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16 min read

# 85. Did Stanley Kubrick film the moon landing? Formulation of the problem. Part 1.

In this article, we will tell you what technology Stanley Kubrick developed in order to create the impression that the astronaut is on the moon when filming in the pavilion. It took him two years.

We do not argue whether the Americans were on the moon or not. We know for sure that we weren't. And those paid agents who protect the lunar scam on all platforms and who angrily attack everyone who does not believe in American fairy tales also know that there were no Americans on the moon. They are simply paid to guard the American fairy tale from exposure. And we, for our part, are trying to figure out what kind of cinema technologies were used to simulate the landing on the moon. Therefore, the dispute is not about whether or not they were on the moon, but about **what technology of deception was used in this or that frame** .

We have already shown in several articles that in many shots, dolls 25-30 cm high were used instead of living astronauts, and the lunar rover (electric car) was replaced with a radio-controlled model.

Last year we posted several articles on this topic, for example,

7. What kind of movie technique allows us to hide that we have a toy lunar rover in front of us?

12. NASA provided puppet cartoons as evidence of the presence of people on the Moon.

14. Distant shots and landscapes on the Moon were filmed with the help of puppets and models.

And in this article we will talk about how the "business cards" of lunar missions were created - an astronaut near the lunar module against the background of a lunar mountain.

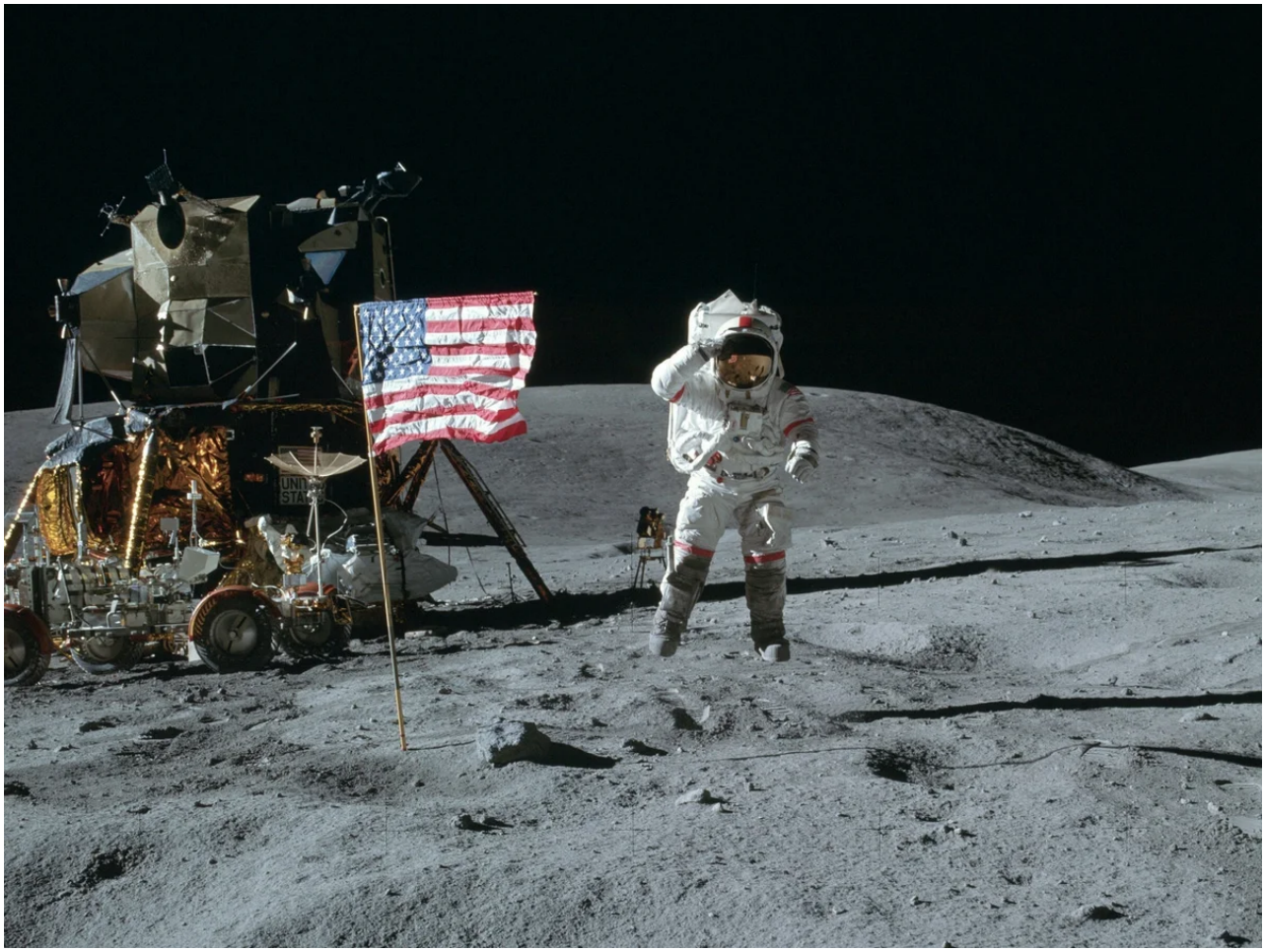


Photo from the album "Apollo 16"

Photo from the album "Apollo 16"

You probably noticed that we wrote: a photo from **the** "Apollo 16" **album** , and not from **the** "Apollo 16" mission, since there was no mission, but just a large set of pavilion "lunar" photographs sorted into different albums ...

Initially, it was assumed that such a "lunar" frame would be obtained by the rear-projection method: the astronaut actor and the lunar module are on a decorated platform in the pavilion, and the mountain behind the astronaut is projected from a slide onto a movie screen.

Keying was widely used in cinema until the advent of computer technology. You can understand how it looked on the set by the example of a shot from the famous at the time of A. Hitchcock's film "North by Northwest", when an airplane on low level flight flies over the actor Cary Grant. The low flying plane was filmed separately and then simply projected onto the screen behind the actor. The screen, as you can easily see, was relatively small in width.

Shooting a frame by the method of keying for A. Hitchcock's film "North by Northwest", 1959

Shooting a frame by the method of keying for A. Hitchcock's film "North by Northwest", 1959

Stills from the movie "North by Northwest"

You can see an example of keying in the next photo, where Doctor of Physical and Mathematical Sciences A.I. Popov gives an interview to the Zvezda TV channel for the film "The Big US Space Lies" (2016). The moon is projected onto the background, onto a translucent frosted glass screen from a back room. "Rir" means "from behind", i.e. the

projector is behind the screen. If you take a closer look at the Sea of Tranquility on the Moon (approximately in the center of the lunar disk, just below), you will notice a "hot spot" there - this is shining through the projector lens.

