



# NASA ER-2: Flying Laboratory for Earth Science Studies

*33<sup>rd</sup> MAES International Symposium and Career  
Fair*



*Albuquerque, New Mexico*

*Presented by Robert Navarro,  
NASA Dryden Flight Research  
Center*

*October 25–27, 2007*

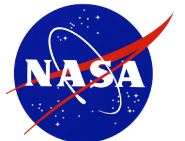
# ER-2 Specifications



Crew:	One Pilot
Length:	62 feet, 1 inch
Wingspan:	103 feet, 4 inches
Engine:	One General Electric F -118 -101 engine
Altitude:	Above 70,000 feet
Range:	Over 6000 nautical miles, subject to pilot duty time limitations
Duration:	Over 10 hours
Cruise Speed:	~400 knots above 65,000 feet altitude (~210 Meters/sec )

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# ER-2 Basic Configuration

## 4. RIGHT WING POD

86.0ft<sup>3</sup> (2.43m<sup>3</sup>)  
650lbs (294 kg)  
50A @ 115VAC/400Hz  
80A @ 28VDC

## 2. Q -BAY

64.6ft<sup>3</sup> (1.83m<sup>3</sup>)  
1000lbs (454 kg)\*\*  
100A @ 115VAC/400Hz  
140A @ 28VDC

## 1. NOSE

47.8ft<sup>3</sup> (1.35m<sup>3</sup>)  
700lbs (317 kg)\*\*  
50A @ 115VAC/400Hz  
70A @ 28VDC

## 5. SYSTEM 20 POD

0.74ft<sup>3</sup> (0.02m<sup>3</sup>)  
45 lbs (20.4 kg)  
30A @ 115VAC/400Hz  
30A @ 28VDC

