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RENDEZVOUS SQUARED

by

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Charlie was seething. Six months ago, his instincts told him signing up for this mission would be a mistake, yet here he was.

He should have been elated. Not only was this his first time in space, but it was also the maiden flight of a new class of spacecraft. The ship, christened Vargas, was in a 240-mile equatorial orbit in the earth's exosphere, circumnavigating the globe every 89 minutes.

Vargas' ultra-slim, cigar-shaped configuration housed two compartments, the larger payload module and the smaller command cabin. It represented a radical departure from previous NASA launch vehicles. The ship had been launched from an EMF magnetic cannon using a

massive pulse of magnetic energy, akin to firing a thin metallic toothpick out of a rifle barrel. Because Vargas did not require fuel to achieve orbit, its payload was significantly larger than payloads of previous orbital vehicles. This greater payload was a requirement for the proposed space hanger in which the first interplanetary spacecraft would be assembled.

The view from orbit was awesome: the gracefully curving horizon of the blue-green earth, sparsely tufted with wispy cotton clouds. Planet Earth was set against a gossamer black curtain of space randomly dusted with trillions of star points.

Yet Charlie couldn't experience any of this beauty, because his spacecraft had no windows. Vargas had been designed without viewing ports in order to withstand the high-velocity and instantaneous g-forces necessitated by a magnetic pulse launch. However, this lack of viewports was not the focus of his anger.

As Vargas hurtled silently through space at twenty times the speed of sound, something else was eating away at Charlie. Shortly after launch he realized certain aspects of the mission had been withheld from him. How could the ship's complement of two souls be expected to make joint mission decisions if one of them lacked critical data?

Charlie felt betrayed. Still, he accepted the importance of this mission and begrudgingly completed his assigned tasks. He served as the navigator/mission specialist, and his station was located in the aft section of the command cabin.

As he scanned the navigation displays, the primary illumination inside the command module emanated from the cobalt shimmer of the instrumentation clusters. Except for a low hum—accompanied by a faint murmur from the bowels of the spacecraft and punctuated by musty wisps of petroleum-laced glycol coolant—it was almost as quiet within the spacecraft as it was without.

Liz, his counterpart, served as aircraft commander. Her station was in the forward section

of the command cabin, with no line-of-sight to Charlie's station. In fact, there was not even an interconnecting passageway. So even though a distance of only twenty feet separated them, their solitary link to each other was through the spacecraft communications and data bus.

The radio crackled, "Vargas, this is Houston CAPCOM. You copy?"

Charlie keyed transmit mode, "Houston, this is Vargas. Go."

"Comm Desk reports Esmovoir proceeding within nominal parameters. Also be advised Astronautics detected a three-centimeter piece of space trash headed your way. It faded out before velocity verified, so probably just space dust echo. Recommend you check it out further."

Charlie responded curtly, "We'll add it to our list, Houston. Out."

Liz switched the com link to private so Houston could not monitor their conversation.

While back at Houston Center, CAPCOM had barely released his mike switch before the barrage began.

"Damn it, CAPCOM!" bellowed the Mission Flight Director. "Being assigned the primary communications slot for this mission does not give you a license to screw up."

"Sorry, Flight," CAPCOM replied meekly. "Esmovoir was on my status sheet, and I blew it. Now they've gone private, and we'll lose their response."

"No, we won't," Flight responded harshly, chewing on the stub of his cigar.

Back in orbit, Liz was perturbed. "Charlie, why are you sulking?"

"I am annoyed," Charlie responded, "because portions of the mission-critical info were withheld from me. During boost-to-orbit burn you called out additional parameters I knew nothing about."

"Now hold on, Liz countered. "I was given the mission-based parameters, and you were given different navigation-based parameters. Together, we have all the critical data."

"That's just great," Charlie replied. "If one of us becomes incapacitated, the mission fails

because the survivor doesn't have all the stats."

Liz was becoming irritated. "Pipe down, partner. This is not a vendetta against you. This mission needs both of us to succeed. End of story."

"Yeah, right," Charlie countered, "So what's Esmovoir all about?"

An astonished Liz responded, "You don't know either?"

Liz switched com out of private and keyed the transmit mode. "Houston, this is Vargas. Transmit latest data on Esmovoir."

"Vargas, Project Esmovoir is classified," Houston responded.

"Houston," Liz shot back, "If it involves our mission, we have a right to know."

"Negative, Vargas. Houston out."

