

# PROBLEM

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IN RETROSPECT, the flashlight really should've tipped me off. But I was groggy; what caught my attention was the free-fall.

"Johnny."

I didn't wake up right away; the computerman and I were coming off a thirty-eight-hour hacking session, and the both of us had literally crashed afterwards. This was a very utilitarian boat, though, and the cabin I shared with the computerman was about the size of a piano box; any movement or speaking within it was bound to disturb me. I opened my eyes, and saw the computerman himself shining a flashlight under his chin, casting a ghostly pallor over his face.

"Johnny," he repeated. "You need to get up. We've got work to do."

"Ugh," I grunted. "We fixed the bug." Thirty-eight hours straight; it had been a particularly recalcitrant bug. But we'd found it and fixed it; we were entitled to our rest. But suddenly it hit me, and I noticed that I was floating several inches above my bunk. We were under pretty low acceleration, so I wasn't really accustomed to having significant weight, but we ought to have had enough to keep me from floating. My eyes popped wide open; my training prevented me from trying to sit up suddenly in free-fall, which would have spun me around rather comically. "The power," I said simply. The computerman, Jim Ringman, nodded curtly.

"The power. Get your shirt; we've got work to do."

The power was down. Which meant that *everything* was down, including our algae systems and the computers that took us to where we were going. I reached up and grabbed my uniform jacket, floating in the upper corner of the cabin, and threw it over my shoulders as I spun around and kicked off the wall toward the door. Ringman was well ahead of me.

"The reactor?" I asked him. I wondered briefly if I'd know if anything were wrong with the reactor. Can you *feel* radiation? Was I getting flushed because I was excited, or because gamma particles were deconstituting my internal organs? Ringman just shrugged as he grabbed the roof-bar and swung himself through the hatch and onto the main deck.

"That's Dak's baby." I followed him up to deck. "You and I have to get the box back up." Once on deck, we wasted no further words and swam the fifteen feet to the bridge. The captain was already there, bearing a flashlight and looking concerned.

"Gentlemen," he began, and Ringman held up his hand.

"My mate and I are on it, Captain," he said curtly, and the captain fell silent. It was well-known among spacemen that

computermen are moody and particular creatures, and must be allowed to work in their own way. Ringman knelt down in front of the box while I went to the cabinet and took out the toolbox and two static guards; we had a long and trying task ahead of us.

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Technically, we're not really just computermen; Ringman was the Chief Astrodynamacist, and I was the Astrodynamacist's mate. We're in charge of getting that clunky old boat from point "A" to point "B," and not running into anything else on the way. That means that we're astrodynamacists; we keep track of the motions of all the heavenly objects of any relevance to us, as well as of what we affectionately refer to as our own little rustbucket, making sure that said rustbucket navigates between said heavenly objects safely. But as a practical matter, that means that we run the computers; the equations involved in practical astrodynamics are extremely hairy, and a properly programmed and maintained computer can do them faster and better than we can. So while we're astrodynamacists officially, we're computermen in reality, and most of the time we refer to ourselves as hackers, an ancient title of honor among computer professionals which we apply to ourselves with pride.

And, of course, the engineers call us chairmonkeys, among other less flattering things. But what do those glorified car mechanics know, anyway?

It was my first cruise as a master computerman; I'd done many with my own master, Randy Conner, a hacker of consummate and universally recognized skill, but had never done one as a master in my own right. As the junior computerman, I was Ringman's mate; he was ten years my senior and much more experienced, and I'd already learned quite a bit from him. We were sailing on the N. S. *Pioneer*, going on a deep haul from Earth (specifically L1 Station) to the new colony on Titan.

We'd been in the black for just under twelve weeks; that put us somewhere in the beginnings of the asteroid belt. Mars was in opposition at the time (that is, on the opposite side of the sun from Earth and Saturn), so we hadn't hit port since we'd left L1 Station. No huhu, though; our reactor provided us with power, which kept the box purring smoothly and the algae systems producing our oxygen and food while recycling our wastes. We could stay in space for an indefinite period; the deepest hauls, all the way out to Pluto's orbit, had been known to go two or three years without ever hitting port, with no unusual problems.