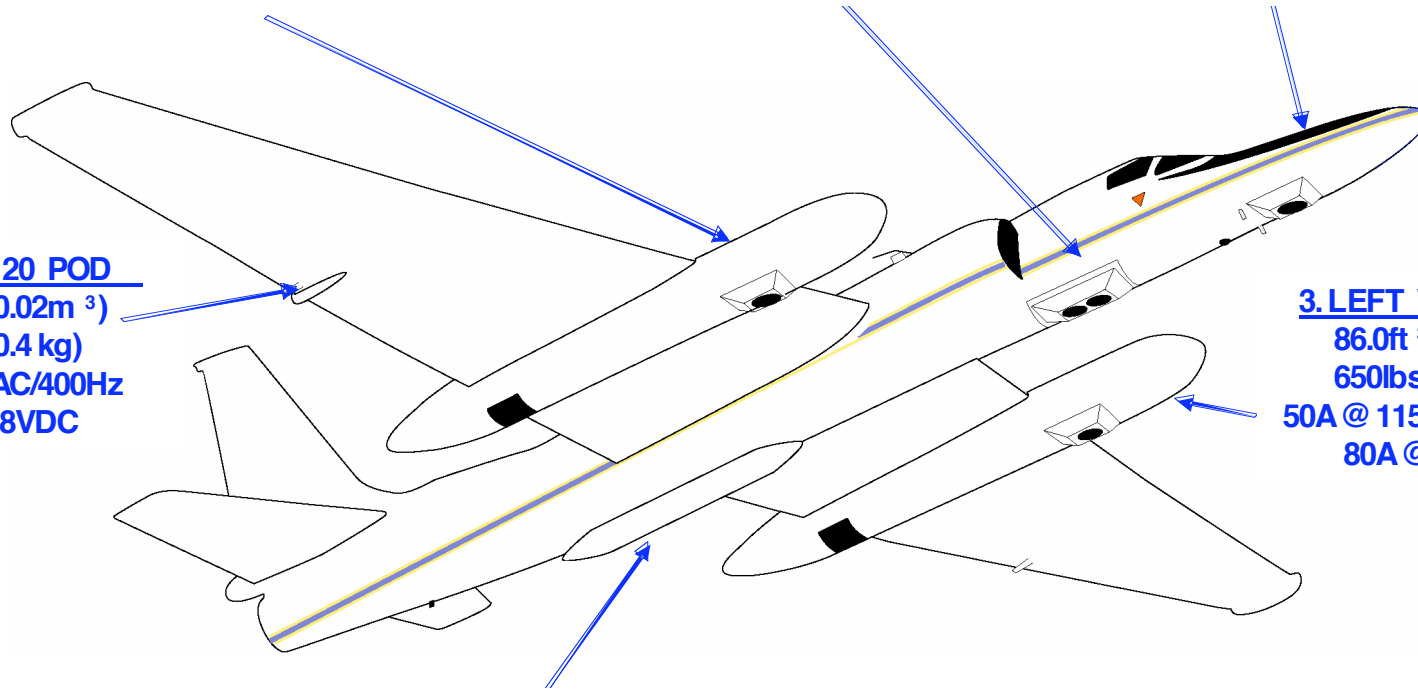
## 3. LEFT WING POD

86.0ft<sup>3</sup> (2.43m<sup>3</sup>)  
650lbs (294 kg)  
50A @ 115VAC/400Hz  
80A @ 28VDC

## 6. CENTERLINE POD

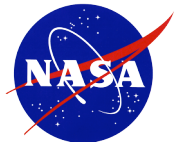
14.0ft<sup>3</sup> (0.40m<sup>3</sup>)  
350lbs (159 kg)  
Electrical Shared with  
Q-Bay

\*\*\* - Max combined Q -Bay and Nose  
payload cannot exceed 1300lbs



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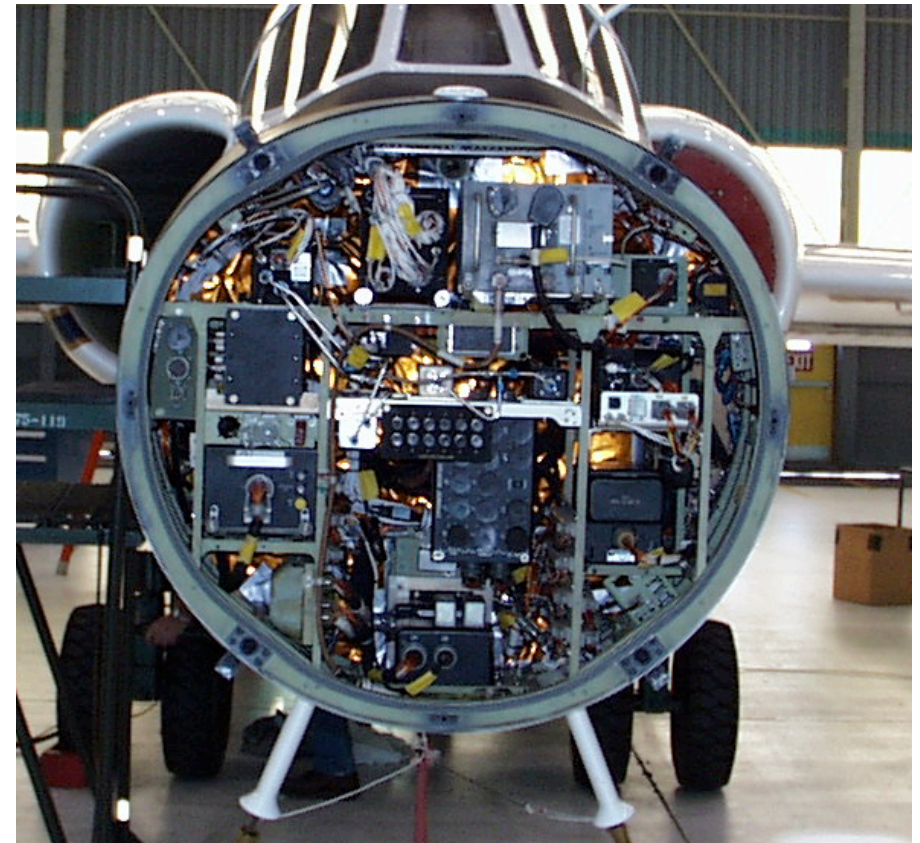


## ER-2 Payload Areas: Nose Area



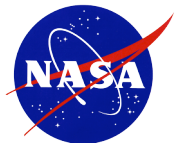
**Inside Nose looking Forward**

**Fixed Nose Looking Aft**



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# ER-2 Payload Areas: SuperPod Fore and Aftbody



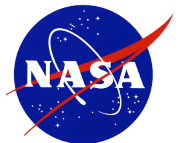
**Forebody inside looking forward**



**Aftbody side view**

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## ER-2 Payload Areas: SuperPod Midbody



