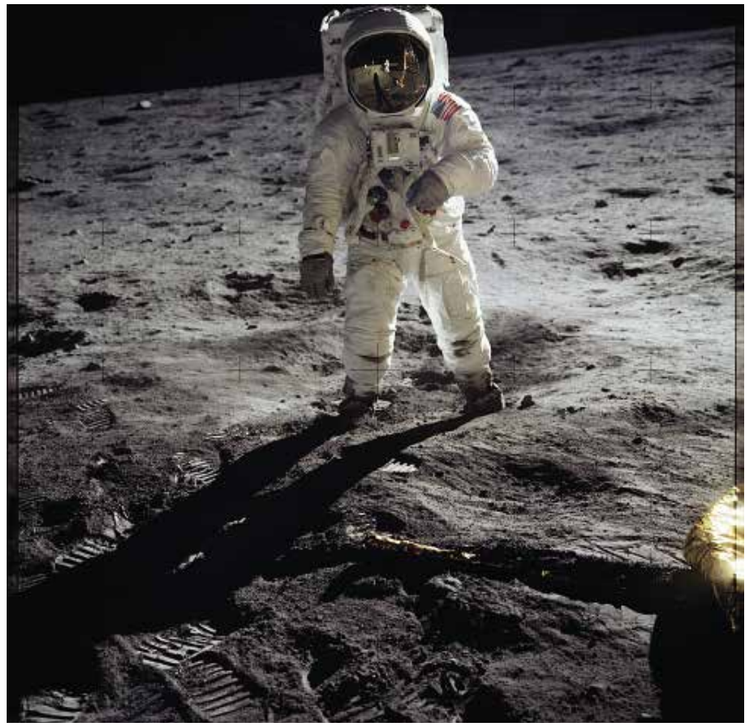
The 50th Anniversary of a Giant Leap for Mankind

By Charys Schuler

The pictures taken by the crew of NASA's Apollo 11 mission are some of the most widely-circulated and immediately recognizable ever made. In 2019, we celebrate the 50th anniversary of mankind's first steps on the moon. The event continues to affect our collective perception of ourselves and our place in relation to other humans, to our planet, and to the universe. (Unless, of course, you are a conspiracy theorist or a flat-Earther.)



Many books have been written about the context of the mission: the Cold War, the Space Race, and the national pride of two Superpowers. There are also books and internet sites devoted specifically to the camera equipment that was used by the Apollo 11 astronauts. There are even a few people who make their living by painstakingly recreating the cameras that were used on the mission. With the overabundance of available material, it is easy to get lost in the technical developments that were necessary to make photography in space possible and spend hours poring over the gorgeous high-resolution scans of the images made by the crew of Apollo 11, but lose track of the human story.

How must it have felt, being on arguably the most exciting scientific expedition ever attempted, knowing that the entire world would be looking over your shoulder as you performed complex tasks in a life-threatening environment? Did Armstrong, Aldrin, and Collins realize at the time that what most people would remember of their mission would not be scientific results, but photographic images? These photos can easily be seen as the most globally unifying images ever made. Although the Space Race pitted East against West in many senses, when a man stepped onto the moon it was an achievement for all humans. The photos showed clearly for the first time how small and fragile our home is, and how insignificant our artificially drawn borders really are.

PREPARING FOR PHOTOGRAPHY IN SPACE

<u>The Equipment: Hasselblad, ZEISS, and Kodak</u>

It's impossible to estimate how many people all over the world were involved in the process of making photography in space possible. In addition to the astronauts themselves and the entire staff of NASA, there were the people who trained them to make the photos, and the companies that redesigned their equipment so that it would work in a vacuum at extreme temperatures, from over 120°C in the sun to minus 65°C in the shade. Although they were not the only contributors (Westinghouse and Maurer are often overlooked), the most famous companies that worked with NASA were Hasselblad, ZEISS, and Kodak.

The Swedish camera manufacturing company, Hasselblad, started its cooperation with NASA inadvertently when Mercury astronaut Walter Schirra took his personal consumer-model Hasselblad 500C with him into orbit. The reliability of the camera and the quality of the photos weren't lost on NASA's engineers, and a long-lived partnership was born. For the Apollo 11 mission, eight cameras were deemed important enough to make the cut for the final set of equipment, including two motion picture cameras, two television cameras, a Kodak stereoscopic camera for closeups, and three Hasselblad 500 ELs. Most of the truly iconic images we know today were shot with the Hasselblads.

Each camera had been forced by NASA's insistence on whittling away every superfluous gram to be completely stripped and rethought in terms of

weight before any other modifications were made. Even with extensive pre-flight training, the astronauts were amateur photographers at best, so the EL model was a natural choice. The electric motor of the 500 EL exposed the frame, wound the film to the next frame, and reset the shutter automatically so that the astronauts only had to set distance, aperture, and shutter speed. (It sounds easy until you imagine doing it while looking through a helmet wearing huge gloves.) Modifications included special locks for the film magazines, and the use of a simple sighting ring instead of a reflex mirror viewfinder. The model used inside the Lunar Module (LM) was painted black to reduce reflections, as were the matching film magazines. The model used for Extra-Vehicular Activity (EVA) outside the LM was anodized, as were its magazines, to prevent the surfaces from overheating in direct sunlight, and didn't have any of the conventional liquid lubricants inside, which would have boiled off and possibly condensed onto the optical elements. The camera and film magazines were fitted with tether rings and were lowered to Armstrong on the lunar surface using what a NASA technical document referred to as a "clothesline-like arrangement."

A detailed, interactive, and very fun 3D model of the EVA camera can be found on the internet site Sketchfab here: https://bit.ly/2U2VW6h

The other element included on the EVA camera was a Reseau plate. Commonly used for scientific and technical photography of the time, it had an extremely precise grid of crosshatches (accurate to 0.002mm) which made it possible judge very accurately how far away (and thus how large) various objects in the picture were. The modification of the Reseau plate is a good example of the many challenges overcome by engineers while planning for lunar photography.

In our normal Earth-bound cameras, when a film is wound, static electricity is generated on the film's surface and then dispersed by the metal rims and rollers which guide the film, and by humidity in the air. In the EVA camera, the film was guided by the raised edges of the Reseau plate. Since glass is a poor conductor and there was no surrounding air to provide humidity, the electrical charge could have built up and caused a spark between the plate and the film. To prevent this, the side of the plate facing the film was coated with a thin transparent conductive layer, and a further layer of silver on the edges of the plate conducted the static charge to the metallic parts of the camera body.

The lenses used on these cameras were developed and manufactured by ZEISS in Germany. The ZEISS company was famous for its Planar 0.7/50mm lens, which had been developed in 1966 for use in extreme low-light situations. (It made possible the filming of scenes using only candlelight in Stanley Kubrick's Barry Lyndon a few years later.) The wide-angle Biogon 5.6/60mm lens was developed especially for the moon landing, and joined Planar 2.8/80mm and Sonnar 5.6/250mm lenses on the Apollo 11 mission. The lenses were modified in several ways: all hollow spaces were opened (trapped air would have exploded outwards in a vacuum), the lenses were not completely coated (to prevent the release of gases from