

SpaceX was founded with the goal of substantially improving the reliability and reducing the cost of space transportation. We are committed to becoming the world's premiere choice for delivery of spacecraft to orbit and beyond.

With the Falcon 1, Falcon 9 and Falcon 9 Heavy launch vehicles, SpaceX offers light, medium and heavy lift capabilities to deliver spacecraft into any inclination and altitude, from low Earth orbit to geosynchronous orbit to planetary missions. And the SpaceX Dragon spacecraft provides both up and down transportation services for cargo, experiments and eventually crew-carrying missions.

Drawn from the top ranks of the aerospace industry, the company's technical personnel share the common belief that significant room for improvement exists in the launch services industry.

Dedication to this shared vision has resulted in technical advancements in propulsion, structures, avionics, manufacturing and launch operations, with the net benefit to our customers of increased reliability and reduced cost.

Company: Private launch vehicle developer and launch services provider.

Facilities: Half-million square foot design and manufacturing facilities located in Hawthorne (Los Angeles), California; a 300-acre propulsion and structural test facility in central Texas; and offices in Washington, DC.

Launch sites: Vandenberg Air Force Base, California; Kwajalein Atoll in the Marshall Islands; Cape Canaveral Air Force Station, Florida.

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RELIABILITY

SpaceX aims to develop a family of space launch vehicles which will ultimately reduce the cost and increase the reliability of space access by a factor of ten.

Our company is based on the philosophy that simplicity, low-cost, and reliability can go hand in hand. By eliminating the traditional layers of management internally, and sub-contractors externally, we reduce our costs while speeding decision making and delivery. Likewise, by keeping the vast majority of manufacturing in house, we reduce our costs, keep tighter control of quality, and ensure a tight feedback loop between the design and manufacturing teams.

The Falcon launch vehicles have been designed to eliminate the main causes of failures – separation events and engines. They have only two stages for the minimal number of staging events possible, and make use of either one engine per stage for simplicity or multiple engines for propulsion redundancy. Intelligent use of redundancy has also been applied to reduce the possibility of avionics related failures. Robust structural design margins are employed to enhance reliability as well as operability.

Furthermore, to ensure manufactured reliability, we have a full quality assurance program, an exhaustive acceptance test program, and a hold before launch system to prevent a liftoff with an underperforming first stage.

Falcon Design Features to Enhance Reliability:

- Two stage design for minimum number of separation events.
- Robust structure with high margins.
- Propulsion redundancy and simplicity.
- Simplest possible turbopump design – one shaft drives both LOX and RP-1.
- Redundant stage and fairing separation systems.
- Hold before liftoff system.
- Limited number of independent subsystems:
 - No separate hydraulic system for thrust vector control – high pressure kerosene tapped from turbopump.
 - Turbopump exhaust gas is used for roll control.

In support of our design philosophy, an independent study by the Futron Corporation concluded that Falcon has the highest design reliability of any American launch vehicle family.

Figure 1 Expected Failure Rates Due to Propulsion and Separation Events Based on the Historical Average*

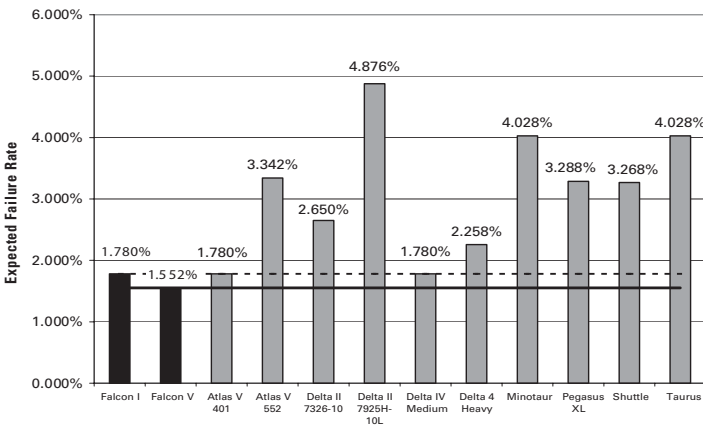
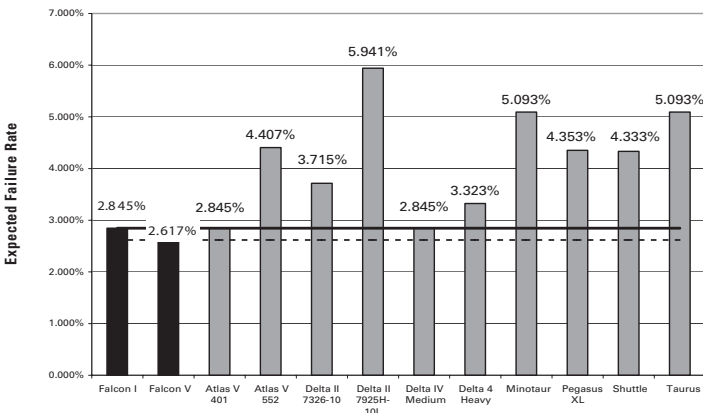


