seeking evidence for a Moon landing hoax

Finding an oddity or anomaly could be the first clue to unraveling a mystery…or it might simply mean you've *misunderstood* something. Moon hoax promoters tend to stop researching a topic as soon as they've found something they don't understand, because they mistake their "discoveries" for evidence. Misunderstandings are not evidence of an elaborate conspiracy.

MANY CLAIMS OF HOAX PROMOTERS ARE JUST PLAIN

BAD SCIENCE

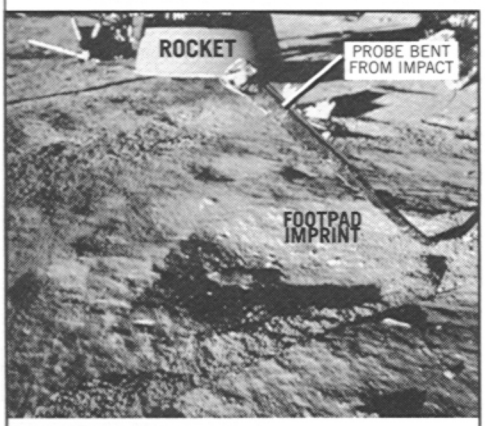


The Van Allen radiation belts, a pattern of particles trapped by the earth's magnetic field, were incorrectly compared to nuclear bomb radiation by hoax promoters.

3. Proof For A Hoax: The radiation in the area above the Earth known as the "Van Allan Radiation belts" should have killed the astronauts when they passed through it on the way to the Moon. One of the most intense Sun storms ever recorded occurred during the Apollo 16 flight. Yet no astronauts were injured in any way by these two forms of dangerous radiation.

Answer: Humans can safely pass through the Van Allen radiation belts, and the claim that "one of the sun's most intense storms occurred during the Apollo 16 mission" is not true. These claims were made to seem scientific simply by calling the person making them a "scientist" and a "physicist." No real experts in the field were allowed to challenge these false claims. Pictures of atomic bomb victims with horrible burns were shown, implying that this is what the astronauts should have looked like if they'd really gone to the Moon. (The wounds depicted were not caused by radiation at all, but by the searing heat generated by the bomb.) The radiation in the Van Allen belts is only a tiny fraction of that generated by an atomic bomb, the astronauts were partially shielded by the metal hull of their ship, and most importantly, they passed through the radiation far too rapidly to receive a dangerous dose.

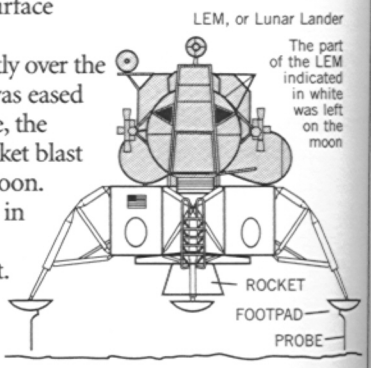
If a major magnetic Sun storm had occurred during an Apollo mission the astronauts might well have been killed. A significant solar storm did occur in August of 1972, and it may be the inspiration for the Moon hoax author's claims. But the Apollo 16 mission happened months before the storm, in April, and the Apollo 17 mission happened months after the storm in December. Solar weather forecasting has improved since the early 70s, and is now taken into account before manned space missions are planned. For a great Website on every aspect of the Sun and its energy see: http://sohowww.nascom.nasa.gov/explore/faq.html



This photo shows the ground under the Apollo 12 Lunar Lander (the second Moon landing). The odd wavy pattern was created by the rocket as it swept fine dust from between small mounds of dirt. The amount of "rocket sweep," as the effect of the rocket exhaust was called, varied as the dirt varied from one landing to another. The straight groove in the foreground was caused by one of the 9' probes that dangled from the footpads to signal when contact was made with the ground, so the engine could be cut off. The round hole was made as the first footpad touched down and bounced off to one side.

4. Proof For A Hoax: There is no blast crater beneath the Lunar Lander , (also called the LEM for Lunar Excursion Module.). If there'd been a rocket blast the dust would have been cleared away from the lander area, yet you see footprints all around the LEM. There is no dust on the LEM footpads.

Answer: This was the only time on the Fox show where a qualified expert was allowed time to at least partially answer a specific Moon hoax claim. He explained that the LEM engine gradually powers down as it lands, much as you'd ease up on the gas and coast a car into a parking spot, so it was only using a small fraction of its power as it neared the surface. He also pointed out that the surface was "cohesive"—fairly solid—there wasn't that much dust.



