

RESEARCH AIRCRAFT DEPLOYMENT DOCUMENT

Gulfstream G-1 Aircraft
Pacific Northwest National Laboratory
P.O. Box 999, MSIN K9-30
Richland, WA 99352
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A. PROJECT IDENTIFICATION

1. Requestor's Name/Telephone number:	2. Requestor's Address:	3. Date:
4. Title that describes this activity:		
5. Abstract of proposed aircraft use:		

B. RESEARCH SPONSOR

1. Name of sponsor:	2. Contract officer name/address/telephone:	3. Funding (check one): <input type="checkbox"/> Approved <input type="checkbox"/> Pending
4. Title of research project:		
5. Principal Investigator(s):		

D. SUPPLEMENTAL INFORMATION FOR COMPLIANCE WITH DOE 440.2A

The aircraft is operated by PNNL for the Department of Energy in accordance with DOE Order 440.2A.

1. Names, titles, affiliations, and duties of personnel onboard the aircraft (do not include PNNL pilots or PNNL scientific crew):

2. Analysis of hazards associated with proposed deployment (e.g., unusual maneuvers, meteorological conditions, terrain, heavy air traffic areas, on-board hazardous chemicals and radioactive materials, high voltages, heat, lasers):

3. Actions taken to mitigate associated hazards:

4. Expected flight conditions (e.g., visual flight rules, instrument flight rules, night flight, meteorological conditions):

5. Proposed deviations from Federal Aviation Regulations and justification (e.g., flights below 500 feet):

E. SCIENTIFIC PAYLOAD

1. List of instruments that can be provided by the Research Aircraft Facility (check those required for this deployment).

Instrument	Weight (lbs)	Size (inches) (19" panel or other)	Power Required (watts, amperes)	Type of power (volts DC, AC)	External Sensor/Probe Requirements	Check to Select
Permanent RAF Instruments						
GPS (TANS & DSM)		Fuselage & Data Rack		28VDC 12VDC	Fuselage top antennas	✓
Particle size (PCASP-300)	40	On Nose Boom	215 W 180 W	28 VDC 110 VAC	Nose boom	✓
Temperature (Rosemount Pt)		In Power Rack	3 W	28 VDC	Fuselage	✓
Pressure/Altitude (Rosemount absolute)		In Power Rack	3 W	28 VDC	Fuselage static	✓
Vector winds (5-port ΔP gust probe)		In Nose Cone	9 W	28 VDC	Nose cone	✓
Cabin temperatures (4)						✓
User Selectable RAF Instruments						
Real-time Particles						
Aerosol Inlet (BMI)	100 (w/KVM)	19W x 24D x 3U	100 W	110VAC	Window	
Particle size (FSSP-300)	40	On Nose Boom	300 W 100 W	28 VDC 110 VAC	Nose boom	
Particle image (OAP-2D)	40	Replaces either FSSP / PCASP	300 W 100 W	28 VDC 110 VAC	Nose boom	
Liquid water content (KLWC-5)	4		120 W	110 VAC	Hatch	
Liquid water content (PVM-100A)	25	19W x 23D x 6H	200 W 60 W	28 VDC 110 VAC	Window	
Ultrafine particle concentration (TSI 3025A, >3 nm)	27	9.5W x 15D x 10H tray mounted	200 W	110 VAC	Aerosol inlet	
Particle concentration (TSI 3010, >7 nm)	12	8.5W x 7.5D x 7.5H tray mounted	30 W	110 VAC	Aerosol inlet	
Aerosol light scattering, bscat (TSI 3563 3λ)	51	43W x 12D x 10H rack-top mounted	175 W 20 W laptop	28 VDC 110 VAC	Aerosol inlet	
Aerosol light absorption (Radiance PSAP)	8	19W x 9.5D x 5.25H	10 W	110 VAC	Aerosol inlet	
Real-time Gases						
SO2 (TECO 43S)	52	19W x 23D x 8.75H	120 W	110 VAC	Teflon inlet	
O3 (TECO 49)	52	19W x 23D x 8.75H	180 W	110 VAC	Teflon inlet	
CO (TECO 48)	65	19W x 23D x 8.75H	200 W	110 VAC	Teflon inlet	
Radiometric Instruments						
UV irradiance (Eppley)	5	In Power Rack		28 VDC	Hatch, wing root	
Surface/Sky IR temperature (PRT-5)	23	19W x 16D x 8.75H	20 W	110 VAC	Window	
Short-wave irradiance (Eppley pyranometer)	2	In Power Rack		28 VDC	Hatch, wing root	
Long-wave irradiance (Eppley pyrgeometer)	2	In Power Rack		28 VDC	Hatch	
Spectral radiation (PNNL MFR)	20	tray mounted	120 W	110 VAC	Hatch, wing root	
Meteorological State						
Dew-point temperature (GE 1011B)	5	In Power Rack	85 W	110 VAC	Window	

