Luna–Aegis Shuttle

Short-Range Orbital Shuttle for the Earth–Moon System

Mission Role

The Luna–Aegis Shuttle is a short-hop transport vehicle optimized for routine travel between the **lunar surface** and **lunar orbit**, specifically servicing **Aegis Station** and its surrounding infrastructure. It is not a deep-space ship—it is a **space truck**, bridging the gap between orbital assets and the Moon's surface.

Core Functions

- **Crew and cargo transport between Moon and Aegis Station**
- **Resupply and personnel rotation**
- **Support for ISRU, rover, and tanker operations**
- **Emergency evacuation capability**

This shuttle operates on a **point-to-point circuit** between Aegis Station's low lunar orbit and permanent bases or mobile hubs on the Moon.

Design Philosophy

- **Low gravity, short distance, high efficiency**
- No need for Earth reentry shielding
- No high delta-v interplanetary systems
- Optimized for reuse, low maintenance, and fast turnaround

Think: **SpaceX Starship's little cousin**, tuned for daily service around the Moon.

Configuration Overview

Attribute	Specification
Max Crew	6 (with cargo) or up to 20 (crew-only)
Cargo Payload	~10–15 metric tons
Propulsion	High-thrust methalox or hypergolic engines

Attribute	Specification
Landing	Vertical, tail-first on retractable legs
Docking	Nose or rear ports (Aegis-standard compatible)
Flight Duration	6–12 hours (one-way)
Life Support	72–96 hours onboard duration capacity

Can operate uncrewed for cargo delivery or autonomously return to base.

Launch and Recovery Cycle

1. **Launch from lunar surface:**
   Vertical takeoff from Aegis-aligned pads at lunar base (South Pole favored)
2. **Transit to Aegis Station:**
   Short-duration powered flight to low lunar orbit
   Ranges: ~1.8–2.4 km/s delta-v depending on profile
3. **Dock at Aegis Station:**
   Payload offload, crew exchange, refuel if needed
4. **Return to lunar surface:**
   Aerodynamically stable descent not required—entirely ballistic

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Propellant Compatibility

- Designed to refuel from ISRU-sourced fuel (LOX + CH_4 or LOX + LH_2)
- Can refuel at:
  - Lunar base (ISRU plant)
  - Aegis Station (orbital depot modules)
  - Landers or mobile tankers (field refuel)

Future upgrades may include in-space propellant transfer or depot rendezvous.

Interior Layout

- **Crew mode:** Pressurized cabin with cockpit, seating, access to EVA hatch
- **Cargo mode:** Central open bay with configurable racks or pallet mounts
- **Hybrid mode:** Rear cargo with forward passenger seating (typical configuration)

Modular cargo handling aligns with the **Rover** and **Tanker** format for seamless loading/unloading.

Mission Cadence & Integration

Mission Type	Crew	Cargo	Frequency
Standard rotation	6	5 t	Weekly
Cargo express	0–2	10 t	As needed
Emergency evac	20	0	Contingency only

Supports:

- Lunar water transport oversight
- Resupply of Rover missions
- Tanker fleet support (parts, tools, crew)
- Mid-range lunar exploration

Fleet Composition

Initial Aegis operations will field a **3- to 5-shuttle fleet**, operating in rotation:

- One always in orbit
- One on the Moon
- One in reserve, transit, or maintenance

Eventually scaled to match **tanker and rover throughput**.

Strategic Role

- Links **surface activity to orbital civilization**
- Enables **routine transport of personnel and mass**
- Essential for **crew recovery, medical support, and modular delivery**
- Forms the **spine of lunar–orbital commerce**

This is the workhorse of the Aegis ecosystem.