Now Liz was fuming, although Charlie's anger had abated.

"Stop stewing about Esmovoir, Liz. We've got a mission to look after."

Charlie felt a sense of relief. Something was being withheld from both of them. At least he wasn't being treated as second fiddle. But then he hadn't told Liz what else was eating away at him.

Charlie's musings were interrupted by a change in the background noise level within the spacecraft. The low background hum was now punctuated with a periodic hissing indicative of a high-rate data stream, except Charlie couldn't detect any data transmission. He had no way of knowing it was Esmovoir at work.

"Liz, did you copy that?" Charlie asked.

"Could be a transmitted data-burst," Liz suggested. "What's its source?"

"Don't know," Charlie responded. "It's not emanating from the command cabin."

"Keep monitoring it, Charlie. Maybe it's part of Houston's super-secret project. Speaking of Mission Control, can you confirm the unidentified space junk they mentioned?"

Charlie switched on the forward-looking radar and scanned the data. “No sign of the phantom space dust.”

But a few seconds away, the tiny piece of space junk was no phantom. In its previous life it had been a 7/8-inch hex nut securing one of the original gyroscopes to the Hubble space telescope. Now it was on a collision course with Vargas. Their combined rate of closure was twice the muzzle velocity of a 45-caliber bullet.

When it collided with the spacecraft, the minuscule meteorite tore through the outer shroud amidships, aft of the command cabin. The only sound inside the command cabin was a bell-like ‘ting,’ followed by a brief metallic ricochet, after which the hex nut, flattened beyond recognition, came to rest next to a torn thruster rivet.

Propellant status alarms sounded as pressure in the number-three aft thruster spiked, then fell. The stern of the spacecraft began a slow fishtail arc, reacting to the hydrazine plume venting into space from the ailing thruster.

“Status, Charlie?” Liz queried.

“Pressure falling,” he responded. “Recommend closing propellant master valve to number-three aft thruster.”

“Do it,” she ordered.

“Roger. Propellant valve closed,” Charlie shot back. “Pressure appears stabilized. We lost ten percent of our reserves. We’re still within safety guidelines for completion of a nominal mission.”

“Stellar job, Charlie,” Liz retorted. “At least we’re still in one piece.”

“That was no particle of space dust.” Charlie observed.

“Roger that, Charlie. I’ll get us straightened out again.” Liz disabled the autostabilizer and began manually compensating with the remaining two aft thrusters. After a series of

precision maneuvers, the oscillations slowed to an imperceptible murmur.

“Propellant pressure now, Charlie?”

“All indicators back in the green and holding steady,” he responded.

After checking her flight manual, Liz suggested “Looks like we can compensate with manual guidance. Let’s open our re-entry protocol checklists.”

If they could have seen the thruster, they would not have been so complacent. The nozzle was shattered. Two of its mounting rivets had been pulled out of the skin of the spacecraft, causing a six-centimeter-long tear in the surface.

Charlie started reviewing his re-entry checklist.

The tentative silence was shattered by a transmission.

“Vargas, This is Houston. Orbit de-insertion in 40 minutes.”

“Charlie,” Liz mused over the intercom, “ever wonder who dreams up words like de-insertion?”

Between his disquiet and the pressures of re-entry, Charlie was no longer in a mood for idle chat. “Liz, we’re entering final orbit. Parametric data on the new heat-shield design still looks good. Current mission lapsed time is T plus five hours, 14 minutes. Re-entry protocol to commence at T plus five hours, 54 minutes.”

“Roger that,” Liz responded, “We’re right on target. Let’s stand down and relax for a few minutes.”

Although Charlie was bothered because he was keeping something from her, he was also relieved to be momentarily distracted from the rigors of the mission. His mode of personal relaxation was unusual. He turned his attention from critical mission activities to skimming through NASA space flight history logs in the flight computer. Prior to being selected for his first space mission, he had spent much of his spare time devouring the minutia of early space

missions.

He recalled a section that amused him.

“Liz,” he pondered, “Looking at us now, it’s astonishing how far we’ve progressed since those early Project Mercury flights.”

“Aside from the growth in spacecraft size,” Liz responded, “Back then Mission Control handled all the crises from the ground, while today we have final responsibility on-board for mission-critical decisions.”

“Remember the re-entry crisis with the first fully-orbital Mercury mission?” Charlie mused. “The world thought the heat shield had jettisoned and expected the capsule would burn up during re-entry—”

Liz interrupted, “And it turned out the culprit was the astronaut’s urine leaking into the cabin from a faulty waste connector, floating throughout the cabin in tiny weightless bubbles. The force of re-entry smashed the salty spheres into the control panel and shorted out the circuit indicators.”

