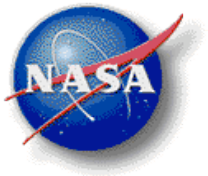
NASA Dryden Flight Research Center
C-17 Research Overview

Agenda



2006 Activities

- T-1 Engine #3 PHM Instrumentation refurbishment & NASA Instrument Data System Upgrade

Current Activities

- IVHM Propulsion Health Management

Future Work

- CEV Parachute Assembly System Tests

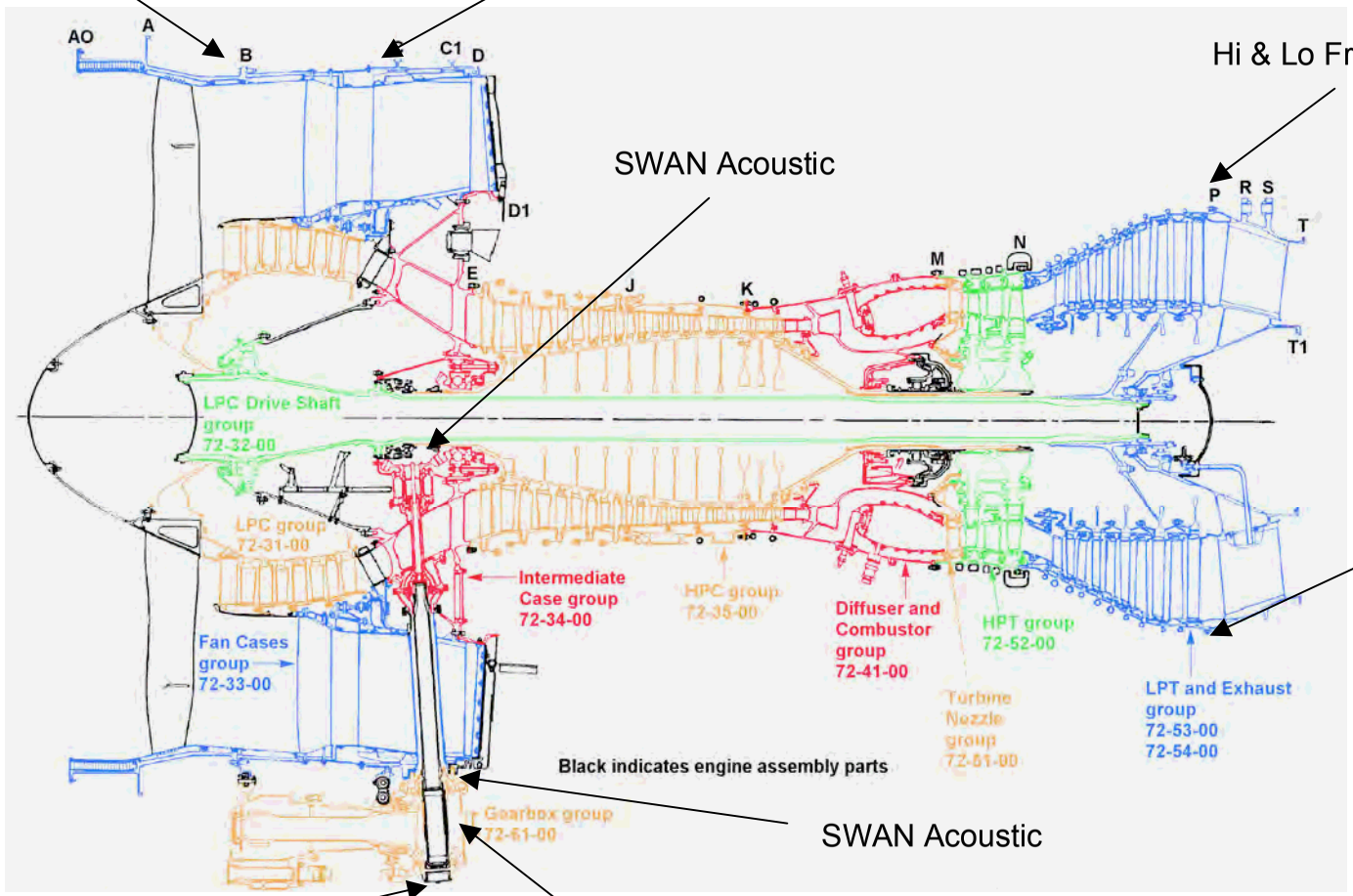
2006 Activities
PHM Instrumentation Refurbishment

2006 was a year for reorganization for NASA's Aeronautics Research Missions Directorate. There were no flights or research involving the C-17.

