Space Photogrammetry - HW1 - Camera & Mission Design

Assigned Friday 29 January, Due Friday 5 February

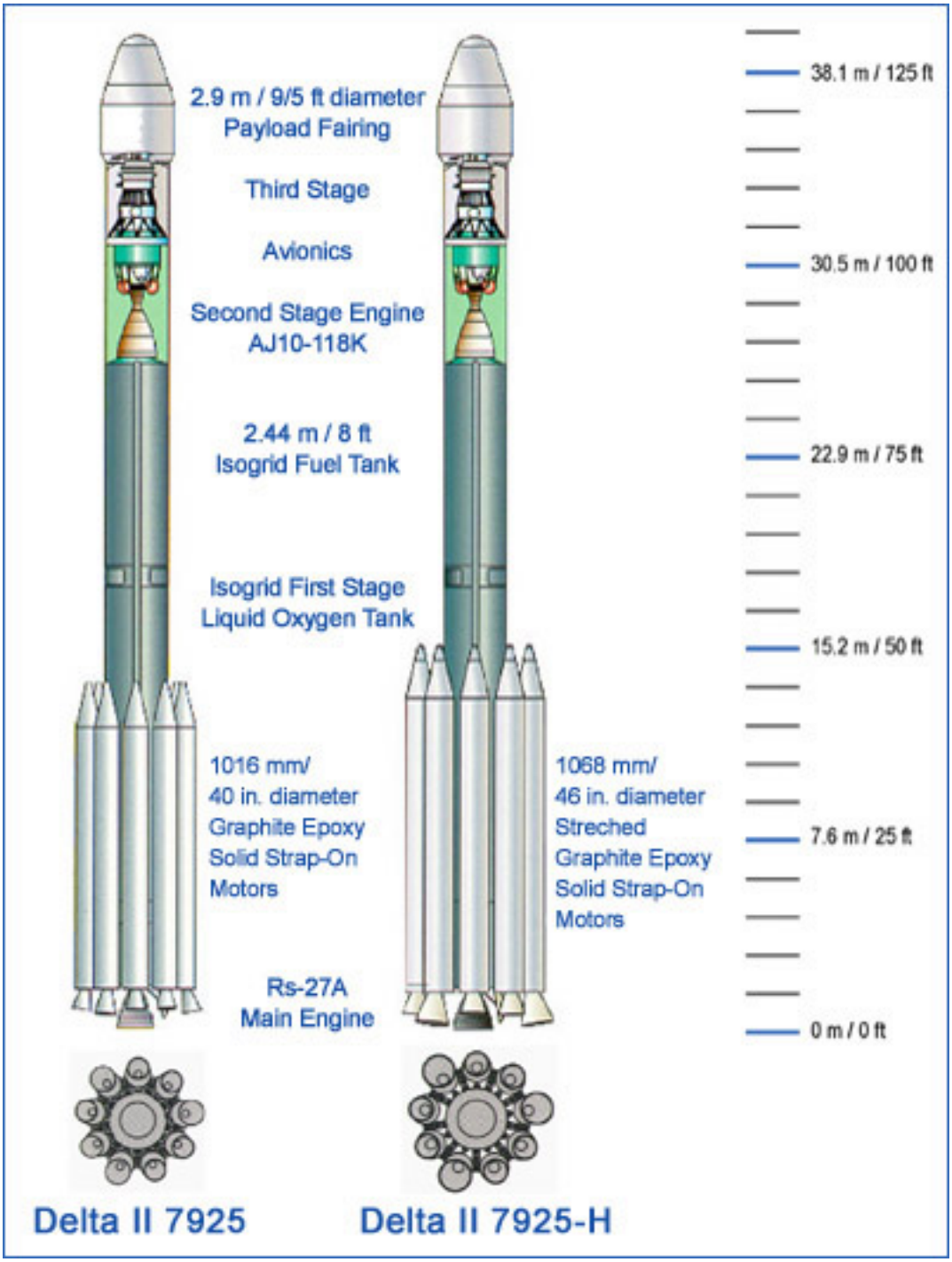
Design camera and mission parameters for the following requirements:

- Panchromatic spectral range (400-700 nm)
- 12 cm GSD
- CCD linear array has 64 TDI stages
- Individual detector size 12 um
- Full well capacity = 100,000 electrons
- Control V_g by rotation or slew motion
- Acquire 30,000 lines in 5 seconds
- Altitude range 450 – 900 km
- Circular / polar orbit
- May not exceed diffraction limit
- **Minimize the aperture size** (see restrictions below)
- Maximum design scene reflectance = 90%, fill detector with this scene
- Quantum efficiency (QE) = 70%
- Noise factor, k=0.7
- Atmospheric attenuation = 0.64 per pass

Show your intermediate steps and report:

- Altitude
- Aperture Size
- Focal length
- T_e , T_{ee}
- d/f and β

As you can see in the figure on the next page, camera must fit inside the payload fairing of the Delta-2 rocket which has diameter of 2.9m. If you cannot achieve a solution that meets this requirement, then **relax** one or more of the other listed requirements so that it fits.


2.9 m / 9/5 ft diameter
Payload Fairing
Third Stage
Avionics
Second Stage Engine
AJ10-118K
2.44 m / 8 ft
Isogrid Fuel Tank
Isogrid First Stage
Liquid Oxygen Tank
1016 mm/
40 in. diameter
Graphite Epoxy
Solid Strap-On
Motors
Rs-27A
Main Engine
1068 mm/
46 in. diameter
Streched
Graphite Epoxy
Solid Strap-On
Motors
38.1 m / 125 ft
30.5 m / 100 ft
22.9 m / 75 ft
15.2 m / 50 ft
7.6 m / 25 ft
0 m / 0 ft
Delta II 7925
Delta II 7925-H