

If done soon enough, the smallest diversion can save the world--or change a life.

Diversion Program

by

Robert Dawson



Like a cat at a mouse hole, Major “Zig” Washington watched the UNS *Beowulf*’s drone control board.

Ninety-nine point nine five six percent.

He ignored the straps that held him into his chair, the

murmurs of his two equally-absorbed crewmates, and the drops of sweat that clung to his face and slowly grew, with no gravity to guide them away.

He raised his eyes to the viewport, completely filled by the irregular ball of rock that was the asteroid 1384756 Grendel. *Beowulf's* orbit took ninety minutes in the asteroid's weak gravitational field; Grendel was at half phase now, but more and more of the sunlit side was becoming visible as *Beowulf* drifted past the terminator. Ninety minutes for the asteroid to go through its phases from fully lit, to dark, to lit again. *Ten kilometers across, big enough to smash all Earth back to the Stone Age if we don't change its course. Only twelve kilometers away. But we still ain't orbiting around it fast enough to earn us a speeding ticket in a school zone. Heck, I could run faster than this!* He smiled at his reflection in the heavy glass, his dark skin almost invisible against the inky black of outer space. *From Seventeenth Street to saving the world. You proud of me yet, Mama?*

The duster drones had sprayed most of the surface with crossing lines of a dull metallic shimmer, as if the rock had been wrapped carelessly in a narrow ribbon of tarnished silver. The retroreflective dust directed most of the light that hit it straight back towards the Sun, like an outfielder returning a ball to home plate. From any other direction, the sheen was subdued, like the gleam of a gun

barrel. Zig's eyes dropped back to the display: *ninety-nine point nine seven two percent*. One hundred percent represented target coverage.

Grendel was a carbonaceous asteroid, the most common type, charcoal-grey. Astronomers had first spotted it on its last visit to the inner Solar System, seven years ago. When it was found to be an Apollo asteroid, with an orbit crossing that of Earth, they had set a computer to track it, and predict its future trajectory. The result had been so shocking that they had run the problem again, many times.

There was no doubt; the gravity of Jupiter and the gentle pressure of sunlight had, over millennia, warped the asteroid's orbit into one that would result in a catastrophic collision with Earth in twenty-three years. They had named it Grendel then, and studied ways of diverting it. Rocket motors or atomic bombs would give only a brief push. They settled on retroreflective paint; by directing sunlight back in the direction it came from, it would almost double the light pressure. The extra push would be tiny but continuous: enough, over two decades, to move Grendel into an orbit that would miss Earth by a safe margin. Target coverage, the amount of paint

needed to make this happen, was about eighty percent of the asteroid's surface. There were still irregular black polygons of bare rock between the silver ribbons.

"Almost done, Commander!" Zig said.

Commander Alina Golubova, ever graceful in free fall, appeared at his right shoulder. She reached smoothly for the grab bar on the side of his instrument panel, held it, and balanced there one-handed, swaying slowly like a plant in an aquarium. The only civilian member of the crew, Dr. Lily Zhang, a physicist specializing in orbit mechanics, hauled herself in on the other side but overshot; her shoulder bumped Zig's cheek.

"Oh! I'm sorry, Major!" She grasped the back of his chair with her other hand to stabilize herself.

"S okay, Doc." He resumed his impassive scrutiny of the counter.

On the night side, a pale blue jet of plasma broke the utter blackness, as one of the *Beowulf*'s duster drones adjusted its lazy hill-skimming orbit. Wherever the sun was about to rise on Grendel, that was the drones' workplace. There the electrostatic charge from the solar wind was greatest, enough to make the beads spread out and cling to the rock in a uniform coating. So the drones

worked tirelessly in the predawn darkness like blind painters, spraying the beads onto the surface. As the asteroid's rotation brought the beads into the daylight, the sun's heat would fuse them permanently in place. The beads, specially engineered for this mission, cost two thousand dollars a kilogram. *Must be about the most expensive spray paint ever.*

Ninety-nine point nine nine three. C'mon mama! You can do it! Ninety-nine point nine nine eight. The glowing numbers turned from red to green. *One hundred!* He pounded his fist on the edge of the panel; his body bounced gently against his seat straps. "Commander! We have target coverage!"

"Roger, Major. Please confirm your report."

"Yes, ma'am. Retroreflective bead coverage of the asteroid Grendel is at, ah, one hundred point zero zero two percent of target value, ma'am."