Figure 2 Expected Failure Rates Due to All Causes Based on the Historical Average Subsystem Failures*



*Charts from Futron Design Reliability Study, 2004. Falcon 9 replaces Falcon V, and has four additional engines, two of which are shut down late in flight, and which can provide additional engine out capability for greater reliability. Link to full study available on SpaceX.com.

SpaceX Solution: By incorporating hundreds of innovations in technical design and launch operations, together with a low overhead corporate environment, SpaceX is able to offer unmatched cost savings to customers.

The cost of a rocket is driven by five fundamental factors: business overhead, propulsion, structures, avionics and launch operations. SpaceX is a vertically integrated company with a common sense management structure and singular product focus, resulting in lower overhead costs than any other launch vehicle provider and a significant cost advantage for any given rocket design.

Additionally, the Falcon family of launch vehicles has the advantage of being a clean sheet design, focused purely on reliability and cost (we view the two as inseparable). As the first rocket developed in the 21st century, the Falcon series takes advantage of the latest technologies, as well as 50 years of "lessons learned". Through count-down automation, system simplicity and delivering completed rockets to the launch pad, our rockets require an order of magnitude smaller launch crew.

Reliability and cost improvements are the sole drivers for technical and manufacturing decisions. In contrast, most prior launch vehicle developments have been performance driven, where the objective is to obtain the highest possible mass to orbit, sacrificing cost and sometimes reliability in the process.

Vehicles, Prices and Payloads

Vehicle	Price* (millions)	Fairing Diameter	Payload LEO (185 km circular)	Payload GTO† (185 x 35,788 km)
Falcon 1	\$ 7.9	1.5 m	420 kg (k)	--
Falcon 1e	\$ 9.1	1.7 m	1,010 kg (k)	--
Falcon 9**	\$ 36.75	5.2 m	12,500 kg (c)	4,640 kg (c)
Falcon 9 Heavy	\$ 94.5	5.2 m	29,610 kg (c)	15,010 kg (c)

* January 2008 US dollars, baseline price to LEO. k = Kwajalein (9.1°) c = Cape Canaveral (28.5°)

**Typical maximum payloads in the Falcon 9 class are 6,800 kg (15,000 lb) in mass. For payloads greater in mass than these values, contact SpaceX.

† SpaceX typically reserves 10% of the GTO mass-to-orbit performance, but this is negotiable.

- Falcon 1 is the world's lowest cost per flight to orbit of a production rocket.
- Falcon 9 offers the lowest cost per pound/kilogram to orbit, in addition to providing breakthrough improvements in reliability.
- A half bay flight of Falcon 9 is available to accommodate customers with payloads sized between Falcon 1 and Falcon 9.



Falcon 1



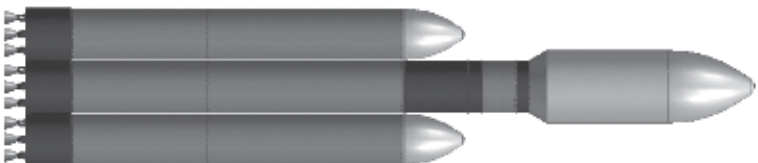
Falcon 1e (available 2010)



Dragon Spacecraft



Falcon 9



Falcon 9 Heavy (available 2010)

Falcon 1 is a two stage, liquid oxygen and rocket grade kerosene (RP-1) powered launch vehicle. Designed from the ground up, Falcon 1 employs current technology to provide cost efficient and reliable transport to low Earth orbit. The Falcon 1 first stage is designed for recovery and reuse.

