

STEREO/Shuttle Implementation

Mission Configuration/Assumptions

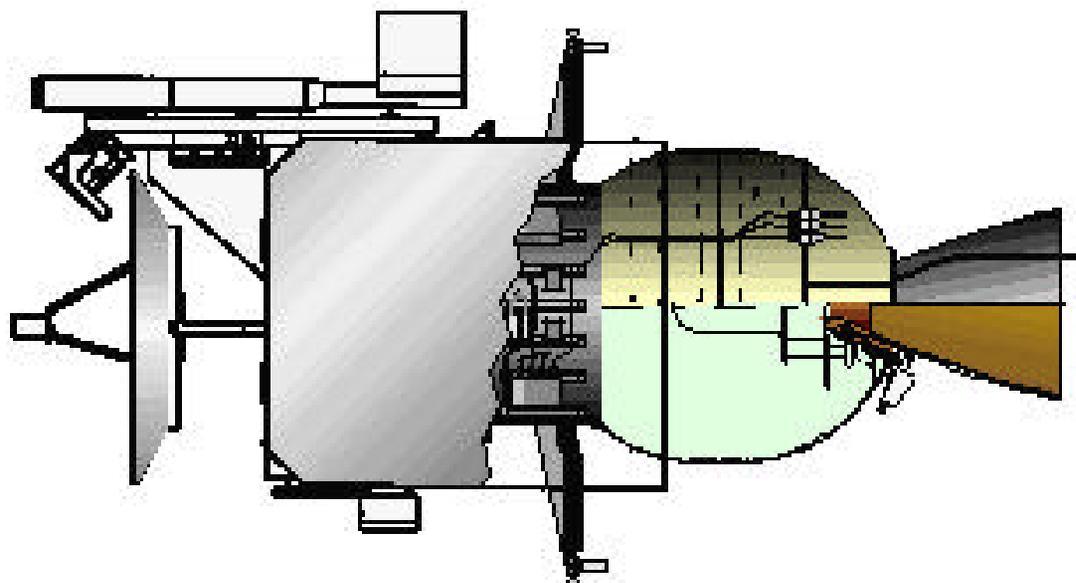
- STEREO is primary payload
- Mission duration 10 days or less
- STEREO weight/dimensions
 - 350kg - 520kg*
 - 80in - 90in long/ 80in - 90in diameter
- Inclination (28.5 - 57deg.)
- Altitude (150 - 300 miles)
- Single Shuttle Flight for both spacecraft
 - Spacecrafts to be flown horizontal in payload bay
- GSFC Flight Support System (FSS) utilized as spacecraft carriers
- Cradles to have 28V power interface with Orbiter for latch activation
- Orbiter configured with RMS for spacecraft deployment
- Orbiter to maintain standard cleanliness level (5 to 10 foot visual inspection)
 - KSC can provide much higher level of cleanliness as non-standard service
- Upper Stage Motor: Thiokol STAR 48V

