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# STS-125 MOD FRR

## FLIGHT DESIGN AND DYNAMICS



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Agenda Item 5a

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# Shuttle CoFR Status Summary

MOD Requirements Codes *	DM	USA FDD
CRITICAL PROC./APPL	G	Y
NON-CRITICAL PROC/APPL	G	G
FD-TRAJECTORY	N/A	G
FD-CONSUMABLES (PROP)	N/A	G
FD-ANALYST CERT	N/A	G
FD-CTF	N/A	G
FDF	G	G
EMCC	G	G
CREW TRAINING (RNDZ)	G	G
CERTIFIED FLIGHT CONTROLLERS	G	G
CERTIFIED INSTRUCTORS (RNDZ)	G	G
FTP-NEW OPS	G	Y
FLIGHT ANOMALY RES	G	G
ANOMALY-PROCEDURE	G	Y
EX/AI FROM PRIOR READINESS REVIEW	None	None
NO CONSTRAINTS	None	None
LEVEL II (PROGRAM) ACTIONS	None	None
MISSION REQUIREMENTS	G	Y
CMD PROC	G	G
EXCEPTION RESOLUTION	G	None
FPPP REQ MET	G	G
CONTRACTOR PROCESS INSIGHT	G	N/A

G	Ready to support flight or standard open work
Y	Non-standard open work with expected resolution
R	Open work without expected resolution
N/A	Does not apply
None	None identified

\* as defined in DA8-020 "MOD Certification of Flight Readiness Process" document

# Mission Overview Summary

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Launch/Landing Times	Date	GMT	EDT	
Launch Window Open	Oct. 8, 2008	05:34:49	01:34:49	(hh:mm:ss)
Launch Window Close		06:36:39	02:36:39	(hh:mm:ss)
Landing Time (KSC)	Oct. 18, 2008		22:20	(hh:mm)

Launch window is approximately 66 minutes in duration. FD3 rendezvous is planned.

First Stage Design Criteria	DOLILU II / High Q
Insertion Altitude/Inclination	297 nm / 28.45 deg

**APM** (at the open of the 66-minute launch window)

**I-load Design**                      **1823 lbs**

**Projected APM\***                      **1847 lbs**

\* Based on FRR cycle APM simulation and 08/19/08 Green Book

Launch hold capability inside of drainback is dependent upon actual DOL performance.

Abort coverage has sufficient overlap from liftoff to MECO.

# Propellant Summary

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<b>Propellant Summary</b>	<b>FRCS (lbm)</b>	<b>ARCS (lbm)</b>	<b>OMS (lbm)</b>
<b>Loadings</b>	<b>2446</b>	<b>4970</b>	<b>25063</b>
<b>FRR Design Margins **</b>	<b>220</b>	<b>0</b>	<b>40</b>

\*\* Assumptions: STS-125 ATL, FRR Cycle Trajectory Inputs - 304 nm RNDZ, 0 sec OMS Assist

# Significant Requirements Changes Since Design Baseline

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- **Launch date changed to October 8, 2008**
  - Interim dates included August 28, 2008, October 2, 2008 and October 5, 2008
- **Mass properties updated to include mid-weight (vs. light-weight) ODS avionics configuration**
  - Required additional aft fuselage ballast to maintain CGx
  - Total weight increase was estimated to be ~415 lbm
- **SSME in position #2 was swapped with STS-126**
  - No issues
- **AOA priorities were updated to reflect KSC as prime due to Edwards temporary runway**
  - DSCT28/Recovery Pre-bank charts were updated

# Significant Mission Firsts and Unique Items

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- **Only one TAL site (Moron) is available** *(also applies to STS-400)*
  - SSP has approved exceptions (directives S063738 and S063739) to requirements to protect 2 TAL sites in the design
- **A gap exists between the last RTLS and PTA boundaries**
  - Current gap estimate is 6 seconds
  - Continuous intact abort coverage is provided by TAL capability
  - Gap means that Moron must be GO on day of launch
- **Will lose high-speed filter early since no tracking is available after 07:30 MET** *(also applies to STS-400)*
  - GPS can be used post-MECO
- **C-Band support capability differs from ISS due to lower inclination** *(also applies to STS-400)*
  - Maximum elevation at Wallops and Dryden will be significantly lower
  - Some pass durations will be longer (13 vs. 8 minutes)
  - Fewer passes will be available for Wallops and Dryden (4)
  - Not expected to affect Navigation accuracy
- **Will perform Flight Day 2 and late inspections but no RPM**

