



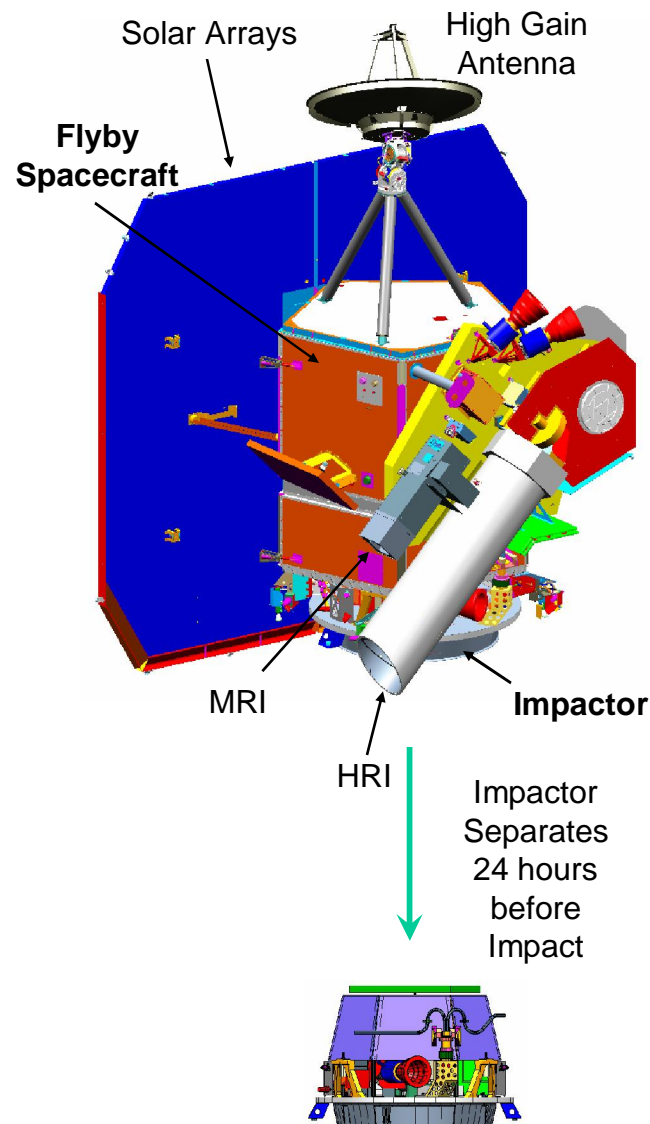
# Deep Impact Flyby Flight System Overview

Additional detailed information may be found in  
Space Science Reviews, Vol. 117, Nos. 1-2, 2005  
“Deep Impact Mission: Looking Beneath the Surface of a Cometary Nucleus”  
Edited by Christopher T. Russell