Some Moon Hoax authors imagine the LEM hovering directly over the landing site, the rocket blasting away at full power. The lander was eased out of Moon orbit and approached the landing site at an angle, the rocket acting as a brake. While there is some evidence of the rocket blast under the lander (see photo), dust moves differently on the Moon. On Earth the rocket blast would have set a great volume of air in motion that would have lifted dust particles high into the air. The Lander would have touched down in a great cloud of dust. On the Moon only dust actually directly hit by the rocket, or hit by other dust would move. In the Moon's vacuum, a feather falls as fast as a rock, and dust falls as fast as a Lander. The rocket was turned off as soon as long probes dangling from the Lander's footpads touched surface, so it wouldn't push back off in the low gravity. Once the rocket was shut down, any moving dust fell directly back down at the same rate as the Lander. There was no air-borne cloud of dust to settle back down on the LEM foot pads.

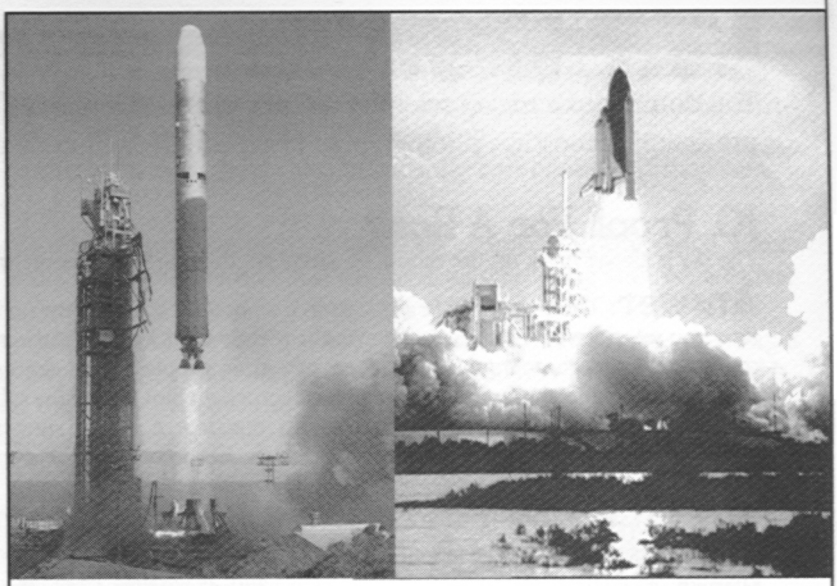
5. Proof For A Hoax: The LEM (Lunar Lander) was too unstable to fly. Just the weight of the astronauts shifting around inside it would have caused it to roll over and crash.

Answer: The LEM could fly—both on earth and on the Moon. Dozens of different versions of the LEM were developed that made hundreds of carefully documented test flights. To create the impression that a LEM was impossible to control, a single incident was shown—the spectacular crash of a prototype trainer nicknamed "the flying bedstead." (They failed to mention that it crashed because its stabilizing jets ran out of fuel!) Mournful music played to suggest the hopelessness of the effort as a column of brown smoke rolled up from the wreckage and astronaut Neil Armstrong parachuted to safety. The hoax author making the claim was labeled a "scientist" to give his unsupported opinion credibility.

For film footage of flying LEM prototypes, photos, and information on how the LEM was actually controlled and developed see: http://www.dfrc.nasa.gov/gallery/photo/LLRV/ and http://www.apollosaturn.com/Lmnr/gn.htm

6. Proof For A Hoax: When the top half of the LEM blasted off the Moon to return to Earth, there was no rocket flame. The LEM just shoots up as if it were yanked up by cables.

Answer: Actually you can see a blast—dirt goes flying in all directions as the top half of the LEM lifts off. The visibility and color of a rocket's exhaust depend mostly on what chemicals produce it. The Lunar Lander used two chemicals (hydrazine and dinitrogen tetroxide) that ignite when combined to produce a relatively transparent flame. Even fuels that produce more visible flames would be harder to see in space because the exhaust fans out in a vacuum. There is no air to confine it into the column that we are used to seeing on an Earth-launched rocket.



Left: This Titan II rocket uses the same kind of fuel mixture as the Lunar Landers. Most of its exhaust is nearly invisible. Right: The shuttle solid rocket boosters use a different kind of fuel and make an impressive show.

7. Proof For A Hoax: The astronaut's flimsy suits couldn't have protected them from the extreme conditions on the Moon. If these suits are so great, why can't they use them to clean up the radiation contamination left over from the nuclear power plant disaster at Three Mile Island?

Answer: It is hard to believe that this claim is being made when astronauts have been safely spacewalking in their spacesuits for decades. (At least one Moon hoax author believes the space shuttle missions are faked as well!) There is no reason to design spacesuits that would protect astronauts from the worst radiation contamination at Three Mile Island because nothing like that is found on the Moon. The hoax theorists exaggerated the problems with the temperature extremes on the Moon. The Moon walks were scheduled to take place when the sun was low in the sky, because temperatures are more moderate then.

8. Proof For A Hoax: Why can you hear the astronauts talking as they land on the moon? Someone on the set forgot that their voices should be drowned out by the roar of the rocket engine.