Absolute Humidity(AIR Lyman-alpha)		In Power Rack		28 VDC	Fuselage	

2. List of collaborative instruments previously flown on G-1. Requestor is responsible for arranging for collaboration and updating table.						
Instrument (Mentor)	Weight (lbs)	Size (inches) (19" panel or other)	Power Required (watts, amperes)	Type of power (volts DC, AC)	External Sensor/Probe Requirements	Check to Select
Particle size & drop/crystal image, CAPS (Sennum, BNL)	45	On Nose Boom	1680W	28 VDC	Nose boom	
BNL 3-Channel NO/NO ₂ /NO _y instrument (Springston, BNL)	304	Double wide rack + 15W x 31D x 11H for pump + O ₂ cylinder 6D x 24H with regulator	Main: 4.2-5.2 A Pump motor: 5-6 A	110 VAC Pump 220 VAC	1/4 ss forward facing. Pump requires exhaust port on aircraft.	
TECO Model 49 O ₃ Detector (Springston, BNL)	35	19W x 23D + 4 (for connections) x 8.75H rack mountable	150 W	110 VAC	1/4 ss forward facing	
TECO Model 48 CO Detector (Springston, BNL)	65	19W x 23D + 3 (for connections) x 8.75H rack mountable	<1 A (~2 A for short periods)	110 VAC	1/4 ss forward facing	
VUV CO Detector (Springston, BNL)	20 pump extra	19W x 23D + 3 (for connections) x 8.75H rack mountable	~0.5 A	110 VAC	1/4 ss forward facing	
TECO Model 43S SO ₂ Detector (Springston, BNL)	43 pump extra	19W x 23D + 4 (for connections) x 8.75H rack mountable	100 W	110 VAC	1/4 ss forward facing	
Carbonyl Sampling System (Lee, BNL)	132	Single wide rack	10 A (nameplate)	110 VAC	1/4 ss forward facing	
Peroxides (Lloyd via BNL)	175	Single wide rack	500 W	110 VAC	1/4 ss forward facing	
PAN-NO ₂ GC/Luminol (Gaffney/Marley, ANL)	65	rack mounted	200 W	110 VAC	1/4 ss forward facing	
ANL canister sampling rack (Doskey, ANL)	127	43W x 17D x 42H	600 W Pump off during takeoff and landing	110 VAC	1/4 ss rear facing	
Proton-Transfer Reaction Mass Spectrometer (Jobson, PNNL)	240	42W x 18D x 42H	700 W MS 58 W pump 20 W flow control 100 W trap	110 VAC	1/4 ss rear facing	
API-365 Mass Spectrometer (Spicer, BCO)	815	60W x 24D x 44H	1380 W	220 VAC	1/4 ss forward facing	
BNL Calibrator with cylinders (Springston, BNL)	92	19W x 24D + 2 (for connections) x 8.5H rack mountable 2 cylinders @ 6.5D x 22H with regulator	~2 A (estimated)	110 VAC		
Aerosol sizing system (Brechtel via BNL)	~270	19W x 24D x 39H	3 A ~3.5 A pumps	110 VAC 220 VAC pumps	Aerosol inlet	
Aerosol Chemical Composition (Lee, BNL)	~155	Single wide rack	6 A	110 VAC	Aerosol inlet	
Aerodyne Aerosol Mass Spectrometer (Jayne, ARI or Alexander, PNNL)	410	42.5W x 24D x 44H	880 W 20 W laptop	220 VAC 110 VAC	Aerosol inlet	
Time Resolved Aerosol Collector (Laskin, PNNL)	15	tray mounted	200 W	110 VAC	Aerosol inlet	
Drum aerosol sampler (Disselkamp, PNNL)	30	tray mounted	420 W	110 VAC	Aerosol inlet	

3. List requirements of requestor-supplied instruments or equipment (attach drawings/photos; add rows as needed). All AC power is 60 Hz 1-phase.

Instrument (Mentor)	Weight (lbs)	Size (inches) (19" panel or other)	Power Required (watts, amperes)	Type of power (volts DC, AC)	External Sensor/Probe Requirements

4. List details of data recording requirements of requestor-supplied and collaborative instrumentation (add rows as needed)

Instrument	Analog or Digital	Signal Voltage Range	Resolution	Sample Rate	Remarks

5. Describe special or unusual installation requirements:

6. Describe hazardous materials required for collaborative and requestor-supplied instrumentation (toxic gases or liquids, flammable materials, radioactive sources, other):

Instrument Using Material	Material	MSDS Provided	Amount On Board (kg, liters)	On Board Usage

7. Describe hazardous wastes produced or emitted by collaborative and requestor-supplied instruments:

Instrument or Process	Material	Amount Generated (kg, liters)	Physical Form (liquid, solid, gas)	Where Generated (ground, plane)	Provision for Management and Disposition

8. Describe emissions of hazardous materials into the air (instrument, material, mass or volume rate):

9. Describe transportation provisions for moving hazardous materials to/from field site and enroute on aircraft:

F. GROUND SUPPORT FACILITIES

1. Describe any field site data access/processing requirements (floppy disk, tape, network, software compatibility, etc.):

2. Describe ground support needs for collaborative or requestor-supplied instrumentation:

On flight days:

A. Pre-flight needs (prior to takeoff):

Access ____ hrs.

Power ____ hrs

B. Post-flight needs (after landing):

Access ____ hrs

Power ____ hrs

On non-flight days:

C. Routine maintenance/calibration:

Access ____ hrs

Power ____ hrs

D. Any special support needs:

3. Describe office, technical work area, storage, and logistical requirements (telephones, desks, etc.):

4. Other information or remarks:

G. OTHER PARTICIPATING AIRBORNE MEASUREMENT SYSTEMS

1. Will other airborne measurement systems (e.g., aircraft, lighter-than-air craft, radiosonde, tetheron, kite, tethersonde, etc.) participate in the proposed measurement program?

____ YES ____ NO If NO continue at Section H.

2. Identify system type(s) and provide name and telephone number for contact person(s):

3. How will the system(s) be used in proposed measurement program? Describe operations relative to the PNNL aircraft.

H. APPROVALS

	Name (print)	Signatures		Date
		Approve	Disapprove	
1. Requestor:				
2. PNNL Lab Safety:	T. Criscuolo			
3. PNNL Environmental Compliance Representative:	J. L. Akers			
4. PNNL Aviation Safety Point of Contact:	R. V. Hannigan			
5. Research Aircraft Facility Coordinator:	J. M. Hubbe			

cc: PNNL Field Services Representative
PNNL Hazardous Materials Transportation

Comments: