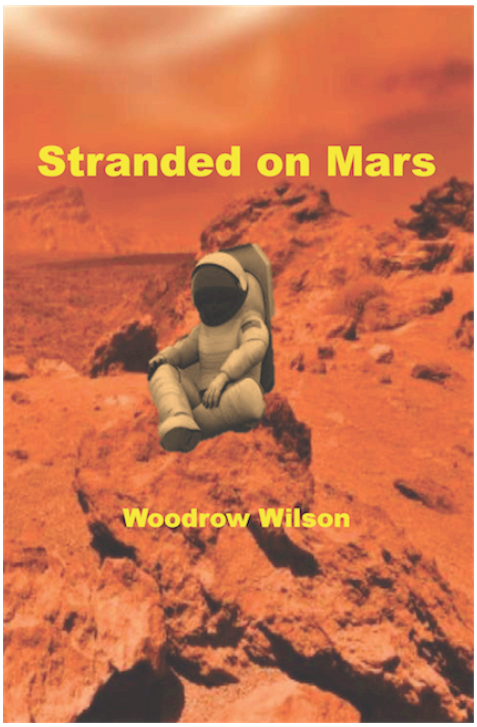

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STRANDED ON MARS

by Woodrow Wilson

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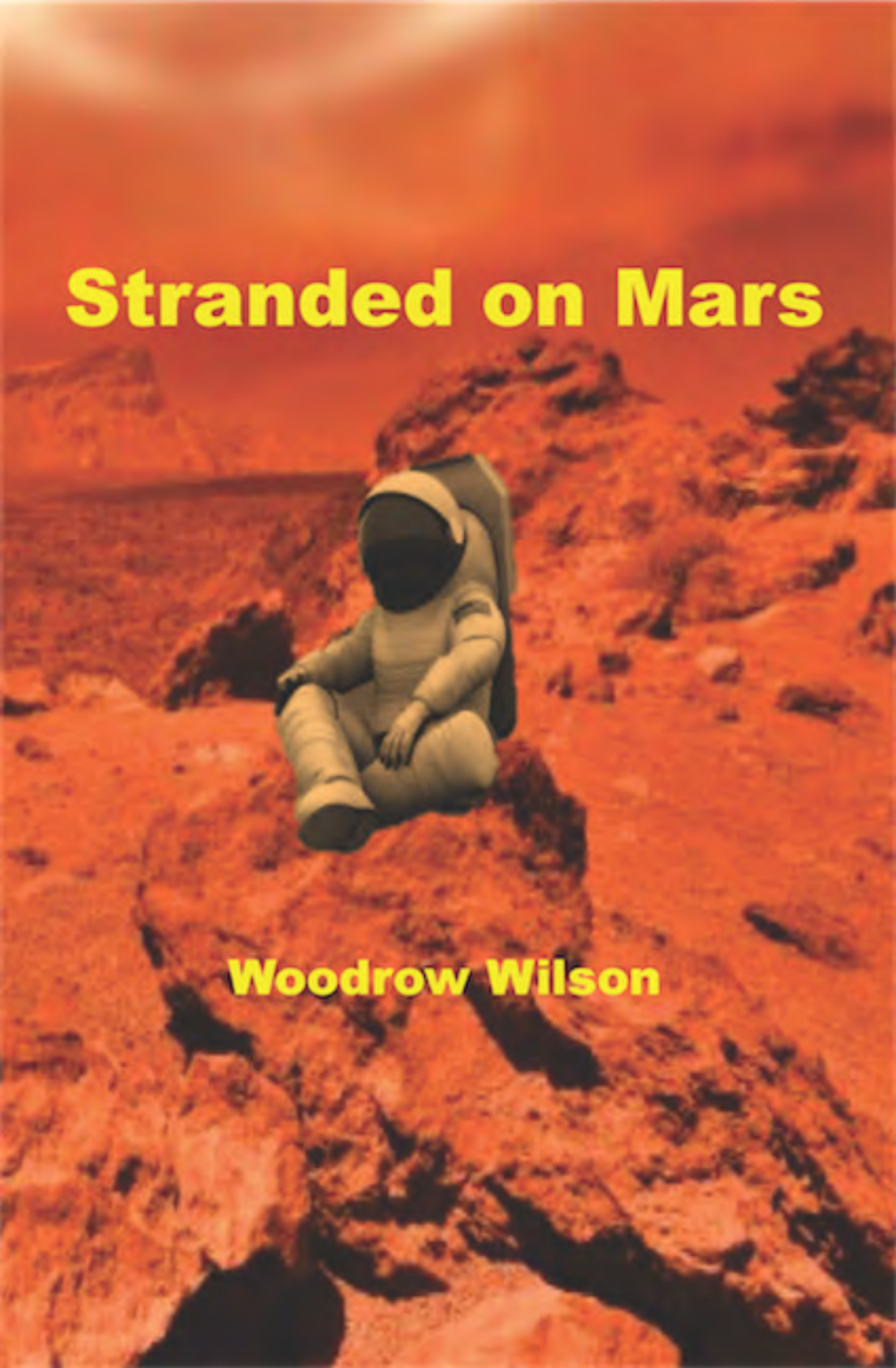