But none of them had ever lost power.

Losing power, see, meant that we'd lost our reactor. That in itself wasn't necessarily worrying. See, a meltdown would be so catastrophic an occurrence that spaceside reactors are specifically designed to do only one thing automatically: *shut down*. They're set up, at both hardware and software level, to stop working unless an engineer specifically tells it to do otherwise. It's safer that way; if anything happens such that nobody's taking care of the reactor, it'll just turn off. This may kill the ship, but at least it won't kill everything else nearby, as well.

So the loss of the reactor could just mean that the engineer on watch fell asleep, and the alarms which are supposed to go off when power gets a little low malfunctioned somehow. With Dak at the switch, though, that was pretty unlikely; as irritating as he could be, he was no bagbiter.

On the other hand, it could be something *really bad*. Worst case, of course, was a meltdown; the reactor had gotten so hot that it had fried the power connections to the cabin and was currently pumping out so much radiation that our shields couldn't handle it, and we'd all be dead in a few hours, our hair in our hands and vomiting out our own teeth. Every spaceman had two great fears: eating vacuum and radiation sickness. I swallowed the lump in my throat and tried to focus on the task at hand. Dak would worry about the reactor; I had my own pressing tasks to do.

I handed Ringman the toolbox, which he immediately put on the deck, and one of the static guards, which he started to put on himself. I then reached in and grabbed our battery, so long unused that it was covered in a thick layer of dust. It wasn't hooked up because it wasted space. A nuclear boat just doesn't lose power; that's why it's got a power pile. Still, here we were, having to hook up the battery and reboot the system. It was going to be a long few hours.

I'd booted systems before, believe it or not; in my seven-year apprenticeship, I'd had to do it twice. Both times it was starting up a new computer on a new boat; never had I had to actually work on recovering a failed system. I'd drilled with it repeatedly, of course; computers could be programmed to mimic a system coming up from a cold stop. But it's different the first time you do it for real. Even Ringman, with all his experience, was sweating as much as I was by the time we'd gotten the battery attached and were ready to initiate power-up.

"You ever done this?" I asked him quietly, so as not to let the captain overhear. He was a good captain, but he was no computerman; no need to let him in on such little details. Ringman wiped the sweat from his forehead with the maroon sleeve of his uniform jacket.

"Never for real," he replied. "You?" I shook my head.

"Never." He nodded and took a deep breath.

"Start up the battery." I did so, and he pressed the dusty power button on the face of the box; the fan started up, and the computer began purring into life.

Dak, the chief engineer, burst onto the bridge, his forest-green uniform jacket hanging open and his hair in an incredible

state of disshevelment. "We need the computer," he said urgently. "Is it up yet?" Ringman turned briefly to look at the engineer, then looked back to the box, viewing the self-tests currently scrolling down the screen for anything that should catch his notice.

"Talk to him, Johnny," he told me. "I'm busy." I swallowed and nodded, standing up and turning to the engineer.

"We've got power to the box and we're starting her up," I told him. "She hasn't been booted for twenty years, so we're really not sure how this'll go. We'll let you know when she's back."

Dak had a vein in the middle of his forehead that tended to expand when he got agitated; this agitation generally corresponded to his conversations with computermen. "How are we supposed to get the reactor going again without the computer?" he demanded, as if I should know the answer to that. I shrugged.

"Not my problem," I told him. "The computer's only down because your reactor's broken; keep it running properly in the future and we won't have this problem." Dak's vein looked about ready to explode at this; I glanced over at the terminal and saw that the system was about through with its initial diagnostics, then turned back to the engineer.

"You should have your diagnostic systems back in about ten minutes," I told him. "Your records will take a little longer."