# Significant Mission Firsts and Unique Items

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- **Will perform an orbit adjust burn to reduce MMOD risk**
  - Performed after vehicle is cleared for entry following late inspection
  - Will not be performed if a rescue mission is required
- **Elliptical orbit and timeline constrain landing opportunities**
  - Pre-flight propellant budget does not support protecting 2 opportunities to KSC and EDW each day
  - Real-time orbit adjust strategy will be modified per Flight Rules, if necessary, to ensure 2-2-2 to KSC and EDW
- **Propellant budget does not protect for an anytime emergency de-orbit following the orbit adjust burn**
  - Ascent/Entry Flight Techniques Panel accepted the trade between emergency de-orbit capability and MMOD risk reduction
- **First flight with pure Linux configuration** *(also applies to STS-400)*
- **First flight of Trajectory Server version 11.7.0.2pr101 ML** *(also applies to STS-400)*



# Significant Mission Firsts and Unique Items

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- **4th Linux Trajectory Server released for operations**
  - Supports STS-125 and STS-400 each with prime and backup servers
  - Supports adherence to flight rule requiring prime/backup server configuration for critical phase support of both activities
- **DOLILU Block update 2008.02** *(also applies to STS-400)*
  - Primarily data changes
  - Roll Maneuver Q-Plane updates for 28.45° inclination (CR S052550NV)
  - System Dispersions for High-Q and Roll Maneuver (CR S052550NV)
  - Alpha/Beta Wind Persistence Increments for Roll Maneuver (CR S052550NV)
  - Large Scale Wind Change Redlines (CR S052550NY)
  - Integrated testing occurred on 08/12/08
  - Operational Acceptance Review will be presented at the SICB on 08/29/08

# Deviations, Exceedances and Anomalies

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## Deviation / Exceedances

- **A Contingency Abort Black Zone (CABZ) assessment is not required.**
  - Mass properties do not meet the CABZ assessment criteria of liftoff weight greater than 259,000 lbm and Xcg aft of 1115.0 in.
  - FRR cycle liftoff weight = 263,949 lbs. and Xcg = 1109.8 in.

**There are no Previous Mission Anomalies affecting STS-125 or STS-400 readiness.**

# Deviations, Exceedances and Anomalies (continued)

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## Significant ARs and Disposition

- **2008-CAF032: ASAB23/ASAB20/R04/R17 STS-125 (HST) No Comm SEPTM Boundary Anomaly**
  - Single engine press issue was identified in stand-alone training which resulted in an unsuccessful ATO OMS1 burn
  - FDD traced the issue to a MECO gamma miss which resulted from an earlier single engine throttle down due to OI-32 automation implementation in conjunction with a large critical underspeed
    - Automatic single-engine throttle down occurred prior to guidance releasing the altitude/planar constraint
    - Low thrust results in holding on to the altitude/planar constraint longer and a more depressed gamma profile, especially at low-level shutdown
    - No OI-32 FSW or I-Load issues identified
  - With auto throttle, approximately 14-19 second single-engine press hit to avoid this region
  - A procedural change for STS-125/400 has been recommended that will be presented to the AEFTP on 8/29/08
    - No single-engine press hit
    - Similar procedures as for pre-OI32 flights, but requires earlier manual throttle selection to inhibit auto throttle-down
  - Tracked as non-standard open work (ECD 8/29/08)

# Deviations, Exceedances and Anomalies (concluded)

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## Non-Conformance Reports (NCR)

- **NCR # 013206 MMEDS 3.4ML Built with TRJSVR Developer Version**
  - MMEDS 3.4 ML was built with a reference to a developer TRJSVR file path
  - Corrective actions have been completed
    - Updated procedures for porting software applications and performing associated QA checks
    - Shared lessons learned with FDD Software Process Integration Team
  - No impact to flight since MMEDS 3.5 ML will be used
  - NCR closure is in work