Length:	21.3 m (70 ft)	Mass:	27,670 kg (61,000 lbs)
Width:	1.7 m (5.5 ft)	1st Stage Thrust (sea level):	347 kN (78,000 lbf)



Beginning in 2010, the enhanced Falcon 1, or Falcon 1e, will offer increased performance capabilities and payload capacities. It will become SpaceX's standard small launch vehicle offering.

Length:	27.4 m (90 ft)	Mass:	46,760 kg (103,000 lbs)
Width:	1.7 m (5.5 ft)	1st Stage Thrust (sea level):	556 kN (125,000 lbf)



First Stage

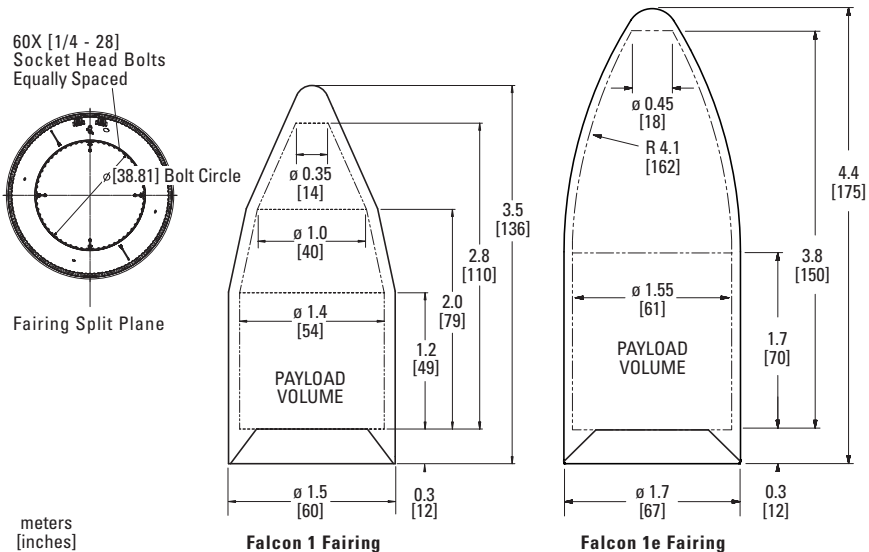
- Flight pressure stabilized architecture developed by SpaceX provides optimization between a fully pressure stabilized design, and a heavier isogrid design.
- Powered by a single SpaceX Merlin turbo-pump engine, the simplest possible design for a pump fed engine.
- Hold before lift off system enhances reliability. After engine start, Falcon is held down until all vehicle systems are verified to be functioning normally before release for liftoff.
- Stage separation occurs via a pneumatic pusher system, released by dual initiated separation bolts, which have a zero failure track record in prior launch vehicles.

Second Stage

- Tanks are precision machined from aluminum plate with integral flanges, minimizing the number of welds necessary. Major circumferential welding is performed by an automated welding machine, reducing the potential for error and ensuring consistent quality.
- Powered by a single SpaceX Kestrel engine, a simple pressure fed system has dual redundant igniters for added reliability of restart.

Payload Accommodation

- Benign flight environment.
- Large available volume for this payload class.
- Standard mechanical interface with a low shock, flight proven separation system.



FALCON 9

Like Falcon 1, Falcon 9 is a two stage, liquid oxygen and rocket grade kerosene (RP-1) powered launch vehicle. It is in the Evolved Expendable Launch Vehicle (EELV) class with a 5.2 m (17 ft) fairing. Falcon 9 can deliver large payloads to Low Earth Orbit (LEO), Geostationary Transfer Orbit (GTO), and destinations beyond.

Falcon 9 offers breakthrough reliability derived from the nine engine, single tank first stage configuration. Falcon 9 is the first American launch vehicle since the Saturn V to offer true engine out redundancy and reliability.

SpaceX offers a dual manifest capability for satellites in between the Falcon 1 and Falcon 9 payload classes.

Length:	54.9 m (180 ft)	Mass:	333,400 kg (735,000 lb)
Width:	3.6 m (12 ft)	1st Stage Thrust (vacuum):	5.56 MN (1,250,000 lbf)

Data reflects the Falcon 9 Block 2 design.