# Flight System

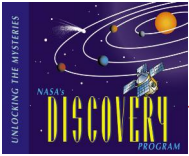


**Delta 2925-9.5**

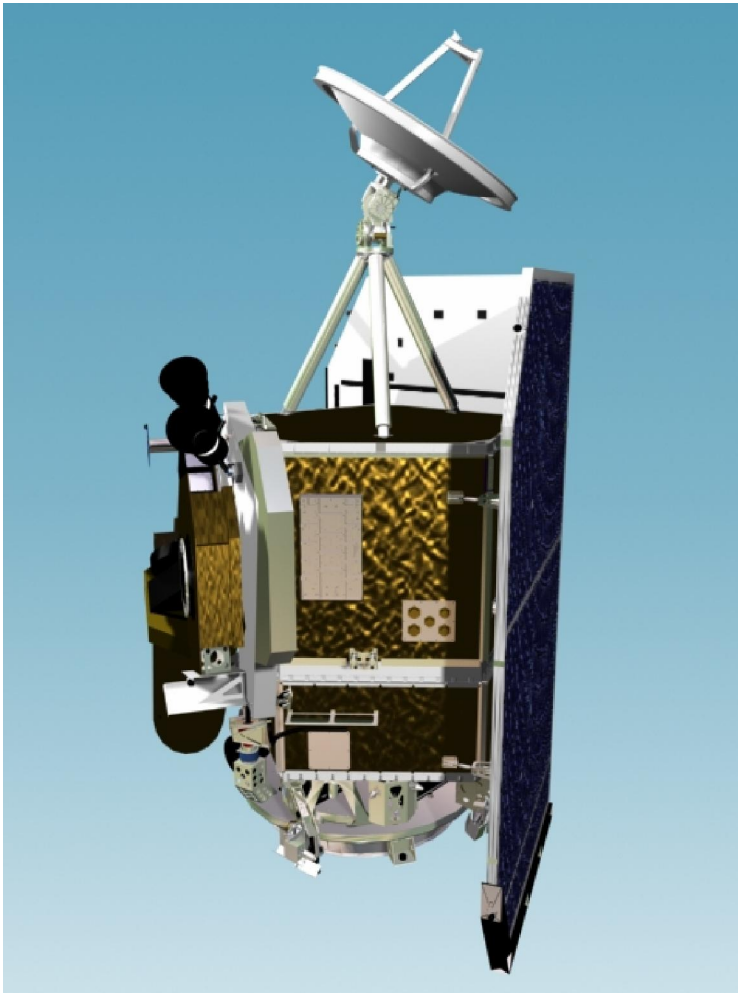


## Overview

- Lift-off! Jan 12, 2005 on Delta II launch vehicle
- Launch mass
  - 973 kg Flight System
  - 372 kg Impactor
- Encountered comet Temple-1 seven months later
- Compatible with 34m/70m DSN
- Flight System Includes:
  - Flyby Spacecraft
  - Impactor Spacecraft
  - HRI/MRI/ITS Instruments



# Flyby Spacecraft Configuration is Optimized for Encounter



## Flyby Spacecraft - Functionally Redundant w/Fault Protection

### **SAM**

- Structures: Composite/Aluminum honeycomb, Debris shielding
- Mechanisms: 2-axis HGA Gimbal, SA Deployment System

### **Propulsion**

- Hardware: Center-mounted tank, 4 - 4 N RCS, 4 - 22 N divert thrusters
- Performance: 170 m/s  $\Delta V$ , 5000 Ns RCS impulse
- Capacity: 65 kg baseline, up to 85 kg  $N_2H_4$

### **EPDS**

- Solar Array: 7.5 m<sup>2</sup> 26.5% efficient triple junction cells; dual string length
- Battery: 16 A-h  $NiH_2$  CPV
- Control: Direct energy transfer via 1553 Power Interface Box

### **CDH**

- Architecture: RAD750 based, 2 x 512 MB NVM, 1553 Architecture

### **ADCS**

- Primary: 2 x CT633 Trackers, Scaleable SIRU, 4 x 2.0 Nms RWAs
- Backup: 12 Course Sun Sensors, RCS
- Performance: 150  $\mu$ rad pointing knowledge, 0.025 deg/s<sup>2</sup> max agility

### **Telecom**

- X-Band: To 34m & 70m DSN, 10 bps -400 Kbps D/L, 7.8 bps - 2 Kbps U/L
- S-Band: Impactor Crosslink, 16 Kbps D/L, 64 Kbps U/L

