



Procedures and Guidelines

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Responsible Office: 572/Flight Dynamics Analysis

Title: Shuttle Spartan Carrier Reflight Mission Analysis (Procedure Guide)

1 PURPOSE

This procedure establishes guidelines for the execution of the analytical effort related to the reflight of Spartan missions.

The effort will be concerned with analytical matters related to a specified trajectory and launch window, to the design of an attitude profile to satisfy the requirements, and to the development of attitude control algorithms that execute that design.

2 REFERENCES

The NASA Mission Design Process, Dr. Michael G. Ryschkewitsch, Goddard Space Flight Center, December 22, 1992

Spacecraft Attitude Determination and Control, Edited by James R. Wertz, Reidel Publishing, Reprinted 1986, ISBN 90-277-1204-2 (paperback.)

Space Mission Analysis and Design (Second Edition), Edited by Larson, Wiley J. and Wertz, James R., Microcosm, 1992, ISBN 1-881883-01-9 (paperback)

Postflight report for the preceding mission. Section 6.2.5 addresses the report.

3 SCOPE

These guidelines apply to anyone in the Guidance, Navigation, and Control Center (GNCC) and its support contractors who provide analytical support to the Spartan project in matters related to reflights of the Spartan spacecraft. They cover the deployment, free flyer operations, and retrieval of the spacecraft from the Shuttle Orbiter.

4 DEFINITIONS

Reflight: The general characteristics of the mission are the same as for earlier missions, but flight-specific details change from mission to mission. That is, the values of some parameters involved in the requirements may have changed, but there are no significant new parameter values or requirements. A change is significant if it involves much more than applying a different set of parameter values to what was done for the previous mission.

5 AUTHORITIES & RESPONSIBILITIES

5.1 All GNCC employees will follow this procedure in all efforts covered by it.

5.2 The head of the Flight Dynamics Analysis Branch (FDAB) will assign team members, approve budgets, and arrange funding. At the discretion of the branch head, considering the scope of the analysis effort and the number of analysts involved, a lead analyst may be identified to serve as the external point of contact and/or to coordinate activities of the analysis team.

5.3 The FDAB head will identify the team's customer. Typically, the customer is the ACS lead engineer assigned by the GNCC. Others within and without the GNCC will interact freely with members of the analytical team. However, only the team's customer has immediate authority regarding priorities and technical requirements that affect the team. 5.4 Implementation guidelines may be modified or waived due to extenuating circumstances, such as limitation of time and/or resources, or customer request. These procedures may be waived in order to use existing contractor ISO 9000 procedures. Changes and waivers must be documented by the analysis team and approved by the customer and the Chief of the GNCC or his designee.

5.5 FDAB management has the authority, in consultation with the customer, for approving and modifying any programmatic relating to the analytical effort.

6 IMPLEMENTATION

6.1 Define the Mission Requirements

The analysis team accepts a statement of the mission requirements from the customer. The analysis team will determine whether changes are significant and state that conclusion in writing to the head of the Flight Dynamics Analysis Branch (FDAB). If the changes are considered insignificant, then this is the proper procedure to follow. If considered significant, the head of the FDAB will accept or reject that conclusion. If accepted, then this is not the proper procedure and the branch head will decide which procedure is to be followed.

6.2 Initial Planning

6.2.1 The GNCC management verifies that the analytical team is composed of individuals with the required technical skills.

6.2.2 Team members verify that analytical tools used on the earlier flights can still be used. Changes in operating systems, platforms, or compilers may render earlier code useless in their current state.

6.2.3 The analysis team submits a budget, if required, that includes personnel costs, travel, training, the procurement of analytical tools that are needed but not available, and any other items considered necessary.

6.2.4 Analytical tools no longer executable will be updated or replaced by procurement or internal development.

6.2.5 The analysis team develops a schedule of deliverables and obtains the concurrence of the customer. The deliverables must be in a form sufficient to document that delivery has occurred, what was delivered, and what is required to reproduce the results. A verbal reporting of results is not sufficient.

Documents produced from one flight contain information needed to prepare for the next. A postflight report will be produced that contains the following information for the planned and actual missions:

- launch date and time
- deployment date and time and the corresponding orbital elements
- times of sunrise before deployment and sunset after deployment
- deployment orientation (i.e., yaw, pitch, roll axis directions)
- attitude profile (i.e., maneuver times, rotations, axis directions)
- retrieval date and time
- restrictions related to crew safety

6.3 Procurement

As required, including the software noted in section 6.2.4.

6.4 Detailed Design

6.4.1 The analysis team will identify whatever personnel and organizational interfaces are necessary and will ensure that all parties who must interact agree on what information is to be exchanged. Some interfaces may be with individuals not part of the analytical team. For example, the customer is not part of the analytical team, nor are those developing flight hardware. However, the analytical team's output is needed by the hardware team.

6.4.2 Analysts in the various disciplines will apply the stated requirements to produce a design or analysis that meets those requirements.

6.4.3 The analysis team will keep abreast of developments that could alter the stated requirements. This will be done by representation at project and working group meetings.

Interactions among analytical team members and those of the ACS hardware team will occur freely and informally. These could lead to changes in the stated requirements also.

6.5 Reviews

6.5.1 The analysis team will participate in one or more peer reviews of the design. Peer reviews will have been included in the schedule.

6.5.2 The analysis team will participate in formal and informal reviews as specified by the customer.

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6.6 Changes in Requirements

Whenever the value of a parameter in a stated requirement changes or a new parameter or requirement is added, the analysis team will execute the first step (6.1) of the procedure and coordinate whatever parts of subsequent steps are required.

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CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	09/29/1998	Initial Release