"Thank you, Major." She tapped him on the shoulder, and motioned with her hand for him to turn and face the camera. "Mission Control, this is Alina Golubova, commanding the UNS *Beowulf*. At 0327 Standard Time, February 21, 2064..."

Zig smiled at the unnecessary formality. The Commander was talking for the history books. This one was going to be right up there with “One small step...”.

“...the total coverage of retroreflective particles on the asteroid Grendel reached the target level. I repeat, we have achieved target coverage; the diversion mission has succeeded. Over and breaking for eight minutes.” She switched off the video feed. In four minutes the broadcast would preempt every newsfeed on Earth, but it would be four more before Mission Control’s response could reach them. Eight minutes of much-needed down time for the crew.

“Boo-yah!” Zig shouted, and punched the air.

Zhang started at the shout, then grinned. “Yes! We did it!” She pulled herself into a quick A-frame embrace with Zig, bodies almost at right angles, then did the same with Golubova.

Zig unstrapped, let himself drift free of the drone command chair, stretched as only the weightless can stretch, and wiped his face with his sleeve. *Is this what saving the world usually feels like?* he wondered. *Man, who would I even ask? Superman?*

“Nice work, Major!” said Golubova. She put her hand on his right shoulder and clapped him on the left, bracing so as not to put them both into a spin. “You can shut the drones off now.”

“With respect, Commander, there are still some gaps. And we have plenty of dust left. Unless you want to save it for something?” He waved at the display.

“It is not necessary to spread more. That is correct, Dr. Zhang?”

“Yes, the plan already includes a twenty percent margin of error. Grendel will definitely miss Earth.” She smiled wryly. “But, as Confucius puts it, ‘Wherever you go, go with all your heart.’”

“What Zhang’s saying, Commander, is you don’t fly back to base with unexpended ammunition. No half stepping.”

Zhang nodded. “Exactly. It can’t hurt. It really can’t.”

Golubova chuckled. “Very well. Major, you may continue deploying the drones while I start preparations for departure. But we are live again in six minutes; after I speak to Mission Control, the rest of Earth will want to hear from us. Do you perhaps have a deployment script

already on the computer?” She raised one neatly-plucked eyebrow.

“It just so happens that I do, ma’am.”

The Commander shook her head. “Why am I not surprised? Well, start it up.”



Commander Golubova had made her detailed report. Mission Control had shown them brief newsclips of cheering crowds in New York, Paris, and St. Peter’s Square. The interviews--live answers to prerecorded questions--were over for now, and the video link was off again. Zig looked at the viewport: Grendel was completely full, the gleaming silver spread across its face. A small, soft-edged, but dazzling disc of light surrounded *Beowulf’s* shadow.

“Hey, peep this, peeps!” he said. “The glory’s back!”

The others turned to look. “It is very bright now,” said Golubova.

“The brighter, the better,” said Zhang. “That means the retroreflection’s effective. That’s what’s really going to make this work.”

“Yes,” said Golubova. “Though I still find it counterintuitive that all that is needed to put this asteroid onto a safe course is a layer of shiny paint. I am an old-fashioned Newtonian cosmonaut. I want to see fire behind my jets!”

Privately, Zig agreed: there was something spooky about light pressure. But he was glad the Commander had been the one to say it.

“Over twenty-three years, the acceleration will add up,” said Zhang.

“So I should take my car in for a respray and it will go faster?” Golubova asked.

“You bet, Commander,” said Zig, and grinned. “Specially if you’re still driving that Lada Elektron beater. You’d get five miles more per hour, easy, just from covering up the rust.”

“You are crazy, Zig,” Golubova said, and tapped her temple. “*Choknutyy!*”

“Chock nutty? That’s what my wife says, too.”

“Anyhow, it works,” said Zhang, firmly. “We make the surface retroreflective, and the acceleration almost doubles.”

“Hey, you know--maybe that’s why white folks get ahead so much easier in this world,” said Zig. “Photon pressure.” He chuckled.

Golubova’s laugh was slightly awkward. Zhang was silent.

Eventually Golubova spoke. “You have not done so badly, Zig.”

“No, I guess I haven’t. Just a moment.” A line of numbers was blinking amber on the screen; he touched a few keys and the numbers vanished. “Drone C wants a course correction. Probably went too close to that high-density area near the pole. Hope the computer knows what it’s doing, because I for sure don’t. Anyhow, like I was saying, for a kid who started in a street gang, I guess I’ve done okay.”