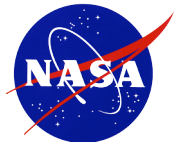
**Forward Midbody looking Aft**



**Lower Midbody looking Up and Aft**

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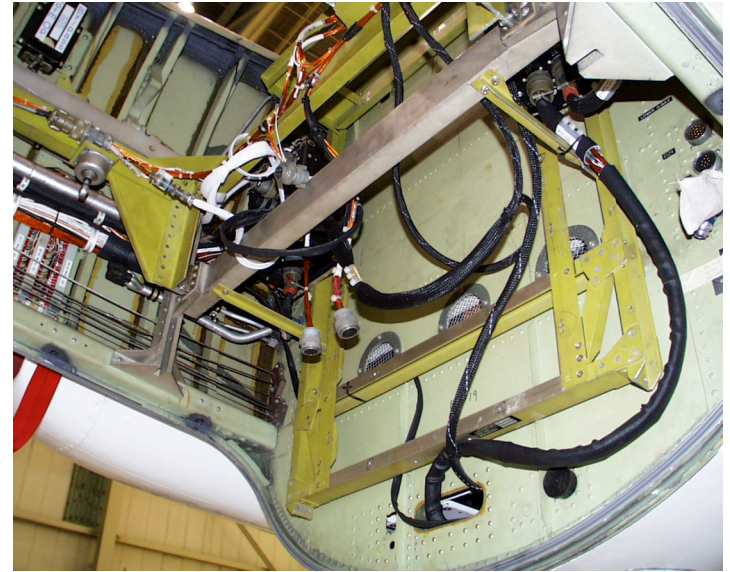