# Special Topics

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- **Pre-bank Thermal Limit and Capture Hp analysis performed to verify applicability to low inclination mission**
  - Previous analysis was developed for high inclination missions
  - Minor modifications to MPSR procedures proposed
  - Final AEFTP approval of modifications expected 08/29/08
  - Tracking as non-standard open work
- **STS-125/400 Operational Readiness Test was performed during STS-124**
  - Performed to test the capability of the Network (Space and Ground) to provide support for two Orbiters
  - MCC set up a separate 400 activity
  - Navigation received TDRS vectors and tracking data a test for a simulated STS-400
  - No issues to report

# Issues and Concerns

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- **Low Overboard Mixture Ratio Impacts**

- The Overboard Mixture Ratio (OBMR) TIM held in July concluded that the OBMR has been lower than predicted on recent flights
- This indicates that the vehicle has been flying with less than 3-sigma FPR protection
- The new predicted OBMR results in a lower Fuel Bias (FB) which makes the design very sensitive to DOL ET loadings
- The impacts of the OBMR and FB (baselined vs. predicted) are significant to the STS-125 Uplink, DOL and ARD products/data
- The panels (PSIG, AGNC and SICB) have agreed that MOD needs to account for the OBMR and FB (via MPS inventory update) in our products/data
- The panels have recommended an inventory update and additional APM holdbacks (~1100 lbs)
  - Launch window reductions can be used to offset the APM impact (less than 10 minute hold to gain 1100 lbs)
  - PRCB review is scheduled for 8/28/08
  - AEFTP review is scheduled for 8/29/08
- The SSP integrated plan to incorporate all of the related changes is in work
  - A quick turn-around of the inventory, UPL TDDP and requirement updates will be needed to support the STS-125 schedule
  - Flight Design will continue to coordinate with MOD to ensure that need dates are identified

# Exceptions and Open Work

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- **Exceptions**

- None

- **Standard Open Work (complete listing in backup charts)**

- All open work is scheduled to be completed per standard flight template
- No issues have been identified

- **Non-standard Open Work**

- No concerns identified for completing any of the open work
- Low Fuel Bias/Mixture Ratio Resolution 08/29/08
- SEPTM Gamma Miss Resolution 08/29/08
- Pre-bank Thermal/Capture Hp analysis closure 08/29/08
- DOLILU Block Update 2008.02 to SICB 08/29/08
- NOC Certification 09/10/08
- Landing Analyst Certification 09/12/08
- Winds Coordinator Certification 09/12/08
- Range Safety Operator Certification 09/19/08

# Flight Design and Dynamics Readiness Accountability Statement

☑ **Software** : All software used to create mission products, and MCC software required for mission support including designated critical processors meets generic and mission-specific Program requirements, and is maintained under configuration control in accordance with the FDD Software Management Plan.

☑ **Flight Software** : All flight software Principal Functions (PFs) owned by FDD are ready for flight. All Discrepancy Reports and Program Notes and Waivers related to USA-owned PFs have been reviewed and appropriately dispositioned for this flight.

☑ **Anomaly Resolution** : All anomalies that could impact mission support have been closed, or have accepted and approved work-arounds in place.

☑ **Production** : All flight reconfiguration products and real-time console support products meet generic and mission-specific Program requirements.

☑ **Operations** : All mission support personnel are or will be certified and current prior to supporting mission related activities.

The FDDOC Flight Readiness Review Process Plan (USA009229) and the Flight Operations Flight Preparation and Readiness Plan (USA008977; Appendix D) which defines the processes and products required for a successful flight have been executed and the applicable Program CoFR requirements satisfied.

The undersigned certify that the Flight Design and Dynamics Department, upon satisfactory resolution of any noted exceptions, is ready to support flight STS-125.

