STS – 335
Level A Groundrules And Constraints

One Cycle To Flight Profile
Launch Date: June 28, 2011

Note: This product will be used for STS-335 I-Load design.
The data in this document is applicable for the STS-135 mission.

Flight Design And Dynamics Department
January 20, 2011

United Space Alliance

Flight Design and Dynamics Department
United Space Alliance
Houston, Texas

STS-335 Level A Groundrules and Constraints

This document contains the approved groundrules and constraints and associated trajectory to be used in generating the One Cycle to Flight Profile. Hardware development, software verification, and crew training should be consistent with the data presented.

These groundrules and constraints are approved and controlled by the office of the USA Flight Design and Dynamics Department, Flight Design Management Unit. Configuration Management Requirements of the Flight Operations Panel (FOP) function are specified in the Flight Design Management Plan.

Prepared By: USA Flight Design Management Office
USA Flight Design and Dynamics Department

Submitted by:

Original signed by — *01/20/2011*
Jennifer Flinn — Date
STS-335 Flight Design Manager

Approved by:

Original signed by	*01/20/2011*	*Original signed by*	*01/20/2011*
Dawn G. Kyle Group Lead, Flight Design Managers	Date	Greg E. Schrage FOP Chairman	Date

STS-335
Level A Groundrules and Constraints
Description of Changes to
One Cycle to Flight Profile

Change Notice	Description/Authority	Date	Pages Affected
Baseline	Baseline One Cycle to Flight Groundrules and Constraints	12-06-10	All
Change 1	Updated applicability of the STS-335 Level A GR&C to the STS-135 mission.	01-20-11	i, ii, iii, and 40

INTRODUCTION

This document defines the Level A Groundrules and Constraints and associated profile baselined by the Flight Operations Panel which will be used in generating the One Cycle to Flight (OCF) profile for STS-335.

STS-335 MISSION DESCRIPTION

The objective of this launch on need (LON) mission is to rescue the shuttle crew in the event of a contingency that prevents the safe return of the shuttle vehicle. The LON flight will utilize the Multi-Purpose Logistics Module (MPLM) for resupplying the depleted Contingency Shuttle Crew Support (CSCS) supplies.

The Lightweight Multi-Purpose Experiment Support Structure (MPESS) carrier will deliver the Robotic Refueling payload and return the failed Pump Module (PM).

JENNIFER FLINN/DM2
DAWN GABRIEL/DM2

STS-335
MISSION OBJECTIVES

PRIMARY OBJECTIVES

- Return the stranded STS-134 crew of six from the International Space Station (ISS) in the event of a contingency that prevents the safe return of the STS-134 vehicle.

SECONDARY OBJECTIVES

- Deliver Contingency Shuttle Crew Support (CSCS) supplies
    - Multi-Purpose Logistics Module (MPLM)
    - Lightweight Multi-Purpose Experiment Support Structure (MPESS) Carrier (LMC)
        - Deliver the Robotic Refueling payload
- Return failed Pump Module (PM) on LMC

PAYLOAD OF OPPORTUNITY (NO DEDICATED BURNS BUDGETED)

- Maui Analysis of Upper Atmospheric Injections (MAUI)
- Shuttle Exhaust Ion Turbulence Experiment (SEITE)
- Shuttle Ionospheric Modification with Pulsed Local Exhaust (SIMPLEX)
- RAM Burn Observations 2 (RAMBO-2)

DEVELOPMENT TEST OBJECTIVES (DTOs)

- DTO 701A – TriDAR Automated Rendezvous and Docking (AR&D) Sensor
- DTO 900 – Shuttle RSRB Chamber Pressure, Strain Gauge, and Acceleration Rates Data Collection

JENNIFER FLINN/DM2
DAWN GABRIEL/DM2

STS-335
CARGO REQUIREMENTS

HARDWARE	TDDP WEIGHT (LB)
Ascent Configuration	
MPLM	26,517
LMC	3,045
M/D Control Weight	8,111
Descent Configuration	
MPLM	26,440
LMC	3,510
M/D Control Weight	9,200

JENNIFER FLINN/DM2
DAWN GABRIEL/DM2

STS-335
FLIGHT OVERVIEW

	OCF CYCLE
LAUNCH DATA:	
DATE	JUNE 28, 2011
TIME	19:40:17 GMT
WINDOW DURATION	10 MINUTES
LAUNCH PAD	39A
FLIGHT DURATION:	12 + 0 + 2 DAYS
CREW:	4 UP / 10 DOWN
ORBIT DATA:	
INSERTION ALTITUDE	122 N. MI.
MIN PERIGEE ALTITUDE	85 N. MI.
MAX RENDEZVOUS ALTITUDE	205 N. MI.
INCLINATION	51.6°
BETA ANGLE @ LAUNCH, MAX, EOM + 3 DAYS	22.33°, -28.69°, -28.69°
EVAs (ORBITER BASED)	1 SCHEDULED / 1 UNSCHEDULED
VEHICLE DATA:	
ORBITER	OV-104
NUMBER OF CRYO TANK SETS	5 (NO OFFLOAD)
GN2 TANKS	5 (NO OFFLOAD)
OMS LOAD	24,860 LBM (NEAR FULL)
FORWARD RCS LOAD	1,912 LBM (MIN)
ORBITER SOFTWARE	OI-34
ET	SLWT

STS-335
FLIGHT OVERVIEW
ASCENT SUMMARY

Michele Kocen / USH-482L

ITEM	335 OCFR3
TDDP	OCFAF335(001)
OMS ASSIST (sec)	95
MECO ALTITUDE (nmi)	52
Q CONSTRAINT / PE ALPHA TARGET	PE OPS HIGH Q SUM/ PE MAX ALPHA
SSME THROTTLE SCHEDULE 1st STAGE (%)	104 / 104 / 72 / 104
ASCENT MEAN WINDS / SRB BULK TEMP.	JUN / 78

STS-335
FLIGHT OVERVIEW – Continued
ASCENT SUMMARY

Michele Kocen / USH-482L

ITEM	335 OCFR3
TDDP ASCENT PERFORMANCE MARGIN (lb)	**1475**
DESIGN ASSESSMENT PERFORMANCE MARGIN (lb)	**1475**
Protection for DOL Dispersions	-700
Projection to 5 Minute Window from Inplane	-600
Payload (difference between sim & greenbook)	-70
STS Operator (difference between sim & greenbook)	24
Crew Compartment (difference between sim & greenbook)	70
SRB BR 1.55 MIL Higher than .3705 Avg	310
Estimated Actual SRB WGT from Gen. Report	-125
PROJECTED ASSESSMENT PERFORMANCE MARGIN (lb)	**384***

***CONTAINS 11/30/2010 GREEN BOOK PROJECTIONS**

JENNIFER FLINN/DM2
DAWN GABRIEL/DM2

STS-335
DESCENT SUMMARY

MAXIMUM CROSSRANGE (NMI.)

APPROACH / DIRECTION	UNDISPERSED	DISPERSED	NOMINAL
A / L	840	787	740
A / R	896	839	N/A
D / L	855	793	N/A
D / R	886	823	N/A

NOTE: A/L IS THE MISSION SPECIFIC CASE.

LANDING SITES:

EOM	- PRIME	KSC 15
	- ALTERNATE	EDW 22
	- ALTERNATE	NOR 17
RTLS	- PRIME	KSC33
TAL	- PRIME	ZZA 30
	- ALTERNATE	MRN 20
	-ALTERNATE	FMI 33
AOA	- PRIME	KSC 15
	- ALTERNATE	NOR 17

JENNIFER FLINN/DM2
DAWN GABRIEL/DM2

STS-335
CONTINGENCY ABORT BLACK ZONE STATUS

- Contingency Abort Black Zone (CABZ) assessment is required
  - Mass properties meet the CABZ assessment criteria of liftoff weight greater than 259,000 LBM and X-CG aft of 1115.0 IN
  - Liftoff mass properties: 267,147 LBM and X-CG = 1119.8 IN
  - A flight-specific assessment will be performed after I-Load submit if the criteria is still exceeded

STS-335 LANDING SITE TABLE
(50° to 63.5° INCLINATION)

