WALKING ON MARS
A JOURNEY TO THE RED PLANET

DAVID GATESBURY
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To Matthew
A special thanks to NASA for supplying the satellite photos for this work.
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Introduction

The United States has placed people on the moon and brought them home safely six times. Our shuttle program introduced space vehicles capable of launching from Earth and returning home for performing more space missions. We have sent probes and satellites to other worlds. There is no other country that can match these accomplishments, yet at this time, our endeavors in space exploration seem to have stalled. If we are to remain a technologically advanced leader of nations, we must invest in our space program and continue challenging ourselves. This is the pioneer spirit that made our country what it is today.

As soon as ancient man was able to think, he looked up to the heavens at the wondrous moon, stars, and planets. Where would man be without his dreams? What makes the idea of sending people to planet Mars so tantalizing is not only the fact that it is our closest neighbor in the solar system, but that this is a place that once had a surface quite similar to Earth’s. Science has provided proof that the red planet once held surface water, lakes and streams, and perhaps great oceans. Since life takes hold in water first, there may have been vast jungles and an array of plant life.

How far did Mars go in supporting life before it changed into a desolate, lifeless planet? Does microscopic life still exist there today? I’d say there is a high probability that microbial life does exist there: There are traces of water beneath the surface; there’s ice at the poles; and atmospheric conditions could support this type of life form. There’s also a strong chance these microbes could be a threat to humans, for anything that can exist in Mars’ poisonous atmosphere can potentially be a danger.

Technology continues to progress, and today we are able to send a manned spacecraft to Mars. However, what limits us are
those things needed to sustain the space travelers so they can survive the trip and return home. I don’t know whether mankind will make it to Mars in my lifetime or not, for there are so many challenges to consider and prepare for, but I’d like to think that it will happen. When that time comes, I’m sure we’ll make some amazing and fantastic discoveries that will impact our world for generations to come. It would be pure ignorance to believe that Earth is the only place in the universe where life can be found. When we contact intelligent life or find proof that intelligent life once existed elsewhere, it will change our lives forever.
The year was 2037, and Stan Rhodes was captain of *Endurance III*, an aerodynamically designed, ninety-ton, V-shaped spacecraft traveling through outer space on the last leg of a 56-million-kilometer trip to reach planet Mars. An American of English, Irish, German, and Cherokee Indian heritage, Rhodes was a Navy captain and test pilot who flew jets from aircraft carriers. For six months, he’d commanded his crew of four in this self-contained vessel.

Rhodes occupied the middle seat of three spanning a broad instrument panel, and sitting to his right was Flavio Muret, a youthful Frenchman acting as second in command. In training exercises, under the most difficult circumstances, technicians watching Rhodes’ body sensor readings said the sound of Muret’s coolheaded voice had a calming effect on him. Suave and charismatic with dark, wavy hair, Muret gained favorable fanfare when competing for a spot on the Mars mission, distinguishing himself nicely. A member of the European Astronaut Corps, he spent six months aboard the International Space Station. When earthbound, Muret indulged his passion for skiing and was a mountain guide in the Alps near his home in Grenoble, France.

Far Hai Win, a petite female of Asian descent, sat to Rhodes’ left. Born in Hong Kong and educated in the United States, she became an American citizen less than a year ago. Although every crew member received a crash course in medical training, Far was an M.D. and, having acquired the most extensive scientific training for the mission, held the rank of Science and Medical Director.
The next two seats staggered behind the first three completed a W formation, and seated behind and between Far and Rhodes was Jetha Karashan, an intelligent Indian-Pakistani. Jetha spent most of her adult life in London, where she received her education, and like Muret, she was a member of the European Space Agency. Although everyone aboard had some education in geology, she was the most qualified and had a great interest in history and archeology. Possessing a friendly nature, she had the most mysterious eyes, beautiful, golden-brown skin, and a healthy, voluptuous figure.