Woodrow Wilson

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WHAT COLOR ARE LITTLE GREEN MEN?

FISH STORY

CHAPTER 1

“Earth, we have a problem!” A lot of good that message would do! It would hang in the ether for twelve minutes before even reaching Earth. Wolf Yeager had only an hour and a half until his last decent shot at the Mars Orbiting Module, MOM. If he missed that one, it would be eighteen months before his next chance to reach home.

"Update firing sequence," he ordered the computer. It balked. It was still downloading data to Houston and couldn’t be interrupted. Shot windows were narrow, but machines took their damn sweet time.

The computer just sat there flashing inane screens about ignition failure. Fuel flows had been nominal; oxidizer flows had been nominal. Ignition had occurred on contact—hypergolics never failed. Thrust had been below minimum—cause undetermined. The engine had sputtered and the computer had shut it down.

The Mars Launch Vehicle was canted, but apparently intact. The engine’s feeble thrust had lifted it off its cradle; abort had dropped it back at an odd angle. In Earth’s gravity, the fall probably would have skewered the thin hull, but Mars was gentler. They were losing pressure, but slowly. A few duct tape patches should be enough to reach MOM and their ride home—if he could get the engine started.

A chorus of "What the Hell?" and "Oh, shit!" erupted from the technical types behind him. He couldn't ignore them. A rebellious computer was trouble enough; he didn't need a panic on his hands. He had a mission to fly.

"The engine misfired and shut down," he announced in his best pilot's voice. He wasn't telling anybody anything they didn't already know. They were a professional crew trained and cross-trained in every aspect of the mission. A little confidence would help maintain calm—even if he had to fake it. "I have the computer optimizing the parameters for the next shot window," he lied. "It's eighty-seven minutes yet—plenty of time for the big machines back home to get the data and crunch it." The murmuring faded.

The hourglass icon on his screen mocked him. With an obscene number of gigahertz and terabytes, what could the damn thing be doing with itself? Was it hung in some sort of infinite loop? *Didn't anybody test software any more?* Eighty-six minutes left, he had no choice; he had to reboot the thing. He pulled the apple menu down, squeezed his eyes shut and clicked.

The machine chimed obedience and faded to black. Wolf hoped no one was watching over his shoulder—but what else was there to look at? The thing flashed to life. Messages streamed across the screen. It was doing its housework—checking twelve terabytes for corruption. "Come on, already," Wolf muttered, his clenched hands ready to strangle the thing.

"What's that?" a low voice drawled behind him.

Oh shit, *busted*. He should have known he couldn't put one past Donner. Colonel Zeb Donner talked like an Alabama plowboy and walked like one too, but his Auburn PhD and full professorship said otherwise.

"We're having a little problem with—"

"What? Where?" a soprano voice asked. That would be Norma Cross, the chief astrobiologist and the only woman on the mission.

"Outside!" Wolf heard Zeb answer. "It looks like smog."