# ER-2 Payload Areas: Q-Bay

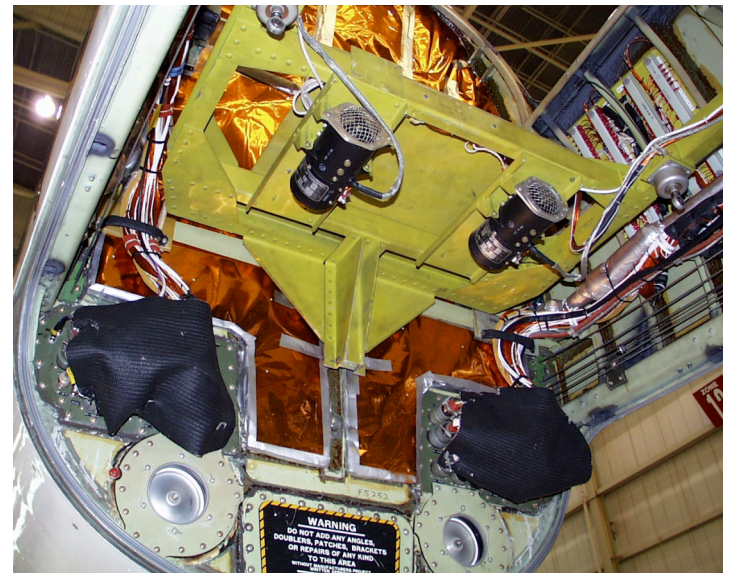


**Internal Q-Bay looking Up and Aft**

**Aft  
Q-bay**

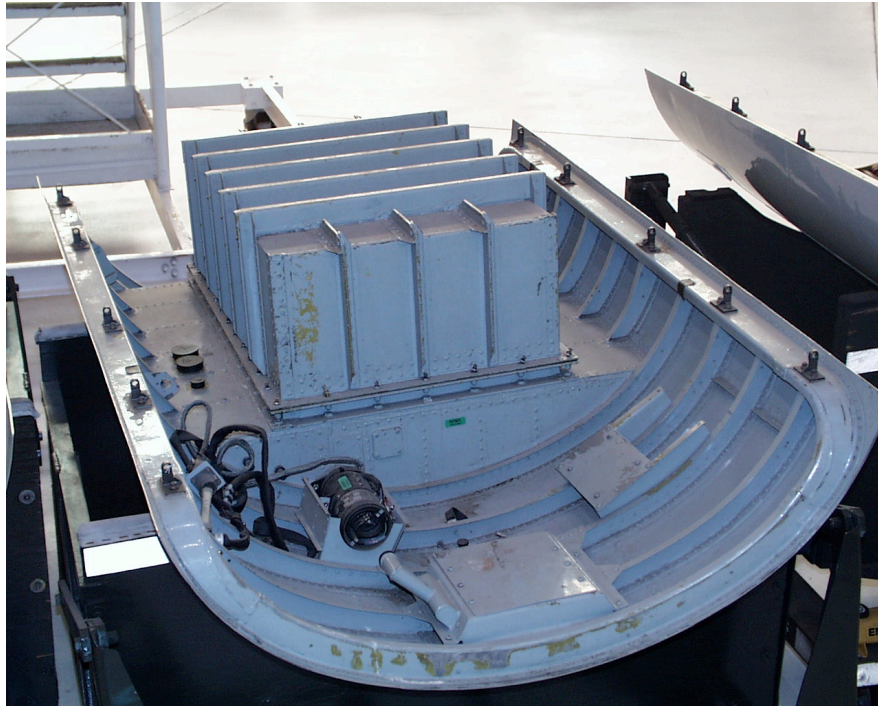


**Forward  
Q-Bay**



# ER-2 Payload Areas: Q-Bay Hatch Designs

**Pressure Box Mount**



**Dual Window Hatch**

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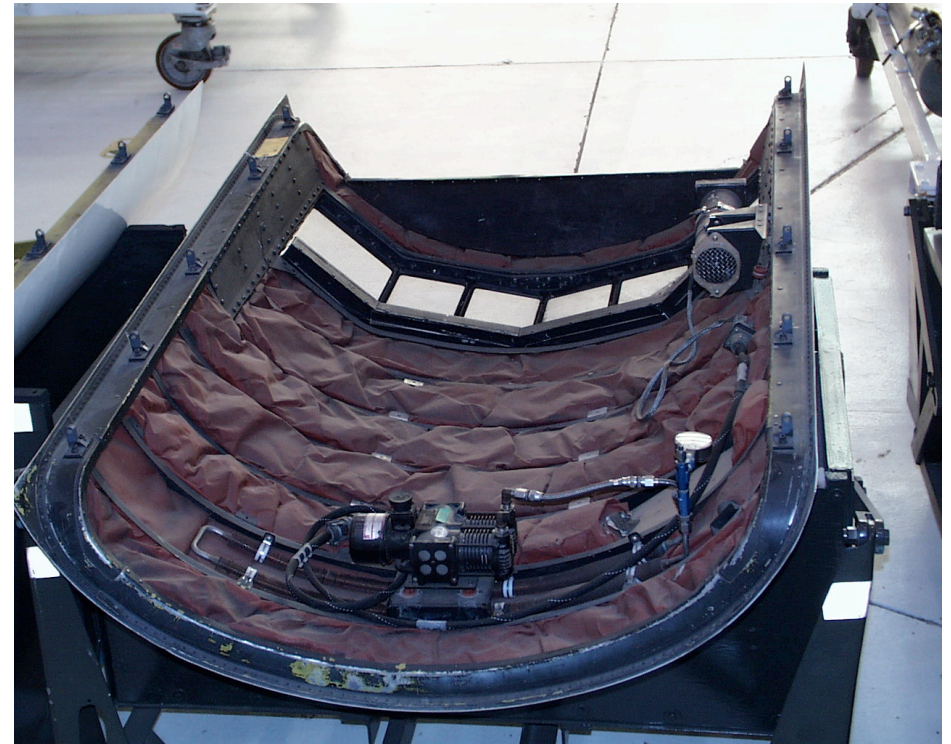


## ER-2 Payload Areas: Q-Bay Hatch Designs



**Open Port With Fairing**

**Panoramic Window Hatch**



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# ER-2 Payload Areas: External Pods