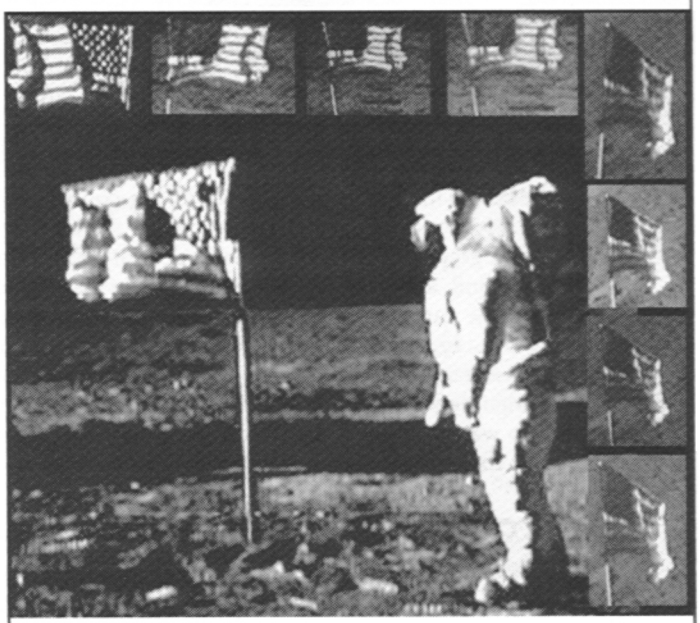
Answer: Watching movies teaches us to expect loud explosions and roaring rockets in the vacuum of space, but there is actually no sound in space because there is no air for the sound waves to travel through. Astronauts have to communicate by radio. Some of the engine vibration could have been transmitted through the material that makes up the body of the spacecraft, but their microphones were designed to minimize any outside interference.

9. Proof For A Hoax: Flags flap in the wind on the Moon. There is no air on the Moon so the flag pictures had to be shot on Earth. Perhaps someone opened the sound stage door and let a puff of wind in, or the shots were taken outdoors at Area 51.

Answer: The "flapping flag" video footage was all taken while the astronauts were twisting the flag pole, trying to jam it into the ground. NASA knew the flag wouldn't look very good drooping off the end of the flag pole like a wet dishrag, so they designed the flag pole with a rod extended out from the top to hold the flag out straight. This rod swings for a few seconds after the astronauts let go of the pole, and ripples the flag material. Since there is no air on the Moon to slow down the flapping flag it takes a little longer to stop moving after the astronauts let go of the pole than it would on Earth. This may be what fooled the Moon Hoax authors into thinking they were seeing the flag blow in the wind.

See videos of astronauts planting the flag on the Moon at: http://www.apollo-hoax.co.uk/flag_waving.html

To read details about the thinking behind the political reasons for putting a flag on the moon, and to find out how NASA purchased nylon flags for $5.50, and altered them for use on the Moon: http://spaceflight.nasa.gov/mars/reference/flag/flag.html



DOH! This flag DOES look like it's flapping. But it's actually frozen in this position—it looks exactly the same on every picture taken by Apollo 11 astronauts. They scrunched the flag, like a curtain on a curtain rod to give it a "waving flag" look, never suspecting that 30 years later someone would point to this scrunch as proof that this flag was never on the moon!

ART MISTAKES

You don't need a rocket scientist to unravel these "mysteries." Simply ask a professional landscape painter, or a professional landscape photographer to explain the well-known visual principles behind these photo "anomalies."

10. Proof For A Hoax:

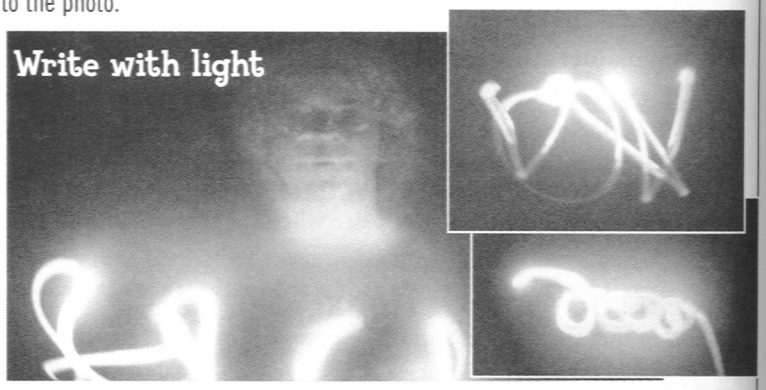
The sky is always black on the moon, so where are the stars? The people who made the fake moon set forgot to put in stars in the sky.

Answer: There *shouldn't be* any stars in the photos! No stars show up in night photos taken of people here on Earth either. The next time you see video of the space station on the nightly news look for stars in the sky—you won't see any. Here's why. When controls on a camera are set to photograph people, especially sunlit people in light clothing, the camera shutter only stays open for a tiny fraction of a second. The light from stars is too faint to be recorded on film during the split second the camera shutter is open. To record the feeble light of the stars the camera lens needs to stay open a long time. A normal shutter speed for people in bright sunlight might be from 1/250th to 1/1000th of a second, while a good star shot needs the lens to be open for several whole seconds, or even as long as 6 minutes.