Flight Design and Dynamics	A. F. Najarian Director	Original signed by A. F. Najarian <i>Signature</i>	8/21/08 <i>date</i>
Flight Design and Dynamics Software	F. M. Hamilton Software Project Manager	Original signed by F. M. Hamilton <i>Signature</i>	8/21/08 <i>date</i>
Ascent/Descent Flight Design	D. J. Brockway Manager	Original signed by D. J. Brockway <i>signature</i>	8/21/08 <i>date</i>
Orbit Flight Design	R. M. Hill Manager	Original signed by R. M. Hill <i>signature</i>	8/21/08 <i>date</i>
Navigation & Flight Design Integration	G. E. Schrage Manager	Original signed by S. Cantu for <i>signature</i>	8/21/08 <i>date</i>
Trajectory Operations & Software Development	F. M. Hamilton Manager	Original signed by F. M. Hamilton <i>signature</i>	8/21/08 <i>date</i>
Management & Engineering Services	A. T. McDowell Manager	Original signed by A. T. McDowell <i>signature</i>	8/21/08 <i>date</i>



# Flight Design and Dynamics Declaration of Compliance with CoFR Endorsement Requirements for STS-125 Flight Readiness

- ☑ **Software** : All software used to create mission products, and MCC software required for mission support and designated critical processors meets generic and mission-specific Program requirements, and is maintained under configuration control in accordance with the FDD Software Management Plan.
- ☑ **Flight Software** : All flight software Principal Functions (PFs) owned by FDD are ready for flight. All Discrepancy Reports and Program Notes and Waivers related to USA-owned PFs have been reviewed and appropriately dispositioned for this flight.
- ☑ **Anomaly Resolution** : All anomalies that could impact mission support have been closed, or have accepted and approved work-arounds in place.
- ☑ **Production** : All flight reconfiguration products and real-time console support products meet generic and mission-specific Program requirements.
- ☑ **Operations** : All mission support personnel and instructors are or will be trained, certified and current prior to supporting mission related activities. All flight-specific rendezvous crew training will be completed prior to launch.

**Requirements Compliance:** All requirements defined by the documents below (as required by the FIDP Compliance Matrix) have been or will be satisfied prior to flight.

DOCUMENT	VERSION	DATE
Flight Implementation Data Pack (FIDP) - Generic	GEN-KB	08/20/08
Flight Implementation Data Pack (FIDP) - Flight Specific	125-BASE-AK	08/20/08

## Waivers & Exceptions:

**None**

*The FDDOC Flight Readiness Review Process Plan (USA009229) and the Flight Operations Flight Preparation and Readiness Plan (USA008977; Appendix D) which defines the processes and products required for a successful flight have been executed and the applicable Program CoFR requirements satisfied.*

*Pending completion of open work and closure of noted exceptions, if applicable, Flight Design & Dynamics Operations Center is ready to support STS-125.*

*Original signed by A. Najarian 08/27/08*

<b>Director</b>	<b>Date</b>
<b>Flight Design &amp; Dynamics Operations Center</b>	

# Trajectory Operations Contents

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- **Significant Mission Firsts And Unique Items**
- **Exceptions and Standard Open Work**
- **Non-Standard Open Work**
- **STS-125 Flight Design & Dynamics Division Readiness Statement**

# Significant Mission Firsts And Unique Items

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- **Launch Window Duration**
  - **66 minutes presents flexibility for launch but challenges for timeline.**
  - **Grapple and Release are designed for lighting. For each minute of launch slip, both events move earlier (with respect to MET) by the same amount.**
  - **The timeline is already crowded and taking away timeline is posing unique challenges for FAO and FDO.**
  - **For any slip greater than ~15 minutes, FAO and FDO will be coordinating prior to NC-1 to negotiate times for Ti and release. It is possible that grapple may move later by an orbit for any significant launch delay.**
  - **Daily PLS opportunities might also be adjusted to keep deorbit at ~ 22 hours MET each day.**

