

PHOTOGRAPH BY [unreadable]

Rocket Man

Elon Musk, pictured in the fuselage of his Falcon 9 rocket, plans to launch satellites at a fraction of the usual cost.



PHOTOGRAPH BY [unreadable]

Inc.

ENTREPRENEUR OF THE YEAR

'07

ELON
MUSK

Electric sports cars.

Solar power.

Space travel.

Finally, an entrepreneur who's not
afraid to think really, really big

BY MAX CHAFKIN

PHOTOGRAPH BY JILL GREENBERG



atching Elon Musk at work is an exercise in controlling your urge to buy a man a drink. Make that several drinks. Musk is 36 years old, wicked smart, worth several hundred million dollars, and built like a tight end—thickset through the middle and well over 6 feet tall. Yet he never looks quite comfortable. Sitting in front of the oversize

computer screen on his desk, he rolls back and forth in his chair, slouches and unslouches, rubs his temples, raps his fingers, and plays with his wedding ring. When he sighs, which he does frequently, his chest heaves, and his

eyes widen, like someone confronted with news of his own death. He generally speaks in complete, precise sentences, rarely telling a joke or even cracking a smile.

It's not that Musk is an unpleasant guy. He just happens to be really, really busy. Musk is CEO, majority owner, and head rocket designer at SpaceX, an aerospace start-up in El Segundo, California, that by 2011 plans to be hauling astronauts to and from the International Space Station. And that's just his day job. Musk has two more wildly ambitious start-ups in play—the electric-car maker Tesla Motors and the solar panel installer SolarCity; in both cases, he serves as chairman and controlling shareholder. In fact, the South African native has been building big, ambitious companies for more than a decade. He co-founded PayPal, the online payment processor that eBay bought in 2002 for \$1.5 billion, as well as Zip2, a dot-com media company that was sold for \$307 million when he was just 27.

Meanwhile, Musk's wife, Justine, a novelist, gave birth to triplets last year. That means Musk now has five children under the age of 4, in addition to three companies to run. Perhaps that explains why it's so rare to see Musk talk to someone on the phone without simultaneously doing something else: pecking out an e-mail, scanning in-

voices, mulling over a spreadsheet, shopping for computer equipment, fiddling with his BlackBerry. He often does several of these things at once. The only tasks that seem to command the entirety of his attention are technical discussions related to SpaceX's soon-to-be-launched rocket, the *Falcon 1*, and job interviews. (Musk personally vets all of SpaceX's employees, and he's in the midst of a frantic—but so far fruitless—search for a CEO for Tesla.)

To get through the day, Musk relies on two stimulants: caffeine and a desire to help humanity colonize Mars. Until he recently started cutting back on the former, Musk consumed eight cans of Diet Coke a day, as well as several large cups of coffee. "I got so freaking jacked that I seriously started to feel like I was losing my peripheral vision," he says. If he realizes how crazy this sounds, he doesn't let on. "Now, the office has caffeine-free Diet Coke." Even so, Musk frequently gets so caught up in his multitasking that it sometimes takes two or three tries at his name, uttered at full volume, to get a response.

The goal of putting people on Mars is no joke. Musk believes that over the four-and-a-half-billion-year history of planet Earth, a dozen or so events have truly mattered. Edging forward in his chair, he ticks off a few: "There was the advent of single-celled

life, multicelled life, the development of plants, then animals," he says. "On this time scale, I'd put the extension of life to another planet slightly above the transition from life in the oceans to life on land." If there's something insane about a CEO who thinks his company's mission is more important than any accomplishment in all of human history—indeed, in all of fish history—there's also something irresistible. "One of Elon's greatest skills is the ability to pass off his vision as a mandate from heaven," says Max Levchin, who co-founded PayPal with Musk. "He is very much the person who, when someone says it's impossible, shrugs and says, 'I think I can do it.'"

YOU'VE PROBABLY HEARD the one about the recklessly ambitious technology entrepreneur from Silicon Valley: the maverick- iconoclast-innovator with the big idea who becomes fantastically rich and changes the world. The problem with this story is that it's generally not true. Although companies like Netscape and Google are almost always presented as radically innovative start-ups, out to change the world from day one, the fact is, they began as incremental improvements, executed at opportune moments. Netscape had a slightly better version of Mosaic, a Web browser built at the Univer-

sity of Illinois. Today, Google is acknowledged as one of the world's most powerful and innovative companies. But when it launched, in 1998, it was simply a slightly better way to search the Web.