He blustered helplessly for a moment, then stormed back out of the room. I really shouldn't lay on him like that; he's really a good guy, and an incredibly competent engineer. The guy almost doesn't need the computer to work; he can eyeball nuclear physics in his head the way Ringman and I can fiddle bits. And he knows his computers, too; not half as well as we do, of course, but all engineers need to know something about them. But engineers and computermen have to fight, at least aboard ship. It's a professional rivalry almost as old as spaceflight; who am I to defuse it?

The terminal beeped, and I stepped back over to it, looking over Ringman's shoulder. The diagnostics were finished; the hardware was in working order, which meant that Dak's diagnostics should be back online. Ringman smiled.

"Won't Dak be pleased," he said rhetorically. "Johnny, please inform the Chief Engineer that he should have access to his diagnostic hardware again." I glanced over at the captain, who nodded and picked up his intercom; coordinating the departments was really his job.

That was the big relief; all our hardware was intact. The software was a different story. How much the power outage, any surge that might have accompanied it, and plain old-fashioned bit-rot had affected the system still remained to be seen, and would take hours to sort out. Not to mention that much of the changes that had been made to the system for the past two decades would probably have to be started up manually; nobody put anything more than bare necessities into startup routines anymore because boat computers aren't supposed to

need to start up; they're supposed to run continuously, from commissioning to decommissioning, and sometimes longer if necessary.

Ringman and I got to work.

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After about thirty minutes Dak and his apprentice, Peter, came onto the bridge. (Dak had shipped without a real mate; his apprentice was as close as he got on this haul.) Gone was his bluster and the anti-computerman rivalry; his eyes were wide and his face concerned. Peter was totally beyond pale. White folks, like Peter, tend to get pretty wan aboard ship; months without sunlight will do that. But Peter was well past white; far from just having seen a ghost, he looked like he'd been punched in the gut by one.

"Captain," Dak began, "we've isolated the problem." The captain nodded his head and folded his arms; he was floating about halfway between "floor" and "ceiling," which were purely academic concepts in free-fall anyway.

"Excellent, sir," he replied. "When can we expect power to be restored?" Dak swallowed, and as I glanced away from the screen and saw Dak's normally strong and confident face looking so sunken and scared I felt my stomach fall out from under me. Again I wondered: can you *feel* radiation? Should I be expecting my hair to fall out?

"Captain," he said, "the reactor is operating and the shielding is all intact. The power's out because the electrical connection has been physically broken, apparently by some sort of impact." The captain's brow furrowed, and even Ringman turned from his work at the mention of a physical impact.

"Impact?" the captain repeated. "That seems unlikely."

Groundhogs tend to think of space as filled with chunky stuff; asteroids and meteors and comets and moons and planets. But the fact is, space is empty. *Really* empty. Even in the "asteroid belt" one shouldn't expect to see much, if any, rock floating through the void. It's more likely there, of course, but it's still very unlikely. One in a million, maybe; I'd have to ask the computer to be sure. But asteroid belt or not, any significant impact was extremely unlikely. Like getting struck by lightning.

But Dak just nodded his head. "Impact, sir," he said. "We're certain of it. A clear path, about two inches wide, was punched through the reactor chamber from the upper port and exited through the lower starboard." Upper and lower relatively speaking, of course, since there was no gravity. "There's been a loss of pressure in the reactor chamber, and the power connection has been severed within it."

Now Ringman stopped completely and spun around, floating in front of the terminal; I felt a huge lump in my throat and turned around; the captain's jaw dropped. Everyone was silent for a moment; the implications of what the engineer had just told us hit us all like bricks to the face. I suddenly understood why Peter so closely resembled a sheet of steel covered in lithium. Finally, after a moment, the captain spoke, as if thinking through what Dak had told us out loud.

"The power has been severed," he said slowly, "from *within* the reactor chamber?" Dak swallowed again and nodded. I'm not sure how he could still swallow; I didn't have any spit, myself.

