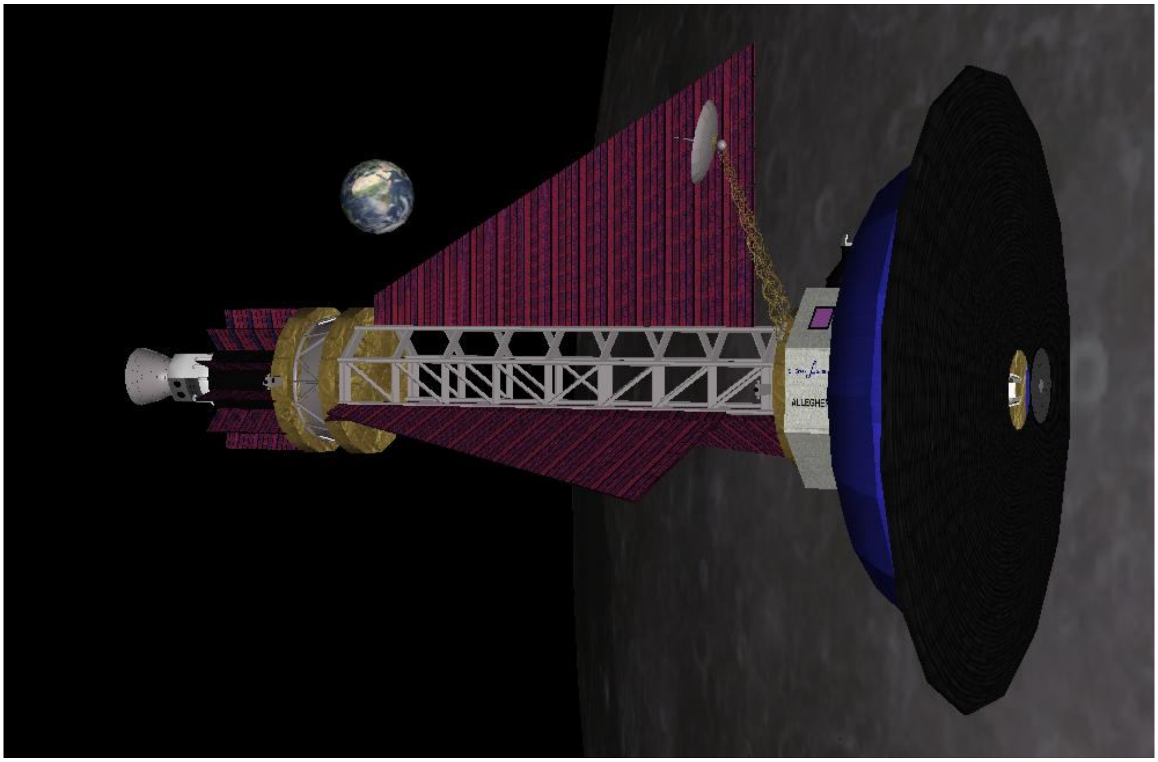
Lunar Transfer Vessel Mk 2
“LTV Allegheny”

LTV ver. 2

Andy44 February 2010



Overview

Oil Creek Astronautix, Inc., would like to congratulate you on the purchase of your new atomic spaceship. LTV Allegheny is the first in her class, the Mk2 Lunar Transfer Vessel, named for the Allegheny River. This is a resusable spacecraft designed to deliver a 28 metric ton payload from low-earth orbit to lunar orbit and return empty to LEO via an aerobraking maneuver. By reducing the payload mass, you can carry payloads both ways, as well.

The craft is propelled by an advanced technology bimodal nuclear thermal rocket engine with a high specific impulse. Upon return to LEO, you will need to refuel it by docking it to some other vessel containing fuel. For now, it's up to you what that vessel will be, but I suggest a the OCA LEO Prefab Station, supplied by the OCA Jumbo Tanker.

The ship has a "wet" (open) payload bay behind the crew module, and is sized to approximately the same dimensions as the Space Shuttle payload bay, but keep in mind that any space shuttle payloads you wish to transfer to lunar orbit must contain a docking port on one end. The Orbiter manual will explain how to do this for simple config file-based payloads. Future release may include attachment points, but keep in mind that if you wish to pump fuel between the payload and the LTV, you must use the docking port.