Perhaps for this reason, many people who invest in start-ups tend to favor companies that are based on small, executable ideas over grand strategies like Martian colonization or the resurrection of the electric car. Small ideas, the thinking goes, have a shot at growing into the next Google. And if they don't, there's a chance that today's Google may simply acquire them for a tidy sum. "Many of the companies we back start out as little features," says Roloef Botha, a partner with Sequoia Capital who led the company's investment in YouTube, which Google bought for \$1.65 billion last year. Botha, whom Musk hired in 2000 and who served as PayPal's CFO for three years, says that he gravitates to "nuggets," small ideas that play into big market trends.

Elon Musk is not a nugget kind of guy. He has distinguished himself by attempting things that most people who care about avoiding personal bankruptcy would not even consider. Yet his bets seem to be paying off. In March, SpaceX, into which Musk has poured \$100 million, launched a rocket 180 miles above Earth. That was farther than any privately developed rocket in recent history and almost three times as far as Burt Rutan's famed SpaceShipOne flight of 2004. (Of course, Rutan's rocket had a pilot at the controls, while Musk's was unmanned.) Meanwhile, Tesla Motors has gone from a half-baked idea about a battery-powered sports car to a rare bright spot in the otherwise troubled American auto industry. This

Yet the kingmakers of innovation—the academics, the investors, the bloggers—tend not to talk about Musk. They dwell on idea people like Facebook's Mark Zuckerberg, the 23-year-old wunderkind whose high-concept notions about social networks have made him the hottest thing in business. Or they talk about prognosticators, people like MIT's Nicholas Negroponte, whose One Laptop per Child program has captured the imaginations of moguls, wonks, and Davos attendees everywhere. Elon Musk isn't a software geek or a self-styled visionary. He's not particularly young or brash or handsome, and he can come off as kind of a jerk. He isn't hawking new technology, and he's quite shy. Yet he just might change the world.

"ELON HERE."

Musk holds a BlackBerry to his ear as we navigate heavy traffic on Los Angeles's 105 freeway in a rented Toyota Prius. (Musk's beloved Porsche 911 Turbo is in the shop.) We'd been eating burgers at Nat's—a greasy spoon inside the Hawthorne Municipal Airport, where Musk's three-engine jet is parked—when he realized he was missing a meeting about his rocket's propellant tank. "They've designed a solution, but it's not a good solution, because it's got several hundred parts," he explains hastily as he dials the office. "If any of those pieces shake loose, they'll get stuck and choke the engine. And that will really suck."

For all the grand visions of men on Mars, SpaceX's pitch is straightforward: The company says it will send your satellite into orbit for as little as a quarter of the going rate. This is no easy task. During its flight, which was

billion to design and build. Boeing is a \$61.5 billion company with more than 150,000 employees. SpaceX employs 370, it uses a converted tractor-trailer as a control room, and its CEO, a man with no prior experience with rockets, doubles as chief engineer. Yet the company has developed a competitive launch vehicle in less time and for less money than would have seemed possible. "Here, we look at every way to do something and then ask what's the minimum amount of money we need to do it—and it's approved like that," says Tom Mueller, vice president of propulsion development, or, as Mueller puts it, the "engine guy." Mueller spent 14 years at defense giant TRW prior to joining SpaceX. From 1995 to 2000, Mueller was part of a TRW team of about 80 people that built an engine intended for the Delta IV, only to see his work abandoned when Boeing selected a competing firm as its engine supplier. Tens of millions of dollars and thousands of hours amounted to no finished product. "I can't think of anything I was responsible for at TRW that ever flew," he says. At SpaceX, Mueller developed a working engine with only 25 engineers. Musk's salespeople have managed to book 14 flights for customers including NASA, the Malaysian government, and MDA, a Canadian data company, charging from \$7.1 million to \$35 million per trip. SpaceX was cash-flow-positive in the fourth quarter of last year and is on track to reach profitability when the books close on 2007.

Amazingly, the aerospace business has reached such levels of inefficiency that you can have a profitable rocket company without having successfully launched a rocket. So far, SpaceX has completed two test launches—achieving less than

ideal results. At its first launch, in 2006, the engine caught fire upon liftoff. The second rocket, launched earlier this year, made it 180 miles up but was doomed by a problem known in the rocket business as "slosh." During the abortive flight, engine vibrations caused the liquid propellants inside the fuel tank to begin sloshing around. This threw the rocket into a spin and kept the engine from running properly. Unfortunately, Musk and his engineers hadn't installed anything inside the fuel tank to slow the liquid down. About five minutes into its flight, the rocket started to wobble. Three minutes later,

"One of Elon's greatest skills is the ability to pass off his vision as a mandate from heaven," says a former colleague.

