

Gulfstream IV-SP (G-IV)



NOAA's Gulfstream IV-SP (N49RF) "hurricane hunter" jet on the ramp.

Photo: Lt. j.g. Richard de Triquet / NOAA

NOAA's Gulfstream IV-SP (G-IV) jet is a high-tech, high-flying, and high-speed platform used for hurricane forecasting and research. The G-IV flies around and over developing tropical cyclones to create a detailed picture of the surrounding upper atmosphere.

The G-IV is a sophisticated twin-engine jet piloted by NOAA Corps officers and crewed by NOAA civilian engineers and meteorologists. Its primary mission is to fly tropical cyclone surveillance missions to support National Hurricane Center forecasts and research by the Hurricane Research Division of NOAA's Atlantic Oceanographic and Meteorological Laboratory. With a range of nearly 4,000 nautical miles and a cruising altitude of 45,000 feet, this aircraft provides observational coverage at high altitudes critical for defining weather systems in the upper atmosphere.

The primary tool used for this task is a tube-shaped instrument released from the bottom of the aircraft, called a GPS dropwindsonde. The dropsonde is released from the G-IV measuring and transmitting back to the aircraft the pressure, temperature, humidity and GPS Doppler frequency shifts as it descends to earth. The Doppler shifts are used to compute the horizontal and vertical wind components.

After analysis and processing of the dropsonde data, the information is formatted and then transmitted to the National Centers for Environmental Prediction and the National Hurricane Center for inclusion into the global and hurricane model runs. This data is also provided to the hurricane forecaster providing real-time observations depicting the synoptic patterns surrounding the hurricane.

Another important tool is a Tail Doppler Radar (TDR) mounted to the rear of the aircraft. The TDR is an 8,000 watt radar system that spins slowly as the aircraft passes by the storm and looks at the structure using radar to determine the intensity of tropical cyclones. The product of the TDR is similar to the layers in a slice of wedding cake. The images collected by the TDR allow forecasters and researchers to see the different layers of a storm, which help improve forecasting capabilities.




Lead Electronics Technician Gabriel Defeo at a console on NOAA's Gulfstream IV aircraft that controls the plane's tail Doppler radar during a January 2013 Honolulu-based winter storms reconnaissance mission. 

Photo: Nicholas Morgan, NOAA

Standard Aircraft Specifications

AIRCRAFT	1994 Gulfstream IV-SP
ENGINES	Two Fuselage Mounted Rolls Royce Tay 611-8 twin spool turbofan jet engines
CREW	Hurricane and Winter Storm Missions: 2-3 pilots 1 flight engineer/mechanic 1 flight meteorologist (flight director) 1 High Altitude Profiling System (HAPS) system operator (can be automated) 3 Engineering Technicians/Dropwindsonde (Sonde) system operators
CEILING	45,000 feet
RATE OF CLIMB (APPROXIMATE - FULLY LOADED)	3000 fpm (first 25000 ft.) 1500 fpm (through 33000 ft.) 1000 fpm (to 41,000 ft. - max wt. ceiling)
OPERATIONAL AIRSPEEDS	41,000 - 45,000 ft. True Airspeeds (Mach .77-.80, 440-460 kts.)
ELECTRICAL	Two engine driven alternators (36KVA, 115 volt, unregulated 3 phase) One Auxiliary Power Unit (APU) (36KVA, 115 volt, 400Hz, 3 phase) Two Converters (converts and regulates engine alternator power) Each provides: 23KVA, 400Hz, 3 phase AC power 250 amps, 28 volts DC power
SCIENTIFIC POWER	SED has an Uninterruptable Power Source (UPS) for scientific gear
MAX. GROSS WEIGHT	Ramp 75,000 pounds Takeoff 74,600 pounds Landing 66,000 pounds
EMPTY WEIGHT	43,700 pounds (operational configuration)
USEFUL LOAD	31,300 pounds (operational configuration)
FUEL LOAD	29,500 pounds
TYPE FUEL	Jet A, JP4, JP5, JP8
STANDARD FUEL BURN	(fully loaded) = 5000 pounds/hr for first hour and 3000 pounds/hr for every hour after that
MAXIMUM RANGE	3600 nm. (with a 1 hour fuel reserve)
MAXIMUM DURATION	8 hrs. 45 minutes (with 1 hour fuel reserve)
EXTERNAL DIMENSIONS	Radome to trailing edge of horizontal stabilizer = 87.58 ft. Radome to aft end of fuselage = 78.83 ft. Wing Span = 77.83 ft. Horizontal Tail Span = 32 ft. Vertical Tail Height = 24.4 ft
INTERNAL DIMENSIONS	Head Room = 6ft. Bulkhead to Bulkhead = 8 ft. Cabin Length (Cockpit to Baggage Comp.) = 33 ft.
USEABLE VOLUME	Usable Length = 33 ft. Usable Width = 6 ft. Usable Height = 4 ft. Usable Volume = 792 cubic ft.

Additional Standard Equipment

COCKPIT:	2 High Frequency (HF) Radios 2 VHF Radios Honeywell SATCOM Phone GPS and Inertial Reference Systems (IRS) for navigation 1 UHF Radio Honeywell TCAS II System (with FAA Change 7) EROS Quick Donning Oxygen System Collins WXR-700C (C-band weather radar)
CABIN:	Dropwindsonde Tube with 8-channel tracking capability Satellite Communication System with voice/data transmission capability Numerous Computer Systems