"Yes, sir." The captain stared for a moment, again in silence; finally he turned partly toward Ringman and I, not looking at us but speaking to us.

"Mr. Ringman," he asked, "how long will the battery keep up the computer system?" Ringman glanced at the instrument and then shrugged; he seemed the calmest of all of us, and his voice revealed only a hint of anxiety.

"It's rated for twelve hours," he replied, "but it's been sitting idle for years. I wouldn't count on it for more than half that." The captain said nothing, then finally turned his head back to Dak.

"Mr. Mbongo, you said the reactor was still operating properly?" Dak nodded.

"For now, sir. But without the power connection to the main cabin, we have no way of controlling it, or the engines." The captain nodded his own head slowly, silent for at least a full minute. Finally he pushed himself gently back off the ceiling and repositioned himself near the floor, looking around at each of us one by one before he spoke.

"Then we have six hours," he said, "to reattach the power between the reactor chamber and the main cabin. This means that one of us must go behind the shield."

It shouldn't have shocked us; we all knew it was coming. But for some reason it hit us all again the way it had the first time, when Dak had first explained where the problem was.

Then Dak began to protest. "We can't," he said. "My apprentice is too young, and if I went back there the ship would be without an engineer. It's not a practical option."

"It's the only option, isn't it, Mr. Mbongo?" Dak was silent. "I thought so. So someone must do it; the only question is who. The only task necessary is to reattach the power?"

"Well, yes, but you make it sound like it's just putting in a plug," Dak replied. "We're talking about a two-inch-wide cord, and it's *severed*. Whoever goes back there will need a pretty good hand with a soldering gun, and he'll have to be able to use it in a p-suit." The captain nodded.

"Of course. How long would you estimate for the task?"

"At least an hour," Dak replied, "even for a bare-bones repair. Two to get it right, such that we could rely on it until we reach Titan."

Ringman nodded. "And it'll need to last that long," he said. "Rock City, Ceres, and Ganymede just aren't practical stop-off points right now." He was right; they weren't in opposition, but being halfway around the sun and being all the way on the other side isn't practically very different for a boat in the black. We were very much on our own.

"And what are radiation levels in the chamber?" Dak laughed shortly.

"The computer puts it at 150 sieverts, if a man stayed in there for an hour." We all fell silent again. A sievert is 100 rem,

the old unit of radiation dosage. “That means death within forty-eight hours.”

And a miserable death it was, too. Ever seen someone with radiation sickness? When they start puking their guts out, they can’t stand up straight, dizzy all the time, losing their orientation? It’s a mess. Not something I ever wanted to experience.

But *somebody* had to. Somebody, on this boat, within forty-eight hours, would be dead from radiation sickness. It *had* to be, or we’d all just keep careening in the general direction of Saturn, our heat slowly dissipating into the black, our oxygen running out as our algae died for lack of sunlight and warmth, until we choked to death on our own carbon dioxide. Space is big, there were no ships around, and we were weeks away from any port. *Somebody* was going to die horribly, and soon. But who should it be?

Impulsively, I realized that it had to be me. We had only one engineer; the captain couldn’t work a soldering gun with his bare hands, much less in a pressure suit; and we only needed one computerman. I was the only surplus here. I didn’t want to think it over too quickly, or I’d probably lose my guts; I pushed off the floor with my toe and stopped myself on the table the captain was steadying himself on, in front of Dak.

“I’ll go,” I told him, regretting it even as I said it. “Where’s the p-suit?”

Dak stared at me, then shook his head. “No way,” he said. “That reactor is *my* baby. If anybody’s killing himself for her, it’s going to be me.”

“Mr. Mbongo,” the captain said, stepping around to face us both, “you’re the only master engineer on this ship. Sacrificing you is not an option.”

“Damn it, it’s *my* reactor,” Dak insisted. “I’ve been working on power piles for twenty-five years. I’ve always known this might happen. It’s my duty.”