There are 3 docking ports, #1 on the nose in the middle of the heat shield behind a retractable door, #3 in the payload bay facing aft, and #2 on the dorsal side of the crew module. When using #2, be sure to mind the heatshield, hi-gain antenna mast, and dorsal radiator.

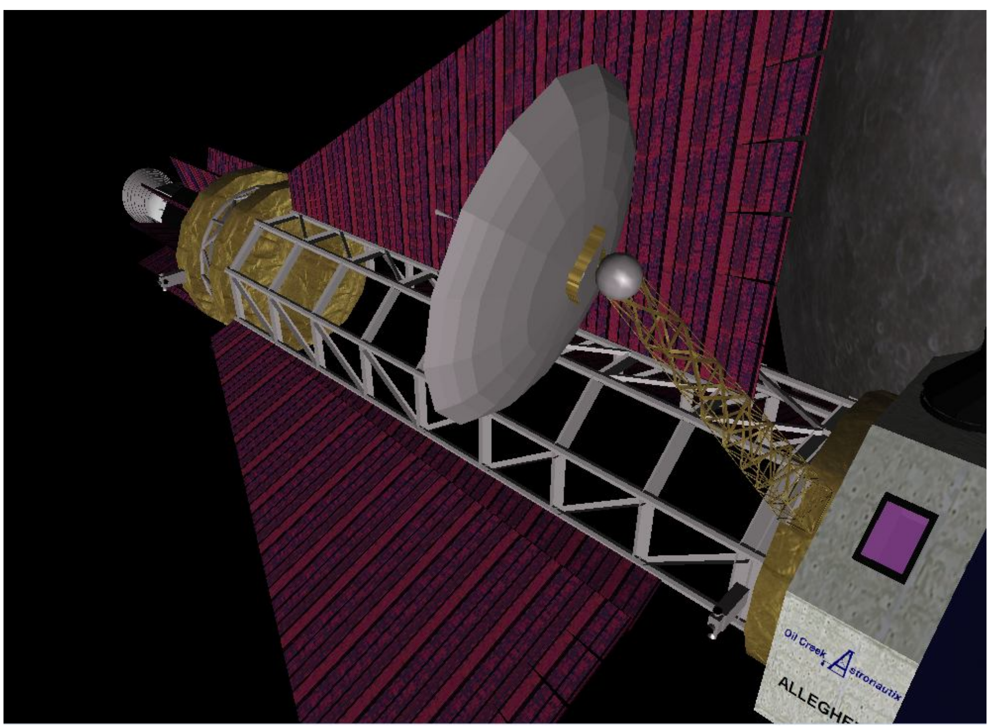
The spacecraft can be launched unmanned aboard a NOVA-class launcher, such as the Nova-SSTO. The initial configuration is with all antenna masts and radiators folded. After launch vehicle separation, the antennae and radiators can be deployed and the nose docking door retracted.

During the aero braking phase of operation, all radiators and antenna masts must be stowed and the nose docking door closed to rig the ship for aero braking. After the aero phase the masts and radiators should be deployed as soon as a safe altitude has been reached.

