

## Aircraft Facts

Model: Boeing 747SP (Special Performance)  
 Number built: 45; still in service: 14  
 Registration: N747NA  
 Manufacturer's serial number: 21441  
 Line number: 306  
 Based: NASA Armstrong Flight Research Center, Building 703, Palmdale, Calif.  
 Staffing: Flight Crew: 3; Mission Crew: 2–6; Observers/Educators: 5–15  
 Fuselage Length: 53.9 meters (177 feet) Standard 747-400: 70.5 meters (232 feet)  
 Wingspan: 59.7 meters (196 feet)  
 Powerplants: 4 x Pratt & Whitney JT9D-7J turbofan engines (50,000 lbf thrust each)  
 Service Ceiling: 45,000 feet (13.7 km) — above 99.8 percent of the Earth's atmospheric water vapor  
 Airspeed at 41,000 feet: Mach 0.8 (450 knots or 520 mph)  
 Range: 12,270 km (6,625 nautical miles)  
 Mission Duration: 7 to 9 hours (standard); 12.2 hours (maximum)  
 SOFIA empty weight (zero fuel): 171,458 kg (378,000 pounds or 189 short tons)  
 SOFIA Maximum Take Off Weight: 315,700 kg (696,000 pounds or 348 short tons)  
 Maximum Fuel Load: 136,100 kg (300,000 pounds; 44,776 U.S. gallons)  
 Fuel Usage: 68,040 to 113,400 kg (150,000 to 250,000 pounds)  
 (standard duration mission)  
 Cavity Door weight: 1,430 kg (3,150 pounds)



NASA / Carla Thomas

## N747NA History

First Flight: April 25, 1977  
 Delivered: May 6, 1977, Pan Am (N536PA)  
 Christened: *Clipper Lindbergh* by Anne Morrow Lindbergh on May 20, 1977, the 50th anniversary of Charles A. Lindbergh's solo flight across the Atlantic.  
 • Rechristened *Clipper Lindbergh* by Erik Lindbergh on May 21, 2007.  
 Sold to United Air Lines: February 13, 1986  
 Registration changed: November 1, 1986 (N145UA)  
 Approximate Total Flight Hours: 76,250 • Approximate Number of Cycles: 10,360  
 Acquired by NASA: October 27, 1997  
 Registration changed: December 17, 2004 (N747NA)  
 First post-modification flight: April 26, 2007 (Waco, Texas)  
 First 100-percent open door flight: December 18, 2009  
 First Light flight: May 25/26, 2010  
 First Science flight: December 1, 2010  
 First Pluto Occultation flight: June 23, 2011  
 First International Deployment: September 17, 2011  
 First Full Cycle of Science flights: November 2012



NASA / Tom Tschida



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## Telescope Facts

Telescope Consortium: MAN Technologie AG and Kayser-Threde GmbH

Nominal Operational Wavelength Range: 0.3 to 1600 microns

Primary Mirror Diameter: 2.7 meters

System Clear Aperture Diameter: 2.5 meters

Nominal System f-ratio: 19.6

Primary Mirror f-ratio: 1.28

Full Elevation Range: +15 to +70 degrees above the horizon

Unvignetted Elevation Range: +20 to +60 degrees

Unvignetted Field-of-View Diameter: 8 arcmin

Maximum Chop Throw on Sky: +/-4 arcmin (unvignetted)

Diffraction-Limited Wavelengths:  $\geq 15$  microns

Telescope installation weight: 15,420 kg (17 tons; 34,000 pounds)

## Optical Information

Optical Configuration: Bent Cassegrain with chopping secondary mirror and flat folding tertiary, Nasmyth focus

Chopper Frequencies: 1 to 20 Hz for 2-point square wave chop

Pointing Stability = 1.0" rms at first light  
= 0.5" rms in full operations

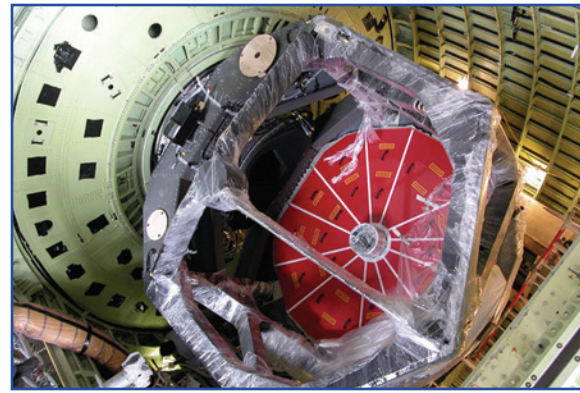
Pointing Accuracy = 0.5" with on-axis focal plane tracking  
= 3" with on-axis fine-field tracking

Total Emissivity of Telescope (Goal):

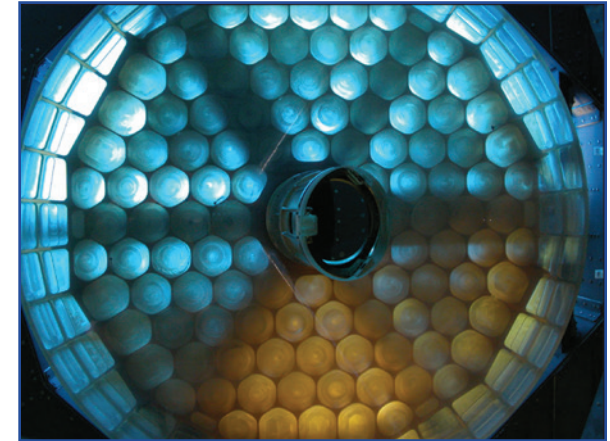
15 percent at 10 microns with dichroic tertiary

10 percent at 10 microns with aluminized tertiary

Recovery Air Temperature in Cavity (and optics temperature) = 240 K



L-3 Communications / USRA



NASA / Ron Strong

## SOFIA Science Themes

Interstellar medium physics and star formation in our galaxy.

Planet formation in nearby star systems.

Origin and evolution of biogenic atoms, molecules, and solids.

Composition and structure of comets, planetary atmospheres and rings, star formation, dynamics, and interstellar medium chemistry of other galaxies.

The dynamic activity in the center of the Milky Way.

Ultra-luminous IR Galaxies (ULIRGS) as a key component of the early universe.

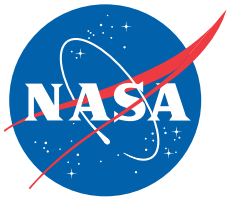
## SOFIA Management

Aircraft Operations: NASA Armstrong Flight Research Center, Palmdale, Calif.

Science Operations: NASA Ames Research Center and  
Universities Space Research Association

Deutsches Zentrum für Luft- und Raumfahrt (DLR)

Deutsches SOFIA Institut (DSI), Universität Stuttgart,  
Germany



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