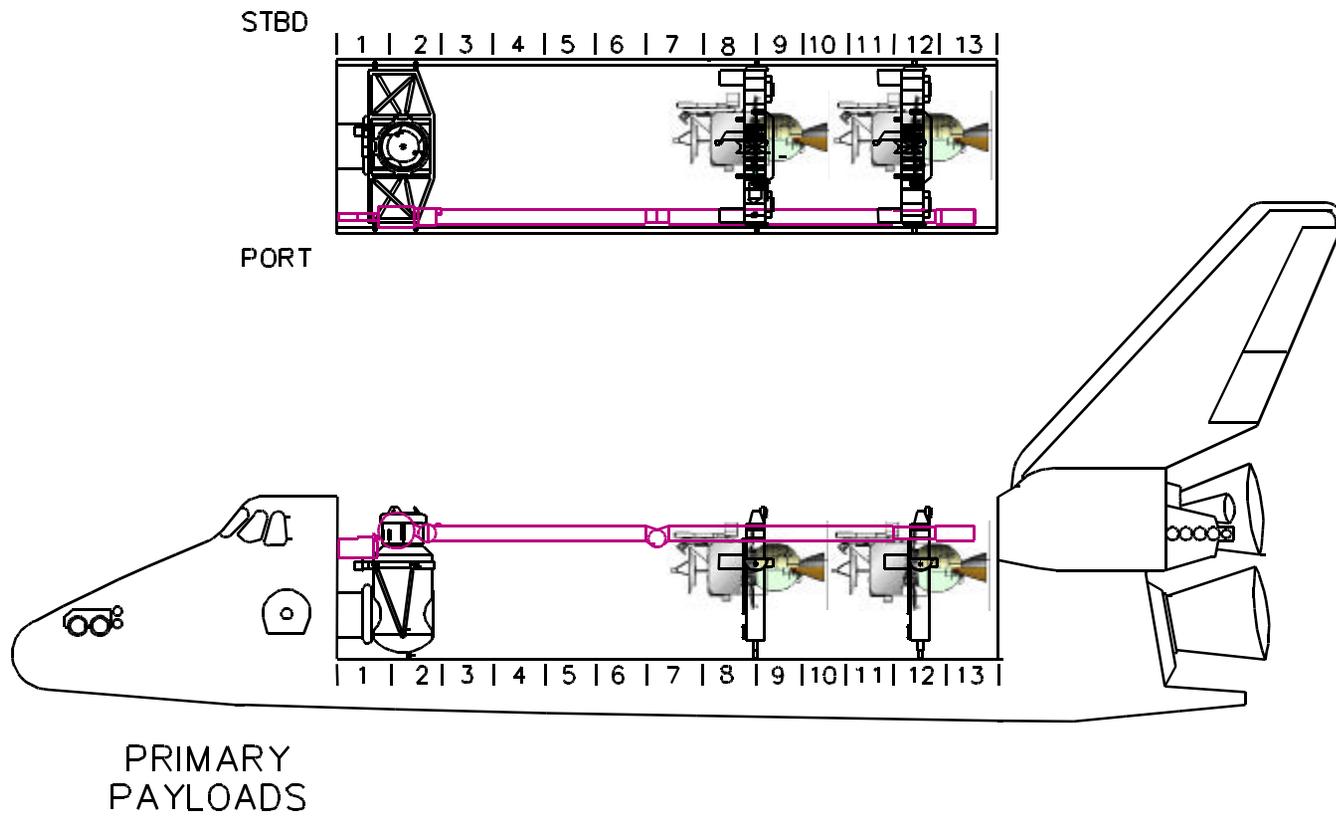
NOTE

Spacecraft = STEREO & Upper Stage

Cargo Element = STEREO, Upper Stage & Cradle

* Maximum weight STAR 48V upper stage can deliver to C3 of 1





Roles and Responsibilities

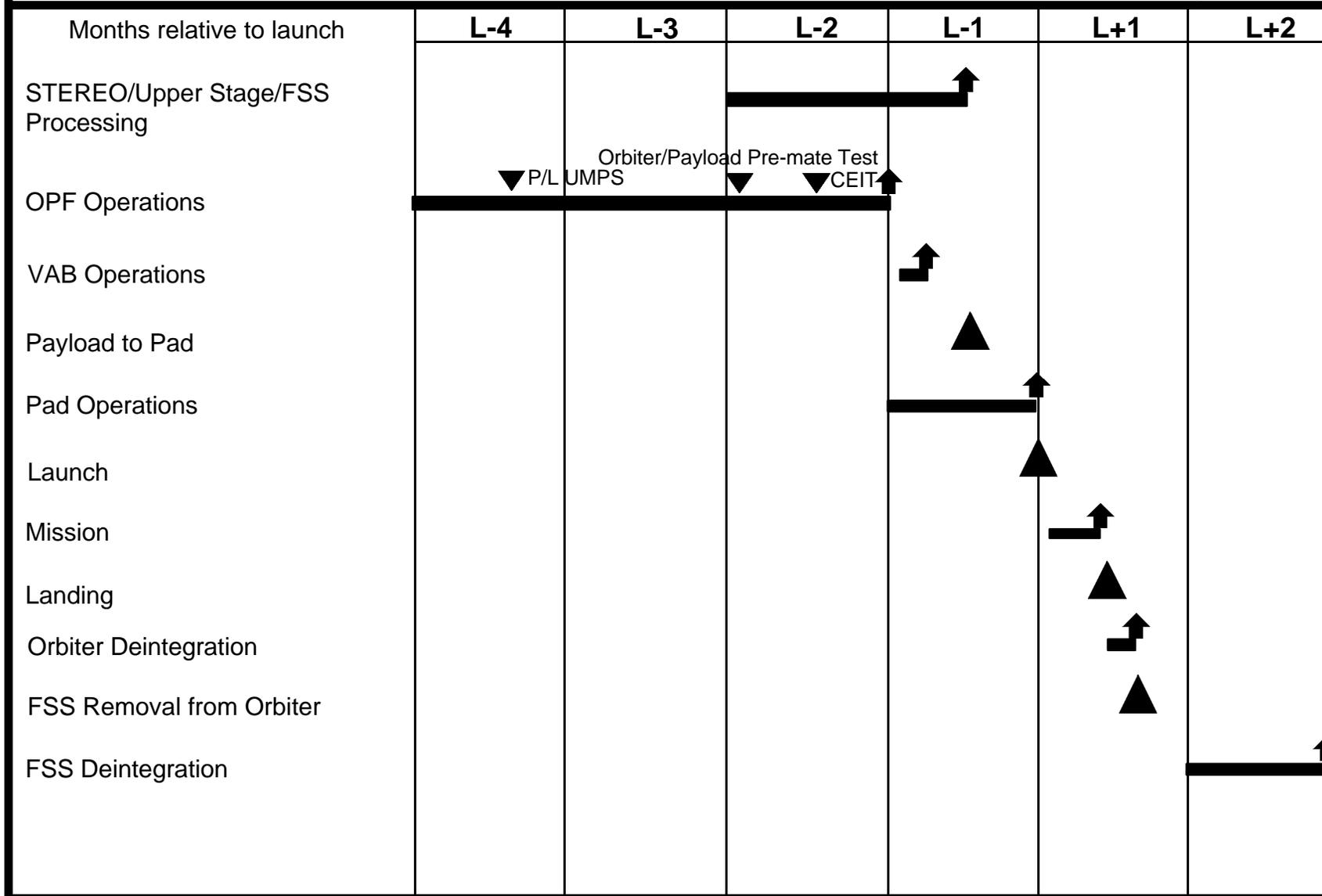
- APL
 - Delivery of STEREO and required GSE to KSC
 - Perform test and checkout of STEREO at KSC
 - Define spacecraft trajectory requirements to achieve C3 of 1
 - Provide interface definition for STEREO to Upper Stage integration
 - Provide “STEREO configured” cradles (cost not included in initial figures)
 - USA negotiating with GSFC for use of FSS cradles
 - Provide technical support and data to USA in support of Programmatic Reviews and Processes (e.g. Safety Reviews, CIR, POWG, etc.)
 - Support launch and deployment activities
- USA
 - Develop and manage engineering products (Upper Stage, Cradle, Shuttle)
 - Manage and acquire upper stage (Thiokol STAR 48V)
 - Develop spacecraft adapter rings
 - Define and integrate upper stage
 - Define and integrate spacecraft to cradle
 - Define interfaces between Cargo Element and Shuttle
 - Facilitate and/or represent Payload Customer at Programmatic Reviews
 - Support launch and deployment activities

