How to use:

1. Input the latitude and longitude of the launch site to the spreadsheet. This is best achieved by checking MJ ground info while still on launch pad. N and E are positive, and S and W are negative.
2. Use ephemerides (MoonNodes.csv) to find the last lunar ascending node before your earliest launch time. Input it into the spreadsheet.
3. In flight scene, set the moon as the target. Find the target inclination, longitude of ascending node, argument of periapsis, and eccentricity using MJ target body information window. Input them to the spreadsheet.
4. Input your earliest launch time.
5. The calculator will then find lunar transfers launching every hour in the next sidereal month. Below is an explanation of the columns:
   1. “Launch Time” and “LAN”: self-explanatory
   2. “Rel Inc”: relative inclination between parking orbit and lunar orbit. A large relative inclination means a large lunar orbit insertion burn, though this effect is on the order of 20 m/s for Cape launches.
   3. “Xfer Node”: how long the probe needs to coast before burn for TLI. Early: 1/4 orbit, or 20 minutes; Late: 3/4 orbit, or 70 minutes.
   4. “Flight Time”: predicted transfer time from launch to perilune in days.
   5. “3-5”: whether flight time is within three to five days.
6. Filter the launches by only showing rows with “TRUE” in column “3-5.” You can also apply other filters on “Flight Time” column. Additionally, you can filter the “Xfer node” column if you have boiloff issue.
7. Finally, refine the launch window by scrolling down. Copy-paste a launch time you like to the highlighted cell. The calculator will show window information in the vicinity of the time pasted.

Known issues:

1. Perturbation from the sun makes the moon moves erratically, so the flight time prediction can be off by up to 0.3 days. In the website version this problem would be solved by storing the moon’s position directly, instead of assuming Keplerian behavior.
2. The calculator generates garbage when the latitude is within two degrees of lunar inclination. In that case it is recommended to launch directly into lunar plane (or lunar LAN if latitude is greater than inclination) and then take a normal DCM on lunar transfer trajectory.

Planned Features:

1. Calculate TLI and LOI Δv costs
2. Window-widening of a fixed flight time using Butcher’s algorithm if RP-1 implements launch delays.