For several seconds there was silence.

“You were in a street gang?” Golubova finally asked. “You mean, criminals? *Khuligani*?”

“Yeah. The Seventeenth Street Boyz. Mostly just baby gangsters. There were a few dudes who figured they were hardcore, but most of us didn’t do much beyond stealing stuff and selling a bit of dope.”

“Why did you do that?” asked Zhang.

“Self-defense. Mostly. You join a gang, you get a pass. Nobody trips on you, nobody beefs with your family. I don’t know if I can explain to you just how it felt, coming home from school, to cross Twenty-First, see our ‘17’ tags on the walls, and know I was in my own hood. I was safe.”

“I think I understand, yes. But how’d you--get here?” Zhang asked.

“You mean, how come I ain’t dead or in jail? Well, I came pretty close to both of those. See, the price of keeping our hood our own was, sometimes we had to fight for it. If another gang came and wrote their tags over ours, that was a way of dissing us, and if we let the tags stay up, we’d lose the turf. So one day we saw a bunch of Diablo tags sprayed over ours, over by the fire hall, and that night we went out to throw ours up again. And while we were writing, some Diablo assclowns came up outta the cut, caught us off guard, and started peeling caps. Two of my homies got offed, and I got winged. Then when the cops turned up, the Diablos got away, and I was the one who got caught. And I was strapped--had a gun, I mean. I hadn’t even had a chance to pull it, but I was in big trouble anyhow.”

“Isn’t having a gun a basic human right in America?”

“Yeah, sure, Doc. Not if you’re underage and the gun’s hot, it ain’t: I was looking at five years. But my mother spoke to the minister, and he talked to a couple of my school teachers, and they all wrote to the judge, and I got into a youth diversion program. Had to get my gang tattoo lasered, and do community service with a food bank for a year. My folks sent me to live with Aunt Jametta, in Boston. And she got me to join the Air Cadets--and here I am today, saving the world. With the capable help of you ladies, of course.”

“You had to leave home?” said Golubova. “That was hard.”

“Yeah. The court didn’t order that, but I couldn’t stay. Some of the other Seventeens were pretty mad at me--you don’t just leave a gang, knamean? And, anyhow, I didn’t fit in anymore. That hurt. I know we did some pretty wack stuff, but that was where I learned about being part of a team. Looking out for your homies. Stuff like that. The Air Force just had to put the polish on.”

“I understand,” Golubova said, quietly. Zhang was silent.



The Commander's voice was crisp. "All personnel should now be at stations for acceleration. Please confirm."

She's two meters away. She wants to see where we are, she can just turn her head, thought Zig. *But you don't get old in this job by cutting corners.* "Jet control board manned, ma'am."

"On station," said Zhang, at the astrogation board. They checked coordinates and accelerations for one last time. Finally Golubova seemed satisfied.

"*Beowulf* to Mission Control. This is Commander Alina Golubova. I am enabling our scheduled return flight plan. Over." She looked at Zig. "Major, help me enable takeoff." She pressed a red button on her console; he pressed its twin.

The main jets remained silent, awaiting the programmed moment; but on each console, identical red numerals appeared: minus six minutes and fifty-two seconds. The displays began to count down; a soft electronic chime repeated with each vanishing second. The chimes seemed very far apart. Zhang's knuckles were

white on the arms of her seat; Golubova was impassive. For an age they sat in silence.

At minus two minutes, there was a brief hoarse bark from the attitude jets, like a sawn-off shotgun a block away, and Zig's seatback jostled his left buttock and shoulder. The stars began to crawl right-to-left across the viewport, as the *Beowulf* rotated into position for the big burn. *Grendel should be coming into sight real soon now.* Sure enough, a sliver of silver appeared at the right edge of the viewport, filling it second by second. Grendel was nearly full again.

"*Bojemoi!* What is that?" Golubova pointed at the asteroid.

The drones, executing their final script, had filled most of the polygonal voids on the gleaming face of Grendel; but they had left some areas unsprayed, leaving fuzzy irregular black lines across the silver. There, crude but recognizable, was the globe-and-olive-branches of the United Nations; and beside it, in fat bubble characters, the numeral 17.

Zig smiled, a big who-da-man grin. "Like I told you, Commander: that tag always did make me feel safer."

Golubova's response, in rich Russian idiom, was lost in the snarling roar of the main jets.



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