Version OR301

SITE	LOCATION	RWY	TACANS		MLS CH	LG	+ OVR RUN
				ITEM 5			
1	KSC	KSC 15 KSC 33	TTS 59Y	COF 97	8 6	15000 15000	1000 1000
2	BEN GUERIR	BEN 36 BEN 18	MAK 80 ■	CBA 116 ■	- -	13720 13220	0 1000
3	MORON AB	MRN 20 MRN 02	MRN 100	AOG 23	◆6 -	11730 11730	1000 1000
4	ZARAGOZA	ZZA 30L ZZA 12R	ZZA 64	ZAR 77 ■	◆6 -	12200 12200	1000 1010
5	MYRTLE BEACH	MYR 36 MYR 18	ILM 117	FLO 99	- -	9500 9500	1000 1000
6	WILMINGTON	ILM 06 ILM 24	ILM 117	DIW 107 ■	- -	7500 7500	0 0
7	CHERRY POINT	NKT 32L NKT 23R	EWN 83 ■	NCA 101	- -	7110 7100	800 880
8	OCEANA NAS	NTU 32R NTU 23L	NGU 86Y	ORF 116	- -	7500 11500	0 0
9	WALLOPS	WAL 28 WAL 04	SBY 49	SWL 71	- -	7510 8750	0 0
10	DOVER AFB	DOV 32 DOV 19	SIE 95	CYN 81	- -	12400 9100	0 0
11	ATLANTIC CITY	ACY 31 ACY 13	CYN 81	SIE 95	- -	9500 9500	0 0
12	BEN GUERIR	BEN 36 BEN 18	MAK 80 ■	CBA 116 ■	- -	13720 13220	0 1000
13	*MORON AB	MRN 20 MRN 02	MRN 100	AOG 23	◆6 -	11730 11730	1000 1000
14	*ZARAGOZA	ZZA 30L ZZA 12R	ZZA 64	ZAR 77 ■	◆6 -	12200 12200	1000 1010
15	GABRESKI	FOK 06 FOK 24	HTO 83	GON 45Y■	- -	8500 8500	1000 1000

◆ Available for TAL Only
* LO XRNG TAL Site

■ DME
Length after displaced threshold

STS-335 LANDING SITE TABLE
(50° to 63.5° INCLINATION)

Version OR301

SITE	LOCATION	RWY	TACANS		MLS CH	LG	+ OVR RUN
				ITEM 5			
16	CAPE COD CGAS	FMH 32 FMH 23	PVD 103	ACK 109 ■	- -	9000 7500	0 0
17	PEASE INT'L	PSM 34 PSM 16	ENE 118	BOS 74 ■	- -	10020 10020	0 0
18	HALIFAX INT'L	YHZ 23 YHZ 32	UAW 38	YHZ 98 ■	- -	8800 7700	0 0
19	STEPHENVILLE	YJT 09 YJT 27	YJT 78	YDF 80 ■	- -	9500 9500	0 0
20	ST JOHNS INT'L	YYT 29 YYT 11	UYT 23	YYT 82 ■	- -	8500 8500	0 0
21	GANDER INT'L	YQX 21 YQX 31	YQX 74	IQX 32 ■	- -	9700 8900	0 0
22	GOOSE BAY	YYR 26 YYR 34	UYR 40	YYR 120 ■	- -	10550 9080	0 0
23	LAJES AB	LAJ 15 LAJ 33	TRM 109	LAJ 45	- -	10870 10870	970 990
24	BEJA AB	BEJ 01L BEJ 19R	MOJ 37	BEJ 105	- -	10820 10820	0 900
25	KEFLAVIK INT'L	IKF 20 IKF 29	KEF 57	HL 44 ■	- -	9520 9560	0 0
26	SHANNON	INN 06 INN 24	SHA 80 ■	CRK 93 ■	- -	9540 9540	0 0
27	FAIRFORD	FFA 27 FFA 09	FFA 81	BZN 56	- -	9490 9490	990 970
28	KOLN-BONN	KBO 14L KBO 32R	GIX 18	DOR 23Y ■	- -	12020 12020	0 0
29	ISTRES AB	FMI 33 FMI 15	◆FMI 16	NIM 53	◆6 -	11300 12300	3960 0
30	ESENBOGA	ESN 03R ESN 21L	BAG 78 ■	BUK 90 ■	- -	11800 11800	0 0

◆ Available for TAL Only

■ DME

Length after displaced threshold

STS-335 LANDING SITE TABLE
(50° to 63.5° INCLINATION)

Version OR301

SITE	LOCATION	RWY	TACANS		MLS CH	LG	+ OVR RUN
				ITEM 5			
31	KING KHALED	KKI 15R KKI 33L	RIY 92	KIA 80	- -	13300 13300	0 0
32	DIEGO GARCIA	JDG 31 JDG 13	NKW 57	NKW 57	- -	12000 12000	950 950
33	AMBERLEY TINDAL RAAF	AMB 15 PTN 14	AMB 94 -	- TDL 70	- -	9500 8500	0 0
34	YOKOTA AB	JTY 36 JTY 18	SHT 19	NJA 98	- -	11000 11000	1000 1000
35	ANDERSEN AFB	GUA 06L GUA 24R	UAM 54	UNZ 105	- -	10560 10560	1050 1000
36	WAKE ISLAND	WAK 28 WAK 10	AWK 82	AWK 82	- -	9340 9340	0 0
37	HONOLULU	HNL 08R HNL 26L	HNL 95	NGF 93	- -	11500 11500	0 0
38	ELMENDORF	EDF 24 EDF 06	EDF 81	BGQ 72	- -	9500 9500	0 0
39	HAO ATOLL	HAO 12 HAO 30	HAO 85 ■	HAO 85 ■	- -	10690 10690	0 0
40	EDW TEMP	EDT 22R EDT 04L	EDW 111	LHS 21	8 6	12000 12000	1000 1000
41	ASCENSION	HAW 13 HAW 31	ASI 59	ASI 59	- -	9520 9520	0 0
42	NORTHRUP	NOR 17 NOR 23	SNG 121Y	HMN 92	6 6	15000 15000	Lkbd Lkbd
43	NORTHRUP	NOR 05 NOR 35	SNG 121Y	HMN 92	- -	15000 15000	Lkbd Lkbd
44	EDWARDS AFB	EDW 15 EDW 18L	EDW 111	LHS 21	- -	16300 15000	Lkbd Lkbd
45	EDWARDS AFB	EDW 22 EDW 04	EDW 111	LHS 21	8/† 6	15020 14020	0 1800

† MSBLS Jr. Ch 8 - Requires Uplink

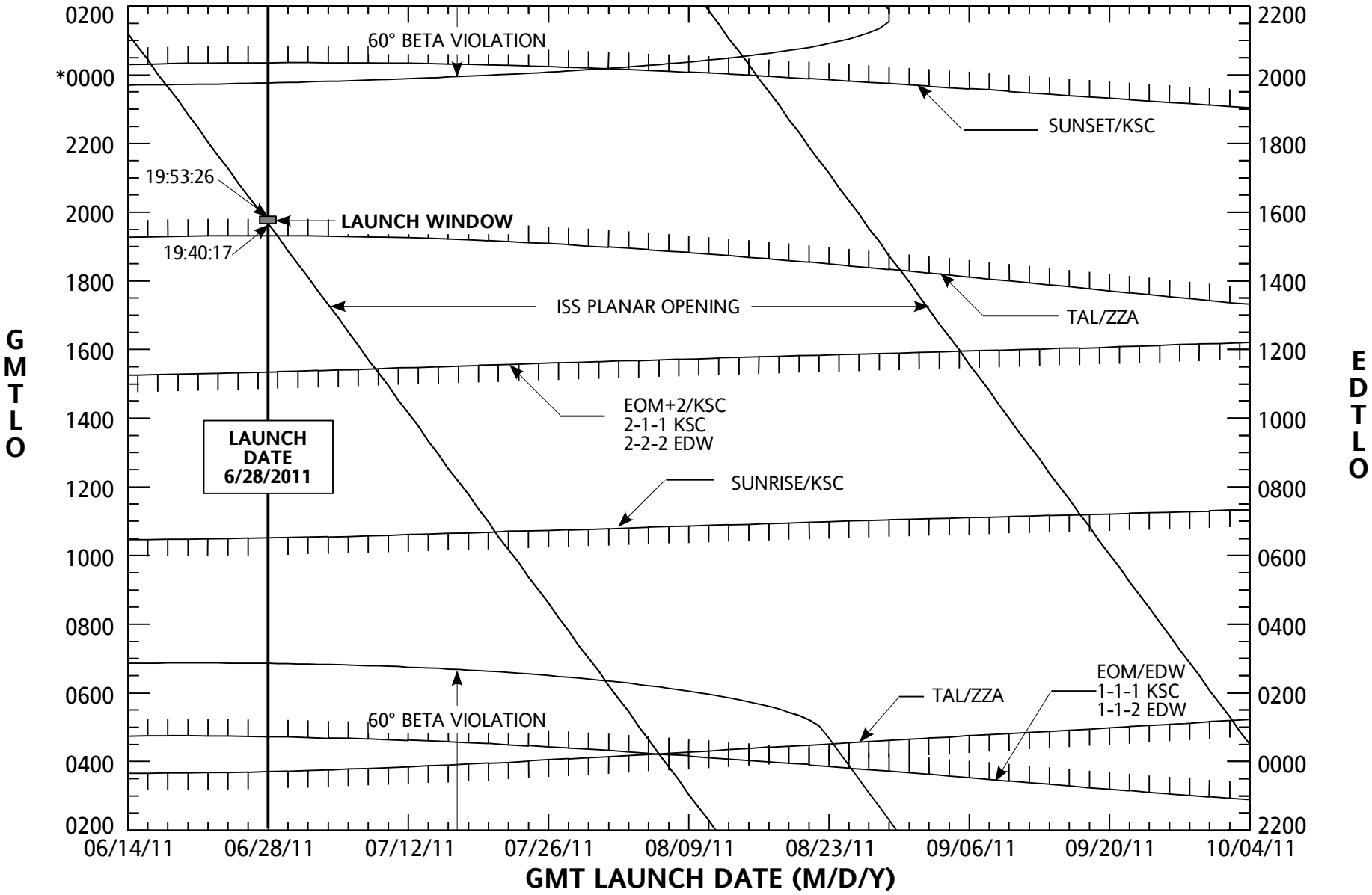
■ DME

Length after displaced threshold

Mission Duration = 12+0+2
Inclination = 51.6°
OMS2 ha/hp = 124 x 85 nmi.
Target ha/hp = 208 x 202 nmi.

