

Statement of Work 747SP Aircraft Galley

**Statement of Work
Boeing 747SP
Revision – 5
April 26, 2012**

Background

The National Aeronautics and Space Administration (NASA) operates a Boeing 747SP (Special Performance) aircraft as an airborne astronomical observatory under the Stratospheric Observatory for Infrared Astronomy (SOFIA) Program. This aircraft is operated by NASA Dryden Flight Research Center (DFRC) and is based in Palmdale, CA. As owner and operator of this unique aircraft, NASA has a requirement to install a galley on the main deck of the aircraft in preparation for the upcoming Science Flights.

Aircraft Information:

Type Aircraft	Boeing 747-SP-09
Engine Type	PW JT9D-7
Tail Number	N747NA
Registration	B747SP-21
Serial Number	21441
Location	Palmdale, CA
Aircraft Flight Hours, Total Time (TT)	74,680
Cycles	10,149

The SOFIA Program consists of an airborne observatory platform equipped with a infrared telescope with a 2.5-meter primary mirror, and multiple subsystems to support the telescope and other scientific instruments capable of infrared and sub-millimeter observations. The aircraft can operate throughout the world at a ceiling of 45,000 feet. The telescope looks out of an open cavity in the side of the aircraft and allow astronomers to obtain sharper infrared images than ever before for a planned operational life of 20 years starting in 2014.

The SOFIA Observatory aircraft will be required to support multiple missions that will consist of diverse crewmembers from around the world as well as students from Universities and High Schools for flight durations up to 12 hours. As a result, installation of a galley to support the mission crew, aircrew and other personnel onboard the aircraft is a requirement. The galley in the main cabin of the aircraft is required to provide personnel with cold storage for food, supply of hot and ambient temperature water, hot beverages, microwaves, sink and waste storage.

Scope

This Statement of Work is for the completion of the design, fabrication, installation support, test and verification of the SOFIA aircraft galley. This Statement of Work covers the design, fabrication and installation support of an aircraft galley installed at aircraft station 550 next to the aircraft lavatories. NASA personnel shall accomplish the installation of the galley with support from the awarded contractor.

Performance of this Statement of Work includes the use of commercial hardware and services to satisfy the stated requirements of NASA SOFIA flight and science operations.

Tasks

Design the galley in the main cabin to include:

- a. Two ACE 9602 refrigerators with approximately 6.6 cubic feet of interior space each (or equivalent)
- b. Space and electrical connections for two TIA WaveJet Microwave ovens (or equivalent)
 - i. One TIA Wavejet Microwave will be procured through this RFP
- c. Space and electrical connections for two TIA Galley Products 1603 Beverage makers (no beverage makers will be provided by this SOW)
- d. Storage for dry goods such as cups and beverage making supplies.
- e. Trash cart capable of holding a plastic trash bag with a capacity of at least 13 gallons
- f. Potable water dispenser with associated sink. Drain diameter shall be 1". Sink shall have removable strain.
- g. Food prep countertop and associated LED under counter lighting
- h. Integrated paper towel dispenser capable of holding 300 C-Fold paper towels.
- i. Integrated small compartment next to beverage makers for storing coins.

Functional Requirements

1. The SOFIA aircraft galley shall have a circuit breaker panel with breakers to control electrical power distribution to all galley equipment and outlets. There shall be one breaker per appliance and outlet.
2. The SOFIA aircraft galley shall provide the necessary plumbing to provide potable water from the aircraft potable water supply. This shall include inflight shut-off valves between the potable water supply and galley.
3. The SOFIA aircraft galley shall have an internal drain system that accommodates attachment with aircraft drain lines. This shall include drain clean out points that are accessible and don't require galley removal to unclog.
4. The SOFIA aircraft galley electrical outlets shall be located to prevent contamination or moisture intrusion.
5. The SOFIA aircraft galley shall have an under shelf LED work surface light(s) with a locally operated dimming control.