"Oh, never mind," Wolf muttered and returned to his computer. The hourglass cursor had disappeared. The thing had finally finished its self-examination. Next, he knew it would run through its full checklist of system status parameters. A blur of text streamed up the screen; it was somewhere in the b's. Eighty-two minutes left and the damn thing was counting band-aids and batteries–his hands clawed the air, urging it on. "Come on, already!"

"I think I see it," he heard Norma say. "It does look like a summer afternoon in Beijing where the trees are gray ghosts and the brown-yellow haze swallows the mountains. What is that stuff?"

"I don't know," Zeb answered. "It's nothing we've seen here on Mars before."

The computer paused and flashed a warning. "Fuel at 90% of capacity". Eighty-one minutes left. Wolf clicked the radio button icon to acknowledge.

"Oh, come on! How could you not recognize it?" another voice from the back chimed in. It was Luther Queen, the mission's so-called chemist. No one had seen the need for a high school chemistry teacher on Mars, but Queen was politically connected. His uncle chaired the Senate Finance Committee, so here he was.

"And what is your expert opinion?" Zeb snapped back. Wolf had watched the tension between the two of them grow since day one. Queen had introduced himself at the team kick off meeting as *Doctor Queen*. Zeb had said he'd be damned if

he'd call anybody from Pissant State Teachers' College *Doctor*.

"It's smog. We've soiled the planet's environment."

"Yeah! Did you figure we were going to levitate into orbit, Doctor?" Zeb almost spit his vacuous title at him.

"Of course not, but we were supposed to leave nothing but nitrogen and steam. That's smog out there."

The computer had worked its way down to the m's. NASA had named every gismo more mission-specific than a screwdriver Mars Excursion this or Mars Lander that. The m's would take a while. The computer didn't need him. Wolf looked up from his console at the yellow-brown cloud swirling outside the windshield. *Blastoff must have kicked up a lot of dust*.

"Wait a minute," Norma shouted to be heard over the din of the two men talking at each other. "He's got a point."

The decibel level dropped. "What?" Zeb said.

Queen gloated, "See!" Wolf could feel the Cheshire cat grin in Luther's tone.

"His thinking may be a bit off," Norma said, "but he may have stumbled onto something."

"I doubt that."

"No, Zeb, he's got a point. The engine is supposed to produce nitrogen and water, not smog."

"What's the big deal about a little smog?"

"That brown cloud looks like nitrogen oxide, the stuff that brings tears to your eyes in New Delhi."

"So?"

"So, that's our oxidizer—and it looks like quite a bit of it out there. Have we sprung a leak? The crash must have ruptured the tank. Where else could it have come from?"

Norma raised her voice, "Hey Wolf! Are we losing nitrous?"

“I don’t know, let me check.”

Seventy-three minutes left and the computer was still working its way through the m’s. *Get on with it.* "Report oxidizer tank parameters," Wolf interrupted the preflight survey.

"Oxidizer at 78% of capacity" flashed on the screen. Conditions were nominal; tank temperature and pressure were steady.

“Oxidizer is marginal,” Wolf announced, “but the tank looks solid.” The computer picked up its survey where it had left off. The crew picked up their arguments where they had left off. Wolf gazed out his window and watched precious oxidizer fade into the Martian atmosphere. The manual said eighty percent. Would seventy-eight be enough?

***

Wolf’s console beeped. MOM was orbiting overhead looking for them. They weren’t where they were supposed to be, so she was paging them. He’d call and tell her they’d be late as soon as the computer was free. Right now, it was hung up with the message "Oxidizer at 78% of capacity" blinking on the screen. Sixty-eight minutes left. Wolf acknowledged the warning and clicked the icon to proceed. Come on already.

The blur of data resumed as the computer picked up its inventory in the o’s. Wolf stared at the screen. Nothing to do but wait.

Just into the p’s, the radio crackled. “Mars, this is Houston. We copy you have a problem. Please elaborate while headquarters computers analyze the data transmitted from your launch computer. Over.”