“After splashdown,” Charlie recalled, “when the Navy Seals blew the hatch, the capsule smelled like an outhouse. At least we don’t need to worry about that anymore.”

Charlie momentarily switched com to private. “By the way, Liz, I looked up Esmovoir. No mention of the project itself, but the word is from an old French dialect and means ‘to excite’.”

An audible caution alert from the secondary power bus jolted them back to the present. Liz reset the breaker, and the anomaly vanished. Although it proved to be a false alarm, the sudden urgency of the alarm quashed their musings. Their attention returned to re-entry preparations. Houston had fallen curiously silent.

During the brief lull, Charlie’s thoughts no longer focused on the hazards of space dust.

He continued to focus on the unfamiliar feeling still gnawing at him. Should he tell her now? As he reviewed the checklist, he decided the time was not right.

Vargas received an updated telemetry packet transmission from Mission Control. Charlie analyzed the data and computed their precise re-entry coordinates, an invisible window in space over the middle of the Pacific Ocean.

“Data looking good. Thanks, Houston.” Then Charlie added dryly, “By the way, any more data on Esmovoir?”

Houston did not respond.

At Vargas’ present velocity, precise penetration of the re-entry window at the correct velocity, altitude, and attitude would be akin to threading a needle. However, in this case the eye of the needle would be stationary with the thread moving at 22,000 feet per second. The margin for error was miniscule. If their approach was too shallow, they risked ricocheting into the black void of space from which there would be no return. If it was too steep, they would join earth’s meteorite club. Neither alternative was particularly appealing.

“Shake a leg, Charlie. It’s time to earn our pay. Give me the data for our mooning maneuver.”

“Roger,” Charlie replied. He completed the calculations while envisioning the gradual end-for-end rotation of the cylindrical Vargas, thus enabling it to re-enter the atmosphere in a stern-forward position. Then he transferred the maneuver commands to her console.

Both of them were immersed in procedures to verify the data and the validity of their calculations. There was no room for miscalculation. Then it was time.

“Charlie, begin rotating on my mark...Mark!”

“Transition initiated,” Charlie responded.

Slowly the sleek cylinder began to pitch its nose away from earth and the plane of orbit,

continuing a gradual, semi-circular rotation until the stern of the capsule faced forward.

During the rotation maneuver, there was no time for idle conversation. The orbital thrusters now operated in reverse. It was like trying to steer a car while driving backwards—at many times the speed of sound. Constant, precise corrections were needed to stabilize roll, pitch, and yaw vector changes generated by the maneuver. These were exceptionally tricky with the aft (now forward) number-three thruster knocked out.

After ten minutes the orbital re-configuration was finally stabilized, and the pre-reentry workload eased to a trickle.

As work tensions abated, Charlie sensed something extraordinary was happening, both to the spacecraft and to them. Was this the right time? How much should he tell her? He was still groping with those thoughts when Liz spoke excitedly.

“Wow, Charlie, this is the moment!” Liz exclaimed. “As long as the new ablative heat shield on the stern of the payload module does its job, we’re home free. Just think of the impact on future space missions if we can bring this baby home safely!”

Charlie pondered for a moment. “And think of the impact on us if it doesn’t.”

Liz again switched com to private. She was exasperated. “Charlie, this is no time for another funk. What the hell is bothering you now?”

Charlie knew it was now or never. He steeled himself to the task and apprehensively struggled for the right words. “Liz, I...I...I can’t ignore this. I feel our relationship has changed. We’ve been on ground duty together for a long time. We’ve worked well together as a professional team. Now we’re in this perilous situation, and I find myself thinking about us rather than about the mission. In case something happens, I want you to know I care about you, Liz. I hope you feel the same about me.”

There was a long, uncomfortable silence.

Charlie's thoughts churned nervously, *Damn it, I should have kept quiet.*

Finally Liz responded. "Charlie, we're both professionals, and this mission is our first priority. Yet I admit I've also been suppressing my fondness for you. However, I'm not sure how to work through these feelings, let alone what or when the next step should be."

"Stop sounding like an operations manual," Charlie griped. "You don't need to be 'sure,' and there's nothing to 'work through.' Do you want to spend time together beyond the confines of this spacecraft or not?"

"Charlie, we're both used to following orders and executing commands. So I admit my feelings toward you scare me. I've tried to ignore them, but I can't."

"Me neither," Charlie admitted, "How ironic a rendezvous with space junk leads to a rendezvous of the heart, but at a time when we can't do anything about it."

What followed was an awkward hush, mercifully interrupted by a spacecraft tremor. Before they could determine its cause, the quivering subsided, and telemetry indicated nominal conditions.

"Liz, now that we've—"

Suddenly there was a faint snap. The spacecraft began to pitch and yaw violently.

"Status, Charlie?"

Charlie analyzed the telemetry and quickly reviewed a summary of the spacecraft design parameters, while Liz hastily adjusted the thrust vectors attempting to quell the violent oscillations but to no avail.

Charlie's response was slow in coming.

"It doesn't look good, Liz."

"O.K., Charlie, give me the situation."

Before he could reply, Houston broke its silence.

“What’s happening up there, Vargas?”

Charlie retorted, “Hold on, Houston.”

He switched com to private.

“Liz, when NASA engineers conducted their stability analysis for our new spacecraft in inverted mode for re-entry, they didn’t consider a scenario where one of the stabilizing thruster nozzles might break off.”

“Come on, Charlie, we just lost a thrust vector nozzle. Now how can we compensate?”

“Liz, we can’t. With number-three aft gone, it’s like trying to balance a camera on a tripod with one of the legs missing. To make matters worse, the thruster apparently took a hunk of our outer-hull skin with it. The hole and its torn skin flap are creating variable drag.”

The vibrations increased in amplitude and were punctuated with brief, but severe, structural convulsions.

“Recommendations, Charlie?”

Charlie responded, “Right now, let’s get this ship turned around so we can stabilize Vargas again.”

“Roger that, Charlie. Give me the command sequence.”

As the ship again slowly recovered its bow-forward attitude, the severity of the shuddering lessened, gradually tapering off to a random quivering.

While Liz focused on keeping the ship stabilized, Charlie keyed transmit mode.

“Houston, this is Vargas. The good news is we’re in one piece. The bad news is we have a gaping hole where our number-three aft thruster used to be. Our options are limited. We cannot achieve successful reentry.”

“Vargas, can we help?”

“You can tell us about Esmovoir.”

“No can do.”

“Vargas out.” Charlie keyed off the transmit switch. Then he switched com to private again.

Liz spoke up. “Charlie, what’s your take on our options?”

He answered, “Either leave orbit and head into space until life-support gives out, or try for the re-entry window in this configuration with no ablative heat shield forward, in which case the re-entry corona will incinerate us.”

“I don’t like those alternatives,” Liz said. “Let’s try thinking out of the box.”

”Maybe we could jettison the payload module and attempt re-entry with just the command cabin,” Charlie suggested. “No, scratch that; there’s no heat shield on the command cabin.”

“What about using the magnetic ranging maser in our nose-cone?” Liz proposed.

“How would that help?” Charlie asked. “It just pulses on and off periodically.”

“But suppose we re-configured it to operate continuously at full power,” Liz explained, “Its magnetic pulse just might force the re-entry corona forward from the nose of the spacecraft. Sure, it would overheat, but it might last long enough to reduce friction and heat to survivable levels.”

“The operative word in your theory is ‘might’,” Charlie countered. “There’s also another possibility.”

“What do you have in mind?” Liz questioned.

“If we make a slight adjustment to our flight parametrics,” Charlie explained, “we can change our 300-mile circular orbit into an elliptical orbit with an apogee of 57,000 miles from earth.”

Charlie transferred the new flight path data to her data buffer.

“What will that solve?” Liz demanded.

“It would allow us more time together before we incinerate,” Charlie clarified.

“Charlie, our mission is to stretch the limits of this new hull design in terms of thermodynamic stress, not additional time. With NASA’s new guidelines, you know we are considered expendable. Our experience here could save lives of future space travelers and advance known orbital science by a quantum leap.”

“Sorry, Liz, it was just a thought. The only option with any chance to test the limits of the new design and get our ship home is your nose-position reentry scenario using the magnetic maser.”

Liz agreed. “Work up the data.”

“Will do,” Charlie answered.

“And, Charlie, once we make it through the launch window and the corona starts forming around the nose of Vargas, our work is done. We’ll reserve that time for each other.”

“Roger that,” Charlie shot back. In the midst of all the chaos, a wave of elation swept over him as he realized they both cared for each other.