# Significant Mission Firsts And Unique Items

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- **Collision Avoidance**
  - The HST altitude presents unique challenges for collision avoidance screening and processing – both for FDO as well as USSTRATCOM.
  - HST missions historically have are more objects to assess
    - For STS-109, 13 conjunctions were assessed.
    - For STS-103, 58 potential conjunctions on 14 different objects.
    - For STS-82, >100 potential conjunctions on 39 different objects were worked at the FDO console.
      - Many were the result of different reboost targeting strategies
      - PEGUSUS breakup ~ 2 weeks prior to launch
  - Prelaunch assessment for window open, +1 minute, and +2 minutes to avoid “repeater” objects.
    - Based on preliminary testing, we’re expecting ~5 objects for each launch time.
    - This requires extensive analysis prelaunch by both FDO and USSTRATCOM
  - Manning for USSTRATCOM will be stretched to the limit due to the large number of expected conjunctions for STS-125 as well as the large number of conjunctions currently being worked by ISS.

# Significant Mission Firsts And Unique Items

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- **Orbit Adjust for MMOD**
  - For STS-125, a programmatic requirement to reduce the altitude of STS-125 has been added to reduce the risk of Micro Meteor Orbital Debris (MMOD). Due to propellant limitations, lowering circularly is not possible.
  - Intend to lower perigee as low as possible but still adhere to the following constraints:
    - **2-2-2 to KSC and EDW**
      - The two opportunities for KSC and EDW must be the last two opportunities of the day from EOM through EOM+2.
    - The orbit adjust will only be performed after vehicle cleared for entry.
    - If entry critical damage is discovered, no orbit adjust will be performed unless it assists in the STS-400 launch window
    - Adhere to rule A4-103 which mandates no more than 3 orbits ELS gap when elliptical

# Significant Mission Firsts And Unique Items

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- **Orbit Adjust for MMOD (con't)**
  - The plan is to reduce perigee from ~304 nm to 160 nm and has several impacts to trajectory operations.
    - Reduces the number of CONUS landing opportunities by 60% to KSC and 50% to EDW. Reduces the number of ELS landing opportunities by 66%.
    - Lost CONUS opportunities are not available from a timeline perspective anyway.
  - Protecting the last two opportunities may exceed the propellant budget.
    - 2-2-1 to KSC and 1-0-1 to EDW for the FRR cycle with no propellant margin.
    - Using propellant margin that is expected with mean usage throughout the mission, the lost opportunities can be regained.
    - If insufficient margins exist to regain 2-2-2 to both KSC and EDW, the post orbit adjust perigee will be increased until the desired landing opportunities are available. If no margin is available, the perigee would be raised to ~200 nm.

# Significant Mission Firsts And Unique Items

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- **Public Entry Risk Assessment (PERA)**
  - **NPR 8715.5: “The assessed collective public risk for Space Shuttle entries shall not exceed the highest risk associated with the ascending entry trajectories into Kennedy Space Center (KSC) from the International Space station orbit inclination of 51.6 degrees...”**
  - **Current highest risk associated with ascending entry trajectories into KSC from 51.6° is 1800x10<sup>-6</sup> casualties/entry**
    - **Highest risk associated with the entry trajectories into KSC from 28.5° is 2370x10<sup>-6</sup> casualties/entry**
    - **23% of all possible KSC 28.5° entry opportunities are higher than 1800x10<sup>-6</sup>**
  - **HQ approval to use maximum KSC 28.5° (2370 x 10<sup>-6</sup>) as limit for nominal EOM placards, thereby allowing all KSC opportunities**
    - **Consistent with philosophy used for public risk management of ISS flights**
    - **Approval from NASA Interim Directive, NID 8715.5-1, Collective Public Risk for Space Shuttle Entry from the Hubble Space Telescope Orbit Inclination of 28.5 Degrees**
  - **FR 125\_A2-TBD, ENTRY PUBLIC RISK CROSSRANGE PLACARDS**
    - **Outlines changes to placards listed in generic FR A2-207, LANDING SITE SELECTION**

# Exceptions and Standard Open Work

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- **Exceptions**
  - None
- **Standard Open Work:**
  - Remaining Integrated Sims
  - CTL Trajectory Data (L-35 & L-7)
  - TCDT Checkout in Ops Cert Mode (L-16)
  - DOD Support Readiness (L-15)
  - FS Orbit FDO Console Handbook Annex (L-14)
  - PERA Pre-Flight Product (DM42 PERA Lead) (L-7)
  - Flight Load Checkouts
    - Orbit , Ascent, A/E GPO, Entry, LSO (L-6)
  - CTL Mass Properties (L-3)