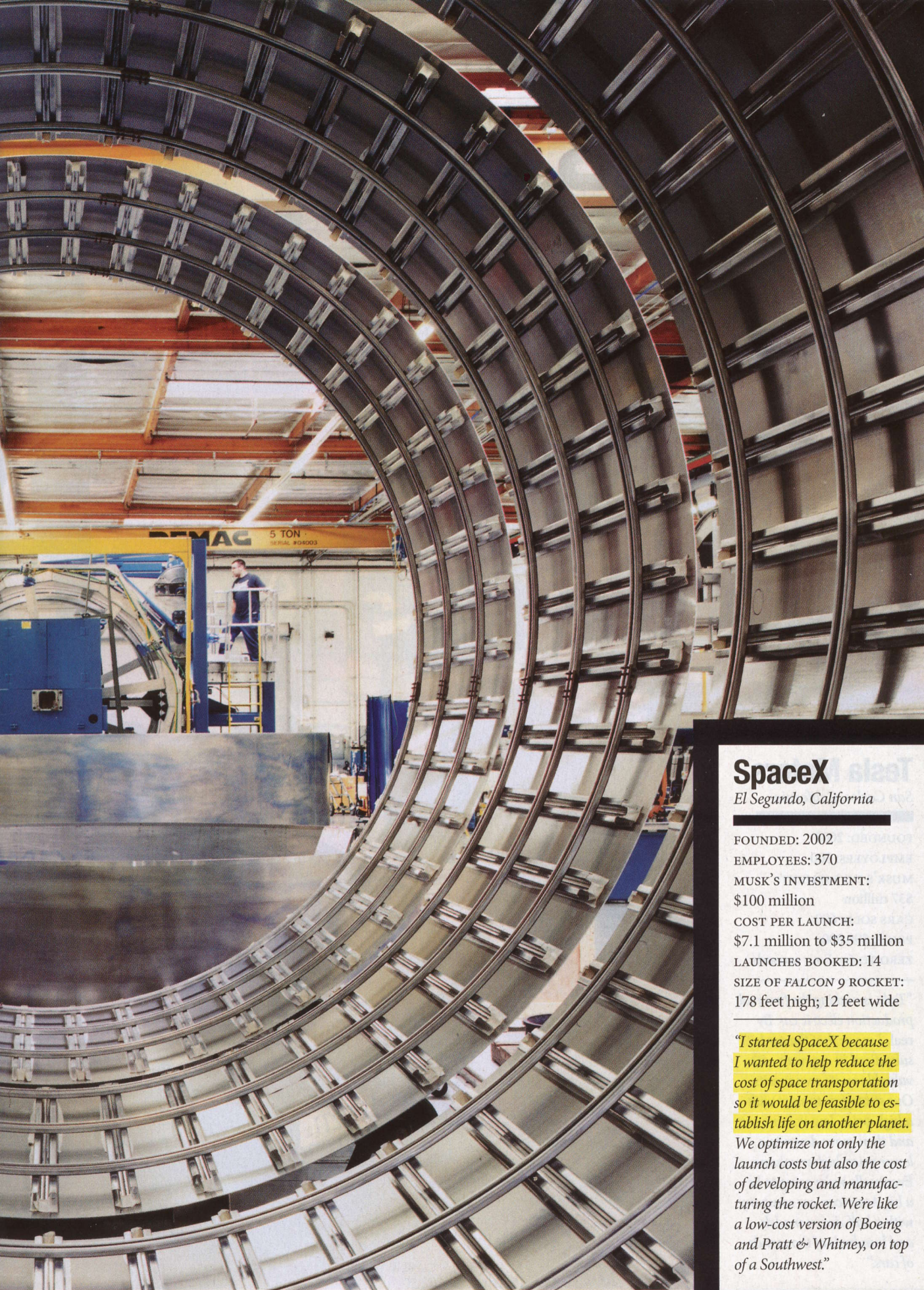
month, Tesla is to begin delivery of its first production vehicle, the Roadster, having already sold 600 at \$98,000 each. Finally, SolarCity, a mere 12 months after its founding, is one of the country's largest installers of home solar panels, making the often-cumbersome process of switching to renewable energy as easy as buying a Dell.

heralded as a landmark in private rocket development, Rutan's SpaceShipOne reached Mach 3, three times the speed of sound. To get to orbit, Musk needs to hit Mach 25, which requires 69 times the energy.

The state-of-the-art method for accomplishing this is Boeing's Delta IV rocket, which cost the aerospace giant roughly \$2.5

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SpaceX

El Segundo, California

FOUNDED: 2002

EMPLOYEES: 370

MUSK'S INVESTMENT:
\$100 million

COST PER LAUNCH:

\$7.1 million to \$35 million

LAUNCHES BOOKED: 14

SIZE OF FALCON 9 ROCKET:

178 feet high; 12 feet wide

"I started SpaceX because I wanted to help reduce the cost of space transportation so it would be feasible to establish life on another planet.

We optimize not only the launch costs but also the cost of developing and manufacturing the rocket. We're like a low-cost version of Boeing and Pratt & Whitney, on top of a Southwest."



Tesla Motors

San Carlos, California

FOUNDED: 2003

EMPLOYEES: 300

MUSK'S INVESTMENT:

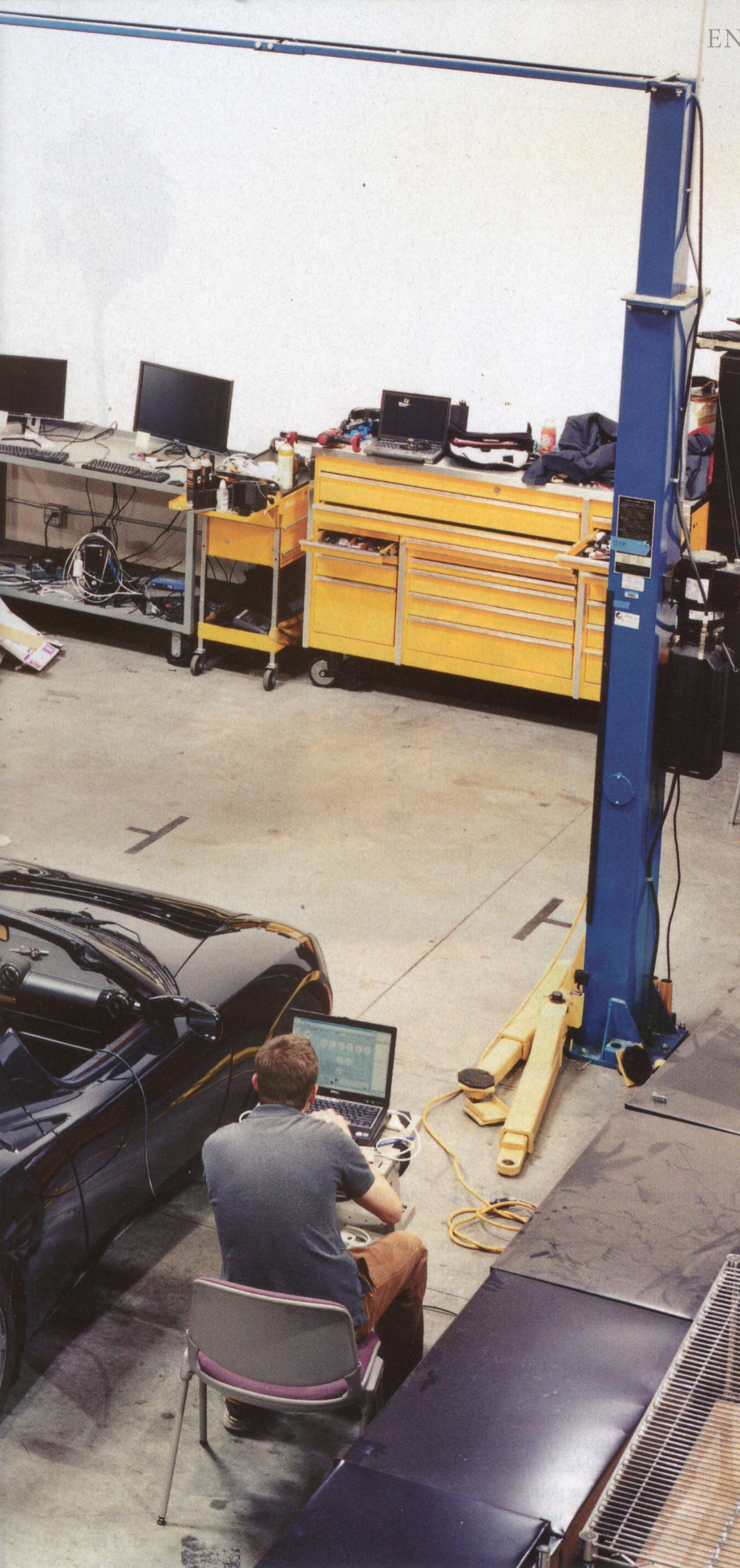
\$37 million

CARS SOLD: 600

PRICE: \$98,000

ZERO TO 60: Four seconds

"Tesla is making the first real production electric car. By real, I mean that the car isn't subsidized in any way—it's valuable on its own merits. Our strategy is to start with a high-price, low-volume car and then move down to a lower price, higher volume. Eventually we're going to be a big American car company with a half-dozen models and hundreds of thousands of cars."



it was plummeting back to Earth.

As he pilots the Prius toward an exit ramp, Musk joins the meeting and begins speaking. He fires off a list of directives, concerns, and ideas related to the fuel tank: How many baffles are necessary? How can SpaceX avoid Teflon clips? What about a filter? Should the team build a model or test it with a computer simulation? Still holding the phone to his ear, Musk parks the Prius smack in the middle of SpaceX's overcrowded lot—at a company that adds 11 employees a month, finding a parking spot is tough—and strides off to finish the meeting. Later that afternoon, he interviews a prospective IT manager and a recent college graduate who hopes to become a launch engineer. He meets with a couple of bankers from Morgan Stanley. After that, he has an extended meeting with a flip-flop-wearing 29-year-old who happens to be in charge of designing the rocket's fins. Musk frets over the state of Tesla Motors—he has interviewed 20 candidates and still can't find a suitable CEO—and gives an interview to a writer with *Photon* magazine about the promise of SolarCity. There are many, many e-mails to answer.

IF SIMULTANEOUSLY SHEPHERDING three disruptive companies sounds tough, it's business as usual for Musk. As a 12-year-old growing up in the South African city of Pretoria with divorced parents, Musk created a video game, *Blaster*, and sold it to a computer magazine for the ungodly sum of \$500. About a year later, Elon and his younger brother Kimbal, who has long been Musk's closest friend and chief co-conspirator, drew up plans to open an arcade near their school. "It was a very compelling proposition when you're 13 and you love video games," Musk says, letting out a rare chuckle. They gave up when a city official informed them that an adult's signature would be required to obtain a permit and instead sold homemade chocolates to their classmates. In his teenage years, Musk parlayed his small entrepreneurial fortune into several thousand dollars of stock market gains.

Just before Elon's 16th birthday, and without telling their parents, the brothers took a bus to the Canadian embassy and applied for passports. (Their mother, a Canadian national, now lives in Manhattan.) A year later, Elon bought a plane ticket to Canada and, over the objections of his father, left South Africa for good. Musk says he was fleeing compulsory service in the South African Defense Force, which was still repressing the country's black major-



ity. But he is quick to add that he'd long dreamed of coming to America. "I would have come here from any country," he says. "The U.S. is where great things are possible." When I ask Musk if his father ever forgave him for leaving, he answers, "I don't really care." The two seldom speak today.

Musk enrolled in Queen's University in Kingston, Ontario; Kimbal joined him a year later. With almost no money, Musk worked a bevy of jobs—as an intern in Microsoft's Canadian marketing department, an intern for the Bank of Nova Scotia, and as a programmer for a video-game developer called, presciently, Rocket Science. He transferred to the University of Pennsylva-

nia on a scholarship and completed a bachelor's degree in finance and one in physics. After graduating, in 1995, he moved to Palo Alto, California, having been accepted into Stanford's physics Ph.D. program, where he planned to study a variety of energy storage device called capacitors.

Something changed that summer, as Musk watched a nascent venture called Netscape Communications—founded by a kid younger than himself—quintuple in value the day it went public. "It just became clear that the Internet was going to change the world in a major way, whereas the capacitor stuff might bear fruit, or it might not," he says. "My overarching interest was

to get involved in stuff that really mattered." Musk withdrew from Stanford after two days on campus, with the vague idea that he would start an Internet company. He had \$2,000 in the bank, a car, a computer, and no friends in the Bay Area.

Musk poured his energy into a company he had founded called Zip2, which in some ways was little more than an opportunistic hack. Musk persuaded Navteq, a digital-mapping company, to let him put its maps online. He then purchased a business directory on CD-ROM for a few hundred dollars, wrote a bit of software code that linked the maps to the directory, and created the Web's first yellow pages. That fall, Kimbal

“Great things will never happen with VCs or professional managers,” Musk says. **“They have high drive, but they don’t have creativity or insight.”**

SolarCity

Foster City, California

FOUNDED: 2006

EMPLOYEES: 180

MUSK’S INVESTMENT:
\$10 million

INSTALLATION COST:
\$30,000 and up

JOB PER MONTH: 90

TYPICAL YEARLY SAVINGS:
\$1,800

“SolarCity installs solar panels, but installation is only one part of what we do. There’s the design of the system: What’s it going to look like? How’s it going to be structured? There’s the wiring, the permitting, the monitoring. It’s a hairball of elements that need to be put together. **What most people don’t realize is that SolarCity—not the panel manufacturer—is providing the bulk of the value.**”

and another friend joined him, and the trio rented a small office with a leaky roof for \$400 a month. They caulked the ceiling, bought a couple of futons, and replaced the carpet—and they lived and worked in the dank office. Unable to afford a high-speed Internet connection, Musk ran the website on his PC using a dial-up modem. “I’d program it in the night and turn the server on during the day,” he says. Eventually Musk persuaded an Internet service provider on the ground floor to let him drill a hole through the ceiling and plug in.

In January 1996, the three co-founders pitched Mohr Davidow Ventures, a Sand Hill Road venture capital firm, and talked

their way into \$3 million in funding. (They’d eventually get \$38 million more.) In order to get the money, Musk agreed to cede the CEO role to a professional—Richard Sorkin, a Stanford M.B.A. who’d been a vice president at hardware manufacturer Creative Technology. Over the next two years, Sorkin navigated Zip2 competently but not spectacularly. While Yahoo, another upstart directory service, marketed itself to Web surfers, Zip2 focused on helping newspaper companies offer maps, directions, and business listings to their online readers. To Musk’s chagrin, Sorkin solicited investments from many of the same companies that were licensing its software. “We wound up beholden to the newspapers,” Musk says. “They were investors, customers, and they were on the board—and they basically forced Zip2 into a position of subservience.” As Yahoo ushered in an era of new media, Zip2, in Musk’s view, was stuck kowtowing to the old guard. (Sorkin, for his part, makes no apologies. “It wasn’t a philosophical issue,” he says. “We went where the money was.”)

By 1998, Musk, who remained chairman and executive vice president, was thoroughly frustrated with the direction of his company but found himself unable to do anything about it. Several rounds of funding had diluted his stake to a mere 7 percent. Investors, which now included Knight Ridder, Hearst, and the New York Times Company, occupied four of seven board seats. In April of that year, Sorkin tried to sell Zip2 to Citysearch, which would have created the country’s largest local search company. Musk, who believed Sorkin was squandering the potential to create a viable consumer brand, helped spark a revolt among Zip2 managers, who threatened to quit if Sorkin was not removed. The board fired Sorkin and killed the deal. Unfortunately for Musk, it installed Mohr Davidow’s Derek Proudian as CEO and promptly sold the company to Compaq. “What they should have done is put me in charge,” he says. “That’s OK, but great things will never happen with VCs or professional managers. They have high drive, but they don’t have the creativity or

the insight. Some do, but most don’t.”

Compaq’s cash payment of \$307 million for Zip2—at the time, the largest sum ever paid for an Internet company—made Musk a rich, but surprisingly unhappy, young man. Despite pocketing \$22 million, he considered Zip2 something of a failure. He had set out to help build the Internet and instead had built software for *The New York Times*. Rather than taking time off, he immediately began work on a new idea: an online financial services firm that would make traditional ones obsolete. “The banks are terrible at innovation, and financial services is a huge sector, so I thought, There should be something here,” he says. In the summer of 1999, Sequoia Capital, the legendary backer of Oracle, Apple, and Cisco, led an investment of \$25 million in Musk’s new financial services firm, X.com.

Like a lot of nutty ideas proposed during the bubble, X.com was forced to scale back its ambitions. Musk chose to focus on a single feature: the ability to make payments via e-mail. In 1999, he merged his company with a venture-backed competitor called Confinity, which had a similar product known as PayPal; the merged company kept the X.com name, and Musk became CEO. For 10 months, he presided over a heated clash of egos, personalities, and visions. “Elon is obviously really freaking smart,” says Levchin, a co-founder of Confinity. However, Levchin adds that working with Musk—which is to say, working for Musk—can be difficult. “He’s one of those guys who can be larger than the room,” says Levchin. He and Confinity’s other co-founder, Peter Thiel, became increasingly frustrated with Musk’s penchant for micromanaging, as disagreements over technology and branding festered. In the fall of 2000, Musk went on a two-week trip to meet prospective investors. When he returned, he learned that Levchin and Thiel had orchestrated a coup. The board fired Musk, replaced him with Thiel, and renamed the company PayPal.

Though Musk admits he was hurt by the coup, he managed to keep his feelings bottled up. “I buried their hatchet,” he says, as he pan-

tomimes pulling a blade out of his back. "Life is too short for long-term grudges." Of course, it's also true that Levchin and Thiel went on to take PayPal public and make him even richer. But what Musk hasn't gotten over is the fact that the company never became more than a glorified feature, and he still believes that PayPal has the potential to become the world's largest consumer financial services company. "It has 120 million customers, and there's a high trust factor," says Musk. "There's a lot of unleveraged value there."

I FIRST SPOKE with Musk in the fall of 2006, back when the Tesla Roadster was still just a pretty prototype. "I'm a Silicon Valley guy," Musk said at the time. "I just think people from Silicon Valley can do anything." Musk's comment was hardly surprising: Tesla Motors, and, indeed, everything about Musk, has been consistently packaged, presented, and explained as Silicon Valley come calling on old-line industries. "This is how a Silicon Valley start-up does car design," gushed a *Wired* magazine writer taken out for a test drive. (Having ridden in the car, I'll admit it's hard not to gush.)