Liz switched com to transmit/receive mode again.

“Houston, Vargas. How do you read?”

“Five by five, Vargas, go ahead.”

“We are attempting a nose-foreword re-entry and reconfiguring the nose maser to force the corona forward.”

“Roger, Vargas. Wait one.”

Charlie mused, *Wait for what?*

Liz toggled com back to private.

“We make a pretty good team, Charlie.”

“Yep,” Charlie agreed. “We may get Vargas through this mission yet.”

”No,” Liz responded softly, “I meant personally.”

“Yes, we do, Liz. It’s about time you got that right.”

He wanted to embrace her, but he couldn’t. Charlie cleared his thoughts and struggled to complete his calculations, while Liz tweaked the rate of the yaw gyro stabilizer.

As the nose of the ship penetrated the coordinates of the reentry window, mild buffeting began as earth’s atmosphere began to reassert its effect on the supersonic silver sliver’s flight arc into the thermosphere.

Liz hit her transmit switch. “Vargas, Houston. We—”

Magnetic interference abruptly killed the airborne signal.

So much for Houston’s cheerleading, Charlie thought.

The first fringes of the electro-magnetic corona began to form around the nose of the craft. It was propagated by the sudden encounter of the molecules of earth’s relatively stationary atmosphere with the supersonic bow of their swift silver spacecraft. Liz switched on the magnetic maser and adjusted it for maximum power. The corona slowly migrated forward of the nose a few centimeters. It seemed to be enough.

The ceramic skin of the spacecraft had been bonded together by molecular boramite, the strongest adhesive known to mankind. It could easily withstand the aerodynamic forces on the smooth surface of Vargas, but not those on the loose skin flap left by the wrenching action of the departed thrust vector nozzle. As the gash from the thruster’s destroyed mount deteriorated, the coolant lines for the magnetic maser became exposed to the battering turbulence and began to leak into the thermosphere.

“Liz, the nose coolant pressure is dropping.”

“I know,” Liz agreed. “We’re losing the maser.”

As the maser's intensity diminished, the ship's corona transformed into a dancing yellow-red funeral shroud engulfing the entire ship. Gradually the corona settled back to the spacecraft nose. It began to glow with a deep red hue.

Temperature alarms sounded as the dull red glow spread further down the skin like an advancing cancer. The outer hull of the spacecraft gradually rose to 6,000°F, and the cabin temperature started its slow inexorable rise to meet that of the skin. Acrid fumes from charred hydrocarbons filled the doomed spacecraft.

Charlie and Liz lay subdued in the cabin, their thoughts no longer on the doomed ship but instead upon each other.

“Liz, I don't want us to die. Not when we've just found each other.”

I know, Charlie. Yet somehow, I believe we won't die. We will live on through our memories. They must survive.”

The aircraft glow changed to yellow as the skin temperature rose further. The temperature in the cabin was rapidly rising to meet the inferno outside.

“If this moment had to be, Liz, I'm glad we found the courage to share our feelings before it was too late.”

Liz felt pride in him. “Charlie, you're right, but then you usually are.”

Charlie knew how much he cherished her. “I love you, Liz. I want to be with you forever.”

“I love you, too, Charlie, and we will be.”

###

Two thirty-something computer scientists stood together on a lonely, dark stretch of

Galveston Bay beach, looking skyward to the south following the sunset. A warm sea breeze caressed their faces with a fine, salt-spray mist. A white-hot, molten, man-made meteor of metal and ceramic was leaving its widening arc across the deepening red and orange hues of the evening Texas sky.

She turned to him. “With that planned collision, NASA will declare Project Esmovoir a technical success, but do you suppose some type of true bonding really passed between them?” she asked.

“I don’t know. I’d like to think it did. After all, we worked damn hard to transfer our feeling pattern matrices into their pattern buffers. It’s the first time computers have ever been able to communicate between each other with feelings and emotion as part of their operating language.”

She sighed. “But we also gave them our shortcomings and fears. That was bound to add a confusing element.”

He turned to her. “If we can sort through ours as humans, they should have been able to do the same as computers. We’ll know for sure if the on-board communications buffers survive the Roche limit.

She felt pride in him.

“Charlie, you’re right, but then you usually are.”

Charlie knew how much he cherished her.

“I love you, Liz. I want to be with you forever.”

“I love you, too, Charlie, and we will be,” she whispered through tears.

As they continued to watch the heavens, her hand found his. Their fingers eagerly intertwined.