STS-335
LAUNCH WINDOW

C. Oliver/USH-483L
P. Gentry/USH-483L

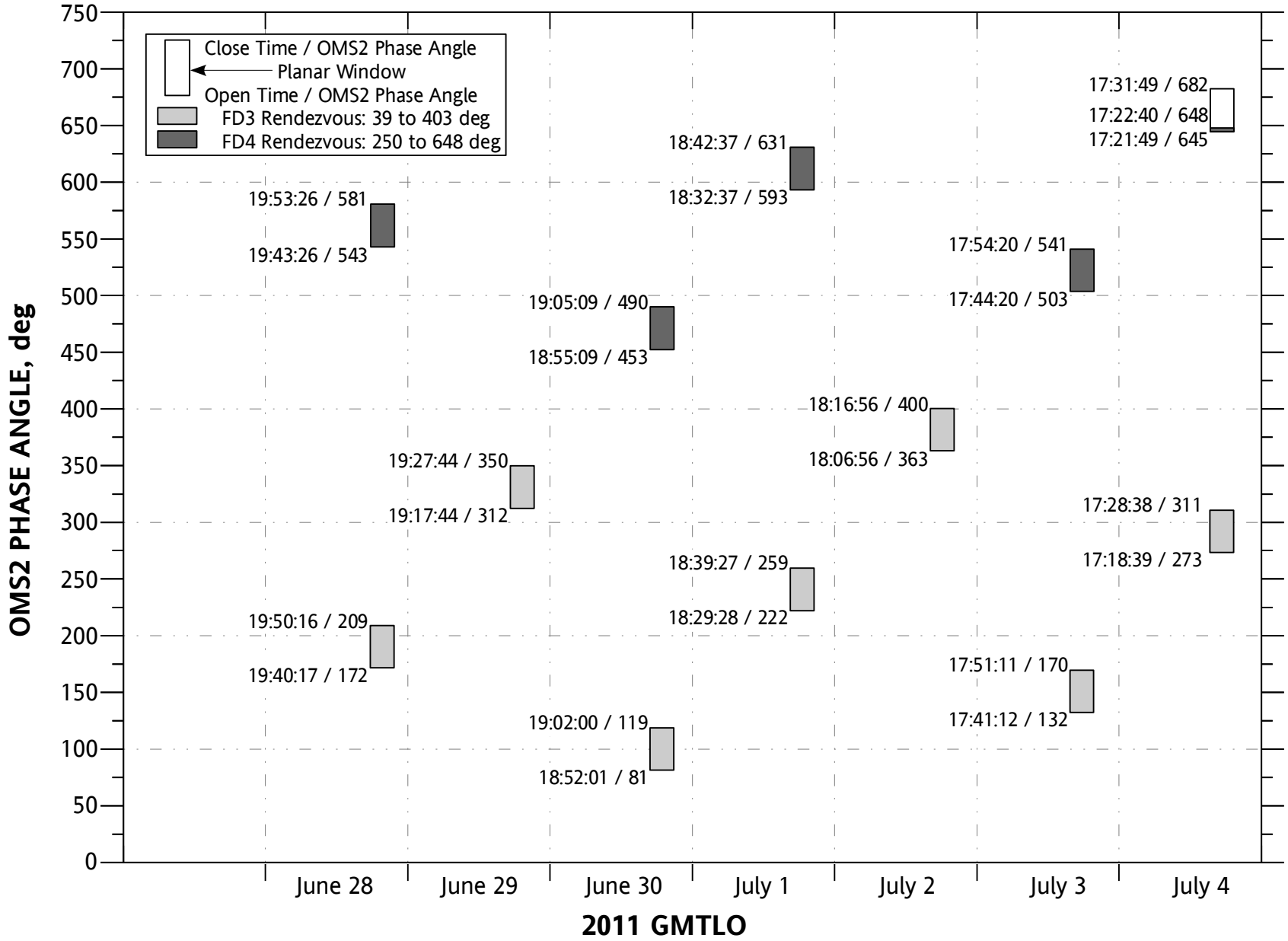


Note: EOM lighting lines, based on an OMS2 phase angle of 172 deg, are representative only.
The ISS beta angle ($|\beta| < 60°$) for mated operation is beginning ~ 1/23:55:10 MET (FD3 Rendezvous) and ending ~ 9/14:20:00 MET.
* **indicates the dateline. Launch times above this point are on subsequent days from the date indicated on the corresponding date axis.**

ISS State Vector
Source: 028fin/topo29
Received: 10/14/2010
Target ha/hp = 208 x 202 nmi.

STS-335
DAILY PLANAR/PHASE WINDOWS

C. Oliver/USH-483L
P. Gentry/USH-483L



C. Oliver/USH-483L
P. Gentry/USH-483L

STS-335
LAUNCH WINDOW SUMMARY

LAUNCH WINDOW

- Consists of the planar and phase windows
- Follows ISS planar opening time throughout the year
- Based on ISS vector 028fin/TOPO29 v1 received on October 14, 2010

PLANAR WINDOW

- Maximum duration is 10 minutes based on thermal limits
- ISS planar opening occurs approximately 24 minutes earlier each day
  (Repeating approximately every 60 days)

PHASE WINDOW

- Phase angle range based on 205 nmi target average altitude and 85 nmi Orbiter minimum perigee
- Phase angle range at OMS2: 39° to 403° for a flight day 3 rendezvous
- Phase angle range at OMS2: 250° to 648° for a flight day 4 rendezvous
- There is a 88% chance of a full planar window with flight day 3 rendezvous capability
  - 12% chance that flight day 3 capability will be a partial window
  - 0% chance that no flight day 3 planar window exists

STS-335
LAUNCH WINDOW SUMMARY (cont.)

SSP LIGHTING

- For June 28, 2011 GMT launch date, launch, RTLS, and EOM landings are in daylight; however, TALs are in darkness
- Daily shift of planar window and/or ISS planar uncertainties may result in lighting changes for launch, aborts, and EOM landing opportunities
- Daylight EOM protection will vary with OMS2 phase angle

BETA ANGLE OF $|\beta| < 60°$ FOR MATED OPERATIONS

- Solar beta angle constraint of $|\beta| < 60°$ for mated operations is satisfied for a June 28, 2011 GMT launch
- The 60° solar beta angle constraint will be violated from August 1, 2011 through August 15, 2011 launch dates

C. Oliver/USH-483L
B. Yarbrough/USH-483L
D. Brownfield/USH-483L

STS-335

SEQUENCE OF EVENTS

LAUNCH DATE: JUN 28, 2011
LIFTOFF: 19:40:17 GMT

EVENT	ORBIT	DAILY ORBIT	MET (DD:HH:MM)	REFERENCE DELTA V (FPS)	HP/HA (N. MI.)		HOUSTON DATE	HOUSTON TIME (CDT)
LAUNCH	***	***	0:00:00	****	***	***	06/28/2011	14:40
OMS2	1	6	0:00:39	97.1	85	124	06/28/2011	15:19
NC1	3	8	0:03:31	202.2	122	200	06/28/2011	18:11
NC2	13	2	0:18:36	8.0	123	204	06/29/2011	09:16
NPC	13	2	0:18:40	1.5	123	204	06/29/2011	09:20
NC3	20	9	1:05:55	69.1	161	204	06/29/2011	20:35
NH	29	3	1:18:51	0.0	162	204	06/30/2011	09:31
NC4	29	3	1:19:36	66.6	197	205	06/30/2011	10:16
Ti	30	4	1:21:08	8.9	201	208	06/30/2011	11:48
DOCK	32	6	1:23:55	****	202	208	06/30/2011	14:35
UNDOCK	151	1	9:14:20	****	200	209	07/08/2011	05:00
SEP1	152	2	9:15:35	3.0	200	209	07/08/2011	06:15
SEP2	152	2	9:16:03	1.5	201	209	07/08/2011	06:43
NC5	157	7	10:00:00	0.0	201	209	07/08/2011	14:40
DEORBIT	185	5	11:18:20	323.0	***	***	07/10/2011	09:00
LANDING	186	6	11:19:26	****	***	***	07/10/2011	10:06

Notes: (1) HP and HA altitudes prior to deorbit are 200 X 209 NM.
(2) Sequence of events is based on OMS2 phase angle of 172 degrees. Event times, burn delta-Vs, HA and HP will vary with actual OMS2 phase angle.
(3) Ti occurs at Sunset - 38.5 minutes. Undocking occurs at Midnight - 2 minutes.
(4) SEP1 burned DV is 1.5 fps. Effective DV is 3.0 fps due to a resultant flyaround.
(5) SEP1 and SEP2 burn times assume a 1 lap flyaround.