First Stage

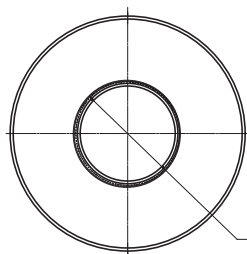
- Tank walls and domes are made from aluminum-lithium chosen for its superior performance and high strength to weight ratio.
- Tank is friction stir welded, the highest strength and most reliable welding technique available.
- Powered by nine SpaceX Merlin engines.
- Hold before lift off system enhances reliability. After engine start, Falcon is held down until all vehicle systems are verified to be functioning normally before release for liftoff.

Second Stage

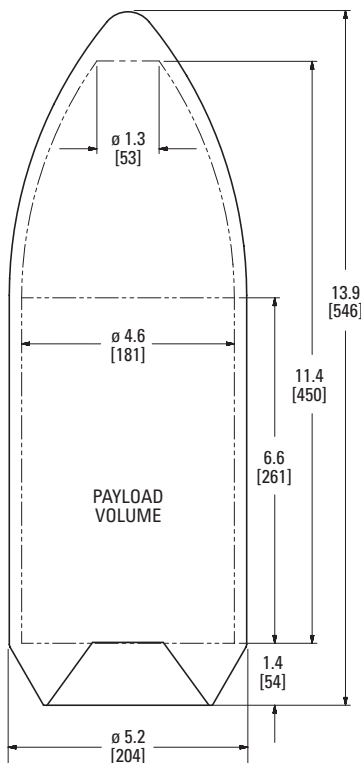
- Tank is simply a shorter version of the first stage tank and uses most of the same tooling, material and manufacturing techniques - resulting in significant cost savings in vehicle production.
- A single Merlin engine, with a larger vacuum nozzle for efficiency, powers the Falcon 9 upper stage. For added reliability, the engine has dual redundant pyrophoric igniters and four injection ports to ensure engine ignition.

Payload Accommodation: 5.2 meter Fairing

meters
[inches]



ø [62.010] Bolt Circle
121x [1/4 - 28]
Socket Head Bolts
Equally Spaced

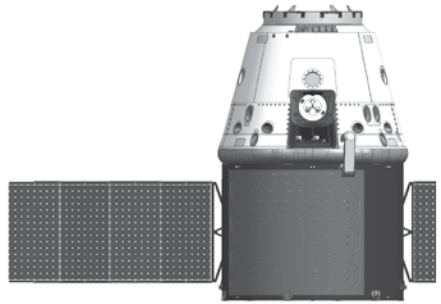


Dragon is a free-flying, reusable spacecraft being developed by SpaceX under NASA's Commercial Orbital Transportation Services (COTS) program. Subsystems include propulsion, power, thermal control, environmental control, avionics, communications, thermal protection, flight software, guidance, navigation & control, entry descent & landing, and recovery.

Though designed to address cargo and crew requirements for the International Space Station (ISS), as a free-flying spacecraft Dragon also provides an excellent platform for in-space technology demonstrations and scientific instrument testing. SpaceX is currently manifesting fully commercial, non-ISS Dragon flights under the name "DragonLab". DragonLab represents an emergent capability for in-space experimentation.

Dragon Spacecraft System

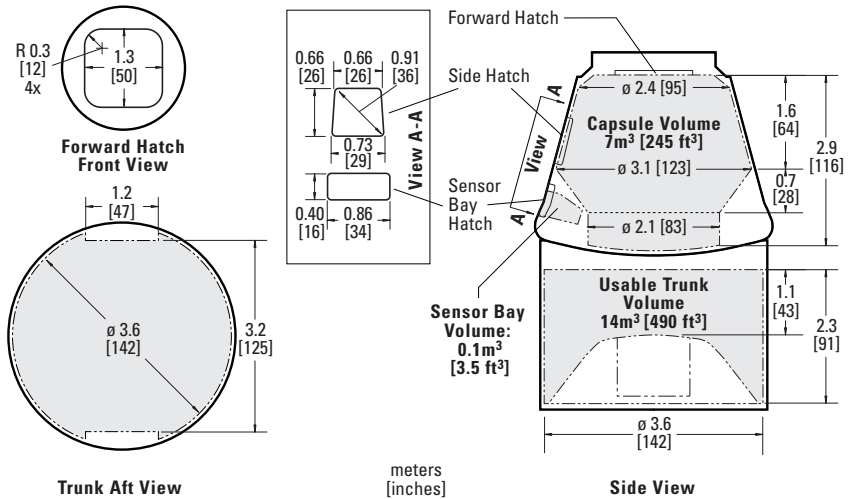
- Fully recoverable capsule
- Trunk jettisoned prior to reentry
- 6,000 kg (13,228 lbs) total combined up-mass capability
- Up to 3,000 kg (6,614 lbs) down mass
- Payload Volume:
 - 7 to 10 m³ (245 ft³) pressurized
 - 14 m³ (490 ft³) unpressurized
- Mission Duration: 1 week to 2 years
- Payload Integration timeline:
 - Nominal: Launch -14 days
 - Late-Load: Launch -9 hours
- Payload Return:
 - Nominal: End-of-Mission +7 days
 - Early Access: End-of-Mission +24 hours