“Houston, this is Mars Base," Wolf radioed back, "We experienced flame out on launch.” *Now, that was a waste of photons*. Their supercomputers would tell them that ten

minutes before his voice message reached them. “Dropped back in the saddle with zero casualties and minor structural damage. We’re canted a few degrees off-bubble, but still within the design envelope. Planning to launch to meet MOM on her next pass in sixty-four minutes. Over.”

Wolf stared blurry-eyed at the data streaming across his screen and waited. Nothing happened.

“Mars, this is Houston,” the call rang in his ears. Wolf glanced at the screen. The computer had reached the z’s—zero-g this and zero-g that. Forty-six minutes to launch—too soon to be a reply to his last message. Signals took twenty-four minutes—twelve to get there and then twelve more to get back—even longer if somebody actually thought before answering.

“Suggest you prepare to stand down,” Houston's call continued. “The computers are having trouble interpreting your data. One model says your engine parameters are dead-on; the other says they’re a factor of two off. Staff on-site is looking into the problem.”

One hell of a time to be debugging your software.

“We’re rousting the day staff out of bed. It’s four in the morning here. We suggest you stand down until they get in and get their arms around the problem. Over.”

Wolf turned to Zeb Donner. “You’re the Commander,” he said. It was a plea.

“You’re the pilot,” Zeb answered. “Reckon it’s your call.”

“We still have a chance at this shot window. If we miss it, the next one is a tough angle on the dark side—out of radio contact with earth. I’d rather not, but earthrise tomorrow will be too late. I’d keep prepping for this one, until you tell me to stop.”

Zeb nodded.

Wolf switched his microphone to transmit. “Roger, Houston, we read you. We are awaiting updated launch parameters while proceeding toward departure in forty-five minutes.”

His computer had completed preflight checking. "Fuel at 90% of capacity" the screen said. The next two lines flashed yellow, "Oxidizer at 78%" and "Cabin pressure dropping." Nothing he could do about the first two: they weren’t going to get any better. The leaks could be fixed. “We developed a minor air leak,” he announced to the crew. “Please look around you and duct tape any cracks you find.”

Wolf bent over his computer ignoring the hubbub around him. Let them scurry about patching little holes. It would keep them off his back while he prepared for takeoff. He had a mission to fly.

He had a reason to go home—a hero’s welcome. Zeb was the mission commander, but the pilot was the public’s hero. It had taken rock-star popularity to win him the lead pilot’s seat on this first expedition to Mars. His publicist had made him a legend. *If you ain’t cheating, you ain’t trying*. Blue Angels lead pilot and tinkerer with a dozen patents on gizmos built in his garage, the media had proclaimed. Only he could fly the Zeus capsule and fix it too. When he flew the thing home, there would be ticker tape parades and dinners at the White House and groupies … lots and lots of groupies. He’d earned it all.

Thirty-eight minutes to go and Wolf was busy with his prelaunch checklist. “Mars, this is Houston,” the radio interrupted. “Glad to hear everybody survived the crash and the MLV is flyable.

“Headquarters computers are having trouble with the data Mars computers sent. We’re working your problem, and

the day shift is on the way in. Stand by; we'll let you know what we find out. Over."

Oh great, we're waiting for a committee decision. Committees are worse than computers.

"Thank you Houston," Wolf answered. "This is Mars One on schedule for launch in thirty-eight minutes. Keep us advised on your progress. Over."

No time to wait for a gaggle of geeks back home, Wolf had a mission to fly. With the oxidizer marginal, it would be tricky. He would have loved to offload some of the deadwood: a tonne of rocks and a hundred kilos of Luther Queen would be a good start. Lighter would be better, but there wasn't time. Besides somebody back at headquarters would probably bitch about the rocks. Wolf bent over the keyboard to recheck his flight plan. The tanks would be empty when they got to MOM. Was there a lower energy trajectory that left him some slack for maneuvering?

"Mars, this is Houston," the radio interrupted again. "The software engineers are here now. They'd like you to retransmit the MLV status data. Over."