In keeping with the international composition of the crew, the last member of the team was a Russian cosmonaut named Aleksei Dimitri Polzinov. Occupying the chair behind and between Rhodes and Muret, Polzinov was a reserved man with rugged features, as well as the oldest of the crew at age forty. Like Rhodes, he kept his hair in a crew cut. A man of few words, he spoke with a slight accent. When holding rank as captain in the Russian Air Force, he complained to his commanding officers about inadequacies regarding safety equipment in the training of young cadets. As a result, his superiors reprimanded him in classical fashion, forcing him to undergo a punishing training course designed to break a person’s mental and physical being, but he proved himself a resilient individual by completing and withstanding their exhaustive demands.

Even though there wasn’t a raised deck at the nose of the ship, the seating area was still designated the bridge, and each chair had its own computer and monitor. Maintaining and overseeing the ship’s status was a powerful computer that responded to commands whenever a crew member used the name Abe, a name that caught on fast with the scientists who programmed it. The unit communicated verbally using a male voice with the temperament of a studious assistant.

Caution held back the Mars mission for years. What helped turn interplanetary space travel into reality was the creation of the gravity simulator, which produced forty percent of Earth’s gravity. Abe activated a pulsing pull of electromagnetic waves that in turn created a magnetic field encompassing the floor.
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throughout most of the ship. There’d been various ideas thought up to compensate for weightlessness in space, but this technological leap transformed the design of a long-distance manned spacecraft by reducing some of the logistical challenges. Without some form of gravity, humans can suffer severe muscle atrophy, a 50-percent loss of muscle strength, and a reduction in bone mass.

The enormity and complexity of the Mars mission evolved at different stages as science and technology made advancements. Planning a trip to Mars demanded rockets with the capacity to deliver more thrust, and aerospace engineers developed a powerful, fuel-efficient nuclear thermal rocket engine that supplied those needs. Mission planners scratched a plan for a manned module to orbit Mars, as success in logistics relied primarily on vitally needed supplies going to those making the critical landing. Astronauts needed a backup ship in case the spaceship they landed in had technical problems that prevented liftoff when they were ready to return home, so planners decided instead to land an emergency ascent vehicle.

The plan actually involved deploying two ships to land on Mars before a ship carrying humans launched, and first to land was Endurance I, a bell-shaped emergency ascent vehicle that had two floors. This ship carried enough supplies for a trip home, but it would remain untouched during the travelers’ stay on Mars. The emergency ascent vehicle ran on conventional rocket fuel, and over the next eighteen months, it would produce its own liquid fuel from Mars’ atmosphere for a return flight. If this transport vehicle wasn’t needed, it would stand ready for use by explorers on future missions. The second to land was Endurance II, a cargo ship and nothing more, and it landed about seven kilometers southwest from the emergency vehicle.

Two ships transported the supplies necessary to sustain a crew of five for a minimum of thirty months. Endurance III carried provisions for the trip to Mars and for a portion of the time spent on the red planet. Endurance II, the cargo ship, served to replenish them after they’d landed, but it also carried hardware and equipment, including the Mars Roving Vehicle (MRV).
Although these two ships had an identical body design, similar to that of an airplane, Endurance II didn’t have a nuclear-powered rocket engine, nor did it have a nuclear power reactor. Both spacecraft relied on powerful rocket propulsion to make them airborne and provide flight control, using a revolutionary form of vector thrust to hover for vertical landings and a level descent.

The crew had recently fallen under Mars’ gravitational pull and were checking coordinates through the main computer and the navigation and guidance system to track their progression for converging with the red planet. They could see Mars off in the distance to their right, often stopping to study its glow in the dark twilight of outer space.

The trip had gone smoothly thus far, and after making routine system checks through the computer, Rhodes unbuckled his safety belt and excused himself to take a short break. He hadn’t moved far from the bridge when something rocked the ship. Rhodes became airborne, thrown against a wall before landing on the floor. Trying to get up, he became airborne again! Slammed onto the floor, he recovered quickly, but after getting tossed in the air once more, his head crashed into the floor.