Baseline

- Ground Processing
 - STEREO, Upper Stages, and cradles to arrive at KSC 2.5 - 4 months prior to launch
 - Facility TBD (KSC, CCAS, Astrotech)
 - Simultaneous processing of Spacecraft
 - Dual support structures required for STEREO and Upper Stage
 - Single set of FSS GSE for interface testing
 - Single set of Upper Stage test equipment
 - APL to determine/provide STEREO test equipment
 - Known hazardous materials:
 - Upper Stage Propellant
 - Upper Stage Ordnance
 - Upper Stage and STEREO High Pressure GN2
 - Orbiter to maintain standard cleanliness level (5 to 10 foot visual inspection)
 - Nominal GN2 purges
 - Full bay GN2 purge performed twice during countdown:
 - First at approximately 3 days prior to launch
 - Second begins at tanking (~L-10 hrs) through liftoff
 - Can provide continuous localized GN2 purge via T-0 umbilical if required

Preliminary Stereo Ground Processing Schedule

January 11, 1999



Baseline

- Orbiter Interfaces
 - No Orbiter to spacecraft power/data/command interface provided while in payload bay
 - RMS power provided through Electrical Flight Releasable Grapple Fixture (EFGF)
 - EFGF attached to STEREO/Upper Stage adapter ring
 - 28V power interface to cradles for latch activation
- Upper Stage Requirements
 - Stand alone Upper Stage with single string avionics
 - STAR 48V Motor
 - Thrust Vector Actuation (TVA) for 3-axis stabilization
 - Guidance System
 - Attitude Control System (ACS)
 - Cold gas (GN2) system

Option 1 - STEREO Self-Test on RMS

- Option 1 allows for the contingency return of STEREO after grappling, prior to unberthing and deployment
 - Power provided through grapple fixture for performing STEREO initialization and self-test
 - STEREO good-to-go confirmation provided via aft flight deck talkback
 - Self-test for STEREO vehicle only, upper stage to remain uninitialized/unpowered until successful confirmation of STEREO self-test
 - Self-test requirement imposes additional safety constraints on STEREO
 - APL to define contingency requirements
 - Define on-orbit repair scenarios (if any)
 - Define any potential replaceable LRU's
 - Once unberthed, spacecraft(s) are committed to deployment and will not be regrapped
 - APL/GSFC responsible for ground analysis and reflight

Option 2 - Spacecraft Contingency Return to Payload Bay

- Option 2 allows for the contingency return of spacecraft(s) at any time prior to upper stage ignition
 - Significantly increases safety requirements
 - Upper stage requirements
 - RF communications system required to ensure receipt, execution and verification of upperstage safing commands
 - Fully redundant avionics system for fault tolerance requirements
 - APL to define contingency requirements
 - Define on-orbit repair scenarios (if any) or return to ground
 - Define any potential replaceable LRU's
 - STEREO vehicle same as baseline (no STEREO initialization or self-test)
- If returned, APL/GSFC responsible for ground analysis and reflight

Option 3 - Additional STEREO/Orbiter Interface

- On-orbit power/data/command capability will be provided from Orbiter to STEREO (not upper stage) while in payload bay
 - Interface provided through existing FSS avionics
 - STEREO initialization/self-test performed while spacecraft is in payload bay
 - Provides data feedback instead of single talkback indicator for failure analysis/troubleshooting
 - APL to define contingency requirements
 - Define on-orbit repair scenarios (if any)
 - Define any potential replaceable LRU's
 - Precludes need for RMS power interface, self-test option
 - Interface connectors automatically demated during unberthing
 - 28V power interface still required for cradle latches
 - Upper Stage same as baseline
- If returned, APL/GSFC responsible for ground analysis and reflight