# Non-Standard Open Work

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- **MECO Flight Path Angle (FPA) target miss can occur for certain two engine out scenarios after Single Engine Press To MECO (SEPTM) boundary**
  - **STS-125/400 Ascent Checklist changes will be implemented to prevent OI-32 automatic throttle-down event prior to onboard guidance position constraint release at 40 seconds prior to MECO.**
- **Low overboard mixture ratio resolution for STS-125**
- **USSTRATCOM hardware/manpower overload for STS-125 and ISS**
  - **Most challenging time period is the pre-launch timeframe where we expect ~30 conjunctions to be assessed.**
    - **OSA Lead Bill Schick (Omitron) will process shuttle conjunctions from a different workstation in a different building during this time. No DVIS voice loop available – only land line telephone.**
    - **No changes for TOPO. ISS conjunctions will continue to be processed by the USSTRATCOM OSA.**
    - **Three different FDOs will process the incoming conjunctions and report findings at L-1 day and launch day.**
    - **Operations to be tested during the TCDT.**
  - **During orbit ops, overflow processing at the OSA console can be directed again to Bill Schick or to ALT SPACE.**
  - **On-call FDOs available for overload conjunction processing.**

# STS-125 Flight Design & Dynamics Division Readiness Statement

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The Flight Design and Dynamics Division has performed the reviews necessary to assess the flight readiness relating to flight design requirements definition, crew and flight controller rendezvous training, and trajectory operations. We have determined all applicable responsibilities acceptable for flight pending closure of the identified open work and issues.

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**Barbara A. Conte**

**Chief, Flight Design Requirements and Integration Branch**

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**Gregory T. Oliver**

**Chief, Flight Design and Dynamics Division**

**As compiled by: DM32/W.H. Tracy**

# Back-Up

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- **Flight Readiness Open Work**
- **TOCSS Software Status**
- **Trajectory Server Software Status**
- **Integrated Sim Shelf-Life**
- **Additional data (separate file)**
  - **Launch Window**
  - **Abort Regions**
  - **Nominal ET Impact Area**
  - **Ascent/Descent Flight Critical Software**

# STS-125 Flight Readiness Open Work

Item	Responsible	Due Date	Closed	Closure Rationale
<b>USA Flight Design Standard Open Work:</b>				
PROP37 SODB Volume II Amendment	PROP	08/27/08	08/27/08	delivered
PROP06 OMRSD OMS/RCS	PROP	08/29/08	08/27/08	delivered
DATA43 FDD FRR Data Pack	FDM	09/02/08		
PROP07 Abort Propellant Dump Tagup	PROP	09/03/08		
CM FOE L-30 day audit	Bedford	09/06/08		
FSW Verification Test Results Review	ADFD	09/08/08		
FSW Verification Test Results Review	Orbit	09/08/08	08/22/08	Completed
RNDZ/FDO Phasing Plan Meeting	Orbit	09/08/08	08/27/08	Completed
PROP02 Mass Properties	PROP	09/08/08		
DATA45 FDD FSW PF Sign-off	FDM	09/09/08		
Prop Analyst & Flt Controller Tag-up	PROP	09/09/08		
ASCT04 Uplink APM	ADFD	09/10/08		
ASCT43 MPS Minimum Sigma Level	ADFD	09/10/08		
ONOR29B RNDZ Launch Target Data	Orbit	09/10/08		
L-4 week LDO Database Freeze	ADFD	09/10/08		
RNDZ08 RNDZ Phasing Limits	Orbit	09/15/08		

