

Avian Development Facility

The Techshot avian research program has been going strong since 1983, when the company's co-founders began developing flight hardware for the first U.S. avian microgravity experiment. That first-generation avian flight hardware was deployed on two shuttle middeck flight experiments (STS-51L & STS-29). Experiment results helped establish a high priority for avian microgravity research within NASA, and the hardware performance established Techshot as the leading experts in avian flight hardware development.



The Avian Development Facility is shown with its top covers removed, revealing its upper carousel and 18 sample containers (non-standard Velcro® was attached during the STS-108 mission).



Workers at pad 39B at the Kennedy Space Center prepare to load ADF aboard the middeck of space shuttle Endeavour.

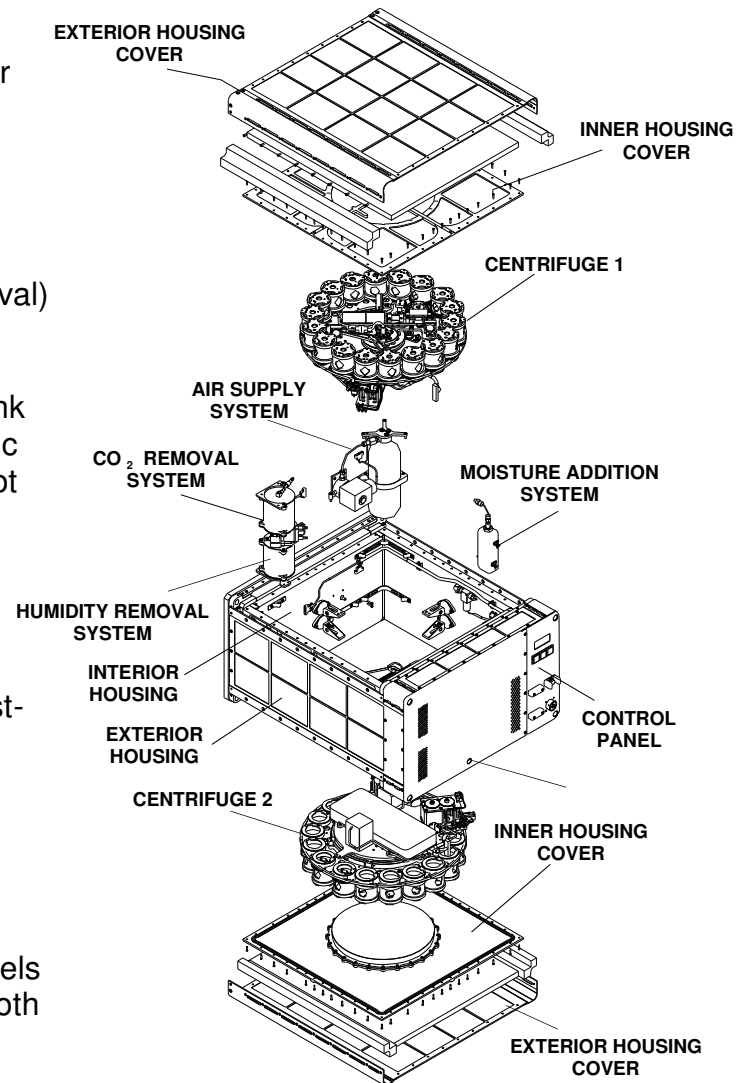
Besides the broad range of advanced features and capabilities, the second generation flight hardware, the Avian Development Facility (ADF), provides advanced telerobotics and teleoperations to minimize dependence on crew time and significantly improve the science return of microgravity life-science investigations. ADF's first mission was STS-108/UF-1 in December 2001.



Astronaut John Blaha on orbit with Techshot's first-generation avian flight hardware.

Avian Development Facility

- Provides “snapshot” of embryogenesis in space using egg specimens as a biological model. Avian eggs are ideally suited for microgravity research: self-contained, self-sustaining, and unaffected by maternal host.
- Single middeck locker size.
- Supports flight experiments with Japanese quail or other small eggs and *can be modified to accommodate fish, plants, insects or cells.*
- Fully programmable, closed environment system, including monitored and controlled temperature, relative humidity, O₂ (supply) level and CO₂ (removal) level.
- Full telemetry capability to downlink data and uplink commands for real time telepresence and telerobotic experiment manipulation (flight crew interaction not essential for experiment operations).
- Maintains optimal incubation conditions for embryos from Day 0 until hatch.
- Additional ADF capabilities available preflight, post-flight, and while on orbit:
 - ✓ Delay onset of embryo development by programming facility for low temperature environment “cold room”
 - ✓ Provide concomitant controls at various levels of artificial gravity by programming either/both carousel(s) to rotate
 - ✓ Independent of carousel rotation, turns each egg about its longitudinal axis automatically in either/both carousel(s) at programmable time intervals
 - ✓ Automatically inject any egg with chemical fixative (or other liquid), upon active command or on pre-programmed basis



The ADF provides capacity for 36 egg holders on two identical carousels. Each carousel rotates independently and is served by a chemical robot that injects reagent solutions into one sample at a time on a predetermined program or by remote control. Each sample holder also rotates independently of carousel rotation.