Performance Requirements

1. The SOFIA aircraft galley castings shall have a minimum-casting factor of 1.5, unless a lower casting factor is justified by inspection level requirements in accordance with FAR 25.621.
2. Stowage compartments shall be constructed to FAR part 25, section 787.
3. The SOFIA aircraft galley lighting shall be capable of providing at least 20 foot candles of light on all areas of work surface.
4. The SOFIA aircraft galley, with associated equipment, shall have a maximum power consumption of:
 - a. 11 KVA, 115VAC, 400 Hz, three phase, continuous
5. All electrical appliances shall be powered from 115VAC, 400Hz, three phase power
6. The Galley shall meet the following takeoff and landing aircraft loading requirements per FAR 25.561:
 - a. 9.0 G, Forward direction
 - b. 1.5 G, AFT direction
 - c. 3.0 G, Up direction
 - d. 6.0 G, Down direction
 - e. 3.0 G, Side direction

Physical Requirements

1. The Galley shall be designed to include the following items:
 - a. Two microwave Ovens, 35 pounds each
 - b. Two beverage makers (Two TIA Galley Products 1603 or equiv), up to 19 pounds
 - c. Two 6.6 Cu ft Refrigerators, 120 pounds each
 - d. Provide a trash container with waste chute and closeable lid build into countertop and 13 gallon capacity designed to secure a plastic trash bag around the top rim.
 - e. Mounting surface for sanitary certificate.
 - f. Multiple storage compartments for a total of at least 9 cubic feet of storage.
 - g. Paper towel dispenser
 - h. Work surface (countertop) for preparing food and beverages with at least 6 cubic feet of work space.
2. The galley shall be located along the centerline of the aircraft in the main cabin approximately located at FS 550in to FS 592in.
3. The SOFIA aircraft galley assembly shall be less than 42" deep, 76" wide and 78" tall.
4. Any container, storage compartment, insert or device that can be a source of water shall have drain provisions into the internal drain system.

5. The galley will mount to existing upper and lower attach points. Drawings will be provided.
6. The SOFIA aircraft galley structure together with the galley inserts shall have a maximum weight of 1103 pounds with no consumables installed.
7. The exterior finish of the galley, except the countertops, shall be commercial aircraft grade laminate, not laminated wood.
8. The potable water supply shall have an inline carbon filter accessible underneath the sink.

Safety Requirements

1. The SOFIA aircraft galley shall include a placard defining thermal hazards that expose personnel to surface temperatures that may cause burns or injury.
2. The SOFIA aircraft galley materials shall meet the burn requirements in accordance with FAR 25.853 AMDT 83.
3. All exposed corners and edges of the SOFIA aircraft galley shall be rounded in accordance with MIL-STD-1472E, or padded to prevent personal injury.
4. The SOFIA aircraft galley and associated equipment shall meet the cleanliness requirements in the FDA Handbook on Sanitation: Construction of Aircraft Galleys and Galley Components.
5. The SOFIA aircraft galley doors, panels, and compartments shall be placarded for closure during taxi, take-off and landing, and turbulence.
6. The SOFIA aircraft galley storage compartments and drawers shall be placarded to show individual maximum allowable loads.
7. The SOFIA aircraft galley integral LED lighting shall be designed and installed such that breakage will not contaminate food.
8. The SOFIA aircraft galley shall be designed to prevent spilled liquids from dripping onto wiring, switches, and other electrical equipment.

Human Factors

1. The SOFIA aircraft galley work surface (countertop) shall be nominally 41 inches above the floor.
2. The SOFIA aircraft galley latching devices shall have a visual indication of full positive engagement.
3. The SOFIA aircraft galley work surface shall be designed with raised beveled edge guards to prevent liquids from spilling over the edge.

4. The SOFIA aircraft galley latching devices shall be uniform in design type and simple to operate by a single motion.

Parts, Materials and Processes

1. The SOFIA aircraft galley shall have protective plating or coating applied to all non-stainless steel metal surfaces to prevent corrosion.
2. The SOFIA aircraft galley work surface (countertop) shall be fabricated of stainless steel with back-splash and side-splashes incorporated as an integral part of the countertop.
3. The SOFIA aircraft galley parts, materials, and processes shall be selected from best commercial aircraft industry practices.
4. The materials used for the SOFIA aircraft galley shall be in accordance with FAR 25.601 and 25.603.

Engineering Support

1. Prior to fabrication of components, vendor will support a Critical Design Review (CDR) not to exceed one day at their facilities and present galley physical drawings, electrical drawings, appliance specifications, structural analysis and hazard analysis.

