



## Lift Off

The Desperate Early Days that Launched SpaceX

by Eric Berger

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*„Elon just wants to get shit done”*

This book pays homage to Elon Musk and his SpaceX early Falcon-1 staff.

Reading the book, two questions arose: (1) what drives Elon Musk deep rooted desire to secure the long term future of humanity by shipping them to Mars for colonization, (2) what lets him achieve impossible goals?

The book “Lift-off” by Eric Berger describes the founding days of Space-X and the bumpy and adventurous road leading up to and the successful launch of the Falcon-1 rocket.

The answer to (1) above is given by author Eric Berger in his book: “He long ago decided that for humanity to have a long-term future it must expand to other worlds, with Mars offering the best place to start...by building a city on Mars. Perhaps it is valid to say something inside Musk relentlessly drives him to do this.”

The answer to (2) is a longer story.

Elon Musk founded SpaceX in May 2002 with the goal to build low cost rockets and to build a small biosphere on Mars, the Mars Oasis. After having talked to NASA and his Mars Oasis ideas (“save your money kid, and go sit on the beach”) and the Russian Space Agency about buying launchers (“every time we talked to them the price went up”) he came to the conclusion that the only way to reach his goals would be to build his own rockets with as much parts designed and manufactured “in house” as possible.

From a managerial point of view Musk combines three important talents: He is an exceptional engineer who can apply his critical and brilliant knowledge to design, production, materials, processes down to “bolts and nuts”. He is rarely misled by his intuition to hire the right people. He has “deep pockets”, only being responsible to himself.

Musk’s first engineers hired were the now legendary Tom Mueller (Vice President of Propulsion), Chris Thompson (Vice President of Structures) and Hans Koenigsman (Vice President of Avionics).

Their unflagging enthusiasm (e.g. 80 hr working weeks), their dedicated contributions and their engineering background is described in detail. Their set-backs and triumphs are followed while working their way through the development of the Merlin engine, testing, meeting US regulations for building rockets, recruiting customers and finding a place to launch their rockets.

This proved to be not easy and when they finally were allowed to refurbish an abandoned launch pad at the Western Test Range (Vandenberg) – only to find out after an 7 Mio \$ investment their first customer’s satellite was too heavy for being launched from this location, they had to find a more mass-favorable launch opportunity near the equator.

After a longwinded search they ended up on a small island in the “middle of nowhere”: a small island called Omelek in the Kwajalein Atoll in the Pacific – under control of the Air Force.

The difficulties and setbacks of their “trial and error” approach reminded me to those of another low cost rocket pioneer, the German Lutz Kayser who had to start from scratch in the Zaire jungle on the grace of President Mobutu in the 1970’s. [3]

The Omelek experience is a fine and impressive story of dedication, endurance, persistence and engineering ingenuity, a disruptive approach – and last but not least a lesson in quick decision making, almost regardless of any financial consequences, like the “crazy capacitor odyssey” or the weekly private jet flights of the Merlin test team from L.A. to Texas and back.

From founding the SpaceX company (May 2002) to the first Falcon-1 launch (March 2006, failure, explosion) through the second Falcon-1/2 launch (March 2007, failure, slosh problem) up to the third Falcon-1/3 launch (August 2008, failure, first stage kicking second stage after separation) six years have passed, with Musk’s funds dwindling, privately being under pressure and struggling with his other two enterprises, Tesla and Sun City, Musk demonstrated his unique leadership: In the first gloomy staff meeting right after Falcon-1/3 has failed to reach orbit everybody worried about their jobs, he did not play the “blame game”, he simply stated: we have all the parts for a forth Falcon-1 rocket out there, go assemble them, I want to fly it in 6 weeks.

“He surprised me,” said Koenigsmann, vice president of avionics, “He collected everyone in the room and said we have another rocket, get your shit together, go back to the island and launch it in six weeks.”

After Musk’s staff meeting, his employees realized they were gambling for everything: “fly or die”. But at that meeting nobody knew which dramatic events were in store for them during the transport of the first stage on a military C-17 to Omelek.

The whole company had to scramble harder than ever before for a successful Falcon-1/4 launch and with surprising ingenuity and improvising talent and with a highest level of personal commitment they barely made it within the available six weeks, they even created a simulated payload with the weight of the Malaysian satellite, called it RatSat and were determined to reach orbit this time knowing they never would have another chance...

...and the 165 kg RatSat was safely put in orbit on 28 September 2008, 23:15 by Falcon 1/4 !

The rest of the story is history – with the commercial COTS and CRS contracts with NASA and follow on contracts with other paying private customers SpaceX now is the first commercial company having developed, flight proven recovering and re-using the first stages of their Falcon-9 rocket to transport satellites for private and institutional customers, NASA and Air Force as well as transporting material and astronauts to the ISS for NASA, achieving all this within barely two decades.

The book is an extraordinary document and belongs in the annals of space history. I highly enjoyed reading it – don’t miss out on it.

#### *The Author*

Eric Berger is the senior space editor at Ars Technica, covering everything from new space to NASA policy. Eric has an astronomy degree from the University of Texas and a master's in journalism from the University of Missouri. For the book he had direct access to Elon Musk and his staff “because he trusted me and liked my style” (Eric Berger in an interview).

#### Reference

[1] Lutz Kayser (see Journal of SpaceOps & Communicator [https://www.opsjournal.org/DocumentLibrary/Uploads/OTRAG\\_u2\\_final\\_LK%20.pdf](https://www.opsjournal.org/DocumentLibrary/Uploads/OTRAG_u2_final_LK%20.pdf)).