

Vehicles: Rover Activity

The first objective for the rover is to complete the minimum objectives to win the Google Lunar X-prize. These objectives include transmitting high-resolution real-time video while roving on the lunar surface, transmitting self-portraits of the rover and lander, and panoramic images on the surface. Many of the X-prize objectives will be accomplished concurrently with Darkside's mission objectives. The remaining X-prize objectives will be completed before the rover begins its surveying phase of the mission

Surveying Phase

Darkside's goal is to gather exhaustive geographical survey data of the area surrounding the landing site. Initially, the area within a 4 km square centered at the lander will be surveyed in a series of separate survey excursions. After completion of the initial survey, the rover may be used for other objectives, or to survey other outlying areas, if its lifetime permits. The length of these excursions is primarily limited by the length of the lunar day (the rover will do no roving during a lunar night). The survey area is subdivided into four quadrants, 2 km on a side. During each lunar day (approx. 14.5 earth days) in the initial surveying phase, the rover will survey one quadrant.

Assuming the rover will rove approximately 1/3 of the time during a lunar day, at a speed of 90m/h, it can cover 10 km each lunar day. At the start of each lunar day, the rover will begin roving the perimeter of the selected quadrant, pausing at intervals of 500m to conduct its survey activities and transmit the data to the lander. The survey data will include ranging of surrounding landmarks, panoramic photography, video, and local soil analysis. The data will be streamed to the lander for retransmission to the earth station or storage, if earth is not visible. The rover will accept any commands from the lander, and then rove to its next destination. Assuming 1/3 of the time is spent roving, 1/3 is spent surveying and transmitting, and 1/3 is spent charging, downloading commands or software updates, or remaining idle, the rover should complete the survey of each quadrant in about 12 days, which leaves approximately 3 days for contingencies. Upon completion, the rover will return to the lander and power down most of its systems in preparation for the lunar night.

The goal of the initial survey phase is to complete the four quadrants, plus an additional quadrant centered around the lander, which covers the centers of the previous quadrants. As the expected lifetime of the rover is around six months, the rover is expected to complete the X-prize requirements, visit the Apollo 11 landing site, and complete the initial survey phase before shutting down. However, given the likelihood of unexpected problems arising, the mission will be considered a success if at least two quadrants can be surveyed.