Overall Length:	6.1 m (20 ft)
Max Diameter:	3.7 m (12.1 ft)
Dry Mass:	4,200 kg (9,260 lbs)

Uses

- Highly Responsive payload hosting
- Sensors/apertures up to 3.5 m (138 in) dia.
- Instruments and sensor testing
- Spacecraft deployment
- Space physics and relativity experiments
- Radiation effects research
- Microgravity research
- Life science and biotech studies
- Earth sciences and observations
- Materials & space environments research

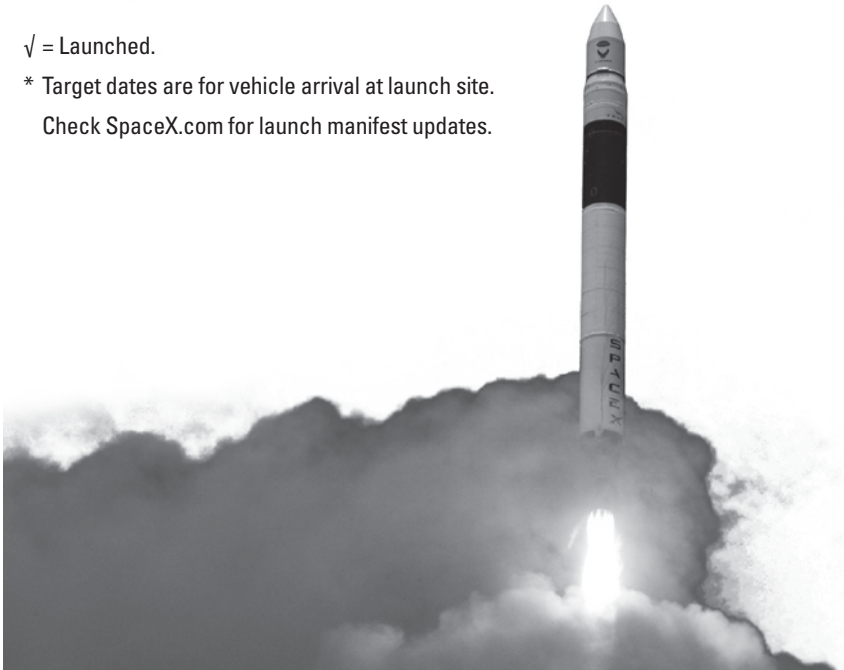


Customer	Vehicle	Target Date*
DARPA Demo Flight 1	Falcon 1	√ March 24, 2006
DARPA Demo Flight 2	Falcon 1	√ March 20, 2007
DoD ORS Office, ATSB (Malaysia) & NASA	Falcon 1	√ August 2, 2008
Falcon 1 Flight 4	Falcon 1	√ Sept. 28, 2008
Falcon 9 Maiden Flight	Falcon 9	2008
ATSB (Malaysia)	Falcon 1	2009
MDA Corporation (Canada)	Falcon 9	2009
Avanti Communications (UK)	Falcon 9	2009
NASA COTS - Demo 1	Falcon 9 / Dragon	2009
NASA COTS - Demo 2	Falcon 9 / Dragon	2009
SpaceDev	Falcon 1	2009
NASA COTS - Demo 3	Falcon 9 / Dragon	2010
MDA Corporation (Canada)	Falcon 1	2010
Swedish Space Corporation	Falcon 1	2010
DragonLab Mission 1	Falcon 9 / Dragon	2010
Bigelow Aerospace	Falcon 9	2011
DragonLab Mission 2	Falcon 9 / Dragon	2011