“A moment ago,” the captain observed, “you agreed that you couldn’t be sacrificed.” Dak cursed loudly and pounded on the table.

“I was trying to avoid it,” he stated. “But if it has to be done, it has to be me. It’s my duty. It’s my *right*, damn it.” He waved an angry hand in my direction. “I’ll give the boy credit for guts, but he’s not an engineer. He hasn’t taken the oath, he’s not part of the brotherhood. This job’s *mine*, by duty and by right.”

Then Peter pushed forward, floating in the middle of our group and pushing down, steadying himself on the floor. The boy was obviously terrified almost beyond words; his lips flapped ineffectually for a moment before his vocal chords finally caught, and he was able to speak.

“I’m an engineer,” he said. “I’ll do it.”

“You’re seventeen years old,” Dak responded. “No.”

“You’re right, Mr. Mbongo,” the captain said, “that this is properly an engineer’s job. But Mr. Riche is also right that you cannot be sacrificed. Peter”—as an apprentice, Peter wasn’t a “Mr.”—“is an engineer, and the ship can function without him. I’m afraid it must be him.”

“You son of a bitch,” Dak shouted at the captain, and I involuntarily winced; men had been eliminated, made to space-swim without a suit, for less than that. He jabbed an angry finger at the captain. “You’re going to kill this boy because he hasn’t got his pips yet but I have? You’re not the one that’s got to explain things to his mother; *I* am. I won’t have it!”

“Mr. Mbongo,” the captain said calmly, “I’ve made my decision. Peter, suit up and prepare to make the repair.”

Dak pounded the table again, sending him up toward the ceiling; he stopped himself with his other arm and let loose a loud curse, pushing himself back down the floor and poising on his toes, as if ready to launch himself at the captain. “That’s *my* apprentice! *I*’m the chief engineer in this ship, you dirty old bastard!”

The captain lost his cool, and he shot himself directly up to the engineer’s face, dishing out as good as he got.

“And *I* am commander! *By law!* My word is law in this boat, and I will *not* tolerate mutiny!” He turned and pointed at Peter. “Boy, get in your p-suit and get ready to walk!” Peter swallowed again, as pale as ever, and pushed himself off the floor and out of the bridge. The captain turned back to Dak. “And if you *ever* question my orders again, we’ll see how well that mouth flaps in vacuum!”

Half expecting Dak to mouth off again, Ringman and I both readied ourselves; if the captain ordered Dak’s elimination, Ringman and I would be expected to execute the order, and we wanted to be ready. Dak was a big man, and strong; he’d be bound to put up a fight.

But Dak subsided, suddenly looking very old and weary. “Yes, sir,” he said. “Please accept my apology.” The captain’s eyes still glared at Dak, but after a moment he nodded his head.

“Your protest will be noted in the log,” he said, and Dak shook his head.

“That’s not necessary, Captain. This is the only way; I can see that.” The captain took a deep breath and put his hand on Dak’s shoulder.

“I understand,” he said, and he was such a master captain that I really believed he did, though he’d never had an apprentice and couldn’t possibly understand the relationship of a master with one. Your apprentice becomes your child, often even closer than your child. You work with him day and night for at least four years, and sometimes as many as seven. You watch him grow up, become a man; you train him in life as well as your trade. When he becomes his own master and goes off on his own, grown men have been known to weep. And here, after only a year of apprenticeship, Dak was losing his boy. Anybody would fight it. I’m shocked that he calmed down as quickly as he did.

“Please, Mr. Mbongo,” the captain said, “get the boy ready. As you say, he’s awfully young for this necessity.” Dak nodded, saluted, and pushed himself off out of the room. One could easily tell that he was trying mightily to blink back his tears.

We were all quite silent for a moment; finally the captain turned and looked at me. “I’ll note your volunteering in the

log, Mr. Riche.” I shook my head.

“That’s not necessary, sir.” But he nodded.

“It is,” he replied. “Your courage may have been impulsive, but courage it was. It will be noted.”

