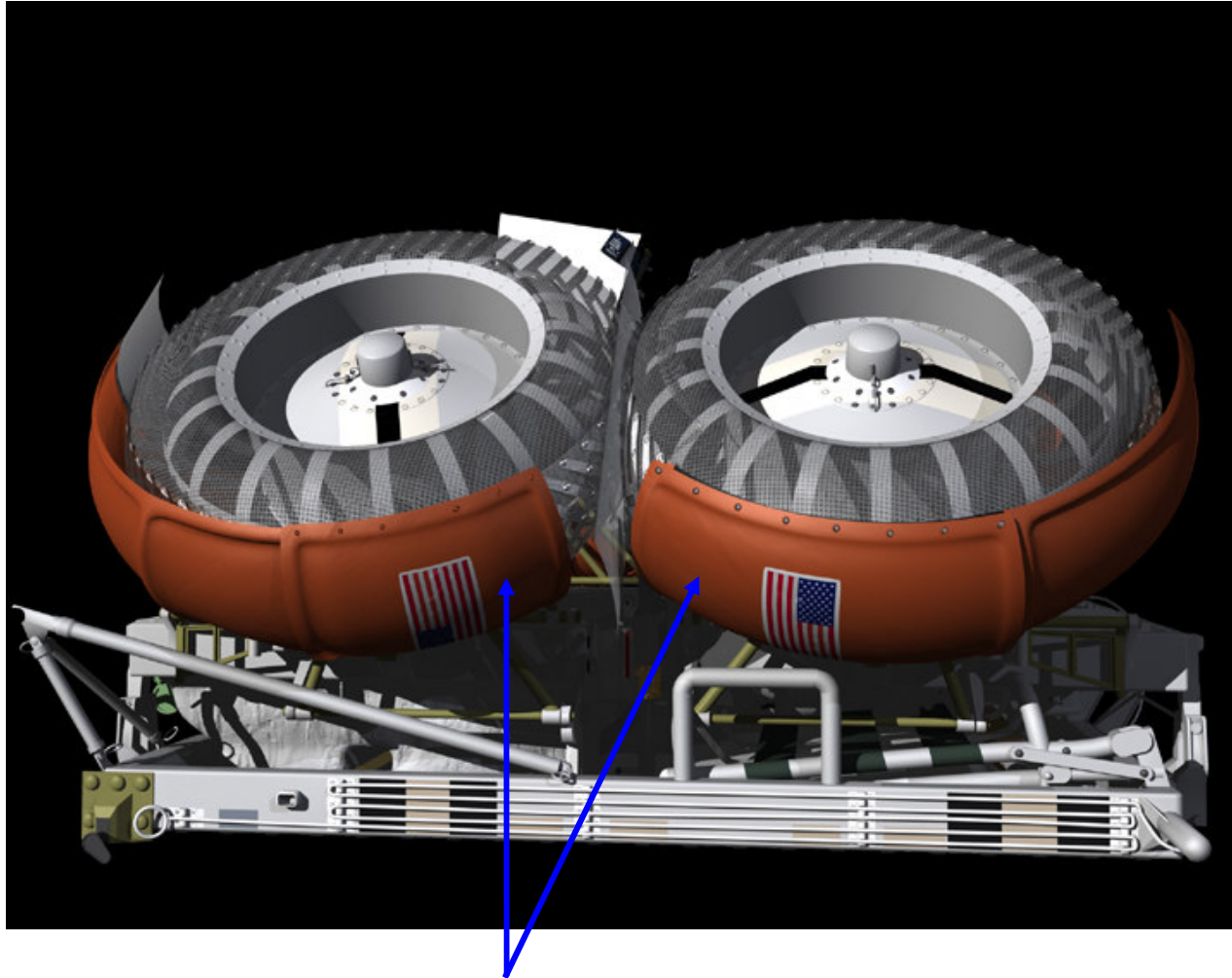


# Lunar Roving Vehicle (LRV) Missing Fender Extension Saga



Retractable Fender Extensions Required For Folding of LRV Wheels

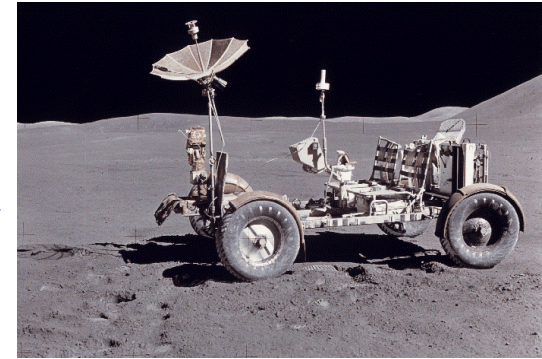
3D LUROVA Image by Don McMillan

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# Extracts From Apollo Mission Flight Evaluation Reports