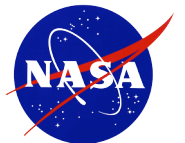
**Centerline Pod**

**System 20 Pod**



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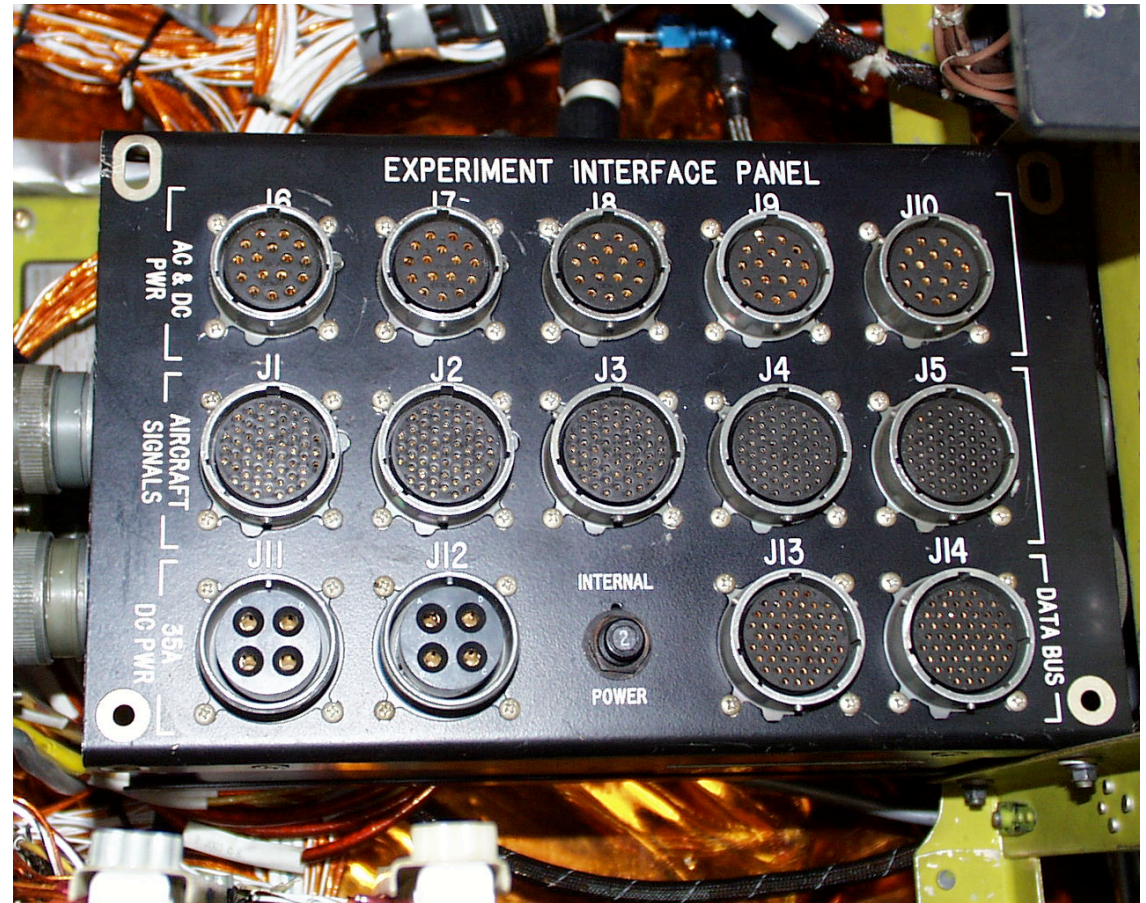