“Thank you, sir.”

He glanced over at Ringman, who looked back at him silently. Finally he raised his hand and said, “Return to your task, gentlemen.” With that, he pushed off and left the bridge.

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About twenty minutes later the captain’s voice came over the intercom. “Mr. Riche, report immediately to the engineering room.” I cursed softly; I was in the middle of a particularly hairy config file and hated to leave it unfinished. Ringman waved me out, totally absorbed in his own work, and I pushed off and headed aft to the engineering room, which was directly on our side of the shield from the reactor.

I’d been in there before, of course, but when the power had gone out our controls over the jets had also gone, which meant that the jets had, in accordance with their hardware fail-safes, cut out. It was normally just a light hum; ion engines aren’t loud. Still, their absence seemed deafening as I floated down the ladder to the aftmost livable part of the ship.

Peter was suited up but for his helmet, and Dak was urgently explaining something to him in quiet tones. The captain gestured me over to him, and I swam over and pushed myself down to the floor off the ceiling, floating level with him in front of a few lockers.

“Mr. Mbongo will remain here, guiding the repairs over video,” he told me. “But we want Peter in and out of the reactor chamber as quickly as possible.”

*“Why? He’ll be dead after half an hour; being more dead sure wouldn’t hurt him. In fact, being less dead would hurt him; it would just take him longer to die.”* But I nodded. “Yes, sir.”

“That’s where you come in. How long’s it been since you’ve walked?” I thought back; it had been quite a while. Engineers in port did spacewalks regularly; computermen, not so much.

“Two or three years, sir,” I replied. “Other than refresher courses at LI.” The captain nodded.

“Good enough; suit up. You’ll need to open the hatch for Peter and shut it behind him; make sure you stay behind the hatch to limit your exposure as much as possible. You’ll wait on the hull for him to complete his work, then open it up to let him out.” There was no direct access to the reactor chamber in-boat, of course; the only way in was through a hatch outside, on the hull. There was no way to open the hatch from the inside, lest some highly radioactive person inside decide to dose whatever happened to be around at the time.

The captain stopped, then started again, slowly. “It’s quite likely that he won’t be moving particularly well by that time. If necessary, it’ll be your job to fish him out of the chamber. Are you prepared for that?” I gulped; only a few minutes shouldn’t kill me. At least not right away. I nodded.

“Yes, sir.”

The captain snatched a black jumpsuit floating nearby and handed it to me. “Strip down and put this on, under your suit,” he told me. “It’s lead-fiber. It should protect you well enough for the brief exposure that would be necessary.” I took it and started looking for a tag with one hand while I unbuttoned my uniform jacket with the other.

“Yes, sir.”

The captain patted my shoulder. “Good work again, Mr. Riche. Your bravery will again be noted in the log.” And he floated away.

I wasn’t particularly eager about getting dosed, obviously. Peter was a great guy, and played a decent hand at poker; I’d gotten to like him pretty well over the weeks I’d been on the *Pioneer*. But that reactor was *hot*, and Peter would already be a walking corpse by the time he came out. So I wanted to see the tag, to see how well this jumpsuit would protect me.

I found the tag. *Rated to 10Sv/min*, it told me. I did some mental calculation; I’m not a doctor, but I decided that the thirty seconds it would take me to pull Peter out of the chamber would be acceptable, if the suit performed to spec. A little dosage doesn’t really hurt, after all, I told myself. And Dak would sure appreciate it, even if Peter wouldn’t care much by then.

I suited up, and was just finishing fastening the seals on my p-suit when Dak turned and spoke. “We’re ready, Captain,” he said, and the captain turned to me.

“Mr. Riche?” I snapped up the last seal and picked up my helmet.

“Ready, sir.” The captain nodded, then went over to Peter and spoke briefly to him, in quiet tones; I pretended not to listen, and won’t report what I heard here. Peter, still ghostly white but appearing resolved, held out his hand to Dak, like an old reactor-hand.

