

October 19, 1984

DA8/Chairman, Ascent/Entry Flight Techniques

Ascent/Entry Flight Techniques Panel Meeting #12 Minutes

The 12th meeting of the SIS 51-A Orbit Flight Techniques Panel was held on September 7, 1984. Rockwell Downey, NASA Headquarters, and Draper Laboratory participated via teleconference.

1. CG for STS 41-G - FM5/J. Hansen

Enclosure 1 shows the SIS 41-G entry weights and c.g. predictions. The c.g. envelope has been opened forward to 1079 Inches including a 1 Inch uncertainty as a result of data obtained through flight STS 41-C.

Action: 09/07-001 - DH - Update the flight rules for the new c.g. envelope.

CG for STS 51-A (walkon) - FM5/G. L. Carman

Enclosure 2 shows STS 51-A entry weight and c.g. predictions. The forward c.g. is 0.2 inches outside the envelope for the Telesat return case (even with 1945 pounds of aft ballast and propellant management). A number of offloading options are being considered to drive the c.g. aft into the box.

2. Elevon Schedule for STS 41-G STS 51-A and SIS 51-B - EH24/L. B. McWhorter

The elevon schedules for SIS 41-G, STS 51-A, and SIS 51-B are presented in enclosure 3. The panel accepted the avionics group recommendation that the STS 41-G nominal schedule be used whether or not there is any c.g. overlap. This means for TAL or AOA more down elevon is required for no yaw jets.

3. PTI Schedules for SIS 41-G STS 51-A and SIS 51-B - EH24/L. B. McWhorter

Mr. McWhorter presented the PTI schedule (enclosure 4) for SIS 41-G, STS 51-A, and SIS 51-B.

4. Launch Window for SIS 41-G - DH3/G. T. Oliver

Enclosure 5 describes the SIS 41-G launch window. The window opens sunrise -15 minutes AOA (Northrup) and RTLS at sunrise. It closes at the opening time plus 2 hours which protects flight day one crew workday length constraints.

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5. STS 41-G Abort Reasons - DH3/B. H. Sweet

a. Abort Boundaries - Mr. Sweet discussed the abort boundaries in accordance with the bar chart in enclosure 6. There is a 31 second TAL window for a two engine burn. The chairman requested an underspeed be determined which could avoid a TAL call.

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Action: 09/07-002 - DH3/B. H. Sweet - Determine the underspeed acceptable to preclude a TAL site landing.

b. Pre-MECO Dump Flight Rules - A performance boundary flight rule was proposed for the STS 41-G Flight Rules Annex. Enclosure 7 is a copy of the

rule. The rule was accepted except the aft c.g. limit was changed to 1109 Inches which conforms with the CEI basic vehicle design specification.

6. Runway Redesignate from KSC FM5/B. K. Joosten

Mr. Joosten Identified four weather alternate landing sites for KSC. Selection was based on proximity for "late" redesignation but far enough from KSC to assure good weather separation. The latest time for redesignation is determined considering vehicle and guidance limitations and navigational and environmental dispersions. The data presented was for 28.5 degrees Inclination KSC return. Different inclinations may cause air-to-ground complications as there are no backup S-band stations to M1 IA. Enclosure 8 shows typical range - crossrange foot prints, the effect of return crossrange and combined redesignation limits.

Action: 09/07-003 - FM5/B. K. Joosten - Provide a runway redesignation from KSC for 57 degrees inclination.

7. S-band Post Deorbit Burn Data for KSC Landing - FM5/B. K. Joosten

Mr. Joosten identified three air-to-ground communication issues. The extent of S-band blackout upon re-entry is not known. Consequently, a redesignated landing site may not really be available at the high mach number. Attenuation between upper and lower omni antenna may differ significantly. Data is not currently available to resolve these issues, but test procedures could be devised to obtain the data for flight beyond STS 41-G.

8. MPS CMD, HYD, or Electrical (Stuck Throttle) Cue Card - DF4/J. M. Howard

This item was deferred to a splinter meeting scheduled September 12. Actions were assigned to Rockwell.

Action: 09/07-004 - Rockwell - Evaluate shutting down an engine with a stuck throttle just prior to delta R bug and check-out mark due to lag of 2 seconds when the crew pushes the button.

Action: 09/07-005 - Rockwell - Evaluate a two stuck throttle scenario at different positions than presently indicated on the cue card.

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9. Landing Opportunities/Runway Selection for STS 41-G - DH3/G. T. Oliver

Daylight landing priorities are KSC 33 (priority 1) and KSC 15 (priority 2). This nominal EOM deorbit opportunity is orbit 132D on flight day 9. Enclosure 9 is a listing of detailed runway priorities and deorbit opportunities.

10. Hydraulic Load Test Requirements for STS 41-G - DF7/W. J. Moon

OMRSD number V58BA0.040 requires a hydraulic load test to be conducted on the first flight of new vehicles and in intervals of five flights thereafter. Flight STS 41-G is the fifth Interval flight of OV-099 having previously flown on STS 6, 7, 8, 11 and 13.

The purpose of the test is to monitor APU decomposition roughness for clues of remaining APU operational life. As APU life is reduced, gas  $\square$  generator catalyst bed efficiency degrades as seen in chamber pressure spikes. Spikes of +300 psi while under high load are an indication the APU is reaching its life span.

The procedure requires aerosurfaces manually cycled with one hydraulic system in low pressure (assuming three good systems) followed by repeating aerosurface cycling with the second system in low pressure and the first system returned to full pressure.

11. STS Support Wind Profile Radar Status - DH3/D. R. Simpson

Deferred

12. Launch Day Water Load - DF7/L. E. Toole

The panel accepted the requirement for an additional 95 pounds of water load to permit a launch day primary landing site return without opening the payload bay doors. This was based on STS 41-G launch day return opportunities load supply water for KSC orbit 61D deorbit and no backup deorbit opportunity.

T. Cleon Lacefield

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