B. Yarbrough/USH-483L
S, Snyder/USH-483L

STS-335
RENDEZVOUS DESIGN ASSUMPTIONS AND CONSTRAINTS

- 208 X 202 nmi predicted ISS orbit
- 172 degrees predicted OMS2 phase angle
- 1 orbit transfer from NC4 to Ti
- Docking with ISS on flight day 3
- 124 nmi effective insertion altitude
- 85 nmi minimum perigee
- Propellant budget does not protect for FD4 rendezvous
- The Ti lighting constraint is sunset - 38.5 minutes because the solar beta angle is within +/- 15 degrees during the manual phase

STS-335
ISS-LON APPROACH DESIGN

ISS CONFIGURATION FOR FINAL APPROACH

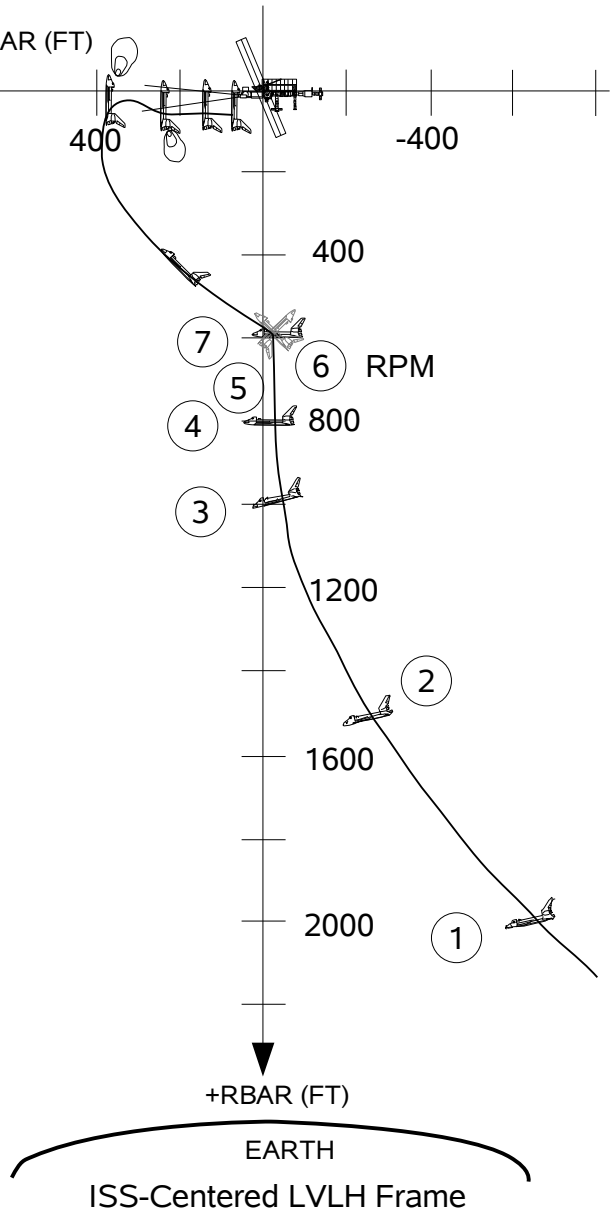
- ISS in LVLH hold (+XVV +ZLV) with PMA2 docking port pointed along +Vbar and arrays feathered for plume loads
- Solar array feathering, radiator feathering, SSRMS position, and visiting vehicle configuration may be different from figures

APPROACH PROFILE

- LOWZ required from 1000 ft. to 75 ft.
- **R**bar **P**itch **M**aneuver (RPM) at 600 ft.
  - 360 degree pitch rotation at 0.75 deg./sec.
  - Terminal phase range rate gates lowered to set up for RPM
  - May require up to 14 minutes of Rbar stationkeeping to avoid Orbiter shadowing by ISS for beta angles less than 20 deg.
- Initiate **T**wice **O**rbital rate **R**bar to **V**bar **A**pproach (TORVA) at 600 ft. after RPM
- Post-Vbar arrival
  - 8 deg. corridor from 250 ft. to 35 ft. and then 5 deg. corridor until 3 ft.
  - Inside 170 ft., ±Y pulses restricted to DAP B
  - Transition to NORMZ at 75 ft., +Z pulses restricted to DAP B, single -X jet configuration continues to be used to avoid requiring a new Loads jet-firing database
  - Stationkeep at 30 ft. if required to provide for possible angular alignment maneuver

D. Brownfield/USH-483L
G. Bartz/USH-483L

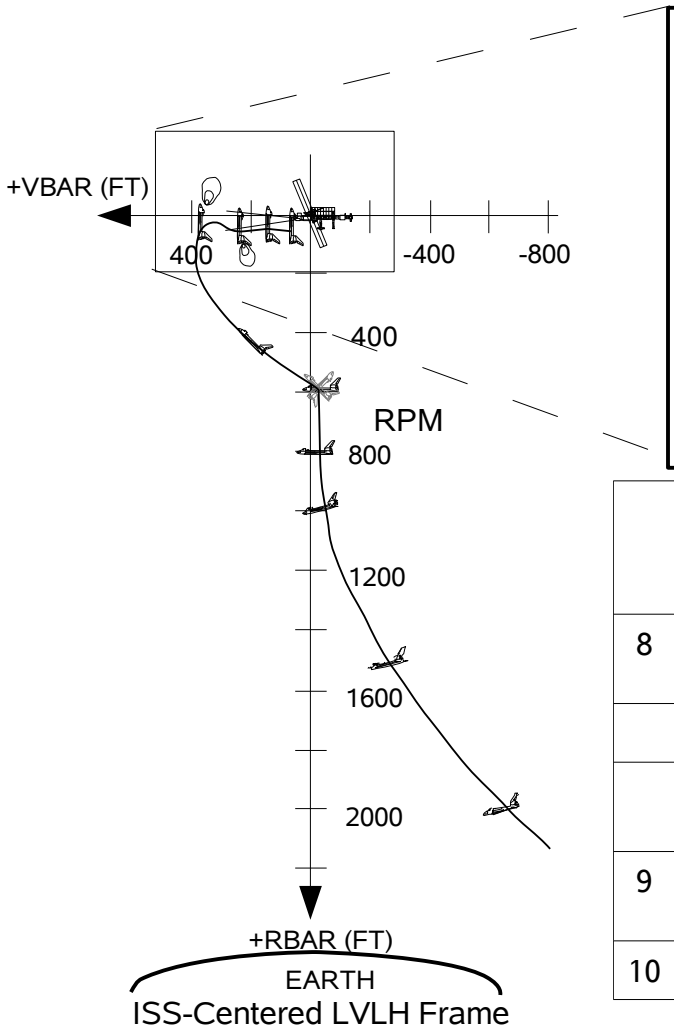
STS-335
TERMINAL PHASE, RPM, AND TORVA

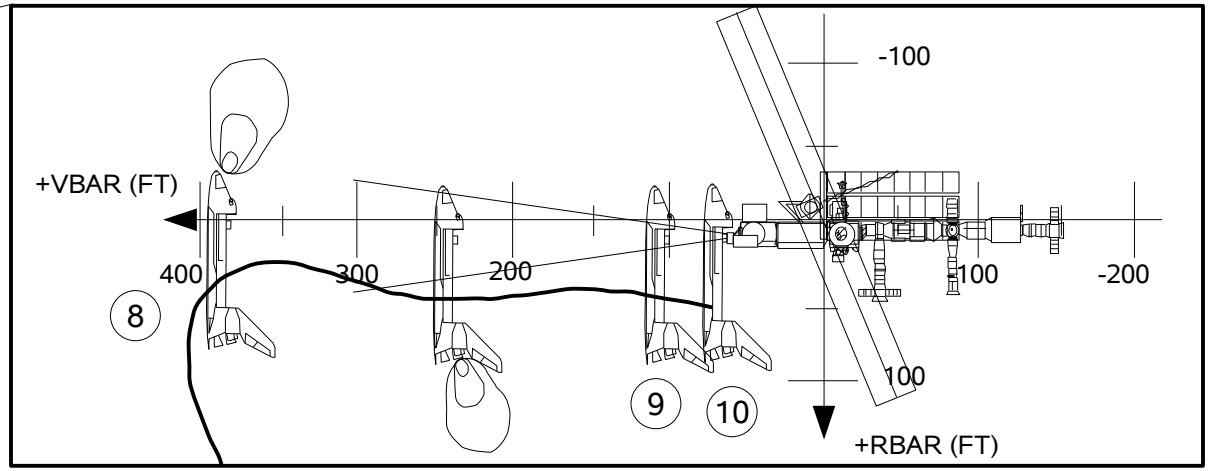


	MC2 ET (h:mm)	Range (ft) CG - CG	Rdot (fps)	EVENT
1	0:27	2000	-3.0	MANUAL PHASE TAKEOVER (POST-MC4)
	0:29	1700	-2.4	
2	0:31	1500	-2.1	
3	0:36	1000	-1.3	TRANSITION TO LOWZ
	0:37	900	-1.1	
4				WHEN IN RBAR ATTITUDE:LOAD DAP A9/B9 MOD DAP A PRI/VERN ROT RATE TO 0.75 DEG/SEC AND YAW JET OPTION TO BOTH NOSE & TAIL (ALL) LOAD UNIV PTG P=145 DEG
		800	-0.9	
		700	-0.6	
		650	-0.4	
5	0:46	620	0.0	STATIONKEEP TO AVOID SHADOWING IF REQUIRED
6	1:00	OPTION 620 OPTION 600 OPTION 580	-0.35 -0.25 -0.15	**INITIATE RPM**: DAP A/PRI, ITEM 19 WHEN -Z ADI PITCH > 100 DEG; DAP A/VERN WHEN -Z ADI PITCH > 170 DEG; DAP FREE, RESET UNIV PTG P=270 DEG, ITEM 19 DIGITAL IMAGERY TAKEN FROM ISS SM WHEN -Z ADI PITCH > 10 DEG: DAP PRI/AUTO WHEN RPM COMPLETE: DAP VERN
7	1:11	OPTION 600 OPTION 550 OPTION 500	-0.7 -0.6 -0.4	RELOAD DAP A9, LOAD UNIV PTG P=179 DEG, REESTABLISH RDOT PER TORVA ICs **INITIATE TORVA**: DAP A, ITEM 19 (+X PULSES AS REQ'D TO NULL TARGET MOTION IN CAMERA)

D. Brownfield/USH-483L
G. Bartz/USH-483L

STS-335
VBAR APPROACH





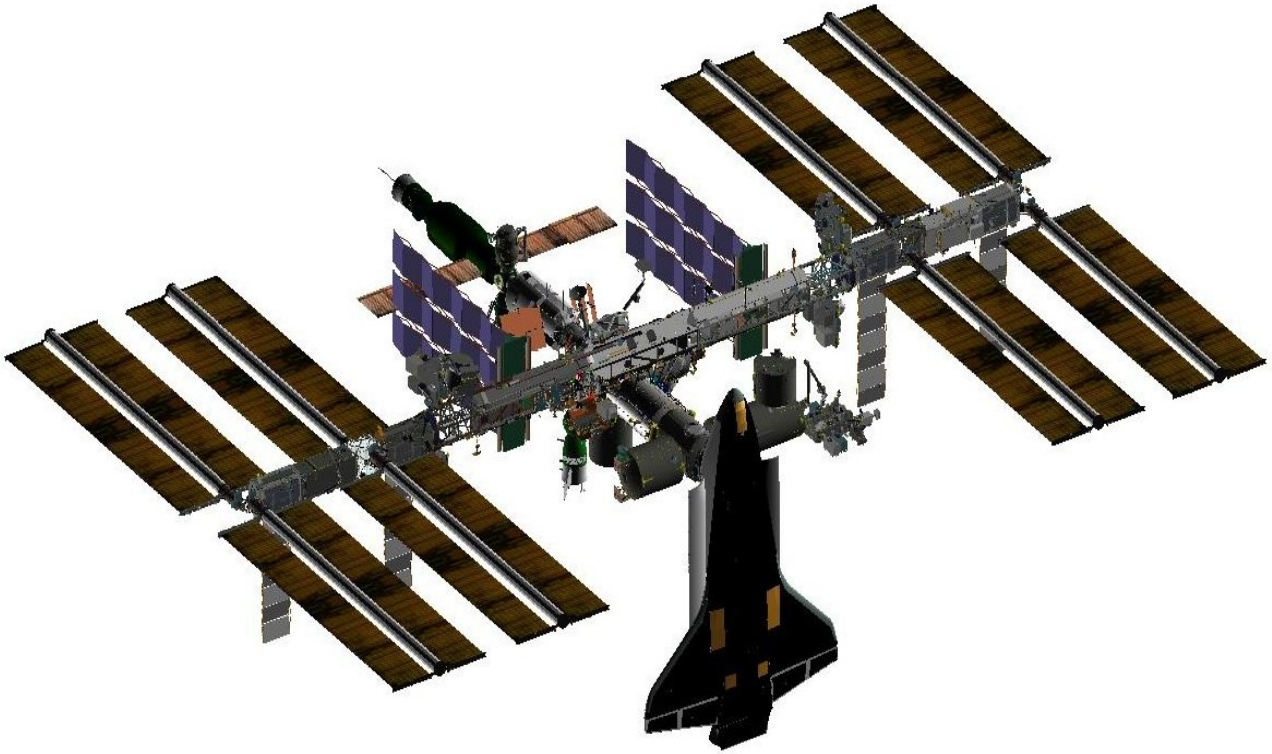
	MC2 ET (h:mm)	Range (ft) DP - DP	Rdot (fps)	EVENT
8	1:25	320	-0.20	VBAR ARRIVAL (-X PULSES AS REQ'D TO NULL TARGET MOTION IN CAMERA)
	1:42	110	-0.15	
	1:46	75	-0.10	TRANSITION TO NORMZ, LOAD DAP A10/B10, CONFIGURE FOR SINGLE -X JET
9	1:54	30	-0.07	STATIONKEEP FOR 5 MINUTES IF ANGULAR ALIGNMENT MANEUVER REQUIRED
10	2:05	0	-0.10	DOCKING

D. Brownfield/USH-483L
G. Bartz/USH-483L

STS-335
ISS-LON SEPARATION DESIGN

ISS CONFIGURATION FOR UNDOCKING

- ISS undocking attitude the same as approach
  - ISS LVLH PYR (0, 0, 0)
  - Orbiter LVLH PYR (90, 0, 0)
- Arrays feathered for plume loads, ISS self-impingement loads, and power balance



Solar array feathering, radiator feathering, SSRMS position, and visiting vehicle configuration may be different from the figure

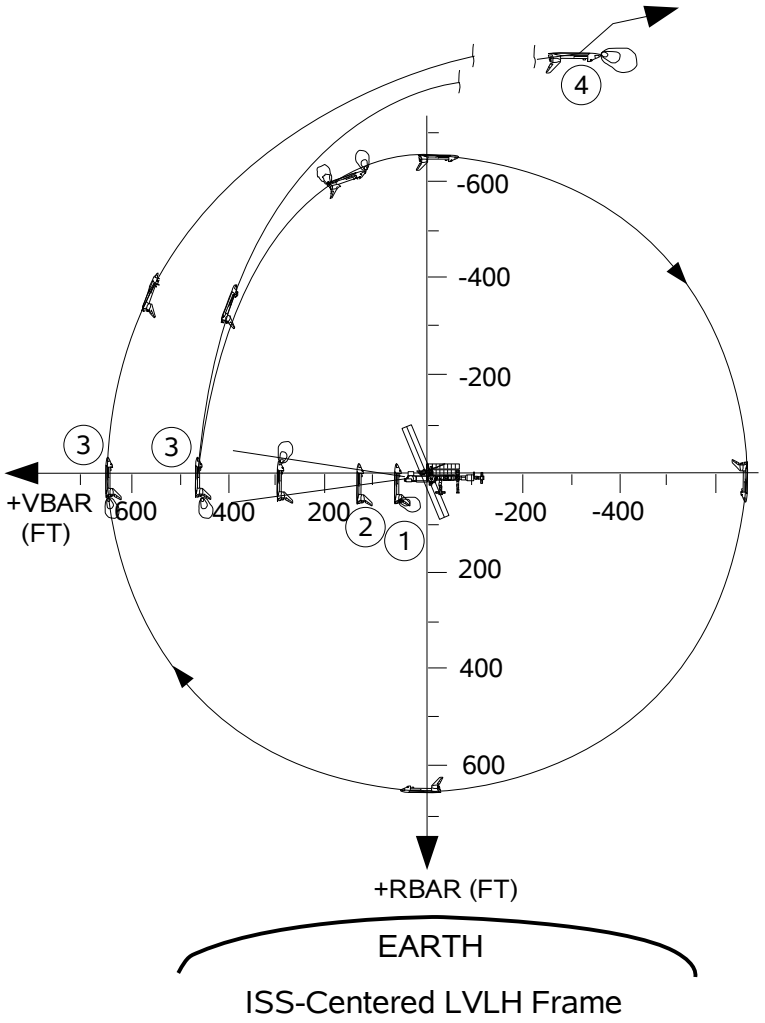
STS-335
ISS-LON SEPARATION DESIGN (CONTINUED)

