

Attributes of the NASA Gulfstream III Aircraft (N520NA)

**Maintained and Operated by the Research Services Directorate
NASA Langley Research Center**

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Revisions

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1.0	June 6, 2024	Original issue
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Table of Contents

Table 1 - Physical Characteristics of the NASA Gulfstream III Aircraft (N520NA)

Table 2. –Performance Data for the NASA Gulfstream III Aircraft (N520NA)

Table 3. – Research Attributes for the NASA Gulfstream III Aircraft (N520NA)

Table 4. – Baseline Research Modifications to the NASA Gulfstream III Aircraft (N520NA)

Table 5. - Science Instruments Flown on the NASA Gulfstream III Aircraft (N520NA)

Table 6. - Science Instrument Acronyms

Table 7. – Non-Science Instruments Flown on the NASA Gulfstream III Aircraft (N520NA)

Table 8. – Acronyms for Non-Science Instruments Flown on the NASA Gulfstream III Aircraft (N520NA)

Table 9.- Baseline Modifications to the NASA Gulfstream III Aircraft (N520NA) – Deletions

Table 10. - Baseline Modifications to the NASA Gulfstream III Aircraft (N520NA) – Additions

Table 11. - Baseline Modifications to the NASA Gulfstream III Aircraft (N520NA) – Modifications/Replacements

Operational References

Table 1. – Physical Characteristics of the NASA Gulfstream III Aircraft (N520NA)

Aircraft	Tail Number	Length	Height	Wingspan	Engine	Engine Power
Gulfstream III	N520NA	83 ft 2 in.	24 ft 4 in.	77 ft 10 in.	2 x Rolls-Royce Spey MK511-8 turbofans	11,400 lbf

Table 2. –Performance Data for the NASA Gulfstream III Aircraft (N520NA)

Aircraft	Tail Number	Min. Sustained Airspeed	Normal Cruise Speed	Max. Sustained Airspeed@ Altitude	Service Ceiling, kft	Service Ceiling, km	Duration w/max. fuel@55% power, hr	Range w/max. fuel@55% power, n.mi.
Gulfstream III	N520NA	150 KIAS (a)	459 KTAS	340 KIAS @5 kft/ 230 KIAS (0.85 IMN) @45 kft	45	13.716	8	3767

Note:

(a) 1.3*Vs at 55 klbs and sea level

Table 3. – Research Attributes for the NASA Gulfstream III Aircraft (N520NA)

Aircraft	Tail Number	Avail. Research Elect. Power	Useful Payload (a)(b), lbs	Pressurized/Airconditioned	Existing Instr.	Max. Number of Experimenters That Can Be Onboard	Existing Nadir Beam Ports, LxW, in.	Possible Add. Nadir Beam Ports	Existing Lateral Beam Ports (c)	Possible Add. Lateral Beam Ports	Existing Zenith Beam Ports LxW, in.	Possible Add. Zenith Beam Ports
Gulfstream III	N520NA	80 A of 120 VAC/60 Hz 300 A of 28 VDC 15 A of 14 VDC 20 A of 5 VDC	2610	Yes/Yes	Dropsonde tube Applanix AVX 210 NASDAT	10 (d)	18.16x18.16 18.16x18.16	Requires custom installation in cabin	Cabin windows in passenger cabin	Requires custom installation in cabin (c)	8x1.5 at Station 306.5	Requires custom installation in cabin

Notes:

- (a) Maximum payload = maximum gross weight – basic aircraft zero fuel gross weight (ZFGW)
- (b) Center of gravity (CG) restrictions may limit payload
- (c) This aircraft has been used for imaging of sounding rocket payloads using cameras imaging through the aircraft windows
- (d) Depends on cabin configuration and research payload

Table 4. – Baseline Research Modifications to the NASA Gulfstream III Aircraft (N520NA)

Modification	Source
Dropsonde tube through baggage compartment floor	RSD based on NASA Johnson design implemented previously in NASA Johnson Gulfstream V aircraft
Floor modifications (seat tracks and venting)	RSD
Instrument racks (18U) (c)	Welch Mechanical Designs
Instrument rack risers	RSD
Intercom Communications System (ICS) upgrades	RSD
Nadir portals (2) with foreign object and debris (FOD) shutters (dimensions in Table 3)	Avenger Aerospace
Shutter control system	Avenger Aerospace
Optical glass panes (a) and (b)	RSD
NASDAT	RSD with National Suborbital Education and Research Center (NSERC)
Operations Engineer's Station	RSD
Research Data Acquisition System	RSD
Research Power Distribution System including six Research Interface Panels	RSD

Notes:

- (a) Typically, optical glass must be provided by the Principal Investigator/requester. However, RSD has flown the RSD-owned AR-coated Fused Silica windows in the **nadir portals**.
- (b) RSD also has flown acrylic panes in the **side windows** (provided by NASA AFRC). It also would be possible to use the NASA-JSC designed side windows from the Hypervelocity OSIRIS-REx Reentry Imagery & Spectroscopy (HORIS) project which have a larger aperture than the NASA-AFRC acrylic windows. The HORIS windows are Fused Silica; two were transferred to RSD.
- (c) RSD has a limited number of racks available for loan for a specific mission. Researchers may provide their own racks with appropriate airworthiness documentation (material certifications, center of gravity limits, weight limits and maximum tip-over moments).