But Musk's companies don't look much like the Internet companies Silicon Valley churns out these days. Tesla Motors, like SpaceX, is an ambitious gamble aimed at an established market. Musk spurned early-stage investors and bankrolled the company himself; he has put in \$37 million to date. Although Tesla has since accepted more than \$68 million from VCs and private equity firms, Musk remains the majority shareholder. This go-it-alone approach represents a challenge to Silicon Valley's assumptions about start-ups, according to John Seely Brown, the former chief scientist at Xerox and a visiting scholar at the University of Southern California. "When I first heard about the space stuff, I said, 'By God, this guy is crazy,'" says Brown. "But that's the point."

When I suggest to Musk that he is being reckless with his fortune, he responds coolly. "It's OK to have your eggs in one basket

as long as you control what happens to that basket," he says. "The problem with the Silicon Valley financing model is that you lose control after the first investment round." Control for Musk means making sure that his companies don't turn into niche plays. It also means making day-to-day decisions. At Tesla, Musk has issued directives on seat cushions, the shape of the headlights, even the style of trunk on the company's forthcoming midrange sedan—an odd request given that his engineers have yet to figure out how exactly the thing is going to be powered. The most controversial of Musk's edicts involved the transmission. Martin Eberhard, Tesla's co-founder and then-CEO, argued

that it would be quicker and easier to build the car with a single-speed transmission. Musk ordered a two-speed model so that the Roadster would be able reach a top speed of well over 100 miles per hour.

Eberhard found these requests difficult to understand. "I've been successful in my career at constraining problems, at keeping them as manageable as possible," says Eberhard, who sold his previous company, e-book manufacturer NuvoMedia, to Gemstar, in 2000, for \$187 million. "Elon has resisted that in a push to make the car better—but at the risk of making it more complex." Musk, who several months ago demoted Eberhard to president of technology and installed an

interim CEO, argues that Tesla is a hit precisely because he hasn't sacrificed the car's performance to meet any arbitrary near-term goal. "The noteworthy thing about Tesla," Musk says, "is that it's the first electric car that is competitive with a gasoline car as a product." In other words, Musk's car is faster, cooler, and more fun to drive than a comparably priced gas guzzler. The result is that Tesla has collected deposits from 600 customers, which amounts to a \$30 million interest-free loan. Of course, Tesla's customers might have judged the car cool enough with only a single-speed transmission or uncomfortable seats or lame headlights. But there's also a chance they would have balked and bought themselves Ferraris.

Tesla's business plan calls for developing a less expensive sedan, code-named White Star, over the next few years, as well as opening a network of dealerships and service centers. The company is also working to strike a deal with a major car manufacturer (which Musk declines to name) to become a supplier of chassis and drive trains for a mass-market electric vehicle. Meanwhile, Musk is struggling to find a CEO. "We need someone who can build Tesla into the next great car company," he says.

Musk acknowledges that the kind of person he is after—someone who has a start-up mindset but understands how

10 QUESTIONS FOR ELON MUSK

What's your favorite part of a typical day? *Coming home to see my kids.*

What's the least glamorous thing you do regularly in the line of duty? *I do lots of unglamorous things. I do a lot of e-mail.*

What skill would you most like to improve? *The ability to do things I don't like. I don't like firing people, and I don't like traveling for a long time.*

What makes for a good salesperson of your product? *Somebody who is really driven, really smart, and nice to work with.*

If you could go back in time and do one thing differently in your business, what would it be? *The whole back-in-time thing is hard for me, because I'm pretty happy with the way things are right now. I would have liked to remain as CEO of PayPal. I think it could be a \$50 billion, \$60 billion company.*

If you were made dictator for a day, what's the first change you'd make? *I'd make it much less advantageous to be a lawyer.*

What's the simplest thing you never learned to do? *I never learned to play an instrument. I can whistle almost anything, but I think it'd be cool to play an instrument.*

Who's the smartest person you know? Why? *Probably Google's Larry Page. If you look at what Larry has done with Google, it's absolutely brilliant.*

Who gives you the best advice about your business? *My brother Kimbal. Sometimes I want things to be true, even though they're not, and Kimbal is good at pointing those out.*

What accomplishment are you most proud of? *Getting into space was pretty cool. We got farther than any privately developed liquid launch rocket.*

to build hundreds of thousands of automobiles—may not exist, which could force him into the CEO role—something he says he has no interest in doing. When I ask Musk if he'd ever consider hiring a CEO to run SpaceX, he pauses for a few seconds to reflect on the question. "This may be presumptuous, but I have not met anyone who could do this," he says, before revising.

"When I first heard about the space stuff, I said, 'By God, this guy is crazy,'" says one expert. "But that's the point."

"Well, wait, that's not true. Jeff Bezos could do this. Larry Page could do this. Bill Gates could do this. But there's just a really small list of people with the sufficient technical and business ability to do this job."