Try This: What happens when you leave the camera lens open longer than usual?

To shoot stars you need a camera that can be set to have the lens stay open, and some way to keep the camera perfectly still during a long exposure. Set up the camera as far away from city lights as possible. Open the aperture (the hole that lets light into the camera) as wide as possible. Leave the lens open for 5 to 6 minutes. This will be long enough to capture the colors of the stars, but short enough so they won't be blurred by the rotation of the earth. Experiment by trying to add people to the photo.

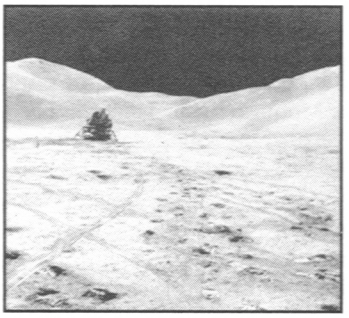
With the lens open, shine a flashlight on your face for a split second. Turn it off. Move to another spot in front of the camera, and turn the light on again. Repeat several times. If you move while the light is on you'll be blurry. This is why stars and people don't often show up on the same photo. As soon as the lens is left open long enough to record stars, people will blur if they move.

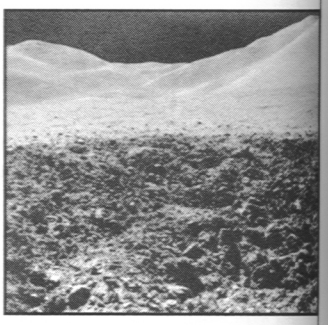


Try writing in the air with a flashlight while the lens is open. If you look carefully you'll notice the model has two noses and three eyes, because his head moved during the long exposure.

11. Proof For A Hoax:

These two Moon pictures are of identical landscapes. Obviously the hills are a movie backdrop because the Lunar Lander appears in one photo, but not in the other. The Lander couldn't be moved on the Moon, so the pictures are fake.





Answer: This is a good example of the confusion caused by the difficulty people have judging distance on the Moon. On Earth, if you photographed a parked car with distant mountain range in the background, and then if you moved just far enough to one side to exclude the car and took another photo of the mountains, the distant mountain range would look almost identical in both photos because it's so far away. Most people glancing at the background of these two Moon landscape pictures assume from their experience on Earth that they are looking at nearby hills. But the hills are actually a distant mountain range. You are fooled because there is no air and no water vapor on the Moon to blur and soften distant objects. Compare the *foreground* of each picture, and you'll see that it was the astronaut with the camera that moved, not the Lunar Lander.

12. Proof For A Hoax:

Two landscapes that NASA says are miles apart are identical!

Answer: The photos are of the same landscape. This is a simple mistake by the person who labeled the images. Tens of thousands of space images have been labeled, and it would be surprising to learn that no one has ever made a single mistake.

13. Proof For A Hoax:

Movies of the astronauts walking on the Moon were faked by slowing down film to make it seem as if they were moving in a low gravity environment. If you double the speed of the moon footage it looks normal.

Answer: We disagree. It doesn't look like it was filmed on earth to us. The double-speed moon footage still looks unearthly.

4. Proof For A Hoax:

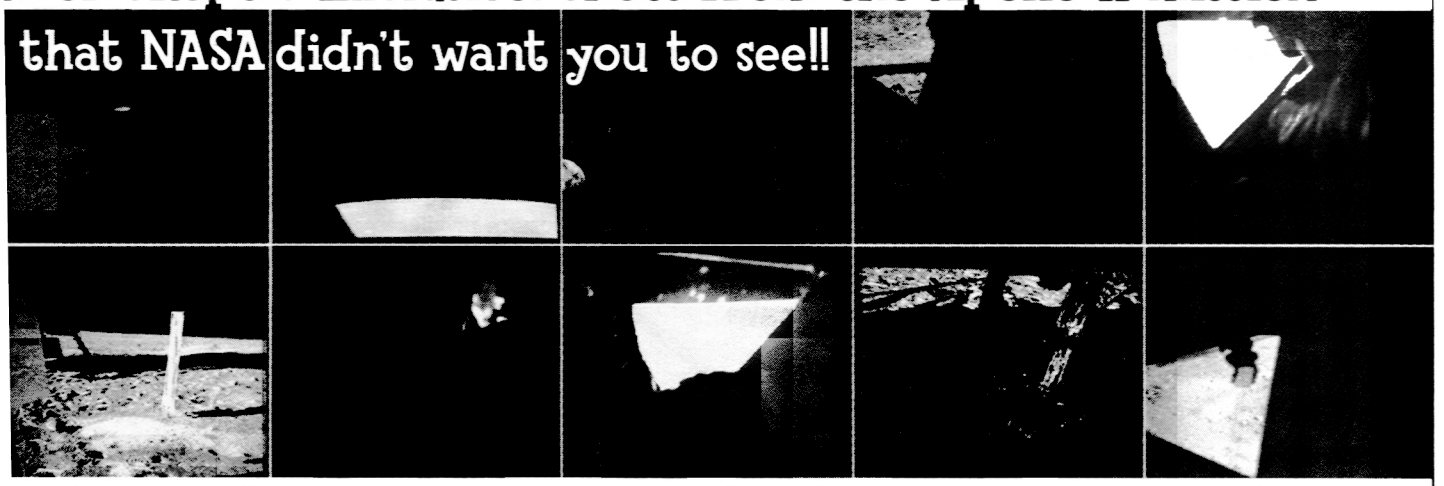
The TV pictures of men on the Moon are grainy, and of poor quality. They were deliberately made this way to hide details that would have exposed the Moon landings as a hoax. Also, why are the still photographs so perfect? The astronauts took them with cameras that were awkwardly strapped to their chests, so they couldn't even look through a viewfinder to focus them. Yet the photos we see are perfectly framed, sharp, and beautifully composed as if they were taken by professional photographers.