Table 5. - Science Instruments Flown on the NASA Gulfstream III Aircraft (N520NA)

Instrument	Source	PI	Location
AVAPS	NASA Langley	Jonathan Hair	Adjacent to dropsonde tube in baggage compartment
AVIRIS-NG	NASA JPL	Michael Eastwood	Forward nadir portal
AWP	NASA Langley	John Marketon and Kristopher Bedka	Aft nadir portal
CMIS	APL/Johns Hopkins	Michael Kelly	Aft nadir portal
CPL	NASA Goddard	Matthew McGill	Aft nadir portal
Dropsondes with AVAPS	NASA Langley	Jonathan Hair	Aft nadir portal
GCAS	NASA Goddard	Scott Janz	Forward nadir portal
HALO	NASA Langley	Amin Nehrir	Aft nadir portal
HSRL-2	NASA Langley	Chris Hostetler	Aft nadir portal
KT-15 Infrared Radiation Thermometer Camera	NASA Langley	Jonathan Hair	Aft nadir portal
LVIS Classic and Facility	NASA Goddard	James Blair	Both nadir portals
NASDAT	NSERC	David Van Gilst	Passenger cabin
Picarro gas concentration analyzer probe with custom standoff	NASA Langley	Joshua Digangi	Top of fuselage at Station 306.5 (former location of USAF SATCOM antenna)
PRISM	NASA JPL	David Thompson	Aft nadir portal

Table 6. - Science Instrument Acronyms

Acronym	Definition
AVAPS suite	Advanced Vertical Atmospheric Profiling System
AVIRIS-NG	Airborne Visible InfraRed Imaging Spectrometer - Next Generation
AWP	Aerosol Wind Profiler
CMIS	Compact Midwave Imaging System
CPL	Cloud Physics Lidar
GCAS	Geostationary Coastal and Air Pollution Events (GeoCAPE) Airborne Simulator
HALO	High Altitude Lidar Observatory
HSRL	High Spectral Resolution Lidar
KT-15	Commercially available Heitronics infrared radiation thermometer camera
LVIS	Land, Vegetation and Ice Sensor
NASDAT	NASA Airborne Science Data and Telemetry System
Picarro	Commercially available gas concentration analyzer from Picarro, Inc.
PRISM	Portable Remote Imaging Spectrometer

Table 7. – Non-Science Instruments Flown on the NASA Gulfstream III Aircraft (N520NA)

Instrument	Source	PI	Location
SCIFLI imagers	RD/NASA LaRC	Jennifer Inman	Cabin windows

Table 8. – Acronyms for Non-Science Instruments Flown on the NASA Gulfstream III Aircraft (N520NA)

Acronym	Definition
SCIFLI	Scientifically Calibrated In-Flight Imaging

Table 9.- Baseline Modifications to the NASA Gulfstream III Aircraft (N520NA) – Deletions

Item	Provider
USAF Satellite Communications (SATCOM) antenna	Removed by RSD

Table 10. - Baseline Modifications to the NASA Gulfstream III Aircraft (N520NA) - Additions

Item	Provider
Hush kits for engines	Provided and installed by QTA Technologies at NASA Langley
Seven antennas (3 x GPS, 2 x Iridium, 1 x Applanix, 1 x Automatic Dependent Surveillance- Broadcast (ADS-B)/Universal Access Transceiver (UAT))	Commercially available units installed by RSD

Table 11. - Baseline Modifications to the NASA Gulfstream III Aircraft (N520NA) – Modifications/Replacements

Item	Provider
Garmin GTN-750	Commercially available unit installed by RSD
Upgraded Flight Management System (FMS)	Commercially available components installed by RSD
Modified Gulfstream/USAF aft avionics cabinet	Modified by RSD

Operational References

RSD: *Conducting Flight Experiments Utilizing Research Services Directorate (RSD) Aircraft*, Langley Management System Center Procedure LMS-CP-0960, Revision F, July 31, 2021

Baxley, Brian: *Airworthiness Review Process for the Eastern Region Airworthiness Review Board (ER-ARB)*, NASA Advisory Implementing Instruction NAI 7900.3, September 10, 2020

McCormick, Sean; and Baxley, Brian: *RSD Crewed Aircraft and Procedures*, Version 1.0, April 12, 2024