## STS-125 Flight Readiness Open Work - Continued

Work Item	Responsible	Due Date	Closed	Closure Rationale
<b>USA Flight Design Standard Open Work - Continued:</b>				
ASCT44 DOL Uplink I-loads	ADFD	09/16/08		
ONOR37B Daily Planar/Phase Windows	Orbit	09/17/08		
NAVO16B GPO COTM Data Pack	Navigation	09/17/08		
NAVO18B GPO/ONAV Ops Memo	Navigation	09/17/08		
ONOR27 Launch and Landing Data	Orbit	09/19/08		
LDO: L-3 week LDO Checkout/TCDT Sim	ADFD	09/24/08		
ONOR29C RNDZ Launch Target Data	Orbit	09/30/08		
RNDZ02 Target Drag Characteristics	Orbit	10/01/08		
DSCT17 Landing Site Tables	ADFD	10/01/08		
PROP00A Prop/Ascent Abort Dump Tag-up	PROP	10/01/08		
C-Band tracking Scheduling Message	Navigation	10/01/08		
ONOR37C Daily Planar/Phase Windows	Orbit	10/02/08		
ASCT99 OMS Assist - ATO Update	ADFD	10/02/08		
PROP33 Ferry Data Package	PROP	10/03/08		
PROP34 MCC Data	PROP	10/03/08		
RNDZ09 Rendezvous COLA Plans	Orbit	10/03/08		

## STS-125 Flight Readiness Open Work - Continued

Work Item	Responsible	Due Date	Closed	Closure Rationale
<b>USA Flight Design Standard Open Work - Continued:</b>				
PROP02A DOL Mass Properties Updates	PROP	10/03/08		
Pre-Launch Mass Properties Request	PROP	10/03/08		
PROP31 ARD Data	PROP	10/03/08		
Rendezvous Crew Training Complete	Instructor	10/03/08		
SRB & ET RTLS Impact Point Update Memo	ADFD	10/05/08		
ASCT42 Collision Avoidance Data	ADFD	10/05/08		
ASCT47 Final MCC Trajectory Inputs	ADFD	10/05/08		
DSCT66 Real-Time Support Files	ADFD	10/05/08		
Range Safety Launch Window Cutout	ADFD	10/05/08		
Flight Annex	Navigation	10/05/08		
ASAB32B AME MCC Support Tables	ADFD	10/06/08		
L-2 day DOLILU System Checkout	ADFD	10/06/08		
DSCT05 Maximum Crossrange Capability	ADFD	10/06/08		
ASAB25 ARD Bias Tables	ADFD	10/07/08		

## STS-125 Flight Readiness Open Work - Continued

Work Item	Responsible	Due Date	Closed	Closure Rationale
<b>USA Flight Design Non-Standard Open Work:</b>				
Verify Alternate MIDDS Line	ADFD	08/27/08	08/27/08	Verified during Wx sim
Low Fuel Bias/Mixture Ratio Resolution	ADFD	08/29/08		
DOLILU Block Update 2008.02 to SICB	ADFD	08/29/08		
SEPTM Gamma Miss Resolution	ADFD	08/29/08		
Pre-bank Thermal/Capture Hp analysis closure	ADFD	08/29/08		
NOC Certification	NAV	09/10/08		
Landing Analyst Certification	ADFD	09/12/08		
Winds Coordinator Certification	ADFD	09/12/08		
Range Safety Operator Certification	ADFD	09/19/08		

## STS-125 Flight Readiness Open Work - Continued

Item	Responsible	Due Date	Closed	Closure Rationale/Status
<b>Trajectory Operations Standard Open Work</b>				
Close to Launch Trajectory Data	OFDO	09/03/08		
L-30 HA Server Audit	TOCSS	09/08/08		
Flight Load Checklist Complete	DOLILU	09/16/08		
Flight Load Checklist Complete	Entry Support	09/16/08		
DOD Support Readiness	LSO	09/23/08		
Flight Load Checklist Complete	Nav	09/23/08		
Flight Load Checklist Complete	Orbit-RNDZ	09/23/08		
TCDT Checkout in Ops Cert Mode	AE GPO	09/24/08		
FS Orbit FDO CHB Annex	OFDO	09/24/08		
PERA Pre-Flight Product	DM42 PERA Lead	10/01/08		
Flight Load Checklist Complete	RGPO	10/02/08		
Flight Load Checklist Complete	AE FDO	10/02/08		
Flight Load Checklist Complete	AE GPO	10/02/08		
Flight Load Checklist Complete	LSO	10/02/08		
Flight Load Checklist Complete	OFDO	10/02/08		
Present new ops notes at Trench tagup	TOCSS	Trench Tag-Up		