Wolf looked at the screen clock. *You're a day late and a dollar short.* "We're go for launch in twenty-two minutes, Houston. We'll be long gone by the time you can get back to us on the data. Over."

Twenty-two minutes—it would be tight.

Fourteen minutes—it looked good for launch. "Mars, this is Houston," the radio interrupted again. "Our people are coming in now. Everybody is working on the cause for your flameout. We advise you to hold your countdown. Over."

Wolf looked over at Zeb and shook his head. "We don't have enough juice to catch MOM if we don't hit this window dead on."

Zeb nodded.

"Houston, this is Colonel Donner. Our launch window to Earth is closing. We're about to lose the light and radio contact with Earth. Unless we receive revised launch instructions in the next thirteen minutes, we have to launch. Over."

Zeb looked over at Wolf. "Go for it, son."

"Thanks," Wolf said as he turned back to the flight console.

Two minutes to go. Wolf turned the launch firing sequence over to the computer. "Take your seats, ladies and gentlemen," he announced. "This is it."

One last look out his window at the hillbilly hovel that had been home for eight months. Deflated igloos stretched beyond the launch rocket's long shadow. Beyond them, a ring of solar collectors glistened in the sun's fading light. The Ledge, the Sphinx, and a dozen other rock formations he'd explored with Zeb Donner vanished into the twilight. In a hundred years, this place would be a National Park, Wolf knew—a place people wanted to go. Right now, he just wanted to go home.

Lights dimmed, pumps rumbled. The computer was switching things on and off. Launch in thirty seconds. The engine roared. The whole bus trembled, then inched up.

"Abort," a voice on the loud speaker commanded.

Wolf reached for the kill switch. Too late. The engine coughed and died. The launch vehicle hesitated, and fell back with a crunch.

CHAPTER 2

"Champagne at four in the morning, what a colossally stupid idea", Jade Lee thought. "By half-past, every one of them will be acting like he just won the Super Bowl single-handedly." Her team had given Mars the *go for launch* half an hour ago. Their bird was in the air; the champagne was on ice. The day shift would monitor the rendezvous with MOM; their job was done. Nobody watching the controls—the graveyard engineering staff milled about the control room awaiting confirmation of their accomplishment. A few had started celebrating early.

"Earth, we have a problem!" the squawk box screamed.

The control room froze—dead quiet.

Data lit up a hundred monitors as the sea of balding heads and ponytails surged into place. Jade surveyed the floor below her crow's nest office. Gray heads bobbed behind nearly every station; a few were conspicuously empty. Those must have slipped out early.

"Where's Papa?" she yelled to her assistant.

"I don't know," Abby Rosen answered.

A holdover from the Return to the Moon staff, James Grove was from another generation, and everyone called him *Papa*. He wore a white shirt and tie to work, and spoke dead languages like Java and C++. If launch had a problem, it was

probably with the legacy code. For that, Jade needed Papa. She needed Papa now. “Find him,” Jade demanded.

“What have we got so far?” she polled the crew.

“Engineering, this is flight. They’re still on the ground.”

Jade muted her mike. “And tell security to get the day shift in here, now,” she yelled after the assistant on her way to find Papa.

“Engineering, this is propulsion.”

“Go, propulsion,” she said.

“Engineering, I’m getting anomalous readings on propellant consumption. Fuel and oxidizer consumption are way out of whack—looks like a factor of two or three to me.”

“Why?”

“Don’t know yet, engineering. Might be a leak or a clogged fuel line. More likely, a computer glitch.”

Reports of normal systems and nominal parameters poured in.

Where the hell is Papa?

Abby returned. “Papa’s not around,” she reported. “Security said he and Zera Zlotlow signed out a half hour ago. I called his home, and told his wife to send him back as soon as he gets there.”

“Thanks,” she said. “Call him on his cell phone. —Oh, never mind, I’ll do it.”

His phone rang five times before he answered. “Papa, this is Jade. Get back in here; they’ve got trouble.”

“I’m on my way.”

