

Safety First

Foundation - I

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Aphrodite Station, Venus

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Michael Donovan glared out at the always-changing cloudscape visible beyond the viewport. He and Gregory Powell had been here on Aphrodite Station for two days, and they were no closer to solving the Reluctance Problem than they had been to begin with.

Behind him, Powell was in the middle of interviewing robot RTR-17.

"Arthur," said Powell, "you know perfectly well that Aphrodite Station was never in any serious danger of losing total buoyancy."

"I know no such thing," Arthur replied. "I was told that the station was not in danger of losing buoyancy. My experience during the emergency sixteen days ago demonstrated to me that there is an appreciable danger of losing buoyancy. I must evacuate all the humans from this station before that happens. Please reactivate my motor controls."

"Arthur," said Powell, "I've explained the steps that have been taken to prevent any recurrence of the accident."

"I agree," said Arthur, "that that particular type of accident has been safely guarded against. However, the fact that it was not anticipated and prevented from occurring in the first place raises the possibility that other equally unanticipated dangers may exist. Until I am assured that all possible dangers have been anticipated and prevented, I cannot allow humans to continue to work on this station. I must evacuate all the humans from this station. Please reactivate my motor controls."

Donovan wanted to start swearing at the stubborn robot, but he knew that it would only make things worse. So he waited until Powell was finished with his interview and had shut down Arthur's positronic brain. Then he swore.

When he was done, Powell said, "Mike, the creativity of your profanity never ceases to amaze me."

"I've got an endless source of inspiration here," said Donovan in frustration, indicating the dormant robot. "For Pete's sake, Greg, what's it going to take to convince these metal morons that the station's not going to crash into the surface of Venus in the next ten minutes?"

"If we figure that out," said Powell, "we'll have the Reluctance Problem licked."

It was a major embarrassment for U. S. Robots. Two years before, the Earth's Regional governments had agreed to embark on the Aphrodite Project, an ambitious attempt to terraform Venus. It would take decades of effort before Venus's greenhouse climate would change enough to allow human settlement. Dozens of "bubble buoys" were floating through the hot, dense atmosphere of Venus, each with a cargo of genetically engineered algae that fixed the gases into solid particles that drifted down to become part of the planet's soil. Eventually there would be hundreds, then thousands, of buoys floating through the atmosphere, all launched from Aphrodite Station.

Everything had been going on schedule until sixteen days before, when an explosion had rocked the station, causing a sudden loss of buoyancy that had sent it plunging several kilometers down into the atmosphere. The explosion had been caused by an unlikely series of equipment failures, and steps had indeed been taken to prevent anything like it from happening again. But the hundreds of robots that carried out most of the station's routine work had been traumatized by the event, and they had all decided that the station was too dangerous for human occupancy. Until they were shut down,

they had been intent on gently forcing the station's eighteen human occupants to board the docked space shuttle and leave.

"It's impossible," Donovan continued. "How can we prove to them that we've thought of everything that could go wrong? Nobody can think of everything that could go wrong! And if we can't get the robots to go back to work, they'll have to abandon the whole Aphrodite Project!"

"It's a pity the robots can't run the station by themselves," said Powell. "That would solve the problem quickly enough."

"If only," said Donovan ruefully. A fully roboticized station had been one of the possibilities floated by the Project director, but U. S. Robot's Director of Research, Dr. Alfred Lanning, had vetoed the idea. There would be too many complex decisions involved in running Aphrodite Station for robots to cope with it. The station required a human presence, and would for the foreseeable future.

On the other hand, staffing the station entirely with humans would cause the Project's costs to quadruple at least, and the Regional governments were unwilling to maintain such an expense. It had to be a mixed crew of humans and robots.

"I don't suppose we could replace all the current crew of robots with new ones that don't know about the accident," said Donovan.

Powell shook his head. "That would cost as much as replacing them with humans. The budget people would never go for it."

"There must be something we can do. What if they just didn't remember the accident?"

Powell thought it over, then reached forward and switched on the robot's power supply.

Arthur's photocells lit up, and he said, "I must evacuate all the humans from this station. Please reactivate my motor controls."

"Arthur," said Powell. "This is a direct order. You must erase everything from your memory between this moment and a period exactly seventeen days ago."

Arthur's photocells dimmed for a time as the specified memory traces within his positronic brain were tracked down and deleted one by one. When the photocells resumed their normal intensity, Arthur said, "There appears to be a seventeen day gap in my memory. What has happened, who are you, and why are my motor controls deactivated?"

"My name is Gregory Powell, I'm a field operative for U. S. Robots and Mechanical Men." He recited a ten-digit code number that established his bona-fides as an authorized agent of U. S. Robots, then finished, "There was an event sixteen days ago that caused a program malfunction in all the robots on Aphrodite Station. Correction of the malfunction required the deletion of the last seventeen days from your memory. As soon as we've established that the malfunction has been corrected, your motor controls will be reactivated."