Fearful his ship was coming apart, he gathered his dazed senses and tried making it back to his seat. Jetha extended her hand to him from her seated position, and catching hold of it, he pulled himself forward to his seat.

Chaos reigned: Lights flashed, alarms and buzzers screamed, and Rhodes stared wide-eyed at the instrument panel with a confused look on his face. After the initial quake, the ship continued to vibrate, and Rhodes was afraid that something onboard had exploded or that perhaps a meteor had struck the ship. They heard a loud pop, and sparks flew from a console on the port side. A second burst of sparks was unsettling, but they had to stay in their seats and endure the shaky ride.

Watching dashboard data changing, Rhodes couldn’t be sure if the cabin pressure and oxygen levels were holding, nor could he get a fix on flight conditions to check the status of primary and backup systems. He said in a loud voice, “Abe, if you’re still with us, shut off warning lights and silence alarms.”
The lights shut off, the alarms silenced, and Far turned to Rhodes. “What do you think happened?”

“I don’t know. Right now I just want to make certain cabin pressure and oxygen readings are holding.”

The ship was still shaking violently. The vibration seemed to worsen and then peak before calming, and then the scenario was repeated.

“Abe, what can you tell me about the condition of this spacecraft?”

“The ship has undergone an abrupt change in course, resulting in a displacement of instrumentation, and data is changing as it is being recalled and rechecked. However, there are no fire indications onboard.”

Flavio pointed into space. “We can no longer see Mars, but look how the star Regulus in the constellation Leo appears to be rotating in an odd way. That’s a sign the ship is in a tumbling barrel roll.”

Rhodes saw Regulus rotating clockwise. “We’ve had a course change, and we’re in an unstable flight path. My best guess is that something struck the ship, probably a meteor or some space debris. While it’s possible something onboard exploded, the computer should’ve reported pressure changes as they occurred through sensors.”

Aleksei said, “You would think a collision with a meteor would’ve destroyed this ship. Even if it were pea-size, it would’ve breached the ship’s skin and the computer would’ve reported pressure changes.”

The next time the vibration settled down, Rhodes grabbed a fire extinguisher and rushed to the panel where he’d seen sparks fly, ready to put out an electrical fire. Removing a panel but seeing no immediate risk of fire, he resisted activating the fire extinguisher. Faint smoke rose out of a box containing delicate computerized components. Realizing the panel covered the communications box, he was concerned they may have lost their ability to trade information with Earth.

It took a short time for data to reach fixed numbers, and they were relieved to see atmospheric conditions inside the ship were
holding. All the vital readings for survivability—cabin pressure, oxygen, and water supply—looked stable, and Rhodes’ next concern was for the ship’s course and what had jarred the ship in the first place.

“I want to keep an eye on these readings to see if there are any changes, but in the meantime I want you to split into pairs to inspect the ship and report anything out of the ordinary. Check the cabin, the cargo bay, and maintenance junctions on the starboard and port sides of the ship, and be thorough.”

Jetha and Far linked up to survey the ship, and Aleksei went with Flavio, and when they returned they had nothing to report outside of the recurring wobble shaking the ship.

“I want all of you strapped in your seats, and we’ll discuss the situation. While you were gone, I tried contacting Earth but didn’t have any success, and I’m concerned we may not be able to restore communications. However, I’m certain technicians are aware we have problems through telemetry readouts they’re receiving.

“In addition, I ran computer programs to determine the ship’s location with regard to the timetable for catching up to Mars. Judging by data I’ve seen, the guidance computer is malfunctioning. Alignment updates and telemetry readouts aren’t making any sense; the numbers are jumping around. At first, I thought it’s because we’re off course, but that’s not it. As long as those navigation coordinates are plagued with inaccurate readouts, we’ve got problems correcting our course. In our training sessions working with computers, when we ran into an outlandish fluctuation in data, we had to shut down the computer and then restart it. It’s just a guess, but the computer has probably gone into overload, and that’s why we’re not getting corresponding data.”