A.I.Popov gives an interview for the TV channel "Zvezda"

A.I.Popov gives an interview for the TV channel "Zvezda"

The re-projection was good in everything, but it had a significant limitation. The maximum screen size was 5-6 meters wide. When the size was increased, the brightness of the screen turned out to be so low that it was impossible to shoot a movie.

For normal exposure of color film, objects had to be strongly illuminated. Here's a look, for example, how the effect of weak **evening lighting was created** in the painting "Romance on the High Seas" - in the frame and behind the frame there is a large number of lighting equipment (and you still do not see the devices that shine from the forests).

Working moment of filming the film "Romance on the High Seas", 1948

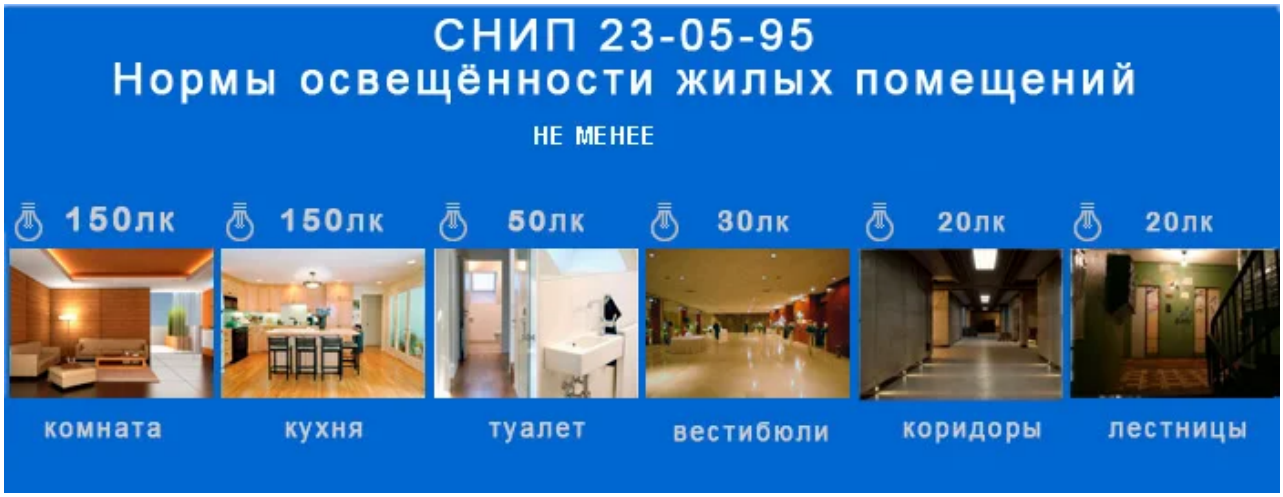
Working moment of filming the film "Romance on the High Seas", 1948

A still from the film "Novel on the High Seas".

A still from the film "Novel on the High Seas".

By the end of the 60s. the maximum sensitivity of color film footage was only 160 ASA units. This required a high level of illumination of 2,000 to 4,000 lux on the set. Even the most powerful rear projectors could not create such illumination on a transmissive screen on a large screen. Therefore, the rear projection screens were relatively small.

For comparison, let us inform you that according to modern standards, according to OST 19-155-00, the **norm in a cinema** is a brightness of 50 cd / m2 in the center of the screen when the projector is running without film. Since this value does not mean anything to an ordinary person, let's translate the brightness into illumination, because the illumination levels are much easier to imagine. If the screen is white-matte with a reflection coefficient of 80% (β = 0.8), then its illumination will be (E = 50 x 3.14 / 0.8 = 196) approximately 200 lux (lx). It is easy to imagine this value - such illumination in the evenings in our apartments.




Illumination standards for various premises.

Illumination standards for various premises.

And for the rear screen, the illumination should be 10 times more. VIn the previous article, we already described the tricks that filmmakers used to increase the screen size for keying: for example, three key projectors were mounted on one bed at once. However, these tricks led to the fact that it became possible to increase the screen size only up to 10 meters in width, and at the same time, the potential capabilities of key projectors were already used to the maximum.

But such a screen was still not enough to create a lunar landscape behind the astronaut's back. Taking into account the size of the lunar module (the width of the supports of which from the edge of one bowl to the edge of the other is 9.5 meters), the screen must be at least 30 meters so that the lunar module occupies at least half a frame or 1/3 in width.

