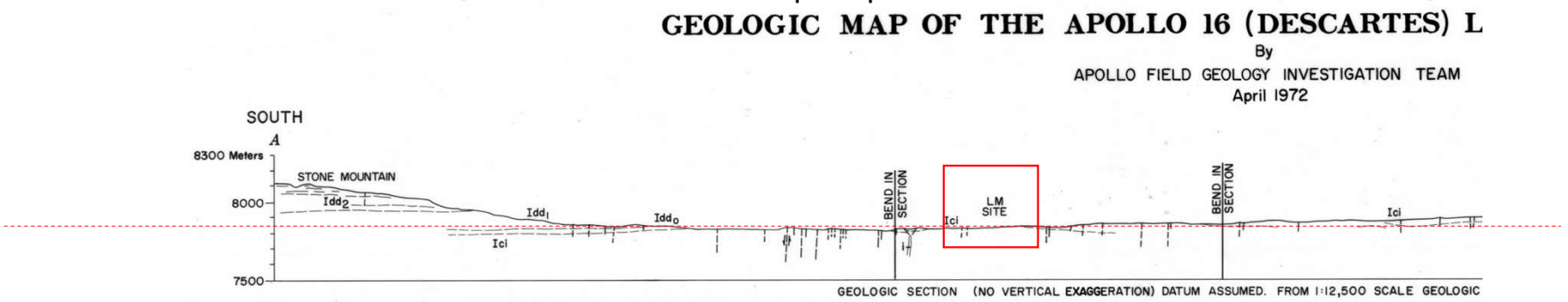
Simulating Orion

Apollo 16 Lunar Module

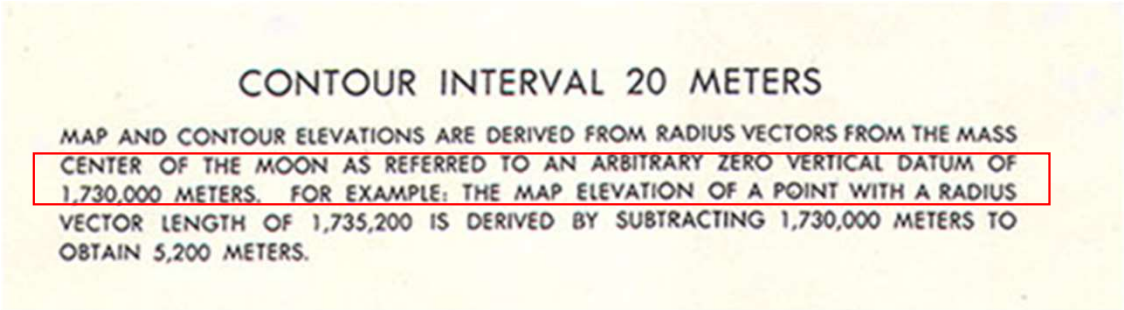
Event	Reference body	Time hr:min:sec	Latitude deg:min	Longitude deg:min	Altitude n. mi.	Space-fixed velocity ft/sec	Space-fixed flight-path angle, deg	Space-fixed heading angle, deg E of N
Docking	Moon	177:41:18	10:32 S	55:39 W	65.6	5 313.7	-0.04	-90.33
Lunar module jettison	Moon	195:00:12	01:08 N	70:28 E	59.2	5 347.9	0.39	-100.50
Subsatellite launch	Moon	196:02:09	00:01 S	115:59 W	58.4	5 349.4	-0.41	-79.43

Altitude relative to landing site…1737.85 km (see next slide)

1972 Map Prepared for the mission



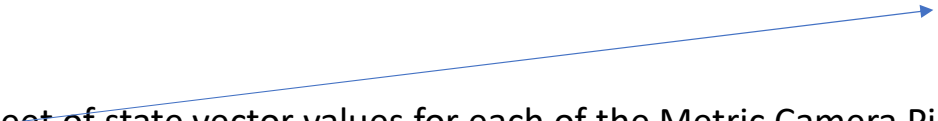
Based on 1972 understanding, the landing site is at 7850 meters relative to a base diameter of 1730 km. Therefore the “Landing Site” altitude should be taken as 1737.85 km