# ER-2 Electrical/Control Interface



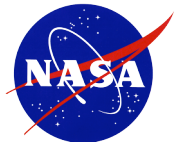
**Experiment Control Panel**

**Experiment Interface Panel**

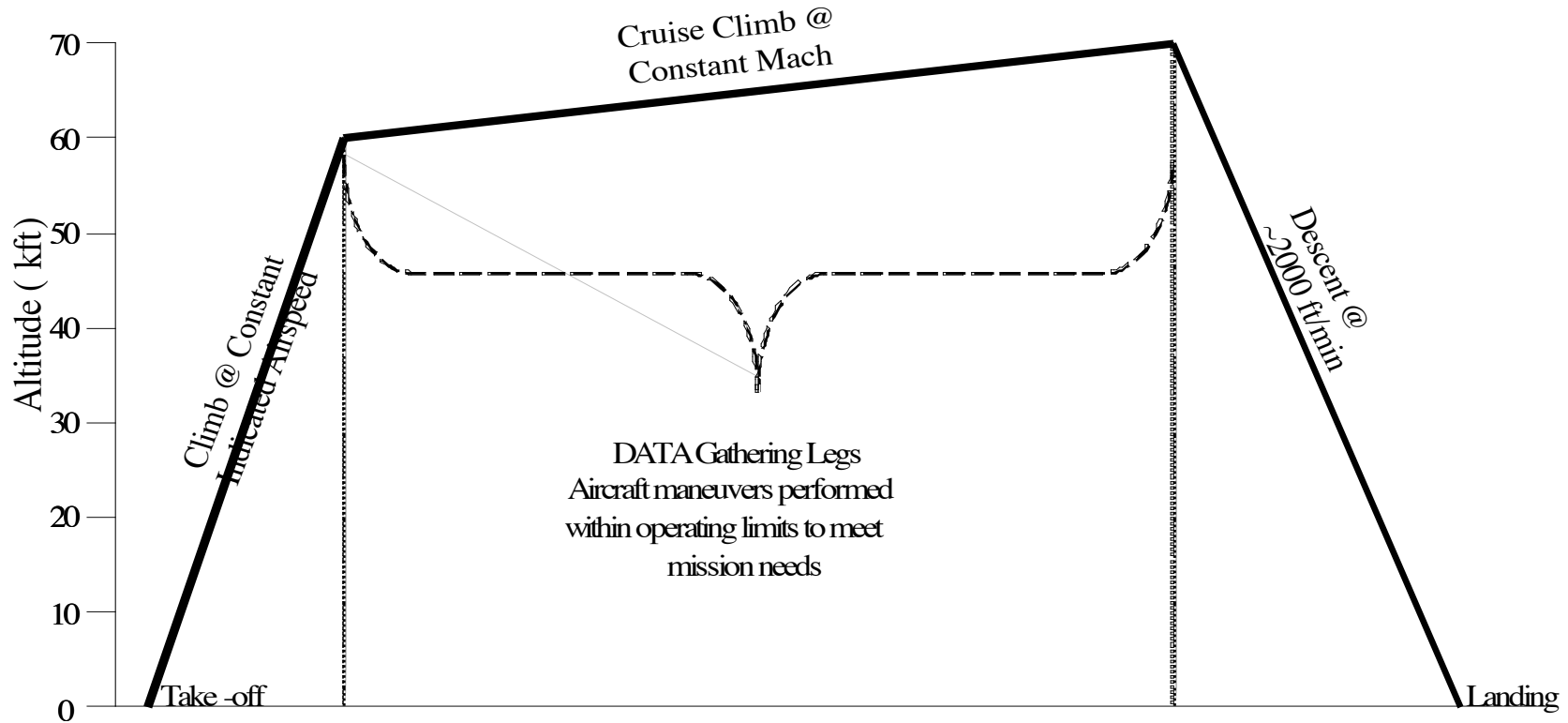


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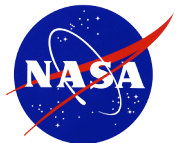


# ER-2 Typical Flight Profile



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# ***Tropical Composition, Cloud and Climate Coupling TC-4***

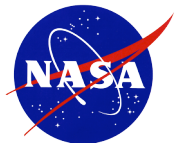
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## **ER-2**

- **Objective:** To investigate the structure, properties and processes in the tropical Eastern Pacific. (cloud formation)
- **Aircraft #809**
  - Completed TC-4 *Tropical Composition, Cloud and Climate Coupling* Science campaign in Costa Rica
  - Completed a total flight hours 87 (includes two test flights – 8.3 hrs)

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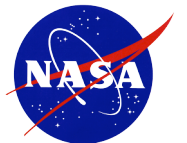


## TC-4 Timeline

- **ER-2 Crew Travel** 12 July (C-5 Transport)
- **Aircraft Transits** 13 July
- **First Science Flight** 17 July
- **Last Science Flight** 8 August
- **Aircraft Transits** 10 August
- **ER-2 Crew Returns** 14 August (C-5 transport)

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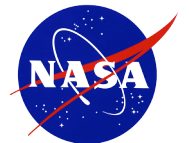