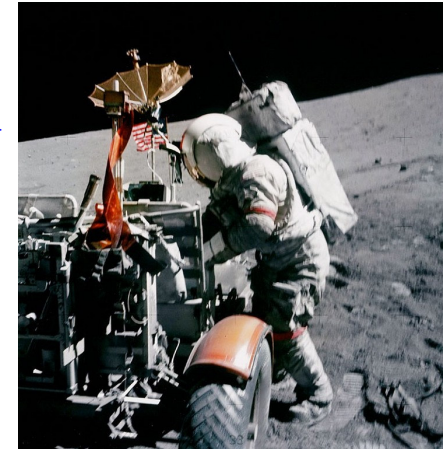
## Loss of LRV Left Front Fender Extension on Apollo 15

No structural damage to the LRV was noticed by the crew, although a close inspection was not performed. A preliminary review of LRV photos reveals no wheel wire mesh breakage. These photos, however, do show that the forward portion of the left front fender was missing after EVA-1. Cause of this is unknown.



## Loss of LRV Right Rear Fender Extension on Apollo 16

The crew reported that the right rear fender extension was bumped and knocked off while working around the aft end of the LRV. This created a significant problem in that excessive dust was thrown forward onto the crew and LRV by the rear wheel. A redesign of the fender extension stop is being incorporated to eliminate this problem.



## Loss of LRV Right Rear Fender Extension on Apollo 17

During Extravehicular Activity (EVA-1) at the LM prior to driving to ALSEP, the CDR inadvertently pulled off the right rear fender extension by catching it with the hammer carried in the right leg pocket of the Extravehicular Mobility Unit (EMU).

While still at the LM site, the CDR spent approximately 12 minutes taping the extension onto the fender. Because of the dusty surfaces, the tape did not adhere and the extension fell off returning from Station 1. In the moon's low gravity and hard vacuum, loss of the fender extension allowed dust to be thrown forward by the revolving rear wheel onto the LRV and crew. Per real time procedures established by MSC and MSFC, the crew taped together four Lunar Module (LM) maps and fastened them to the fender with two clamps from the LM (refer to Figure 20-3). Installation of this fix required approximately 7 minutes of CDR and Lunar Module Pilot (LMP) surface time at the beginning of EVA-2. This fix was adequate for the remainder of the mission.



A fender extension was also lost on Apollo 15 and 16. A fender modification was incorporated for Apollo 17 to prevent the fender extension from being dislodged from its guides. The fix would have been effective except that the force applied was so great that it fractured the guide material.

## Post Apollo 17 – Astronauts With LRV Team



## Astronauts Were Presented With Fender Extension From LRV Qualification Unit

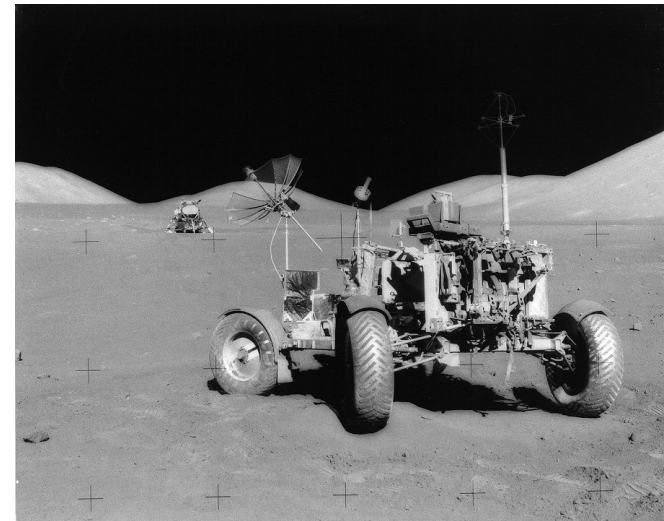
Autographed By MSFC Support Team

(This fender extension had been used to examine potential repair during the Apollo 17 mission. Crew did not indicate any status of fender extensions from LRV left on the moon at the conclusion of Apollo 17)



