

National Aeronautics and  
Space Administration  
Lyndon B. Johnson Space Center  
Houston, Texas  
77058

Reply to Attn of: DA8-86-25 (FT)

June 26, 1986

TO: Distribution  
FROM: DA8/Chairman, Entry Flight Techniques  
SUBJECT: Ascent/Entry Flight Techniques Panel Meeting #22 Minutes

The 22nd Ascent/Entry Flight Techniques meeting was held at the Johnson Space Center on Thursday, June 19, 1986, at 12:00 noon CDT in building 4, room 3025. Rockwell-Downey participated via teleconference.

1. Loss of Two Air Data Transducer Assembly's (ADTA) - DF6/H. J. Clancy

DF6/F. E. Trlica presented a chance to the ADTA flight rules proposing priority flight for loss of one A ADTA and next primary landing site (PLS) for the loss of two ADTA's (current rules specify priority flight for loss of two ADTA's and next PLS for three ADTA's failed-. Although the Flight Techniques Panel was not opposed to the change, the existing rule combined with a detailed discussion of change rationale is required prior to receiving a recommendation for approval.

Action: 06/19-001 - DF6/H. J. Clancy - Investigate existing rule rationale and background with EH2/L. B. McWhorter. Identify changes to assumptions/ experience base that have occurred that justify rule change. Research acceptability of flying theta limits below M=2.5 with guidance and control (G&C using default/navigation derived air data (NAVDAD). Address first day PLS rules along with next PLS and priority flight rules.

Action: 06/19-002 - DF6/H. J. Clancy - Determine if downmoding to a lakebed runway is required for ADTA failures (rule 8-22).

2. Crew Instrument Requirements for Daylight/Night Landings - DF6/H. J. Clancy

DF6/R. S. Galvez identified the crew dedicated display requirements for entry considering differences between day and night landing pilot tasks. The intent of the discussion was to identify the differences in instrument requirements and the associated impact on orbit phase go/no go criteria. Mr. Galvez presented the day/night requirements based on a July 1985 CB poll conducted by CB/L. J. Shriver following the attitude direction indicator (ADI) failure on STS 51-D. After some discussion, CB/B. H. Shaw agreed that another poll of crewmember requirements was warranted to eliminate any confusion on the subject (AD] requirements during night entry/daylight landing will be included). This subject will be rescheduled for a future flight techniques discussion.

Action: 06/19-003 - CB/L. B. Hammond - Identify crew dedicated display

requirements for night entry/night landing, night entry/daylight landing, and daylight entry/daylight landing.

### 3. Restrinq in MM304/305 to Optimize FCS Channels - DF6/H. J. Clancy

DF6/J. W. Bantle proposed MM304/305 restrinqing criteria to be used to optimize systems configuration during entry. Although restrinqing is currently accomplished in MM304/305 to regain nosewheel steering and to protect against the multiplexer demultiplexer (MDM) A/D failure (loss of both rotation hand controller's), sufficient uncertainty exists in the redesign/certification effort currently underway to warrant deferral of this subject until a more concrete definition of hardware/software fixes is available (i.e., MDM A/D problems may be fixed no longer requiring a restrinq; no yaw jet mode certification completion; fail operational/fail safe nosewheel steering, etc.). The position of the Flight Techniques Panel at this time is that restrinqing during MM304/305 should be minimized (including the position that restrinqing will not be accomplished to avoid backup flight system (BFS) engage).

### 4. Radar Altimeter System Requirements - DF6/H. J. Clancy

Mr. Galvez discussed the radar altimeter system requirements pertaining to launch commit criteria (LCC) and piloting tasks. This subject was brought to the attention of Flight Techniques as a result of a Program Requirements Change Board (PRCB) action to the Mission Operations Directorate to assess the criticality of the radar altimeter. CB/M. S. Ivins, assigned the action to determine crew radar altimeter criticality, presented the opinion that the radar function be classified crit 1. Based on an assumption that microwave landing system (MLS) derived altitude is not accurate at low altitudes and cannot be considered as a reliable backup, CB is recommending that two of two radar altimeters be required for launch. It was determined that an understanding of the accuracy of the MLS derived nav altitude was required prior to assessing radar altimeter criticality.

Action: 06/19-004 - DF6/H. J. Clancy, DM6/W. S. Presley - Determine adequacy of MLS derived nav altitude and adequacy as backup to radar altimeter. Identify any reference differences that may exist between the MLS and radar altimeter.

### 5. Post Main Engine Cutoff (MECO) Orbital Maneuvering Subsystem (OMS) Burns >0.05 - EP2/J. C. Hooper

Mr. Hooper presented the concerns associated with burning an OMS engine curing transatlantic abort landing (TAL) post-MECO abort dump operations when subject to Nz accelerations greater than .04g. Because of propellant acquisition system I imitations, helium ingestion may occur prior to abort dump timer completion resulting in potentially hazardous conditions. Adhering to the Nz >04 g constraint can result in OMS propellant residuals as large as 60 percent remaining (affecting Orbiter c.g. , OMS tank landing weight constraints, and vehicle aerodynamics). A Flight Techniques splinter group will address this concern with respect to several abort mode profiles and determine initial conditions to be investigated in the Rockwell-Downey assessment of this problem. The Rockwell-Downey study is estimated to be completed by August 1 with documentation available September 10.

Action: 06/19-005 - DA8/R. D. Dittemore - Schedule a Flight Techniques Splinter Group meeting to identify abort timelines and initial conditions for the Rockwell-Downey Study.

Action: 06-19-006 - EP2/J. C. Hooper - Insure level II is appraised of the OMS burn safety concerns.

6. Return to Launch Site (RTL) External Tank (ET) Separation (SEP) Jet Requirements - DF6/R. E. Yackovetsky

Mr. Yackovetsky presented an overview of RTL ET SEP loss of control concerns. Analyses using an updated ascent aero data base (STS-5 data) has revealed that the loss of a single forward reaction control system (FRCS) downfiring jet (jet, MDM, general purpose computer, reaction jet driver, etc.) results in sufficient loss of control authority to preclude meeting MM602 transition design staging requirements. Jets available for ET SEP are reduced from 4 FRCS/6 aft reaction control system (ARCS) to 2 FRCS/4 ARCS resulting in a 50 percent reduction in pitch authority compared to the nominal.

As a result CR 79767 has been submitted that revises the GRTL ET SEP flight control system, optimizing the use of FRCS and ARCS jets. Additional fixes to help resolve the GRTL sensitivity to single point failures include relieving outdated orbital flight test (OFT) constraints where applicable, updating aero data bases, and improving the control of critical separation parameters. Issues still to be worked include data base verification, new flight control system verification, and revisiting the definition of GRTL ET SEP minimum jet requirements.

Original Signed By:  
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