Key Commands

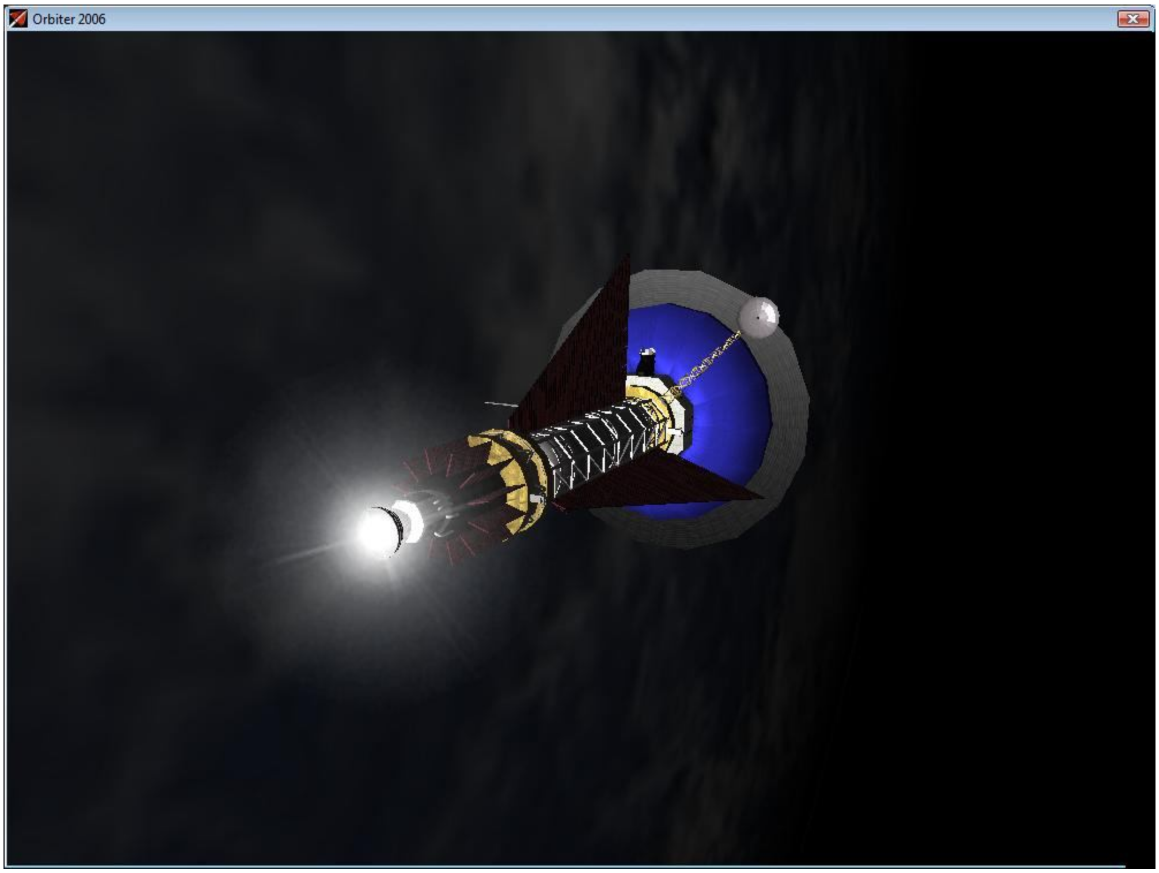
G – deploys or retracts antenna masts and radiators

K – retracts or closes nose docking thermal protection door



Notes on Operating Your Atomic LTV Mk2

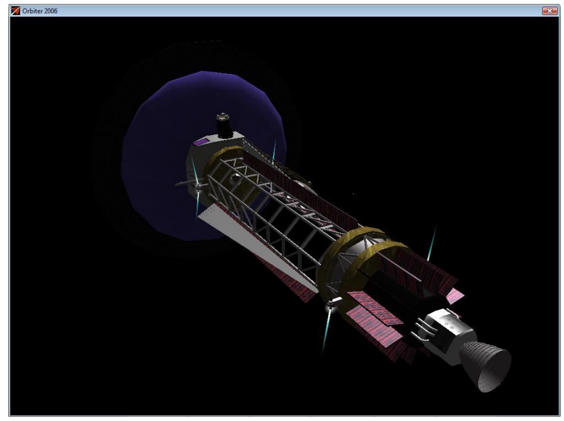
During docking operations it may be necessary to retract the masts and radiators in order to avoid contact with the docking target. For most vessels and space stations, the nose docking port is preferred because it places the reactor on the other side of the LTV's radiation shield from the docking target and its occupants. However, the nose docking port is recessed and surrounded by the large aeroshield, so in some cases the dorsal port is a better choice. When using the Prefab LEO Station, the dorsal port is preferred since it places the station's centrifuge within the radiation shadow of the reactor.



The radiators should be deployed whenever possible to shed reactor waste heat. Never operate the reactor in high-power mode (ie. for thrust) without deployed radiators, as severe thermal damage to the propulsion and electrical power subsystems could occur! (Note: damage is not modeled.) Reactor damage and nuclear accidents due to crew negligence are not covered by the OCA warranty.

It is recommended you launch unmanned, and with no fuel in the reactor core, and that you avoid fueling the reactor until the first crew arrives to put the reactor into operation. Until then, the vehicle can be controlled remotely from the ground and maneuvered using the RCS thrusters in low-earth orbit. It is up to you how much risk you wish to incur, of course.

