

## G-1 Payload

<b>List of instruments provided by the Research Aircraft Facility.</b>						
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
<b>Permanent RAF Instruments</b>						
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 $\Delta$ P gust probe)		In Nose Cone	9 W	28 VDC	Nose cone	✓
Cabin temperatures (4)						✓
<b>User Selectable RAF Instruments</b>						
<b>Real-time Particles</b>						
Aerosol Inlet (BMI)	100	19W x 24D x 3U	100 W	110VAC	Window	✓
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 3 $\lambda$ )	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	✓
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	✓
<b>Meteorological State</b>						
Dew-point temperature (GE 1011B)	5	In Power Rack	85 W	110 VAC	Window	✓
Absolute Humidity (MayComm TDL)		In Radio Rack	120W	28 VDC	Fuselage	✓

List of collaborative instruments						
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	✓
VUV CO Detector (Springston, BNL)	74 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 SO2 Detector (Springston, BNL)	54 pump extra	19W x 23D + 4 (for connections) x 8.75H rack mountable	100 W	110 VAC	1/4 ss forward facing	✓
Proton-Transfer Reaction Mass Spectrometer (Alexander/Ortega, 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	✓
BNL Calibrator with cylinders (Springston, BNL)	72	19W x 24D + 2 (for connections) x 8.5H rack mountable 1 cylinders @ 6.5D x 22H with regulator	~2 A (estimated)	110 VAC		✓
Twin Scanning Electrical Mobility Sizing (TSEMS) (Wang BNL)	~270	19W x 24D x 39H	3 A ~3.5 A pumps	110 VAC 220 VAC pumps	Aerosol inlet	✓
Aerodyne Aerosol Mass Spectrometer (Lee, BNL)	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	✓

<b>Requirements of requestor-supplied instruments or equipment. All AC power is 60 Hz 1-phase.</b>					
Instrument (Mentor)	Weight (lbs)	Size (inches) (19" panel or other)	Power Required (watts, amperes)	Type of power (volts DC, AC)	External Sensor/Probe Requirements
Counterflow Virtual Impactor (Ogren, NOAA)				110 VAC	
Flow PID box	5	19W x 10D x 1.75H			
Temperature PID box	6	19W x 10D x 1.75H			
MFC box	23	19W x 16D x 7H			
Umac	6	19Wx 10D x 1.75H			
Pump	??	?? mounted in rackbase			
Laptop	6				
Tank zero air	63	14Wx10Dx1H on tray			
Inverters for CVI heaters	4	8" diameter x 52H Mounted in CPC tray			
B2B Ozone Analyzer (Ogren, NOAA)	5	19W x 10D x 1.75H		110 VAC or 12VDC	¼" teflon
Aerosol light scattering, bscat (TSI 3563 3λ; Ogren NOAA)	51	43W x 12D x 10H	175 W	28 VDC	CVI inlet
Aerosol light absorption (Radiance PSAP; Ogren NOAA)	8	19W x 9.5D x 5.25H	10 W	110 VAC	CVI inlet
Particle concentration (TSI 3010, >7 nm; Ogren NOAA)	12	8.5W x 7.5D x 7.5H mounted in CPC tray	30 W	110 VAC	CVI inlet
Absolute Humidity (MayComm TDL)	6	19W x 10 x 1.75H	120W	110 VAC	CVI inlet
110 VAC→28 VDC power supply	6.5	mounted in CPC tray			
Fast Integrated Mobility Spectrometer (Wang, BNL)					Aerosol inlet
Los Alamos PhotoAcoustic (3λ & 1 3λ; Dubey, LANL)	48	19W x 24D x 8H	~85 W		Aerosol inlet & CVI inlet
LiCor (Dubey, LANL)					
<b>Details of data recording requirements of requestor-supplied and collaborative instrumentation</b>					
Instrument	Analog or Digital	Signal Voltage Range	Resolution	Sample Rate	Remarks
Los Alamos PhotoAcoustic	Digital	N/A	N/A	Non-constant, between 1 and 0.5 Hz	
LiCor	Digital	N/A	N/A	1 Hz	Bidirectional signal sent over serial port to and from acquiring computer,

					and voltage signal over the back connectors.
<b>Hazardous materials required for collaborative and requestor-supplied instrumentation (toxic gases or liquids, flammable materials, radioactive sources, other)</b>					
Instrument Using Material	Material	MSDS Provided	Amount On Board (kg, liters)		On Board Usage
VUV CO Detector & TEI 43S	NO, SO2, CO				Calibration gas
	Ar		1000 cc		
FIMS, TSEMS, & CPC	Butanol		125 gm/flight		Activate aerosols
FIMS & TSEMS	Sealed Ca254 source		<2mCi		Used in aerosol sizing equipment. J. Wang is radiation officer.
<b>Hazardous wastes produced or emitted by collaborative and requestor-supplied instruments</b>					
Instrument or Process	Material	Amount Generated (kg, liters)	Physical Form (liquid, solid, gas)	Where Generated (ground, plane)	Provision for Management and Disposition
FIMS, TSEMS, & CPC	Butanol	100 gm/flight	Liquid	Plane	Will be disposed of through PNNL Hazardous Waste protocols. Will be transported from PNNL to Ponca City OK on the G-1