



### Vehicle Concept Characteristics - LV 41.4003.08001

#### UPPER STAGE

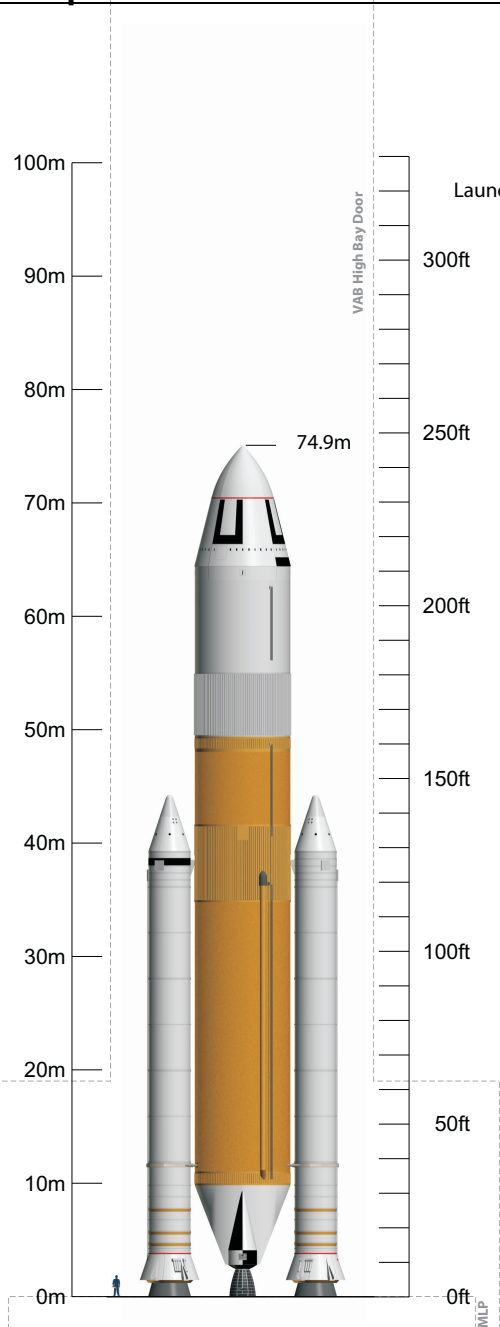
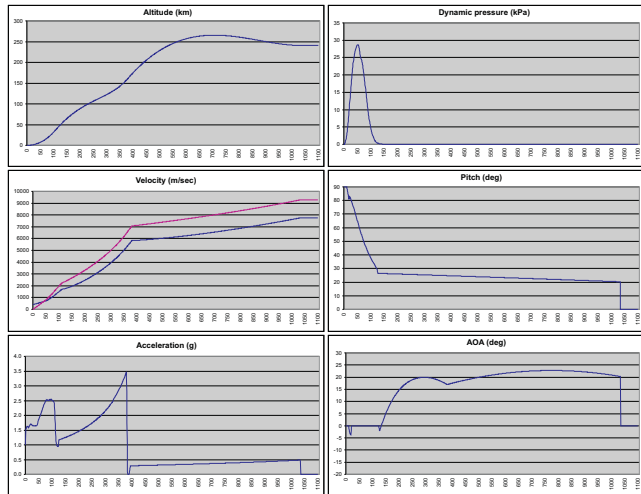
Design Heritage	Boeing ACES / Lockheed-Martin WBC
Propellants	LOX / LH2
Maximum Gross Propellant	379,321lb (172,057kg)
Usable Ascent Propellant	151,961lb (68,928kg)
Ascent Flight Performance Reserve	6,418lb (2,911kg)
Usable Post-Ascent Propellant	214,816lb (97,439kg)
Post-Ascent Flight Performance Reserve	2,170lb (984kg)
Unusable Residuals	3,735lb (1,694kg)
Ascent In-Flight Losses	220lb (100kg)
RCS Propellant	992lb (450kg)
Propellant Offload	0.00%
Stage pmf	0.9342
Dry Mass	22,737lb (10,313kg)
Burnout Mass	26,473lb (12,008kg)
# Engines / Type	6 / RL-10A-4-2
Engine Thrust (@ 100%) Vac	22,300lbf (10,115kgf / 99,195N)
Engine Isp (@ 100%) Vac	445.2s
Mission Power Level	100.0%
Upper Stage Ascent Burn Time	646.9s
LEO Loiter Period	4 + 1 days
Pre-TLI Overboard Mass	6,418lb (2,911kg)
ASE*	1,102lb (500kg)

#### DYNAMICS

Thrust : Weight @ Liftoff	1.536 : 1
Max Dynamic Pressure	599.0psf (28,678Pa)
Max g's During Ascent	3.46g
Insertion Altitude	130.0nmi (240.8km)

#### ASCENT PERFORMANCE

Delivery Orbit	130.0 x 130.0nmi, 29.0°
Payload w/ regular NASA GR&A's	219,080lb (99,373kg) †
Payload w/ additional 10% Reserve	<b>197,172lb (89,436kg) †</b>



#### Launch Site

KSC LC-39 (Latitude: 28.6084°)

#### GLOW

<b>GLOW</b>	<b>4,789,235lb (2,172,360kg)</b>
Payload Fairing	27.6 x 0.0ft (8.4 x 0.0m)
Payload Envelope	25.0 x 0.0ft (7.6 x 0.0m)
Payload Fairing Jettison Mass	8,724lb (3,957kg)
Payload Fairing Jettison	329.9s @ 71.9nmi
Launch Abort System Jettison Mass	-
Launch Abort System Jettison	-

#### BOOSTERS (each)

Design Heritage	Shuttle RSRM - Flown Unchanged
Propellants	PBAN
Usable Propellant	1,111,604lb (504,215kg)
Stage pmf	0.8561
Dry Mass	183,948lb (83,437kg)
Burnout Mass	186,864lb (84,760kg)
# Boosters / Type	2 / 4-segment Shuttle RSRM
Booster Thrust (@ 0.7s) SL	2,892,912lbf (1,312,203kgf / 12,868,314N)
Vac	3,142,302lbf (1,425,324kgf / 13,977,656N)
Booster Isp (@ 0.7s) SL	237.0s
Vac	269.1s
Booster Burn Time	123.8s

#### CORE STAGE

Design Heritage	Shuttle Super Light Weight Tank ET
Propellants	LOX / LH2
Gross Propellant	1,621,191lb (735,360kg)
Usable Ascent Propellant	1,604,979lb (728,006kg)
Unusable Residuals	16,047lb (7,279kg)
In-Flight Losses	325lb (147kg)
Propellant Offload	0.00%
Stage pmf	0.9075
Dry Mass	147,479lb (66,895kg)
Burnout Mass	163,526lb (74,174kg)
# Engines / Type	4 / SSME-Block-II
Engine Thrust (@ 104.5%) SL	392,326lbf (177,956kgf / 1,745,155N)
Vac	490,847lbf (222,644kgf / 2,183,396N)
Engine Isp (@ 104.5%) SL	361.4s
Vac	452.2s
Mission Power Level	104.5%
Core Burn Time	384.1s

#### INTERSTAGE

Dry Mass	8,748lb (3,968kg)
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#### EDS TLI PERFORMANCE

2-Launch EOR	2-Launch EOR
TLI dV (Adj. for Gravity Losses)	3,220.0m/s (+ FPR)
LEO Loiter Period	5.0 days
TLI Payload Performance*	<b>162,469lb (73,695kg) ‡</b>

Work In Progress

6th June 2009

\* ASE is part of the Payload, not additional

† Ascent Performance for Jupiter-246 protects for Upper Stage Single-Engine-Out and full FPR  
‡ TLI Performance for Jupiter-246 protects for Upper Stage Dual-Engine-Out and full FPR