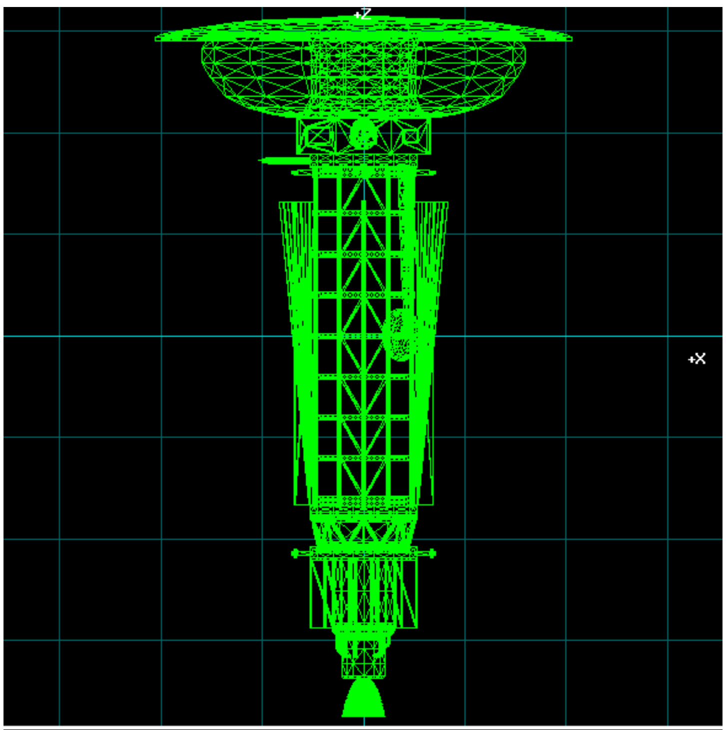
<u>Technical Data:</u>
Length: 34.5 m
Diameter (fuselage): 5.1 m
Diameter (aeroshield): 20.6 m



Dry Mass: 43,000 kg
Max Propellant Mass: 55,000 kg

Main Propulsion: Nuclear Thermal Rocket, 1 jet nozzle
Main Thrust: 900,000 N (202,328 lbf)
Specific Impulse: 1100 s
Exhaust Velocity: 10791 m/s

Reaction Control System: 16 jets, 4 clusters



<u>Developer's note:</u> There appears to be a bug in Spacecraft3.dll which causes the spacecraft to transition to a low-drag profile when entering the atmosphere. In order to allow the user to more easily plan aerobraking maneuvers using Aerobrake MFD, I adjusted the frontal area of the craft to an unrealistically low level. You will thus want to plan your aerobraking perigee to be at an altitude of approximately 40 km when returning from the Moon.

Included Scenarios

Three scenarios have been included in this package.

The first is a launch scenario using the Nova SSTO. Along with the Allegheny, there is a Simple Tank Payload aboard the mighty Nova rocket. After MECO, press the J key twice to separate first the LTV and then the tank payload in quick succession. This will ensure that the tank docks itself to the LTV at separation.

The next scenario is the Allegheny and the tank payload in LEO, about ¾ orbit away from trans-lunar injection (TLI). Using TransX MFD, it is fairly easy to transport the tank to lunar orbit and drop it off. Getting back to LEO with TransX is a little more difficult; I recommend flytandem's good TransX tutorials if you need help: http://flytandem.com/orbiter/tutorials/index.htm

The final scenario is the Allegheny in lunar orbit preparing for return to LEO.

If you are sharp with orbit planning, you should be able to aerobrake into LEO, and with a small burn insert yourself into a circular orbit at about 300 km or so with a fair margin of delta-V left. Use of Burn Time Calculator MFD is recommended.

Acknowledgements

Thanks to Vinka for his Spacecraft3.dll, Steve Glanville for Anim8or, ar81 for Mesh Wizard, Urwumpe for his Anim8or mesh export plug-in, Dr. Martin Schweiger for creating Orbiter, to the Probe, and to all the Orbiterheads out there who are reading this. Enjoy!