“Thanks,” she said. “And tell Zera to put her pants on and get back here with you.” Senior aeronautical engineer and fantasy of half the night shift, Zera Zlotlow was built like a missile—tall and sleek. She and Papa seemed more than coworkers lately.

"It's nothing like that," Papa answered.

"Whatever," she said, "the two of you just get back here ASAP. And don't figure on going home anytime soon."

***

"Take that with you," Papa told Zera. "We've got to go." He took a long swallow of coffee, laid ten dollars on the counter and walked out.

Zera picked up her half-eaten donut and followed him. "What was that all about?"

"That was Jade. There's trouble up there," he answered as they got into the car.

"What kind of trouble?"

"Don't know—don't think she does either—but it's enough to drag us back in."

"What do you think?"

Papa checked the clock on the dashboard, added twelve minutes for message transmission, and twelve more for bureaucratic inertia. "Some kind of launch failure, I imagine. It's too early to be anything else."

Four in the morning—no one on the road except cops and drunks. Papa pulled onto the empty highway and floored it. He backed off on the gas when his radar detector beeped. Sometimes slow was the fastest way.

"I hope they're all right," Zera said.

"Some of them must have survived," he assured her, "otherwise we wouldn't have to be rushing to the rescue. Besides, the brass would be too busy covering their asses to bother with us technical types."

Papa flashed his identification and skated through the gate without stopping. He grabbed the closest parking place, and raced into the building with Zera close behind. Inside, the din of a thousand whispers filled the air. Mainframe computers

scrolled highlights across the big board. A sea of heads hunched over an armada of consoles consuming the details.

"Glad you two could join us," Jade said.

"What's up?" Papa asked.

"We don't know. Apparently, they're still on the ground. A lot of propellant is gone, so they must have tried to launch. Propulsion thinks the numbers look funny."

"Funny? What do you mean funny?"

"Don't know yet. Propulsion thinks it's a computer screw up."

"They always do," Papa said as he turned and walked away. "I'll check it."

"Oh, by the way," Jade called after him. "Abby called your house looking for you. You might want to call your wife and let her know you're all right."

"Thanks. I owe you one." He had work to do. He'd get to that when he had a minute.

Papa's screen flashed, "NMOP: detected propellant ratio error" when he woke it. NMOP, the NASA Mars Operation Profile, was the government master plan for the Mars expedition. From initial crew training to the final landing at Edwards Air Force Base, the entire mission had been reduced to equations and loaded into Houston's mainframe computers. It was the authority on absolutely everything. If it said there was a problem, there was a problem. He'd start there.

The Details button unleashed a flood of numbers. He scrolled down to the line highlighted in red. "Hydrazine flow 45±5%" of requirement, it read.

"Houston, this is Mars Base, we experienced flame out on launch…" Papa half-listened to the radio traffic between Control and Mars. He knew that would be consistent with a hydrazine fault.

Papa pulled up the Mars Flight Simulator analysis of the flight data and paged down to the engine performance results. *Let's see what the other code had to say about it*. Hardware and software suppliers had provided detailed performance models of their Mars Mission components; NASA had integrated them into the detail-oriented simulation, the ugly stepchild of the NASA master plan program. "Thrust 45%. Automatic shutdown", the headline said. "Hydrazine flow nominal," the details said. The suppliers' version found nothing out of range—everything had performed as contracted

"Engineering, this is modeling," he called Jade, "we've got a problem with the codes."

"Go ahead, modeling."

"The analyses disagree. Ask them to stand down while I dig into the differences?

"Roger, modeling, we will advise."

What had gone wrong up there? More important, how do they fix it? He had forty-five minutes to give them the answers or they'd miss their shot window. First, find out which analysis was right. The answer had to be hidden in the source code.

Papa entered his password to the archives. He scrolled down to the h's; none of the *hydrazine* objects looked promising. Next the p's—the list of pumps was endless. He'd try the f's. The link to *Fuel pump, MLV* looked promising. He opened it. It just looked up data generated elsewhere and passed it on. He'd have to track backwards through the program.