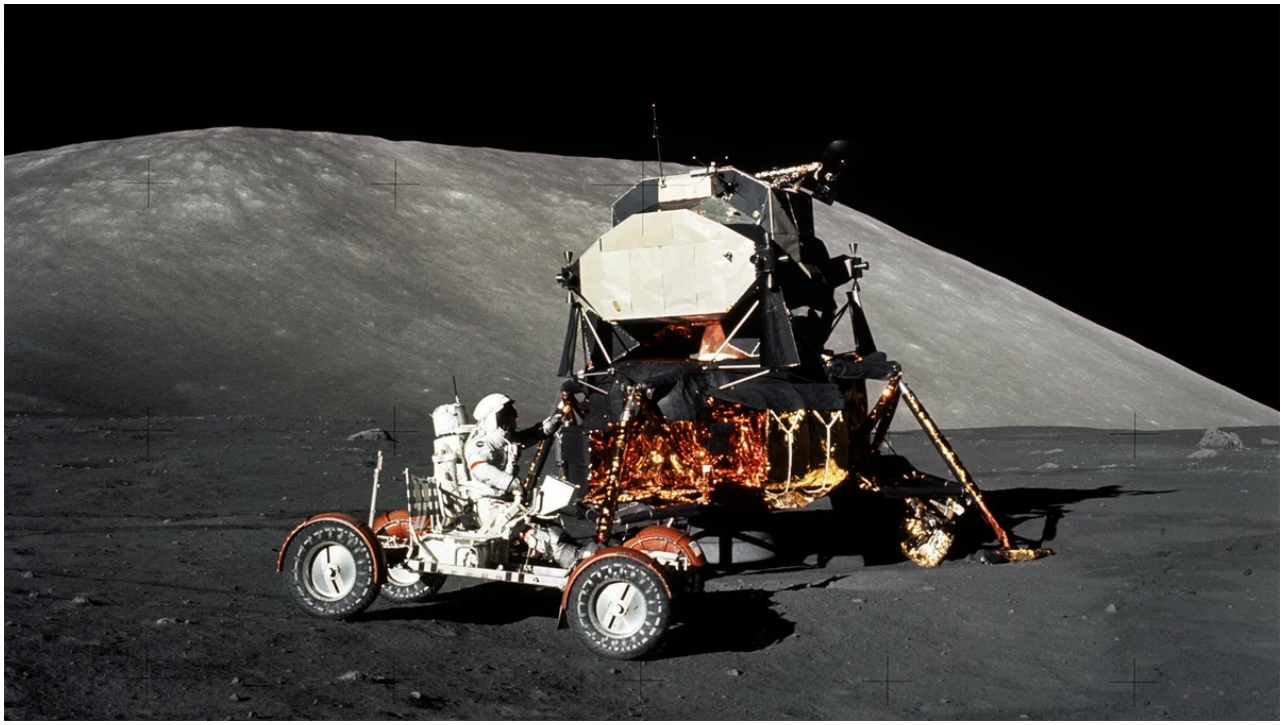


Photo from the album "Apollo 17"

Photo from the album "Apollo 17"

And since in the Apollo albums you see "lunar" frames obtained by the combined method, and the width of the screen against the background is not less than 30 meters (the lunar module takes about 1/3 of the frame in width), this means that S. Kubrik succeeded somehow raise the screen brightness 10 times. But it took him about two years.

Kubrick's collaboration with NASA began, apparently in 1965, that is, 4 years before the proposed "flight" to the moon. In the famous image from September 28, 1965, S. Kubrick is surrounded by representatives of the NASA administration.

From left to right: Fredrik Ordway - NASA technical advisor, Dick Slayton - NASA responsible for preparing and selecting the Apollo crew, Arthur Clarke - science fiction writer, Stanley Kubrick - filmmaker, George Mueller - NASA administration representative

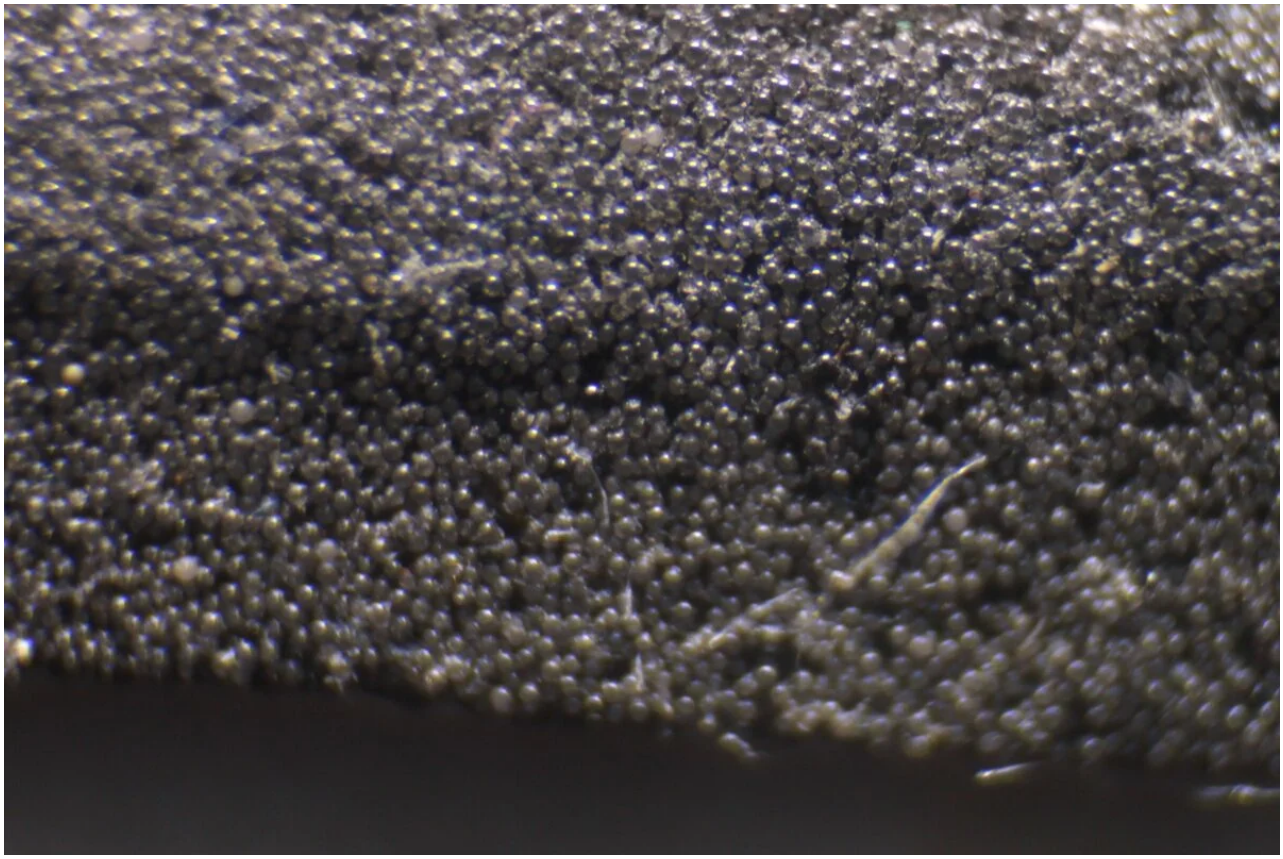
From left to right: Fredrik Ordway - NASA technical advisor, Dick Slayton - NASA responsible for preparing and selecting the Apollo crew, Arthur Clarke - science fiction writer, Stanley Kubrick - filmmaker, George Mueller - NASA administration representative

When in 1965 S. Kubrik started filming "A Space Odyssey", he perfectly understood the tasks of state importance assigned to him. The main task is to create a TECHNOLOGY, with the help of which, by means of cinema, it is possible to achieve realistic shots of astronauts' stay on the Moon, in order to then present these combined surveys as the greatest achievement of mankind in space exploration. It took two years of painstaking work to develop such a technology (closed production cycle). All this had to be worked out on the movie "2001. A Space Odyssey".

According to the contract, the director had to deliver the final version of the film no later than October 20, 1966. But only by the middle of 1967 it was possible to close the chain of all the necessary working elements and create a technological procedure for the conveyor production of the so-called "lunar" frames. In the summer of 1966, work on "A Space Odyssey" came to a halt, and for almost a year Kubrick tried to solve a single technical problem - projection onto a giant screen to create lunar landscapes.