Mesh Group List: For those of you who wish to tinker, here is the mesh group list

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hi-gain dish gimbal    73                      2.264107  1.554441  8.280398  -0.707106781186548 0.707106781186548 0 -90deg
                                                7.544343  7.570535 8.4093    -0.707106781186548 0.707106781186548 0 -15deg
hi-gain dish antenna   71-72                   2.264107  1.554441  8.280398  -0.707106781186548 0.707106781186548 0 -90deg
                                                7.544343  7.570535 8.4093    -0.707106781186548 0.707106781186548 0 -15deg
hi-gain comm pallet    80                      2.264107  1.554441  8.280398  -0.707106781186548 0.707106781186548 0 -90deg
                                                7.544343  7.570535 8.4093    -0.707106781186548 0.707106781186548 0 -15deg
hi-gain mast hinge     28                      2.264107  1.554441  8.280398  -0.707106781186548 0.707106781186548 0 -90deg
hi-gain mast           79                      2.264107  1.554441  8.280398  -0.707106781186548 0.707106781186548 0 -90deg
main nozzle            69-70
rcs                    29-68,81-84
aft tank               27
thrust structure       0-26
main propellant tank   74
forward crew comp.     78
aft rad shield         77
forward cargo bulkhead 76
aft cargo bulkhead     75
Dorsal dock PMA        88-91
NTR machinery housing  85-86
reactor                92-95,261
dorsal radiator 1      129
dorsal radiator 2      102            scale from point  2.467404 -.7844548  6.542511 fct:5 dir: 0.86303420590433 -0.505145483439259 0
dorsal radiator 3      101            scale from point  2.467404 -.7844548  6.542511 fct:5 dir: 0.86303420590433 -0.505145483439259 0
dorsal radiator 4      100            scale from point  2.467404 -.7844548  6.542511 fct:5 dir: 0.86303420590433 -0.505145483439259 0
dorsal radiator 5      99             scale from point  2.467404 -.7844548  6.542511 fct:5 dir: 0.86303420590433 -0.505145483439259 0
dorsal radiator 6      98             scale from point  2.467404 -.7844548  6.542511 fct:5 dir: 0.86303420590433 -0.505145483439259 0
dorsal radiator 7      97             scale from point  2.467404 -.7844548  6.542511 fct:5 dir: 0.86303420590433 -0.505145483439259 0
dorsal radiator 8      96             scale from point  2.467404 -.7844548  6.542511 fct:5 dir: 0.86303420590433 -0.505145483439259 0
port radiator 1        130
port radiator 2        109            scale from point  -2.467404 -.7844548  6.542511 fct:5 dir: -0.86303420590433 -0.505145483439259 0
port radiator 3        108            scale from point  -2.467404 -.7844548  6.542511 fct:5 dir: -0.86303420590433 -0.505145483439259 0
port radiator 4        107            scale from point  -2.467404 -.7844548  6.542511 fct:5 dir: -0.86303420590433 -0.505145483439259 0
port radiator 5        106            scale from point  -2.467404 -.7844548  6.542511 fct:5 dir: -0.86303420590433 -0.505145483439259 0
port radiator 6        105            scale from point  -2.467404 -.7844548  6.542511 fct:5 dir: -0.86303420590433 -0.505145483439259 0
port radiator 7        104            scale from point  -2.467404 -.7844548  6.542511 fct:5 dir: -0.86303420590433 -0.505145483439259 0
port radiator 8        103            scale from point  -2.467404 -.7844548  6.542511 fct:5 dir: -0.86303420590433 -0.505145483439259 0
starboard radiator 1   131
starboard radiator 2   116            scale from point  2.297485E-03  2.044304 6.544318 factor:5   direction: 0 1 0 (
starboard radiator 3   115            scale from point  2.297485E-03  2.044304 6.544318 factor:5   direction: 0 1 0
starboard radiator 4   114            scale from point  2.297485E-03  2.044304 6.544318 factor:5   direction: 0 1 0
starboard radiator 5   113            scale from point  2.297485E-03  2.044304 6.544318 factor:5   direction: 0 1 0
starboard radiator 6   112            scale from point  2.297485E-03  2.044304 6.544318 factor:5   direction: 0 1 0
starboard radiator 7   111            scale from point  2.297485E-03  2.044304 6.544318 factor:5   direction: 0 1 0
starboard radiator 8   110            scale from point  2.297485E-03  2.044304 6.544318 factor:5   direction: 0 1 0
aft radiators          117-128
nose docking shield    132            rotate 170deg about point -1.126709  0 15.65702
main crew comp.        87,133,240-242,254-259,260?,262
nose dock hatch        136
nose dock clamps       253?
payload dock hatch     135
payload dock clamps    252
dorsal dock hatch      134
dorsal dock clamps     251
main truss structure   137-232,238
omni antenna mast      233-237        translate -X 1.8m per segment
heat shield            239
NTR plumbing           243-250
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