## Apollo 17 LRV Fender Extensions Found to Be Missing and in Kansas

In the process of preparing “Back to the Future” retrospective LRV thermal control experiences presentation, discovered picture of Apollo 17 in it's last parked position that shows missing left front and left rear fender extensions, and missing right rear fender extension and fender map fix



LRV Parked For Lunar Module Ascent Observation

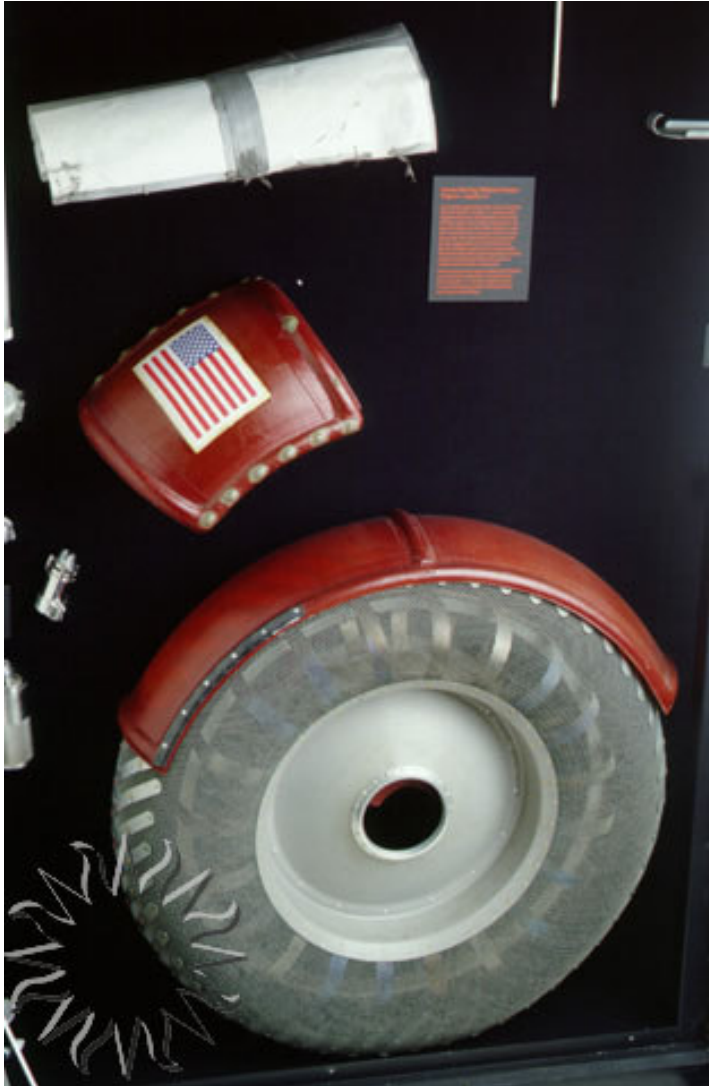
Fender extensions claimed to be: “Actual fender from the Lunar Rover used on Apollo 17” discovered on display at Kansas Cosmosphere museum.

Could possibly be used for future “dust mitigation” studies and testing for the “Moon, Mars, and Beyond” Space Exploration Initiative



Picture of Apollo 17 Extensions Taken by Ben Nault

## Apollo 17 Fender Extension and “Map Fix” Located at Smithsonian National Air and Space Museum (NASM)



- The saga about the missing LRV fender extensions is important because, had we known about them being returned to Earth, we could have inspected them and gained knowledge about exposure of materials to the lunar environment, and the nature and extent of the damage which had resulted in their being removed – accidentally or on purpose
- Perhaps we can now extract them from their resting places in the museum in Kansas and at the NASM and take a new look at them
- It would also be useful to ask whether similar LRV parts were returned from Apollo 15 and/or Apollo 16

LRV Artifacts On Display at National Air and Space Museum

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