Deliverables

1. All hardware and parts associated with the installation of the galley. This includes but is not limited to the structures and hardware associated with the complete assembly and installation of the galley. This includes the following aircraft certified items:
 - a. One TIA WaveJet Microwave ovens (or equivalent)
 - b. Two Air Cabin Engineering ACE 9602 Refrigerators (or equivalent)
 - c. One trash cart
2. Operation, Installation and maintenance manuals.
3. Provide all Engineering Documents associated with the galley. This shall include the following:
 - a. Engineering Drawings
 - b. Stress analysis
 - c. Installation Drawings
 - d. Installation Specifications
 - e. Installation Procedures
 - f. User Documents and IPC

Safety and Quality Assurance

1. All supplied materials and hardware used for installation must have an accompanying FAA 8130-3 Airworthiness document
2. Provide a Certificate of Conformance that includes:
 - a. As part of each shipment, the manufacturer shall certify contract conformance to the Government.
 - b. Manufacturer shall identify the shipped product in a manner that is traceable to the included Certification of Conformance.
 - c. The Certification of Conformance shall include:
 - d. Verification of acceptability of all articles before shipment – by completion of the necessary inspections, tests, stress analysis, audits, process controls and records reviews.
 - e. Identification of the contract, and relevant line item number.
 - f. Identify the manufacturer's part number or serial number (when applicable).
 - g. Identify the shipped quantity.
 - h. Be signed by a duly authorized officer or quality representative of the manufacturer – whose name and title shall be legible.
3. Delivery Requirements
 - a. To assure protection from damage during normal handling, transport, and storage after receipt, articles and materials shall be packaged and preserved in accordance with NPR 6000.1 – Packaging, Handling, and Transportation:
 - i. Level B – Preservation, Packaging, and Packing.
 - ii. Class I – Shipping and Handling.
 - b. Marking shall include, as a minimum, nomenclature, part number, quantity, supplier and temperature handling requirements.
 - c. Items containing hazardous materials shall have the manufacturer's Material Safety Data Sheet (MSDS) included.
 - d. Articles or materials that have shelf life limitations or storage control requirements imposed by the manufacturer, Government, NASA or the contractor shall be accompanied by positive indication of such limits. Examples include manufacturing date, cure date, assembly date or temperature storage limitation.

4. Certified Material Test Report and Aircraft Fastener Testing

Supplier shall include in each shipment the raw material manufacturer's test report. The test report shall certify that the relevant lot of raw material has been tested, inspected and verified compliant with the applicable specifications and is traceable to the Certified Material Test Report.

The Certified Material Test Report shall contain the following:

- a. Identify the raw material heat/lot number to which the report applies.
- b. Identify the applicable raw material specifications, by number and revision level.
- c. List the actual test / inspection values obtained for each chemical

- d. Identify the raw material manufacturer.
 - e. Be signed by a duly authorized officer or quality representative of the raw material manufacturer.
 - f. Test specimen gage diameter per ASTM E
 - g. Specifications including revision numbers or letters to which the material has been tested and/or inspected
 - h. When the material specification requires quantitative limits for chemical, mechanical, or physical properties, the test report shall contain the actual test and/or inspection values obtained.
 - i. No unauthorized processes (i.e. re-melt) shall be allowed.
5. Non-Destructive Evaluation Certifications
- a. When Non-Destructive Evaluation is required the contractor shall provide a Certificate of Conformance (C of C) to certify that the material meets the related requirements.
6. Independent Laboratory Testing
- a. If the material was altered (forged, rolled, heat treated etc.) subsequent to procurement from the mill and prior to delivery to DFRC, an Independent Laboratory Test shall be submitted with the material. The testing must be performed after all subsequent conversion processing. The test report must comply with requirements above for Manufacturer Test Certifications.
7. Prohibited material process
- a. The contractor shall not provide material that has been machined down, sawed or by any other means to achieve the requested thickness or diameter.
 - b. The contractor shall not substitute cut plate for bar stock.
8. Electrical wire for aircraft
- a. Polytetrafluorethylene (PTFE) insulation, or equivalent, not to include polyvinylchloride (PVC).
 - b. Wire Selection – Select wire so that the rated maximum conductor temperature is not exceeded for any Combination of electrical loading, ambient temperature, and heating effects of bundles, conduit, and other enclosures. Factors to be considered in the selection are operating voltage, circuit current, temperature, mechanical strength, voltage drop, abrasion, flexure, pressure altitude, and chemical resistive requirements. Wires will be of sufficient size to ensure that they will provide adequate current –carrying capability and that voltage drops will be within limits required to provide satisfactory operation of equipment. Voltage drop effects must be carefully considered during wire gauge selection, especially when low impedance devices (such as multiple strain gauges, meter movements) or

long wire runs are used. To avoid unnecessary weight, use the smallest size wire compatible with operational and performance requirements. Wire selection guidance is contained in section 6 of SAE AS50881, including wire ampacity derating factors such as altitude, wire bundling effects, etc.