Answer: First, its odd that the Moon conspiracy authors don't notice that these two claims contradict each other. The same details supposedly hidden by the bad TV shots that would reveal that the landing was being shot on a movie set would stand out crisp and clear in the photos.

Video was a fairly new technology at the time. Producing quality video was complicated by other needs—creating a relatively compact system that could stand up to the harsh moon environment and at the same time transmit live pictures to Earth. Conspiracy authors also complain that the video pictures improved in later landings. But of course video, like all the rest of the space technology improved with every successive landing. Practice makes perfect!

The astronauts also practiced taking pictures with their chest mounted cameras just as they rehearsed every other chore they had to perform on the moon. Common sense indicates that professional book and magazine designers would select only the best pictures for publication (there were almost 1,400 photos from the first landing alone). Below are a few shots that probably never made it onto a magazine cover.

A Jr Skeptic Exclusive! Shots from the Apollo 11 mission that NASA didn't want you to see!!



Left to right, starting at the top: mystery blur; blurred moonscape; earth; moon's surface with spacecraft in foreground; blurry astronaut; backpack, leg, and solar wind experiment; orbiting Lunar Lander?; astronaut's profile; Lander's foot; and Moon's surface with blurry object.

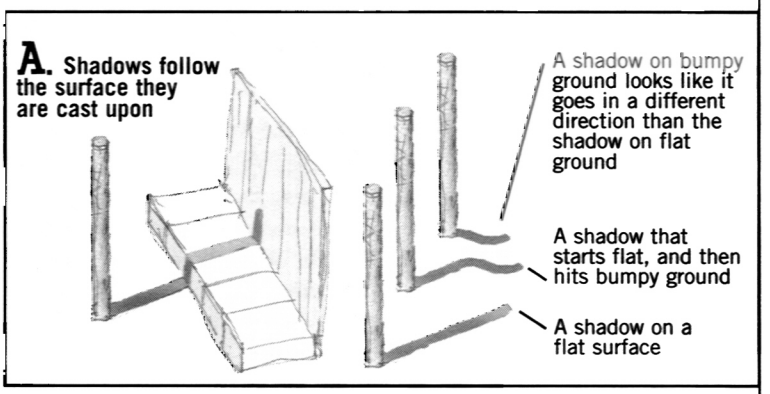
5. Proof For A Hoax: Shadows cast by objects on the Moon should all be parallel because there is only one light source. Since the shadows in NASA photos go in different directions, there are many light sources—the photos are fakes.

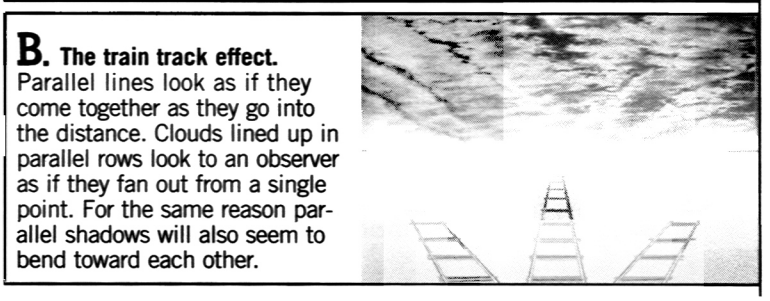
Answer: There are two reasons that shadows in pictures do not look parallel. Both are well known to any artist who paints realistic landscapes. First, shadows follow the lay of the ground (see illustration A). A shadow bends down when it follows a dip, and turns up when it comes to a rise in the ground. The Moon's surface is covered with more undulating lumps, bumps and smaller craters than we expect because its surface is all the same color and texture, and the lighting is unfamiliar.