Some links of the technological chain had already been perfectly worked out long before Kubrick, such as countertyping large-format materials, in other words, making duplicates and intermediate materials to obtain combined frames. Some missing stages, such as taking photographs of the appearance of the lunar mountains for projection onto the background, are about to be resolved with the help of the automatic Surveyor stations sent to the moon. Some elements of the technological process had to be invented during the filming - for example, the projector had to be redesigned for large slides measuring 20 x 25 cm, since such a projector simply did not exist. Certain elements had to be borrowed from the military - anti-aircraft searchlights to simulate the light of the sun in the pavilion.

Instead of a white matte screen, S. Kubrik used a special screen made of "scotch-light" reflective material, consisting of the smallest glass balls. When laid out in a line, that's about 300 balls per inch, about the size of a printed dot in a printer.



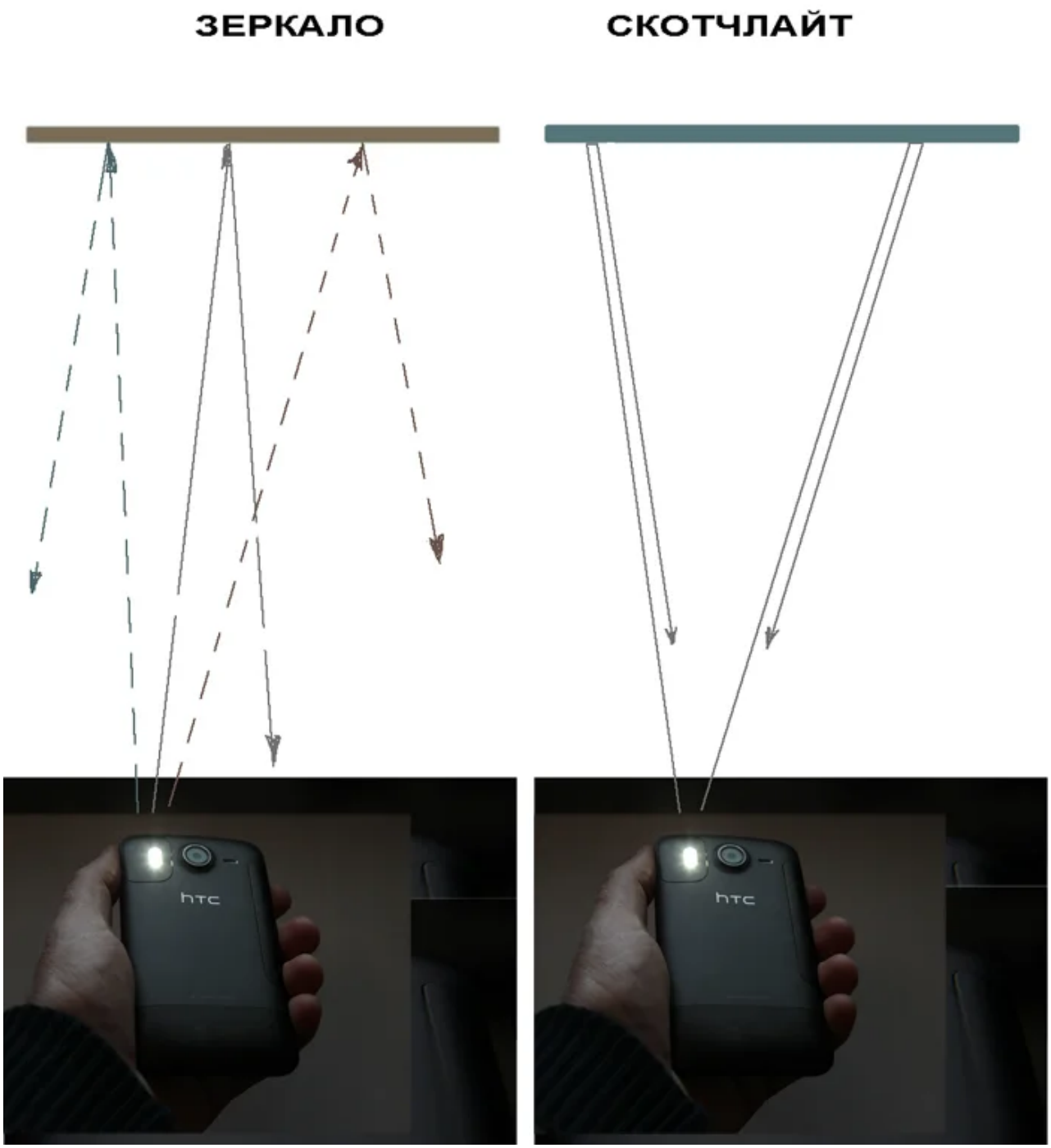
Macro photography. Reflective screen.

Macro photography. Reflective screen.

When light hits a glass ball, it bounces off the back surface and **returns back to the light source** , which is why such materials are called retroreflective materials. In fact, it is a

screen consisting of the smallest mirrors. Retroreflective materials are used for the manufacture of road signs, car numbers, and are used in the form of stripes on overalls. Reflective material was invented by 3M (Minnesota Mining and Manufacturing Company) in 1939.

In normal specular reflection, the angle of incidence is equal to the angle of reflection. The rays falling on the left and right edges of a conventional mirror will be reflected, respectively, in different directions, and a bright spot of reflection of the camera flash will turn out only in one place of the mirror (picture on the left).



Different reflection schemes.

Different reflection schemes.

Reflective material will reflect the light beam of the flash in a completely different way (picture on the right). Beams of light hitting the left and right edges of the material will return along the same path they came from. And since the camera lens is next to the flash, all the rays will return back to the lens, and the entire surface of the material will be bright.

Reflective material looks gray in diffused light, but in directional light (with a flash close to the lens) it starts to glow brightly.

Reflective material in diffused lighting (left) and directional (right) - flash added.

Reflective material in diffused lighting (left) and directional (right) - flash added.

A cinema screen made of such a material will be 100-120 times brighter in directional light than a white sheet of paper. Thanks to the incredible brightness, it was possible not only to project onto a 32-meter wide screen, but also to aperture the lens.

Previously, keyed shots had to be shot at full aperture. This led to the fact that when focusing on the actor, the screen in the background was already out of focus due to the shallow depth of field (DOF). This gave out the reception of combined surveys. Pay attention to the frame from the movie "The River Does Not Flow Backward" - the background is out of focus, although from the actors to the background - no more than 3 meters.