### **TCS**

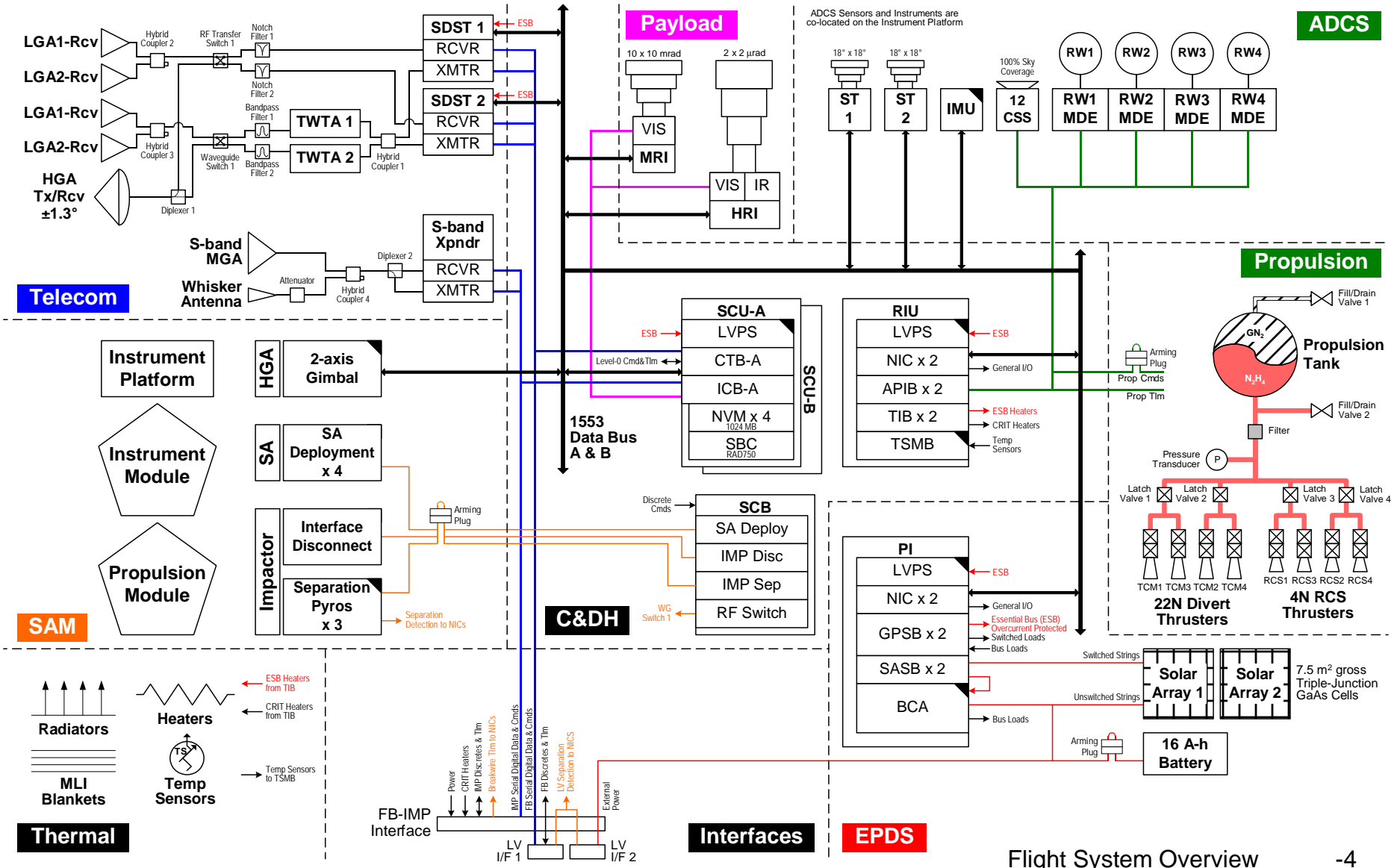
- Type: 64 primary/secondary heater controllers, passive radiators, MLI

### **Payload Accommodations**

- Mass: 82 kg HRI/MRI and 365 kg Impactor
- Power: Supply 92 W average at encounter
- Storage: ~ 770 MB Science data EOL

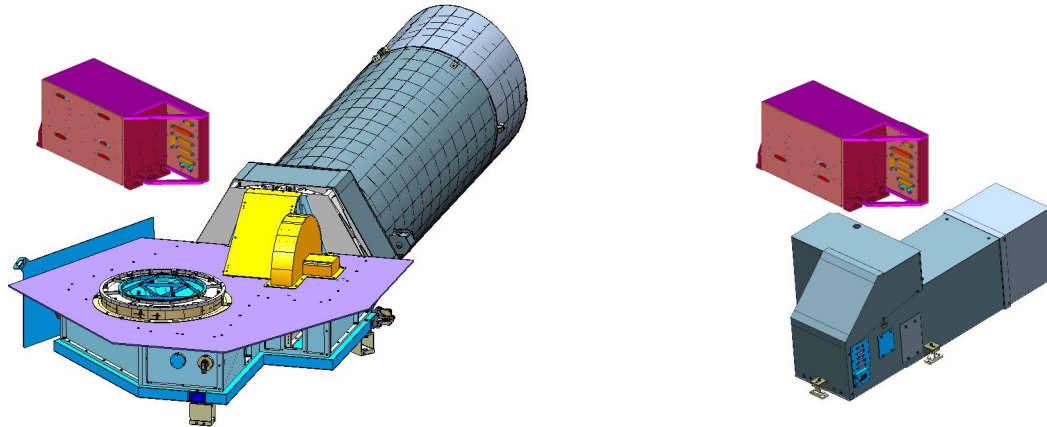


# Simplified Flyby Functional Block Diagram





# Two Imaging Instruments Complete Flyby Flight System



## High Resolution Imager

- 30 cm aperture Cassegrain telescope
- Visible CCD and IR spectrometer

### **Flyby Interface**

- Kinematic flexures to Instrument Platform
- Electronics Box inside S/C bus structure
- 51.4 watts peak power
- 1553 data connection to ICB PWA in SCU
- Storage: 2 x 512 MB in SCU (shared)
- Cold unobstructed view of space

## Medium Resolution Imager

- 12 cm aperture Cassegrain telescope
- Visible CCD

### **Flyby Interface**

- Kinematic flexures to Instrument Platform
- Electronics Box inside S/C bus structure
- 41.2 watts peak power
- 1553 data connection to ICB PWA in SCU