Illustration B shows how, even on a perfectly flat surface, parallel lines seem to come together in a picture or photo. The farther apart two objects are in a picture, the less parallel their shadows will look.

The Moon hoax believers have been fooled by a combination of these two effects.

To see photos used by the moon hoax authors, and models to explain and recreate the same lighting effects see: http//www.astronomy.com/bad/tv/ and look for the Ian Goddard link.





B. The train track effect. Parallel lines look as if they come together as they go into the distance. Clouds lined up in parallel rows look to an observer as if they fan out from a single point. For the same reason parallel shadows will also seem to bend toward each other.

BAD TASTE PAGE

The charge that the United States government murdered three of its astronauts by burning them alive is probably one of the the sleaziest claims ever made by a "documentary"-style TV show

16. Proof For A Hoax: The outspoken Gus Grissom and two other Apollo 1 astronauts, Roger Chaffee and Ed White were murdered because they were about to reveal that the Moon landings would be faked. The cause of the launching pad fire that killed them remains a mystery. Seven other astronauts died in freak accidents. A government whistle blower was murdered.

Test pilot Gus Grissom with an F-102
The early astronauts were test pilots, a dangerous profession famous for an extremely high accident and mortality rate. While Grissom spoke out in favor of taking risks to explore space, he was also known for letting people know when when he felt safety and engineering standards were inadequate.

Answer: There is no direct evidence that these people were murdered—the only reason to suppose so is simply that murder fits in nicely with a conspiracy theory.

The cause of the fatal Apollo cabin fire was not a mystery. The Apollo 1 cabin had been pressurized with a highly flammable 100% oxygen atmosphere. The walls, floor and ceiling of the Apollo cabin were jammed with combustible insulation and packing, combustible and corrosive coolant in tubing, and vulnerable, easily damaged wiring that could spark and serve as a source of ignition. The fire started near the unit that controlled oxygen levels and air temperature in the cabin, though the specific wire that sparked it could not be pinpointed. A Soviet astronaut also died when his cabin, pressurized with a 100% oxygen atmosphere, burst into flame.

The supposed "whistle blower," Thomas Baron, had already testified before Congress and given them a copy of his report, so killing him wouldn't have covered up much. His report had already become part of the public record. People that Baron had gotten information from were named in his testimony, and were still around if anyone wanted to talk to them. While the report was very detailed, it contained nothing unusual. It was a list of safety and rule violations, and complaints about cleanliness standards, quality control, record keeping, morale, employee communication, and even bathroom privileges, made against a single government contractor, North American. Baron was not the only critic of North American. Before Baron testified, an Air Force Major General, Samuel Phillips, had also submitted a report highly critical of North American's performance. Baron died when his car was hit by a train at a railroad crossing, an unlikely form of assassination.

TABLOID TV

When we ask the producers of these one-sided shows how they justify presenting them as balanced examinations of evidence, they say their show is really only "entertainment," so they can't be expected to be held to any kind of standard of truth or fairness. They use the documentary format only for dramatic effect.

Exploiting the horrible deaths of the Apollo 1 astronauts and encouraging the public to believe in elaborate conspiracies is more than simple bad taste—it's also socially dangerous.

If powerful conspiracies secretly control society why bother to get involved? Why vote, run for office, or support social action groups? Conspiratorial thinking also oversimplifies things and encourages people to focus on one cause for all problems—the untouchable conspirators. Real solutions to problems will be ignored, and unpopular social groups can be attacked for being in league with the conspirators.

We are concerned about the cumulative effects of shows like this. Tabloid TV builds up a reservoir of paranoid and simplistic thinking in our society. Extremists are more likely to feel that violence is justified when their paranoia is reinforced by irresponsible media. These shows are aired throughout the world, so their influence is widespread. During good times their influence may result in no more than a lot of disgruntled griping. But during an economic recession, natural disasters or war, unscrupulous politicians can easily manipulate an already paranoid population that has been conditioned to believe that unnamed conspirators are responsible for all their troubles.

Perhaps the producers of the Fox show thought no damage would be done because they announced at the very end of their show that in two years a Japanese photo survey mission to the Moon would settle the issue. The Japanese photos will be detailed enough to show the abandoned bottom halves of the Lunar Landers, if they are there.

Will the Moon hoax authors then admit they were wrong? Will the cynicism, defeatism, helplessness and alienation encouraged by conspiratorial thinking disappear? We doubt it. Mythology that exploits people's deepest fears and darkest emotions takes on a life of its own.

It's unfortunate that the considerable persuasive talent and skills of the producers of the Fox show have been used to convince people that one of the most inspiring and thrilling accomplishments of all time is simply one of the biggest lies of all time.