“Thank you, Dak,” he said. “For everything.”

I thought the big engineer would start bawling then and there. But he took Peter’s hand and shook it hard, saying quietly, “You’re a better man than I am, boy. Godspeed.” Peter smiled nervously.

“First you fry,” he said, and Dak laughed shortly and looked at the floor. Clearly this was some engineers’ incantation that I wasn’t familiar with, calling for Dak’s response. But Dak didn’t seem able to do it; he started a couple of times, but the words stopped in his throat, like a cough. Finally he managed to choke it out, and then I did see a tear run down his cheek. Just one, but a tear it was.

“Then you die,” he said, and he took Peter’s helmet and put it over Peter’s head, lining it up with the threads and tightening it, then fastening the seals. I did the same with my own and headed for the airlock, holding it open for Peter. He went through; I followed him and slammed it shut behind us. We could hear the vacuums begin to cycle clear.

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I’d never liked walking. Space travel is great; free-fall never bothered me much; but space-walking always gave me the

willies. If you've never done it, try to imagine: you're staring into space, totally empty for as close to infinity as is possible in a finite world, protected by nothing but a thin layer of fabric and metal surrounding a little pocket of air and your own soft, fragile skin. You can't walk without being in free-fall, so you've got no weight; while the magnets on your boots hold you firmly to the hull, you still feel like you're going to go flying off into the great nothingness at any moment. And space? It's *scary*. The guilds have a lot of their own lingo, but one piece of jargon that's common across all breeds of spacemen is "the black," our word for the Great Empty. The black of space is different from any other black. It's almost infinite emptiness, and it feels like you're going sailing off into it the entire time you're out.

We're required to do a refresher whenever we hit Earth orbit by the guild. I get through it as quickly as I can. It gives me the creeps, every time.

Still, this time I didn't think much about it. Peter and I were silent in the airlock while the vacuum cycled it out; when the green light came on, I started toward the outer hatch when Peter held out a hand and stopped me.

"I'll get it," he said. "Just follow me."

I nodded; engineers had to walk pretty frequently, and inspected the engines outside whenever a boat hit port, so he was definitely more in practice than I was. He grabbed the wheel, spun it deftly, and shoved the hatch open, revealing the horrible, endless emptiness of the black. Reaching around the edge of the hatch, he took the hook of his harness and latched it to a ring on the hull, then pushed off and sailed straight out of the hatch, as if going out into space. I wasn't worried; I'd seen engineers' space-walk bravado before. He stopped himself by grabbing his harness line and pulled himself back, deftly locking his boots to the hull. I laughed shortly and attached my own harness, much more carefully pulling myself out of the hatch and locking my boots without ever floating free of the boat.

"Damn engineers," I said shortly, and I could tell that Peter was smiling behind the gold of his viewplate. "Never can stop showing off, can you?"

"Hey," Peter replied, "space is fun. May as well enjoy it." Without another word, he walked ten feet down the hull toward the engines; I followed him, and he stopped beside the wheel that opened the hatch to the reactor chamber.

It was another airlock, of course, but the controls were only accessible on the inside; remote depressurization was not possible. The chamber was already depressurized from the impact, though, so he wouldn't have to wait for it to cycle. That would buy him a few extra minutes inside the chamber.

I followed behind Peter and bent down, laying my hands on the wheel and spinning it hard. It stuck, then spun freely, and when it was done I pulled the hatch open. I then looked up. "All right, Pete," I said, trying vainly to swallow the lump in my throat. "All ready." I was careful to stay behind the hatch; you could feel the heat coming from the chamber, even

if only slightly, and I didn't want any more dose than I needed.

Peter was standing behind the hatch, also, looking straight out into the black. "Pretty, aren't they?" he said. His voice sounded tinny over the radio, but still somehow firm; gone was the stuttering youth who had initially volunteered to commit suicide. I looked out briefly, then felt queasy and turned back to the deck.