A still from the movie "The River Does Not Flow Backward", where a small depth of field is visible (DOF)

A still from the movie "The River Does Not Flow Backward", where a small depth of field is visible (DOF)

Working moment of shooting the episode on the river using the rear projection method in the film "The River Does Not Flow Backward"

Working moment of shooting the episode on the river using the rear projection method in the film "The River Does Not Flow Backward"

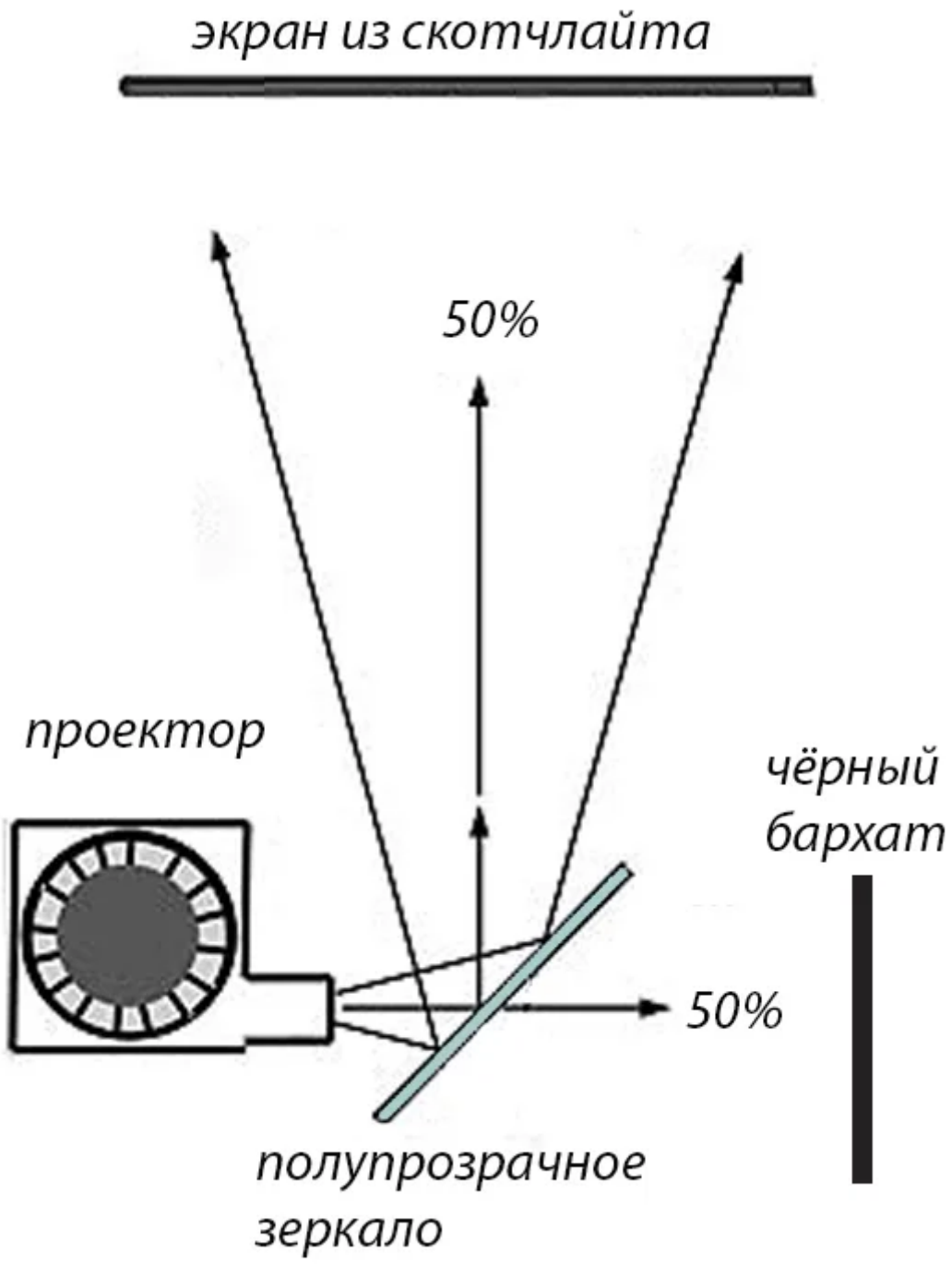
To increase the depth of field, it is necessary to "clamp" the aperture of the lens, and this requires even more light. So the use of retroreflective material made it possible to reach an aperture of 6.3 - this is the middle between 5.6 and 8.

The maximum brightness of the image on the reflective screen will be seen by only one person who is near the light source, i.e. next to the projector as light striking the screen returns back to the projector.

And the closer the observer gets to the projector lens, the brighter he will see the image on the screen. It is physically impossible to put the **camera** in the place where the projector lens is located - they will overlap each other. Therefore, a translucent mirror is used and the camera is combined with the reflection of the projector in the mirror. Below you will see all this in photographs and drawings.

Since the light falls on the screen from the front, from the same side where the camera is located, this method of combined shooting is called **front projection** ("front" means front).

The front-projection technology was invented by Philip Palmquist, a developer of the 3M company. According to its development, obtaining a combined frame looks like this. The light from the projector, in which the transparency is installed, hits a translucent mirror located at an angle of 45 ° to the axis of the projector. In this case, 50% of the light passes through the mirror glass directly and is not used in any way. To prevent this image from being reflected in the mirror, black velvet is hung in its path. The remaining 50% of the light is reflected at right angles to the reflective film screen.