SEPARATION PROFILE

- Undocking time of midnight - 2 minutes chosen to ensure sunlight for flyaround (if performed)
- Separation profile designed to minimize plume impingement and propellant usage
  - Initial separation sequence combines attitude control firings and +Z burns to achieve opening rate
    - ALT DAP mode with 0.08 sec. on time limit and 10 sec. delay required for attitude control
    - DAP B and 10 sec. intervals required for +Z translations inside 75 ft.
    - Timing and burn size constraints imposed to protect solar arrays of the Russian docked vehicles
  - Prior to 50 ft., single -X jet configuration continues to be used to avoid requiring a new Loads jet-firing database
  - 8 degree corridor separation along the +Vbar
  - Inside 150 ft., ±Y pulses restricted to DAP B
  - LOWZ between the ranges of 75 ft. and 1000 ft.
  - If no flyaround, Vbar separation sequence performed outside 400 ft.
- If prop available, a 1 lap **T**wice **O**rbital **R**ate **S**eparation/**F**lyaround (TORS/TORF) performed for photographic survey of ISS
  - Flyaround required to be outside 600 ft. range for plume loads
  - After TORF, perform Vbar separation sequence

D. Brownfield/USH-483L
G. Bartz/USH-483L

STS-335
UNDOCKING, TORS/TORF, AND FINAL SEPARATION



	UNDOCK ET (h:mm)	Range (ft) DP - DP	EVENT
	-0:03	0	ORBITER AND ISS IN FREE DRIFT TO BEGIN UNHOOKING (ISS LVLH PYR 0, 0, 0, ATTITUDE)
1	0:00	0 2	**UNDOCKING** AT MIDNIGHT-2 MIN; DAP B/ALT MODE TO LVLH; MAINTAIN CORRIDOR
	0:01		SELECT VERNS; PERFORM DAP B +Z NORMZ BURNS AT 10 SEC INTERVALS TO BUILD OPENING RATE TO 0.15 FPS
	>0:03	>30	DAP B +Z NORMZ BURNS AT 10 SEC INTERVALS TO BUILD OPENING RATE TO 0.20 FPS
		50	RESELECT -X JETS
2	0:07	75	TRANSITION TO LOWZ
3	0:29 [1:15]*	>400 (CG-CG)	**SEP1:** 1.5 FPS +X RADIAL BURN [IF PROP AVAILABLE, PERFORM 1/4 LAP TORS BETWEEN 400 AND 600 FT (CG-CG); NULL OPENING RATE OUTSIDE 600 FT; PERFORM 3/4 LAP TORF BETWEEN 600 AND 700 FT; THEN PERFORM SEP1]
4	0:57 [1:43]*	>2000 (CG-CG)	**SEP2**: 1.5 FPS -X, NORMZ POSIGRADE BURN

* Alternate Times are for Flyaround Case

C. Oliver/USH-483L
B. Yarbrough/USH-483L
D. Brownfield/USH-483L

INFORMATION

- Addition of PSSC/Picosat to the flight will be picked up during the FRR design cycle. The 1.5 fps Orbiter SEP2 burn from ISS will have to be modified to accommodate the Picosat ejection.

C. Oliver/USH-483L
P. Gentry/USH-483L

STS-335
ABORT LANDING OPPORTUNITIES

LAUNCH DATE: 06/28/2011
LIFTOFF: 19:40:17 GMT

ABORT	SITE	ORBIT	XRANGE (NM)	DIR	LANDING MET (D:H:M)	TIME AFTER SUNRISE (H:M)	TIME BEFORE SUNSET (H:M)
RTLS	KSC	1			00:00:26	09:38	04:17
TAL	ZZA	1			00:00:38	-08:15	-00:37
	MRN	1			00:00:38	-08:48	-00:33
	FMI	1			00:00:38	-07:45	-00:54
AOA	KSC	2			00:01:54	11:06	02:50
	NOR	2			00:01:50	09:30	04:47
PLBD FAIL PRIME	EDW	4	617	A/R	00:04:48	11:47	02:40
PLBD FAIL B/U	KSC	6	381	D/R	00:08:08	-06:39	-03:24
PLBD FAIL B/U	NOR	7	276	D/R	00:09:37	-06:42	-03:00

NOTE: (-) = DARKNESS

C. Oliver/USH-483L
P. Gentry/USH-483L

STS-335
LANDING OPPORTUNITIES

EOM-1

LAUNCH DATE= 06/28/2011 LAUNCH TIME= 19:40:17.000 GMT H:M:S

ORBIT NO.	KSC CROSSRANGE NM A/D L/R	KSC --- LANDING TIMES --- MET/ DLST (D:H:M)	KSC --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)	EDW CROSSRANGE NM A/D L/R	EDW --- LANDING TIMES --- MET/ DLST (D:H:M)	EDW --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)	NOR CROSSRANGE NM A/D L/R	NOR --- LANDING TIMES --- MET/ DLST (D:H:M)	NOR --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)
170	* 707 A/L	10:18:51	9:52						
		10:31	3:59						
171	* 239 A/R	10:20:27	8:16						
		12:07	5:35						
172				* 534 A/L	10:21:58	9:29	* 29 A/L	10:21:59	8:36
					10:38	4:52		11:39	5:34
173				* 278 A/R	10:23:33	7:53	* 690 A/R	10:23:35	7:00
					12:14	6:28		13:16	7:11
174				* 831 A/R	11:01:10	6:16			
					13:50	8:05			
175	774 D/R	11:02:57	1:46						
		18:37	12:05						
176	40 D/L	11:04:33	0:10	774 D/R	11:04:25	3:01	620 D/R	11:04:28	2:08
		20:13	13:41		17:05	11:19		18:08	12:03
177				178 D/R	11:06:02	1:24	128 D/L	11:06:04	0:32
					18:42	12:56		19:44	13:39
178				660 D/L	11:07:37	-0:10			
					20:18	-9:28			

NOTE: (*) DENOTES ACCEPTABLE LANDING OPPORTUNITY
FOR A GROUND-UP RENDEZVOUS, LANDING OPPORTUNITIES WILL VARY WITH OMS 2 PHASE ANGLE.

C. Oliver/USH-483L
P. Gentry/USH-483L

STS-335
LANDING OPPORTUNITIES

EOM

LAUNCH DATE= 06/28/2011 LAUNCH TIME= 19:40:17.000 GMT H:M:S

ORBIT NO.	KSC CROSSRANGE NM A/D L/R	KSC --- LANDING TIMES --- MET/ DLST (D:H:M)	KSC --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)	EDW CROSSRANGE NM A/D L/R	EDW --- LANDING TIMES --- MET/ DLST (D:H:M)	EDW --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)	NOR CROSSRANGE NM A/D L/R	NOR --- LANDING TIMES --- MET/ DLST (D:H:M)	NOR --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)
186	101 A/L	11:19:26	9:16						
		11:07	4:34						
187	* 729 A/R	11:21:03	7:40	887 A/L	11:20:58	10:28	* 360 A/L	11:20:59	9:36
		12:43	6:10		9:38	3:52		10:39	4:34
188				* 6 A/L	11:22:33	8:53	* 448 A/R	11:22:35	8:00
					11:14	5:27		12:15	6:10
189				* 660 A/R	12:00:10	7:16			
					12:50	7:04			
191	295 D/R	12:03:33	1:09				831 D/R	12:03:27	3:08
		19:13	12:40					17:07	11:02
192	641 D/L	12:05:09	-0:25	438 D/R	12:05:01	2:24	183 D/R	12:05:04	1:31
		20:49	-9:43		17:42	11:55		18:44	12:39
193				321 D/L	12:06:37	0:48	695 D/L	12:06:39	-0:03
					19:18	13:31		20:20	-9:45

NOTE: (*) DENOTES ACCEPTABLE LANDING OPPORTUNITY
[ ] PRIMARY END OF MISSION LANDING SITE
FOR A GROUND-UP RENDEZVOUS, LANDING OPPORTUNITIES WILL VARY WITH OMS 2 PHASE ANGLE.