MUSK HAS TAKEN his jet to Silicon Valley for yet another Tesla CEO interview. So I'm keeping myself busy by climbing onto the roof of a two-story house in Santa Monica, California. I'm here to have a look at SolarCity, Musk's latest—and in some ways, his best—bet. The company is based in an unassuming office park in Foster City, in the heart of Silicon Valley. But if you really want to understand what Musk is up to, the best place to go is a rooftop, far removed from the world of software and stock options and talk of innovation. Two guys in green SolarCity T-shirts, Wade Meier and Johnny Davis, are using power wrenches to attach shiny black solar panels onto the flat roof. They work carefully: Each 5-foot-by-3-foot panel costs \$950, and this house looks to be worth well over \$2 million. The installation takes six days and costs \$35,000, and it will save the homeowners about \$250 a month on their electric bill.

All over California—and before long in Arizona and Colorado—SolarCity crews in snappy green trucks and matching uniforms are signing up customers. Musk seeded the company last year with \$10 million and an idea to do for solar energy what Dell did for computers. The company, which Musk says will probably be the highest returning of his three investments, already employs some 180 in offices in Berkeley, Foster City, Los Angeles, San Diego, and Sacramento, and averages 90 installations a month. In Octo-

ber, it won a contract to outfit eBay's headquarters with solar panels. Revenue for 2007 will exceed \$23 million.

SolarCity's business plan, which Musk first proposed to company co-founders (and his cousins) Lyndon and Peter Rive at the Burning Man festival several years ago, is to leave panel manufacturing—an increasingly competitive and commoditized business—

to the likes of BP and focus on building a retail brand. Installing solar capacity in a home or small business costs about \$9 per watt, but the panels cost only \$4 per watt. The installation business, which includes surveying, planning, sales, and the actual bolting on of panels, is expensive and inefficient. "It's all mom-and-pop contractors, and they basically suck," Musk says. "None of them have put any serious effort into honing the whole process—you know, squeezing out excess parts and labor—and then they have no economies of scale as far as buying panels en masse or establishing best practices."

Accomplishing this has meant creating what might be the new economy construction company, amid a housing downturn. Technicians like Meier and Davis—who would otherwise be making an hourly wage working for roofers or contractors—get stock options in a company that Musk says is headed for an IPO and a nationwide expansion. They're also encouraged to try out different installation techniques—for instance, ways to drill fewer holes into a roof—and report back on their findings. "We have all the engineers' personal cell phone numbers, and they're listening to us," says Davis, a former construction worker. When a customer calls SolarCity's toll-free number, a salesperson uses satellite imagery to assess whether the house gets enough sunlight. Next, laptop-toting employees are dispatched to survey the roof, work up an estimate, and produce a contract. In addition to actual installation, SolarCity processes customers' rebate applications with the state government, remotely monitors the performance of the panels, and handles any maintenance. "Our goal is to reduce the cost of solar so that everyone can

adopt clean power," says Lyndon Rive. "We definitely want to be a consumer brand."

A HALF HOUR'S drive south of the SolarCity work site is another construction project, a new headquarters for SpaceX. The rocket company, which occupies five large warehouses in El Segundo, is ready for a home becoming of its grand ambitions, and Musk has picked out an absurdly large one. The building, a giant shed right next to the Hawthorne airport, takes up 11.4 acres and once housed the factory that made the fuselage for Boeing 747s. This fact seems to excite Musk immensely: To reclaim a factory from an old aerospace titan—Boeing, no less—is too good to be true.

The place is still under construction when Musk shows me around, but you can see that it will be special. The entire company will be housed on a single open floor with low-walled cubicles. Musk's cube is dead center, right behind a place where two steel girders form a giant X. When it's finished, an engineer will be able to walk right over to the manufacturing floor and see a rocket engine milled from a piece of stainless steel or a fuel tank formed from giant sheets of aluminum. Salespeople will be able to hear the factory workers welding, and the workers will pass by the salespeople when they arrive in the morning. Everyone will eat free meals in the cafeteria.

Musk designed the building's interior. Bob Reagan, who is supposed to be in charge of SpaceX's manufacturing operation, has been detailed to duty as construction foreman. After pausing briefly to urge Reagan to make sure Scotchguard is applied to the new cubicles, Musk points to some glimmering metal on the ceiling. "You're never going to see ducts like that anywhere else," he says, grinning. "Look at those contours." As we stroll onto what will become the factory floor, he again looks up. "Those are 60-foot ceilings with catwalks," he says. He pauses to marvel at the number and then adds, "If there were people walking up there, they'd be tiny." During the visit, Musk is in fine form, smiling, laughing, gawking—in fact, almost calm. There's something strange and touching about a man this intent on reaching the heavens who can pause to marvel at a really high ceiling. **1**

Max Chafkin is an Inc. staff writer.