## STS-125 Flight Readiness Open Work - Continued

Item	Responsible	Due Date	Closed	Closure Rationale/Status
<b>Trajectory Operations Standard Open Work</b>				
L-5 HA Server Audit	TOCSS	10/03/08		
Close to Launch Mass Properties	OFDO	10/05/08		
<b>Trajectory Operations Non-Standard Work:</b>				
Load PADS 10.0.1	TOCSS	08/29/08	8/27/08	Released
Low Overboard Mixture Ratio Resolution	AE FDO	08/29/08		
Ascent Checklist Update for Manual Throttle	AE GPO	09/17/08		
Test Collision Avoidance Support Plan (TCDT)	FDO	09/24/08		

# STS-125 Flight Readiness Open Work - Concluded

Item	Responsible	Due Date	Closed	Closure Rationale/Status
<b>DM Standard Open Work:</b>				
Orbiter Readiness Statement	FDRIB	09/18/08		
Range Safety Readiness Statement	FDRIB	09/22/08		

The Flight Design and Dynamics Division has performed a final review and determined all Division and USA FDD open work and/or actions for this mission are closed or acceptable rationale is provided for proceeding with the flight.

\_\_\_\_\_  
 Flight Design Manager  
 Date\_\_\_\_\_

\_\_\_\_\_  
 Chief, Flight Design Requirements and Integration Branch  
 Date\_\_\_\_\_

\_\_\_\_\_  
 Director, Flight Design and Dynamics Department  
 Date\_\_\_\_\_

\_\_\_\_\_  
 Chief, Flight Design and Dynamics Division  
 Date\_\_\_\_\_

# TOCSS Software Status

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**All TOCSS flight-critical software is certified and ready to support STS-125 and STS-400**

**Waivers - None**

## **Updated Flight-Critical Software**

- **18 Linux Applications**

## **Updated Non-Flight-Critical Software**

- **84 Linux Applications**
  - **PADS projected RTO 8/29/2008**
  - **New versions of JADE DRAGON, JADE GREMLIN, and JADE GOBLIN**
    - **ACE software will use previously certified versions of JADE DRAGON, JADE GREMLIN, and JADE GOBLIN**
    - **Any other software that uses these libraries will use the new versions**

# TRAJECTORY SERVER SOFTWARE STATUS

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## Updated Flight-Critical Software:

CI	Version	RTO	Changes
TRJSVR	11.7.0.2.pr101 ML	05/30/08	<b>2 SRs</b> –SR 054281.13 Recompile 11.7.0.2 ML - Lynx 2.3 –SR 054281.14 Recompile 11.7.0.2 ML - Perseus 1.0.1 <b>1 Minor AR</b> –Recompile 11.7.0.2 ML - Perseus 1.0

# TRAJECTORY SERVER SOFTWARE STATUS (concluded)

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TRJSVR Sim Shelf Life:

Version	Sim Release Date	SRs	Major ARs	Minor ARs	# Sims
11.7.0.2.ly23 ML	02/25/2008	1	0	0	9
11.7.0.2.pr10 ML	03/06/2008	0	0	1	1
11.7.0.2.pr101 ML	04/09/2008	1	0	0	56
	<b>Total</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>66</b>

See backup charts for integrated sim usage details.

# INTEGRATED SIM SHELF-LIFE

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- **TRJSVR 11.7.0.2.ly23 ML**
  - **1 STS-125 flight specific sim**
  - **8 generic sims**
- **TRJSVR 11.7.0.2.pr10 ML**
  - **1 generic sim**
- **TRJSVR 11.7.0.2.pr101 ML**
  - **8 STS-125 flight specific sims**
  - **1 STS-400 flight specific sim**
  - **47 generic sims**
    - **13 ascent**
    - **6 entry**
    - **2 deorbit prep**
    - **11 rendezvous**
    - **15 orbit**