NASA Johnson Space Center
Aircraft Operations Division

- Aircraft Operations Division (AOD) is a part of the Flight Operations Directorate (FOD) at Johnson Space Center.
- The FOD values require our team members to always be aware that, suddenly and unexpectedly, we may find ourselves in a role where our performance has ultimate consequences.
- AOD manages 26 total aircraft of 5 different types in support of numerous missions to include Space Flight Readiness Training (SFRT). AOD also operates a small number of small Unmanned Aerial Systems (UAS).
- AOD has a contractor and civil service workforce of maintenance, quality, engineering, safety and operations professionals to fly, modify and maintain aircraft in support of these various missions.

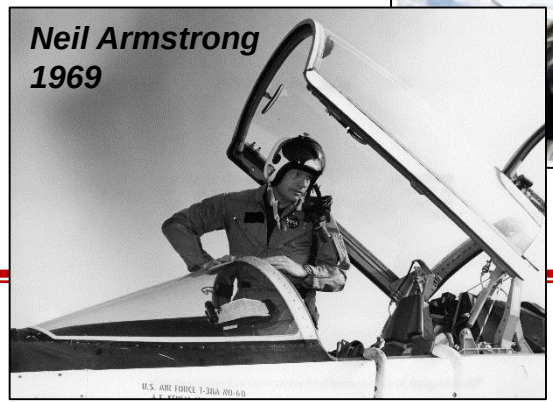
JSC AOD Aircraft

- **Current AOD Aircraft**

  - T-38N – 18 operational, 2 in storage
  - WB-57 High Altitude Research Aircraft – 3
  - Gulfstream V – 1 (Direct Return (DR), Airborne Science Mission support)
  - Gulfstream III – 1 (Airborne Science Mission support, DR backup)
  - B377 Super Guppy Large Cargo Transport (SGT) – 1
  - UAS – 10 (varies according to missions)

T-38N Supersonic Trainer (18)

- **Primary Mission: Space Flight Readiness Training**
  - Crew members learn to operate as a team member in a highly dynamic, unpredictable environment, with real-world, life-dependent consequences
- **Skills Developed:**
  - Aerobatics, Instrument, Formation, Night Operations, Cross Country
- **Safety and Performance Improvements**
  - Redesigned Inlet
  - Redesigned Ejector
  - State-of-the-Art Ejection Seat
  - Electronic Flight Information System
  - TCAS and TAWS
  - Weather Radar
  - Flight Management System
  - Flight Director



Gulfstream G-III (1)

- **Primary Mission:** SMD support - AirMOSS pod to study North American root-zone soil moisture – **300 flight hours/year**
- **Secondary Mission:** Backup for return astronauts from Kazakhstan to EFD after ISS missions – **up to 120 flight hours/year**
- **Recent Improvements:** ADS-B, Stage III Noise Reduction

Flight Hours and Dates	Potential Payloads in Discussion
140 flt hrs/year in 2016-2020	**Oceans Melting Greenland (OMG)**
35 flt hours in 2016	**Hawaii Volcano Study**
20 flt hours in 2015	**Alpine Glacier Study, Western US**

Gulfstream G-V (1)

Range: 6,500 nm (13+ hours)
Maximum Speed: 0.88 Mach
Maximum Altitude: 51,000 feet

- **Primary Mission:** Return astronauts from Kazakhstan to EFD after ISS missions – **up to 120 flight hours/year**
- **Secondary Mission:** SMD support – developing capabilities to support NASA Airborne Science missions – **300 flight hours/year**
- **Recent Improvements:** 1st round of science support modifications for power, antennas, and data distribution

Flight Hours and Dates	Potential Payloads in Discussion
300 flt hrs/year in 2019-2024	**Operation Ice Bridge**

WB-57 (3)

- **Primary Mission**: High-altitude research
  - Maximum operating altitude over 60,000’
  - Pilot and Sensor Equipment Operator
  - 2,500 nautical miles, 6+hours
- High Definition Sounding System, Volcano-plumb Investigation, 2017 Solar Eclipse
- Over 100 flight hours in 2017

Super Guppy Transport

- **The Super Guppy has been an invaluable asset for NASA programs, allowing for safe and timely transportation of critical space hardware**
  - Recently completed airlifts of Orion and SLS flight components and test articles around the country
  - On-going support of assembly and test activities including EM-1 CSM testing at Plum Brook

- The need for large-cargo airlift capability within NASA has persisted through different Programs and missions, and will continue
  - Critical for safe, secure and timely transportation of space hardware
  - Allows programs control of transportation schedule
  - Allows programs flexibility in selecting contractors across the country

N940
1966-1989

N941
1997-Present

- NASA 941 Timeline:
  - 1983 — Aircraft Assembly Complete
  - 1983 – 1997 — Operated by Airbus
  - 1997 — Acquired by NASA
  - 2008 — Programmed Depot Maintenance (PDM), Tinker AFB
  - 2014 — Avionics Upgrade, El Paso FOL