Proof Of the Moon Landings Avoided By the Fox TV Show

● The Moon missions were easily some of the most documented events in history. The Apollo program floated on a vast sea of organizational, scientific, and engineering paperwork. Every step of the enormously complex process was recorded—every proposal, every rejection, every process, every strategy, every technical solution, every test, every failure, every success. There are a number of libraries across the country that contain the historical records of the Apollo program. You might begin to explore this history at *Chariots for Apollo* on the Web at: www.hq.nasa.gov/office/pao/History/SP-4205/cover.html

● Over 840 pounds of moon rocks and soil were returned by the six Apollo missions that landed on the Moon. These samples have been examined by many scientists from around the world. All the scientists agree that the rocks came from the Moon. Many books and reports have been written about the scientific study of these rocks.

● Hundreds of independent astronomers, using telescopes around the world, watched the Apollo spacecraft go to and from the Moon. (see page 104)

● Detailed observations of the Moon's surface were made from lunar orbit. Before, during and after the landings, the Apollo Command Module (or CM) orbited the Moon with at least one astronaut aboard at all times They had an unprecedented view of the moon's surface. Many motion and still photographs were made. No close up detailed pictures like these existed before Apollo.

● Reflectors know as Laser retroreflector panels were placed on the Moon's surface by the visiting astronauts. Astronomers on Earth beamed lasers at these panels and then measured the time for the laser light to return from the Moon's surface. These measurements were important for studying the Moon's distance and motion in space. These panels are still on the Moon and can still be used today to reflect laser beams back to Earth.

● Instruments (seismometers) were placed on the Moon's surface to record "moonquakes" and meteor impacts, and radio the information back to Earth. Scientists could then better understand the geology of the moon. An used rocket booster was deliberately crashed into the moon's surface to produce an artificial moonquake that was used to learn about the interior geology of the Moon.

LINKS

ABOUT THE FOX TV SHOW:

http://www.badastronomy.com/bad/tv/foxapollo.html
(Great site! AstronomerPhil Plait will soon have a book out inspired by the popularity of this site. Also contains Ian Goddard's fine photo lighting demos.)

http://www.badastronomy.com/bad/tv/iangoddard/moon01.htm (Ian Goddard duplicates the light and shadow effects of Moon photos with models to clearly and easily show how wrong Moon hoax authors are.)

http://pirlwww.lpl.arizona.edu/~jscotti/NOT_faked/
(Jim Scotti is an astronomer, a photographer and a space landscape artist—the perfect combination to dissect the claims of Moon hoax authors.)

http://www.redzero.demon.co.uk/moonhoax/
(Comprehensive British site. Well organized. Links to Moon hoax believers)

http://www.the-indigestible.com/specials/moon.htm
(A nice summary of the arguments)

http://www.ews.uiuc.edu/~akapadia/moon.html
(A joke site lampooning the arguments of the moon hoax authors.)

ABOUT THE SPACE PROGRAM:

http://curator.jsc.nasa.gov/curator/lunar/lunar.htm
(Rent a rock—borrow real Moon rocks for your school to use!)

http://www.hq.nasa.gov/office/pao/History/alsj/
(Apollo Lunar Surface Journal—huge library of information—excellent pictures—videos—stunning site!—mind boggling!)

http://www.nasa.gov/ (Main NASA Page—over 30 links to other NASA sites: Biology; Astrobiology; Climate; Space Exploration, Space Science; Historical Sites; Astronomy; Space-oriented Technology; etc.)

http://www.hq.nasa.gov/office/pao/History
(Detailed History of all aspects of NASA—space, robots, aircraft, planets, etc. Another site that you could get lost in.)

http://images.jsc.nasa.gov/ (NASA/JSC Digital Image Libraries. Space, Hubble, Apollo, etc. Thousands of photos. Links to several image sites)

http://www.nasm.edu/galleries/attm/nojs/a11.am.lm.1.html (The Smithsonian/National Air & Space Museum site. Good intro.)

http://www.hq.nasa.gov/office/pao/History/alsj/a11/a11-hass.html (This site shows where the crosshairs were located in the cameras, explains how the cameras were modified to go into space.)

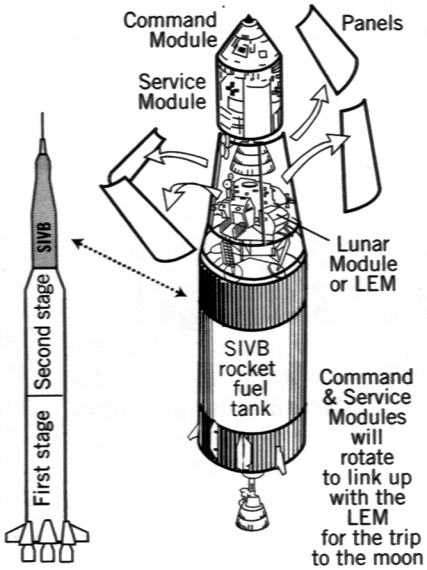
DID ANYONE USE A TELESCOPE TO WATCH THE APOLLO SPACECRAFT GO TO THE MOON?—YES!

by Michael Gilmore

Early in the Fox show, moon conspiracy author Bill Kaysing speaks with the conviction of someone who is about to reveal the obvious, "The astronauts *were* launched with the Saturn V," he announces. But "they simply orbited the Earth for 8 days...in the interim they showed these faked pictures of the astronauts on the Moon. And on the 8th day the command capsule separated from the vehicle and descended to Earth...."