Apollo16_APE_Data_Book.pdf (asu.edu)

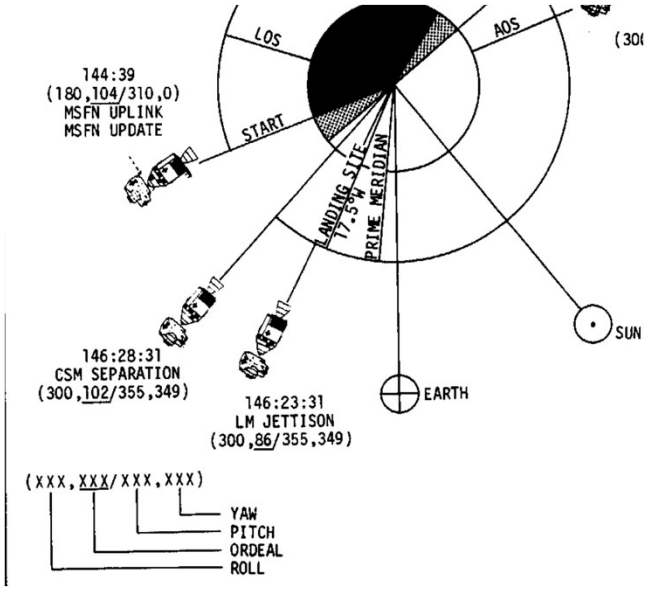
Apollo Image Archive - Ephemeris Data (asu.edu)

http://apollo.sese.asu.edu/data/metric/AS16/state_vectors/AS16_Metric_SV.csv



This spreadsheet of state vector values for each of the Metric Camera Pictures is a gold mine of orbital data.

(Excerpt from Apollo 14 Flight Plan)

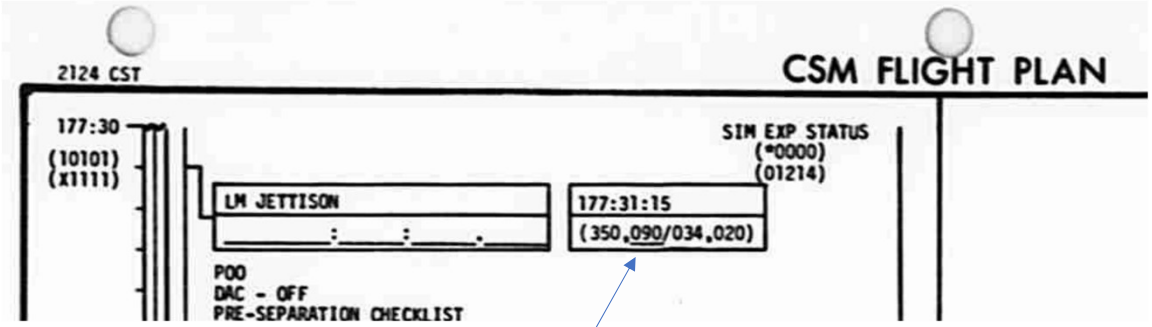


LM is jettisoned “upward” and then the sep burn is retrograde relative to the Moon.
This puts the LM in a higher, slower orbit.

(Excerpt from Apollo 16 Crew Debrief)

MATTINGLY Separation maneuver was a nominal thing. They changed the maneuver from the preflight value, but it was executed nominally. It was small; 2 foot per second. We deleted the shaping maneuver on plane change 2.

(Excerpt from Apollo 16 Flight Plan)



090 means 90° on ORDEAL mode…pointing away from the moon

Then the sep burn is in the opposite direction
So total ~2 fps “up” for LM jettison and 2 fps retro for CSM sep burn