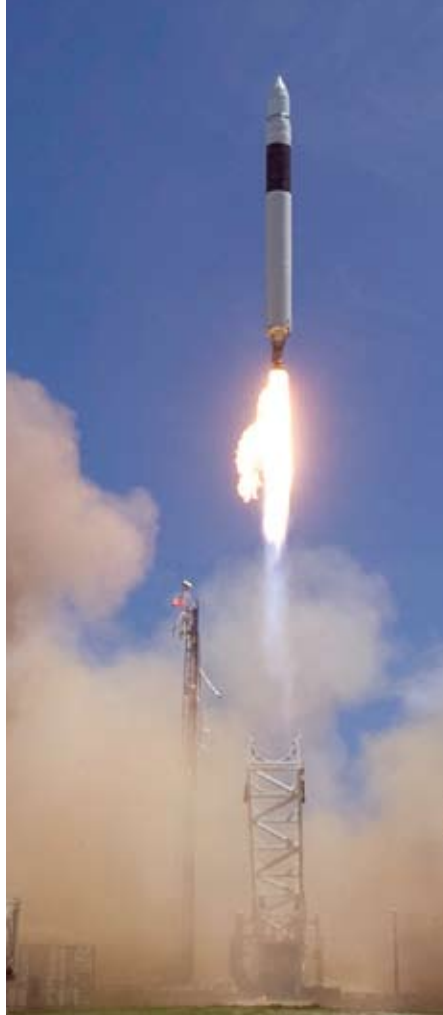
√ = Launched.

* Target dates are for vehicle arrival at launch site.

Check SpaceX.com for launch manifest updates.



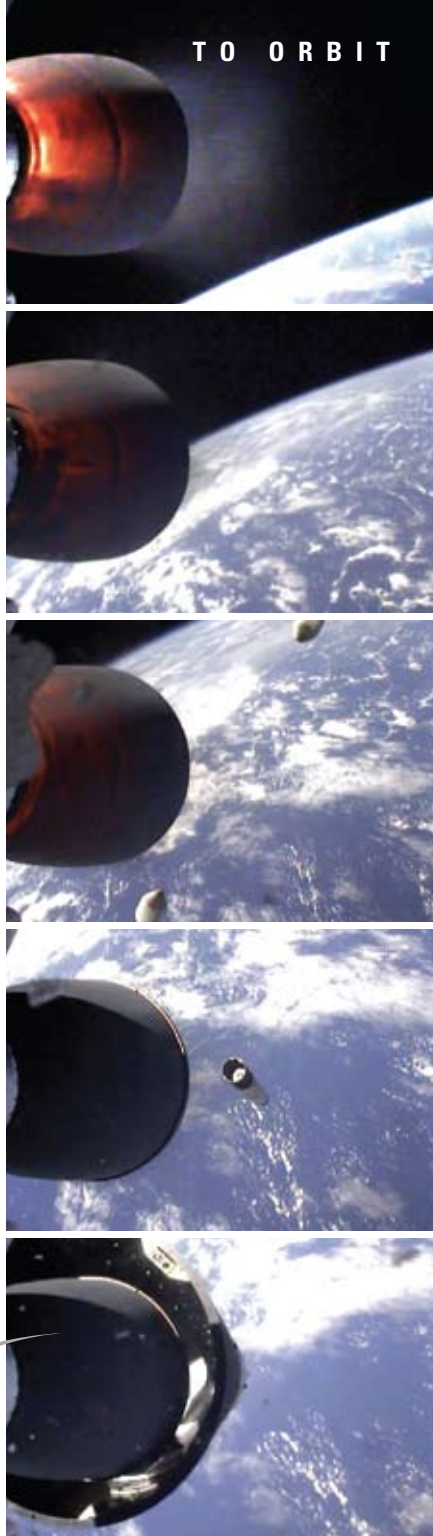
TO ORBIT



On 28 September 2008 SpaceX Falcon 1 became the first privately developed liquid fuel rocket to achieve Earth orbit.

Falcon 1 leads the world market in providing the lowest cost to orbit of any launch system.

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TO ORBIT