A total of 131 NASA airlifts

Notable Super Guppy Missions

SOFIA 747 Fuselage

ISS Elements

Double T-38s

SLS MPCV Stage Adapter

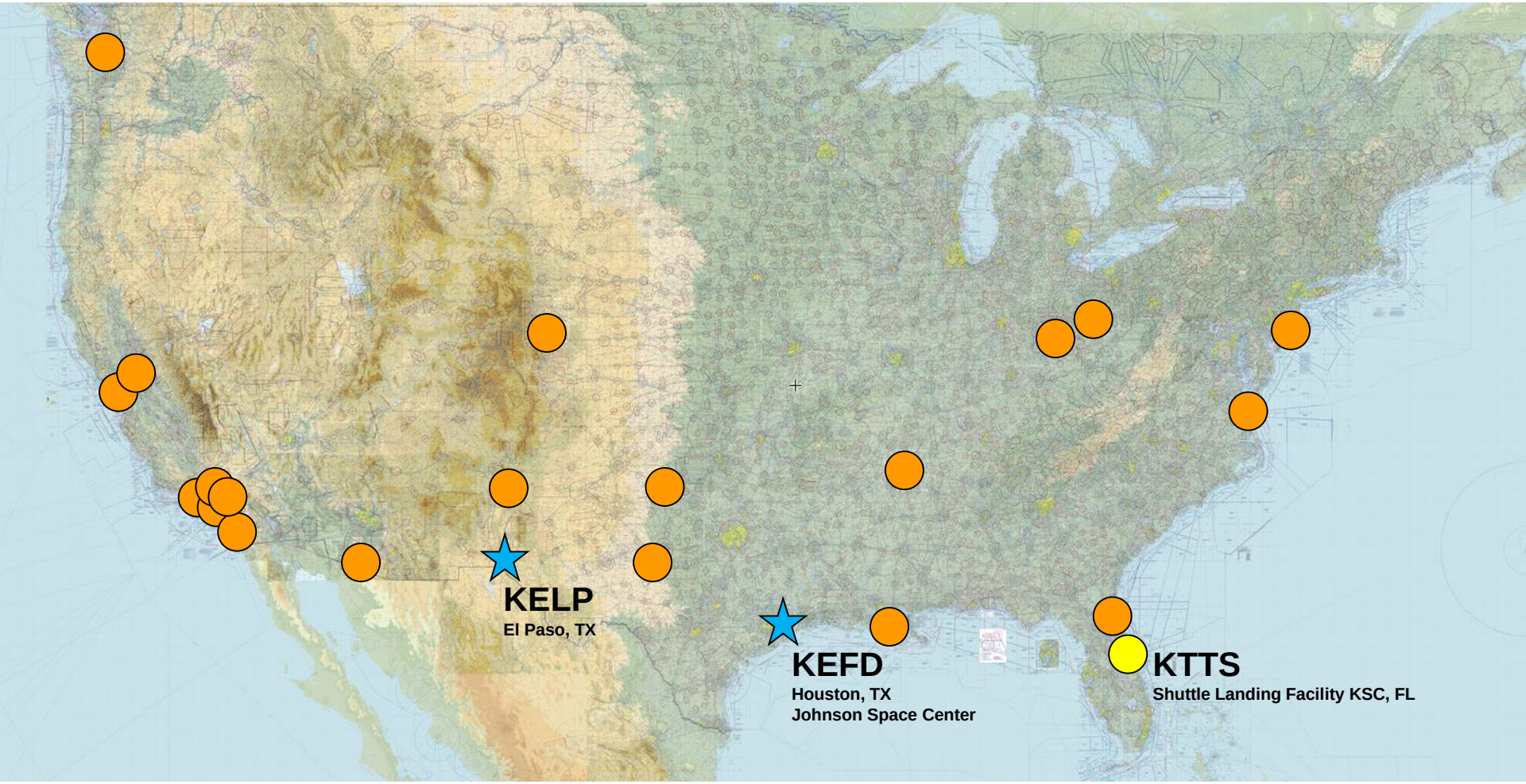
Orion Heatshield

Orion STA Crew Module

Super Guppy Team

- Aerospace Cargo Transport Program
  - Program Manager
  - Flight Crew:
    - Pilots (4)
    - Flight Engineers (3-4)
    - Loadmasters (2)
  - Maintenance:
    - Maintenance Manager
    - Dedicated Maintenance Crew (4 people)
    - Other maintenance/quality support from Division as required
  - Engineering:
    - One dedicated Project Engineer
    - Other engineering support from Division as required
  - Other support functions from the Division

Super Guppy Mission Map



In Summary…

- **AOD has been supporting NASA's Astronaut Training Program and other aviation needs since 1962**
- **Over the decades, AOD has proven to be a lean and agile organization, adaptive to change as NASA missions and programs change**
- **Every day AOD safely flies airplanes (~10 flights a day)**

Questions?