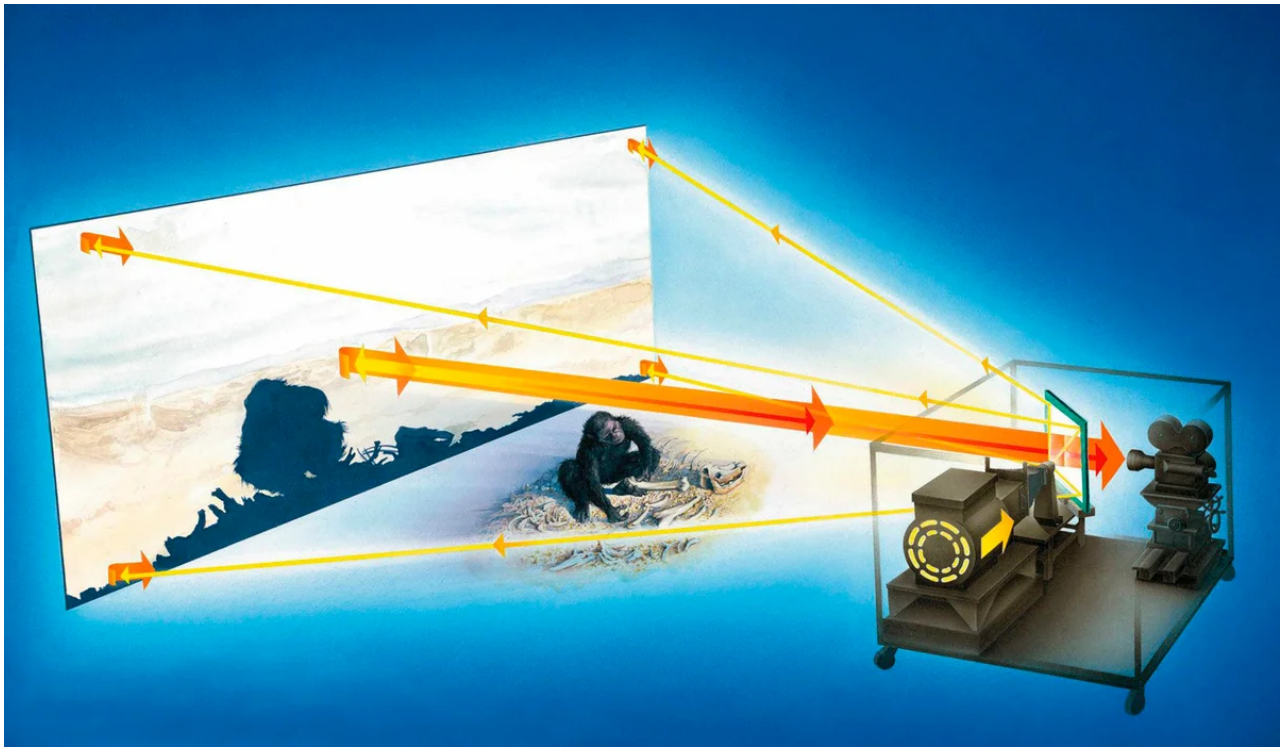



View from above.

View from above.

Glass balls of the screen return the rays back to their original point.

In the following figure, which is a diagram of a frame from the movie "2001. A Space Odyssey", the outgoing rays are shown in yellow, and the return rays are red-orange.



Obtaining a combined frame by the front projection method. A slide projector and a film camera are located on the platform.

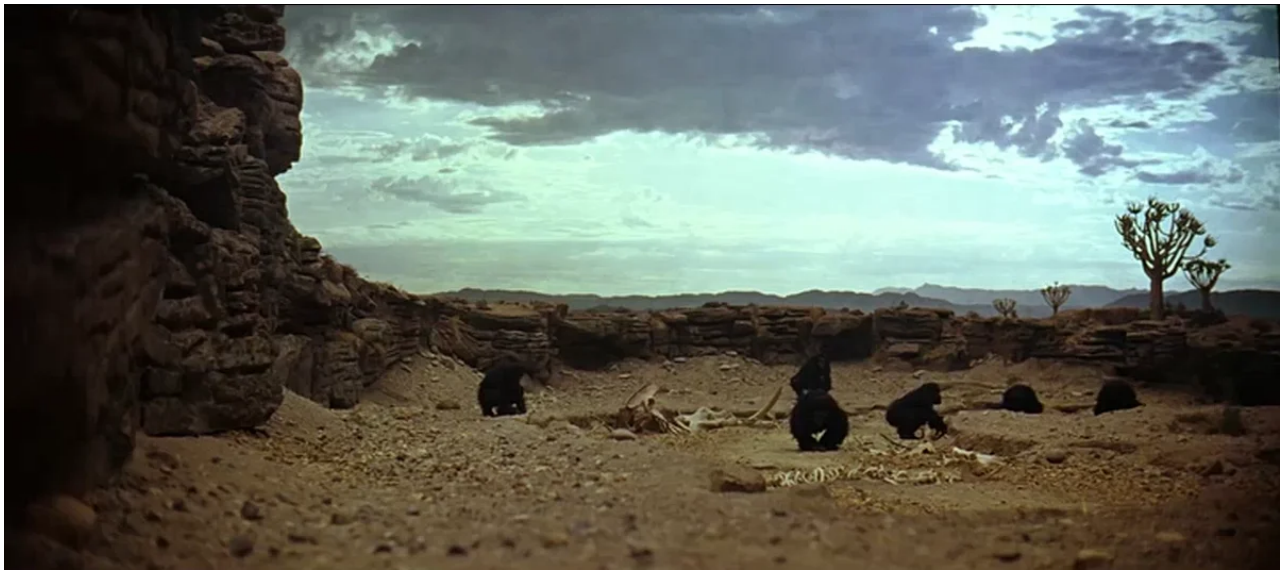
Obtaining a combined frame by the front projection method. A slide projector and a film camera are located on the platform.

This is how this shot looks in the movie. This mid-shot was taken with an 85mm "portrait" lens.

A shot from the film "2001. A Space Odyssey". Mountains in the background - image from the slide. Taken with an 85mm lens.

A shot from the film "2001. A Space Odyssey". Mountains in the background - image from the slide. Taken with an 85mm lens.

And here's how the same object looks on a wide-angle lens. Filming is made from the same place, the projection unit and the camera do not move.



Let's trace the rays that are reflected from the screen. They come back and gather in a light spot, in focus, their brightness greatly increases. And since there is a semitransparent mirror in the path of these rays, half of this light is deflected into the lens of the projector, and the other half of the light reflected from the screen, which we need, falls directly into the lens of the movie camera.

To get a bright picture in the plane of the camera lens, the projector lens and the camera lens must be exactly at the same distance from the semitransparent mirror, at the same height and strictly symmetrical with respect to the mirror.

Kubrick in the episode "Dawn of Humanity" used a then completely new and practically unknown technique called front projection. He was not entirely sure that the front projection would work. So he asked for help from Tom Howard - the chief special effects officer at MGM, and an Oscar winner - and calmly proceeded to conduct camera tests with John Alcott.

John Alcott first worked in the cinematography team of cinematographer Jeffrey Unsworth on the set of 2001. A Space Odyssey, and then became famous for films in which he worked with Stanley Kubrick - A Clockwork Orange, Barry Lyndon, The Shining.

In 1968, almost two years later than planned, the movie 2001. A Space Odyssey was finally released. He collected in himself the best methods of imitation of weightlessness at that time. Front projection on a giant screen was truly revolutionary, and the magazine "American Cinematographer" in 1968 devoted a story aboutfront projection is a large article over several pages.

# FRONT PROJECTION FOR 2001 A S ODY

**An incredibly bright image on a huge screen lends tremendous scope to a limitless subject and adds an extra dimension to the art of film making**

Perhaps the most significant single technique utilized in M-G-M's "2001: A SPACE ODYSSEY"—considered in terms of its potential value to the film industry as a whole — is Stanley Kubrick's extensive use of a completely new departure in the application of front-projection for background transparencies.

This advanced technology evolved out of the dramatic demands of his "Dawn of Man" prologue which called for hordes of ape-men to be shown against vast natural terrain backgrounds of primeval beauty. A perfect location in a remote area of Southwest Africa had been found and Kubrick was anxious to use this spectacular setting for his opening sequence.

"The geology in that area was completely different from anything else I'd seen," he explains. "The rocks didn't look like 'Bible' rocks and they didn't look like 'Western' rocks. They were really quite unique."

To capture this setting on film the way he envisioned it there were several options open to him. The first, most obviously, would have been to take a large cast and crew on location to the actual site. However, aside from the enormous cost involved, the company would most likely have found itself at the mercy of inclement and ever-changing weather.

Another obvious alternative would have been the use of a painted backdrop, which, in this case, would have had to be 40 feet high and 110 feet wide. The main drawback was not the size, but rather the fact that such backdrops all too often look like exactly what they are.

In theory, the blue-screen matting system could have been used, or even a king-size adaptation of the standard rear-projection process method. In actual practice, however, each of these approaches, applied on such a vast scale, might not have produced quite the illusion of reality which the director hoped to achieve.

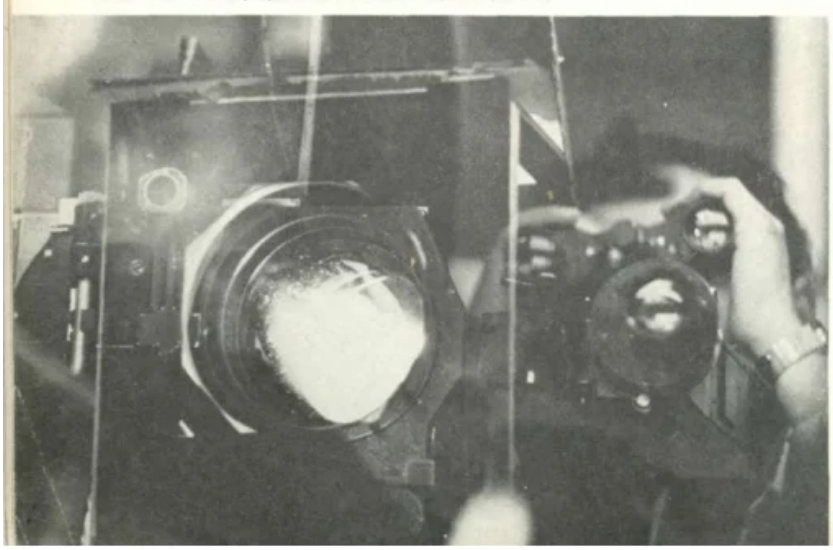
He elected, instead, to use front-projection on a scale never before attempted. The front-projection concept is not, in itself, new. The method has, in fact, been in practical use for several years, mainly by still photographers and in television studios. It had not, however, up until now, been used to any great extent in the motion picture industry.

The largest format utilized to date had been a 4 x 5-inch Ektachrome transparency, but it was felt that the grand-scale requirements of this particular space epic would demand an even larger transparency.

"I had made a test using a 4 x 5 still and it was almost good enough, so I was positive that with an 8 x 10 the effect would be perfect," Kubrick comments. "The trickiest part would be balancing the foreground illumination to match the intensity of the front-projected background. Now that it's over I'm convinced that if a still transparency is to be used for the background scene an 8 x 10 is essential, because if you don't have a surplus of resolution you are going to get a degradation, of the projected background image."

The only drawback at the time was

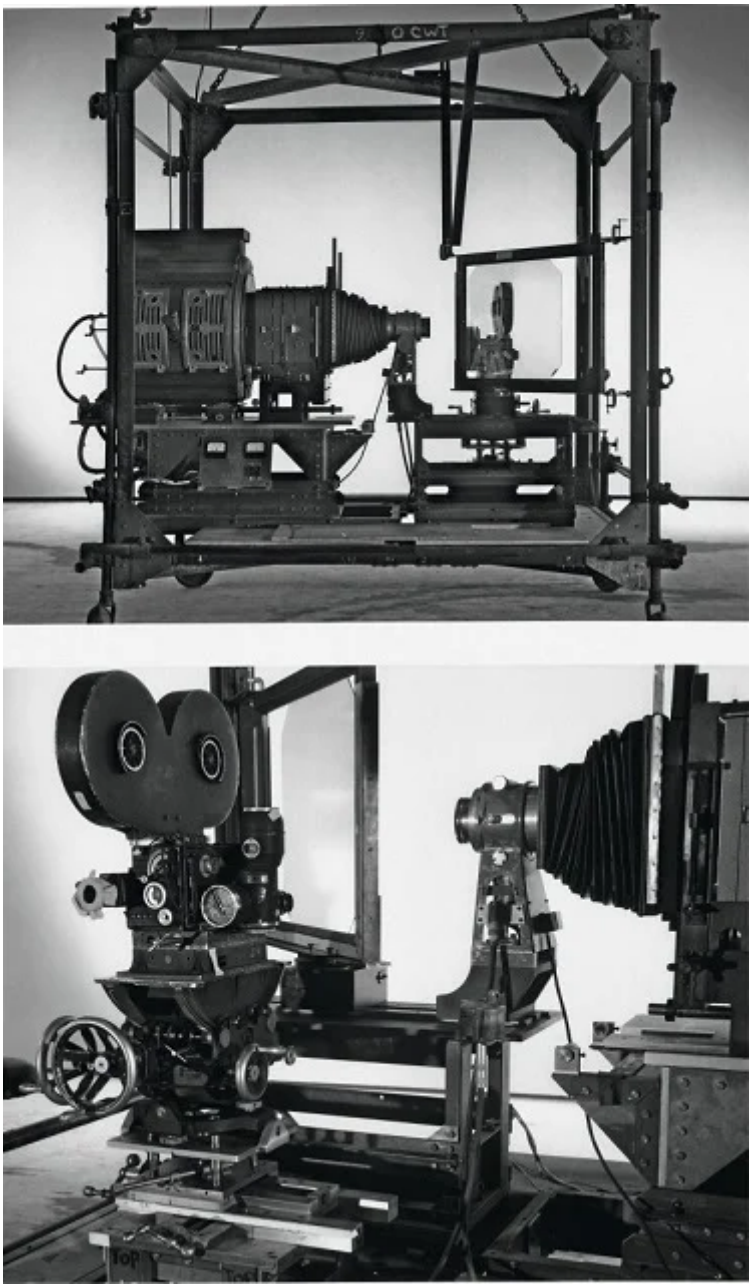
On the set of "2001: A SPACE ODYSSEY," producer-director Stanley Kubrick uses binoculars to check fine focus on the vast front-projection screen. Special 3M material reflects 100 times the light falling upon the screen, provided that projector and film camera lenses are aligned on precisely the same axis. Kubrick wanted to use an 8 x 10 transparency for maximum sharpness, found there was no projector for it in existence, built his own.



An article from the magazine "American Cinematographer"

An article from the magazine "American Cinematographer"

Kubrick's translucent mirror was about 90 cm wide and was rigidly attached to the projector frame 20 cm from the lens. Since you know the width of the mirror, you can easily imagine the size of the entire structure and its height - about 2.5 m.



Installation for front projection. The top picture shows the slide projector, the bottom picture shows the movie camera better. In the middle there is a translucent mirror in the frame.

Installation for front projection. The top picture shows the slide projector, the bottom picture shows the movie camera better. In the middle there is a translucent mirror in the frame.

The entire unit was mounted on a wheeled platform. It is easy to guess that the weight of such an installation was about a ton. It was with the help of such an installation that general plans were obtained in the "Space Odyssey", where a game scene was located in front of the camera, and the view of a mountain landscape from a slide was projected onto a 30-meter screen in the background.

The general plan obtained by the front projection method.

The general plan obtained by the front projection method.

Thus, we can conclude that by the fall of 1967 (the shots with front projection were taken in July-October 1967) Stanley Kubrick, together with cameraman John Alcott, solved the problem of combining the acting scene in the foreground with the projection of a mountain landscape from a slide to a 30-meter movie screen on the background.

The way to create "lunar" shots was opened.

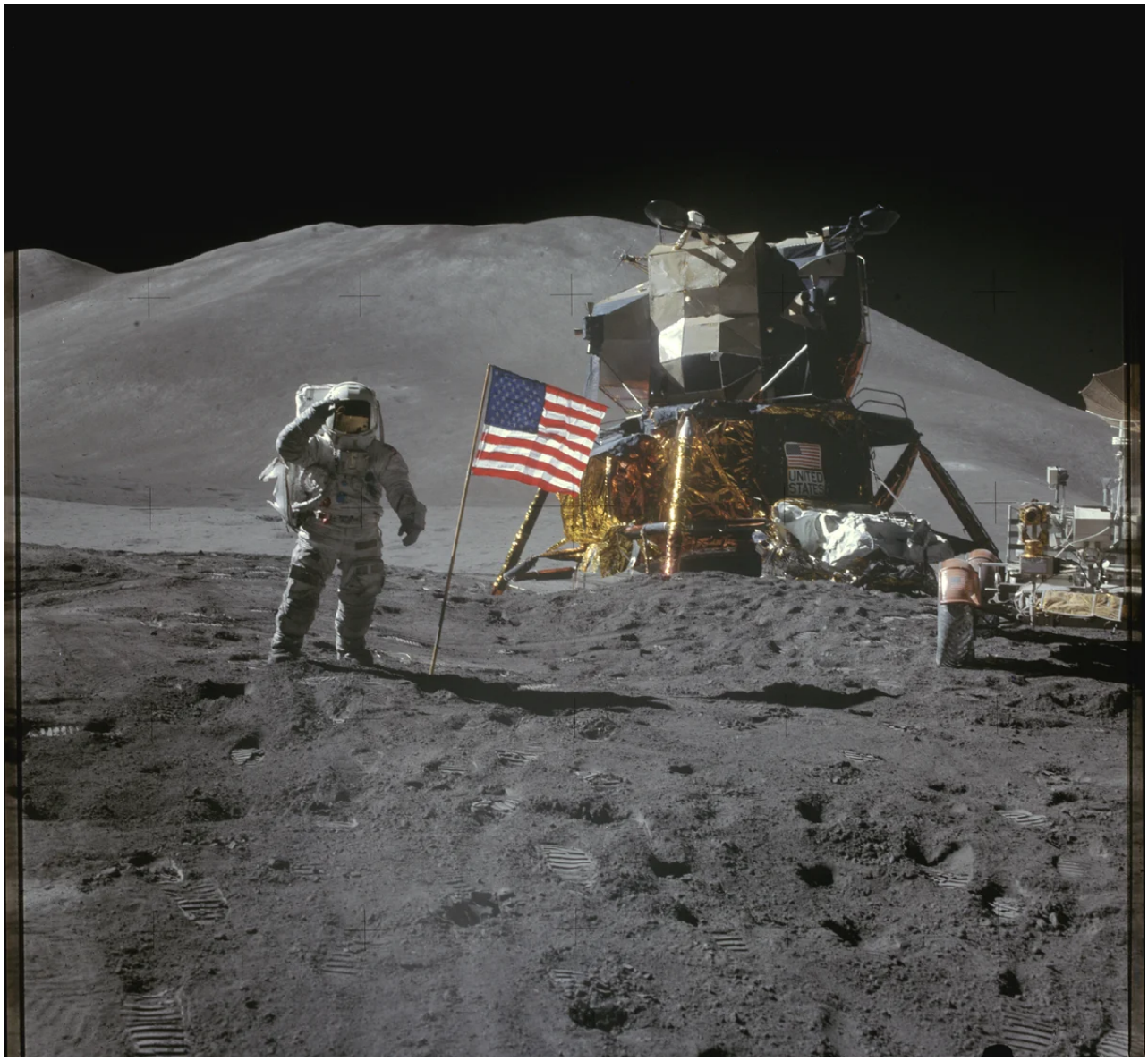


Photo frame from the album "Apollo 15", obtained by the front projection method.

Photo frame from the album "Apollo 15", obtained by the front projection method.

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The next article, which will appear next - **"Did Kubrick shoot a lunar epic and How much does the" lunar "Hasselblad weigh?"** , will tell about the difficulties S. Kubrik faced at the stage of developing the technology of front projection onto a giant screen.

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More about front projection application in lunar images:

25. The most famous lunar photograph from the Apollo 15 mission was taken in the pavilion by the front projection method

27. A long time passed between these two images, "11861" from the album "Apollo 15" and "Astronaut at the Flag".

28. Eight Photos at the American Flag, or Attack of the Mushroom People

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Cameraman L. Konovalov was with you. Until next time!