"I suppose," I said. "It's just the black." I suppose he probably nodded in his helmet; it was impossible to see, of course. But then he turned around and walked around the hatch, latching his foot to the wall inside the airlock so as to allow him to sit on the edge. He held out his hand.

"It's been good knowing you, Johnny." I nodded and shook it; it already felt like I was saying farewell to the dead.

"You, too, Pete," I replied. Peter took a deep breath.

"Here goes." And down he went. I swung the door shut and spun the wheel, locking it firmly, then switched radio circuits with my chin control.

"He's inside, Captain."

"Good," the captain replied. "Stand ready to retrieve."

My boots were locked firmly to the deck; in free-fall, sitting's no better than standing. So I switched to the main circuit and stood there, like a statue, waiting to hear that Peter was ready to come out.

He finished the job. He also died before he got out of the hatch.

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We sent Peter on his Final Orbit when we hit Titan Station. We'd radioed ahead for a lead coffin, which was ready and waiting for us there. It was a tough moment; the Captain stood strong and captainly and said a few words praising Peter's bravery, and Dak got teary-eyed and pounded the bulkheads before we sent Peter on his way.

This was traditionally done out-ship, standing on the hull; Dak stood there and watched the coffin as it rapidly proceeded out of sight, taking up its orbit around the great, yellowish bulk of Saturn and joining up with those enormous rings as if it were a part of them. The rest of us left when the coffin was out of sight; most spacemen are like me, and don't like staring out into the black if they can help it, no matter how pretty Saturn is. But Dak stood out there until his air tank ran out, and even then I was starting to think we'd have to go out and get him.

He unsuited and kicked around the bridge for a few minutes. It was my watch at the computer, so I pretended to be busy and tried not to notice Dak's obvious discomfort. Finally he pushed himself over to me, clearly gearing up for a question he was pretty sure he shouldn't ask. I knew what it was, and I was ready not to answer it; I'd been in the war at Tycho Under during my apprenticeship, and had seen this happen before. Everybody always wants to know; but nobody can ever find out.

"Uh, Johnny," he said, and his using my familiar name confirmed his intentions to me, "I have a question." I leaned

back from the keyboard and turned to him, shaking my head.

“No,” I said. “I can’t tell you. I don’t even know; we don’t calculate it.” And that was true, to a certain degree; we never calculate anyone’s Final Orbit. It’s an old tradition, out of respect for the dead; in the old days, when men were buried at sea, nobody tried to find out when they’d hit port next, and we don’t try to figure it out, either. At least not exactly; we usually had some idea, if only to avoid the coffin interfering with shipping lanes. But we certainly never told anybody.

Dak cursed and put his hand to his forehead. “You computermen,” he spat, “you’re all alike. I remember in the war, you’d send a dozen or more out at once, and never tell anybody when they’d come down. Not even their own mothers.” That’s right; we wouldn’t. I’d sent a dozen out myself once, after the fight above Port Tycho; family men, every one. And not even their children ever learned when or where they’d come down.

So I just nodded my head. “And you know why. It’s a matter of respect. You’ve got your traditions and we’ve got

ours. If I told you, I’d be dishonoring what he did. It’s *his* last orbit, not anybody else’s. Only God knows when he’ll come down, and only God ever will know.” Dak cursed again and came as close to stalking off the bridge as zero gravity would allow. I watched him go, then turned back to the monitor, trying to focus on doing something important.

But instead, my mind wandered. We don’t know *exactly* when. But given the angle we sent him off at, and the orbit we were currently in, and the velocity he’d gain as he approached the planet...

I smiled a little. Maybe we’ll meet again one day, Pete. You won’t know me, but I’ll know you. Somewhere out in the black.

They shall not grow old, as we that are left grow old; Age shall not weary them, nor the years contemn. And at the going down of the sun and in the morning, We will remember them.  
—Laurence Binyon, *For the Fallen*, 1914.

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