C. Oliver/USH-483L
P. Gentry/USH-483L

STS-335
LANDING OPPORTUNITIES

EOM+1

LAUNCH DATE= 06/28/2011 LAUNCH TIME= 19:40:17.000 GMT H:M:S

ORBIT NO.	KSC CROSSRANGE NM A/D L/R	KSC --- LANDING TIMES --- MET/ DLST (D:H:M)	KSC --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)	EDW CROSSRANGE NM A/D L/R	EDW --- LANDING TIMES --- MET/ DLST (D:H:M)	EDW --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)	NOR CROSSRANGE NM A/D L/R	NOR --- LANDING TIMES --- MET/ DLST (D:H:M)	NOR --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)
201	* 464 A/L	12:18:26	10:16						
		10:07	3:33						
202	* 441 A/R	12:20:02	8:40				* 714 A/L	12:19:59	10:36
		11:43	5:09					9:39	3:33
203				* 319 A/L	12:21:33	9:52	* 168 A/R	12:21:35	9:00
					10:14	4:27		11:15	5:09
204				* 440 A/R	12:23:09	8:16	* 821 A/R	12:23:11	7:23
					11:50	6:03		12:52	6:46
206	599 D/R	13:02:33	2:10						
		18:13	11:40						
207	268 D/L	13:04:09	0:33	658 D/R	13:04:01	3:25	462 D/R	13:04:03	2:31
		19:49	13:16		16:41	10:54		17:44	11:38
208				7 D/L	13:05:37	1:48	342 D/L	13:05:40	0:55
					18:18	12:31		19:20	13:14
209				888 D/L	13:07:13	0:13			
					19:53	14:06			

NOTE: (*) DENOTES ACCEPTABLE LANDING OPPORTUNITY
FOR A GROUND-UP RENDEZVOUS, LANDING OPPORTUNITIES WILL VARY WITH OMS 2 PHASE ANGLE.

C. Oliver/USH-483L
P. Gentry/USH-483L

STS-335
LANDING OPPORTUNITIES

EOM+2

LAUNCH DATE= 06/28/2011 LAUNCH TIME= 19:40:17.000 GMT H:M:S

ORBIT NO.	KSC CROSSRANGE NM A/D L/R	KSC --- LANDING TIMES --- MET/ DLST (D:H:M)	KSC --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)	EDW CROSSRANGE NM A/D L/R	EDW --- LANDING TIMES --- MET/ DLST (D:H:M)	EDW --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)	NOR CROSSRANGE NM A/D L/R	NOR --- LANDING TIMES --- MET/ DLST (D:H:M)	NOR --- LANDING TIMES --- BEFORE SS/ AFTER SR (H:M)
216	847 A/L	13:17:26	11:15						
		9:07	2:33						
217	* 120 A/R	13:19:02	9:40						
		10:42	4:09						
218	892 A/R	13:20:39	8:03	* 659 A/L	13:20:33	10:52	* 145 A/L	13:20:35	10:00
		12:19	5:45		9:14	3:26		10:15	4:08
219				* 179 A/R	13:22:09	9:16	* 608 A/R	13:22:11	8:24
					10:49	5:02		11:51	5:45
220				* 775 A/R	13:23:46	7:39			
					12:26	6:38			
221	866 D/R	14:01:32	3:10						
		17:12	10:39						
222	84 D/R	14:03:09	1:33	830 D/R	14:03:00	4:25	702 D/R	14:03:03	3:31
		18:49	12:15		15:41	9:53		16:43	10:37
223	889 D/L	14:04:44	-0:01	276 D/R	14:04:37	2:48	12 D/L	14:04:39	1:55
		20:25	-10:09		17:17	11:30		18:20	12:13
224				535 D/L	14:06:13	1:12			
					18:53	13:06			

NOTE: (*) DENOTES ACCEPTABLE LANDING OPPORTUNITY
FOR A GROUND-UP RENDEZVOUS, LANDING OPPORTUNITIES WILL VARY WITH OMS 2 PHASE ANGLE.

STS-335
PROPULSION SYSTEMS ANALYSIS

1) Propellant has been allocated for:
   - TPS Inspection
   - ET-photo opportunity +X translation and modified pitch maneuver
   - 48-Hour Extension
   - Any Attitude Sep/Wcbkout for No-Dock PLS
   - Emergency Sep for Nominal & EOM Contingency Payload Cases
   - 3 mated water/waste dumps with 6 maneuvers
   - Early and Late Inspection Surveys
2) Propellant has not been allocated for: fly-around, RCS hotfire, DTOs, or any other mated ops than those stated above.
3) OMS Assist is set to 95 sec (3717 lbm).
4) Aft fuselage ballast is 17 lbm.
5) No fluid ballast is required.
6) Relative to the 0.5" XCG margin protection, the abort & critical XCG margins at 'PRIOR TO WHEELS DOWN' event (with consideration to ballasting) are:
   - RTLS XCG margin is 8.77"
   - TAL XCG margin is 9.29"
   - DPLY ALL/RTRV MIDDECK ONLY has an XCG margin of 3.58".
7) The NO DOCK PLS case exceeds the EOM downweight limit by 868 lbm.

STS-335

OMS/RCS PROPELLANT REQUIREMENTS SUMMARY

ITEM	FWD RCS (LBM)	AFT RCS (LBM)	OMS (LBM)
TOTAL LOADED	1912	4970	24860
MISSION USAGE	904	2522	22685
TOTAL DISPERSIONS & CONTINGENCIES	433	2019	1366
UNUSABLE	282	378	797
BUDGETED BALLAST	0	0	0
TOTAL REQUIRED	1619	4919	24848
MARGINS	293	51	12

DATA REFERENCE: OCFAF335
FLT SOFTWARE: OI-34
ANALYSIS DATE: Mon Nov 22 12:38:17 2010

STS-335
MISSION USAGE BREAKDOWN

ITEM	Delta-V (FPS)	FWD RCS (LBM)	AFT RCS (LBM)	OMS (LBM)
ASCENT USAGE		195	478	3717 **
OMS-2 INSERTION BURN	97.1			2468
NC1	202.2			5059
NC2	8.0			198
NPC	3.3	4	100	
NC3	69.0			1698
NC4	66.8			1631
NCC		17	29	
TI	8.7			212
MC1-MC4 BURNS		41	96	
PROXIMITY OPERATIONS		143	229	
UNDOCK TO 400 FT		21	12	
SEP1	1.5	2	45	
SEP2	1.5	44	4	
ON-ORBIT USAGE		437	1180	
OMS DEORBIT BURN	326.0			7702
ENTRY USAGE			350	
MISSION USAGE		904	2522	22685

** ASCENT OMS ASSIST ENABLED

DATA REFERENCE: OCFAF335
FLT SOFTWARE: OI-34
ANALYSIS DATE: Mon Nov 22 12:38:17 2010

STS-335
TOTAL DISPERSIONS AND CONTINGENCIES

ITEM	FWD RCS (LBM)	AFT RCS (LBM)	OMS (LBM)
INFLIGHT GAUGE ERROR	84	168	
CONTINGENCY PAYLOAD RETURN	0	0	371
ENTRY REDLINE		825	
LTP BIAS	2	86	0
MPS DUMP BIAS	2	92	0
MINIMUM PERIGEE BIAS	0	0	234
TARGET ALT UNCERTAINTY BIAS	0	0	0
3-SIGMA NOMINAL DISPERSIONS	99	279	105
OMS DISPERSIONS	0	0	549
48 HOUR EXTENSION	244	552	106
MIXTURE RATIO BIAS	2	17	1
TOTAL DISPERSIONS & CONTINGENCIES	433	2019	1366

DATA REFERENCE: OCFAF335
FLT SOFTWARE: OI-34
ANALYSIS DATE: Mon Nov 22 12:38:17 2010

STS-335
PROPELLANT DUMP CONFIGURATION

CASE	MPS	OMS	ARCS	FRCS
RTLS	# 5143 LBM	* MIDPOINT 20656 LBM	185 SEC 2301 LBM	25 SEC 305 LBM
TAL	5143 LBM	** 11% GAUGE 20873 LBM	120 SEC 1493 LBM	60 SEC 732 LBM
AOA	5143 LBM	*** 927.1 FPS 23411 LBM	100.2 FPS 2907 LBM	0% GAUGE 1231 LBM
NOMINAL	5143 LBM	5% GAUGE 649 LBM	NO DUMP 0 LBM	0% GAUGE 633 LBM
NO DOCK PLS	5143 LBM	5% GAUGE 278 LBM	NO DUMP 0 LBM	0% GAUGE 859 LBM
DPLY ALL/RTRV MIDDECK ONLY	5143 LBM	5% GAUGE 1598 LBM	NO DUMP 0 LBM	0% GAUGE 638 LBM
DPLY MPLM ONLY/NO RTRV MIDDECK	5143 LBM	5% GAUGE 724 LBM	NO DUMP 0 LBM	0% GAUGE 633 LBM

\# MPS LO2 DUMP DELAY OF 53.0 SEC IMPLEMENTED FOR THIS FLIGHT
MPS LO2 8" FILL AND DRAIN DELAY OF 30.0 SEC IMPLEMENTED FOR THIS FLIGHT

* RTLS PRE-MECO OMS DUMP TO MIDPOINT WITH INTERCONNECT ENABLED

** TAL OMS DUMP INCLUDES PRE-MECO OMS DUMP (18448 LBM) WITH INTERCONNECT ENABLED AND 100.0 FPS POST-MECO OMS DUMP (2425 LBM) WITH INTERCONNECT INHIBITED FOR ET RUPTURE DEBRIS AVOIDANCE

*** INCLUDES A 867.3 FPS OMS-1 BURN (21997 LBM) AND A 59.8 FPS DEORBIT BURN (1414 LBM)

NOTE: RTLS AND TAL OMS DUMP QUANTITIES MAY REQUIRE UPDATES DUE TO ASCENT I-LOAD DESIGN

STS-335
MASS PROPERTIES

Mass Properties Post ET Separation

REPORT POINT	WEIGHT (LBM)	X cg(IN)	Y cg(IN)	Z cg(IN)
RTLS	244649	1093.3	0.3	374.9
TAL	246912	1097.4	0.3	375.7

Mass Properties at Entry Interface

REPORT POINT	WEIGHT (LBM)	X cg(IN)	Y cg(IN)	Z cg(IN)
NOMINAL	232664	1086.3	0.4	374.8
TAL	239352	1090.9	0.1	374.8
AOA	233052	1085.5	0.1	372.9
NO DOCK PLS	234419	1087.3	0.2	373.7
DPLY ALL/RTRV MIDDECK ONLY	204801	1082.6	0.3	371.4
DPLY MPLM ONLY/NO RTRV MIDDECK	232510	1089.7	0.4	374.7

Mass Properties Post Full MPS Dump

REPORT POINT	WEIGHT (LBM)	X cg(IN)	Y cg(IN)	Z cg(IN)
TAL	238807	1089.2	0.1	374.8

Mass Properties at Mach 3.5

REPORT POINT	WEIGHT (LBM)	X cg(IN)	Y cg(IN)	Z cg(IN)
NOMINAL	232193	1085.5	0.4	374.6
RTLS	238098	1086.7	0.1	374.4
TAL	236352	1086.7	0.1	373.9
AOA	232483	1084.4	0.2	372.7
NO DOCK PLS	233948	1086.5	0.2	373.6
DPLY ALL/RTRV MIDDECK ONLY	204330	1081.6	0.3	371.2
DPLY MPLM ONLY/NO RTRV MIDDECK	232039	1088.9	0.5	374.6

NOTE: RTLS X-CG AT ALPHA EQUAL TO 30 DEGREES IS 1090.0 INCHES.

STS-335
MASS PROPERTIES - Concluded

Touchdown Weights at Landing

REPORT POINT	WEIGHT (LBM)	X cg(IN)	PITCHDOWN MOMENTS (FT-LB)
NOMINAL	232113	1087.1	1.65E06
RTLS	237441	1087.7	1.67E06
TAL	236205	1088.2	1.65E06
AOA	232371	1086.0	1.67E06
NO DOCK PLS	233868*	1088.1	1.64E06
DPLY ALL/RTRV MIDDECK ONLY	204250	1083.5	1.51E06
DPLY MPLM ONLY/NO RTRV MIDDECK	231959	1090.5	1.58E06

* NOTE: NEOM downweight limit exceeded for contingency P/L return

DATA REFERENCE: OCFAF335
FLT SOFTWARE: OI-34
ANALYSIS DATE: Mon Nov 22 12:38:17 2010

STS-335

EPS CONSUMABLES SUMMARY

MISSION DURATION (TD): = 283.43 HOURS

MISSION DURATION (EOM): = 286.43 HOURS

CONSUMABLES	NUMBER OF TANKS	LIFTOFF QUANTITY (LBM)	MIN/LO REQMT (LBM)	MARGIN (LBM)	LAUNCH HOLD CAPABILITY (HOURS)	EVALUATION
CRYOGENIC HYDROGEN	5	455.5	429.0	26.5	79.0	MARGINAL
CRYOGENIC OXYGEN	5	3886.4	3811.7	74.7	75.6	MARGINAL

(a) Cryogenic Loading and Stabilization Times:

	HYDROGEN		OXYGEN	
TANK #	LOADED (%)	STABILIZATION (L – HRS)	LOADED (%)	STABILIZATION (L – HRS)
1-5	102.1	45.0	100.7	47.5

(b) This analysis assumes standard 65% degradation for FC1, FC2, and FC3

(c) Group B Powerdowns scheduled per typical ISS flight
- RJD Logics and Drivers remain powered until docking

(d) 2 KSC – 2 KSC – 2 EDW deorbit opportunities protected

(e) 14.0 lbm O2 protected for PMA/ODS repress, MPLM Vestibule repress, 1 scheduled EVA, and 1 unscheduled EVA

(f) 14.17 kW mission average power

STS-335
EPS CONSUMABLES SUMMARY – Concluded

(g) Payload Energy Summary:

MPLM	52.6 kWh	(Includes htrs & environment/pressure checks)
Robotic Refueling	19.6 kWh	(210 W, Liftoff to EVA 1)
TriDAR	11.4 kWh	(P.I. thru Deorbit Prep, plus ext. days)
GLACIER	53.9 kWh	(160 W, Liftoff to EOM, including ext. days)

(h) Analysis protects for 3 hrs extended postlanding power for GLACIER

(i) 96 hrs of Launch hold (H2 limited) requires an energy buyback of 70 kWh, equivalent to a 255 W on-orbit powerdown

(j) Payload Impact Assessment

		Launch Hold Impact	
	Energy (kWh)	H2	O2
PSSC (35 W P.I. -> DO Prep, + ext):	11.0	-3.0 hrs	-8.1 hrs
Per AEM added (36 W L/O to EOM):	12.1	-3.3 hrs	-9.0 hrs
Per CGBA added (65 W L/O to EOM):	21.9	-6.0 hrs	-16.2 hrs
STL (70 W L/O to EOM):	23.6	-6.5 hrs	-17.5 hrs

STS-335

ECS CONSUMABLES SUMMARY

MISSION DURATION (TD): = 283.43 HOURS

MISSION DURATION (TD): = 11/19:26 DHM

CONSUMABLES	NUMBER OF OV TANKS	LIFTOFF QUANTITY (LBM, CANS)	MIN/LO REQMT (LBM, CANS)	MARGIN (LBM, CANS)	EVALUATION
ATMOSPHERIC N_2	5	321.8	314.6	7.1	ADEQUATE
LiOH	N/A	69	69	0	ADEQUATE
LiOH (STS-135)*		31	24	7	TBD

Regenerative consumables

- Supply and waste water budgets are adequate.
  - Non-standard supply water loading reflects a 180 lbm offload to support CG and ascent performance margins.
    Supply water 306 lbm (std 486 lbm)
    Waste water 20 lbm
- On orbit and end-of-mission water requirements can be satisfied through water management.

Non-Regenerative consumables

- N2 Redline protects largest single contingency: the N2 amount required for an 8 psi, 165 minute contingency return. N2 Redline does not protect for both a cabin leak and extension days.

LiOH

- Min L/O rqmt protects FRD requirements (12+0+3 extension days). 31 cans stowed/installed in Shuttle Middeck and 38 stowed in MPLM to support 4 crewmembers for 2 days and 10 crewmembers for 13 days.
- Liftoff quantity reflects planned stowage for this flight.
- Margin reflects planned LiOH use, updated based on ISS CO2 removal during docked phase.
- *NOTE: LiOH requirement for an STS-135 4 up/4 down configuration is 24 cans stowed/installed in Shuttle Middeck to support 4 crewmembers for 15 days. This preliminary analysis also assumes the LiOH box will be loaded full resulting in a 7 can margin for the flight.

DEVIATIONS AND VIOLATIONS

- None

STS-335
REFERENCES

A.	Mission Specific Flight Implementation Data Package (FIDP)	335-BASE2-E, January 7, 2011 + PRCB Directive S072135
B.	Generic FIDP	Generic-MP, December 1, 2010