

# Complete GVT of the 747 SP SOFIA Aircraft



Image Credit: NASA/Jim Ross

## Case Study

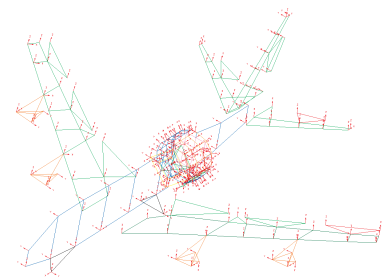
### OVERVIEW

A Boeing 747SP aircraft was modified by L-3 Communications Integrated Systems to accommodate a 2.5 meter reflecting telescope as part of the SOFIA program. SOFIA, the largest airborne observatory in the world, is a collaborative effort of NASA and DLR, the German Aerospace Center.

Because major structural modifications were made to the aircraft to accommodate the telescope and supporting equipment, a ground vibration test (GVT) to characterize the dynamic properties of the aircraft was required. L-3 performed detailed finite element analysis of the modified aircraft, and ATA conducted the GVT, providing all of the instrumentation and data collection and analysis systems and working side by side with L-3 analysis engineers to compare test and analysis results in preparation for final flight certification.

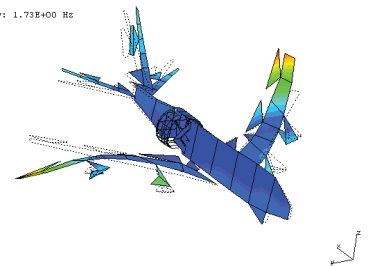
### TASKS PERFORMED & KEY OUTCOMES

- Coordinated sensor location selection with L-3 and other team members.
- Conducted complete GVT of the 747SP SOFIA aircraft for eighteen unique configurations.
- Provided detailed test results to L-3 analysis engineers.
- Evaluated the telescope assembly isolation system characteristics and collected overall aircraft and telescope data during telescope assembly drive system excitation to assess servoeelastic properties.
- Studied local component modal behavior including telescope cavity acoustic modes and tuned mass damper behavior.
- Coordinated final test results with L-3 engineers for model updating activities.



Test display model of 747

Test TA40 AP20 URDeLosed  
Frequency: 1.73E+00 Hz



Fundamental wing bending and empennage mode measured during test

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