Kaysing ignores the fact that objects orbiting the Earth are easy to track by radar. You can also see objects in Earth orbit at night. You don't even need binoculars. People familiar with the night sky have no problem spotting satellites as they speed past the background of stars.

Also, professional and amateur astronomers all over the world were asked to take part in an experiment to use telescopes to watch Apollo missions travel to and from the Moon. As a college student I joined the observation corps of hundreds of astronomy volunteers. We watched every Apollo spacecraft go to and from the Moon. A number of teenage amateur astronomers played an important part in this program with their keen eyesight and willingness to work through cold nights.



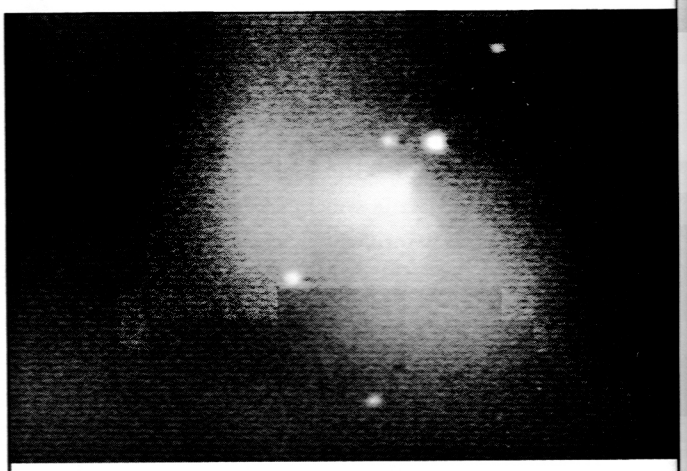
One experiment was conducted with the Saturn third stage rocket known as the S-IVB (pronounced S-four-B). The Apollo missions did orbit Earth immediately after they were launched. Then they were boosted out of orbit toward the Moon by the S-IVB rocket. After the S-IVB had done its job it was set adrift along with four panels that had protected the Apollo landing craft during launch. Since the S-IVB and panels were moving at the same speed as the Apollo spacecraft, they continued along with it, traveling toward the Moon.

The discarded S-IVB fuel tank became part of several experiments conducted by the famous Smithsonian Museum of Washington, DC and Bellcomm Labs. Both professional and amateur astronomers were asked to look where Apollo was calculated to be against the starry night sky on each mission. Hundreds of astronomers reported what they saw.

The astronomers saw several star-like objects (see picture). These objects were the Command, Service, and Lunar Modules, which were linked together at this time, the discarded S-IVB fuel tank, and the discarded panels that were tumbling in space. These objects made a beautiful star-like grouping as they fell toward the Moon. The discarded panels twinkled as they tumbled, reflecting sunlight back to Earth. From time to time when waste water was dumped, the spacecraft would appear brighter. Unused fuel that was dumped from the S-IVB created a spectacular sight, filling the field of the telescope view, looking like an exploding supernova. In one case the venting of liquid made the spacecraft so bright that you could walk outside the observatory, look up, and see it with your naked eye. The returning spacecraft was not as spectacular because it was just one dim object headed straight for Earth, washed out by bright moonlight.

Observers in New Mexico and elsewhere actually witnessed the explosion of the oxygen tank that crippled Apollo 13 and forced its emergency return to Earth. Astronomers then continued to observe it to provide information that helped scientists keep Apollo 13 on course.

Of course the Russians were watching too, with some of the best technology available. Since they were racing us to the moon, they would have been the first to point it out if the spacecraft had been merely circling the earth.



This picture of the Apollo 14 mission to the moon is from a video taken though a telescope at Pine Mountain Observatory in Oregon on February 1, 1971. The largest round spot is the used S-IVB rocket just beginning a liquid oxygen fuel dump. The actual Apollo spacecraft is most likely hidden behind the fan-shaped cloud of previously dumped hydrogen fuel, and the other dots are probably the panels that protected the spacecraft during launch. The objects were 33,000 miles from Earth at the time traveling at 7,636 miles per hour.

Scientists conducting this experiment were looking forward to the time of spacestations. They needed to know how vented fuel would act in space because they knew waste material would have a tendency to travel along with the vehicle that vented it. The jet of vented fuel was also used for one last experiment. The venting adjusted the S-IVB's trajectory to make sure it slammed into the moon. The impact of the crashing rocket was needed to calibrate seismographs left on the Moon by previous missions.