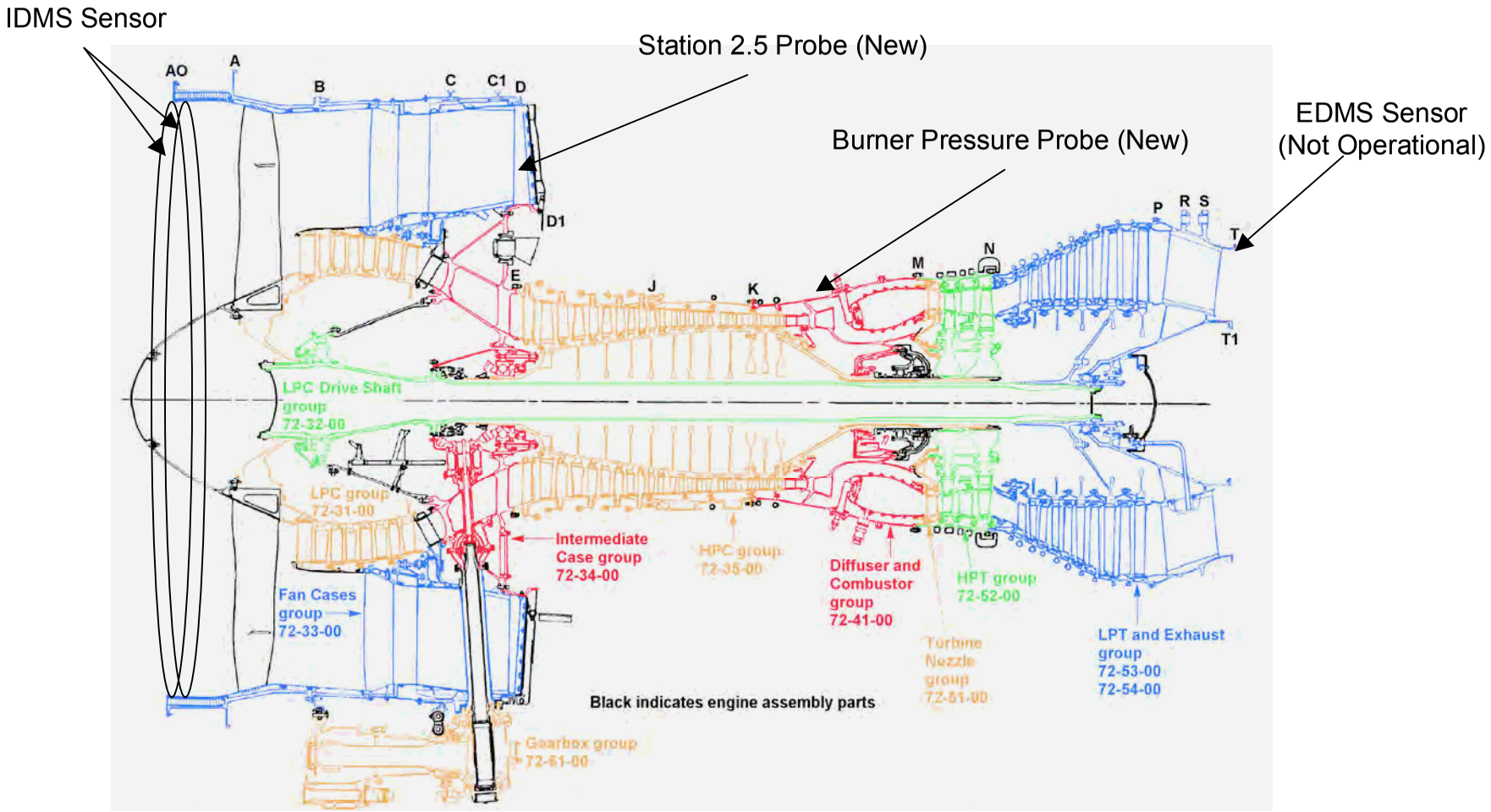
NASA Dryden used the time to refurbish the existing instrumentation and wiring on the C-17A T-1 aircraft, Engine No. 3:

- Replaced damaged wiring
- Removed obsolete wiring
- Recalibrated instrumentation
- Rewired NASA Instrument System Racks

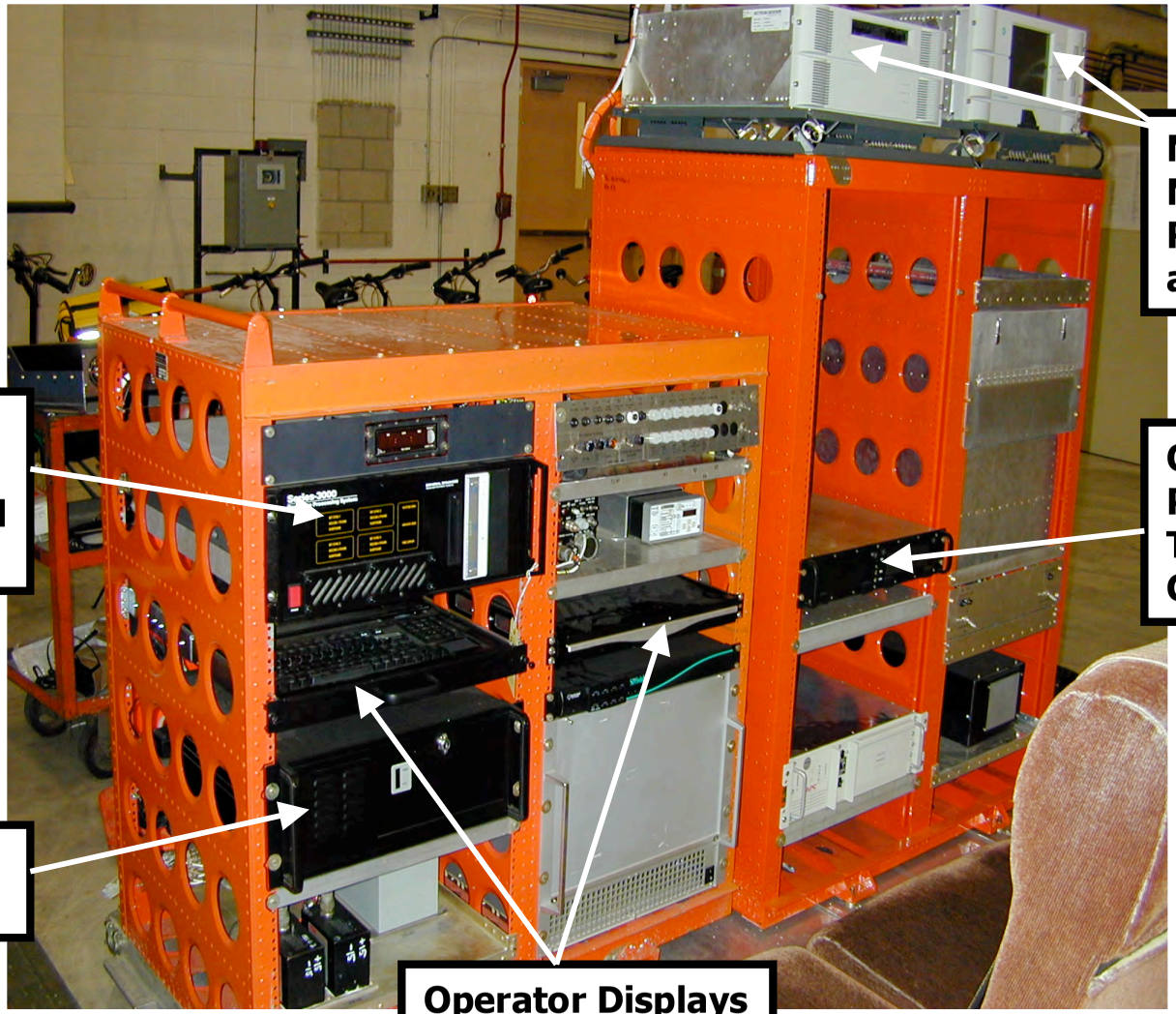
Acoustic and Vibration Sensors



Gas Path Sensors



NASA Instrumentation System Racks



NASA C-17 Simulator

Current Activities

- **Integrated Vehicle Health Management - Propulsion Health Management**

  NASA PHM Flight Objectives:

  - ***Damaged Aircraft Good Engines (DamAGE) Project Compressor Mapping:*** NASA will record compressor flow, temperatures, and pressures at the inlet and exhaust of the High Pressure Compressor (HPC) in order to calibrate an engine model for Glenn Research Center
  - ***IVHM Data Fusion:*** Flight data collected from existing sensors, advanced PHM sensors, and ARINC 429 available signals will be utilized to develop Models, Analysis Methods, and Information Fusion Algorithms, and to develop real-time data publishing and data mining capabilities
  - ***Evaluation of Propulsion Control Algorithms:*** NASA will use an existing USAF Veridian laptop to monitor all 1553 bus traffic from Mission Bus 2 at the crew rest area, record selected 1553 bus data for use in propulsion control algorithms, evaluate algorithms for display purposes only loaded into the USAF Veridian laptop

  NASA C-17 assets are being developed into an integration (V&V) platform for NASA developed IVHM technologies

Future Work

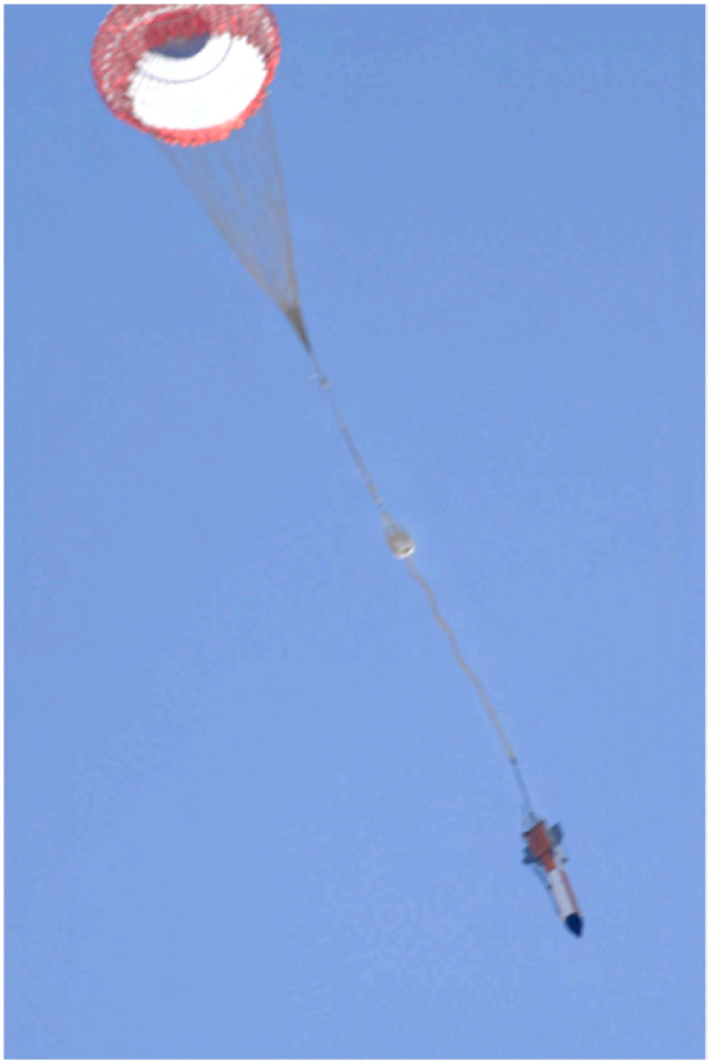
- **Crew Exploration Vehicle (CEV) Parachute Assembly System Tests (CPAS):**

  CPAS Goals:
  - Verify that the decelerator system for the CEV functions as designed
  - Collect data to verify predictive computer simulation models
  - Demonstrate repeatability of the system's performance
  - Build confidence in the CPAS design for a man-rated deceleration system

- **CPAS Objectives:**
  - Up to 30 single-chute tests using a C-130E/H, C-17A, or helicopter
  - 15 full-system tests through Low Velocity Air Drops (LVAD) from an AFFTC C-17 aircraft

- **Nominal Schedule:**
  - FY 2007 - 2008 - Generation 1 testing
  - FY 2009 - 2010 - Generation 2 testing and Qualification

“Lawn Dart”



Weight Tub

Parachute Test Vehicle