"Acknowledged," said Arthur.

Powell breathed a sigh of relief. "It worked."

Donovan was not so pleased. "Do you mean we're going to have to do this to every single robot on the station? There are over three hundred of them!"

Powell shrugged. "Those are the breaks." He turned back to the robot. "Arthur, what is your primary function aboard Aphrodite Station?"

Arthur said, "My primary function is the cultivation of algae for the terraforming buoys."

"Are you currently capable of carrying out your primary function?"

?I am unable to function due to my inability to access my motor controls.?

Donovan grinned as Powell frowned in irritation. ?Once your motor controls have been reactivated, will you be capable of carrying out your primary function??

Arthur was silent for a moment before saying, ?Primary function override. First Law priority. Station logs show that an accident occurred sixteen days ago resulting in loss of buoyancy on the station. This station is unsafe for human habitation. I must evacuate all the humans from this station. Please reactivate my motor controls.?

Donovan swore again. ?Right back where we started! What happened??

Powell had one hand over his eyes. ?I bet he had to access the station logs to check on the status of the algae farms. And as soon as he found out about the accident??

??he went right back into his Reluctance Loop. Of all the rotten luck!?

Arthur began to repeat his request that his motor functions be restored, and Donovan switched him off again. He said to Powell, ?Do you suppose we could erase the accident from the station logs too??

?We can?t,? said Powell. ?They?re triple-redundant safeguarded against erasure. We?d have to completely lobotomize the station computer. The Project would be in worse shape than it is now.?

?Well then, maybe we could order him not to access the station logs.?

Powell shook his head. ?He has to access them to carry out his primary function. If we don?t let him, he can?t do his job, and he?ll

go into a Second Law fugue.?

Donovan brooded at the deactivated robot for a time, then said, ?If we can?t bring Mohammed to the mountain, maybe we can bring the mountain to Mohammed.?

Puzzled, Powell said, ?What?s that supposed to mean??

?It means I?m going to try a long shot,? said Donovan. He reached forward and switched on the power supply.

Arthur?s photocells lit up, and he said, ?I must evacuate all the humans from this station. Please reactivate my motor controls.?

?Arthur,? said Donovan, ?just what would it take to convince you that the station was safe??

?I would need proof that every possible source of danger had been guarded against.?

?All of which basically involve exposure to the Venusian environment,? said Donovan. ?Right??

The robot remained silent while it evaluated Donovan?s proposition. ?There are certain dangers of a physical nature,? the robot said slowly, ?such as injuries sustained due to errors in judgment.?

?But those kinds of dangers aren?t unique to the station,? Donovan pointed out. ?Humans are prone to such dangers everywhere.?

Arthur?s photocells flickered for a moment before he said, ?True. Very well, I concede your point. Exposure to the Venusian environment is the chief danger posed to humans on this station. This still requires that they be evacuated.?

?So you think,? said Donovan, ?that the way to deal with the situation is to remove the humans from the threatening environment.?

?That seems to be the most straightforward way to proceed,? said Arthur.

?Wouldn?t it be even more straightforward to remove the threatening environment from the humans??

Arthur was silent for another time before he said, ?How would that be more straightforward??

?Well,? said Donovan, ?there?s always a certain amount of risk involved when transporting humans.?

?Yyyes,? said the robot slowly.

?So if a solution were to present itself that would involve not transporting humans, that would be preferable, right??

?Yyyyyyes,? the robot said again, even more slowly.

?So it would actually be safer for the humans to remain here while the Venusian environment was made less dangerous. Right?? Powell, standing behind Donovan, saw him cross his fingers behind his back.

There was a long, long pause while the robot considered Donovan?s argument. When the robot finally said, ?There seems to be a certain logic to your position,? Donovan felt himself sag with relief. ? It would indeed be safer for the humans to remain here while the Venusian environment was made less dangerous. I must resume my work culturing algae for the buoys. Please reactivate my motor controls.?

By the next morning, all the station?s robots had been convinced of the need to continue their work terraforming Venus. Powell and Donovan had been showered with accolades by the station staff. The Station Manager, Irina Zebutinska, met them in the shuttle bay as they prepared to leave. ?Once again,? she said, ?I?d like to thank you both for putting the Project back on track.?

Powell gave her a reassuring nod. "All in a day's work, ma'am." A glance to his left showed him Donovan rolling his eyes. He'd be hearing about that one for months.

The two were about to board their shuttle when they found it blocked by one of the station's robots, an SPD model. "Sirs," the robot said, "it would be safer for the two of you to remain on the station."

Powell glared at Donovan. The other man shrugged and said, "Hey, I did my part by convincing them to let us stay. It's your turn to convince them to let us go."

THE END