“I agree,” said Jetha as she studied the numbers. “The guidance computer’s probably been in a type of emergency mode ever since our trajectory changed, and these readings are fallout resulting from that course change.”

“It may be that the system is still computing information,” stated Flavio. “We can’t risk shutting down the guidance com-
puter. What if we can’t power it up again? That computer must be operating when we enter the Martian atmosphere to track the location of the first two unmanned ships that landed ahead of us on Mars. This isn’t a vehicle we can land manually. To power down the computer at this stage may cause it to lose critical data. I don’t want the controlled tracking and landing procedures to malfunction at the very moment we’re preparing to land on Mars’ surface. If we shut it down and it won’t boot up, we’ll have to abort the mission, so my suggestion is to give it more time to stabilize.”

Aleksei spoke up. “We cannot attempt a landing with the guidance computer feeding distortions. We may land hundreds or perhaps thousands of kilometers off from our targeted landing site.”

Rhodes nodded, taking a moment to think. “The main computer oversees navigation and guidance system coordinates. Listen while I ask Abe to advise us.” He raised his voice slightly and said, “Abe, the guidance computer is not reading the data fed into it correctly. Seeing how it’s not computing information accurately, we’re considering a power-down to allow it to recalibrate itself. Do you find that advisable, or can you make those corrections?”

Abe responded, “The guidance and navigation system is on overload at this time. Data fed into this system is correct, but as the computer tabulates and unscrambles it, I’m reading distortions.”

“If the guidance computer becomes unreliable, can you take over its functions?”

“No, I cannot, not for a long-term duration, and I am not able to interfere with the landing procedure, as my ability to override navigation and guidance functions is limited. Shutting down the navigation system and restarting it may allow it to tabulate the information correctly, but I urge you not to give the system any complicated commands for a short time after the restart. A few minutes should afford it time to reset and reprogram; otherwise, the computer may go into overload again. Shutting down the guidance computer will result in the loss of critical electric
power. For the length of the shutdown period, you will barely have adequate power to run the ship, but your desk computers and their monitors will still work.”

“While the guidance computer is off, do you have the ability and the data required to aid us in correcting our course?”

“Yes, a shutdown will not hinder my ability to perform this function, but you will have to power the ship manually to correct your trajectory. There will be sufficient energy to start rocket engines and thrusters to make a burn to correct the ship’s course. By correcting the ship’s course during this shutdown period, you’ll take strain off the navigation and guidance computer that could otherwise throw it into another failure. I’ve concluded it’s the ship’s wobble throwing off this computer’s ability to navigate, channel, and conduct our course. Directional finders cannot lay down a fixed trajectory, thus creating distortions in data.”

Flavio’s eyes squinted as he said, “Power the ship manually. . . . Don’t tell me we’re going to correct our course by navigating by the stars with a slide rule, doing calculations, conversions, and rudimentary computations.” Rhodes shook his head no. “The main computer’s going to do all of that for us.”

Then Aleksei said, “How do we work that process? Will the computer give verbal commands on how to steer the ship to correct our flight path?”

“No, we use computer graphics to optically align our flight path, but first, we’ll shut off the navigation and guidance computer. As soon as the main computer has made corrections in plotting our course of trajectory and we’ve performed the maneuver, we’ll power up the navigation system and let it reprogram itself to take over again. I’m relying on this rocket burn not only to straighten out our flight path, but also to take us out of this tumbling wobble while smoothing out any other gyrations and myriad problems the ship has. After correcting our course in this manner, the navigation system’s work should be made easy.”

“Of course,” said Far, catching on to the plan. “I remember doing something like that in flight class. This will be one of the rare times this ship will be flown manually.”
“That’s why the captain is the captain,” Jetha remarked optimistically.

“Now I don’t see that we have any choice but to shut down the navigation and guidance computer,” said Rhodes. When no response came, Rhodes gave Abe the order to shut it down. A warning light indicator for the navigation system brightened before shutting off, and then some of the other lights dimmed, including cabin lights, giving him an eerie feeling.

The ship began to shake and shudder. Rhodes was breaking the rules, as the crew was supposed to be fully suited and wearing helmets when performing this procedure. “Flavio, prepare to fire up the engines and, after I give you the signal, start a countdown from ten.”

After coordinating a short system check between Far and Flavio, there was quiet, and then Rhodes brought up a computer graphics program on his monitor for initiating manual guidance of the ship. His monitor screen turned a bright shade of blue, and a pulsating tunnel appeared by way of white, throbbing, arched lines that kept blinking in a recurring inward fashion. Adjusting the steering column by pulling it up and toward him, he shifted the steering wheel until it fell into a comfortable, locked position. He then threw switches to establish manual control of the ship. An image in the shape of a plane took center on a level line on the monitor, and he controlled the little plane with the steering wheel. Turning the wheel slightly to the right and left tipped its short wings to one side and then the other. This would also influence change in the tunneling effect too. Rhodes then addressed Flavio, “Ready for countdown to begin.”

Flavio responded, “Ten, nine, eight, seven, six, five, four, three, two, one, ignition,” and with the flip of a switch at his fingertip, the engines fired.

Placing his hand on the power lever, Rhodes slowly moved it forward. The firing thrusters made the ship lurch forward with a burst of speed. The shake and shimmy of the ship worsened as power increased and symptoms persisted, but soon engine thrust and speed delivered a smooth, stabilizing motion while propelling them through space. As he manipulated the spacecraft, he
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watched the computer-generated imagery as the plane shifted within the dancing, pulsating lines. The plane tilted from right to left as he steered to center it and level it off. In executing the maneuver, he coaxed the ship one way and then the other while steadying it to alter their course. The pulsating arched lines slowed to indicate the ship was closing in on its true flight path, and after the lines locked to hold steady, he’d successfully redirected their trajectory for Mars.

Believing they were back on track and had straightened out their trajectory, they could see Mars in the distance again. Rhodes eased back on the power lever and said, “Engine power stop.” With the ship cruising smoothly, he no longer sensed any vibrations, and flipping a few switches to take the ship off manual control, he then adjusted the steering wheel into a downward position. He last addressed the computer, saying very plainly, “Abe, as soon as you think it’s safe to power up the navigation and guidance computer, do so.”

Easing back in his seat, he remarked, “Let’s just sit tight till the navigation and guidance computer resets itself.” A short time later, the computer made a chattering sound, the light indicator for the navigation and guidance system came on, and he heard sighs of relief.

After waiting a few minutes, Rhodes ran computer program files to ensure the guidance computer was in control of the ship, and leaning back in his chair, he reviewed the information. The navigation and guidance system was actively receiving tracking from range finders, assimilating data to calculate their position.

“Before doing anything else, let’s make certain the guidance computer readouts are accurate and confirm that data through the main computer. We accomplished a lot getting this ship back on course, and with a little luck, the trip will go smoother from here on, but we’re not out of the woods yet. We still have a communications breakdown, and when we orbit Mars later, we’ll have to inspect the ship’s heat shield before considering a landing.”

The crew spent hours checking systems and making repairs, and when Rhodes inspected the electrical box, a blackened area revealed that they had nearly had an electrical fire. Replacing two
bad circuit breakers, he noticed that the breaker that gave power to communications kept kicking off. Sensitive elements burned up inside the box kept triggering the breaker. Rhodes knew receiving stations on Earth constantly disseminated telemetry data with a seven-minute delay while actively receiving tracking from range finders for calculating their position. However, mission planners would be concerned about losing contact with their ship, and as much as Rhodes hoped to soon overcome these system failures, there looked to be little chance of reinstating communications with Earth.