"Mars, this is Houston. Suggest you prepare to stand down," Papa heard Control's message to the Mars crew. "The computers are having trouble interpreting your data. One model says your engine parameters are dead-on; the other says

they're a factor of two off. Staff on-site is looking into the problem."

"At least somebody listened," Papa thought and returned to slogging through code and tables left over from who-knew-when. He knew why they called these the *bowels*. Nothing leapt off the screen at him. Time was wasting.

"Roger, Houston," he heard the astronauts reply over the speaker, "we read you. We are awaiting updated launch parameters while proceeding toward departure in forty-five minutes."

Forty-five minutes—that left him twenty-one to find the answer: forty-five less the twelve the question had taken to get there, and the twelve it would take the answer to return.

He was getting nowhere with NASA's master plan; maybe he'd have better luck with the contractor's code. He typed in his password and worked his way down to its *Fuel pump, MLV* module. The message "Proprietary data, no source code supplied," answered his click. *Shit!*

He hit speed dial for Abby Rosen. Jade's assistant struck the fear of God into everyone from the Director to the janitor. When you needed something now and didn't care how you got it, you called Abby. Eight people sitting on Mars needed him to know what was in that code.

"Abby, find the turkey who built the MLV fuel pump and get him on the phone for me."

"It's four o'clock in the morning, Papa."

"Then try him at home first."

"Thank you Houston," the squawk box drowned her response. "This is Mars One on schedule for launch in thirty-eight minutes. Keep us advised on your progress. Over."

Thirty-eight minutes, that left him fourteen. Even Abby's miracles took time—time he didn't have. He'd have to load the executable module into his machine and read what he

could from the core image. He translated hexadecimal numbers and scrawled their base-ten values on the back of an old memo. Not the same numbers he'd seen in the master plan; none of them rang a bell at first. *Sixty-two point four sounds familiar. What the hell is sixty-two point four?*" Papa shook his head. *Oh shit, nobody's that dumb anymore. Are they?*

He speed dialed Control. "Patch me through to the MLV."

"Are you authorized?"

"Yes, damn it. Hurry."

"I'll have to verify that, sir. It will only take a minute."

"They don't have a minute," Papa yelled into a dead phone line.

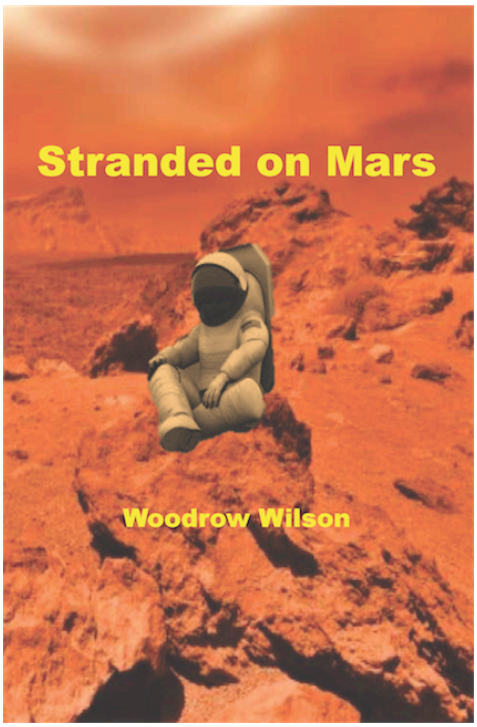
He switched lines and redialed. "Put me through to them now."

"You don't need to be rude. We have procedures, you know," the operator answered.

"Yes, I see you are authorized," she continued. "Go ahead, please."

Papa heard a tone on the line, then silence. He hoped that meant he was connected.

"Abort," he screamed into his microphone. "We've found your problem, and the fix is straightforward. The fuel pump is calibrated in pounds; the controller works in kilograms. Just recalibrate it, and you should be good to go. We're dragging the manufacturer out of bed, and should have confirmation for you before we lose contact. Over."



Stranded on Mars, a hundred million miles from home. Rescue is months or more away. Can the astronauts survive with winter coming? Rescue mission or body recovery? NASA engineers work around the clock searching for ways to keep the Mars crew alive until help arrives.

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