# TC4 Area of Interest

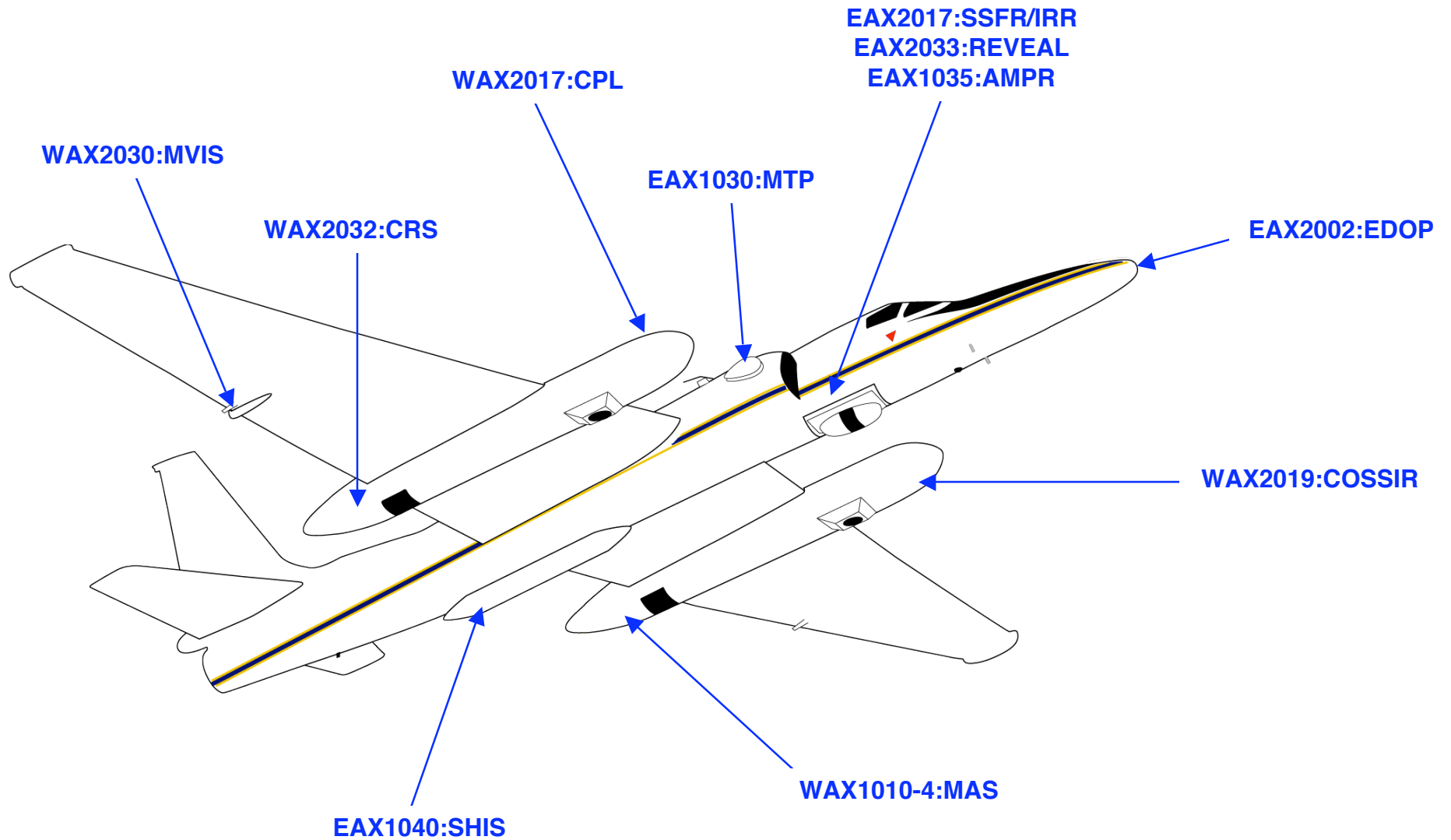


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# ER-2 TC4 Payload



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## A/C ready for fuel



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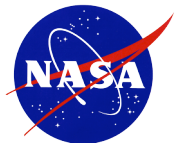


## ER-2 Pilot being suited



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# ER-2 Taxing



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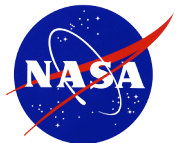


## ER-2 Pilot post flight debrief



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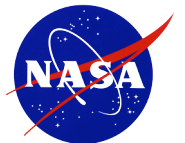


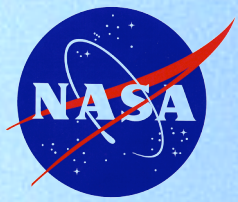
# NASA ER-2: Flying Laboratory for Earth Science Studies and Remote Sensing

- **ER-2 has successfully conducted campaigns of**
  - **Stratospheric and tropospheric chemistry**
  - **Land-use mapping**
  - **Disaster assessment**
  - **Pre-testing and calibration/validation of satellite sensors.**
- **ER-2 aircraft facility provides:**
  - **Cost-effective approach to high altitude flight-test/data collection**
  - **Mission planning and logistics**
  - **Sensor Integration and Upload**
  - **Experienced personnel**
- **Conduct missions in CONUS and foreign countries**

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# NASA ER-2: Flying Laboratory for Earth Science Studies

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